

DIPTERA FROM NEPAL

---

CRYPTOCHAETIDAE, DIASTATIDAE  
& DROSOPHILIDAE

BY

T. OKADA

Dept. of Biology, Faculty of Science  
Tokyo Metropolitan University

BULLETIN OF  
THE BRITISH MUSEUM (NATURAL HISTORY)  
ENTOMOLOGY Supplement 6  
LONDON: 1966

THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY), *instituted in 1949, is issued in five series corresponding to the Departments of the Museum, and an Historical series.*

*Parts will appear at irregular intervals as they become ready. Volumes will contain about three or four hundred pages, and will not necessarily be completed within one calendar year.*

*In 1965 a separate supplementary series of longer papers was instituted, numbered serially for each Department.*

*This paper is Supplement No. 6 of the Entomological series. The abbreviated titles of periodicals cited follow those of the World List of Scientific Periodicals.*

© Trustees of the British Museum (Natural History) 1966

TRUSTEES OF  
THE BRITISH MUSEUM (NATURAL HISTORY)

*Issued 6th May, 1966*

*Price £3*

# DIPTERA FROM NEPAL

## CRYPTOCHAETIDAE, DIASTATIDAE & DROSOPHILIDAE

By T. OKADA

### CONTENTS

	<i>Page</i>
SYNOPSIS . . . . .	3
INTRODUCTION . . . . .	4
ABBREVIATIONS USED IN THE TEXT-FIGURES . . . . .	5
ACKNOWLEDGEMENTS . . . . .	6
Family CRYPTOCHAETIDAE . . . . .	6
Family DIASTATIDAE . . . . .	8
Family DROSOPHILIDAE . . . . .	14
Subfamily STEGANINAE . . . . .	15
Subfamily DROSOPHILINAE . . . . .	37
GEOGRAPHICAL DISTRIBUTION . . . . .	112
ECOLOGICAL DISTRIBUTION . . . . .	117
NOTES ON SOME SPECIAL SYSTEMATIC CHARACTERS . . . . .	119
A. Archestinic characters . . . . .	119
B. Homeotic expression of the hooked scaly bristles . . . . .	120
C. Homology in the components of phallic organs and the systematic analysis of phallic formulae . . . . .	121
REFERENCES . . . . .	124
INDEX . . . . .	127

### SYNOPSIS

The Cryptochaetidae, Diastatidae and Drosophilidae collected by Mr. Ralph L. Coe, British Museum (Natural History), during the British Museum East Nepal Expedition, 1961-1962 amounted to twelve hundred and eighty-seven well-preserved dried flies and a puparial case. They represent seventy-six species belonging to fifteen genera, including *Lissodrosophila* gen. n. and thirty-seven new species. In addition to describing new forms, insufficiently known species have been re-described according to current taxonomy. Brief notes of the geographical and ecological distributions of the genera and species concerned are given, and some systematically important problems concerning the occurrence of "archestinic" characters in a taxon, the homeotic and compensatory expression of characters, and homology in the components of phallic organs are analysed and discussed.

## INTRODUCTION

THROUGH the recommendation of Dr. E. B. Basden, Institute of Animal Genetics, Edinburgh, the author was enabled to examine a large collection of Cryptochaetidae, Diastatidae and Drosophilidae from East Nepal, collected by Mr. R. L. Coe while a member of the British Museum East Nepal Expedition, Sept. 1961–Febr. 1962. The collection is made up of the following fifteen genera : *Cryptochaetum* (1 sp.) of Cryptochaetidae, *Diastata* (2), *Campichoeta* (1) and *Apsinota* (2) of Diastatidae, and *Stegana* (1), *Leucophenga* (16), *Microdrosophila* (6), *Lissodrosophila* (1), *Hypselothyrea* (1), *Liodrosophila* (4), *Paramycodrosophila* (1), *Chaetodrosophilella* (1), *Scaptomyza* (4), *Diathoneura* (1) and *Drosophila* (34) of Drosophilidae.

The genus *Lissodrosophila* and thirty-seven species belonging to ten genera are described as new : *Diastata* (1 sp. n.), *Apsinota* (1), *Leucophenga* (4), *Microdrosophila* (5), *Lissodrosophila* (1), *Liodrosophila* (3), *Chaetodrosophilella* (1), *Scaptomyza* (3), *Diathoneura* (1) and *Drosophila* (17).

These genera have apparently not been recorded from Nepal, apart from *Drosophila*, of which the following six species were recorded earlier by the present author (Okada, 1955) : *D. bipectinata* Duda, *D. kikkawai* Burla, *D. melanogaster* Meigen, *D. takahashii* Sturtevant, *D. nepalensis* Okada and *D. immigrans* Sturtevant. Of these, *D. bipectinata* alone is not recorded in the present collection, which has brought the number of Nepalese species of the three families involved to seventy-seven.

The drosophilid fauna of Nepal is most interesting biogeographically and ecologically, as it comprises Palaearctic and Oriental elements ranging from low, subtropical lands to the highest mountains in the world. In this respect, it closely resembles the pattern of the Japanese fauna, which is, though essentially Palaearctic, rich in Oriental elements, as for example with the mosquitoes (Edwards, 1921 : 264). In addition to describing new forms, some of the poorly-known species are re-described in the light of current taxonomic knowledge.

Some taxonomic characters are explained below.

*Width of front at its posterior margin* : measured across the ocellar triangle.

*Width of cheek* : the greatest distance from eye margin measured vertically to the tangent drawn upon eye margin.

*Wing indices* : C-index (costal index), a ratio in length of the second and the third costal sections ; 4V-index (4th vein index), a ratio in length of the distal and the proximal sections of the vein *M* (media) ; 4C-index, a ratio in length of the third costal section and the proximal section of *M* ; 5x-index, a ratio in length of the distal section of the vein *Cu* (cubitus) and the posterior crossvein ; Ac-index (acrostical index, Burla, 1956 : 193), a ratio in length of the third and fourth costal sections.

*C1-bristles* : strong bristles at the end of the first costal section.

*C3-fringe* : the portion of the third costal section bearing the strong costal fringe (Wheeler and Takada, 1964 : 168).

*Sterno-index* : a ratio in length of the anterior and the ventral (posterior, Kikkawa

and Peng, 1938) sterno-pleurals (Kikkawa and Peng, 1938 : 552).

*Mesonotum* : prescutum and scutum of the morphological mesonotum (Sturtevant, 1921 : 28).

*Abdominal tergite* : sometimes abbreviated as T, e.g., 1T means the first abdominal tergite.

The terminology of the male and female genitalia is chiefly based on Hsu (1949), Nater (1953), and Okada (1954, 1956). The *phallic formula* (p.f.) is a series of alphabetical signs indicating various characters of the phallic organs of each species according to the following rules.

- (A) Aedeagus apparently bifid, or (a) fused.
- (B) Aedeagus non-pectinated, or (b) pectinated.
- (C) Aedeagus bare, or (c) pubescent.
- (D) Anterior parameres large, or (d) minute.
- (E) Anterior parameres articulated to the aedeagus, or (e) non-articulated.
- (F) Anterior parameres with sensilla mesad to or scattered evenly on the parameres, or (f) distal, or absent (f<sub>0</sub>).
- (G) Posterior parameres (penis mantle sheath, Nater, 1953) non-contiguous, or (g) contiguous to each other to compose a "distal bow" (Fota-Pessoa, 1954), or (g<sub>0</sub>) absent.
- (H) Posterior parameres non-branched or (h) branched.
- (I) Novasternum with paired submedian spines (hyandrial bristles, Nater, 1953) on its caudal margin, or (i) without such spines.
- (K) Novasternum without or (k) with a median notch on its caudal margin.
- (L) Aedeagus vertically or (l) horizontally flattened.
- (M) Aedeagus without or (m) with a prominent basal vertical rod or ventral recurved process.
- (N) Basal apodeme of aedeagus as long as or longer than aedeagus, or (n) less than half the length of aedeagus.

A small alphabetical letter with attached dash (') indicates a feature intermediate between those of the corresponding large and small letters.

*Phallosomal index* (PI) : a ratio in length of aedeagus and its apodeme.

#### ABBREVIATIONS USED IN THE TEXT-FIGURES

- a. anterior paramere or anterior gonapophysis (phallic organs).
- d. decasternum or bridge connecting claspers (periphalllic organs).
- e. aedeagus or penis (phallic organs).
- g. genital arch or novatergum (periphalllic organs).
- h. subterminal hair (egg-guide).
- i. basal isthmus (egg-guide).
- k. clasper (periphalllic organs).
- l. lobe (egg-guide).
- n. novasternum or hypandrial plate (phallic organs).
- o. basal apodeme of aedeagus (phallic organs).
- p. posterior paramere or posterior gonapophysis (periphalllic organs).

- r. vertical rod of aedeagus (phallic organs).
- s. submedian spine of hypandrium (phallic organs).
- t. anal plate or cercus (periphallic organs).
- u. ventral recurved process of aedeagus (phallic organs).
- v. ventral fragma of novasternum (phallic organs).

The scales of the text-figures 1-327 : solid line, 0.1 mm. ; broken line, 1.0 mm.

#### ACKNOWLEDGEMENTS

The author wishes sincerely to thank Dr. E. B. Basden, Institute of Animal Genetics, Edinburgh, for recommending that this material should be offered to the author to study. His hearty thanks are due to Mr. R. L. Coe, British Museum (Natural History), for entrusting the author with this precious material and reading the manuscript, and to Mr. J. P. Doncaster, British Museum (Natural History), for sanctioning the loan of the specimens and for accepting this paper for the Museum's Bulletin.

He is much obliged to Dr. M. R. Wheeler, University of Texas, for his valuable advice on taxonomic accounts, and also Dr. F. A. Turk, Shang-ri-la, Reskadinnick, Camborne, Cornwall, and Dr. R. H. Cobben, Landourwhogeschool, Wageningen, Netherlands, for their kind help in obtaining literature. He acknowledges grants from the Japan Society of the Promotion of Science, through the courtesy of Dr. K. Dan, Tokyo Metropolitan University, and from the Japan U.S. Co-operative Science Program through the courtesy of Dr. D. Moriwaki, Tokyo Metropolitan University.

### Family CRYPTOCHAETIDAE

#### *CRYPTOCHAETUM* Rondani

*Cryptochaetum* Rondani, 1875 : 167.

Type-species : *Cryptochaetum grandicorne* Rondani, 1875 : 167 (Europe).

#### *Cryptochaetum nipponense* (Tokunaga)

(Text-figs. 1-5)

*Hippelates nipponensis* Tokunaga, 1943 : 1075 (Japan).

*Cryptochaetum nipponense* (Tokunaga) Foote and Arnaud, 1958 : 241 (Japan).

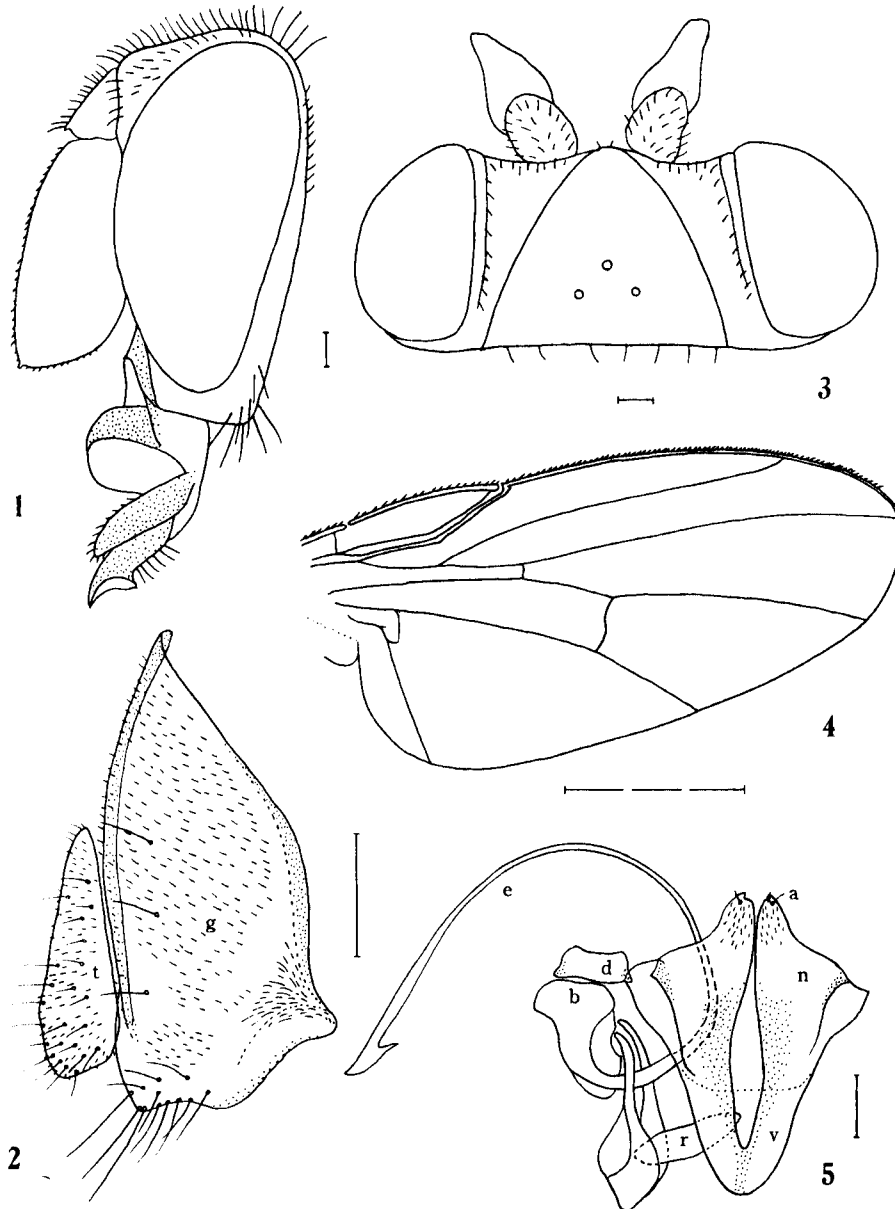
*Cryptochaetum grandicorne* Rondani ; Coquillett, 1898 : 340 (Japan) ; Kuwana, 1922 **1** : 28 ; **2** : 37 (Japan) ; Okada, 1956 : 9 (Japan). [Mis-identification.]

♂. Body about 3 mm. Front large, frontal triangle not sharply pointed anteriorly. Antennae slightly shorter than face, apically angular, ending in a minute tubercle. Fore tarsi normal, not dilated. Posterior crossvein sinuate, anterior crossvein level with the second costal break.  $R_1$  angulate at middle. *Costa* extending slightly beyond the end of  $R_{4+5}$ .

Taplejung District, damp evergreen oak forest above Sangu, c. 9,200', 2-26.xi.1961, 12 ♂ (2 ♂ hovering in front of eyes) (*R.L.C.*) ; below Sangu, by stream in shady ravine, c. 6,000', 1 ♂, 30.x.1961 (*R.L.C.*).

Distribution : Nepal (new locality), Japan.

All the features mentioned above and the detailed structures of male genitalia (Text-figs. 2, 5) fully agree with those of the Japanese form examined by the author (1956) and confirmed and re-described by Foote and Arnaud (1958).



FIGS. 1-5. *Cryptochaetum nipponense* (Tokunaga), ♂. 1, head, lateral aspect ; 2, periphallallic organs, lateral aspect ; 3, head, dorsal aspect ; 4, wing ; 5, phallic organs, ventral aspect.

Family **DIASTATIDAE**

## KEY TO GENERA

- 1 Mesopleura with bristles. Orbitals above the middle of front . . . . . 2  
 - Mesopleura bare. Orbitals at the middle of front. Arista pubescent. Anterior  
 reclinate orbitals slender. *Subcosta* short, not reaching *costa*  
**CAMPICHOETA** Macquart (p. 10)
- 2 Three orbitals present, anterior reclinate orbitals strong, posterior reclinate orbitals  
 slender. Arista with short branches. *Subcosta* short, not reaching *costa*  
**DIASTATA** Meigen (p. 8)
- Only one orbital present, strong and reclinate. Arista with long branches both  
 dorsally and ventrally. *Subcosta* complete, reaching *costa*  
**APSINOTA** van der Wulp (p. 11)

**DIASTATA** Meigen

*Diastata* Meigen, 1830 : 94.

Type-species : *Diastata vagans* Loew, 1864 : 362 (Europe).

## KEY TO SPECIES

- 1 Wing with two large transverse black bands surrounding crossveins. C-index about  
 3.2 . . . . . **ussurica** (p.8)  
 - Wing black only at its base and along posterior crossvein, fuscous along *costa*.  
 C-index about 6.0 . . . . . **basdeni** (p. 8)

**Diastata ussurica** Duda

*Diastata ussurica* Duda, 1934 : 8 (Ussuri) ; Okada, 1956 : 13 (Japan) ; Okada, 1960b : 165 (Japan).

♂. Wing patterns somewhat intermediate between those of Ussurian (Duda, 1934) and Japanese (Okada, 1956) forms, the black patch covering posterior crossvein distinctly narrowing below *M* as in the Ussurian form, but extending outside posterior crossvein as in the Japanese.

Taplejung District, below Sangu, mixed vegetation on sheltered slopes above river, c. 4,000', 3.i.1962, 1 ♂ (*R.L.C.*).

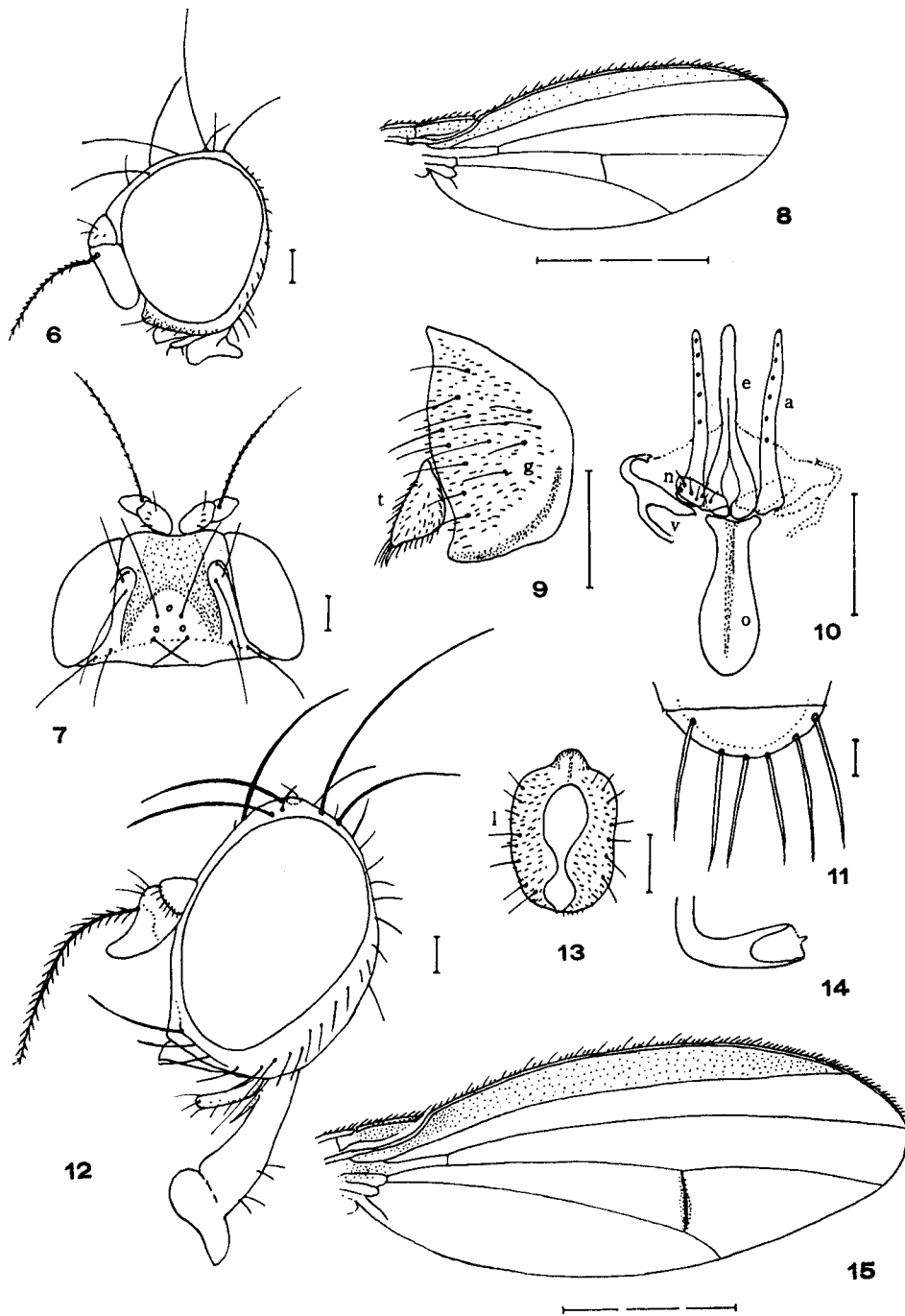
Distribution : Nepal (new locality), Japan, Ussuri.

**Diastata basdeni** sp. n.

(Text-figs. 12-15)

♀. Body about 3.5 mm., black, slender. Head much broader than thorax. Eyes dark purplish red, bare. Antennae orange-yellow ; third segment broad, slightly more than twice as long as broad, apical half fuscous, anteroventrally narrowing. Arista black, shortly plumose on both sides. Palpus slender, curved, yellow, basally brown, with about three black setae near apex below. Ocellar triangle fuscous. Periorbit fuscous, strongly curved inward anteriorly, ending before middle of front. Front pale yellow, anterior margin concave, anteriorly slightly broader than length down middle, posteriorly half as broad as head width. Face pale yellow, shining silvery white in dorsal view. Carina undeveloped, represented by a weak median ridge. Cheeks yellowish grey, about two-ninths the greatest diameter of eye. Postgena black. Clypeus reddish brown. Occiput black, concave, grey pollinose. Anterior reclinate orbital longer than





FIGS. 6-15. 6-11, *Campichoeta obscuripennis* (Meigen), ♂. 6, head, lateral aspect ; 7, head, dorsal aspect ; 8, wing ; 9, peripheral phallic organs, lateral aspect ; 10, phallic organs, ventral aspect ; 11, sixth abdominal tergite. 12-15, *Diastata basdeni* sp. n., ♀. 12, head, lateral aspect ; 13, egg-guides, ventral aspect ; 14, ventral receptacle ; 15, wing.

proclinate, before and inside proclinate ; proclinate half as long as inner vertical ; posterior reclinate minute, behind anterior reclinate ; a minute seta before anterior reclinate. Only one strong oral, second oral about one-third length of vibrissa, third as long as second.

Mesonotum, scutellum, and thoracic pleura black, bluish grey pollinose. One long humeral. Prescutellars long, somewhat divergent. Acrostichal hairs in about ten irregular rows. Anterior dorsocentrals about six-sevenths as long as posteriors ; distance between anterior and posterior dorsocentrals about four-fifths of distance between anterior pair. Anterior scutellars long, parallel ; posterior scutellars three-fifths as long as anteriors, upright and crossed. Sterno-index about 0.6. Legs yellowish brown or dark brown, femora especially dark. All metatarsi as long as next three segments together ; fore femur with a few stout but short setae inside near apex. Wing fuscous along *costa*, black at base below first costal section. Posterior crossveins narrowly clouded.  $R_{2+3}$  straight where it reaches *costa*.  $R_{4+5}$  and *M* slightly divergent distally. C-index about 6.0 ; 4V-index about 1.2 ; 4C-index about 0.3 ; 5x-index about 0.7 ; Ac-index about 1.1. C1-bristle one, long ; C3-fringe on basal two-thirds. Halteres white. Abdominal tergites black, somewhat shining blue.

Egg-guide lobes pale brown, horizontally flattened, fused to each other, setigerous and pubescent, apically narrowing and curved inward. Ventral receptacle large, dark brown, proximally narrowing and curved rectangularly, apically with a U-shaped invagination.

Holotype ♀. EAST NEPAL : Taplejung District, above Sangu, damp evergreen oak forest, c. 9,200', 2-26.xi.1961 (*R.L.C.*), BMNH.

Paratypes : 2 ♀, collected together with the holotype (*R.L.C.*), BMNH and Tokyo Metropolitan University.

Allied to *D. vagans* Loew, 1864 (Europe), in having wings basally black and anteriorly fuscous, but differs in the less distinct dark cloud on posterior crossvein and in the shape of egg-guide (distally not narrowing in *vagans*, Okada, 1960b) and ventral receptacle (apical invagination shallow triangular in *vagans*, Okada, 1960b).

### **CAMPICHOETA** Macquart

*Campichoeta* Macquart, 1833 : 547.

Type-species : *Diastata obscuripennis* Meigen, 1830 : 97 (Europe).

#### ***Campichoeta obscuripennis*** (Meigen)

(Text-figs. 6-11)

*Diastata obscuripennis* Meigen, 1830 : 97 (Europe).

*Campichoeta obscuripennis* (Meigen) Duda, 1934 : 14 (Europe).

*Campichaeta obscuripennis* (Meigen) ; Basden and Collin, 1958 : 139 (Europe).

♂. Body about 2.5 mm., matt black. Head as broad as thorax. Eyes dark red, large, bare. Antennae matt velvety black, second segment somewhat grey pollinose, third elongate and more than twice as long as broad, apically blunt. Palpus black, curved, apically rounded, with about two strong black ventral setae. Ocellar triangle matt black, grey pollinose. Peri-orbit black, grey pollinose, anteriorly rounded, about two-thirds as long as front, posteriorly narrowing. Front matt black, grey pollinose, anteriorly nearly as broad as median length, posteriorly about half as broad as the head width. Face black, marginally yellowish white. Carina flat, broad, black. Cheeks narrow, yellowish white, marginally black, about one-twelfth as broad as the greatest diameter of eye. Anterior reclinate orbital much before and inside proclinate, about one-fourth as long as posterior reclinate ; proclinate shortly before and outside posterior reclinate, about two-thirds as long as posterior reclinate. Vibrissae short, other orals fine.

Mesonotum matt black, somewhat bluish grey pollinose. Scutellum matt black, unicolorous. Thoracic pleura black, bluish grey pollinose. Only one prominent humeral. Prescutellars long. Acrostichal hairs in eight rows. Anterior dorsocentrals three-fourths length of posteriors, distance between anterior and posterior dorsocentrals slightly shorter than distance between anterior pair. Anterior scutellars divergent; posterior scutellars three-fifths length of anteriors. Sterno-index about 0.7; median sternopleural slender. Legs yellowish brown; femora darker; fore femur with a row of about ten short black stout setae anteroventrally on distal two-thirds, ventrally with a stout seta near apex. Preapicals well developed on all legs; apicals prominent on mid leg. Wings narrow, deeply fuscous especially along *costa*. *Costa* with sparse long black setae besides the usual strong fringe. C-index about 4.5; 4V-index about 1.5; 4C-index about 0.6; 5x-index about 2.7; Ac-index about 1.5. C1-bristles two, well developed; C3-fringe on basal one-fifth. Halteres yellowish white. Abdomen black, slender; caudal tergite with about three pairs of long stout black bristles.

Periphallalic organs: Genital arch black, broad, much narrowing above, with microtrichia and scattered macrotrichia, toe broad and triangular. Clasper absent. Cercus fusiform, brownish black, with thick microtrichia, which are especially long at lower apex. Phallic organs: Aedeagus orange-brown, rod-like, straight, apically curved ventrally, basally swollen laterally; apodeme thick, straight. PI about 1.3. Anterior paramere slender, straight, tapering, orange-brown, with a few sensilla in a longitudinal row on distal half. Posterior parameres fused to form a broad triangular medially pointed black lobe. Ventral fragma short. p.f.=ABCDEF gHikLMN. Hypandrial plate setigerous.

Taplejung District, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', 10.xi.1961, 1 ♂, 1 ex. (R.L.C.).

Distribution: Nepal (new locality), Europe.

The ♂ genitalia agree with those figured by Basden and Collin (1958: Text-fig. 5) for the European form.

### ***APSINOTA* van der Wulp**

*Apsinota* van der Wulp, 1887: 178.

Type-species: *Apsinota pictiventris* van der Wulp, 1887: 178 (Java).

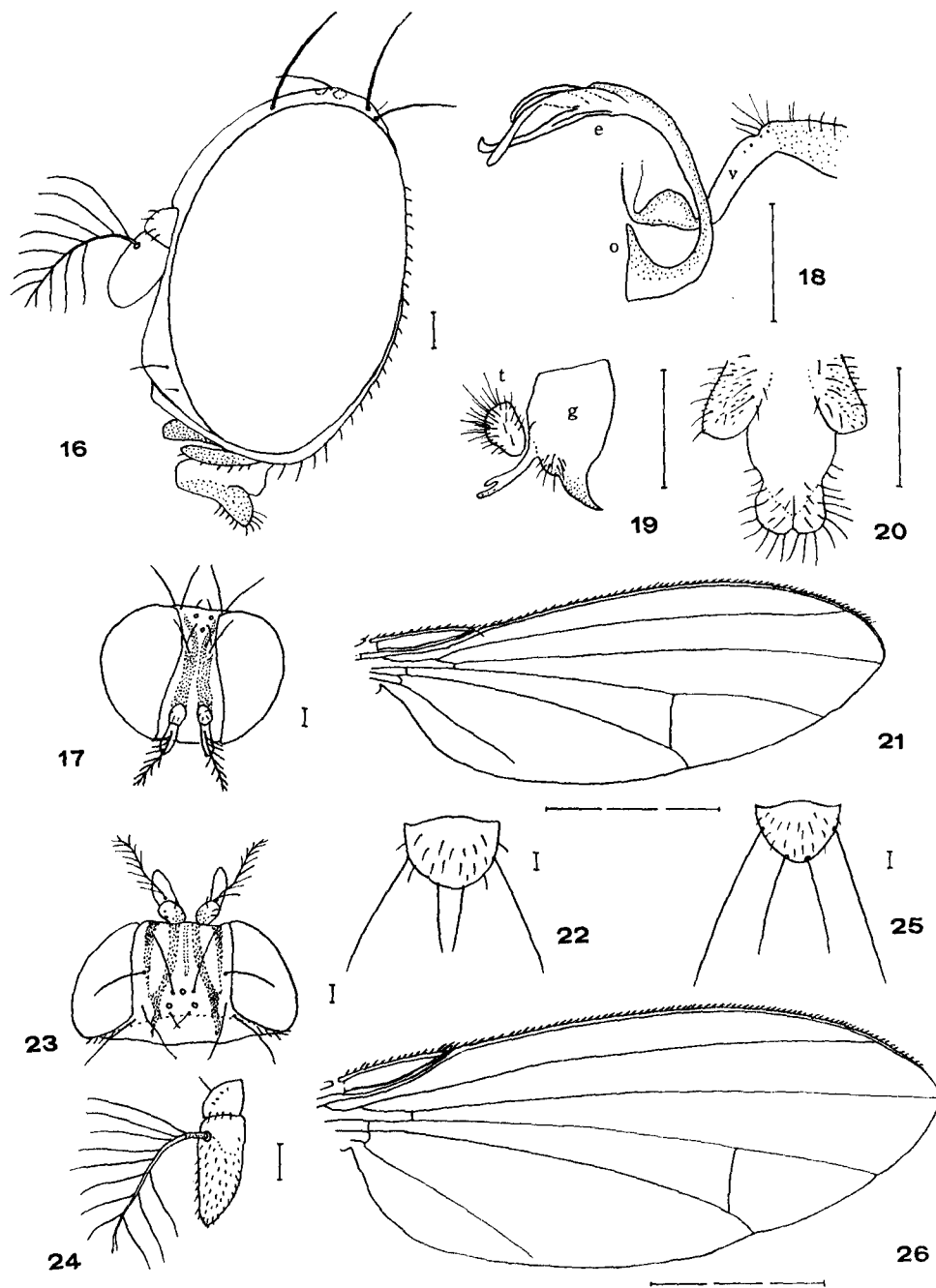
#### KEY TO SPECIES

- 1 Front with a pair of dark longitudinal stripes. Mesonotum uniformly greyish white, somewhat bluish pollinose. Acrostichal hairs in about four rows. Anterior scutellar about twice as long as the posteriors. Legs entirely yellow; mid tibia with row of long setae anteriorly . . . . . ***rufipes*** (p. 11)
- Body larger and darker. Front with two pairs of dark longitudinal stripes. Mesonotum dark greyish black, with two pairs of bluish white longitudinal stripes. Acrostichal hairs in six rows. Anterior scutellar about one and a half times the length of posteriors. Legs yellow; tarsi fuscous; mid tibia without a row of long setae anteriorly . . . . . ***pictiventris*** (p. 13)

### ***Apsinota rufipes* sp. n.**

(Text-figs. 16-22)

♂, ♀. Body about 2.7 mm., greyish white, blue pollinose. Head round, slightly broader than thorax. Eyes large, dark purplish red, bare. Antennae with second segment orange-grey, shortly setose; third elliptical, bright orange-grey, pubescent. Arista with about seven dorsal and three ventral long branches and a small terminal fork. Palpus black, elongate, with short setae below. Ocellar triangle greyish white. Periorbit short, narrow, one-third as long as front. Male front narrow; anteriorly wider, two-ninths as broad as head width, greyish white, pollin-



FIGS. 16-26. 16-22, *Apsinota rufipes* sp. n. 16, ♂ head, lateral aspect ; 17, ♂ head, dorso-anterior aspect ; 18, phallic organs, lateral aspect ; 19, peripheral organs, lateral aspect ; 20, ♀ egg-guides and cerci ; 21, ♂ wing ; 22, ♂ scutellum. 23-26, *Apsinota pictiventris* van der Wulp, ♀. 23, head, dorsal aspect ; 24, antenna ; 25, scutellum ; 26, wing.

ose, darker above ; with a pair of greyish brown submedian longitudinal stripes, which are broadened anteriorly. Female front wider than in ♂. Face greyish white, pollinose. Clypeus black. Carina low. Mouth-parts black. Occiput greyish white, pollinose. Cheek very narrow, about one-fiftieth as broad as the greatest diameter of eye. Only one long reclinate orbital bristle, situated at one-third distance from the vertex to anterior margin of front. Vibrissae small, second oral minute.

Mesonotum strongly convex, black, bluish white pollinose. Scutellum greyish white pollinose, apically rounded and slightly yellowish grey, with about twelve discal and four marginal setae besides the scutellars. Thoracic pleura with two stout mesopleurals. Two subequal humerals. Prescutellars longer than anterior dorsocentrals. Acrostichal hairs in four irregular rows. Posterior dorsocentrals about two and a half times as long as anteriors ; distance between anterior pair of dorsocentrals slightly more than twice distance between anterior and posterior pairs. Anterior scutellars divergent, long, about twice the length of scutellum ; posterior scutellars convergent, closely approximated, as long as scutellum. Only one prominent sternopleural (posteroventral), the anterior one minute. Legs yellowish grey, slender ; fore femur with a row of about ten short thick black bristles anteroventrally on distal half. Preapicals on all legs, apicals prominent on mid leg. Wings hyaline, slender, iridescent ;  $R_{2+3}$  straight ; *costa* reaching *M* ;  $R_{4+5}$  ending at wing tip ;  $R_{4+5}$  and *M* apically divergent. C-index about 5.9 ;  $4V$ -index about 0.7 ;  $4C$ -index about 0.4 ;  $5x$ -index about 0.4 ; Ac-index about 0.8.  $C1$ -bristles two,  $C3$ -fringe on basal one-third. Halteres yellowish white. Abdominal tergites black, bluish grey pollinose, slender. In ♀ each abdominal tergite with an anteromedian small longitudinal, and a lateral triangular apically broadened, dark spot.

Periphallalic organs : Genital arch black, broad, narrowing below, lower distal margin with short setae. Anal plate conical, black, hairy, separated from genital arch. Clasper (?) elongate, black, apically bifurcated, without teeth. Phallic organs : Aedeagus brown, elongate, large, C-shaped in lateral aspect, apically somewhat swollen and forked. Basal apodeme recurved and pointed at tip, short. PI about 6.0. Ventral fragma pale brown, quadrate, proximally semicircular, distally closely fused to the tip of genital arch. Anterior paramere apparently fused to the lateral arm of ventral fragma, with a few long sensilla. Posterior paramere absent. p.f.=aBCdefg<sub>0</sub>HiklMN.

Holotype ♂. EAST NEPAL : Arun Valley, below Tumlingtar, River Sabhaya, west shore, evergreen shrubs on sandy shore, c. 1,800', 9-17.xii.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype male. BMNH.

Paratypes : 4 ♂, 4 ♀, same data as holotype ; 1 ♀, Tumlingtar, bare rocky slope above River Sabhaya, west bank, c. 1,900', 8-24.xii.1961 (R.L.C.), BMNH. 1 ♂, 1 ♀, same data as holotype, deposited at the Tokyo Metropolitan University.

Resembles *A. obscuripes* de Meijere, 1911, (Java and Formosa) in wing venation, but differs from it in its pale hind tibia and tarsi and unicolorous mesonotum.

### *Apsinota pictiventris* van der Wulp

(Text-figs. 23-26)

*Apsinota pictiventris* van der Wulp, 1887 : 178 (Java) ; de Meijere, 1908 : 149 (Java) ; Duda, 1924a : 177 ; 1924b : 224 (Java) ; Duda, 1929 : 415 (Moluccas, New Guinea, Sumatra).

♀. Body about 3.7 mm. Head slightly broader than thorax. Eyes reddish brown, bare, large. Antennae with second segment reddish brown ; third thrice as long as broad, somewhat pointed apically, greyish brown, basally reddish brown. Arista with about nine dorsal and three ventral branches and a moderate terminal fork. Palpus black, slender, without long setae. Ocellar triangle greyish brown. Periorbit greyish brown, short, about one-third length of front.

Clypeus velvety black. Front anteriorly somewhat swollen above, parallel-sided, matt greyish brown, with two pairs of deep brownish black longitudinal stripes, lateral pair on anterior half of front, median pair posteriorly divergent and reaching occiput; eye margin narrowly white. Occiput black, grey pollinose. Face black, silvery grey pollinose. Carina large but low. Cheeks very narrow, white. Vibrissae fine, no succeeding orals.

Mesonotum dark greyish black, with two pairs of bluish white posteriorly narrowing longitudinal stripes, median pair occupying anterior half of mesonotum. Scutellum greyish brown, setigerous. Thoracic pleura with two long bristles and about ten minute hairs. Two long humerals, upper slightly longer. Prescutellars well developed, two-thirds length of posterior dorsocentrals. Acrostichal hairs in six rows. Anterior dorsocentrals about one-third length of posteriors, distance between anterior pair of dorsocentrals about one and a half times distance between anterior and posterior pairs. Anterior scutellars long, divergent; posteriors divergent, two-thirds length of anteriors. Only one long sternopleural. Legs yellow, tarsi and apices of femora and tibiae somewhat fuscous. Fore femur with a row of about ten black hooklets anteroventrally on distal half. Coxa greyish white. All metatarsi as long as two succeeding tarsal segments. Mid tibia without long setae anteriorly. Preapicals on all tibiae; apicals prominent on mid leg. Wing hyaline, *costa* reaching *M*; *R*<sub>2+3</sub> gently upcurved, straight where it meets *costa*. C-index about 5.0; 4V-index about 0.6; 4C-index about 0.3; 5x-index about 0.5; Ac-index about 0.9. C1-bristles two; C3-fringe on basal three-fifths. Halteres white, basally yellow. Abdominal tergites greyish black, laterally paler; 1-2T white, with yellowish grey laterally broadened anterior cross bands; 3-6T with a pair of bluish grey triangular spots on anterior borders. Cercus elongate.

Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs, bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 1 ♀ (*R.L.C.*).

Distribution: Nepal (new locality), Java, Sumatra, Moluccas, New Guinea.

Slightly different from the original form as re-described by de Meijere (1908), in having median pair of pale mesonotal stripes anteriorly almost equally distant from each other and from lateral pair (nearer to each other than to lateral pair in the original form).

## Family DROSOPHILIDAE

### KEY TO GENERA

- 1 Posterior reclinate orbital nearer to inner vertical than to proclinate. Anterior reclinate orbital nearly as long as proclinate. Discal and second basal cells usually separated (if confluent, *costa* with several thorn-like warts on the lower surface of the third section). Prescutellars present . . . . . (**STEGANINAE**) 2
- Posterior reclinate orbital nearer to proclinate than to inner vertical. Anterior reclinate orbital usually shorter than proclinate. Discal and second basal cells confluent. *Costa* without thorn-like warts on the third section. Prescutellars usually absent . . . . . (**DROSOPHILINAE**) 3
- 2 Discal and second basal cells separated. Mid tibia with a row of long stout bristles dorsally. *R*<sub>4+5</sub> and *M* strongly convergent distally. . . . . **STEGANA** (p. 15)
- Discal and second basal cells confluent. Mid tibia without a row of long stout bristles dorsally. *R*<sub>4+5</sub> and *M* not strongly convergent distally  
**LEUCOPHENGIA** (p. 17)
- 3 Face flat, without true carina. Postverticals minute. Anal vein abbreviated  
**DIATHONEURA** (p. 65)
- Face with carina . . . . . 4
- 4 Periorbit much broadened anteriorly. Anterior reclinate orbital fine. Anterior dorsocentrals situated near suture . . . . . **MICRODROSOPHILA** (p. 37)

- Periorbit not greatly broadened anteriorly. Anterior dorsocentrals situated much behind suture . . . . . 5
- 5 Front broad, glossy, and flat. Postverticals minute or absent. Anal vein and cell abbreviated . . . . . 6
- Front not exceedingly broad, nor glossy, nor flat. Postverticals usually long. Anal vein and cell usually well developed . . . . . 8
- 6 Orbitals two, both proclinate, no reclinate. Antenna exceedingly large. Fore femur without a row of anteroventral spinules . . . . . **LISSODROSOPHILA** (p. 45)
- Reclinate orbital present. Antenna normal. Fore femur with a row of anteroventral spinules . . . . . 7
- 7 Postvertical and anterior reclinate orbital absent. Only one sternopleural . . . . . **HYPSELOTHYREA** (p. 47)
- Postvertical and anterior reclinate orbital present, though minute. Two sternopleurals . . . . . **LIODROSOPHILA** (p. 48)
- 8 Postvertical minute. Anterior reclinate orbital large, as long as proclinate. Second costal section somewhat swollen at tip, with deep incision . . . . . **PARAMYCODROSOPHILA** (p. 55)
- Postverticals usually not minute. Anterior reclinate orbital shorter than proclinate. Second costal section not swollen apically, with incision shallow . . . . . 9
- 9 More than two pairs of dorsocentrals present . . . . . **CHAETODROSOPHILELLA** (p. 57)
- Dorsocentrals in two pairs . . . . . 10
- 10 Acrostichal hairs in two or four rows. Body and wing slender . . . . . **SCAPTOMYZA** (p. 58)
- Acrostichal hairs usually in six or more rows. Body and wings usually not slender . . . . . **DROSOPHILA** (p. 66)

Subfamily **STEGANINAE****STEGANA** Meigen

*Stegana* Meigen, 1830 : 79.

Type-species : *Drosophila curvipennis* Fallén, 1823 : 1 (Europe). [teste Westwood, 1843 ; according to Wheeler, 1960].

Subgenus **Steganina** Wheeler

*Steganina* Wheeler, 1960 : 110.

Type-species: *Musca coleoptrata* Scopoli, 1763 : 338 (Europe).

**Stegana (Steganina) nigrifrons** de Meijere

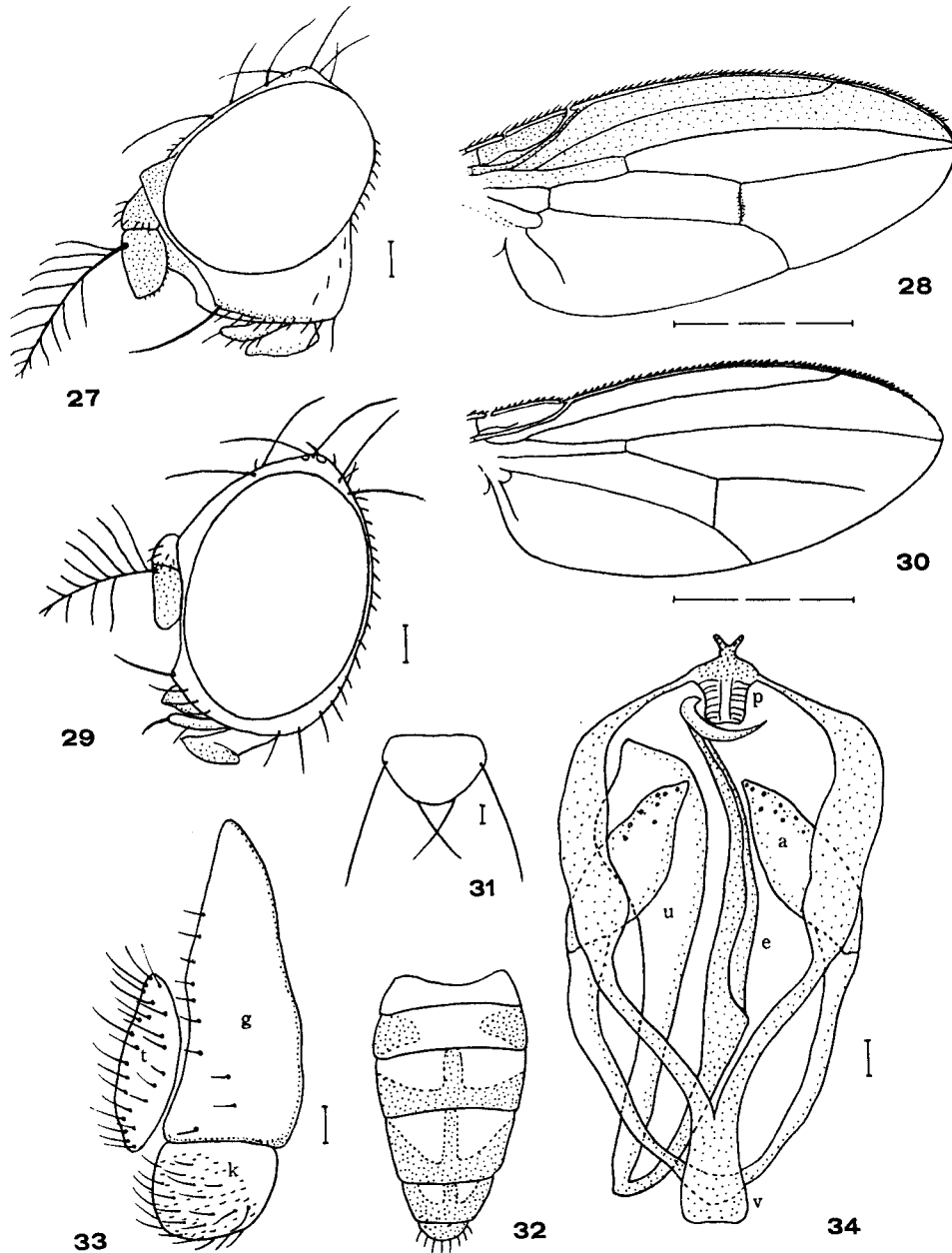
(Text-figs. 27-28)

*Stegana nigrifrons* de Meijere, 1911 : 418 (Java) ; Duda, 1923 : 37 (Formosa) ; Duda, 1924a : 182 (Java) ; Duda, 1926 : 45 (Sumatra) ; Duda, 1939 : 13 (S. Africa).

*Stegana (Steganina) nigrifrons* de Meijere ; Wheeler, 1960 : 110.

♀. Body about 2.2 mm. Head slightly narrower than thorax. Eye dark purplish red, bare. Antenna with second segment yellowish orange, anteriorly brown ; third velvety black, pubescent, anteroventral corner rectangular, posterior margin rounded, basally orange-yellow. Palpus slender, pale yellowish orange, with about three black ventral setae. Ocellar triangle black. Periorbit pale yellowish grey, half as long as front, straight, posteriorly somewhat broadened. Front deep glossy brown, concave, anterior width nearly two-thirds as broad as length down middle, posteriorly two-fifths as broad as head width. Clypeus yellowish grey. Face brownish black, lower margin broadly white. Carina short, half as long as face, high,

narrow. Cheek white, glossy, black above, about one-fourth as broad as the greatest diameter of eye. Occiput brownish black, concave. Orbitals equally distant from eye margin; anterior reclinate orbital two-thirds length of proclinate, twice as distant from posterior reclinate as from proclinate. Proclinate slightly longer than posterior reclinate. Vibrissae stout and long, succeeding orals fine.



FIGS. 27-34. 27-28, *Stegana (Steganina) nigrifrons* de Meijere, ♀. 27, head, lateral aspect; 28, wing. 29-34, *Leucophenga abbreviata* Duda, ♂. 29, head, lateral aspect; 30, wing; 31, scutellum; 32, abdominal tergites; 33, peripheral phallic organs, lateral aspect; 34, phallic organs, ventral aspect.



Mesonotum and scutellum dark brownish black, somewhat glossy. Scutellum triangular, somewhat pollinose. Thoracic pleura white, with a broad black longitudinal stripe above. One prominent humeral. Humeral callus somewhat pale. Acrostichal hairs in about ten irregular rows. Anterior dorsocentrals apparently absent. Anterior scutellars long, divergent; posteriors half as long as anteriors, much nearer to each other than to anteriors. Sterno-index about 0.8. Legs greyish white; knees dark brown; fore and hind femora brown apically, mid femur dark on distal half; mid and hind tibiae proximally dark. Front metatarsus as long as three succeeding tarsal segments together, subequal to the rest of tarsal joints in mid and hind legs. Wing brown, anteriorly darker.  $R_{2+3}$  strongly convex;  $R_{4+5}$  and  $M$  strongly convergent apically. Crossveins clouded, posterior crossvein somewhat sinuated.  $Cu$  distally curved downward. C-index about 1.8; 4V-index about 1.9; 4C-index about 1.3; 5x-index about 1.8; Ac-index about 20.0. C1-bristle one, short; C3-fringe on basal five-sixths. Abdominal tergites dark brownish black, darker than mesonotum.

Taplejung District, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961, 1♀ (R.L.C.).

Distribution: Nepal (new locality), Java, Sumatra, Formosa, S. Africa.

### LEUCOPHENGA Mik

*Leucophenga* Mik, 1886: 317.

Type-species: *Drosophila maculata* Dufour, 1839: 50 (Europe).

In homologizing components of the phallic organs of this genus, the author (1956) made some wrong interpretations, which are now amended. The main part of aedeagus (misidentified as the main part of posterior paramere) is elongate, usually partially bifurcated longitudinally, and distally with a hooked piece, which is contiguous with the posterior parameres, and proximally with a stout ventral recurved process (u, misidentified as the main part of aedeagus) (cf. pp. 121-122).

#### KEY TO SPECIES

1	$M$ distally abbreviated, not reaching wing margin . . . . .	<i>abbreviata</i> (p. 18)
-	$M$ distally not abbreviated, reaching wing margin . . . . .	2
2	Wing with more or less distinct dark markings . . . . .	3
-	Wing clear, without distinct dark markings . . . . .	6
3	Wing markings distinctly demarcated . . . . .	4
-	Wing markings diffuse . . . . .	5
4	Wing markings along <i>costa</i> and interrupted near middle . . . . .	<i>interrupta</i> (p. 21)
-	Wing markings along <i>costa</i> and on the crossveins . . . . .	<i>ornata</i> (p. 21)
5	Wing markings along <i>costa</i> and below $R_1$ . . . . .	<i>costata</i> (p. 19)
-	Wing markings only below $R_1$ . . . . .	<i>subpollinosa</i> (p. 21)
6	Third abdominal tergite very short . . . . .	7
-	Third abdominal tergite normal . . . . .	8
7	Scutellum laterally black, apically white . . . . .	<i>leucozona</i> (♂) (p. 21)
-	Scutellum dark brown, unicolorous . . . . .	<i>albifascia</i> (♂) (p. 22)
8	Halteres with black knob . . . . .	9
-	Halteres yellow or white . . . . .	11
9	Mesonotum and scutellum white, silver pollinose . . . . .	<i>argentata</i> (p. 24)
-	Mesonotum yellowish brown, scutellum dark brownish black and apically white . . . . .	10
10	Thoracic pleura without black patches . . . . .	<i>halteropunctata</i> (p. 25)
-	Thoracic pleura with black longitudinal stripe . . . . .	<i>leucozona</i> (♀) (p. 21)
11	Thoracic pleura yellow, without dark patches or stripes . . . . .	12

-	Thoracic pleura dark brownish black or with dark longitudinal stripes . . . . .	16
12	Palpus black or dark brown . . . . .	13
-	Palpus yellow or orange-yellow or at least apically yellow . . . . .	15
13	Scutellum laterally black, apically pale yellow . . . . .	<i>salatigae</i> (p. 27)
-	Scutellum yellowish grey, basally somewhat fuscous . . . . .	14
14	Palpus slender, with long setae . . . . .	<i>nigripalpis</i> (p. 28)
-	Palpus large, without setae . . . . .	<i>guttiventris</i> (p. 30)
15	Palpus apically black. Abdominal tergites banded, not spotted . . . . .	<i>nigriceps</i> (p. 31)
-	Palpus pale yellowish white. Abdominal tergites spotted . . . . .	<i>rectinervis</i> (p. 33)
16	Palpus pale brown. Abdominal tergites mostly black, 1T yellow . . . . .	<i>nigroscutellata</i> (p. 34)
-	Palpus pale yellow. Abdominal tergites spotted . . . . .	<i>albiceps</i> (p. 36)

### *Leucophenga abbreviata* (de Meijere)

(Text-figs. 29-34)

*Drosophila abbreviata* de Meijere, 1911 : 400 (Java).

*Drosomyiella abbreviata* (de Meijere) Hendel, 1914 : 114 (Java, Formosa).

*Leucophenga abbreviata* (de Meijere) Duda, 1924a : 185 (Java).

♂, ♀. Body about 2.2-3.0 mm. Head as broad as thorax. Eyes dark red, bare ; ocelli bright red. Antennae with second segment yellowish brown ; third greyish brown, oblong, apically rounded. Arista with about seven dorsal and three ventral branches and a small terminal fork. Palpus yellowish orange, slender, with only one prominent apical seta, ventrally with a long fine hair. Ocellar triangle black, pollinose. Periorbit greyish brown, short, medially constricted. Front somewhat glossy dirty yellow, darker in caudal aspect, parallel-sided, anterior width three-fourths as broad as length down middle, posteriorly two-fifths as broad as head width. Clypeus pale yellowish orange, somewhat protruded. Face yellowish grey, ventral margin somewhat convex. Postverticals small. Cheeks narrow, about one-thirteenth as broad as the greatest diameter of eye. Occiput dark brown, pale above. Posterior reclinate orbital slightly longer than others ; anterior reclinate thrice as distant from posterior reclinate as from proclinate. Second oral fine, half as long as vibrissa, succeeding orals shorter.

Mesonotum yellowish brown, matt without prominent patches. Scutellum yellowish brown, grey pollinose, tip whitish. Thoracic pleura pale yellowish white, unicolorous. Humerals two, strong, upper the longer. Prescutellar longer than anterior dorsocentral, almost equally distant from each other and from dorsocentral. Acrostichal hairs in about ten irregular rows. Anterior dorsocentrals about one-third as long as posteriors ; distance between anterior and posterior dorsocentrals about one-fourth distance between anterior pair. Anterior scutellars divergent, long, one and a half times as long as posteriors, which are nearer to each other than to anteriors. Sterno-index about 0.5. Legs yellowish white ; last tarsal segment orange ; front metatarsi subequal to the remaining segments together, mid metatarsi twice next two segments together, and hind metatarsi subequal to next three segments together. Preapicals on mid and hind legs ; apicals on mid and hind legs. Knees somewhat fuscous. Wings hyaline, somewhat fuscous ; veins yellowish brown, crossveins not clouded.  $R_{2+3}$  slightly curved to *costa* at tip ;  $R_{4+5}$  slightly convex anteriorly ; *M* apically abbreviated. C-index about 2.3 ; 4V-index about 2.0 ; 4C-index about 1.3 ; 5x-index about 1.0 ; Ac-index about 1.7. C1-bristles two, C3-fringe on basal two-thirds. Halteres yellow, apically black. Abdominal tergites yellowish or reddish brown ; 2T medially and laterally with black spots ; 3-5T with caudal black bands projected forward at middle ; 6T mostly black, often with an obscure caudal band.

Periphallalic organs brownish black. Genital arch narrow above, truncate below, without microtrichia, posterior margin with several long setae ; toe somewhat projected posteriorly ; heel low, rectangular. Anal plate vertically elongate, fusiform, setigerous. Clasper nearly quadrate, pubescent, and setigerous. Phallic organs : Aedeagus black, basally pale, elongate, bifurcated on distal half, basally with a distally broadening apically pointed pale yellowish

brown recurved process ; hooked piece yellowish orange. Anterior paramere fusiform, with long stalk, subapically with several sensilla. Ventral fragma anteriorly pointed, lateromedially somewhat swollen.  $PI = \infty$ . p.f. = ABCDeFgHikLmN.

Taplejung District, Sangu mixed vegetation by stream in gully, c. 6,200', 9.xi.1961, 3 ♀ ; below Sangu, by stream in shady ravine, c. 6,000', 30.x.1961, 1 ♂ ; Arun Valley : east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 24 ♂, 26 ♀ (R.L.C.).

Distribution : Nepal (new locality), Java, Formosa.

### *Leucophenga costata* sp. n.

(Text-figs. 35-37)

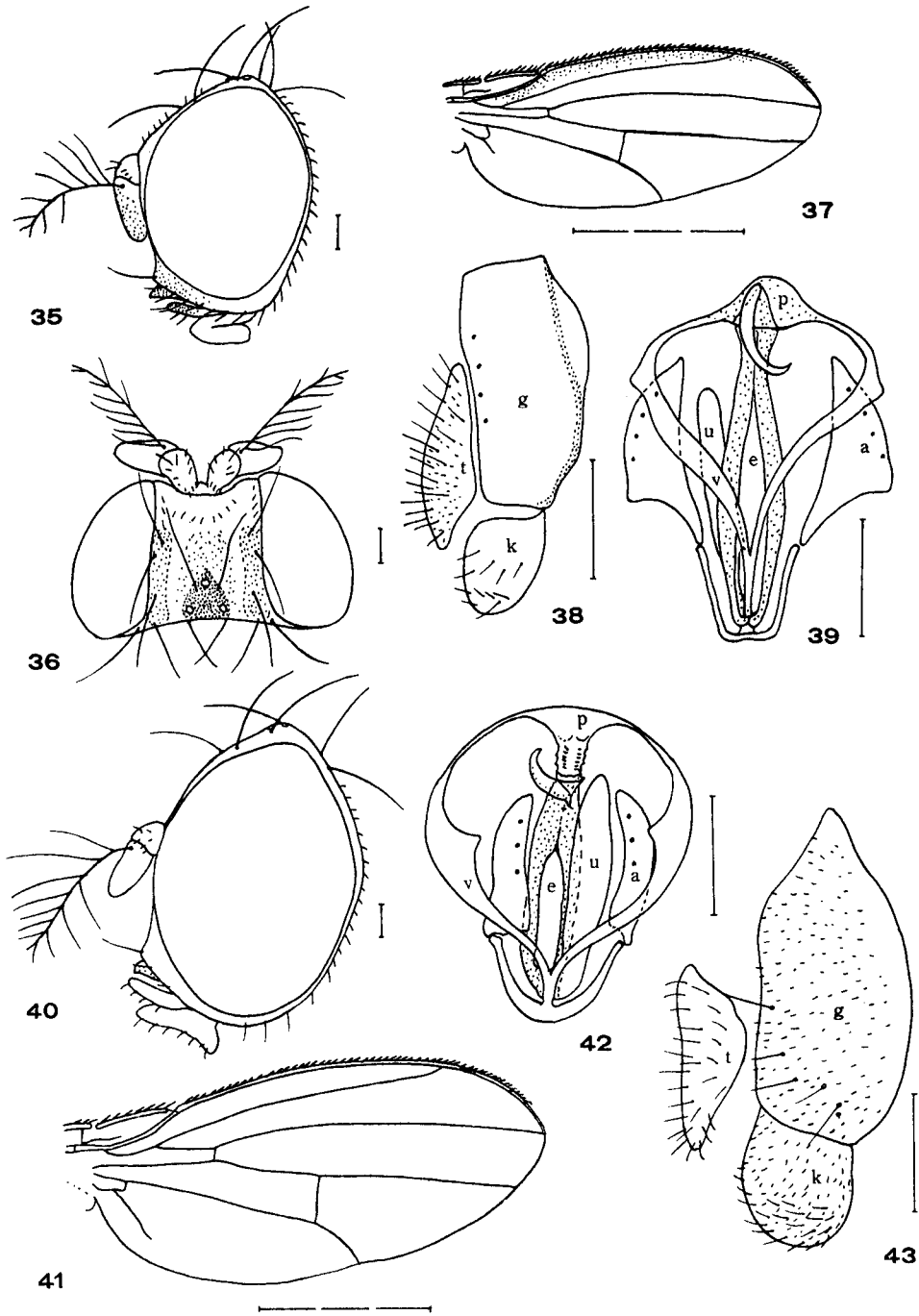
♀. Body about 2.3 mm. Head as broad as thorax. Eyes dark red, bare. Antennae with second segment yellowish grey ; third grey, basally white, apically dark orange. Palpus comparatively large, yellowish brown, apically rounded, with a subapical and a ventral black setae. Ocellar triangle black, grey pollinose. Periorbit black, grey pollinose, broad, two-thirds as long as front. Front yellowish grey, somewhat glossy, whitish and anterior width about seven-eighths as broad as length down middle, posteriorly one-third as broad as head width. Clypeus yellowish grey. Face greyish white, matt, concave. Carina low. Cheeks white, narrow, about one-twelfth as broad as the greatest diameter of eye. Occiput dark brown. Posterior reclinate orbital slightly longer than others ; anterior reclinate thrice as far from posteriors as from proclinate. One prominent oral ; second fine, one-third length of vibrissa. Postvertical rather long.

Mesonotum dark yellowish brown, black behind, grey pollinose ; humeral callus grey pollinose, dorsally bordered by a somewhat fuscous patch. Scutellum dark brownish black, grey pollinose. Thoracic pleura dark yellowish orange, with two black broad longitudinal stripes, upper one extending to postnotum ; lower short, limited to sternepisternum. One long humeral, a few shorter below it. Prescutellar longer than anterior dorsocentral. Acrostichal hairs in about eight irregular rows. Anterior dorsocentrals one-third length of posteriors ; distance between anterior and posterior dorsocentrals about one-third distance between anterior pair. Anterior scutellars divergent, longer than posteriors ; posterior scutellars four-fifths as long as anteriors, nearer to each other than to anteriors. Sterno-index about 0.7. Legs yellowish white, knees of mid and hind legs black ; all metatarsi much longer than remaining tarsal segments together. Wings hyaline, fuscous on and below *costa* ; *costa* reaching  $R_{4+5}$ . Crossveins clear.  $R_{2+3}$  weakly curved to *costa* at apex ;  $R_{4+5}$  and *M* nearly parallel. C-index about 1.9 ; 4V-index about 2.4 ; 4C-index about 1.4 ; 5x-index about 1.5 ; Ac-index about 2.0. C1-bristles two, subequal ; C3-fringe on basal five-sevenths. Halteres yellowish white. Abdominal tergites glossy black ; 2T posteriorly silvery white pollinose, ultimate T white, 3-5T latero-anteriorly with white patches.

Holotype ♀. EAST NEPAL : Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961 (R.L.C.), BMNH.

Paratypes : 2 ♀, same data as holotype ; 1 ♀, Taplejung District, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', 10.xi.1961. (R.L.C.), BMNH and at Tokyo Metropolitan University (1 ♀ from Arun Valley).

Similar to *L. nigroscutellata* Duda, 1924, (Formosa) in having black palpus, striped thoracic pleura, yellow halteres, black *costa*, and clear crossveins, but differs in having entirely black scutellum (apically yellow in *nigroscutellata*) and palpus with only a moderately strong apical seta.



FIGS. 35-43. 35-37, *Leucophenga costata* sp. n., ♂. 35, head, lateral aspect ; 36, head, dorsal aspect ; 37, wing. 38-39, *Leucophenga subpollinosa* de Meijere, ♂. 38, periphallic organs, lateral aspect ; 39, phallic organs, ventral aspect. 40-43, *Leucophenga leucozona* Duda, ♂. 40, head, lateral aspect ; 41, wing ; 42, phallic organs, ventral aspect ; 43, periphallic organs, lateral aspect.

***Leucophenga subpollinosa* de Meijere**

(Text-figs. 38-39)

*Leucophenga subpollinosa* de Meijere, 1914 : 263 (Java) ; Duda, 1923 : 27 (Formosa) ; Duda, 1924a : 186 (Java, Annam, Formosa) ; 1924b : 237 (Formosa) ; Duda, 1926 : 52 (Sumatra) ; Duda, 1939 : 42 (Africa) ; Okada, 1956 : 30 (Japan) ; Wheeler and Takada, 1964 : 229 (Palau).

Periphallic organs : Genital arch black, broadly truncate below, heel and toe rectangular. Anal plate black, elongate, fusiform. Clasper oval, setigerous tip, rounded. Decasternum laterally oblong, yellowish brown. Phallic organs : Aedeagus slender, distal half black and bifid, basally with pale brown, rod-shaped, ventral recurved process. Anterior paramere elongate, triangular, medially with a few sensilla. Ventral fragma narrow, proximal half rod-shaped. Posterior parameres triangular.  $PI = \infty$ . p.f. = ABCDeFgHikLmN.

Taplejung District, river banks below Tamrang Bridge, c. 5,500', x-xi.1961, 1 ♂ ; below Sangu, mixed vegetation on sheltered slopes above river, c. 4,000', 3.i.1962, 1 ♂ ; Dobhan, small pockets of plants on arid slopes above River Maewa, c. 3,500', 2.i.1962, 12 ♂, 15 ♀ ; ibid., shady places on shrubby slope above River Tamur, c. 3,500', 21-27.i.1962, 9 ♂, 9 ♀ ; Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 1 ♂, 10 ♀ (R.L.C.).

Distribution : Nepal (new locality), Java, Sumatra, Viet-Nam, Formosa, Japan, Africa, Micronesia.

Slightly different from the Japanese form (Okada, 1956) in ♂ genital organs ; clasper apically rounded (pointed and clawed in Japanese form).

***Leucophenga ornata* Wheeler**

*Leucophenga ornata* Wheeler, 1959 : 184 ; Okada, 1964a : 105 (Japan : Amami).

*Drosophila ornatipennis* Williston ; de Meijere, 1914 : 256 (Java).

*Leucophenga ornatipennis* (Williston) ; Duda, 1924a : 186 (Java) ; Okada, 1956 : 37 (Japan) ; Paik, 1958 : 211 (Korea).

Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 1 ♀ (R.L.C.).

Distribution : Nepal (new locality), Java, Japan, Korea.

***Leucophenga interrupta* Duda**

*Leucophenga interrupta* Duda, 1924a : 187 ; 1924b : 237 (Formosa) ; Okada, 1956 : 36 (Japan) ; Okada, 1964a : 106 (Amami : Japan).

Arun Valley : above River Sabhaya, east shore, swept from dwarf bamboos in deep ravine, c. 2,000', 12.xii.1961, 1 ♂ (R.L.C.).

Distribution : Nepal (new locality), Formosa, Japan.

***Leucophenga leucozona* Duda**

(Text-figs. 40-43, 96)

*Leucophenga leucozona* Duda, 1924a : 188 (New Guinea).

♂, ♀. Body about 2.2-2.8 mm. Head as broad as thorax. Eyes deep red, large, bare. Antennae with second segment yellow ; third grey, oblong, twice as long as broad. Arista with

five to eight dorsal and two or three ventral branches besides a small fork. Palpus yellowish orange, with short black stout setae below. Ocellar triangle black. Periorbit yellowish grey, medially narrowing, two-thirds as long as front. Front yellowish grey, parallel-sided, anterior width two-thirds or three-fourths as broad as length down middle, posteriorly two-fifths as broad as head width, medially slightly fuscous. Face greyish white, laterally concave. Carina flat. Cheeks yellow, very narrow, about one-fourteenth as broad as the greatest diameter of eye. Orbitals equal sized; anterior reclinate four times as distant from posterior reclinate as from proclinate. Only one prominent oral. Postverticals rather long.

Mesonotum deep yellowish orange, unicolorous. Scutellum deep yellowish orange, laterally black, apically yellowish white. Thoracic pleura yellow, with a black longitudinal obscurely defined stripe. Prescutellar long, as long as anterior dorsocentral. Acrostichal hairs in about ten rows. Anterior dorsocentrals two-thirds length of posteriors; distance between anterior and posterior dorsocentrals about two-sevenths distance between anterior pair. Anterior scutellars divergent, slightly longer than scutellum; posteriors slightly shorter than anteriors. Sterno-index about 0.8. Legs yellow, thick; mid and hind knees slightly fuscous. Mid metatarsi sub-equal in length to the other segments together, fore and hind metatarsi slightly longer than the other segments together. Preapicals on all legs; those on mid leg large. Wing hyaline, crossveins clear.  $R_{2+3}$  gently curved to *costa* at tip;  $R_{4+5}$  and  $M$  somewhat divergent apically. C-index about 2.2; 4V-index about 2.0; 4C-index about 1.1; 5x-index about 1.4; Ac-index about 2.0. C<sub>1</sub>-bristles two; C<sub>3</sub>-fringe on basal seven-tenths. Halteres yellow, slightly black at tip. Abdominal tergites: In ♂, 1T yellow; 2T anteriorly black, posterior half silvery white; 3T very short, silvery white, without macrotrichia; 5-6T black, dorsolaterally with small yellowish spots; anal cerci yellow. In ♀, 2T with lateral black spot; 3T not short; 3-5T black, lateroanteriorly yellow; 6T yellow; anal cercus yellow.

Periphallalic organs: Genital arch white, narrow above, broadly truncate below, heel and toe nearly rectangular, with evenly distributed microtrichia and several setae on posterior and ventral margins. Anal cercus white, small, fusiform, setigerous, anteriorly convex. Clasper white, oval, pubescent, setigerous on lower half. Phallic organs: Aedeagus black, entirely bifurcated, apically with an orange-yellow hooked piece, basally with a pale rod-shaped recurved process. Anterior paramere pale, elongate, fusiform, distally with a few sensilla. Posterior parameres triangular, orange-brown. Ventral fragma proximally pointed, laterally somewhat dilated. PI = ∞. p.f. = ABCDEFgHikLmN.

Taplejung District, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961, 1 ♂; Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 15 ♂, 5 ♀ (R.L.C.).

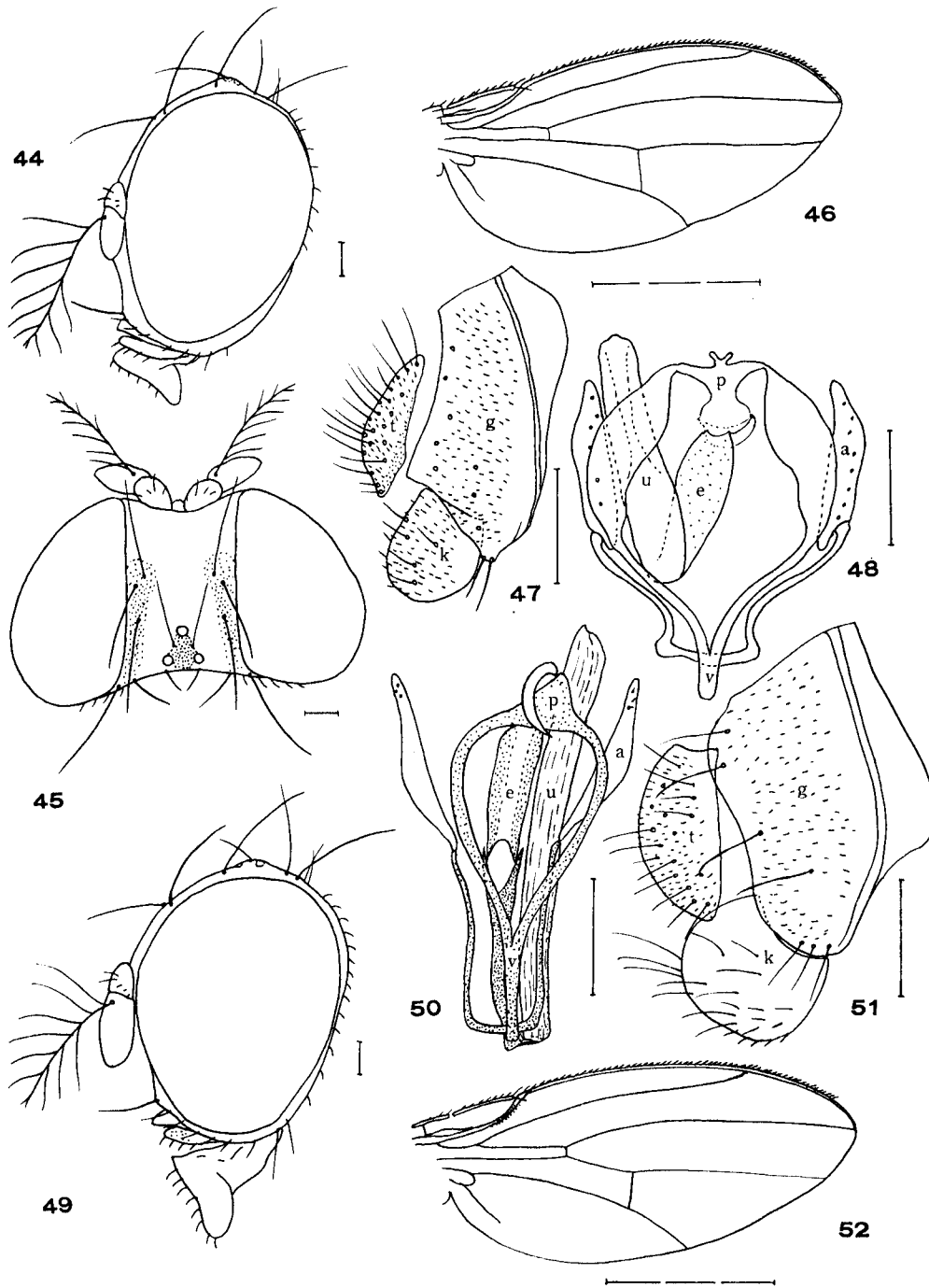
Distribution: Nepal (new locality), New Guinea.

Agrees with the original form (New Guinea, Duda, 1924a) in having yellow palpus, yellow and apically black halteres, and striped thoracic pleura, but differs in having no prominent macrotrichia on ♂ 3T.

### *Leucophenga albifascia* sp. n.

(Text-figs. 44-48, 95)

♂. Body about 2.5 mm. Head slightly broader than thorax. Eyes dark red, large, bare. Ocelli bright deep red. Antennae with second segment yellow, third grey. Arista with about six dorsal and three ventral branches and a small terminal fork. Palpus orange-yellow, slender, ventrally with a few strong black setae. Ocellar triangle black, grey pollinose. Periorbit brown, obscurely demarcated from front, anteriorly broadened, two-thirds as long as front. Front narrow, nearly parallel-sided, dark yellowish grey, anteriorly paler, anterior width as



FIGS. 44-52. 44-48, *Leucophenga albifascia* sp. n., ♂. 44, head, lateral aspect; 45, head, dorsal aspect; 46, wing; 47, peripheral organs, lateral aspect; 48, phallic organs, ventral aspect. 49-52, *Leucophenga argentata* de Meijere, ♂. 49, head, lateral aspect; 50, phallic organs, ventral aspect; 51, peripheral organs, lateral aspect; 52, wing.

broad as length down middle, posteriorly about two-sevenths as broad as the head width. Face greyish white, flat, laterally concave. Carina undeveloped. Cheeks white, very narrow, about one-twentieth as broad as the greatest diameter of eye. Occiput brownish black. Anterior reclinate orbital thrice as distant from posterior reclinate as from proclinate. Postverticals slender. Inner vertical much shorter than outer vertical. Vibrissae long, succeeding orals about one-third as long as vibrissa.

Mesonotum dark orange-brown, silver pollinose, mediocaudally and laterally more fuscous. Scutellum dark brown, grey pollinose. Thoracic pleura pale yellow, orange below, with an anteriorly narrowing dark brownish black median longitudinal stripe. Humerals two, upper longer. Prescutellar as long as anterior dorsocentral. Anterior dorsocentrals about half length of posteriors; distance between anterior and posterior dorsocentrals about two-thirds distance between anterior pair. Anterior scutellars divergent, slightly longer than posteriors, which are nearer to each other than to anteriors. Sterno-index about 0.9. Legs yellow; knees of hind leg somewhat fuscous; last tarsal segment brownish. Front and mid metatarsi slightly longer than the other segments together, hind metatarsi as long as the other segments together. Pre-apicals on mid and hind legs; apicals prominent on mid leg. Wings hyaline, crossveins clear.  $R_{2+3}$  nearly straight, gently curved to *costa* apically;  $R_{2+3}$  and *M* nearly parallel. C-index about 2.2; 4V-index about 2.1; 4C-index about 2.2; 5x-index about 1.3; Ac-index about 2.5. C1-bristles two; C3-fringe on basal two-thirds. Halteres yellow, tip glossy black. Abdominal tergites black, matt; 1T yellow; 2T medioanteriorly yellow, caudal margin narrowly white; 3T very short, white, without setae. Cerci black.

Periphallalic organs: Genital arch black, pubescent, broad; heel low, triangularly pointed, with a few stout long setae; toe nearly rectangular; caudal margin with several long setae. Anal plate rather small, fusiform, setigerous, pubescent, ventral tip pointed. Clasper oval, pubescent and setigerous, proximally somewhat narrowing, distally rounded. Decasternum a narrow transverse bar. Phallic organs: Aedeagus black, flat, oblong; ventral recurved process pale yellow, rod-shaped, parallel-sided, twice as long as aedeagus. Anterior paramere oblong, pale, with a row of several sensilla on nearly entire length. Ventral fragma appearing pointed proximally, laterally pale, fusiformly dilated. PI =  $\infty$ . p.f. = ABCDeFgHikLmN.

Holotype ♂. EAST NEPAL: Arun Valley, west shore of River Arun, below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961 (R.L.C.), BMNH.

Closely resembles *L. leucozona* Duda in having very narrow white 3T in ♂, halteres with black knob, striped thoracic pleura, and yellowish orange palpus, but differs from it in having unicolorously dark brownish black scutellum, 2T only yellow anteriorly and cercus black.

### *Leucophenga argentata* (de Meijere)

(Text-figs. 49-52, 73)

*Drosophila argentata* de Meijere: 258 (Java).

*Leucophenga argentata* (de Meijere) Duda, 1924a: 188; 1924b: 238 (Java, Formosa); Sturtevant, 1927: 364 (Philippine); Wheeler and Takada, 1964: 226 (Palau).

♂, ♀. Body about 2.5 mm. Head slightly broader than thorax. Eyes reddish brown, large, bare. Antennae milky white; third segment twice as long as broad, tip somewhat angular anteroventrally. Arista with about seven dorsal and three ventral branches and a small terminal fork. Palpus pale brown, darker in female, small, apically fuscous, ventrally with a few long black setae. Ocellar triangle black, grey pollinose. Periorbit milky white, obscurely demarcated from front. Front milky white, flat, parallel-sided, anterior width four-sevenths as



broad as length down middle, posteriorly two-sevenths as broad as head width. Clypeus greyish white, medially white. Face white, narrow. Carina undeveloped. Cheeks white, narrow, about one-twentieth as broad as head width. Occiput dark brownish black, white above. Anterior reclinate orbital four times as distant from posterior reclinate as from proclinate, which is slightly shorter than reclinates; posterior reclinate slightly nearer to proclinate than to inner vertical. Inner vertical one-third as long as outer vertical. Postverticals short, half as long as inner verticals. Only one prominent oral.

Male mesonotum white, densely silver pollinose; scutellum silver pollinose, unicolorous. Female mesonotum yellowish white; scutellum yellowish white, apically white. Thoracic pleura white, matt, unicolorous. Only one long median humeral. Prescutellar as long as anterior dorsocentral. Acrostichal hairs in about eight rows. Anterior dorsocentrals two-thirds length of posteriors; distance between anterior and posterior dorsocentrals about two-thirds distance between anterior pair. Anterior scutellars divergent, posteriors slightly nearer to each other than to anteriors. Sterno-index about 0.8. Legs white; all metatarsi subequal in length to the other segments together. Preapicals on mid and hind legs; apicals prominent on mid leg. Wings hyaline, slightly pointed at tip; crossveins clear; *costa* ending at the tip of  $R_{4+5}$ ;  $R_1$  and  $R_{2+3}$  apically black;  $R_{2+3}$  gently curved to *costa* apically;  $R_{4+5}$  and  $M$  nearly parallel. C-index about 1.8; 4V-index about 2.9; 4C-index about 1.9; 5x-index about 1.9; Ac-index about 2.4. C1-bristles two; C3-fringe on basal five-sevenths. Halteres white, knob black. Abdominal tergites yellowish white. In male, 2T laterally with a small black spot; 4-5T medially with a long black stripe, laterally with two large black spots. In female, 2T laterally with a large black spot; 3-4T with five black spots; 5T with seven black spots; 6T with two black spots.

Periphallallic organs yellowish white. Genital arch broad, gently narrowing below, pubescent, with a few setae on upper caudal margin, lower tip, and at middle; heel rectangular; toe rounded. Anal plate semicircular, setigerous and pubescent. Clasper nearly quadrate, broader than long, with long setae on caudal margin and inferior surface. Phallic organs: Aedeagus black, elongate, distal half bifurcated, basally with a pale yellowish brown elongate ventral recurved process, which is longer than aedeagus and apically slightly pointed. Anterior paramere long, narrow, slightly swollen medially, apically with a few sensilla. Posterior paramere brown, attached to a dark brown hooked piece of aedeagus. Ventral fragma black, proximally pointed. PI =  $\infty$ . p.f. = ABCDefgHikLmN.

Taplejung District, Dobhan, evergreen trees overhanging stream in deep gully, c. 3,500', 30.i.1962, 1 ♂; Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 6 ♂, 5 ♀; above River Sabhaya, east shore, swept from dwarf bamboos in deep ravine, c. 2,000', 12.xii.1961, 1 ♂ (R.L.C.).

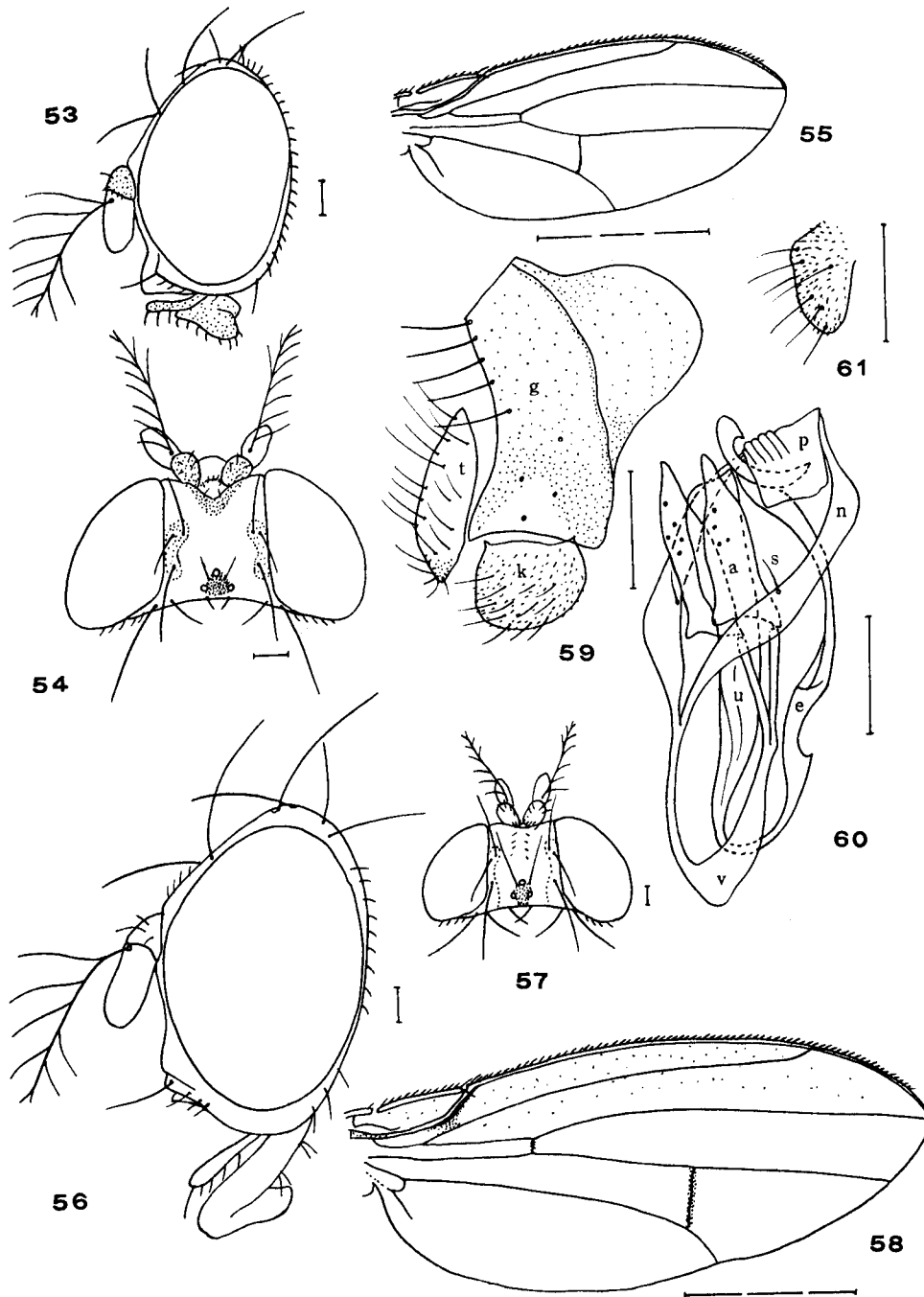
Distribution: Nepal (new locality), Java, Formosa, Philippines, Palau.

### *Leucophenga halteropunctata* Duda

(Text-figs. 53-55, 71)

*Leucophenga halteropunctata* Duda, 1923: 28 (Formosa) [nom. nud.]; Duda, 1924a: 188; 1924b: 239 (Formosa); Sturtevant, 1927: 364 (Philippine); Burla, 1954: 29 (Africa); Wheeler and Takada, 1964: 228 (Palau).

♀. Body about 2 mm. Head as broad as thorax. Eyes dark red, bare. Antennae with second segment orange-brown; third greyish yellow. Arista with about five dorsal and two or three ventral branches and a moderate terminal fork. Palpus dark brownish black, slender, with an apical and two ventral long setae. Ocellar triangle black, grey pollinose. Periorbit greyish yellow, not sharply demarcated. Front yellowish grey, parallel-sided, somewhat glossy,



FIGS. 53-61. 53-55, *Leucophenga halteropunctata* Duda, ♀. 53, head, lateral aspect; 54, head, dorsal aspect; 55, wing. 56-61, *Leucophenga salatigae* de Meijere. 56, ♂ head, lateral aspect; 57, ♂ head, dorsal aspect; 58, ♂ wing; 59, peripheral organs, lateral aspect; 60, phallic organs, lateral aspect; 61, ♀ egg-guide.

anterior width three-fourths as broad as length down middle, posteriorly slightly less than one-third as broad as head width. Carina flat, grey. Buccal margin somewhat convex. Cheek narrow, yellowish white, about one-twentieth as broad as the greatest diameter of eye. Occiput dark brown, paler above. Proclinate orbital slightly shorter than others; anterior reclinate just outside proclinate. Inner vertical much shorter than outer vertical. Postvertical minute. One prominent oral.

Mesonotum orange-yellow, anterolaterally and caudomedially yellowish brown; neck region brownish black above. Scutellum dark brown, laterally with a black patch at the insertion of anterior scutellar. Thoracic pleura white, without dark patches. Only one humeral. Prescutellar slightly longer than anterior dorsocentral. Acrostichal hairs in about nine irregular rows. Anterior dorsocentrals about half length of posteriors; distance between anterior and posterior dorsocentrals slightly longer than one-third distance between anterior pair. Anterior scutellars divergent; posteriors as long as anteriors, equally distant from each other and from anteriors. Sterno-index about 0.8. Legs yellowish white; femora white; tibiae fuscous apically and tarsi slightly so. Preapicals on mid and hind legs; apicals on mid leg. Wing hyaline; veins yellowish brown; crossveins not clouded, posterior crossveins somewhat sinuated.  $R_{2+3}$  nearly straight, apically curved to *costa*;  $R_{4+5}$  and  $M$  nearly parallel, considerably convergent basally. C-index about 1.7; 4V-index about 3.1; 4C-index about 1.9; 5x-index about 1.3; Ac-index about 2.8. C<sub>1</sub>-bristles two; C<sub>3</sub>-fringe on basal three-sevenths. Halteres yellow, base orange, knob glossy black. Abdominal tergites yellowish brown, with black spots as follows: two small ones on 1T (usually absent), four outer larger, on 2T, three on 3T, median one large, five large ones on 4T, five small ones on 5T, and two small ones on 6T.

Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 10 ♀ (*R.L.C.*).

Distribution: Nepal (new locality), Formosa, Philippines, Palau, Africa.

### *Leucophenga salatigae* de Meijere

(Text-figs. 56-61, 72)

*Leucophenga salatigae* de Meijere, 1914: 260 (Java).

*Leucophenga albicincta* de Meijere var. *Salatigae* de Meijere; Duda, 1939: 47 (Africa).

♂, ♀. Body about 3 mm. Head as broad as thorax. Eyes dark red, large, bare. Antennae with second segment yellowish grey; third grey, twice as long as broad, pale at base of arista, which has about six dorsal and two ventral branches and a small terminal fork. Palpus yellowish orange, slender, curved upward, apical half dark brown, with short setae below. Ocellar triangle black. Periorbit yellowish grey, not reaching anterior extremity of front. Front yellowish grey, matt, anteriorly pale, anterior width narrower than length down middle, posteriorly about two-fifths as broad as head width. Clypeus yellowish grey. Face yellowish white. Carina flat. Cheek very narrow, about one-twelfth as broad as the greatest diameter of eye. Occiput black. Postverticals moderate in size. Posterior reclinate orbital nearly twice as long as others; anterior reclinate slightly behind proclinate and thrice as distant from posterior reclinate as from proclinate. Only one prominent oral, others slender.

Mesonotum orange-brown, convex, unicolorous. Scutellum yellowish orange, apically pale yellow, laterally black. Thoracic pleura yellow, with a broad black longitudinal stripe for entire length. Humeral callus yellow. Humerals three, uppermost longest, lowermost shortest. Acrostichal hairs in about eight rows. Prescutellar nearly as long as anterior dorsocentral. Posterior dorsocentrals nearly twice as long as anteriors; distance between anterior and posterior dorsocentrals about one-third distance between anterior pair. Anterior scutellars long, divergent; posteriors two-thirds length of anteriors and as long as scutellum. Sterno-index about

0.6. Legs yellow ; knees not absolutely black ; front metatarsi slightly longer than the other segments together, mid and hind metatarsi much longer than the other segments together. Preapicals on mid and hind legs, apicals prominent on mid leg. Wing slightly fuscous especially on anterior half, with black patch below  $R_1$  ; crossveins slightly clouded. C-index about 2.4 ; 4V-index about 1.2 ; 4C-index about 0.9 ; 5x-index about 1.6 ; Ac-index about 2.1. C1-bristles two ; C3-fringe on basal three-fourths. Halteres whitish yellow, not fuscous. Abdominal tergites black ; 1T yellow, 2T anteromedially yellow, 3T yellow on anterolateral margin. Abdominal sternites pale yellow.

Periphallalic organs : Genital arch black, broad, ventrally broader and truncate, pubescent and caudally with setae ; toe triangularly pointed caudally ; heel low, rectangular. Clasper oval pale brown, darker anteriorly, setigerous and pubescent. Anal plate fusiform, pale brown, setigerous but without microtrichia, ventral tip black. Phallic organs : Aedeagus pale brown, slender, bifid on distal two-thirds ; ventral recurved process slender, nearly as long as aedeagus ; apical hooked piece yellowish orange. Anterior paramere elongate, blade-like, pale yellowish brown, medially with a few sensilla. Posterior parameres dark brown, fused to be a quadrate lobe. Ventral fragma with distinct submedian spines. PI =  $\infty$ . p.f. = ABCDeFgHIkLmN.

Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x.1961, 1 ♀ ; between Sangu and Tamrang, shrubs by path, c. 5,800', 6.xi.1961, 3 ♂ ; ibid., mixed shrubs in deep gorge, c. 5,200', x-xi.1961, 19 ♂, 3 ♀ ; ibid., mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961, 3 ♂, 1 ♀. Arun Valley, below Tumlingtar, River Sabhaya, west shore, evergreen shrubs on sandy shore, c. 1,800', 9-17.xii.1961, 1 ♂, 1 ♀. (R.L.C.).

Distribution : Nepal (new locality), Java, Africa.

Differs from the original form (Java, de Meijere, 1914) in having pale yellow halteres (fuscous in original form) and much smaller 4V-index (2.3 in original form). Occurrence of submedian spines on ventral fragma of phallic organ seems to be unique among the genus *Leucophenga*, although it is prevalent in the subfamily Drosophilinae.

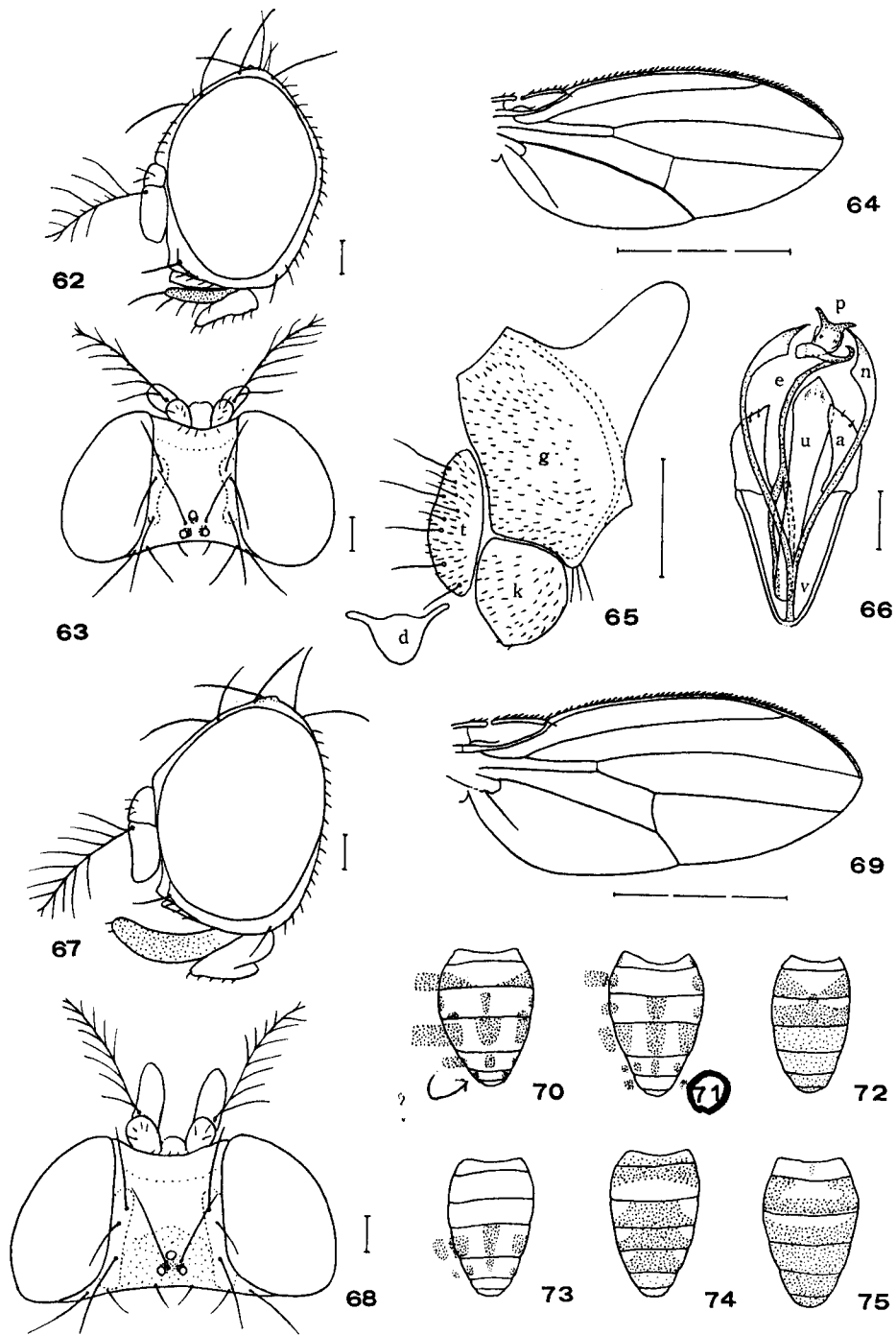
### *Leucophenga nigripalpis* Duda

(Text-figs. 62-66)

*Leucophenga nigripalpis* Duda, 1924a : 188 (Formosa).

♂. Body about 2 mm. Head as broad as thorax. Eyes reddish brown, large, bare. Antennae with second segment pale yellowish brown, third greyish yellow. Arista with about five to six dorsal and two to three ventral branches and a moderate terminal fork. Palpus black, slender, with an apical and a few ventral long black setae. Ocellar triangle black within the bright red ocelli. Periorbit greyish yellow, short, medially constricted. Front pale yellowish grey, somewhat glossy, flat, parallel-sided, anteriorly yellowish white and two-thirds as broad as length down middle, posteriorly slightly narrower than one-third head width. Face flat, yellowish white ; buccal margin slightly convex. Cheek white, narrow, about one-fifteenth as broad as the greatest diameter of eye. Orbitals subequal in size ; anterior reclinate orbital just outside and behind proclinate, four times as distant from posterior reclinate as from proclinate. Postverticals small. Vibrissae rather short, second oral much shorter than vibrissa. Clypeus pale brown.

Mesonotum pale yellowish orange, laterally and caudally fuscous. Scutellum yellowish brown, anterolaterally fuscous. Thoracic pleura pale yellowish orange, without dark patches. Two humerals. Prescutellar longer than anterior dorsocentral. Acrostichal hairs in about ten irregular rows. Anterior dorsocentrals short, about two thirds length of posteriors ; distance



FIGS. 62-75. 62-66, *Leucophenga nigripalpis* Duda, ♂. 62, head, lateral aspect ; 63, head, dorsal aspect ; 64, wing ; 65, periphallallic organs, lateral aspect ; 66, phallic organs, ventral aspect. 67-70, *Leucophenga guttiventris* Duda, ♀. 67, head, lateral aspect ; 68, head, dorsal aspect ; 69, wing ; 70, abdominal tergites. 71-75, abdominal tergites of 71, *Leucophenga halteropunctata* Duda, ♀ ; 72, *L. salatigae* de Meijere, ♂ ; 73, *L. argentata* de Meijere, ♂ ; 74, *L. nigroscutellata* Duda, ♀ ; 75, *L. albiceps* de Meijere ♂.

between anterior and posterior dorsocentrals about two-sevenths distance between anterior pair. Anterior scutellars divergent, slightly longer than posteriors, which are a little nearer to each other than to anteriors. Sterno-index about 0.7. Legs yellowish white; mid and hind knees somewhat fuscous. All metatarsi longer than the other segments together. Preapicals on all legs; apicals prominent on mid leg. Wings hyaline, slightly pointed at tip; crossveins clear.  $R_{2+3}$  nearly straight;  $R_{4+5}$  and  $M$  somewhat convergent distally;  $Cu$  black, other veins pale. C-index about 2.0; 4V-index about 2.2; 4C-index about 1.4; 5x-index about 1.1; Ac-index about 2.6. C1-bristles two; C3-fringe on basal about three-fifths. Halteres yellowish orange, stalk paler. Abdominal tergites mostly black; 1T and 2T except posterior margin yellowish brown.

Peripheral organs: Genital arch brownish black, broad, pubescent; anterior fragma extremely protruded forward; heel lower than toe, with a few long hairs. Anal plate oblong, brown, hairy and pubescent. Clasper brownish black, roughly pentagonal, lower tip somewhat pointed, without teeth, pubescent on surface. Phallic organs: Aedeagus black, slender, basal half bifurcated; ventral recurved process dark orange, elongate, distally much swollen, apically curved ventrally and pointed, nearly as long as aedeagus. Anterior paramere pale, broad, subapically with a few sensilla. Posterior paramere brown. Ventral fragma proximally pointed, distally narrowing.  $PI = \infty$ . p.f. = ABCDefgHikLMN.

Arun Valley, east shore of River Arun, Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 3 ♂ (*R.L.C.*).

Distribution: Nepal (new locality), Formosa.

Differs from the original form (Formosa) in having 3-5T largely black, without diffuse black lateral spots.

### *Leucophenga guttiventris* (de Meijere)

(Text-figs. 67-70)

*Drosophila guttiventris* de Meijere, 1911: 414 (Java).

*Leucophenga guttiventris* (de Meijere) Sturtevant, 1921: 131 (Java); Duda, 1924a: 187, 188; 1924b: 239 (Java, Formosa); Duda, 1923: 28 (Java, Formosa); Bezzi, 1928: 155 (Fiji); Duda, 1939: 32; 51 (Africa); Okada, 1956: 27 (Japan).

*Leucophenga guttiventris* var. *curvipila* Duda, 1939: 32 (Africa).

*Leucophenga guttiventris* var. *fuscipennis* Duda, 1939: 32 (Formosa).

*Leucophenga fuscipennis* Duda, 1923: 28 (Formosa).

*Drosophila maculiventris* van der Wulp; de Meijere, 1908: 155 (Java).

♀. Body about 2.5 mm. Head as broad as thorax. Eyes pale reddish brown, large, bare. Antennae with second segment pale yellowish brown; third greyish white, elongate. Arista with about six dorsal and four ventral branches and a small terminal fork. Palpus large, dark brownish black, basally paler, curved upward, subapically with a fine short seta. Ocellar triangle black, pollinose. Periorbit greyish white, short, flat, not well demarcated from front. Front white, somewhat glossy, posteriorly slightly yellowish brown, anteriorly about five-sevenths as broad as length down middle, posteriorly about two-fifths as broad as head width. Clypeus pale brown, narrow. Face white, flat. Carina undeveloped. Cheeks white, narrow, about one-twentieth as broad as the greatest diameter of eye. Occiput black, upper margin yellow. Anterior reclinate orbital slightly shorter than other orbitals, outside proclinate, thrice as distant from posterior reclinate as from proclinate. Only one prominent rather short oral.

Mesonotum orange-yellow, caudomedially somewhat brownish, posteriorly slightly silver pollinose; humeral callus pale. Scutellum orange-yellow, slightly glossy, laterally somewhat fuscous, pale at tip. Thoracic pleura pale yellowish white, without dark markings. Humeral two. Prescutellar as long as anterior dorsocentral. Acrostichal hairs in about eight rows. Anterior dorsocentrals about five-eighths as long as posteriors; distance between anterior and

posterior dorsocentrals about one-fourth distance between anterior pair. Anterior scutellars long, divergent; posteriors shorter, nearly equally distant from each other as from anteriors. Sterno-index about 0.7. Legs yellowish white; knees of mid and hind legs narrowly black; all metatarsi nearly as long as the other segments together. Preapicals on all legs; apicals on fore and mid legs. Wing hyaline, veins dark yellow, crossveins clear.  $R_{2+3}$  somewhat convex anteriorly at middle, curved to *costa* at tip;  $R_{4+5}$  strongly convex anteriorly before middle. *Costa* reaching tip of  $R_{4+5}$ . C-index about 2.3; 4V-index about 3.3; 4C-index about 1.7; 5x-index about 1.0; Ac-index about 2.7. C<sub>1</sub>-bristles two; C<sub>3</sub>-fringe on basal five-eighths. Halteres yellow, stalk paler. Abdominal tergites orange-yellow; 1T entirely yellow; 2-6T with black spots as follows: two on 2T, 3 small on 3T, three large on 4T, three small on 5T, two small on 6T.

Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 5 ♀. Taplejung District, Dobhan, mixed vegetation in dry gully on wooded slope, c. 3,500', 29.i.1962, 1 ♀ (R.L.C.).

Distribution: Nepal (new locality), Java, Formosa, Japan, Fiji, Africa.

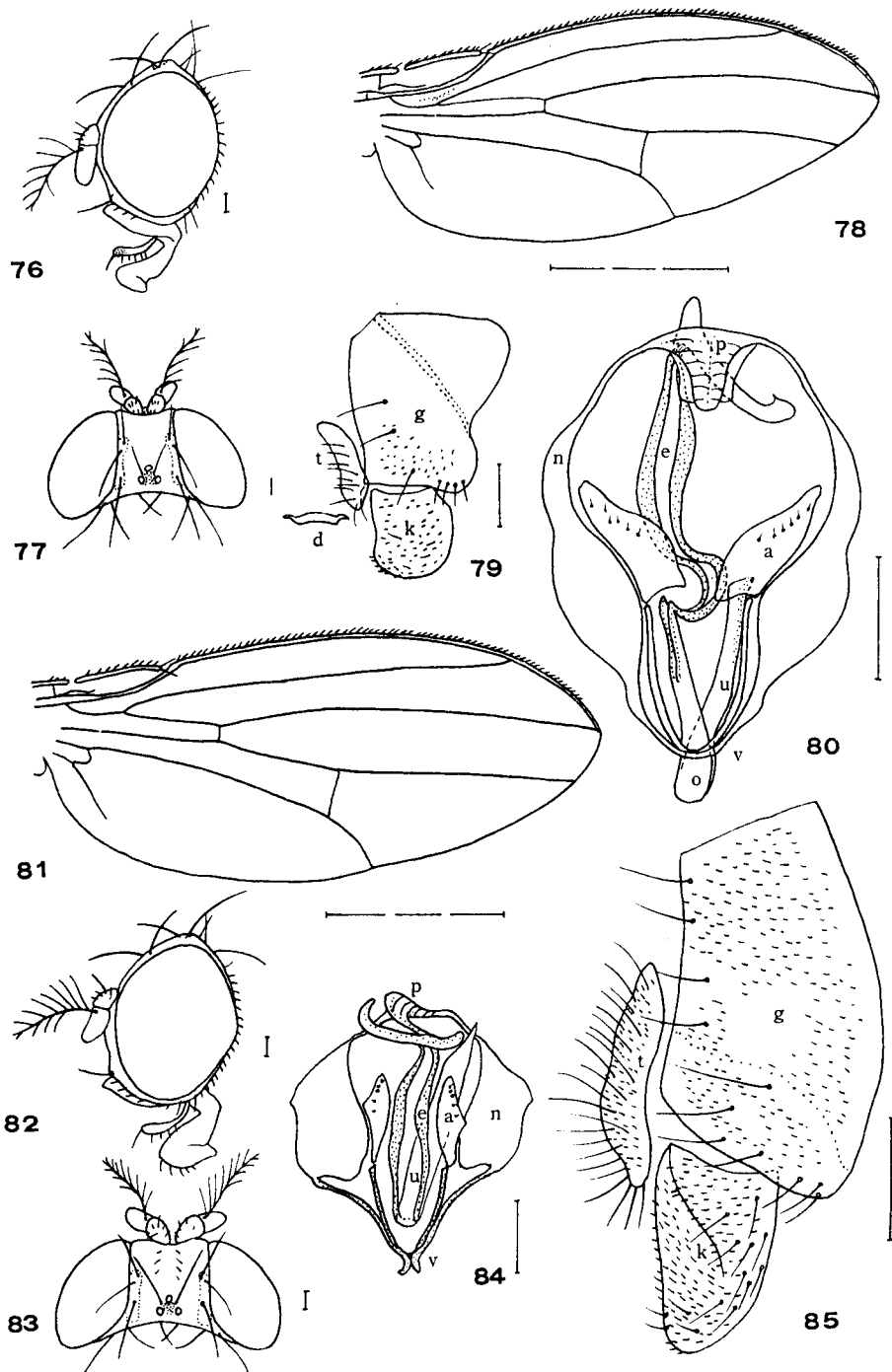
### *Leucophenga nigriceps* sp. n.

(Text-figs. 76-80)

♂. ♀. Body about 3 mm. Head slightly broader than thorax. Eyes dark red, bare, large. Antennae with second segment yellow; third yellowish grey, oblong, twice as long as broad, pale at the base of arista. Arista with about five dorsal and one ventral branches and a small terminal fork, branches rather short. Palpus slender, curved, yellow, apically black. Ocellar triangle black. Periorbit slightly paler than front, short, a little more than half as long as front. Front flat, narrow, parallel-sided, pale yellowish grey, matt, anteriorly five-sevenths as broad as length down middle, posteriorly one-third as broad as head width. Clypeus pale yellowish brown. Face yellowish white, concave. Carina undeveloped. Cheeks yellow. Very narrow, about one-sixteenth as broad as the greatest diameter of eye. Occiput black. Orbitals subequal in size; anterior reclinate orbital close to and outside proclinate, more than four times as distant from posterior reclinate as from proclinate. Only one prominent oral.

Mesonotum dark orange-brown, medioanteriorly paler, medioposteriorly fuscous. Scutellum black, apically pale. Thoracic pleura yellowish brown, with irregular longitudinal patches; sternepisternum largely black. Humerals two, lower longer. Acrostichal hairs in about eight irregular rows. Anterior dorsocentrals two-thirds as long as posteriors; distance between anterior and posterior pair nearly one-third distance between anterior pair. Anterior scutellars long, divergent; posteriors half as long as anteriors. Sterno-index about 0.6. Legs yellow; mid and hind knees dark; front and hind metatarsi subequal to next three segments together, mid metatarsi longer than the other segments together. Preapicals on mid and hind legs; apicals prominent on mid leg. Wing hyaline, veins black, crossveins clear. *M* apically pale;  $R_{2+3}$  gently curved to *costa* at tip. C-index about 2.5; 4V-index about 1.8; 4C-index about 1.1; 5x-index about 1.3; Ac-index about 1.9. C<sub>1</sub>-bristles two; C<sub>3</sub>-fringe on basal three-fifths. Halteres entirely pale yellow. Abdominal tergites: 1T yellow, 2T black, medioanteriorly and laterally yellow, 3T shining silvery blue especially in male, 4T to caudal end largely black.

Periphallalic organs: Genital arch broad, black, paler below, much narrowed above, broadly truncate below, caudal margin with a few setae, anteroventral corner with a few shorter setae; heel low, rounded. Anal plate small, oblong, pale. Clasper large, quadrate, pubescent inferiorly, setigerous exteriorly, pale yellowish brown. Decasternum in shape of narrow cross bar. Phallic organs: Aedeagus black, bifid, sinuate in lateral aspect, with short basal apodeme; ventral recurved process short, rod-like, pale, apically pointed. Anterior paramere fusiform, pale, with a longitudinal row of a few sensilla at middle. Posterior parameres yellow. PI = 12.0. p.f. = ABCDeFgHikLmN.



FIGS. 76-85. 76-80, *Leucophenga nigriceps* sp. n., ♂. 76, head, lateral aspect; 77, head, dorsal aspect; 78, wing; 79, peripheral phallic organ, lateral aspect; 80, phallic organs, ventral aspect. 81-85, *Leucophenga rectinervis* sp. n., ♂. 81, wing; 82, head, lateral aspect; 83, head, dorsal aspect; 84, phallic organs, ventral aspect; 85, peripheral phallic organ, lateral aspect.



Holotype ♂. EAST NEPAL : Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x.1961 (*R.L.C.*), BMNH.

Paratypes : 4 ♂, same data as holotype ; 9 ♂, 2 ♀, Taplejung District, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961 ; 1 ♂, Sangu, mixed vegetation by stream in gully, c. 6,200', ix.1961-i.1962 ; 1 ♂, north of Sangu, dry grass above river bank, c. 5,000', 5.i.1962 ; 1 ♂, Dobhan, evergreen trees overhanging stream in deep gully, c. 3,500', 30.i.1962 ; 2 ♀, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', i-ii.1962 ; 1 ♂, *ibid.*, mossy ground under bushes by hill stream, c. 5,500', 20.x.1961 (*R.L.C.*), BMNH, 1 ♂ from between Sangu and Tamrang, at the Tokyo Metropolitan University.

Allied to *L. albiceps* de Meijere, 1914, (Java and Formosa) but differs in having palpus black apically, 4-5T unspotted, and 3T silvery shining.

***Leucophenga rectinervis* sp. n.**

(Text-figs. 81-85, 94)

♂, ♀. Body about 3 mm. Head slightly broader than thorax. Eyes bright reddish brown ; ocelli bright red. Antennae pale yellowish white, third segment relatively slender. Arista with about seven dorsal and three ventral long branches and a small terminal fork. Palpus pale yellowish white, slender, gently curved upward, rounded at tip, with a strong apical and a few weaker ventral setae. Ocellar triangle black. Periorbit pale yellowish white, slightly glossy, obscurely demarcated from front. Front flat, pale yellowish white, matt, parallel-sided, anteriorly somewhat narrower than length down middle, posteriorly about one-third as broad as head width. Face white, laterally concave. Clypeus pale yellowish white. Cheeks pale, narrow, about one-twentieth as broad as the greatest diameter of eye. Occiput black. Proclinate orbital slightly shorter than other orbitals ; anterior reclinate outside and just posterior to proclinate. Only one prominent oral.

Mesonotum yellowish brown, silver pollinose. Scutellum dark yellowish brown, matt, apically white. Thoracic pleura pale yellowish grey, with an obscurely demarcated dark cloud on pteropleuron. Humeral callus pale, with two humerals, lower shorter. Prescutellars long, parallel with each other, slightly longer than anterior dorsocentral. Acrostichal hairs in about ten irregular rows. Anterior dorsocentrals shorter than posteriors ; distance between anterior and posterior dorsocentrals about one-third distance between anterior pair. Anterior scutellars divergent ; posterior scutellars longer than anteriors and nearer to each other than to anteriors. Sterno-index about 0.6. Legs yellowish white ; all metatarsi much longer than the other segments together. Preapicals on all legs ; apicals prominent on mid leg. Wing hyaline, veins brown ; crossveins clear.  $R_{2+3}$  nearly straight, not curved to *costa* at tip ; *costa* weak beyond  $R_{4+5}$  ;  $R_{4+5}$  and *M* nearly parallel. Wing tip slightly pointed. C-index about 3.0 ;  $4V$ -index about 2.0 ;  $4C$ -index about 1.0 ;  $5x$ -index about 1.3 ; Ac-index about 2.0.  $C_1$ -bristles two ;  $C_3$ -fringe on basal two-thirds. Halteres white. Abdominal tergites yellowish white, with black spots as follows : two small on 2T, three large on 4T, five large on 5T (median one small and longitudinal), two on 6T. 3T largely black. Caudal sternites black.

Periphallallic organs : Genital arch black, broad, not narrowing above, pubescent and setigerous, ventrocaudally obliquely truncate, heel low. Anal plate narrow, pale yellow, pubescent and setigerous. Clasper large, black, oval, pubescent and with short setae. Phallic organs : Aedeagus entirely bifid, black, medially somewhat broadened ; ventral recurved process pale brown, long, blade-like, apically pointed. Anterior paramere pale, fusiform, with a longitudinal row of a few sensilla on distal half. Posterior paramere pale yellow, contiguous with orange hooked piece of aedeagus.  $PI = \infty$ . p.f. = ABCDeFgHikLmN.

Holotype ♂. EAST NEPAL : Arun Valley, east shore of River Arun, below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961 (R.L.C.), BMNH.

Allotype ♀. Taplejung District, between Sangu and Tamrang, dense vegetation in tree shade by hill stream, c. 5,500', 23.x.1961 (R.L.C.), BMNH.

Paratypes : 1 ♂, same data as holotype ; 1 ♂, below Sangu, mixed vegetation on sheltered slopes above river, c. 4,000', 3.i.1962 ; 1 ♀, below Sangu, edge of small mixed wood, c. 6,000', 4.xi.1961 ; 1 ♀, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961 ; 1 ♀, old mixed forest above Sangu, c. 6,200', 25-28.x.1961 (R.L.C.), BMNH ; 1 ♂, below Sangu, deposited at the Tokyo Metropolitan University.

Resembles *L. flavipalpis* Duda, 1939, (Uganda, Africa) in having pale palpus, clear wings, pale halteres, spotted abdominal tergites, and silvery pollinose mesonotum, but differs from it in having nearly straight  $R_{2+3}$  (hence the specific name) and larger C-index (2.5 in *flavipalpis*).

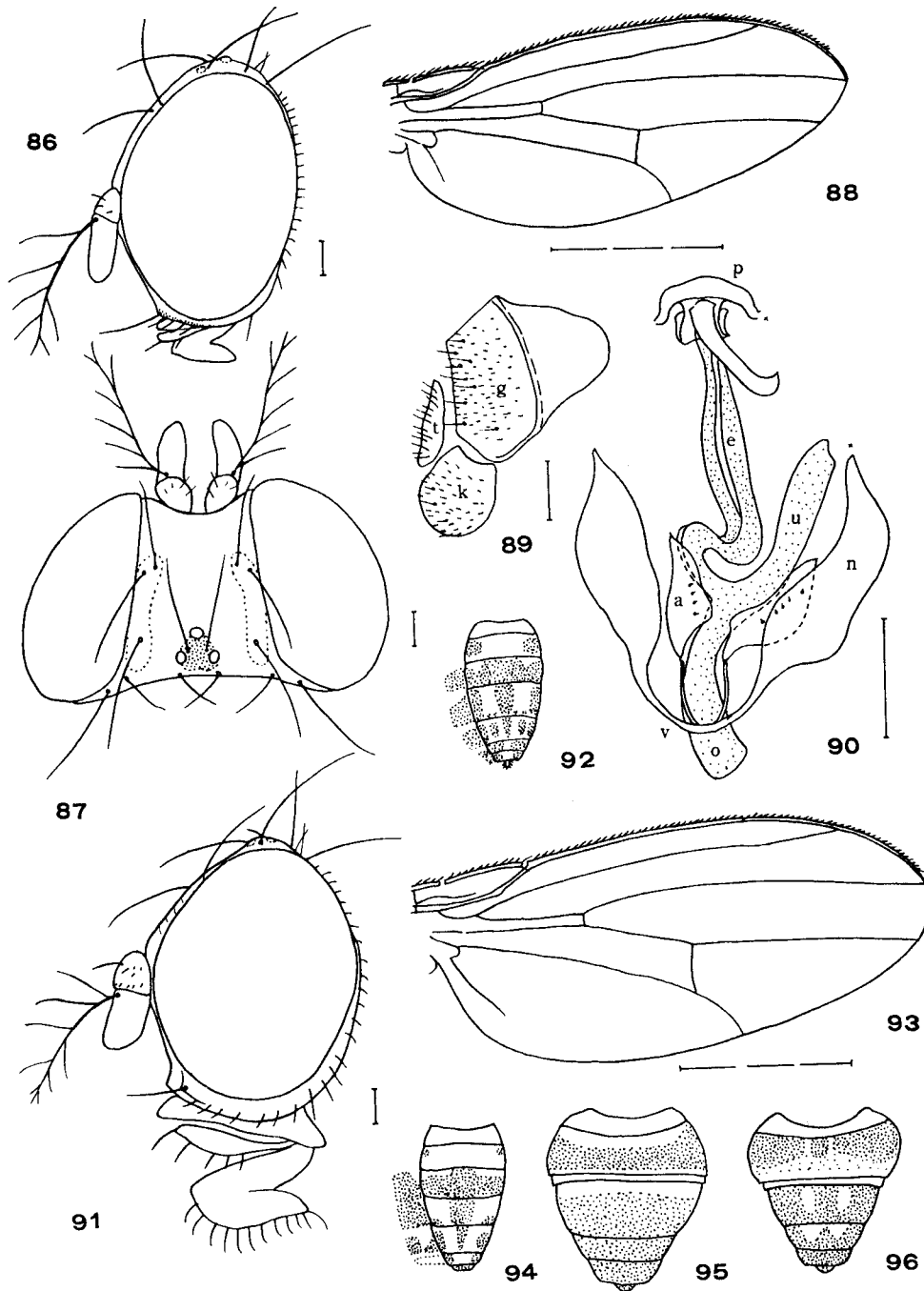
### *Leucophenga nigroscutellata* Duda

(Text-figs. 74, 86-90)

*Leucophenga nigroscutellata* Duda, 1924a : 186 ; 1924b : 237 (Formosa).

♂, ♀. Body about 3 mm. Head slightly broader than thorax. Eyes reddish brown, bare. Antennae with second segment orange-yellow ; third greyish brown, oblong. Arista with about five dorsal and one ventral sparsely arranged branches and a large terminal fork. Palpus yellowish brown, oblong, with an apical and a few ventral setae. Ocellar triangle black, grey pollinose. Periorbit pale greyish brown, somewhat glossy, short, half as long as front, not constricted medially. Front yellowish white, parallel-sided, anteriorly paler and two-thirds as broad as length down middle ; posteriorly about one-third as broad as head width. Face whitish grey, somewhat concave. Clypeus brown. Cheeks yellowish white, narrow, about one-twentieth as broad as the greatest diameter of eye. Occiput dark brownish black. Anterior reclinate orbital four times as distant from posterior reclinate as from proclinate. Postverticals short. One prominent oral, others fine.

Mesonotum dark brown, slightly glossy, not distinctly pollinose ; humeral callus pale. Scutellum brownish black, matt, apically pale. Thoracic pleura mostly dark brown. Three long humerals, median one longest, ventral one shortest. Acrostichal hairs in about eight irregular rows. Anterior dorsocentrals one-third as long as posteriors ; distance between anterior and posterior dorsocentrals about one-third distance between anterior pair. Anterior scutellars divergent ; posterior scutellars about two-fifths as long as anteriors, nearer to each other than to anteriors. Sterno-index about 0.6. Legs yellowish white ; mid and hind knees brown ; front metatarsi as long as next three segments together, mid metatarsi subequal to the succeeding segments, hind metatarsi longer than the succeeding segments. Preapicals on mid and hind legs ; apicals on mid leg. Wing hyaline, veins pale.  $R_{2+3}$  nearly straight, not curved to *costa* at tip ;  $R_{4+5}$  and *M* nearly parallel. C-index about 2.6 ; 4V-index about 1.8 ; 4C-index about 1.1 ; 5x-index about 1.9 ; Ac-index about 2.3. C1-bristles two ; C3-fringe on basal about two-thirds. Halteres yellowish white. Abdominal tergites mostly black, somewhat glossy ; 1T yellow, often laterally fuscous ; 2T medially with a yellow caudally narrowing patch ; ultimate T white.



FIGS. 86-96. 86-90, *Leucophenga nigroscutellata* Duda, ♂. 86, head, lateral aspect ; 87, head, dorsal aspect ; 88, wing ; 89, periphallallic organs, lateral aspect ; 90, phallic organs, ventral aspect. 91-93, *Leucophenga albiceps* de Meijere, ♀. 91, head, lateral aspect ; 92, abdominal tergites ; 93, wing. 94-96, abdominal tergites of 94, *Leucophenga rectinervis* sp. n., ♂ ; 95, *L. albifascia* sp. n., ♂ ; 96, *L. leucozona* Duda, ♂.

Periphallidic organs : Genital arch broad, ventrally somewhat narrowing, brownish black, setigerous and pubescent ; heel low, rectangular. Anal plate pale yellowish brown, oblong, thickly setigerous. Clasper ovoid, distally rounded, brownish black, pubescent and with short, setae. Phallic organs : Aedeagus black, entirely bifid, sub-basally strongly sinuate ; ventral recurved process rod-shaped, orange ; apodeme unusually developed, long, and stout. Anterior paramere pale, short, fusiform, medially with a row of a few sensilla. Posterior parameres orange. Ventral fragma laterally pale yellow, broad, fusiform. PI = 5.0. p.f. = ABCDeFgHikLmN.

Taplejung District, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961, 1 ♂, 1 ♀ ; above Sangu, evergreen scrub, c. 6,500', 5-13.x.1961, 1 ♀. Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 1 ♀ (*R.L.C.*).

Distribution : Nepal (new locality), Formosa.

Differs slightly from the original form (Formosa, Duda, 1924) in having larger body and sometimes entirely yellow palpus.

### *Leucophenga albiceps* de Meijere

(Text-figs. 75, 91-93)

*Leucophenga albiceps* de Meijere, 1914 : 258 (Java) ; Duda, 1924a : 190 (Java, Formosa).

*Leucophenga albiceps* var. *meijerea* Duda, 1924a : 190 (Formosa).

*Leucophenga meijerei* Duda, 1924b : 240 [in citation].

♀. Body about 3.2 mm. Head as broad as thorax. Eyes dark red, bare. Antennae with second segment yellow ; third yellowish white, quadrate, broad, apically truncate. Arista with about four dorsal and two ventral branches and a moderate terminal fork. Palpus yellowish white, large, medially broadened, with a few prominent ventral setae. Ocellar triangle black, bluish grey pollinose. Periorbit short, greyish white, well demarcated, apically curved inward. Front pale yellowish grey, parallel-sided, anteriorly slightly broader than median length down middle. Clypeus pale yellowish grey, protruded. Postverticals short. Face greyish white, flat, laterally depressed, lower margin somewhat protruded. Cheeks narrow, whitish, about one-twelfth as broad as the greatest diameter of an eye. Posterior reclinate orbital longer than other orbitals ; anterior reclinate orbital outside and posterior to proclinate, four times as distant from posterior reclinate as from proclinate. Only one prominent oral.

Mesonotum dark yellowish brown, somewhat silver pollinose ; neck region brown above. Scutellum dark yellowish brown, silver grey pollinose, apically white and broadly rounded. Thoracic pleura pale yellowish grey, somewhat fuscous below, with dark patches on pteropleuron. Humerals two, long, stout. Prescutellar longer than anterior dorsocentral. Acrostichal hairs in about eight rows. Anterior dorsocentrals half as long as posteriors ; distance between anterior and posterior dorsocentrals about one-fourth distance between anterior pair. Anterior scutellars divergent, longer than posteriors, which are nearer to each other than to anteriors. Sterno-index about 0.9. Legs yellowish white, knees pale. Front metatarsi slightly shorter than the succeeding segments, mid and hind metatarsi slightly longer than the succeeding segments. Preapicals on mid and hind legs ; apicals on all legs. Wings hyaline, veins yellowish brown.  $R_{2+3}$  nearly straight, apically not curved to *costa* ;  $R_{4+5}$  and *M* parallel ;  $R_{4+5}$  only weakly convex near base. Posterior crossveins weakly curved inward. C-index about 2.3 ; 4V-index about 1.8 ; 4C-index about 0.9 ; 5x-index about 1.2 ; Ac-index about 1.6. C1-bristle two ; C3-fringe on basal five-sevenths. Halteres yellow. Abdominal tergites pale yellow, with black spots as follows : two small on 2T ; three large somewhat confluent on 3T ; three large on 4T ; five on 5T ; two on 6-7T. Anal cercus elongate, pale yellow, setigerous.

Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x.1961, 1 ♀; old mixed forest above Sangu, c. 6,200', 25-28.x.1961, 3 ♀; below Sangu, edge of small mixed wood, c. 6,000', 4.xi.1961, 1 ♀; below Sangu, mixed vegetation on sheltered slopes above river, c. 4,000', 2.i.1962, 1 ♀ (R.L.C.).

Distribution : Nepal (new locality), Java, Formosa.

Differs slightly from the original form in having less distinct dark band on the thoracic pleura and lower 4V-index.

### Subfamily DROSOPHILINAE

#### *MICRODROSOPHILA* Malloch

*Microdrosophila* Malloch, 1921 : 312.

Type-species : *Drosophila quadrata* Sturtevant, 1916 : 341 (N. America).

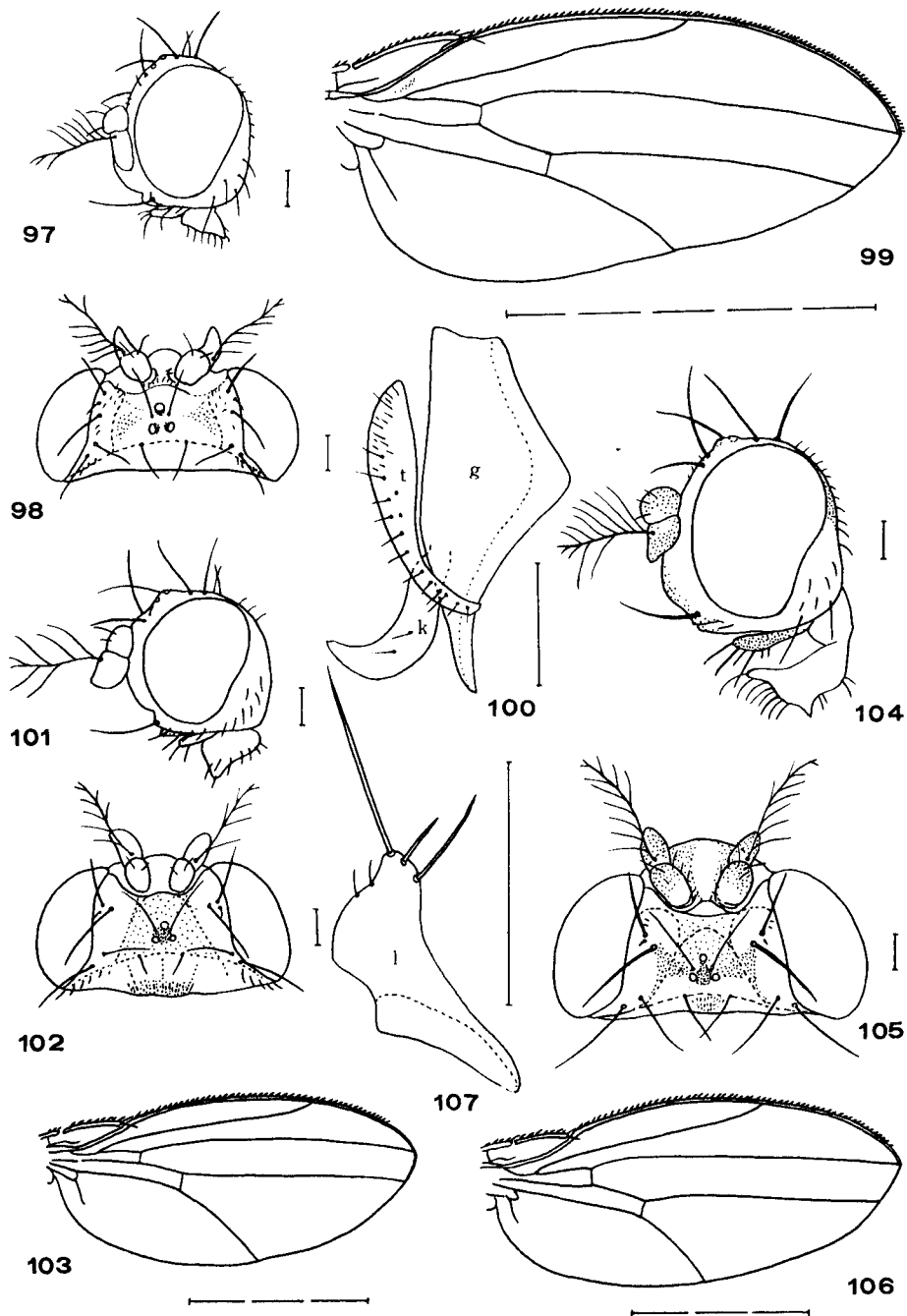
#### KEY TO SPECIES

- 1 Third costal section with strong bristles on almost entire length. Second costal break deep, more than one-fourth as deep as the length of first costal section between two breaks. Wing somewhat pointed at tip . . . . . *pectinata* (p. 37)
- Third costal section with strong bristles ending well before the apex . . . . . 2
- 2 Second costal break more than one-fourth as deep as the length of first costal section between two breaks. First costal section apically much swollen and black . . . . . sp. (p. 39)
- Second costal break less than one-fifth as deep as the length of first costal section between two breaks. First costal section apically not much swollen and not black . . . . . 3
- 3 Third costal section with strong bristles on its basal two-thirds. Arista with only three dorsal and two ventral branches beside terminal fork. Thoracic pleura dark only on humeral callus . . . . . *pauciramosa* (p. 40)
- Third costal section with strong bristles on its basal five-sixths or more. Arista with about six dorsal and three ventral branches beside fork. Thoracic pleura with more or less distinct black longitudinal stripe . . . . . 4
- 4 Palpus orange-yellow. Thoracic pleura with diffuse dark brown longitudinal stripe. Halteres yellow . . . . . *marginata* (p. 42)
- Palpus black. Thoracic pleura with a well demarcated black longitudinal stripe. Halteres black or brownish black . . . . . 5
- 5 Mesonotum with three distinct black longitudinal stripes. Ocellar triangle black . . . . . *nigripalpis* (p. 41)
- Mesonotum with three diffuse black stripes or uniformly dark brown. Ocellar triangle yellow . . . . . *nigrohalterata* (p. 41)

#### *Microdrosophila pectinata* sp. n.

(Text-figs. 97-100)

♂. Body about 1.5 mm. Head slightly broader than thorax. Eyes dark red, pilose. Antennae with second segment dark yellowish brown, large, conical; third narrower, yellowish brown, with long pubescence. Arista with about five dorsal and one ventral branches and a moderate terminal fork. Palpus pale yellowish brown, with a few stout black apical setae. Ocellar triangle pale yellowish grey, black within ocelli. Periorbit rather narrow, somewhat convex, anteriorly broadened, extending near anterior margin of front. Front pale yellowish grey, slightly glossy, mediolaterally fuscous, anteriorly two and a half times as broad as length down middle, posteriorly about three-fifths as broad as head width. Clypeus yellowish white.



FIGS. 97-107. 97-100, *Microdrosophila pectinata* sp. n., ♂. 97, head, lateral aspect ; 98, head, dorsal aspect ; 99, wing ; 100, peripheral organs, lateral aspect. 101-103, *Microdrosophila pauciramosa* sp. n., ♀. 101, head, lateral aspect ; 102, head, dorsal aspect ; 103, wing. 104-107, *Microdrosophila nigripalpis* sp. n., ♀. 104, head, lateral aspect ; 105, head, dorsal aspect ; 106, wing ; 107, egg-guide, lateral aspect.

Face pale yellowish white, somewhat narrowing below. Carina high, long, yellowish white, reaching buccal margin. Cheeks pale yellowish white, slightly less than one-fourth as broad as the greatest diameter of an eye. Occiput pale yellowish grey. Proclinate orbital slightly inside posterior reclinate; anterior reclinate minute, not distinguishable from adjacent microtrichia, outside other orbitals, almost equally distant from proclinate and posterior reclinate. Vibrissae strong, second oral slender.

Mesonotum yellowish brown, matt. Scutellum pale yellowish grey, matt, slightly pollinose. Thoracic pleura pale yellowish white, somewhat fuscous above. Only one humeral. Acrostichal hairs in about six rows. Distance between anterior and posterior dorsocentrals about five-sevenths distance between anterior pair. Anterior scutellars divergent, small, one-third length of posteriors, which are somewhat divergent and nearly equidistant from each other and from anteriors. Posterior sternopleural long, others missing. Legs yellow, anterior femur with a few long hairs below; claws long; all metatarsi subequal to the next three segments together; last tarsal segment large. Preapicals on all legs; apicals prominent on mid legs. Wing hyaline, second costal incision very deep; tip pointed.  $R_{2+3}$  apically curved to *costa*;  $R_{4+5}$  and *M* medially somewhat convergent. C-index about 1.1; 4V-index about 3.6; 4C-index about 3.3; 5x-index about 5.7; Ac-index about 3.6. C<sub>1</sub>-bristles two; C<sub>3</sub>-fringe on nearly entire length. Halteres yellowish brown. Abdominal tergites matt black; 1T pale yellowish grey, with dark patches; 2T yellowish white laterally. Abdominal sternites pale.

Periphallallic organs: Pregenital lobe long, club-shaped, pale orange. Genital arch pale yellowish brown, nearly bare, ventrally pointed; heel very high. Clasper apparently fused to genital arch, crescentic, pale brown. Anal plate pale brown, setigerous, narrow but long, ventrally curved anteriorly. Phallic organs not examined.

Holotype ♂. EAST NEPAL: Taplejung District, Dobhan, east bank of River Tamur, mixed vegetation by stream in deep gully, c. 3,500', i-ii.1962 (R.L.C.), BMNH.

Resembling *M. tectifrons* (de Meijere, 1914) (Java) in having pointed wings and only one ventral branch of arista, but differs in the paler body,  $R_{2+3}$  not straight, and carina well developed. Belonging to the subgenus *Oxystyloptera* Duda, 1924.

### *Microdrosophila* sp.

1 ex. Head much broader than thorax. Eyes green-black, thickly grey pilose. Antennae with second segment globular, yellowish brown, paler below; third dark brown, oval, paler caudally. Arista with four dorsal and three ventral branches and a large terminal fork. Palpus yellowish brown, subapically with two strong black setae. Ocellar triangle glossy black, convex. Periorbit glossy grey, broad, medially somewhat constricted, anteriorly truncate, four-fifths as long as front. Front greyish yellow, anteriorly paler, black inside periorbits, with a pair of large triangular anteriorly pointed black patches. Clypeus pale brown, medially with a dark narrow cross stripe. Face yellow, very broad, parallel-sided. Carina large, high, pale. Cheek greyish white, three-eighths as broad as the greatest diameter of eye. Occiput yellowish grey. Anterior reclinate orbital minute, just outside proclinate, nearer to proclinate than to posterior reclinate, which is longer than anterior reclinate. Second oral two-thirds as long as vibrissa, succeeding orals slender.

Mesonotum greyish yellow, matt, with five narrow dark brown longitudinal stripes, median one broadest. Scutellum greyish yellow, with a pair of broad dark longitudinal stripes. Thoracic pleura pale yellowish grey, with two dark longitudinal stripes. One long humeral. Acrostichal hairs in six rows. Distance between anterior pair of dorsocentrals equal to distance between anterior and posterior pairs. Anterior dorsocentrals two-thirds as long as posteriors. Anterior scutellars divergent, as long as posteriors, which are nearer to each other than to anteriors. Sterno-index about 0.8. Legs yellow, fore and hind metatarsi subequal to next

three segments together, mid metatarsi subequal to the following segments together. Pre-apicals on all legs; apicals prominent on mid leg. Wing hyaline, 2.1 mm. in length; first costal section apically much swollen and black; second costal break deep.  $R_{2+3}$  straight. Wing-tip somewhat pointed.  $R_{4+5}$  and  $M$  parallel. C-index about 1.8; 4V-index about 1.9; 4C-index about 1.3; 5x-index about 2.0; Ac-index about 3.3. C1-bristles two; C3-fringe on basal half. Halteres missing. Abdomen missing.

Taplejung District, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961, 1 ex (R.L.C.).

Characters intermediate between *Styloptera* Duda, 1924 and *Microdrosophila* Malloch; first costal section apically swollen and black as in *Styloptera*, acrostichal hairs in six rows as in *Microdrosophila*. A deep incision at the second costal break suggests that this species belongs to the subgenus *Oxystyloptera* Duda.

### *Microdrosophila pauciramosa* sp. n.

(Text-figs. 101-103)

♀. Body about 1.5 mm., yellowish brown. Head broader than thorax. Eyes deep purple-red, oval, pilose, with caudal margin straight. Antennae dark yellowish brown, third segment quadrate, slightly longer than broad. Arista with only three dorsal and two ventral sparsely arranged branches and a large terminal fork. Palpus pale yellow, broad, with two stout bristles below near apex. Ocellar triangle black; ocelli pale. Periorbit large, somewhat convex, pale yellowish brown, anteriorly broadened and reaching anterior margin of front. Front pale yellowish grey, medio-anteriorly orange, anteriorly twice as broad as length down middle, posteriorly somewhat wider and about five-ninths as broad as head width. Clypeus dark brown. Face yellowish white, slightly narrowing below, buccal margin white. Carina high, long, reaching near buccal margin. Cheek pale yellowish white, darker above, about one-third as broad as the greatest diameter of eye. Occiput pale yellow, darker below. Proclinate orbital slightly shorter than posterior reclinate, close to and outside posterior reclinate; anterior reclinate minute, just outside posterior reclinate.

Mesonotum dirty yellowish brown, slightly glossy, with three indistinct longitudinal dark patches. Scutellum dirty yellowish brown. Thoracic pleura pale yellow, darker above. Humeral callus dark brown. Only one humeral. Acrostichal hairs in about eight rows. Distance between anterior pair of dorsocentrals about one and a half times distance between anterior and posterior pairs. Anterior scutellars slightly shorter than posteriors, divergent; posterior scutellars as long as posterior dorsocentrals. Sterno-index about 0.4. Legs pale yellowish brown; front metatarsi subequal in length to next three segments together, mid and hind metatarsi subequal to the rest of segments. Fore femur and mid coxa with long hairs below. Preapicals on all legs; apicals prominent on mid leg. Wings hyaline; crossveins clear; first costal section distally curved posteriorly and swollen; *costa* reaching  $M$ ;  $R_{2+3}$  subapically gently curved to *costa*;  $R_{4+5}$  and  $M$  parallel. C-index about 1.9; 4V-index about 5.2; 4C-index about 2.7; 5x-index about 7.5; Ac-index about 4.3. C1-bristles two; C3-fringe on basal two-thirds. Halteres greyish brown. Abdominal tergites dirty yellowish brown, laterally darker, with irregular dark brown clouds, posterior margin narrowly grey. Abdominal sternites pale. Cerci broader than long.

Holotype ♀. EAST NEPAL: Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961 - i.1962 (R.L.C.), BMNH.

Somewhat resembles *M. cristata* Okada, 1960 in having obscurely demarcated mesopleural dark stripe, gently curved  $R_{2+3}$ , and orbitals close to each other, but differs from it in having fewer arisal branches, posterior reclinate orbital not inside proclinate and lesser range of C3-fringe.



***Microdrosophila nigripalpis* sp. n.**

(Text-figs. 104-107)

♀. Body about 2 mm., dark yellowish brown. Head slightly broader than thorax. Eyes deep purplish black, thickly pilose. Antennae dark greyish brown; second segment large, oval; third triangular, short, with long pubescence. Arista with seven dorsal and three ventral long branches and a moderate terminal fork. Palpus black, slender, apically rounded, with a few stout black setae below near apex. Ocellar triangle black; ocelli pale yellow. Periorbits quite large, anteriorly broadened, pale yellowish white, convex, reaching anterior margin of front. Front short, anteriorly nearly four times as broad as length down middle, posteriorly more than half as broad as head width, dark orange-brown, caudally black. Clypeus pale yellow. Face pale, laterally concave. Carina pale yellow, large, long, evenly convex, extending near buccal margin. Cheeks yellowish white, black above, about one-fourth as broad as the greatest diameter of eye, narrow below. Occiput pale yellow, black below. Three orbitals close to each other; proclinate orbital about half as long as posterior reclinate, just before and outside posterior reclinate; anterior reclinate minute, slightly outside proclinate. Only one stout oral.

Mesonotum yellowish brown, with three broad black longitudinal stripes; median stripe diffuse, reaching apex of scutellum; lateral stripes well demarcated, not extending in front of suture. Scutellum laterally yellowish brown, medially dark. Thoracic pleura pale yellow below, with broad black longitudinal stripe above. One humeral. Acrostichal hairs in about eight rows. Distance between anterior and posterior dorsocentrals about three-fourths distance between anterior pair; anterior dorsocentrals slightly shorter than posteriors, situated near the suture. Anterior scutellars missing; posteriors slightly divergent, twice length of scutellum. Sterno-index about 0.3. Legs yellowish grey; mid and hind pairs with distal half of femur and proximal part of tibia brownish black; all metatarsi nearly as long as the other segments together. Preapicals on all legs; apicals prominent on mid leg. Wings hyaline, tip pointed; veins brown, crossveins clear; *costa* reaching *M*; second costal break deep.  $R_{2+3}$  nearly straight, weakly sinuated;  $R_{4+5}$  and *M* parallel. C-index about 1.3; 4V-index about 4.1; 4C-index about 2.7; 5x-index about 6.0; Ac-index about 4.0. C1-bristles two; C3-fringe on basal six-sevenths. Halteres greyish black. Abdominal tergites matt black, posterior margins narrowly pale; 1T laterally pale. Abdominal sternites pale yellow. Egg-guide triangular, dark brown, apically with a very long and two shorter setae.

Holotype ♀. EAST NEPAL; Taplejung District, old mixed forest above Sangu, c. 6,200', 25-28.x.1961 (R.L.C.), BMNH.

Allied to *M. purpurata* Okada, 1956, (Japan) in having black mesonotal and mesopleural longitudinal stripes and triangular egg-guides, but differs from it principally in having palpus and halteres black and pointed wings.

***Microdrosophila nigrohalterata* sp. n.**

(Text-figs. 114-118)

♂, ♀. Body about 2.5 mm., dark yellowish brown. Head broader than thorax. Eyes dark purplish red, somewhat quadrate, weakly sinuous at inner margin, pilose. Antennae thick, second segment dark yellowish brown, with two long stout setae; third rounded at tip, greyish brown, with long pubescence. Arista with about five dorsal and three ventral long branches and a moderate terminal fork. Palpus dark brown or black, slender, with a few stout spical setae. Ocellar triangle highly convex, pale yellowish brown; mouth-parts yellowish white. Periorbit large, highly convex, glossy greyish brown, anteriorly broadened, reaching near the anterior margin of front. Clypeus yellowish white. Front glossy greyish brown, highly convex,

anteriorly and laterally orange-brown; anteriorly two and a half times as broad as length down middle; posteriorly about half as broad as head width. Face pale yellowish white, laterally depressed. Carina high, slender, two-thirds as long as face. Occiput yellowish grey, black below. Cheek pale yellowish black near neck region, about one-third as broad as the greatest diameter of eye, narrow below. Proclinate orbital two-thirds length of posterior reclinate, outside and slightly anterior to posterior reclinate; anterior reclinate minute, just outside posteriors, twice as distant from proclinate as from posterior reclinate. Only one very stout and long oral.

Mesonotum glossy yellowish brown, mediocaudally and laterally dark brown, or uniformly dark brown. Scutellum dark yellowish brown, glossy, often medially and marginally pale. Thoracic pleura yellowish white, with broad black longitudinal stripe above. Humeral two, very long, stout, subequal in length. Acrostichal hairs in six rows. Anterior dorsocentrals near the level of suture; distance between anterior and posterior dorsocentrals subequal to distance between anterior pair. Anterior scutellars short; posteriors long, divergent, thrice as long as anteriors. Sterno-index about 0.5. Legs fuscous yellow, femora pale on proximal half. Preapicals on all legs; apicals prominent on mid leg. Wings hyaline, crossveins clear, tip slightly pointed, *costa* reaching *M*.  $R_{2+3}$  apically curved to *costa*;  $R_{4+5}$  and *M* parallel. C-index about 1.3; 4V-index about 3.6; 4C-index about 2.2; 5x-index about 5.0; Ac-index about 4.4. C<sub>1</sub>-bristles two, long; C<sub>3</sub>-fringe on basal ten-elevenths. Halteres greyish black. Abdominal tergites mostly black, glossy; abdominal sternites yellowish white.

Periphallalic organs: Genital arch yellow, broad, narrowing below, pubescent, setigerous on upper caudal margin, ventral apex pointed anteriorly, caudal lower margin orange, rounded. Clasper and anal plate obscure. Decasternum triangular, yellowish white. Phallic organs: Aedeagus robust, orange, with several complicated triangular processes, basally narrowing and with a stout recurved dark orange ventral process, which is slightly shorter than aedeagus (cf. Text-fig. 117). Apodeme of aedeagus thick but short, about one-third as long as aedeagus. PI = 3.0. Anterior paramere seemingly fused to hypandrium and with about two sensilla. Posterior paramere elongate, connecting hypandrium and subbasal part of aedeagus (cf. Text-fig. 117). Ventral fragma triangularly pointed proximally; hypandrial plate large, blade-like. p.f. = abCdeFgHiKlmn. Egg-guide yellow, oval, distally fuscous and with four stout brownish setae and a small hair.

Holotype ♂. EAST NEPAL: Taplejung District, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', i-ii.1962 (R.L.C.), BMNH.

Allotype ♀. Taplejung District, above Sangu, mixed vegetation in dried-up ravine, c. 6,800', 17.ii.1962 (R.L.C.) BMNH.

Paratypes: Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962, 1 ♀ (R.L.C.), BMNH. Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 1 ♀ (R.L.C.), deposited at the Tokyo Metropolitan University.

Closely resembles *M. nigripalpis* Okada, in having distinct broad black mesopleural longitudinal stripe, black palpus, and black halteres, but differs from its allies in having less distinct mesonotal black stripes, pale ocellar triangle, and oval egg-guide.

### ***Microdrosophila marginata* sp. n.**

(Text-figs. 108-113)

♂, ♀. Body about 1.3 mm., pale yellowish brown. Head very large, much broader than thorax. Eyes deep purplish red, large, thickly pilose. Antennae with second segment dark

yellowish brown, large, globular ; third as long as second, much narrower and paler. Arista with about seven dorsal and three ventral very long branches and a small terminal fork. Palpus orange-yellow, small, apically rounded and with a stout black and a few thinner ventral setae. Ocellar triangle medially black. Frontal triangle large, convex. Periorbit large, convex, anteriorly much broadened, pale yellowish grey, somewhat glossy, reaching anterior margin of front. Front pale yellowish grey, somewhat glossy, anteriorly two-thirds as broad as length down middle, posteriorly slightly more than half as broad as head width. Face pale yellow, laterally concave. Carina high, long, pale yellowish white, wider below, reaching near buccal margin. Clypeus pale yellow. Cheeks narrow below, yellowish white, about one-fifth as broad as the greatest diameter of eye. Occiput pale yellow. Anterior reclinate orbital minute, just behind proclinate ; proclinate about two-thirds as long as posterior reclinate, before and outside posterior reclinate. Only one long stout oral, others fine.

Mesonotum yellowish brown, caudomedially and caudolaterally with indistinct dark brown patches. Scutellum yellowish brown, slightly darker medially. Thoracic pleura pale yellowish white, diffuse dark brown above. Only one stout humeral. Acrostichal hairs in six somewhat irregular rows. Anterior dorsocentrals at the level of suture ; distance between anterior pair of dorsocentrals about four-fifths distance between anterior and posterior pairs. Anterior scutellars small, parallel, less than half as long as posteriors, which are divergent. Sterno-index about 0.5. Legs yellowish grey ; all metatarsi subequal to the next three segments together. Preapicals on all legs ; apicals prominent on mid leg. Wings hyaline, pointed at tip (slightly below end of  $R_{4+5}$ ) ; crossveins clear.  $R_{2+3}$  gently curved to *costa* at tip ;  $R_{4+5}$  and  $M$  slightly divergent. C-index about 1.7 ; 4V-index about 5.0 ; 4C-index about 3.0 ; 5x-index about 5.3 ; Ac-index about 3.0. C1-bristles two ; C3-fringe on basal five-sixths. Halteres yellow. Abdominal tergites yellowish grey, laterally and caudally dark brown. Abdominal sternites pale.

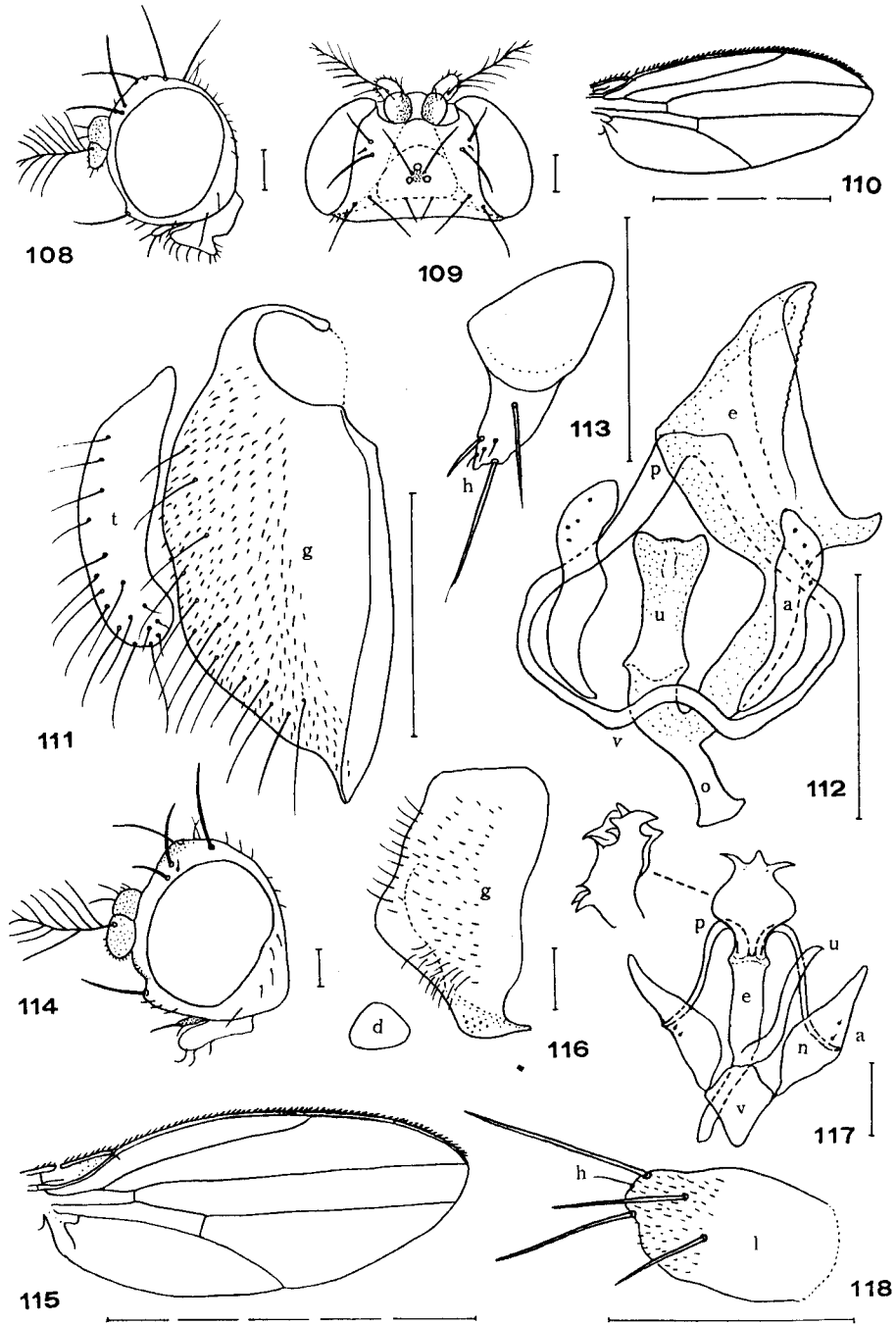
Periphallalic organs : Genital arch pale yellow, broad, fusiform, pubescent, abruptly narrowing above, ventroanteriorly pointed downward, caudoventral margin setigerous. Anal plate pale yellow, oblong, setigerous, lower tip rounded. Clasper apparently absent. Phallic organs : Aedeagus large, pale orange-brown, fusiform in lateral view, with a narrow anterior projection subbasally, basal half rod-shaped, contiguous with a large distally truncate ventral recurved process, which is nearly half as long as aedeagus. Apodeme of aedeagus short, rod-like. PI = 6.0. Anterior paramere elongate, pale yellow, proximally narrowing, subapically with a row of a few sensilla. Posterior parameres fused to each other and to ventral fragma. Ventral fragma like a narrow bow. p.f. = aBCdeFgHikLmn. Egg-guide pale yellowish brown, short, triangular, apically pointed, with a long apical and two shorter submedian stout setae and a fine subapical hair.

Holotype ♂. EAST NEPAL : Taplejung District, Dobhan, small pockets of plants on arid slopes above River Maewa, c. 3,500', 2.i.1962 (R.L.C.), BMNH.

Allotype ♀. Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 (R.L.C.), BMNH.

Paratype : 1 ♂, same data as allotype, BMNH.

Resembles *M. maculata* Okada, 1960, (Japan) in having dark second antennal segment, yellowish abdomen laterally dark, pale palpus, and large fusiform aedeagus, but differs from it in having pointed wings, entirely black ocellar triangle, entirely yellow halteres (knob darker in *maculata*), and triangular egg-guide (quadrate in *maculata*).



FIGS. 108-118. 108-113, *Microdrosophila marginata* sp. n. 108, ♂ head, lateral aspect ; 109, ♂ head, dorsal aspect ; 110, ♂ wing ; 111, peripheral organs, lateral aspect ; 112, phallic organs, ventral aspect ; 113, ♀ egg-guide, lateral aspect. 114-118, *Microdrosophila nigrohalterata* sp. n. 114, ♂ head, lateral aspect ; 115, ♂ wing ; 116, peripheral organs, lateral aspect ; 117, phallic organs, ventral aspect ; left upper figure, tip of aedeagus, lateral aspect ; 118, ♀ egg-guide, lateral aspect.

***LISSODROSOPHILA* gen. n.**

Type-species, *Lissodrosophila longicornis* sp.n. (Nepal).

Eyes vertical. Arista without ventral branches below fork, dorsal branches long. Front broad, glossy, smooth. Periorbit very broad, reaching anterior margin of front. Orbitals two, both proclinate, without reclinate orbitals. Postverticals minute. Mesonotum very convex, glossy. Scutellum matt, short. Two long sternopleurals, one humeral, one supra-alar. Acrostichal hairs in two rows. Only one pair of dorsocentrals. No prescutellars. Alula and anal vein abbreviated.

Related to the genus *Lissocephala* Malloch, 1929, in having a smooth, glossy, and flat front, small postverticals, shining convex mesonotum, dull scutellum, no anal vein, and no row of spinules on fore femur. Differs from *Lissocephala* in having no reclinate orbitals, no ventral branches of arista, only one pair of supra-alar, two rows of acrostichal hairs, and only one pair of dorsocentrals.

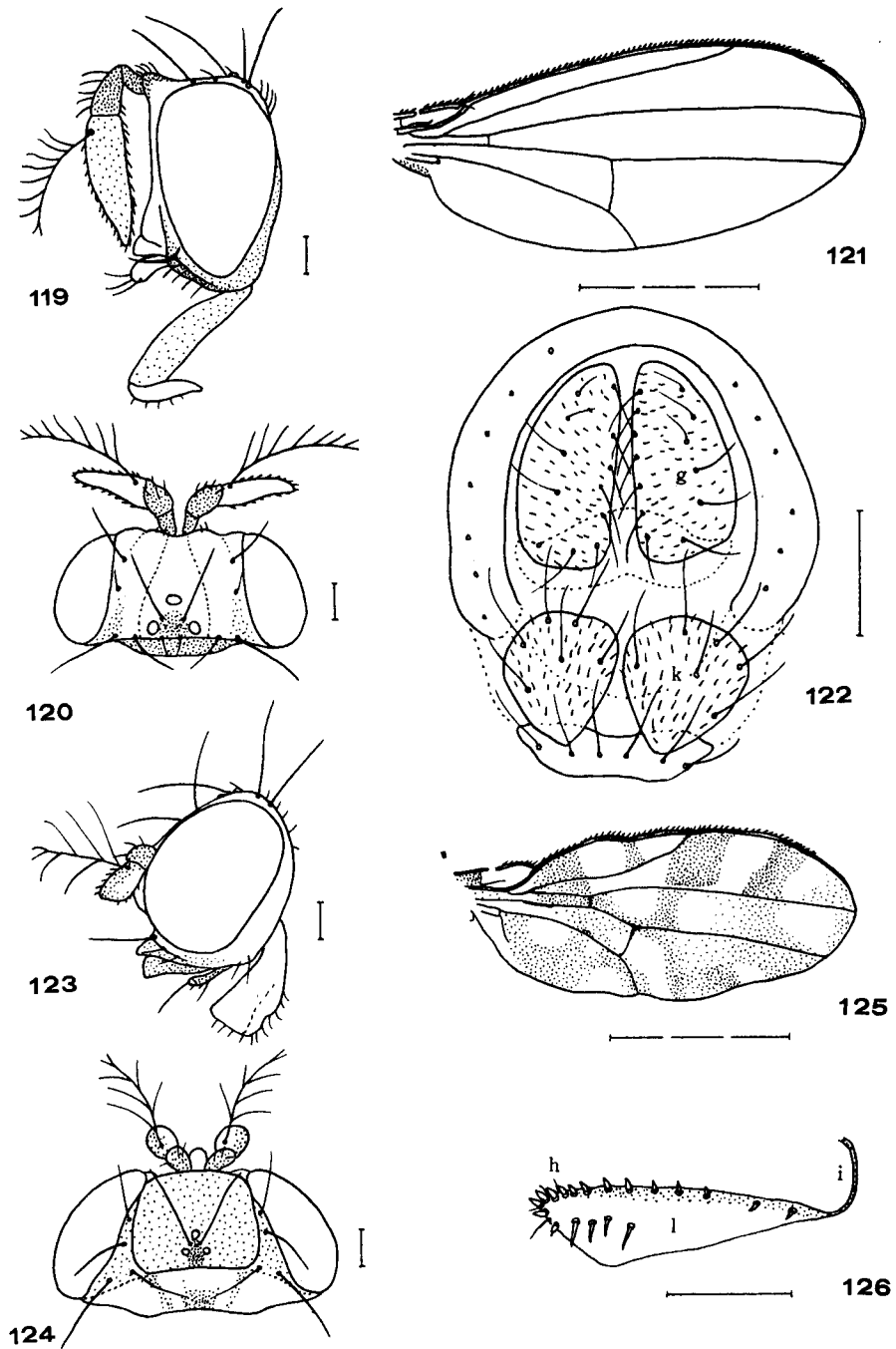
***Lissodrosophila longicornis* sp. n.**

(Text-figs. 119-122)

♂. Body about 1.5 mm. Head dorsoventrally elongated, much broader than thorax, anteriorly protruded at antennal base. Eyes vertically elongate, ventrally narrowing, deep purplish brown, bare. Antennae very large and long; first segment black, longer than broad; second black, distally broadened, rectangularly articulated to the first; third matt black, with grey pubescence, about four times as long as broad, distally tapering. Arista with about seven dorsal long branches and a small terminal fork. Palpus club-shaped, yellow, subapically with a few black setae. Ocellar triangle dark brown, glossy. Periorbit very broad, reaching anterior margin of front, glossy deep brown. Postverticals minute. Front glossy deep brown, smooth, anteriorly one-third broader than length down middle, posteriorly more than half as broad as head width. A few frontal hairs present. Clypeus dark brown. Face narrow, deep glossy brown, buccal margin pale and much protruded upward. Carina absent. Cheeks narrow, yellowish brown, pale at eye margin, about one-ninth as broad as the greatest diameter of eye, black above. Occiput deep brownish black. Mouth-parts deep brown, robust and long. Anterior proclinate orbital long and upright, posteriors minute. A few short orals; vibrissa somewhat longer than other orals.

Mesonotum black, shining blue-green, convex, with thick grey pubescence. Scutellum velvety black, much shorter than broad, posteriorly grey pollinose. Thoracic pleura dark brownish black, glossy, somewhat blue-green. Dorsocentrals near the caudal end of scutum. Anterior scutellars divergent, about two-thirds as long as posteriors; posteriors longer than dorsocentral, parallel, twice as far from each other as from anteriors. A small marginal hair between anterior and posterior scutellars. Sterno-index about 0.7. Legs mostly brownish black; femora darker; all metatarsi much longer than the other segments together. Preapicals on all legs; apicals prominent on mid leg. Wings hyaline, tip rounded, veins yellow. Alula black, small, without fringe.  $R_{2+3}$  strongly curved to *costa* at tip;  $R_{2+3}$  and *M* parallel; posterior crossvein curved outward; anal vein absent. C-index about 1.8; 4V-index about 2.0; 4C-index about 1.3; 5x-index about 1.2; Ac-index about 3.1. C1-bristles two; C3-fringe on basal half, sparse. Halteres white, stalk black. Abdominal tergites glossy black, shining metallic green, broader and shorter than thorax. Genital arch narrow, setigerous; clasper oval, setigerous and pubescent; anal plate elliptical, setigerous and pubescent. Phallic organs not examined.

Holotype ♂. EAST NEPAL: Taplejung District, below Sangu, by stream in shady ravine, c. 6,000', 30.X.1961 (R.L.C.), BMNH.



FIGS. 119-126. 119-122, *Lissodrosophila longicornis* gen. & sp. n., ♀♂ 119, head, lateral aspect ; 120, head, dorsal aspect ; 121, wing ; 122, abdomen, caudal aspect. 123-126, *Hypselothyrea guttata* Duda, ♀. 123, head, lateral aspect ; 124, head, dorsal aspect ; 125, wing ; 126, egg-guide.

***HYPSELOTHYREA*** de Meijere*Hypselothyrea* de Meijere, 1906 : 193.Type-species : *H. dimidiata* de Meijere, 1906 : 193 (New Guinea).***Hypselothyrea guttata*** Duda

(Text-figs. 123-126)

*Hypselothyrea guttata* Duda, 1926 : 56 (Sumatra) ; Duda, 1928 : 86 (Formosa).

♀. Body about 1.6 mm., glossy purplish brown, with ornamented wing. Head somewhat broader than thorax. Eyes dark red, widely separated, with fine pilosity. Antennae with second segment dark brown, conical ; third broader, tip rounded, yellowish brown and anteriorly black. Palpus black, slender, basally narrowing, with about two stout apical and subapical setae. Ocellar triangle black. Periorbit glossy dark brown, anteriorly narrowing, posteriorly much broadened, two-thirds as long as front. Postverticals absent. Front brownish black, glossy, somewhat purplish, quadrate, as broad as long. Clypeus black or dark brown. Face yellowish brown, highly convex below. Carina yellowish orange or dark brown, high, short, less than half as long as face. Cheeks dark brown, paler above, about two-ninths as broad as the greatest diameter of eye, narrow below. Two long orbitals, no posterior reclinate ; proclinate orbital slightly shorter than reclinate ; both orbitals equidistant from eye margin. Vibrissae thin, long ; succeeding orals short.

Mesonotum convex, yellowish or dark reddish brown, glossy, posteriorly darker. Scutellum triangular, tip protruded dorsoposteriorly, black, marginally white. Thoracic pleura pale yellowish grey, with a black longitudinal stripe above. One humeral. Acrostichal hairs in six rows. Posterior dorsocentrals slightly longer than anteriors ; distance between anterior and posterior dorsocentrals four-sevenths distance between anterior pair. Anterior scutellars parallel, half as long as posteriors, which are twice as distant from anteriors as from each other. Only one stenopleural. Legs pale yellowish grey ; fore femur basally black ; fore and mid coxae black ; hind coxa white ; mid and hind femora subapically black. Fore femur with anteroventrally a row of about ten small black teeth. Front metatarsi somewhat shorter than next three segments together, mid and hind metatarsi as long as the rest of segments together. Preapicals on all legs ; apicals prominent on mid leg. Wings broad, with scattered large black patches roughly in six transverse rows. Costa irregularly sinuous, alternatively white and black.  $R_{2+3}$  gently curved to costa apically ;  $R_{4+5}$  and  $M$  slightly divergent distally ; posterior cross-vein curved outward. C-index about 1.3 ; 4V-index about 4.0 ; 4C-index about 4.1 ; 5x-index about 1.3 ; Ac-index about 3.8. C1-bristles one, small ; C3-fringe on basal two-thirds. Halteres black. Abdomen narrowing anteriorly ; abdominal tergites mostly glossy black, mediolongitudinally yellowish brown ; abdominal sternites reddish brown.

Egg-guide lobe slender, pale yellow, basally brownish, tip gently narrowing, with about fifteen marginal thick yellow teeth and four discal longer but thinner yellow teeth. Basal isthmus narrow, brown.

Taplejung District, Sangu, rotting fruits of Bhor tree on ground, c. 6,200', 7-31.x.1961, 1 ♀ ; below Sangu, by stream in shady ravine, c. 6,000', 30.x.1961, 1 ♀ (R.L.C.).

This species has some features characteristic of the genus *Liodrosophila* Duda : an anteroventral row of small bristles on fore femur, smooth glossy front, and narrow triangular egg-guide. It has, however, no postverticals, no anterior reclinate orbital, and only one sternopleural, characteristics of the genus *Hypselothyrea*.

Distribution : Nepal (new locality), Sumatra, Formosa.

**LIODROSOPHILA** Duda*Liodrosophila* Duda, 1922 : 153.Type-species : *Camilla coeruleifrons* de Meijere, 1911 : 421 (Java).

## KEY TO SPECIES

- 1 Wings with black markings. Front and mesonotum granulose, moderately shining black. Legs yellow, fore tarsi black . . . . . ***bimaculata*** (p. 48)
- Wings without black markings. Front and mesonotum smooth, glossy, not granulose. Fore tarsi yellow or yellowish grey, not black . . . . . 2
- 2 Acrostichal hairs in two rows. Mesonotum somewhat shining blue, punctured . . . . . ***onchopyga*** (p. 50)
- Acrostichal hairs in six rows. Mesonotum glossy, not punctured . . . . . 3
- 3 Mesonotum usually brownish black. Clasper with a concave row of marginal teeth. Wings somewhat fuscous. Periorbit relatively broad, not narrowing anteriorly . . . . . ***fuscipennis*** (p. 51)
- Mesonotum enamel-blue-black. Clasper with a convex row of marginal teeth. Wings hyaline. Periorbit much narrowing anteriorly . . . . . ***nitida*** (p. 54)

***Liodrosophila bimaculata* sp. n.**

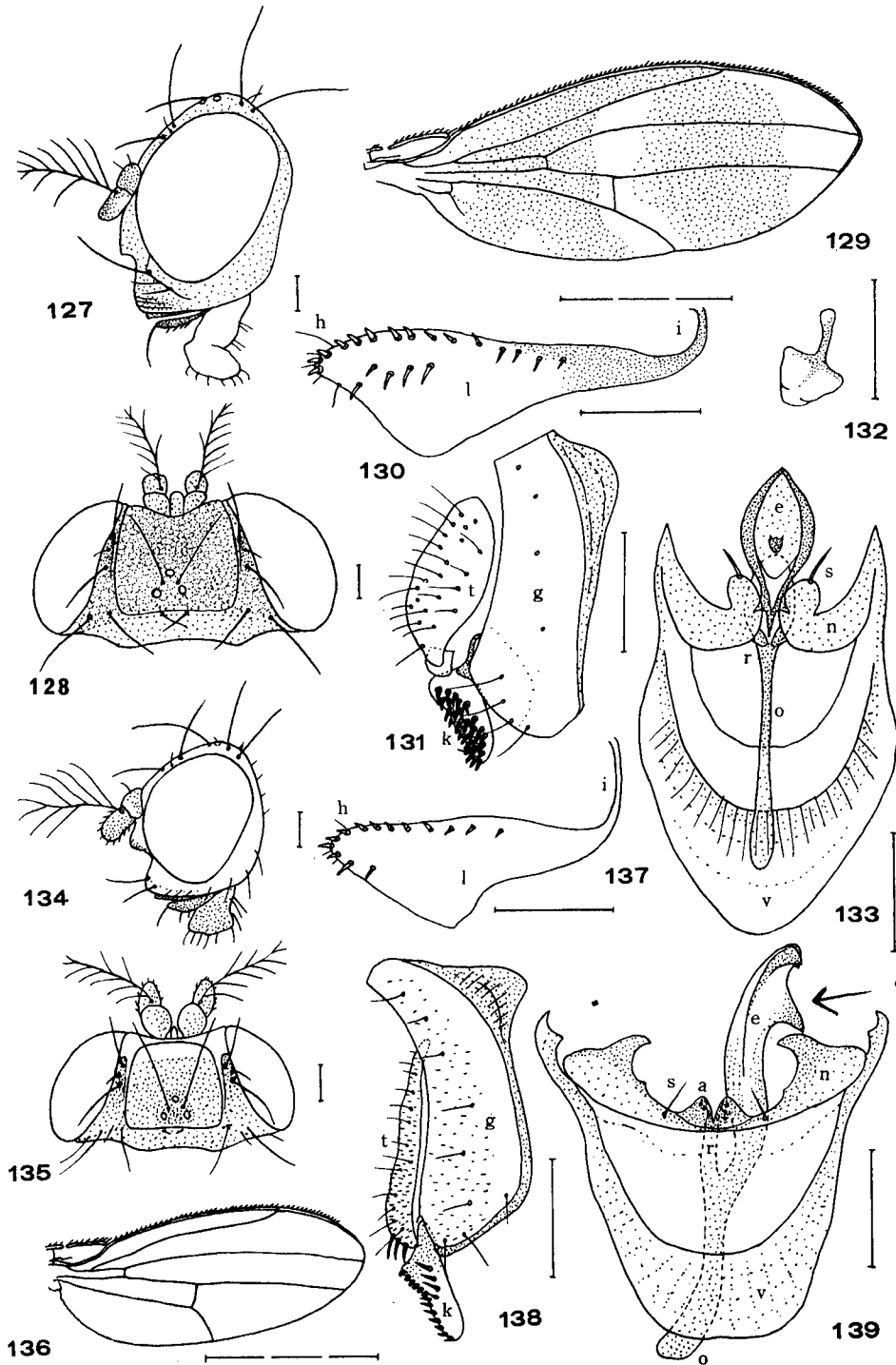
(Text-figs. 127–133)

♂, ♀. Body about 2.5 mm. Head slightly broader than thorax. Eyes dark reddish brown with thick long grey pilosity. Antennae with second segment black ; third orange-brown, twice as long as broad. Arista with about six dorsal and two ventral long branches and a small terminal fork. Palpus black, slender, with a very long apical black seta and a few shorter ventral setae. Ocellar triangle bluish black, flat, not sharply demarcated. Mouth-parts black, thick. Periorbit bluish black, moderately shining, granulose, somewhat convex, three-fourths as long as front. Front moderately shining black, slightly bluish, flat, quadrate, granulose. Face moderately shining black, slightly bluish, not depressed ; buccal margin with a few transverse fine linear grooves. Carina high, black, broader below, ventrally reaching three-fifths length of face, flat above. Cheek moderately shining black, one-fifth as broad as the greatest diameter of eye. Occiput black. Postverticals slender. Anterior reclinate orbital minute, outside and behind proclinate, thrice as distant from posterior reclinate as from proclinate ; proclinate two-thirds as long as posterior reclinate. Vibrissae long, stout, succeeding orals short.

Mesonotum moderately shining black, granulose. Scutellum velvety black, somewhat pollinose at anterolateral corners. Thoracic pleura moderately shining black, slightly bluish. Two long humerals, lower longer. Acrostichal hairs in six sparse and somewhat irregular rows. Anterior dorsocentrals about three-fourths as long as posteriors ; distance between anterior and posterior dorsocentrals four-sevenths distance between anterior pair. Anterior scutellars divergent, four-ninths as long as posteriors, which are nearly parallel and subequally distant from each other and from anteriors. Sterno-index about 0.3. Legs yellow, fore tarsi and basal half of fore femur black ; tips of mid and hind femora somewhat dark. Fore femur with a row of spinules anteroventrally on distal half and a row of long hairs ventrally on distal half. Front metatarsi as long as next three segments together, mid and hind metatarsi subequal to the other segments together. Preapicals on all legs ; apicals on mid leg. Wings with two large black spots, one triangular, basal to posterior crossvein, and the other round, large, outside posterior crossvein ; wing tip slightly pointed.  $R_{2+3}$  weakly curved to *costa* at tip ;  $R_{4+5}$  and *M* nearly parallel. C-index about 1.8 ; 4V-index about 3.3 ; 4C-index about 2.3 ; 5x-index about 2.1 ; Ac-index about 3.8. C1-bristle one ; C3-fringe on basal five-sevenths. Halteres greyish brown, basally white, outer margin black. Abdominal tergites elongate, glossy black, somewhat purplish, slightly grey pollinose.

Periphallallic organs dark brownish black. Genital arch slightly broader below, ventrally truncate obliquely, sparsely setigerous ; heel low, rounded. Anal plate fusiform, setigerous,





FIGS. 127-139. 127-133, *Liodrosophila bimaculata* sp. n. 127, ♂ head, lateral aspect ; 128, ♂ head, dorsal aspect ; 129, wing ; 130, ♀ egg-guide ; 131, periphallic organs, lateral aspect ; 132, ejaculatory apodeme ; 133, phallic organs, ventral aspect. 134-139, *Liodrosophila onchopyga* sp. n. 134, ♂ head, lateral aspect ; 135, ♂ head, dorsal aspect ; 136, ♂ wing ; 137, ♀ egg-guide ; 138, periphallic organs, lateral aspect ; 139, phallic organs, ventral aspect.

caudal tip somewhat elongated below. Clasper elliptical, with about three rows of black teeth along outer margin. Decasternum orange, small, oval. Phallic organs: Aedeagus black, medially paler, rhombic in ventral aspect, basally with a pair of short triangular vertical rods; apodeme slender, black, nearly twice as long as aedeagus. Anterior paramere fused to hypandrium, without prominent sensilla. Hypandrial plate crescentic, brown, inferiorly with a stout short submedian spine. Ventral fragma large, ovoid, dark brown. Ejaculatory apodeme with black stalk and dark brown triangular plate. PI = 0.8. p.f. = aBCdef<sub>0</sub>g<sub>0</sub>HIklmN. Egg-guide lobe pale orange, triangularly pointed apically, basally tapering and black, with about eighteen marginal and five discal orange teeth, subapically with a rather stout yellow hair above and below. Basal isthmus short, black.

Holotype ♂. EAST NEPAL: Taplejung District, below Sangu, by stream in shady ravine, c. 6,000', 30.X.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes: 2 ♀, same data as holotype; 1 ♀, Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 (R.L.C.), BMNH (2 ♀), and the Tokyo Metropolitan University (1 ♀, from Sangu).

Easily distinguished from other members of the genus *Liodrosophila* in having two large black markings on wings, front and mesonotum granulose.

### *Liodrosophila onchopyga* sp. n.

(Text-figs. 134-139)

♂, ♀. Body about 1.0-1.5 mm., glossy black. Head broader than thorax. Eyes dark red, very sparsely pubescent. Antennae with second segment dark orange, third narrower, dark yellow, anteriorly and apically black. Arista with about four dorsal and two ventral long branches and a large terminal fork. Palpus black, with a fine long terminal seta and a few short ventral setae. Ocellar triangle glossy brownish black, convex. Periorbit glossy brownish black, convex, anteriorly narrowing, four-fifths as long as front. Front flat, glossy brownish black, shining blue, anterior one-fourth sometimes orange-brown, anteriorly one-third broader than length down middle; posteriorly two-thirds as broad as head width. Face yellowish grey, concave. Carina high, narrow, yellowish grey, half as long as face. Clypeus black. Cheek yellowish grey, anterior corner black, one-sixth as broad as the greatest diameter of eye. Occiput black. Postverticals minute, upright. Anterior reclinate orbital minute, outside and slightly behind proclinate, a little nearer to posterior reclinate than to proclinate; proclinate slightly shorter than posterior reclinate. Two well developed orals, second a little shorter than vibrissa.

Mesonotum black, glossy, slightly bluish, with fine punctures, without pubescence. Scutellum velvety black, tip grey pollinose. Thoracic pleura greyish brown, glossy. Three long humerals, uppermost one somewhat shorter than others. Acrostichal hairs in two rows. Anterior dorsocentrals about half as long as posteriors; distance between anterior and posterior dorsocentrals half distance between anterior pair. Anterior scutellars nearly parallel, less than half as long as posteriors; posteriors longer than scutellum, slightly more distant from each other than from anteriors. Legs yellow; mid and hind metatarsi longer than next three segments together, front metatarsi slightly shorter than next three segments together. Preapicals prominent on hind leg; apicals on mid leg. Wing hyaline, crossveins clear;  $R_{2+3}$  gently curved to *costa* apically;  $R_{4+5}$  and *M* somewhat convergent apically. C-index about 1.6; 4V-index about 2.0; 4C-index about 1.5; 5x-index about 1.7; Ac-index about 3.2. C1-bristle one, short;

C<sub>3</sub>-fringe on basal half. Halteres yellowish orange. Abdominal tergites glossy dark brown, slightly shining purple.

Periphallic organs : Genital arch brownish black, pubescent, dorsally narrowing, ventrally triangularly pointed ; heel high, rounded. Anal plate very narrow, ventrally broadened, pale yellowish brown, pubescent and setigerous. Clasper yellowish brown, elongate below, broader and darker basally, distally with a concave row of about fourteen marginal black teeth, discally with about three long stout black spines. Phallic organs : Aedeagus robust, brown, rod-shaped, subapically with a large dorsal triangular black projection (thus the specific name), gently sinuous in S-form in lateral aspect, basally with a black narrow vertical rod and a long apically broadened black apodeme. PI = 1.5. Anterior paramere brown, minute, triangular, with a few sensilla, attached to vertical rod of aedeagus. Posterior parameres apparently absent. Hypandrial plate triangular, brown, apically with a large black hooked process. Ventral fragma quadrate, large, caudally with a pair of small black triangular submedian processes. p.f. = ab'CdEfg<sub>0</sub>HIKLmn. Egg-guide lobe brownish black, basally darker, broad, apically rounded, projecting mediodorsally, with about thirteen brown marginal teeth and a discal dorsal one. Basal isthmus rather long, dark brown.

Holotype ♂. EAST NEPAL : Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype, BMNH.

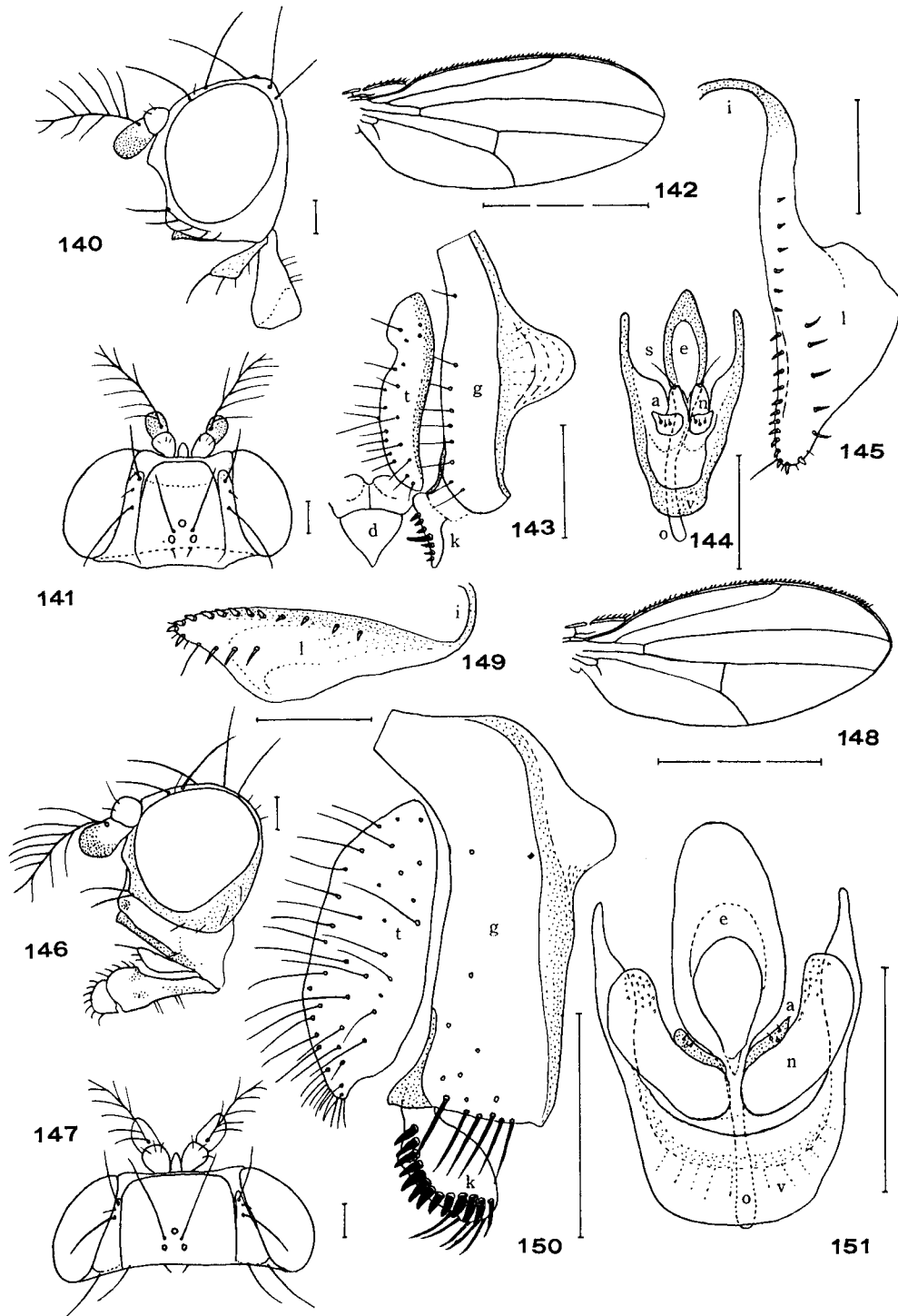
Paratypes : Taplejung District, 6 ♂, same data as holotype ; 2 ♂, 1 ♀, Sangu, rotting fruits of Bhor tree on ground, c. 6,000', 7-31.xi.1961 ; 3 ♂, 1 ♀, below Sangu, by stream in shady ravine, c. 6,000', 30.x.1961 ; 1 ♂, 1 ♀, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961. Arun Valley, 1 ♀, evergreen shrubs on sandy shore, below Tumlingtar, River Sabhaya, west shore, c. 1,800'. 9-17.xii.1961 ; 4 ♂, 7 ♀, above River Sabhaya, east shore, swept from dwarf bamboos in deep ravine, c. 2,000', 12.xii.1961 ; 13 ♀, east shore of River Arun, below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961 ; 2 ♂, 4 ♀, below Tumlingtar, west shore, fermented millet seeds on shore, c. 1,800', 24.xii.1961 (R.L.C.), BMNH : 1 ♂, from rotting fruits, Sangu, deposited in the Tokyo Metropolitan University.

Similar to *L. rugulosa* (de Meijere, 1915) (Java) in having brownish black finely punctured mesonotum, velvety black scutellum, and dark anterior corners of face, but differs from it in having only two rows of acrostichal hairs (six in *rugulosa*), yellow halteres (black in *r.*), and yellow fore and mid femora (black in *r.*).

### *Liodrosophila fuscipennis* sp. n.

(Text-figs. 140-145)

♂, ♀. Body about 1.7-2.2 mm. Head broader than thorax. Eyes dark red, bare. Antennae with second segment conical, orange-brown ; third mainly black, as broad as long. Arista with about five dorsal and two ventral long branches and a large terminal fork. Palpus distally broadened, with a slender apical and two shorter ventral setae. Ocellar triangle somewhat convex, shining black. Periorbit black, anteriorly narrowing, three-fifths as long as front. Front shining brownish black, anteriorly broader than length down middle ; posteriorly about two-thirds as broad as head width. Clypeus black. Postverticals minute, upright. Face glossy brownish black, greyish white along eye margin. Carina high, brownish black, narrow, short,



FIGS. 140-151. 140-145, *Liodrosophila fuscipennis* sp. n. 140, ♂ head, lateral aspect ; 141, ♂ head, dorsal aspect ; 142, ♂ wing ; 143, peripheral organs, lateral aspect ; 144, phallic organs, ventral aspect ; 145, ♀ egg-guide. 146-151, *Liodrosophila nitida* Duda. 146, ♂ head, lateral aspect ; 147, ♂ head, dorsal aspect ; 148, ♂ wing ; 149, ♀ egg-guide ; 150, peripheral organs, lateral aspect ; 151, phallic organs, ventral aspect.

about half as long as face. Cheeks brownish black, grey along eye margin, two-sevenths as broad as the greatest diameter of eye. Occiput black. Anterior reclinate orbital minute, equally distant from posterior reclinate and from proclinate; proclinate slightly inside others and shorter than posterior reclinate. Second oral about two-thirds as long as vibrissa.

Mesonotum usually brownish black, glossy, without punctures. Scutellum velvety black. Thoracic pleura dark brown, darker below and caudally. Three humerals. Acrostichal hairs in about six rows. Distance between anterior and posterior dorsocentrals about three-fifths distance between anterior pair; anterior dorsocentrals about two-thirds as long as posteriors. Anterior scutellars divergent; posteriors twice as long as anteriors, equidistant from each other and from anteriors. Sterno-index about 0.5. Legs dark yellow; fore and mid coxae and basal two-thirds of fore femur black; hind coxa and trochanter yellowish white. Front and hind metatarsi subequal to the next three segments together, mid metatarsi subequal to the remaining segments together. Preapicals on mid and hind legs; apicals strong on mid leg. Wings comparatively large, somewhat fuscous, crossveins clear.  $R_{2+3}$  gently curved to *costa* at tip;  $R_{4+5}$  and  $M$  nearly parallel. C-index about 1.1; 4V-index about 1.9; 4C-index about 1.6; 5x-index about 2.0; Ac-index about 4.5. C1-bristles two, lower weaker. C3-fringe sparse, on basal two-fifths. Halteres yellow. Abdominal tergites glossy black, somewhat purplish.

Periphallic organs: Genital arch dark brown, rather narrow, posterior margin setigerous, dorsally and ventrally only moderately narrowed, ventral tip rounded; heel low, angular, somewhat curved upward; toe only slightly swollen. Anal plate yellowish brown, elongate, setigerous, basal margin dark. Clasper yellow, crescentic, projecting below genital arch, outer margin with a concave row of about nine black pointed teeth, the row not reaching ventral tip of clasper, and with a stout black submedian bristle. Decasternum large, yellowish brown, triangular. Phallic organs: Aedeagus dark brown, medially yellowish brown, fusiform in ventral aspect; basal apodeme slender, slightly longer than aedeagus.  $PI = 1.2$ . Anterior paramere small, conical, subapically with a few sensilla. Posterior parameres apparently fused to decasternum. Ventral fragma V-shaped, hypandrial plate yellowish brown, apically with a stout yellow submedian spine. p.f. = aBCdEfgHIklm'N. Egg-guide lobe yellowish orange, proximally darker, tip obtusely pointed, mediodorsally much swollen, with about twenty marginal and four discal yellowish brown teeth.

Holotype ♂. EAST NEPAL: Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes: 4 ♂, 4 ♀, Taplejung District, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961; 2 ♀, collected with holotype; 3 ♀, below Sangu, by stream in shady ravine, c. 6,000', 30.x.1961; 1 ♂, river banks below Tamrang Bridge, c. 5,500', x-xi.1961; 3 ♂, below Sangu, mixed vegetation on sheltered slopes above river, c. 4,000', 3.i.1962; 1 ♀, Sangu, mixed vegetation in deep gully, c. 6,200', 2.i-13.ii.1962; 1 ♀, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', i-ii.1962; 1 ♂, edge of mixed forest above Sangu, c. 6,200', 17.x-i.xi.1961. 1 ♀, Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961 (R.L.C.), BMNH; 1 ♀, at the Tokyo Metropolitan University.

Resembles *L. aerea* Okada, 1956 (Japan) especially in the shape of phallic and periphallic organs, and somewhat fuscous wings, but differs from it in having front mesonotum, and abdominal tergites not shining metallic blue, and clasper teeth less numerous, the row of teeth not extending to the lower tip of the clasper.

*Liodrosophila nitida* Duda

(Text-figs. 146-151)

*Liodrosophila nitida* Duda, 1922 : 157 (Annam, Formosa) ; Duda, 1924b : 241 (Formosa).*Liodrosophila nitida* var. *marginifrons* Duda, 1926 : 53 (Sumatra).

♂, ♀. Body about 1.6 mm. Head as broad as thorax. Eyes reddish brown, bare, oval in lateral aspect. Antennae with second segment large, rounded ; third black, basally brown, apically swollen and rounded, one and a half times as long as broad. Arista with about five dorsal and two ventral long branches and a large terminal fork. Palpus black, with a long apical and a few shorter ventral setae. Ocellar triangle black, glossy. Periorbit glossy chestnut-black, anteriorly narrowing, four-fifths as long as front. Front glossy blue-black, anterior one-fourth orange-brown ; posteriorly broadened and about two-thirds as broad as head width ; anteriorly broader than length down middle. Cheeks dark brown, pale along eye margin, about one-fourth as broad as the greatest diameter of eye, narrow below. Occiput black. Anterior reclinate orbital minute, twice as distant from posterior reclinate as from proclinate, outside latter. Posterior reclinate stout, one and a half times as long as proclinate. Second oral slightly shorter than vibrissa, which is relatively weak.

Mesonotum glossy bluish black, strongly convex, without punctures nor pubescence. Scutellum short, velvety black, apically with grey pubescence. Thoracic pleura glossy black, somewhat bluish. Two subequal humerals. Acrostichal hairs in six rows. Anterior scutellars divergent, two-thirds as long as posteriors, which are nearer to anteriors than to each other. Distance between anterior and posterior dorsocentrals two-thirds distance between anterior pair ; anterior dorsocentrals three-fourths as long as posteriors. Sterno-index about 0.9. Legs yellowish brown ; femora black, glossy, apically paler. Mid metatarsi as long as the other segments together, fore and hind metatarsi subequal to next three segments together. Pre-apicals prominent on fore and mid legs ; apicals on mid leg. Wings hyaline, veins brown, crossveins clear. *Costa* reaching *M*, weak beyond  $R_{4+5}$ ;  $R_{2+3}$  curved to *costa* at tip ;  $R_{4+5}$  and *M* slightly convergent at tip. C-index about 1.2 ; 4V-index about 1.8 ; 4C-index about 1.7 ; 5x-index about 1.3 ; Ac-index about 4.0. C1-bristle one, short ; C3-fringe on basal two-thirds. Halteres black, stalk yellow, knob large and triangular. Abdominal tergites glossy black, somewhat shining blue. Abdominal sternites small, quadrate, surrounded by pale membrane.

Periphallic organs brownish black. Genital arch dorsally abruptly narrowed, ventrally slightly broadened and truncate below, apicoventrally black, projected caudally. Clasper oval, with a strongly convex row of about thirteen large black teeth, occupying entire outer margin, subapically with a large black spine on inferior surface. Anal plate elliptical, large, setigerous, ventrocaudal end with a tuft of short hairs. Phallic organs dark brown. Aedeagus elliptical in ventral aspect, medially pale ; basal apodeme slightly shorter than aedeagus, slender, straight, PI = 1.6. Anterior paramere small, elongate, subapically with a few sensilla. Hypandrial plate large, crescentic, apico-inferiorly with numerous minute tubercles. Ventral fragma quadrate, lateral arm pointed. p.f. = aBCdEFgHIklm'N. Egg-guide lobe brown, basally darker, fusiform, with both ends pointed, with about thirteen marginal and four long discal dark brown teeth, ultimate marginal tooth largest. Basal isthmus brown, straight, one-fifth as long as lobe.

Taplejung District, old mixed forest above Sangu, c. 6,200', ix-x.1961, 1 ♂ ; Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x.1961, 1 ♀ ; below Sangu, edge of small mixed wood, c. 6,000', 4.xi.1961, 1 ♂ ; below Sangu, by stream in shady ravine, c. 6,000', 30.x.1961, 1 ♀ ; Dobhan, east bank of River Tamur, mixed vegetation by stream in deep gully, c. 3,500', i-ii.1962, 4 ♂, 1 ♀. Arun Valley, above River Sabhaya, east shore, swept from dwarf bamboos in deep ravine, c. 2,000', 12.xii.1961, 14 ♂, 15 ♀ ; below Tumlingtar, River Sabhaya, west shore, fermented

millet seeds on shore, c. 1,800', 24.xii.1961, 1 ♀; east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 3 ♂ (*R.L.C.*).

Distribution : Nepal (new locality), Sumatra, Viet-Nam, Formosa.

Apart from its darker body, identical with the original form (Formosa), both having glossy blue metallic mesonotum without punctures, front anteriorly orange, six rows of acrostichal hairs, all femora black, somewhat convergent  $R_{4+5}$  and  $M$ , and anteriorly narrowing relatively short periorbit.

### **PARAMYCODROSOPHILA** Duda

*Paramycodrosophila* Duda, 1924a : 191.

Type-species : *Drosophila pictula* de Meijere, 1911 : 412 (Java).

#### ***Paramycodrosophila pictula*** (de Meijere)

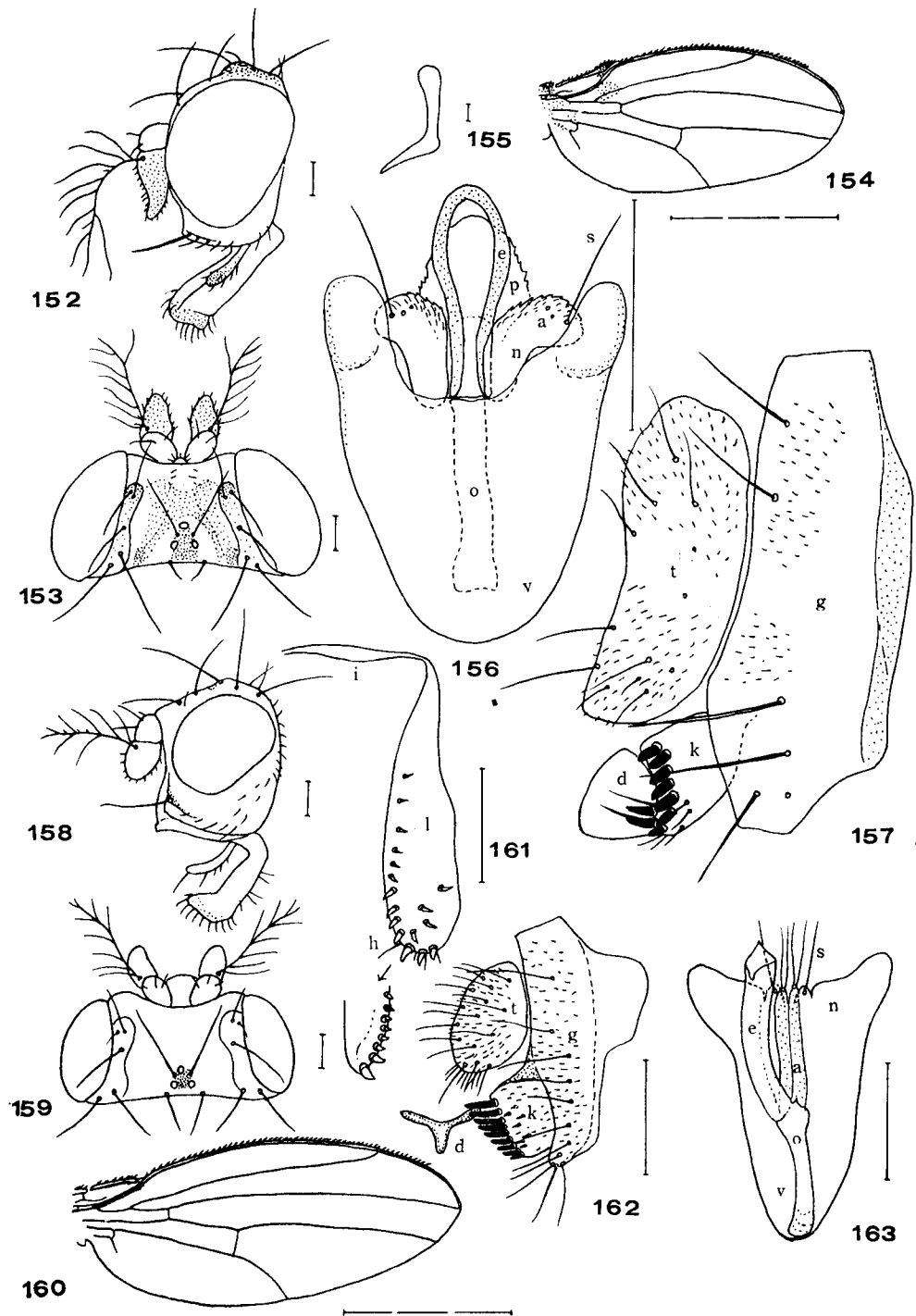
(Text-figs. 152-157)

*Drosophila pictula* de Meijere, 1911 : 412 (Java).

*Paramycodrosophila pictula* (de Meijere) Duda, 1924a : 191 ; 1924b : 241 (Java, Formosa) ; Duda, 1926 : 58 (Sumatra) ; Wheeler and Takada, 1964 : 206 (Palau).

♂. Body about 1.5 mm., greyish white with black patches. Head slightly broader than thorax. Eyes large, dark red, slightly purplish, sparsely pilose. Antennae with second segment yellow, conical ; third black, long, with long pubescence, anterior margin somewhat concave. Arista with six dorsal and one long subapicoventral branches and a large terminal fork. Palpus black, basally paler, slender, with a long apical seta. Ocellar triangle black. Periorbits two-thirds as long as front, straight, greyish white, medially narrowing, anterior end black. Front greyish brown, anteriorly pale yellow, posterolateral corner dark, pale around ocellar triangle ; anteriorly slightly narrower than length down middle ; posteriorly wider, half as broad as head. Face greyish white, parallel-sided. Carina high, narrow, short, pale grey, white at lower tip. Cheeks white, about one-sixth as broad as the greatest diameter of eye. Occiput brown. Postverticals minute. Anterior reclinate orbital outside and slightly before proclinate, as long as posterior reclinate ; posterior reclinate slightly shorter than proclinate, equidistant from proclinate and inner vertical. Vibrissae long, stout ; succeeding orals fine.

Mesonotum greyish white, pollinose, with black clouds as following : a large median one anteriorly bilobed to reach anterior margin, a pair of large lateral ones above suture, a pair of smaller lateral ones above humeral callus, a large caudomedian one anteriorly narrowing and mediolongitudinally pale. Scutellum flat, black, grey pollinose, apically pale yellow. Thoracic pleura greyish white, pollinose, with two long broad black stripes. Humeral callus whitish grey. Two long subequal humerals. Acrostichal hairs in eight rows. Posterior dorsocentrals twice as long as anteriors ; distance between anterior and posterior dorsocentrals slightly more than one-third distance between anterior pair. Anterior scutellars convergent, as long as posteriors and as scutellum ; posteriors nearer to each other than to anteriors. Sterno-index about 0.5 ; median sternopleural fine but long. Legs yellowish grey, with black rings, two on fore femur, one on mid and hind femora, and two on fore tibia. Mid and hind metatarsi as long as next three segments together, front metatarsi subequal to next two segments together. Preapicals on all legs ; apicals stout on mid leg. Wings broad, hyaline, rounded at tip, with dark cloud below second costal break and below it between  $R_{2+3}$  and  $M$ . Second costal section apically much swollen and black. Second costal break deep.  $R_{2+3}$  nearly straight ;  $R_{4+5}$  and  $M$  nearly parallel. C-index about 3.0 ; 4V-index about 2.3 ; 4C-index about 1.7 ; 5x-index about 1.9 ;



FIGS. 152-163. 152-157, *Paramycodrosophila pictula* de Meijere, ♂. 152, head, lateral aspect; 153, head, dorsal aspect; 154, wing; 155, ejaculatory apodeme; 156, phallic organs, ventral aspect; 157, periphallal organs, lateral aspect. 158-163, *Chaetodrosophilella coei* sp. n. 158, ♂ head, lateral aspect; 159, ♂ head, dorsal aspect; 160, ♂ wing; 161, ♀ egg-guide; 162, periphallal organs, lateral aspect; 163, phallic organs, dorsal aspect.



Ac-index about 3.8. C<sub>1</sub>-bristle one, short ; C<sub>3</sub>-fringe on basal half. Halteres white. Abdominal tergites mainly black ; 2-5T each with a pair of white spots on anterior margin ; 6T white.

Periphallallic organs pale yellow. Genital arch not narrowing above, pubescent and rather weakly setigerous, subapically dilated ; heel high. Clasper proximally narrowing, with about seven large black teeth in a weakly concave row on entire distal margin and two large subapical black teeth. Anal plate separated from genital arch, oblong, large, setigerous and pubescent. Phallic organs pale yellow. Aedeagus elliptical in ventral aspect ; basal apodeme rod-shaped, as long as aedeagus. PI = 1.0. Anterior paramere fused to oval hypandrial plate, apically with about two sensilla ; hypandrial plate with a long submedian hair inserted outside sensilla. Posterior parameres fused to become a fan-shaped oval flap, lateral margin serrated. Ventral fragma large, oval. p.f. = abCdEfgHIKlm'N. Ejaculatory apodeme pale yellow with narrow plate and distally broadened stalk, which is slightly longer than the plate.

Arun Valley, above River Sabhaya, east shore, swept from dwarf bamboos in deep ravine, c. 2,000', 12.xii.1961, 1 ♂ (R.L.C.).

Distribution : Nepal (new locality), Java, Sumatra, Formosa, Palau.

### **CHAETODROSOPHILELLA** Duda

*Chaetodrosophilella* Duda, 1923 : 40.

*Chaetodrosophila* Duda, 1924a : 180.

Type-species : *Drosophila quadrilineata* de Meijere, 1911 : 396 (Java).

### ***Chaetodrosophilella coei* sp. n.**

(Text-figs. 158-163)

♂, ♀. Body about 1.6 mm., slender. Head somewhat broader than thorax. Eyes oval, dark red, relatively small, finely pilose. Antennae with second segment greyish brown ; third oval, grey, pubescent, broader than second joint. Arista with about four dorsal and two ventral branches and a moderate terminal fork. Palpus yellowish grey, slender, curved upward, with a long subapical and a few shorter ventral setae. Ocellar triangle black. Periorbit grey, large, anteriorly rounded, medially narrowing, three-fourths as long as front. Front yellowish grey, convex, anteriorly paler, depressed along margin of frontal triangle, anteriorly one and a half times as broad as length down middle ; posteriorly two-thirds as broad as head width. Clypeus yellowish grey. Cheeks yellowish grey, broad, nearly half as broad as the greatest diameter of eye. Occiput yellowish grey. Postverticals long. Anterior reclinate orbital minute, just outside proclinate, which is slightly shorter than posterior reclinate. Mouth-parts slender. Only one long oral. Face broad, yellowish grey, anteriorly rounded, flat, parallel-sided. Carina low, short, pale, half as long as front.

Mesonotum greyish brown, somewhat pollinose, caudolateral side fuscous. Scutellum greyish brown. Thoracic pleura pale, darker above ; humeral callus dark. Thorax rather elongate. Two long humerals. Acrostichal hairs in six rows. Three pairs of dorsocentrals ; presutural pair slightly outside others ; distance between two posterior pairs four-fifths distance between individuals of each pair. Sterno-index about 0.6. Legs yellowish grey, tarsi slightly darker ; fore femur with a row of a few long black setae below, without a row of ventral spinules. All metatarsi as long as next three segments together. Preapicals on all legs ; apicals on fore and mid legs. Wings slightly fuscous, relatively narrow, weakly pointed at tip.  $R_{4+5}$  and  $M$  distally somewhat divergent, medially narrowing. Crossveins clear. C-index about 2.5 ; 4V-index about 2.7 ; 4C-index about 1.4 ; 5x-index about 2.6 ; Ac-index about 2.5. C<sub>1</sub>-bristles two, subequal ; C<sub>3</sub>-fringe on basal half. Halteres greyish brown, knob pale. Abdominal tergites yellowish grey, each with a broad black medially contiguous caudal transverse band. Female cercus yellow, longer than broad.

Periphallalic organs yellowish grey. Genital arch pubescent, ventrally narrowing, pointed caudoventrally; caudal margin with about twelve setae. Clasper quadrate, large, pubescent, with a row of about ten large pointed black teeth in a straight row on nearly entire distal margin; inner surface with about eight short setae. Anal plate, oval, separated from genital arch, setigerous and pubescent, ventral tip with a tuft of short setae. Phallic organs: Aedeagus pale brown, rod-shaped, slightly curved ventrally, apically triangularly pointed. Basal apodeme two-thirds length of aedeagus, straight.  $PI = 1.3$ . Anterior paramere elongate, orange-yellow, basally attached to aedeagus, apically partially fused to hypandrium, rounded, and with about two long sensilla. Hypandrial plate conical, with a stout submedian spine outside sensilla. Ventral fragma narrow, triangular, lateral arms apically rounded. p.f. = aBCdEfg<sub>0</sub>HIKIMN. Decasternum triangular, orange-brown, lateral sides concave. Egg-guide lobe yellowish brown, darker below, elongate elliptical, rounded to tip, basally narrowing, with about thirteen dark brown marginal and four discal teeth, distal marginal teeth being larger. Basal isthmus dark, long, moderately swollen, medially about half as long as the lobe.

Holotype ♂. EAST NEPAL: Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes: 1 ♂, same data as holotype; 1 ♀, same locality as holotype, ix-x. 1961; 1 ♂, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', i-ii.1962; 1 ♀, *ibid.*, mixed shrubs in deep gorge, c. 6,200', x-xi.1961; 1 ♀, above Sangu, evergreen scrub, c. 6,500', 5-13.x.1961; 1 ♀, *ibid.*, mixed vegetation in dried-up ravine, c. 6,800', 17.ii.1962; 1 ♂, 1 ♀, Sangu, mixed vegetation in deep gully, c. 6,200', 2.i-13.ii.1962 (R.L.C.).

Allied to *C. quadrilineata* (de Meijere, 1911) (Java, etc.), but differs in having mesonotal dark stripes obscurely demarcated (distinct in *quadrilineata*), six rows of acrostichal hairs (four in *q.*), two long sternopleurals (one long and two short in *q.*), and no row of spinules on fore femur.

### SCAPTOMYZA Hardy

*Scaptomyza* Hardy, 1849: 361.

Type-species: *Drosophila graminum* Fallén, 1823: 8 (Europe).

#### KEY TO SPECIES

- 1 Only one prominent, median, humeral. Acrostichal hairs in two rows. ♂ genitalia with paralobes. ♀ egg-guide lobe weakly sclerotized, with a few subapical long setae . . . . . ***S. (Parascaptomyza) pallida*** (p. 59)
- Two or three prominent humerals. ♂ genitalia without paralobes. Egg-guide lobe well sclerotized, with numerous short stout bristles . . . . . ***S. (Scaptomyza)*** 2
- 2 Two rows of acrostichal hairs. Legs mostly yellowish grey. Genital arch narrowly pointed below . . . . . ***parasplendens*** (p. 59)
- Four rows of acrostichal hairs. Genital arch blunt below . . . . . 3
- 3 Arista without branches below terminal fork. Clasper with a row of large stout pointed teeth occupying entire outer margin. Legs yellowish grey, ultimate two tarsal segments dark. Ocellar triangle black, pollinose . . . . . ***melanissima*** (p. 62)
- Arista with one branch below fork. Clasper with a row of marginal teeth on basal two-thirds on outer margin, with numerous discal teeth on lower one-third. Legs mostly black, fore coxa yellow. Ocellar triangle matt velvety-black . . . . . ***silvata*** (p. 63)

Subgenus **PARASCAPTOMYZA** Duda

*Parascaptomyza* Duda, 1924 : 203.

Type-species : *Drosophila pallida* Zetterstedt, 1847 : 2571 (Europe).

/ *Scaptomyza (Parascaptomyza) pallida* (Zetterstedt)

*Drosophila pallida* Zetterstedt, 1847 : 2571 (Europe).

*Scaptomyza (Parascaptomyza) pallida* (Zetterstedt) Hackman, 1959 : 41 (Asia, Australia, Hawaii, N. America, S. America, Europe, N. Africa, etc.) ; Wheeler and Takada, 1964 : 196 (Bonin Is.).

*Scaptomyza disticha* Duda, 1921 : 64 (N. Africa).

*Scaptomyza (Parascaptomyza) disticha* Duda, 1935 : 58 (Orbis Terrarum) : Okada, 1956 : 68 (Japan).

*Parascaptomyza disticha* (Duda) ; Basden, 1952 : 201 (Europe) ; Collin, 1953 : 149 (Europe) ; Basden, 1954 : 648 (Scotland) ; Hackman, 1955 : 80 (Finland).

Taplejung District, Sangu, yellow blooms of cultivated Composite (*Guizotia abyssinica* Cassini), c. 6,200', 16-29.x.1961, 1 ♂ ; *ibid.*, mixed vegetation by stream in gully, c. 6,200', ix-x.1961, 1 ♀ ; *ibid.*, xi.1961-i.1962, 1 ♀ ; below Sangu, mixed vegetation on sheltered slope above River Tamur, c. 4,000', 3.i.1962, 1 ♂, 2 ♀ ; Dobhan, shady places on shrubby slope above River Tamur, c. 3,500', 21-27.i.1962, 1 ♂ ; ex *Lycopodium* sp. on slope above Sangu, c. 7,800', 11-14.i.1962, 2 ♂, 5 ♀ ; above Sangu, mixed vegetation in dried-up ravine, c. 6,800', 16.ii.1962, 1 ♀. Arun Valley, east shore of River Arun below Tumlingtar, swept from *Ricinus communis* L., c. 1,800', 14-23.xii.1961, 7♂, 7 ♀ ; *ibid.*, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 1 ♀, (R.L.C.).

Distribution : Nepal (new locality), Viet-Nam, Java, China, Formosa, Japan, Korea, Siberia, Iraq, Turkestan, Bonin Is., Hawaii, N. America, S. America, Europe, Canary Is., Azores, Madeira, Cape Verde Is., N. Africa.

All of the Nepalese specimens examined belong to the type with dark body coloration.

Subgenus **SCAPTOMYZA** Hardy

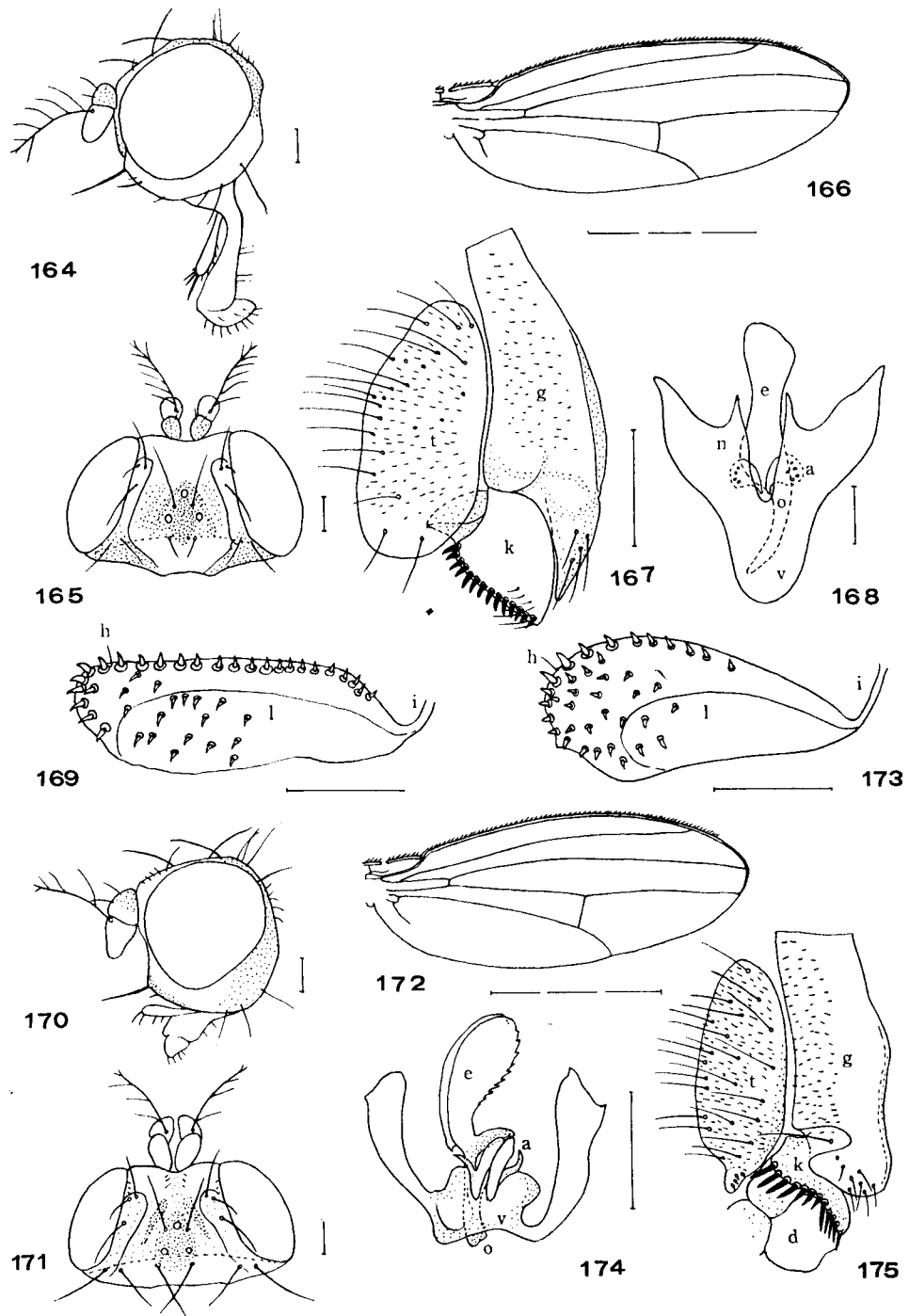
*Scaptomyza* Hardy, 1849 : 361.

Type-species : *Drosophila graminum* Fallén, 1823 : 8 (Europe).

*Scaptomyza (Scaptomyza) parasplendens* sp. n.

(Text-figs. 164-169)

♂, ♀. Body about 2.2 mm., dark greyish brown. Head slightly broader than thorax. Eyes dark red, with thick long grey pilosity. Antennae with second segment black ; third yellowish orange. Arista with about five dorsal branches, a long ventral one, and a small terminal fork. Palpus yellow, slender, apically dark. Ocellar triangle black, large, somewhat grey pollinose. Periorbit grey, somewhat pollinose, three-fourths as long as front, anteriorly slightly broadened. Front mostly yellowish grey, dark orange between periorbits and ocellar triangle, dark around ocellar triangle, anteriorly somewhat narrowing and narrower than median length, posteriorly nearly half as broad as head width. Clypeus pale brown, narrow. Face white, flat, parallel-



FIGS. 164-175. 164-169, *Scaptomyza parasplendens* sp. n. 164, ♂ head, lateral aspect ; 165, ♂ head, dorsal aspect ; 166, ♂ wing ; 167, peripheral phallic organs, lateral aspect ; 168, phallic organs, ventral aspect ; 169, ♀ egg-guide. 170-175, *Scaptomyza melanissima* sp. n. 170, ♂ head, lateral aspect ; 171, ♂ head, dorsal aspect ; 172, ♂ wing ; 173, ♀ egg-guide ; 174, phallic organs, ventral aspect ; 175, peripheral phallic organs, lateral aspect.

sided, broad, mediolaterally with a small black spot. Carina very low, white. Cheeks yellowish white, black above, about one-fifth as broad as the greatest diameter of eye. Occiput black, medially yellow. Anterior reclinate orbital about half as long as proclinate, just outside proclinate, much nearer to proclinate than to posterior reclinate. Posterior reclinate slightly longer than proclinate. Vibrissa long, stout; second oral about one-third as long as vibrissa; succeeding orals shorter.

Mesonotum greyish brown, bluish grey pollinose, anteriorly pale, dark along dorsocentral lines and caudomedially. Scutellum grey pollinose, grey-brown, laterally pale. Thoracic pleura greyish brown, pollinose. Two long humerals, lower slightly longer. Acrostichal hairs in two rows. Anterior scutellar long, divergent; posterior scutellar three-fifths as long as anterior, one and a half times as distant from anterior as from each other. Sterno-index 0.6. Legs mostly yellowish grey; coxae yellow; fore tibia and fore tarsi brownish black; last two tarsal segments of mid and hind legs black. Pulvilli white, large. Front metatarsi as long as next two segments together, mid and hind metatarsi as long as next three segments together. Preapicals on all legs; apicals prominent on fore leg. Wings narrow, hyaline; crossveins clear.  $R_{2+3}$  gently curved to *costa* at tip;  $R_{4+5}$  and *M* parallel; *costa* reaching *M*. C-index about 2.6;  $4V$ -index about 1.4;  $4C$ -index about 0.7;  $5x$ -index about 1.8; Ac-index about 3.4.  $C1$ -bristle two;  $C3$ -fringe on basal one-third. Halteres yellow, elongate, dark at tip. Abdominal tergites greyish black, bluish grey pollinose. Abdominal sternites pale grey.

Periphallalic organs: Genital arch brownish black, pubescent, dorsally narrowing, anterior margin with narrow projection below. Clasper brownish black, large, triangular, dorsocaudally with an acute black projection, distally with a convex row of about fourteen pointed black teeth on almost entire margin, and with a few short marginal setae below. Anal plate brownish black, very large, separated from genital arch, ventrally broadened, rounded below, setigerous and pubescent. Phallic organs: Aedeagus yellowish orange, oblong, apically rounded in lateral aspect, basally narrowing. Basal apodeme slender, rod-like, half as long as aedeagus. PI = 2.0. Anterior paramere minute, conical, distally with a few sensilla. Ventral fragma triangular, brownish; lateral arm broad and pointed apically; median notch deep, acute; submedian process narrow, without submedian spine. p.f. = aBCdEfg<sub>0</sub>HikLmn. Egg-guide lobe dark brownish black, robust, distal margin obliquely truncate, with about twenty-four marginal and twenty scattered discal strong black teeth. Basal isthmus short.

Holotype ♂. EAST NEPAL: Taplejung District, Sangu, mixed vegetation in deep gully, c. 6,200', 2.i-13.ii.1962 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes: Taplejung District, 7 ♂, 4 ♀, same data as holotype; 11 ♂, 8 ♀, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962; 1 ♂, 2 ♀, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x.1961; 1 ♂, *ibid.*, clearing in small wood, c. 6,200', 25.xi.1961; 1 ♀, *ibid.*, spray-splashed rocks in shallow ravine c. 6,200', 25-28.x.1961; 1 ♀, *ibid.*, damp evergreen oak forest, c. 9,200', 2-26.xi.1961; 7 ♂, 6 ♀, *ibid.*, mixed vegetation in dried-up ravine, c. 6,800', 16.ii.1962; 2 ♂, below Tamrang Bridge, river banks, c. 5,500', x-xi.1961; 1 ♂, below Sangu, edge of small mixed wood, c. 6,000', 2-26.xi.1961; 1 ♂, *ibid.*, 4.xi.1961; 2 ♀, *ibid.*, mixed vegetation on sheltered slope above river, c. 4,000', 3.i.1962; 2 ♀, *ibid.*, by stream in shady ravine, c. 6,300', 30.x.1961; 3 ♀, Dobhan, east bank of River Tamur, mixed vegetation by stream in deep gully, c. 3,000', i-ii.1962 (R.L.C.), BMNH, 1 ♂, 1 ♀ at the Tokyo Metropolitan University.

Closely allied to *S. subsplendens* Duda, 1935, (East Siberia) especially in having two rows of acrostichal hairs, medially pale occiput, and ♂ with large anal plate, but

differs from it in having paler periorbit (black in *subsplendens*,) mostly yellow front (mostly dark in *s.*), ♂ anal plate as large as in *S. graminum* (Fallén) (smaller in *s.*), and black fore tibia.

***Scaptomyza (Scaptomyza) melanissima* sp. n.**

(Text-figs. 170-175)

♂, ♀. Body about 1.8 mm. Head slightly broader than thorax. Eyes dark purplish brown, thickly pilose, relatively small and oval. Antennae with second segment yellowish orange, dorso-anteriorly darker; third pale yellowish orange, triangular. Arista with five short branches including a moderate fork, without ventral branches. Palpus yellow, apically swollen, with a few stout black ventral setae. Ocellar triangle black, large, grey pollinose, convex. Periorbit broad, black, grey pollinose, anterior tip rounded, about three-fourths as long as front. Front mostly black, grey pollinose, anteriorly orange, especially dark between periorbits and ocellar triangle, with a few frontal hairs, anteriorly narrowing and narrower than length down middle, posteriorly two-thirds as broad as head width. Clypeus small, yellowish grey. Face greyish white matt, concave, wider below. Carina low, narrow, slightly wider below. Cheeks white, posteriorly black, about one-third as broad as the greatest diameter of eye. Occiput black. Postverticals long. Anterior reclinate orbital two-thirds as long as proclinate, just outside proclinate, thrice as distant from posterior reclinate as from proclinate. Posterior reclinate slightly longer than proclinate. Only one long stout black oral.

Mesonotum matt black, bluish grey pollinose, with diffuse median and lateral black longitudinal stripes, lateral pair extending to scutellum. Scutellum flat, bluish black pollinose. Thoracic pleura black, grey pollinose, somewhat bluish. Three long humerals, lowermost longest. Acrostichal hairs in six rows, relatively long. Posterior dorsocentrals more than twice as long as anteriors; distance between anterior and posterior dorsocentrals three-fifths distance between anterior pair. Anterior scutellars very long, divergent, twice as long as scutellum; posteriors about three-fifths as long as anteriors, twice as distant from anteriors as from each other. Sterno-index about 0.7. Legs yellowish grey, last tarsal segment large, black; penultimate black; front and hind metatarsi longer than the other segments together, hind metatarsi subequal to next three segments together. Preapicals on all legs, apicals prominent on mid leg. Wings hyaline, narrow, slightly pointed at tip; crossveins clear.  $R_{2+3}$  medially convex anteriorly, apically gently curved to *costa*;  $R_{4+5}$  and  $M$  somewhat convergent distally. C-index about 4.0; 4V-index about 1.1; 4C-index about 0.5; 5x-index about 1.5; Ac-index about 2.6. C1-bristle one; C3-fringe on basal one-third. Halteres white, knob rounded and large. Abdominal tergites slender, black, matt, somewhat bluish grey pollinose.

Periphallic organs: Genital arch brownish black, pubescent, dorsally not narrowing, ventrally broadly truncate and with several setae, subapically pale on caudal half. Clasper brownish black, crescentic, marginally with a concave row of about twelve long stout black pointed teeth, the row covering entire distal margin of clasper. Anal plate pale brownish black, elliptical, setigerous, pubescent, lower tip narrowly pointed and with a few short setae. Decasternum large, quadrate, tripartite. Phallic organs: Aedeagus yellowish grey, elliptical, basally tapering, ventral margin serrated and with a yellow vertical rod; apodeme brown, straight.  $PI = 1.5$ . Anterior paramere minute, sensilla obscure, ventral fragma greyish brown, deeply notched, lateral arms distally broadened. p.f. = abCdEf<sub>0</sub>g<sub>0</sub>HikLmn. Egg-guide lobe large, oval, dark brown, distally broadly rounded, with about fifteen marginal and twenty scattered discal strong black teeth. Basal isthmus narrow, black, about one-fifth as long as egg-guide lobe.

Holotype ♂. EAST NEPAL: Taplejung District, damp evergreen oak forest above Sangu, c. 9,200', 2-26.xi.1961 (R.L.C.), BMNH.

Allotype ♀. Taplejung District, Sangu, clearing in small wood, c. 6,200', 25.x.1961 (R.L.C.), BMNH.

Paratype ♂: Taplejung District, ex *Lycopodium* sp. on slope above Sangu, c. 7,800', 11-14.i.1962 (Head missing) (R.L.C.), BMNH.

Closely allied to *S. grahami* Hackman, (China) but ocellar triangle not darker than any part of front, arista with three dorsal branches (four in *grahami*), thoracic pleura not dark reddish brown, scutellum not brown medially, and male clasper with fewer and stronger teeth on entire outer margin (on lower half and without stout teeth in *g.*).

### *Scaptomyza (Scaptomyza) silvata* sp. n.

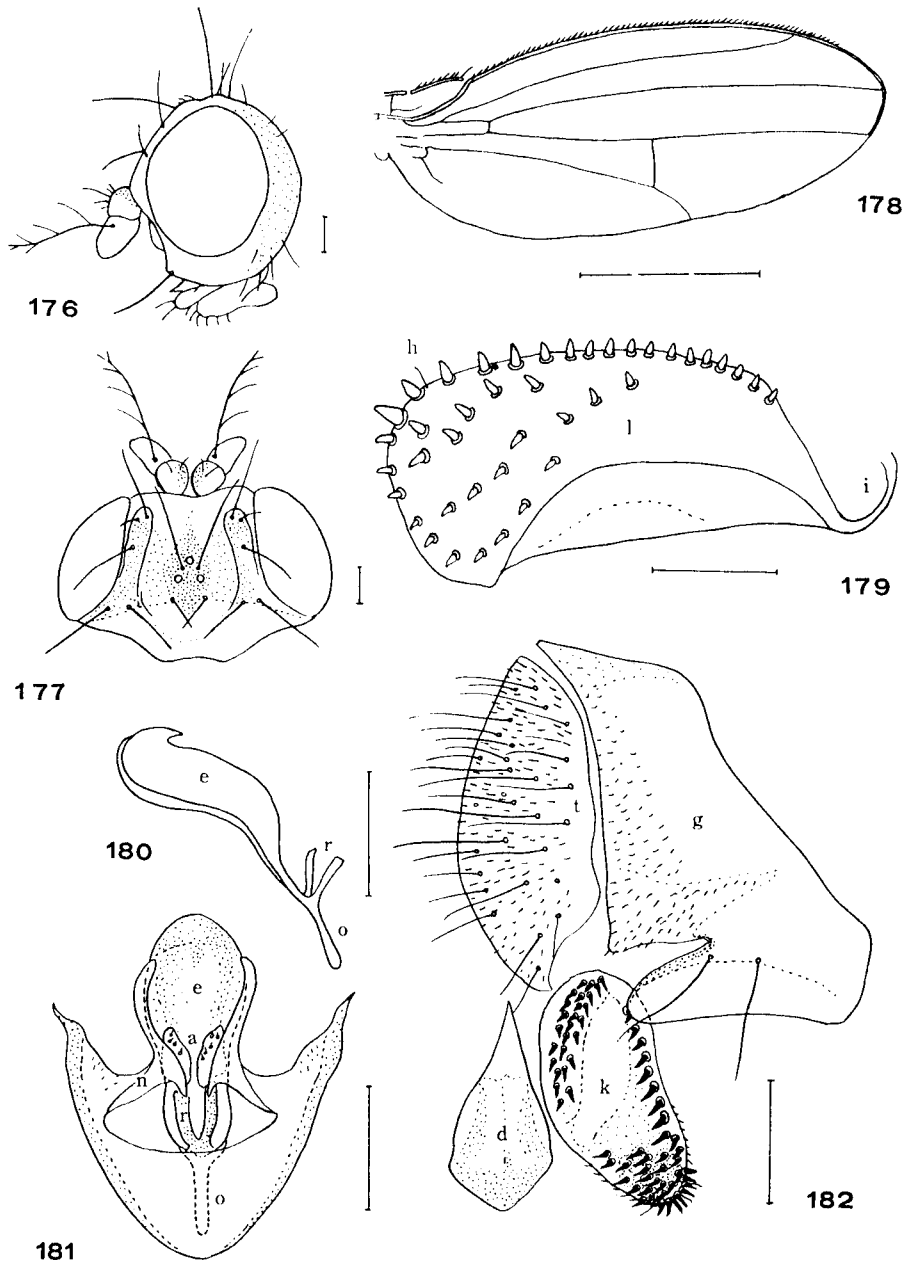
(Text-figs. 176-182)

♂, ♀. Body about 2.2 mm. Head very slightly broader than thorax. Eyes oval, relatively small, dark purplish brown, thickly pilose. Antennae orange-yellow; second segment brown at base; third broad, triangular. Arista with about three dorsal and a ventral short branches and a small terminal fork. Palpus orange in ♂, black in ♀, apically with a few rather short stout black setae. Ocellar triangle velvety black, large, longer than broad. Ocelli greyish brown. Periorbit grey, pollinose, without frontal hairs, apically rounded and not reaching anterior margin of front. Front grey, pollinose, anteriorly orange, somewhat narrowing, as broad as length down middle; posteriorly about half as broad as head width. Face yellowish white, slightly concave, nearly parallel-sided. Carina low, black, narrow, broadened below, reaching buccal margin. Cheek yellowish white, black posteriorly, about one-fourth as broad as the greatest diameter of eye. Occiput black, medially white, pollinose. Anterior reclinate orbital two-thirds as long as proclinate, outside proclinate, and thrice as distant from posterior reclinate as from proclinate. Proclinate slightly shorter than posterior reclinate. Vibrissae strong, second and third orals one-fourth as long as vibrissae.

Mesonotum black, bluish grey pollinose, with a median and lateral black longitudinal stripe, median one reaching end of scutellum. Scutellum black, bluish grey pollinose. Thoracic pleura black, somewhat glossy. Two humerals, upper longer. Acrostichal hairs in four rows. Anterior dorsocentrals four-fifths as long as posteriors; distance between anterior and posterior dorsocentrals about five-eighths distance between anterior pair. Anterior scutellars long, divergent, twice length of scutellum; posteriors two-thirds as long as anteriors, one and a half times as distant from anteriors as from each other. Sterno-index about 0.5. Legs greyish brown, trochanters and fore coxa yellow, femora black, last two tarsal segments black; all metatarsi as long as next three segments together. Preapicals on all legs; apicals on mid leg. Wings hyaline, veins brown, tip somewhat pointed.  $R_{2+3}$  medially convex anteriorly, gently curved to *costa* apically; *costa* reaching end of *M*;  $R_{4+5}$  and *M* parallel. C-index about 3.1; 4V-index about 1.4; C<sub>4</sub>-index about 0.7; 5x-index about 0.9; Ac-index about 2.5. C<sub>1</sub>-bristle one, long; C<sub>3</sub>-fringe on basal one-third. Halteres yellow. Abdominal tergites black, somewhat glossy. Abdominal sternites black, large quadrate.

Periphallallic organs: Genital arch dark brownish black, pubescent, dorsally much narrowing, ventrally broadly truncate and with a few long setae, subapically with a deep caudal incision. Clasper oval, dark brownish black, marginally with a row of about ten black teeth, discally with numerous black pointed teeth in about three rows above and six rows below. Anal plate dark brownish black, very large, fusiform, separated from genital arch, setigerous and pubescent. Decasternum rhombic, dark brownish black. Phallic organs: Aedeagus yellowish brown, somewhat sinuous, elliptical, tip rounded in lateral aspect. Apodeme black, narrow, short and straight, about one-fourth as long as aedeagus. PI = 4.0. Vertical rod as long as apodeme, black, slender. Anterior paramere small, oval, pubescent, brownish black, attached to the

vertical rod, with a few sensilla subapically. Hypandrial plate elongate, basally broad. Ventral fragma V-shaped. p.f. = aBCdEfg<sub>0</sub>HikLmn. Egg-guide lobe robust, brownish black, abruptly narrowing proximally, broadly truncate distally, with about twenty-four marginal and seventeen discal strong black pointed teeth. Basal isthmus black, short, one-sixth as long as egg-guide lobe.



FIGS. 176-182. *Scaptomyza silvata* sp. n. 176, ♂ head, lateral aspect; 177, ♂ head, dorsal aspect; 178, ♂ wing; 179, ♀ egg-guide; 180, aedeagus, lateral aspect; 181, phallic organs, ventral aspect; 182, periphallalic organs, lateral aspect.



Holotype ♂. EAST NEPAL : Taplejung District, damp evergreen oak forest above Sangu, c. 9,200', 2-26.xi.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes : 3 ♀, same data as holotype (R.L.C.), BMNH, 1 ♀ at the Tokyo Metropolitan University.

Closely resembles *S. nigrita* Wheeler, 1952, (N. America) but differs slightly in having deep velvety black, not pollinose, large ocellar triangle and front only orange anteriorly.

### DIATHONEURA Duda

*Diathoneura* Duda, 1924a : 180.

Type-species : *Drosophila taeniatipennis* Duda, 1925 : 168 ; designated by Malloch, 1934 (S. America).

### *Diathoneura ripa*, sp. n.

*lastopteronomyia* (?)

(Text-figs. 274-279, p. 94)

♂, ♀. Body about 2 mm., small, glossy black. Head slightly broader than thorax. Eyes large, dark reddish brown, with thick pilosity. Antennae black, third segment oval and with grey pubescence, apically widely apart from face. Palpus black, with a prominent apical bristle. Ocellar triangle black, convex, straight somewhat glossy. Periorbit black, slightly glossy, posteriorly somewhat narrowing, anteriorly blunt, not reaching anterior margin of front. Front evenly black, matt, grey pollinose, anteriorly grey, slightly broader than length down middle, posteriorly broader and slightly narrower than head width. Clypeus black. Face black, flat, parallel-sided, whitish between second segments of antennae. Carina entirely absent. Cheeks black, narrow, about one-ninth as broad as the greatest diameter of eye. Occiput black. Anterior reclinate orbital slender, half as long as proclinate, one-fourth as long as posterior reclinate, about twice as distant from posterior reclinate as from proclinate. Proclinate inside other orbitals. Vibrissae long, second oral one-third as long as vibrissae ; other orals shorter. Post-verticals fine, very short.

Mesonotum black, glossy, with fine punctures. Scutellum black, somewhat grey pollinose. Thoracic pleura glossy black. Two long humerals. No prescutellars. No propleurals. Acrostichal hairs in six to eight rows. Anterior dorsocentrals two-thirds as long as posteriors ; distance between anterior and posterior dorsocentrals half distance between anterior pair. Anterior scutellars divergent, slightly longer than posteriors, which are equally distant from each other and from anteriors. Sterno-index about 0.7. No prominent median sternopleural. Legs short, thick, dark brown, femora black. All metatarsi as long as the other segments together. Preapicals on all legs ; apicals on fore and mid legs. Wings hyaline, relatively slender, veins pale yellow, crossveins not clouded, tip rounded.  $R_{2+3}$  straight, curved to *costa* at tip.  $R_{4+5}$  and *M* distally somewhat convergent. C-index about 2.3 ; 4V-index about 3.1 ; 4C-index about 2.6 ; 5x-index about 3.1 ; Ac-index about 5.3. C1-bristles only one ; C3-fringe on basal five-eighths. Halteres white. Abdominal tergites entirely black, somewhat glossy. Abdominal sternites pale brown, small, elongate.

Periphallic organs : Genital arch black, dorsally slightly narrowing, setigerous ventro-posteriorly ; toe deep black, rounded ; heel somewhat high. Clasper black, crescentic, dorsally narrowly pointed, with a slightly concave row of about thirteen black teeth on entire distal margin. Anal plate fusiform, greyish black, setigerous, narrowly pointed ventroposteriorly. Phallic organs : Aedeagus black, short, apparently bifurcated and hooked apically,

medially broadened. Anterior paramere bifid, black, slender, basally recurved ventrocaudally and attached to hypandrium. Posterior parameres fused to form a large dorsally folded quadrate flap. Ventral fragma quadrate, finely pubescent medially, and distally with a pair of short submedian processes.  $PI = 0.3$ . p.f. = aBCdEf<sub>0</sub>gHiKlMn. Egg-guide lobe brown, distally orange, fusiform, apically pointed, with about fifteen sharply pointed black marginal teeth, apical tooth largest, and with a prominent pale subterminal hair. Basal isthmus thick, black, half as long as lobe.

Holotype ♂. EAST NEPAL: Taplejung District, river banks below Tamrang Bridge, c. 5,500', x-xi.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes: 6 ♂, 3 ♀, 1 ex. (abdomen missing), same data as holotype; 1 ♀, Taplejung District, below Sangu, mixed vegetation on sheltered slopes above river, c. 4,000', 3.i.1962 (R.L.C.), BMNH, 1 ♂ and 1 ♀ (below Tamrang Bridge) deposited at the Tokyo Metropolitan University.

Small body size, minute postverticals, non-carinate face and relatively short anterior reclinate orbital are the features characteristic of the Neotropical genus, *Diathoneura* Duda. Differing from the American species of the genus, however, the present species has eyes with thick pilosity. Frota-Pessoa (1947) treats this genus as a synonym of *Clastopterymyia* Malloch, 1924 (in Malloch and McAtee, *Proc. Biol. Soc. Wash.* 37: 27), but Wheeler (1952) considers them to be distinct genera.

### **DROSOPHILA** Fallén

*Drosophila* Fallén, 1823: 4.

Type-species: *Musca funebris* Fabricius, 1787: 345 (Sweden).

#### KEY TO SUBGENERA

- |   |  |   |
|---|--|---|
| 1 | Preapicals prominent only on hind tibiae . . . . .   | 2 |
| – | Preapicals prominent on all three tibiae . . . . .   | 3 |
| 2 | The longest axis of eye nearly rectangular to body axis. ♂ with submedian spines of novasternum short and usually paired. Egg-guide teeth usually yellowish brown                                |   |
|   | <b>HIRTODROSOPHILA</b> Duda (p. 77)  |   |
| – | The longest axis of eye considerably oblique to body axis. ♂ novasternum with submedian spines rather long and in two pairs. Egg-guide teeth black   |   |
|   | <b>DORSILOPHA</b> Sturtevant (p. 81)   |   |
| 3 | Prescutellars present. ♂ with submedian spines of novasternum exceedingly long and stout. Egg-guide teeth yellowish brown . . . . .  | 4 |
| – | Prescutellars absent. ♂ with submedian spines of novasternum usually short and weak or frequently absent . . . . .   | 4 |
| 4 | The longest axis of eye very oblique to the body axis. Ocellars inserted well outside ocellar triangle. Clasper teeth and egg-guide teeth relatively large in size and few in number . . . . .   | 5 |
|   | <b>DICHAETOPHORA</b> Duda (p. 73)  |   |
| – | The longest axis of eye nearly rectangular to the body axis. Ocellars inserted inside ocellar triangle. Clasper teeth and egg-guide teeth relatively small in size and large in number . . . . . | 5 |
| 5 | Abdominal tergites with medially contiguous black cross-bands. Egg-guide teeth usually black . . . . .   | 5 |
|   | <b>SOPHOPHORA</b> Sturtevant (p. 81)   |   |
| – | Abdominal tergites usually with medially interrupted black cross-bands or spots. Egg-guide teeth usually yellowish brown . . . . .   | 5 |
|   | <b>DROSOPHILA</b> Fallén, s. str. (p. 96)  |   |

Subgenus **SCAPTODROSOPHILA** Duda*Scaptodrosophila* Duda, 1923 : 37.*Pholadoris* Sturtevant, 1942 : 28 [teste Wheeler and Takada, 1964 : 185].? *Paradrosophila* Duda, 1923 : 43.Type-species : *Scaptodrosophila scaptomyzoidea* Duda, 1923 : 37 (New Guinea).

As pointed out by Wheeler (1957) and Wheeler and Takada (1964), re-examination of *Drosophila pictipennis* Kertész, the type-species of *Paradrosophila* designated by Sturtevant, 1927, is required in determining relationships between *Paradrosophila* and *Scaptodrosophila*. The characteristics of this subgenus are most clearly expressed in male genital organs, and *Drosophila brunnea* Duda and *D. pilicrus* Duda are tentatively included in this subgenus as they have been included by Duda in his *Paradrosophila*, although the females alone have been examined by the present author.

## KEY TO SPECIES

- 1 Scutellum yellowish brown, laterally black, apically white. Eyes bare. Arista with three branches below fork. Abdominal tergites with medially contiguous, laterally not broadened, black cross-bands . . . . . ***brunnea*** (p. 67)
- Scutellum unicolorously yellowish brown, dark brown, or black. Arista with two branches below fork. Eyes pubescent. Abdominal tergites each with medially interrupted, laterally broadened, black cross-bands . . . . . 2
- 2 Wings black at base . . . . . ***pilicrus*** (p. 67)
- Wings not black at base . . . . . 3
- 3 Mesonotum deep black. Front velvety black. Wings hyaline. Minute species with body length about 1 mm. . . . . ***minima*** (p. 69)
- Mesonotum yellowish or reddish brown. Wings fuscous . . . . . 4
- 4 Front reddish brown, somewhat velvety. Scutellum dark brown. Two long humerals.  $R_{2+3}$  apically not curved to *costa* . . . . . ***marginata*** (p. 70)
- Front golden brown. Scutellum yellowish brown, pollinose. Three long humerals.  $R_{2+3}$  apically curved to *costa* . . . . . ***alternata*** (p. 72)

***Drosophila (Scaptodrosophila) brunnea*** de Meijere **subgen. comb. n.***Drosophila brunnea* de Meijere, 1911 : 401 (Java).*Drosophila (Paradrosophila) brunnea* de Meijere ; Duda, 1924a : 206 (Java) ; Duda, 1926 : 79 (Sumatra) ; Okada, 1964b : 445 (Borneo).*Drosophila (Paradrosophila) scutellimargo* Duda, 1923 : 43 [nom. nud.] ; Duda, 1924a : 206 ; 243 (Formosa).

Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x. 1961, 1 ♀ (R.L.C.).

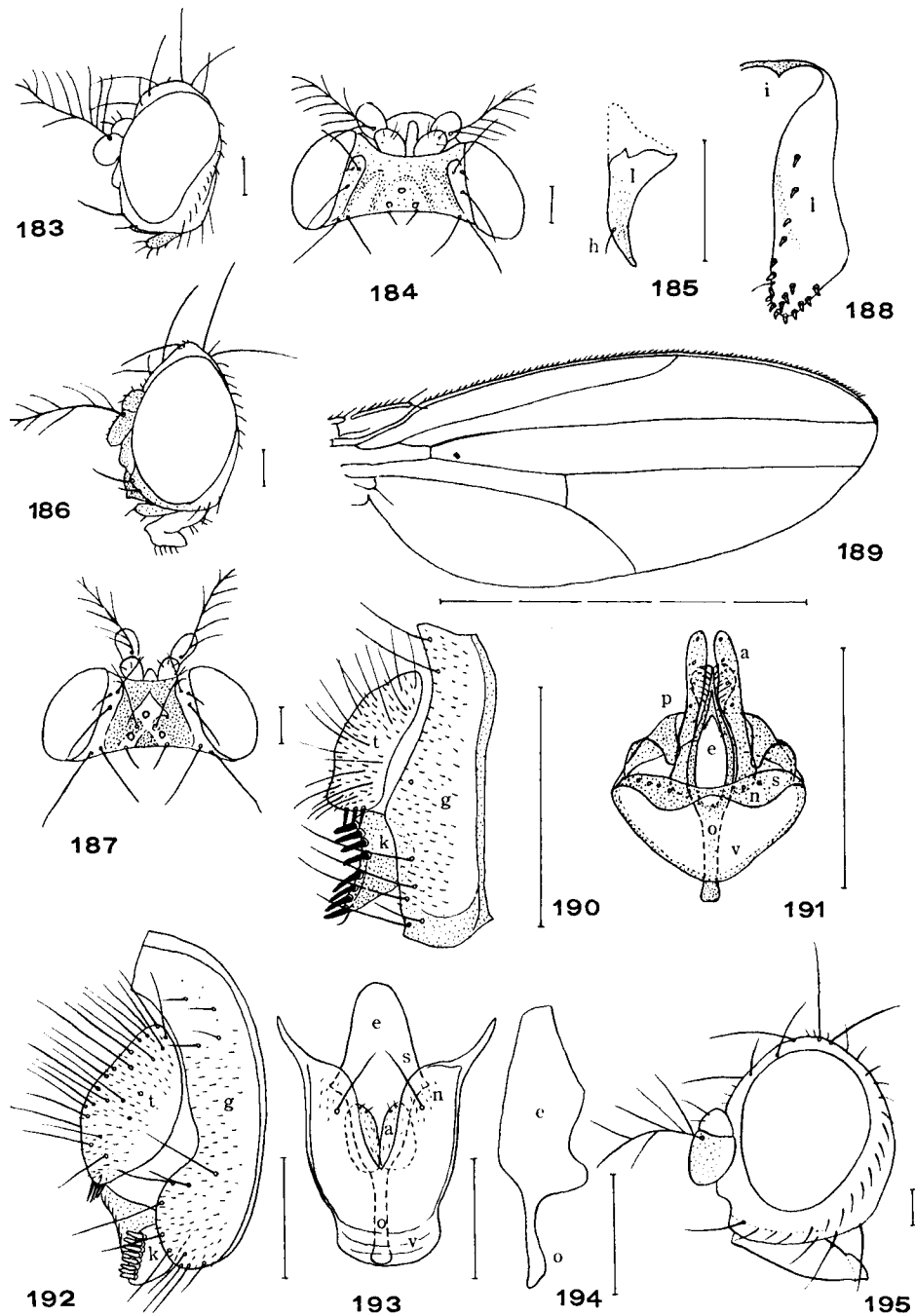
Distribution : Nepal (new locality), Java, Sumatra, Borneo, Formosa.

***Drosophila (Scaptodrosophila) pilicrus*** Duda **subgen. comb. n.**

(Text-figs. 183-185)

*Drosophila (Paradrosophila) pilicrus* Duda, 1926 : 74 (Sumatra).

♀. Body about 2 mm. Head slightly broader than thorax. Eyes dark red, with fine pilosity. Antennae yellowish brown, third segment one and a half times as long as broad. Arista with about seven or eight dorsal and two or three ventral branches and a moderate terminal fork. Palpus brown, with an apical and a few ventral setae. Ocellar triangle matt



FIGS. 183-195. 183-185, *Drosophila (Scaptodrosophila) pilicrus* Duda, ♀. 183, head, lateral aspect; 184, head, dorsal aspect; 185, egg-guide. 186-191, *Drosophila (Scaptodrosophila) minima* sp. n. 186, ♂ head, lateral aspect; 187, ♂ head, dorsal aspect; 188, ♀ egg-guide; 189, ♂ wing; 190, peripheral organs, lateral aspect; 191, phallic organs, ventral aspect. 192-195, *Drosophila (Drosophila) pentastrata* sp. n. ♂. 192, peripheral organs, lateral aspect; 193, phallic organs, ventral aspect; 194, aedeagus, lateral aspect, sinistral side ventral; 195, head, lateral aspect.

black, somewhat pollinose, narrowing posteriorly, anteriorly rounded and ending shortly before anterior margin of front, laterally entirely separated from eye margin. Front dark brown, somewhat grey pollinose, nearly parallel-sided, black around ocellar triangle, anteriorly deeply depressed downward and twice as broad as length down middle, posteriorly five-eighths as broad as head width. Frontal hairs absent. Clypeus black. Face greyish brown, laterally black, parallel-sided. Carina high, long, ending before buccal margin, mediolongitudinally pale grey, laterally black. Cheeks greyish white, one-fifth as broad as the greatest diameter of eye. Occiput black. Postverticals very slender. Anterior reclinate orbital just outside proclinate, two-thirds as long as proclinate, more than twice as distant from posterior reclinate as from proclinate; proclinate slightly shorter than posterior reclinate. Second oral slightly shorter than vibrissa; succeeding orals gradually shorter.

Mesonotum matt black. Scutellum matt black, grey pollinose. Thoracic pleura dark grey, lower tip of sternepisternum darker. Two long humerals. Sterno-index about 0.8. Pre-scutellar as long as anterior dorsocentral. Posterior dorsocentrals much longer than anterior; distance between anterior pair of dorsocentrals twice distance between anterior and posterior pair. Legs yellowish grey; femora and fore and mid tibiae brownish black; fore femur ventrally and apicodorsally with a few long black setae. Preapicals on all legs; apicals on mid leg. Front metatarsi slightly shorter than next two segments together, mid and hind metatarsi subequal to next two segments together. Wings hyaline, veins yellow; wing base and tip of second costal section black.  $R_{2+3}$  nearly straight;  $R_{4+5}$  and  $M$  parallel. C-index about 1.5; 4V-index about 2.0; 4C-index about 1.5; 5x-index about 1.5; Ac-index about 3.0. C1-bristle one, long; C3-fringe of basal two-thirds. Halteres black, grey pollinose. Abdominal tergites yellow; 1T-dark brown. Anal cerci conical. Egg-guide lobe orange brown, elongate, triangular, apically darker, narrowly pointed, basally much broadened, subterminally with a long marginal hair, without teeth.

Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x. 1961, 1 ♀ (*R.L.C.*).

Distribution: Nepal (new locality), Sumatra.

It is noticeable that the egg-guide resembles that found in the genus *Microdrosophila*.

### *Drosophila (Scaptodrosophila) minima* sp. n.

(Text-figs. 186-191)

♂, ♀. Body about 1 mm., velvety black. Head black, as broad as thorax. Eyes dark red, finely pilose. Antennae with second segment dark brown; third black, one and a half times as long as broad, rounded at tip. Arista with about four dorsal and two ventral long branches and a large terminal fork. Palpus black, with a strong apical and a weaker ventral setae. Ocellar triangle convex, large, black, somewhat grey pollinose. Periorbit dark greyish black, pollinose, anteriorly somewhat broadened and ending near the anterior margin of front. Front velvety black, anterior margin deeply concave, anteriorly narrowing and slightly narrower than length down middle, posteriorly half as broad as head width. Clypeus black, somewhat glossy blue. Face greyish black, medially somewhat broadened. Carina dark brown, long, high, almost reaching buccal margin. Cheeks narrow, black, grey pollinose, about one-seventh as broad as the greatest diameter of eye. Occiput black. Postverticals moderate in size. Mouth-parts greyish brown. Anterior reclinate orbital just outside proclinate, twice as distant from posterior reclinate as from proclinate, slightly shorter than proclinate, which is about two-fifths as long as posterior reclinate. Vibrissae strong; second oral weak, half as long as vibrissae; other orals shorter.

Mesonotum deep black, somewhat glossy, setigerous. Scutellum velvety black. Thoracic pleura black. Two humerals. Prescutellars five times as long as anterior dorsocentrals. Acro-

stichal hairs in eight rows. Anterior dorsocentrals half as long as posteriors; distance between anterior and posterior dorsocentrals about one-third distance between anterior pair. Anterior scutellars parallel, long, as long as posteriors or as scutellum itself; posteriors equally distant from anteriors and from each other. Sterno-index about 0.7. Median sternopleural long, intermediate in size between anterior and posterior ones. Legs black, femora darker. All metatarsi as long as rest of tarsal segments together. Preapicals on all legs; apicals strong on mid leg. Wings hyaline, tip rounded, veins brown. Crossveins clear. Costa reaching end of  $R_{4+5}$ ;  $R_{2+3}$  medially straight, apically slightly curved to costa;  $R_{4+5}$  and  $M$  parallel. C-index about 1.3; 4V-index about 2.2; 4C-index about 2.3; 5x-index about 2.8; Ac-index about 5.0. C1-bristles two, subequal; C3-fringe on basal five-sixths. Halteres black. Abdominal tergites entirely black, somewhat glossy.

Periphallalic organs: Genital arch greyish brown, pubescent, not narrowing dorsally, broadly truncate ventrally, ventral tip black and somewhat swollen, posterior margin with a few long setae in a row, lateromedially somewhat swollen caudally. Clasper black, quadrate, lower tip pointed; distal margin broad and with a concave row of about eight strong pointed black teeth, the row occupying entire length of distal margin. Anal plate greyish brown, separated from genital arch, oblong, setigerous and pubescent, caudal tip truncate and with a few strong short setae. Phallic organs: Aedeagus apparently bilobed, elongate, black, fusiform in ventral aspect. Apodeme straight, black, slightly shorter than aedeagus. Anterior paramere large, dark brown, basally black, apically rounded, basally contiguous with aedeagus, with a row of about four sensilla on distal half. Posterior parameres dark brown, fused to be a broad distally flattened medially pale lobe. Hypandrial plate large, crescentric, dark brown, with a few submedian spines. Ventral fragma broad, brown, V-shaped, marginally black. PI = 1.5. p.f. = ABCDeFGHIKLMN. Egg-guide lobe dark brown, elliptical, apically narrowly rounded, with about fourteen marginal and three discal stout black teeth, ventral margin with a prominent subterminal hair. Basal isthmus black, one-third as long as lobe, medially broadened.

Holotype ♂. EAST NEPAL: Arun Valley, east shore of River Arun below Tumlungtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes: 1 ♂, 2 ♀, same data as holotype (R.L.C.), BMNH, 1 ♀ at the Tokyo Metropolitan University.

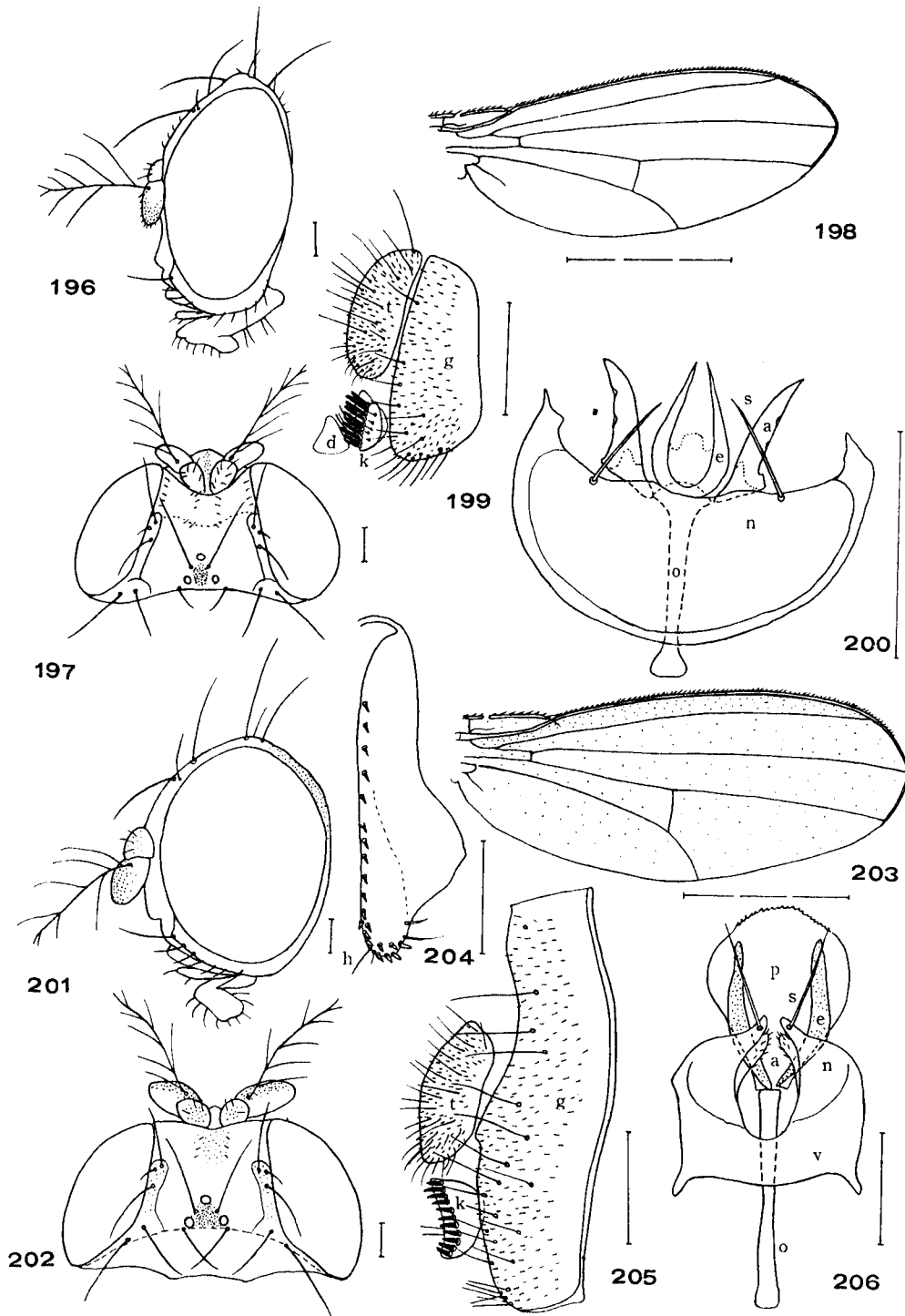
Distinguished from other members of the subgenus by extremely small body. Somewhat resembles *D. coracina* Kikkawa and Peng, 1938 (Japan and China), in the shape of genital arch of male periphallalic organs, but differs in having much smaller and less glossy body and spiny clasper teeth.

### ***Drosophila (Scaptodrosophila) marginata* Duda subgen. comb. n.**

(Text-figs. 201-206)

*Drosophila (Paradrosophila) marginata* Duda, 1924a: 209 (Formosa); Duda, 1923: 46 [nom. nud.] (Formosa).

♂, ♀. Body about 2.4-2.8 mm. Head as broad as thorax. Eyes dark reddish brown, finely pilose. Antennae with second segment brown; third dark brown, posterior margin pale. Arista with about four dorsal and two ventral branches and a fine terminal fork. Palpus yellowish orange, with an apical and a ventral black setae. Ocellar triangle black. Periorbit greyish brown, somewhat glossy, short, half as long as front, anteriorly blunt, posteriorly pale and broadened. Front yellowish brown, somewhat velvety, parallel-sided, anteriorly somewhat darker and as broad as length down middle, posteriorly about half as broad as head width.



FIGS. 196-206. 196-200, *Drosophila (Scaptodrosophila) alternata* de Meijere, ♂. 196, head, lateral aspect ; 197, head, dorsal aspect ; 198, wing ; 199, periphallallic organs, lateral aspect ; 200, phallic organs, ventral aspect. 201-206, *Drosophila (Scaptodrosophila) marginata* Duda. 201, ♂ head, lateral aspect ; 202, ♂ head, dorsal aspect ; 203, ♂ wing ; 204, ♀ egg-guide ; 205, periphallallic organs, lateral aspect ; 206, phallic organs, ventral aspect.

Face yellowish grey. Carina yellowish grey, high, broad, long. Clypeus yellowish brown. Cheek yellowish brown, very narrow, about one-fifteenth as broad as the greatest diameter of eye. Occiput dark brownish black. Postverticals long, slightly shorter than inner verticals. Anterior reclinate orbital short, just outside and shortly behind proclinate, one-third as long as proclinate, one-fourth as long as posterior reclinate, thrice as distant from posterior reclinate as from proclinate. Second oral half as long as vibrissae; succeeding orals as long as second.

Mesonotum dark brown, matt, humeral callus paler, along dorsocentral line pale. Scutellum flat, dark brown, somewhat velvety, elongate. Thoracic pleura dark brown, paler below. Two humerals, lower shorter. Prescutellars as long as anterior dorsocentrals. Acrostichal hairs in six rows. Anterior dorsocentrals one-third as long as posteriors; distance between anterior and posterior dorsocentrals about half distance between anterior pair. Anterior scutellars divergent, slightly longer than posteriors, which are nearer to each other than to anteriors. Sterno-index about 0.7; median sternopleural as long as posteriors. Legs yellow, including coxa. Preapicals on all legs; apicals prominent on mid leg. All metatarsi much longer than the other tarsal segments together. Wing very fuscous especially along costal margin, relatively large; veins dark; crossveins not clouded but distinct.  $R_{2+3}$  nearly straight, not curved to *costa* apically;  $R_{4+5}$  and  $M$  slightly divergent; *costa* reaching  $M$ . C-index about 4.5; 4V-index about 1.5; 4C-index about 0.5; 5x-index about 1.3; Ac-index about 1.4. C1-bristles two; C3-fringe on basal one-third. Abdomen elongate; abdominal tergites yellowish brown, each with a caudal, medially contiguous, latero-anteriorly curved, black cross-band. Abdominal sternites pale yellow.

Periphallalic organs: Genital arch pale brownish black, densely pubescent and setigerous, dorsally not distinctly narrowing, ventral half broader, apically sharply truncate. Clasper pale brownish black, hemispherical, not extending below genital arch, outer margin with about thirteen strong black pointed teeth in a slightly concave row, occupying entire length of outer margin. Anal plate small, elliptical, separated from genital arch, setigerous and pubescent, ventrally obtusely pointed. Phallic organs: Aedeagus bifid, black, crescentic in lateral aspect; basal apodeme one and a half times as long as aedeagus, brownish black, straight. Anterior paramere small, slender, pale yellowish brown, pubescent, attached to hypandrium. Posterior parameres (?) fused to form a large pale brown flat oval process, finely serrated along distal margin. Hypandrium brown, large, triangular, distally narrowly pointed and with a stout long submedian spine. Ventral fragma quadrate, anterolateral corners shortly projected forward, with deep median notch. PI = 0.5. p.f. = ABCdefgHIkLMN. Egg-guide elongate elliptical, swollen dorsally, pale yellowish brown, distally and ventrally darker, apically narrowly rounded, with about twenty two marginal and two apical discal pointed brown teeth, upper two teeth being very long, and with a subterminal hair near apex. Basal isthmus very short and pale.

Taplejung District, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961, 2 ♂, 1 ♀; between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', 1 ♂, 1 ♀, x-xi.1961, (R.L.C.).

Distribution: Nepal (new locality), Formosa.

***Drosophila (Scaptodrosophila) alternata* de Meijere subgen. comb. n.**

(Text-figs. 196-200)

*Drosophila alternata* de Meijere, 1911: 402 (Java).

*Drosophila (Paradrosophila) alternata* (de Meijere) Duda, 1924a: 207 (Java); Duda; 1931: 194 (Sumatra); Mayer, 1935: 467 (Sumatra).

♂. Body about 2 mm. Head as broad as thorax. Eyes dark red, large, finely pilose. Antennae with second segment orange-brown, conical; third greyish black, basally orange-brown, oblong, twice as long as broad. Arista with about four dorsal and two ventral branches and a small fork. Palpus yellowish brown, with a few setae. Ocellar triangle medially black,



marginally pale brown, well demarcated. Periorbit narrow, black, extending for upper half of front. Front flat, golden yellowish orange, anterior one-third paler and slightly narrower than length down middle, posteriorly half as broad as head width, with several frontal hairs and anterior periorbital microtrichia. Face grey, narrow. Carina high, long, greyish brown. Cheeks narrow, greyish yellow, about one-twelfth as broad as the greatest diameter of eye. Occiput yellowish brown, dark below. Anterior reclinate orbital small, one-fourth as long as proclinate. Vibrissae rather short; second oral one-third as long as vibrissa; succeeding orals shorter.

Mesonotum greyish brown, with indistinct dark brownish patches. Scutellum yellowish brown, pollinose. Thoracic pleura dark yellowish brown, sternepisternum pale yellow. Humerals three, median longest. Prescutellar long, as long as anterior dorsocentrals. Anterior dorso-centrals one-third as long as posteriors; distance between anterior and posterior dorsocentrals about one-fourth distance between anterior pair. Anterior scutellars divergent; posteriors as long as anteriors, nearer to each other than to anteriors. Sterno-index about 0.3. Median sternopleural as long as posteriors. Legs yellow; fore and mid metatarsi as long as the other segments together, hind metatarsi longer than rest of segments together. Preapicals on all legs; apicals prominent on mid leg. Wings deeply fuscous, relatively narrow; *costa* reaching end of *M*;  $R_{2+3}$  nearly straight, apically curved to *costa*;  $R_{4+5}$  and *M* slightly divergent. C-index about 3.5; 4V-index about 1.5; 4C-index about 0.7; 5x-index about 2.0; Ac-index about 1.8. C1-bristles two, subequal; C3-fringe on basal two-ninths. Halteres yellowish brown. Abdominal tergites yellowish grey, caudolaterally with a black medially interrupted laterally broadened cross-band. Abdominal sternites pale.

Periphallalic organs: Genital arch pale yellowish brown, setigerous and pubescent, ventrally gradually broadened, with high heel and rounded toe. Clasper low, semicircular, pale yellowish brown, relatively small, distal margin with a straight row of about eleven large long black teeth for entire length. Anal plate elliptical, yellowish brown, separated from genital arch, setigerous and pubescent; ventral corner with a tuft of short setae. Phallic organs: Aedeagus apparently bifid, oval in ventral aspect, pale yellowish orange, distally narrowing, basally rounded. Basal apodeme pale yellowish grey, straight, longer than aedeagus.  $PI = 0.8$ . Anterior paramere blade-like, pale yellowish orange, basally contiguous with aedeagus and hypandrium, apically pointed, laterally with two small pale depressions, which are probably sensory pits. Posterior paramere obscure. Ventral fragma pale yellowish grey, broad semicircular, distal margin straight, without median notch, with a pair of stout long yellowish brown submedian spines. p.f. = ABCDEFg<sub>0</sub>HIKLMN.

Taplejung District, Sangu, yellowish blooms of cultivated Compositae (*Guizotia abyssinica* Cassini), c. 6,200', 16-29.x.1961, 1 ♂ (R.L.C.).

Distribution: Nepal (new locality), Java, Sumatra.

Strikingly like the original form except for larger 5x-index (slightly over 1.0 in original form) and distinctly interrupted abdominal cross-bands (obscurely interrupted in original form). Mayer (1935) described larva and puparium of this species from Sumatra.

### Subgenus *DICHAETOPHORA* Duda

*Dichaetophora* Duda, 1940: 19.

Type-species: *Drosophila aberrans* Lamb, 1914: 334 (Seychelles).

Duda (1940) established this subgenus for one species, *aberrans* Lamb. Burla (1954) added two species, *agbo* Burla and *suruk* Burla from Africa, and two other species, *magnidentata* Lee, 1964, from Korea and *raridentata* Okada and Chung,

were suggested by Lee (1964) to belong to this subgenus. Although this subgenus was originally characterized by only one pair of dorsocentrals, anterior pair being absent, some species have two pairs with anterior pair fine, and yet other species have both anterior and posterior pairs well developed. These species are characterized in having very oblique eyes and ocellars inserted outside ocellar triangle, by which they can be assigned to *Dichaetophora*. Consequently, the occurrence of only one pair of dorsocentrals is an "archestinic" character (Stenzel, 1963) which means a diagnostic character of a taxon occurring only in some individual units of that taxon (cf. p. 119).

## KEY TO SPECIES

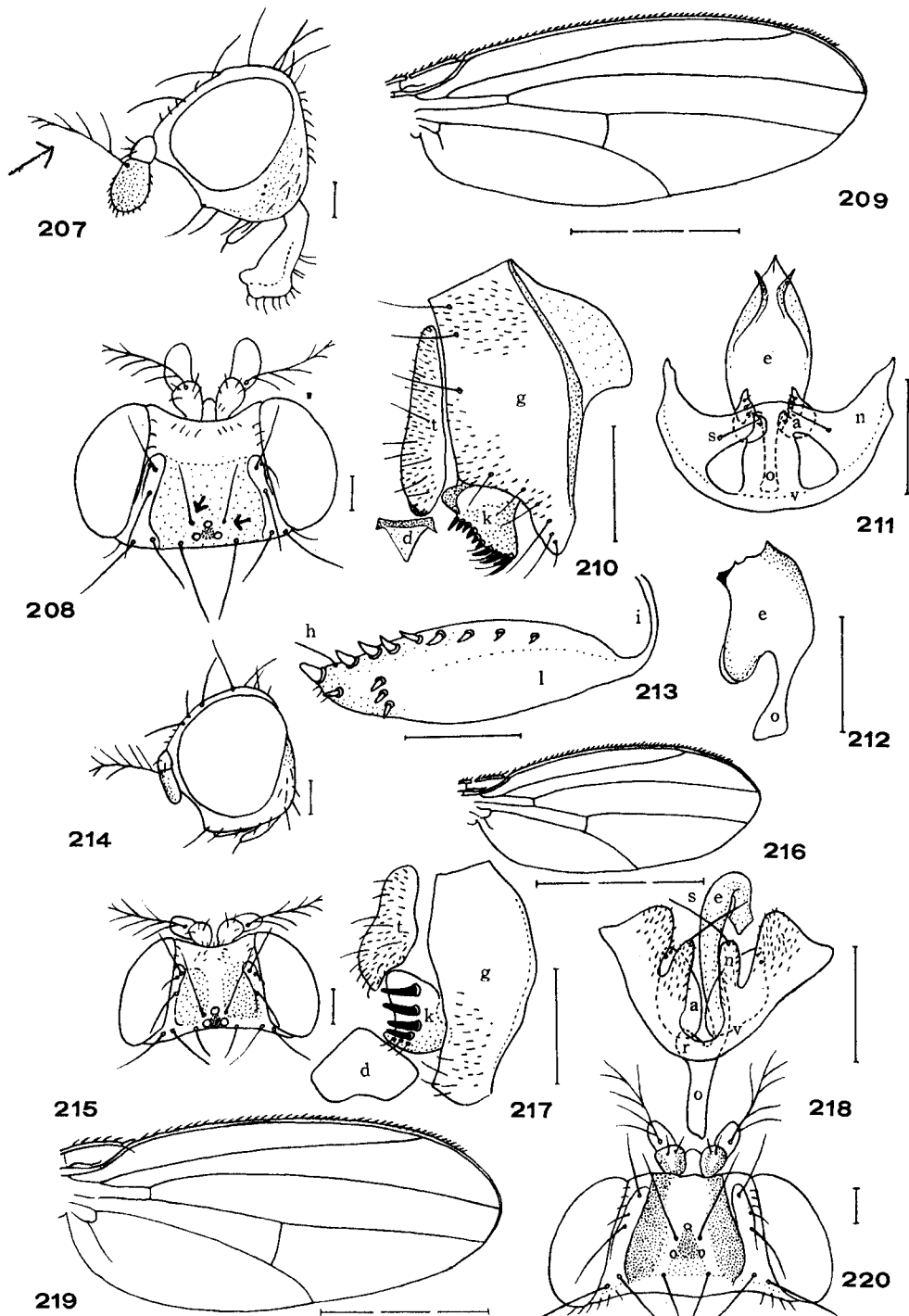
- 1 Antennae vertically erected from head, with the third segment remarkably swollen distally. Arista with only one branch below fork. Abdominal tergites almost entirely black . . . . . ***rotundicornis*** (p. 74)  
 - Antennae recumbent on the head, with the third segment not remarkably swollen distally. Arista with two branches below fork. Abdominal tergites with distinct black cross-bands . . . . . ***raridentata*** (p. 76)

***Drosophila (Dichaetophora) rotundicornis* sp. n.**

(Text-figs. 207-213)

♂, ♀. Body about 1.8 mm. Head slightly broader than thorax. Eyes dark red, triangular in lateral aspect, finely pilose and faint green iridescence. Antennae yellowish brown, large, upright; second segment somewhat longer than broad; third with thick long pubescence, distally dark brown and much swollen. Arista with about four dorsal and one ventral branches and a small terminal fork. Palpus yellow, tip rounded, with a prominent apical seta. Ocellar triangle black, marginally pale. Periorbit yellowish grey, not sharply demarcated from front, about two-thirds length of front. Front matt yellowish grey, flat, anterior one-third yellow, anteriorly narrower than median length; posteriorly twice as broad as head width. A few frontal hairs present. Carina low, narrow, half of face, distally broadened. Face broad, grey-brown, much broadened below, buccal margin with a broad white transverse band, narrowly pale on carina and along eye margin. Clypeus dark brown. Cheeks yellowish white, somewhat pollinose, about one-third as broad as the greatest diameter of eye. Occiput greyish brown. Postverticals very long, longer than outer verticals. Ocellars long, inserted well outside ocellar triangle. Anterior reclinate orbital slightly before and outside proclinate, three-fifths as long as proclinate, two-thirds as long as posterior reclinate, twice as distant from posterior reclinate as from proclinate. Second oral about half as long as vibrissa; succeeding orals shorter.

Mesonotum deep greyish brown, matt. Scutellum deep greyish brown, marginally and centrally somewhat pale. Thoracic pleura greyish orange, pollinose, with a dark brown longitudinal stripe on upper half. Three humerals, median longest. Acrostichal hairs in six rows. Anterior dorsocentrals two-thirds as long as posteriors; distance between anterior and posterior dorsocentrals two-thirds distance between anterior pair. Anterior scutellars divergent, as long as posteriors, which are twice as distant from anteriors as from each other. Sterno-index about 0.3. Legs dusty yellow, coxae paler, all metatarsi as long as the other segments together. Pre-apicals on all legs; apicals prominent on mid leg. Wings hyaline; veins yellowish brown; crossveins not clouded; *costa* paler and reaches the end of  $R_{4+5}$ ;  $R_{2+3}$  gently curved to *costa* at tip;  $R_{4+5}$  and *M* slightly divergent distally. C-index about 3.5; 4V-index about 2.4; 4C-index about 1.0; 5x-index about 2.3; Ac-index about 2.0. C1-bristles two; C3-fringe on basal three-sevenths. Halteres yellowish white. Abdominal tergites mostly black, somewhat glossy; 1T pale yellow at anterior corner.



FIGS. 207-220. 207-213, *Drosophila (Dichaetophora) rotundicornis* sp. nov. 207, ♂ head, lateral aspect; 208, ♂ head, dorsal aspect; 209, ♂ wing; 210, periphallallic organs, lateral aspect; 211, phallic organs, ventral aspect; 212, aedeagus, lateral aspect, dextral side dorsal; 213, ♀ egg-guide. 214-218, *Drosophila (Dichaetophora) varidentata* Okada and Chung, ♂. 214, head, lateral aspect; 215, head, dorsal aspect; 216, wing; 217, periphallallic organs, lateral aspect; 218, phallic organs, ventral aspect. 219-220, *Drosophila (Drosophila) pentastriata* sp. n. ♂. 219, wing; 220, head, dorsal aspect.

Periphallic organs : Genital arch black, pubescent, medially and apically bare, with a few setae, ventrally conically projected, caudal margin rectangular above insertion of clasper. Clasper black, ovoid, with a row of about eleven black teeth along entire distal margin, median teeth smaller than upper and lower teeth. Anal plate white, pubescent and setigerous, narrow and long, dorsally somewhat narrowing. Phallic organs : Aedeagus robust, dark brown, apparently bifid laterally, quadrate in lateral aspect, caudodorsally round, upper margin truncate and with a few serrations. Basal apodeme shorter than aedeagus.  $PI = 1.5$ . Anterior paramere small, conical, contiguous to hypandrium, medially with a few sensilla. Ventral fragma black, semicircular, with a very deep and wide median notch and a median process projected from the bottom of the notch, laterally with submedian spines. p.f. = ab'CdeFg<sub>0</sub>HI kLMN. Egg-guide lobe deep brown, fusiform, with about ten marginal and four discal dark brown teeth, apical one largest and directed ventrally. Anal cercus of female yellow, elongate.

Holotype ♂. EAST NEPAL : Taplejung District, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes : Taplejung District, 1 ♂, same data as holotype ; 1 ♂, 2 ♂, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 ; 1 ♂, 2 ♀, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', i-ii.1962 ; 4 ♀, 1 ex. (abdomen missing), river banks below Tamrang Bridge, c. 5,500', x-xi.1961. 1 ♀, Arun Valley, east shore of River Arun below Tumlingtar, c. 1,800', 14-23.xii.1961 (R.L.C.), BMNH ; 1 ♂ and 1 ♀ from between Sangu and Tamrang, deposited at the Tokyo Metropolitan University.

Resembles *D. (Dichaetophora) suruk* Burla, 1954 (Ivory Coast, Africa), in having rather well developed anterior dorsocentrals, which are widely distant from posterior dorsocentrals, but differs from the latter in having only one ventral branch of arista (three in *suruk*), front narrower than length down middle (broader in *s.*), six rows of acrostichal hairs (four in *s.*),  $R_{4+5}$  and *M* not sinuated (much sinuated in *s.*), and male anal plate narrow and long (broad in *s.*).

### ***Drosophila (Dichaetophora) raridentata* Okada and Chung**

(Text-figs. 214-218)

*Drosophila (Drosophila) raridentata* Okada and Chung, 1960 : 28 (S. Korea).

*Drosophila raridentata* Okada and Chung ; Wakahama, Kaneko, and Tokumitsu, 1963 : 94 (Japan) ; Wakahama, 1964 : 56 (Japan).

*Drosophila (Dichaetophora?) raridentata* Okada and Chung ; Lee, 1964 : 108.

♂. Body about 1.2 mm. Head somewhat broader than thorax. Eyes oval, dark red, pilose. Arista with about five dorsal and two ventral branches and a small fork. Palpus yellowish grey, slender, with a prominent apical seta. Ocellar triangle medially black. Periorbit yellowish grey, anteriorly somewhat swollen inward and one-third as long as front. Front dark grey, pale along median longitudinal line, anteriorly slightly narrowing and orange-yellow, with scattered frontal hairs, narrower than length down middle, posteriorly half as broad as head width. Clypeus grey. Face flat, grey, parallel-sided, buccal margin straight and narrowly white. Carina very small and low, yellowish grey, with a pair of small black spots apically. Occiput yellowish grey. Cheeks pale yellow, darker above, about one-fifth as broad as the greatest diameter of eye. Postverticals moderate in size, shorter than outer verticals. Anterior reclinate orbital two-thirds as long as proclinate, one-third as long as posterior reclinate,

twice as distant from posterior reclinate as from proclinate. Proclinate inside others. Second oral half as long as vibrissa.

Mesonotum yellowish grey, matt. Scutellum yellowish grey, pollinose. Thoracic pleura paler, with two or three dark longitudinal stripes. Humeral callus paler. Humerals two, subequal. Acrostichal hairs in six rows. Anterior dorsocentrals two-thirds as long as posteriors; distance between anterior and posterior dorsocentrals two-thirds distance between anterior pair. Anterior scutellars longer than posteriors, divergent; posteriors thrice as distant from anteriors as from each other. Sterno-index about 0.4. Legs yellowish grey, coxa paler; all metatarsi as long as three following segments together. Last tarsal segment large. Preapicals on all legs; apicals on mid leg. Wings hyaline, slightly fuscous.  $R_{2+3}$  gently curved to *costa* at tip;  $R_{4+5}$  and  $M$  nearly parallel, *costa* reaches  $M$ , but weak beyond  $R_{4+5}$ . C-index about 2.1; 4V-index about 2.5; 4C-index about 1.7; 5x-index about 4.5; Ac-index about 2.7. Cr-bristles two; C3-fringe on basal half. Halteres yellowish grey, tip somewhat dark. Abdominal tergites yellowish brown, each with a distinct not medially interrupted, broad median black transverse band.

Periphallalic organs: Genital arch greyish brown, setigerous and pubescent, truncate below. Clasper large, quadrate, greyish brown, submedially with a row of about four very large pointed black teeth. Anal plate setigerous and pubescent, pale yellowish grey, oval, lower tip narrowing. Phallic organs: Aedeagus rod-shaped, yellowish grey, apically truncate; apodeme one-third as long as aedeagus; vertical rod short but thick. Anterior paramere large, oval, pale grey, basally contiguous with vertical rod, apically with a few sensilla. Ventral fragma pale grey, pubescent, with a deep median notch and a pair of finger-like submedian processes, apically with a pair of long submedian spines, lateral arms triangular. Decasternum triangular, large. PI = 3.0. p.f. = abcdefghijklmn.

Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x. 1961, 1 ♂ (R.L.C.).

Distribution: Nepal (new locality), Japan, Korea.

Differs somewhat from the original form (Korea) in having smaller body, longer anterior dorsocentral, and two ventral branches of arista (one in the original form). Originally described from ♂, the ♀ was recorded by Wakahama, Kaneko, and Tokumitsu (1963) from Japan.

### Subgenus *HIRTODROSOPHILA* Duda

*Hirtodrosophila* Duda, 1924a : 203.

Type-species: *Drosophila longecrinita* Duda, 1924a : 204; 1924b : 242 (Formosa, New Guinea).

#### KEY TO SPECIES

- 1 Arista with two branches below fork. Palpus with only one prominent apical seta. Cheeks broad, about two-fifths as broad as the greatest diameter of eye. Mesonotum glossy dark reddish brown. Acrostichal hairs in six rows. Preapicals on all legs. Third costal section with strong bristles. Postverticals longer than verticals . . . . . *tripartita* (p. 78)
- Arista with only one branch below fork. Palpus with a few prominent ventral setae. Cheeks narrow, about one-eighth as broad as the greatest diameter of eye. Mesonotum dark chestnut-brown. Acrostichal hairs in eight rows. Preapicals on mid and hind legs. Third costal section without strong bristles. Postverticals much shorter than inner verticals . . . . . *limbicostata* (p. 79)

*Drosophila (Hirtodrosophila) tripartita* sp. n.

(Text-figs. 262-267, p. 90)

♂, ♀. Body about 2.2 mm. Head as broad as thorax. Eyes deep red, fusiform in lateral aspect, with thick pilosity. Antennae orange-yellow; third segment fuscous at tip, oval, much broader than second segment, slightly longer than broad. Arista with about four dorsal and two ventral branches and a large terminal fork. Palpus yellowish orange, with an apical seta. Ocellar triangle small, deep reddish brown. Periorbit glossy grey-brown, anteriorly somewhat curved inward, posteriorly slightly broadened and paler. Front orange-grey, paler anteriorly, nearly parallel-sided, frontal triangle fuscous, anteriorly broader than length down middle, posteriorly about four-sevenths as broad as head width. A few frontals present. Clypeus dark brown. Carina long, low, broadened below to reach buccal margin. Cheeks orange-yellow, broad, about two-fifths as broad as the greatest diameter of eye. Occiput yellowish brown, ventromedially fuscous. Postvertical very long, much longer than outer vertical. Anterior reclinate orbital about one-third as long as posterior reclinate, slightly nearer to proclinate than to posterior reclinate. Proclinate slightly shorter than posterior reclinate, inside others. Only one pair of long vibrissae, second oral one-fourth as long as vibrissa.

Mesonotum glossy dark reddish brown. Scutellum dark reddish brown, unicolorous. Thoracic pleura paler than mesonotum. Two humerals, lower longer. Acrostichal hairs in six rows. No prescutellars. Anterior dorsocentrals nearly half as long as posteriors; distance between anterior and posterior dorsocentrals about five-ninths distance between anterior pair. Anterior scutellars divergent, longer than posteriors, which are nearer to each other than to anteriors. Sterno-index about 0.5; sternopleurals situated close to each other. Legs yellow; all metatarsi as long as other segments together. Male fore leg without sex-combs; mid leg without hooked scaly bristles. Preapicals on all legs; apicals prominent on mid leg. Wings hyaline, crossveins clear. *Costa* reaching *M*.  $R_{2+3}$  gently convex at middle, gently curved to *costa* at tip.  $R_{4+5}$  and *M* parallel. C-index about 3.8; 4V-index about 1.6; 4C-index about 0.6; 5x-index about 1.7; Ac-index about 2.1. C1-bristles two; C3-fringe on basal three-eighths. Halteres yellowish orange, stalk paler. Abdominal tergites mostly dark brownish black, somewhat glossy; 1T and 2T anteriorly yellowish orange; terminal T greyish white.

Periphallalic organs: Genital arch pale yellowish orange, setigerous and pubescent, dorsally gently narrowing, medially swollen, ventrally tapering triangularly. Clasper dark brown, oblong, with a sinuous row of about thirteen black pointed teeth occupying nearly entire length of outer margin, and with a few short fine setae on inferior surface of distal half. Anal plate pale yellowish brown, fusiform, separated from genital arch, pubescent and shortly setigerous, lower tip pointed ventrally and with about five strong black bristles in a clump. Phallic organs yellowish brown. Aedeagus rod-shaped, hairy, apically somewhat broadened, proximally much swollen. Anterior paramere slender, curved, tapering, orange-brown, basally contiguous with hypandrium. Posterior parameres fused to form a large quadrate flap, distal and proximal margins medially concave. Ventral fragma triangular, pale brown, with deep median notch. PI = 2.3. p.f. = aBcDEf<sub>0</sub>gHiKIMN. Egg-guide lobe triangular, proximally narrowing, yellowish orange, with about seventeen marginal and twenty-two discal short scattered yellowish orange bristles on distal half. Subterminal hair short but distinct. Basal isthmus short.

Holotype ♂. EAST NEPAL: Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 (R.L.C.), BMNH.

Allotype ♀. Same locality as holotype, ix-x.1961 (R.L.C.), BMNH.

Paratypes: Taplejung District, 1 ♂, same data as holotype; 1 ♂, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961; 1 ♂, above Sangu, mixed vegetation in dried-up ravine, c. 6,800', 16.ii.1962 (R.L.C.), BMNH, (2 ♂), and at the Tokyo Metropolitan University (1 ♂, between Sangu and Tamrang).

Closely similar to *D. (H.) denticeps* Okada and Sasakawa, 1956 (Japan), especially in male periphallallic organs and female egg-guide, but differing from it and also in general from species of the subgenus in having two ventral branches of arista and well developed preapicals on all legs. This species is, consequently, only tentatively included in the subgenus *Hirtodrosophila*.

***Drosophila (Hirtodrosophila) limbicostata* sp. n.**

(Text-figs. 221-225)

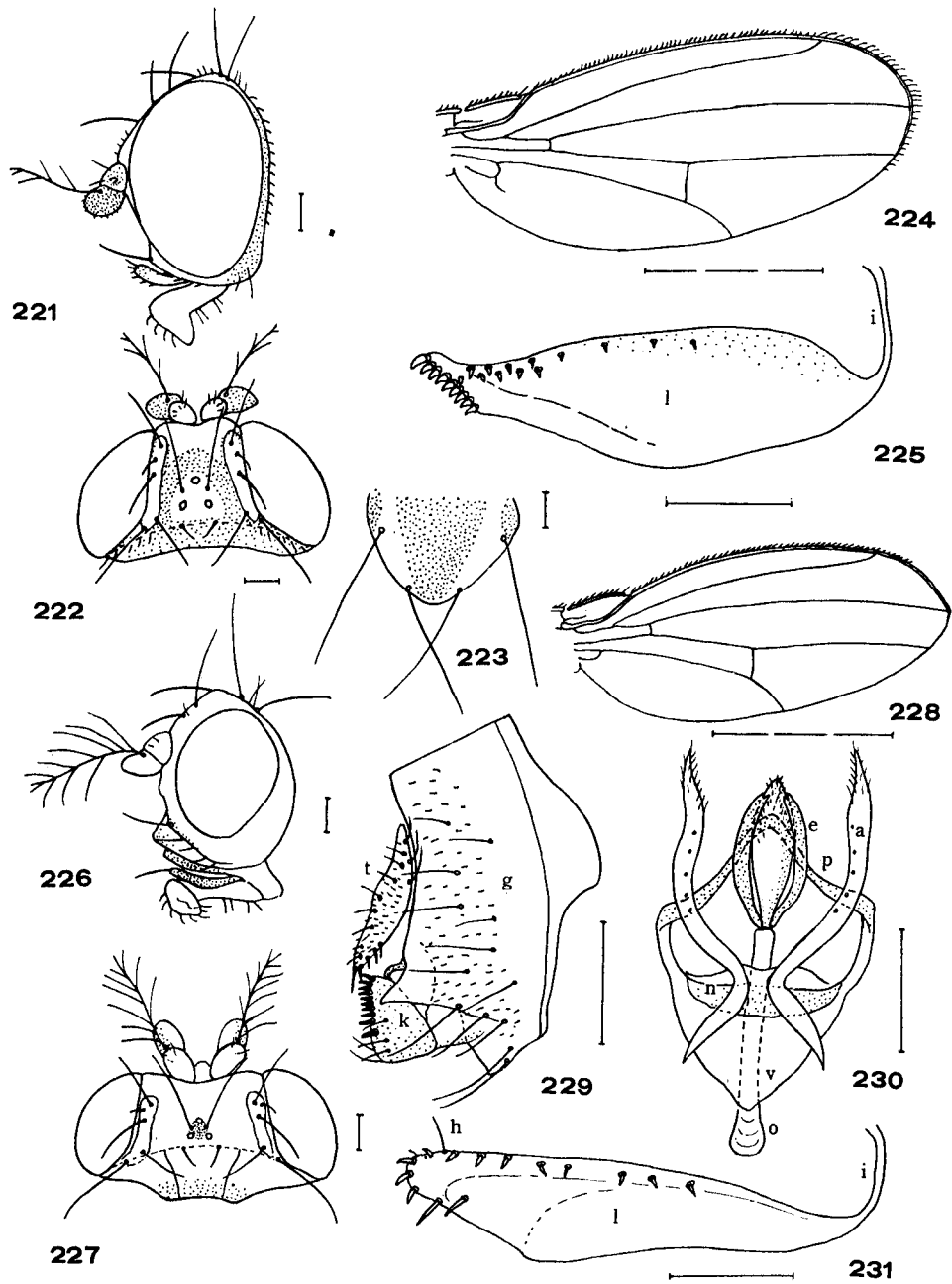
♀. Body about 2 mm. Head slightly broader than thorax. Eyes dark purplish brown, large, with thick pilosity. Antennae with second segment conical, yellowish brown, medio-laterally dark; third black, large, and rounded. Arista with about two dorsal and one ventral short branches and a fine terminal fork. Palpus yellowish orange, thick, tip rounded, with a few short black apical and ventral setae. Ocellar triangle large, black, grey pollinose, convex. Periorbit posteriorly somewhat narrowing, black, grey pollinose, anteriorly nearly reaching anterior margin of front. Front velvety black, nearly parallel-sided, anterior half deep orange-brown anteriorly as broad as length down middle, posteriorly two-fifths as broad as head width. Clypeus brown. Face grey, concave. Carina grey, narrow, low, less than half length of face. Cheeks narrow, yellow, about one-eighth as broad as the greatest diameter of eye; postgena black. Occiput black. Postverticals short. Anterior reclinate orbital slightly shorter than proclinate, which is as long as posterior reclinate. Three orbitals nearly equally distant from eye margin, anterior reclinate equidistant from proclinate and from posterior reclinate.

Mesonotum dark chestnut-brown, somewhat glossy, with fine yellow punctures. Humeral callus pale yellowish grey. Scutellum dark yellowish brown, medially and anterolaterally blackish brown. Thoracic pleura pale brown. Three humerals, uppermost shortest. Acrostichal hairs in eight rows. Prescutellars fine. Anterior scutellars divergent, slightly longer than posteriors, which are one and a half times as distant from anteriors as from each other. Postscutellum chestnut-black. Sterno-index about 1.0; median sternopleural as long as others. Anterior dorsocentrals half as long as posteriors; distance between anterior and posterior pair less than one-third distance between anterior pair. Legs yellow, last tarsal segment dark, claw large. All metatarsi subequal to next segments together. Preapicals on mid and hind legs; apicals prominent on mid leg. Wings somewhat fuscous, broad, tip rounded.  $R_{2+3}$  apically gently curved to *costa*;  $R_{4+5}$  and *M* parallel. C-index about 2.6; 4V-index about 1.5; 4C-index about 0.9; 5x-index about 1.6; Ac-index 2.3. C1-bristles two, fine, subequal; C3-fringe absent, strong costal bristles ending before tip of  $R_{2+3}$ . Halteres yellow. Abdominal tergites: 1T yellowish grey, others brownish black, each medioanteriorly with a small triangular yellow spot. Abdominal sternites paler.

Egg-guide lobe fusiform, apically pointed and somewhat curved downward, with about eighteen marginal and five apicodiscal pale brown teeth, nine upper marginal ones arranged in a compact straight row, apical tooth largest. Subterminal hair distinct. Basal isthmus yellow, narrow, straight, about one-fourth length of lobe.

Holotype ♀. EAST NEPAL: Taplejung District, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961 (R.L.C.), BMNH.

Peculiar among the family Drosophilidae in having strong costal bristles ending before end of  $R_{2+3}$ . Somewhat similar to *D. (H.) hirticornis* de Meijere, 1914, (Java) in having very narrow cheeks and fuscous wings, but differs from it in short branches of arista, pubescent eyes, and brownish black abdominal tergites.



FIGS. 221-231. 221-225, *Drosophila (Hirtodrosophila) limbicostata* sp. n., ♀. 221, head, lateral aspect; 222, head, dorsal aspect; 223, scutellum; 224, wing; 225, egg-guide. 226-231, *Drosophila (Sophophora) coei* sp. n. 226, ♂ head, lateral aspect; 227, ♂ head, dorsal aspect; 228, ♂ wing; 229, periphallallic organs, lateral aspect; 230, phallic organs, ventral aspect; 231, ♀ egg-guide.



Subgenus **DORSILOPHA** Sturtevant*Dorsilopha* Sturtevant, 1942 : 28.Type-species : *Drosophila busckii* Coquillett, 1901 : 16 (N. America).***Drosophila (Dorsilopha) busckii*** Coquillett*Drosophila busckii* Coquillett, 1901 : 16 (N. America).

Taplejung District, Sangu, from rotten Naspati fruits in traps, c. 6,200', 8-31.x. 1961, 15 ♂, 12 ♀ ; ibid., from rotten bananas in traps, c. 6,200', x-xii.1961, 2 ♀ ; below Sangu, by stream in shady ravine, c. 6,000', 30.x.1961, 1 ♂ ; river banks below Tamrang Bridge, c. 5,500', x-xi.1961, 1 ♂ (*R.L.C.*).

Distribution : Nepal (new locality), India, Sumatra, Formosa, China, Japan, Korea, Bonin Is., Australia, Africa, Europe, N. America, S. America.

Subgenus **SOPHOPHORA** Sturtevant*Sophophora* Sturtevant, 1939 : 139.Type-species : *Drosophila melanogaster* Meigen, 1830 : 85 (Europe).

## KEY TO SPECIES

- |   |  |                              |    |
|---|--|------------------------------|----|
| 1 | Anterior reclinate orbital minute, one-fifth or less as long as posteriors. ♂ fore legs without sex-combs. Mesonotum strongly convex . . . . .                   | <b>mommai-group</b>          | 2  |
| - | Anterior reclinate orbital usually large, about one-third or more as long as posteriors. ♂ fore legs with sex-combs. Mesonotum usually not very convex . . . . . | <b>melanogaster-group</b>    | 4  |
| 2 | Palpus with only one prominent apical seta. Crossveins clear. Head much broader than thorax . . . . .  | <b>coei</b> (p. 82)          | 3  |
| - | Palpus with a few prominent ventral setae. Crossveins clouded. Head as broad as thorax . . . . .   |                              | 3  |
| 3 | Palpus black. Front glossy brown. Median sternopleural fine. Third abdominal tergite entirely black . . . . .  | <b>zonaria</b> (p. 83)       | 3  |
| - | Palpus yellow. Front matt orange. Median sternopleural as long as anteriors. Third abdominal tergite not entirely black . . . . .                                | <b>serriflabella</b> (p. 84) | 3  |
| 4 | Palpus with a few prominent ventral setae . . . . .  | <b>melanogaster</b> (p. 92)  | 5  |
| - | Palpus with a prominent apical seta . . . . .  |                              | 5  |
| 5 | ♂ wings distally with a large black patch . . . . .  |                              | 6  |
| - | ♂ wings without black patch distally . . . . .   |                              | 8  |
| 6 | Large distal black patch of ♂ wing not extending to the wing tip. Small black patches at wing base . . . . .   | <b>pulchrella</b> (p. 89)    | 7  |
| - | Large distal black patch of ♂ wing extending to the wing tip. No black patches at wing base . . . . .  |                              | 7  |
| 7 | Large distal black patch of ♂ wing crescentic, extending below <i>M</i> . Anterior reclinate orbital about five-eighths as long as posteriors . . . . .          | <b>tristipennis</b> (p. 89)  | 7  |
| - | Large distal black patch of ♂ wing oval, not extending below <i>M</i> . Anterior reclinate orbital about half as long as posteriors . . . . .                    | <b>nepalensis</b> (p. 91)    | 7  |
| 8 | Two humerals subequal in length . . . . .  |                              | 9  |
| - | Upper humeral longer than lower. ♂ sex-combs large, longitudinal. Second oral nearly as long as vibrissae . . . . .  |                              | 11 |

- 9 ♂ sex-combs larger, in two oblique sets on metatarsus. Second oral nearly as long as vibrissae . . . . . *bipectinata* (p. 95)
- ♂ sex-comb smaller, transverse. Second oral much shorter than vibrissae . . . . . 10
- 10 Acrostichal hairs in six rows. Anterior reclinate orbital about half as long as posteriors, one-third as long as proclinate. Distance between anterior and posterior dorsocentrals about two-fifths distance between anterior pair . . . . . *immacularis* (p. 87)
- Acrostichal hairs in eight rows. Anterior reclinate orbital one-third as long as other orbitals. Distance between anterior and posterior dorsocentrals about half distance between anterior pair . . . . . *takahashii* (p. 92)
- 11 Front nearly parallel-sided. Periorbit greyish brown, posteriorly narrowing, anteriorly curved inward. Anterior scutellars convergent. . . . . *kikkawai* (p. 92)
- Front considerably narrowed anteriorly. Periorbit black, narrow, anteriorly not curved inward. Anterior scutellars divergent . . . . . *trapezifrons* (p. 93)

#### THE MOMMAI GROUP

♂ foreleg without sex-comb. Mesonotum highly convex. Anterior reclinate orbital minute. Only one prominent oral. Anterior paramere of phallic organs large, hairy, usually with a longitudinal row of sensilla. Aedeagus hairy, often with a pair of basal elongate processes.

#### *Drosophila (Sophophora) coei* sp. n.

(Text-figs. 226–231)

♂, ♀. Body about 1.8 mm. Head slightly broader than thorax. Eyes deep purplish red, fusiform, relatively small, pilose. Antennae with second segment yellowish orange, third greyish orange and triangularly pointed. Palpus black, slender, with a long terminal seta. Ocellar triangle deep reddish brown. Periorbit glossy greyish white, somewhat convex, broad, three-fourths as long as front. Front greyish white, glossy. Carina high, broadened below. Clypeus brown. Cheeks yellowish brown, about two-sevenths as broad as the greatest diameter of eye. Occiput yellowish brown, centrally somewhat fuscous. Postverticals rather short. Anterior reclinate orbital minute, outside and slightly posterior to proclinate, somewhat nearer to proclinate than to posterior reclinate. Proclinate about three-fourths as long as posterior reclinate. Vibrissae long; second oral half as long as vibrissa, others shorter.

Mesonotum glossy brown or yellowish brown, sometimes deep brown, strongly convex, laterally with a dark longitudinal stripe. Scutellum glossy brown or deep brown, unicolorous. Thoracic pleura pale, glossy, dark brown below. Humeral callus mostly dark brown. Only one long lower humeral, upper one very fine. Acrostichal hairs in six rows. Anterior dorsocentrals three-fifths as long as posteriors; distance between anterior and posterior dorsocentrals about half distance between anterior pair. Anterior scutellars parallel or convergent, as long as posteriors, which are nearer to each other than to anteriors. Sterno-index about 0.4. Legs yellow, glossy, relatively slender; tarsi fuscous; coxae white, fore coxa sometimes black (in darker specimens); all metatarsi subequal to the next segments together. Preapicals on all legs; apicals prominent on fore and mid legs. Wings relatively large, somewhat fuscous, veins yellow, crossveins clear. *Costa* reaching *M*, *R*<sub>2+3</sub> nearly straight and apically curved to *costa*; *R*<sub>4+5</sub> and *M* somewhat convergent distally. C-index about 2.7; 4V-index about 1.8; 4C-index about 1.0; 5x-index about 1.5; Ac-index about 2.5. C1-bristles two; C3-fringe on basal one-fourth. Halteres yellow. Abdomen slender and dorsally convex, tergites mostly glossy black. Female cercus yellow or yellowish brown, triangular in dorsal aspect.

Periphallalic organs: Genital arch black, pubescent and setigerous, broad, ventrally triangular, caudal margin with a large acute triangular projection below anal plate, deeply incised below the projection. Anal plate black, relatively small, narrow fusiform, setigerous and pubescent, separated from genital arch, ventrally exceedingly narrowing and with a few stout short black

setae. Clasper large, black, triangular, with a straight row of about ten pointed black teeth occupying dorsal two-thirds of distal margin. Phallic organs mostly deep brownish black. Aedeagus elongate fusiform, hairy, pale yellow, ventrally with a pair of elongate apically bifid gently curved projections. Apodeme straight, about twice as long as aedeagus. Anterior paramere elongate, medially curved, proximally broadened, distally narrowing and thickly hairy, with a longitudinal row of several sensilla on median two-thirds, and basally with a large pointed ventrally directed processes. Posterior parameres fused to form a pale large triangular flap, laterally attached to the lateral processes of ventral fragma.  $PI = 0.5$ . p.f. = Ab'CDE fgHiKLMN. Egg-guide lobe orange-yellow or dark orange, elongate oval, distally narrowly rounded, proximally tapering, with about thirteen marginal and a discal pointed orange-yellow teeth, ultimate marginal tooth longest. Subterminal hair distinct. Basal isthmus yellow, straight, about one-fifth as long as lobe.

Holotype ♂. EAST NEPAL : Taplejung District, between Sangu and Tamrang, mixed plants by damp cliff in river gorge, c. 5,200', i-ii.1962 (R.L.C.), BMNH.

Allotype ♀. Taplejung District, Sangu, mixed vegetation in deep gully, c. 6,200', 2.i-13.ii.1962 (R.L.C.), BMNH.

Paratypes : 6 ♂, same data as holotype ; 10 ♀, same data as allotype ; Taplejung District, 1 ♂, 2 ♀, Sangu, by stream in gully, c. 6,200', ix-x.1961 ; 1 ♂, *ibid.*, clearing in small wood, c. 6,200', 25.xi.1961 ; 7 ♂, 20 ♀, *ibid.*, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 ; 2 ♂, between Sangu and Tamrang, collected with holotype ; 1 ♂, 1 ♀, *ibid.*, dense vegetation in tree shade by hill stream, c. 5,500', 23.x.1961 ; 1 ♂, *ibid.*, mossy ground under bushes by hill stream, c. 5,500', 20.x.1961 ; 1 ♂, 5 ♀, above Sangu, old mixed forest, c. 6,200', 25-28.x.1961 ; 1 ♀, *ibid.*, damp evergreen oak forest, c. 9,200', 2.26.xi.1961 ; 4 ♂, 17 ♀, *ibid.*, mixed vegetation in dried-up ravine, c. 6,800', 16.ii.1962 ; 1 ♂, 2 ♀, below Sangu, by stream in shady ravine, c. 6,000', 30.x.1961 ; 2 ♀, *ibid.*, mixed vegetation on sheltered slopes above river, c. 4,000', 3.i.1962 ; 1 ♂, 1 ♀, north of Sangu, dry grass above river bank, c. 5,000', 5.i.1962 ; 1 ♂, 1 ♀, river banks below Tamrang Bridge, c. 5,500', x-xi.1961 (R.L.C.), BMNH.

Closely resembles *D. (S.) mommai* Takada and Okada, 1960 (Japan), in having highly convex mesonotum and abdominal tergites, and in the general features of phallic and periphallid organs, but distinguished from it in having genital arch less prominently narrowing below, lateral lobes of aedeagus apically bifid (simple in *mommai*), discal teeth of egg-guide only one (several in *m.*), and posterior scutellars as long as anteriors and not upright (short and upright in *m.*).

### *Drosophila (Sophophora) zonaria* sp. n.

(Text-figs. 232-237)

♂, ♀. Body about 1.7 mm. Head as broad as thorax. Eyes dark purplish red, thickly pilose, somewhat fusiform in lateral aspect. Antennae with second segment orange-yellow ; third yellowish grey, basally pale, and nearly twice as long as broad. Arista with about six dorsal and three ventral branches and a small terminal fork. Palpus black, slender, with a few strong ventral black setae. Ocellar triangle glossy black. Periorbit glossy pale brown, anteriorly broader and curved inward, not reaching anterior margin. Front glossy greyish brown, parallel-sided, anterior one-third yellowish, anteriorly one and a half times as broad as length down middle, posteriorly half as broad as head width. Face white, glossy. Carina white, high,

broad, broader below. Clypeus white, laterally black. Cheeks broad, white, about one-fourth as broad as the greatest diameter of eye. Occiput yellowish brown, ventromedially black. Anterior reclinate orbital very fine, equidistant from proclinate and from posterior reclinate, slightly outside proclinate; proclinate about two-thirds as long as posterior reclinate. Vibrissae long; second oral fine, two-fifths as long as vibrissa; succeeding orals finer. Postverticals moderate in size.

Mesonotum and scutellum glossy grey-brown, unicolorous. Thoracic pleura pale yellowish white. Two humerals, upper half as long as lowers. Acrostichal hairs in six rows. Anterior dorsocentrals half as long as posteriors; distance between anterior and posterior dorsocentrals one-third distance between anterior pair. Anterior scutellars divergent, longer than posteriors, which are nearer to each other than to anteriors. Sterno-index 0.4. Legs yellow, tibiae and tarsi slightly fuscous; all metatarsi subequal to next three segments together. Preapicals on all legs; apicals prominent on mid leg. Wings somewhat fuscous; crossveins clouded; *costa* reaching  $R_{4+5}$ , strong bristles on *costa* relatively fine.  $R_{4+5}$  and  $M$  distally somewhat convergent. C-index about 2.7; 4V-index about 2.1; 4C-index about 1.1; 5x-index about 0.8; Ac-index about 2.6. C1-bristles two; C3-fringe on basal three-tenths. Halteres yellowish brown. Abdominal tergites yellowish-brown, glossy, each with a caudal black medially contiguous cross band; 3T nearly entirely black (thus the specific name).

Periphallalic organs pale brown. Genital arch pubescent and setigerous, much narrowed dorsally, gently projected at middle caudally, ventrally narrowing and rectangularly curved caudally at tip. Clasper large, triangular, distally broadened, with a nearly straight row of about twelve pointed black teeth, occupying almost entire distal margin. Anal plate separated from genital arch, elliptical, pubescent and setigerous, with short hairs at ventral tip. Phallic organs yellowish orange. Aedeagus short, thickly hairy, apically pointed, proximally much broadened; apodeme slender, straight, nearly twice as long as aedeagus. Anterior paramere orange, hairy, slender. Posterior paramere absent? Ventral fragma quadrate, large, with lateral arms conically projected ventrally, without median notch.  $PI = 0.5$ . p.f. = ABcDef<sub>0</sub>g<sub>0</sub>HiKLMN. Egg-guide lobe orange-brown, well sclerotized, fusiform, with about thirteen marginal and three large brownish discal teeth; subterminal hair distinct. Basal isthmus about one-fourth as long as lobe.

Holotype ♂. EAST NEPAL: between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

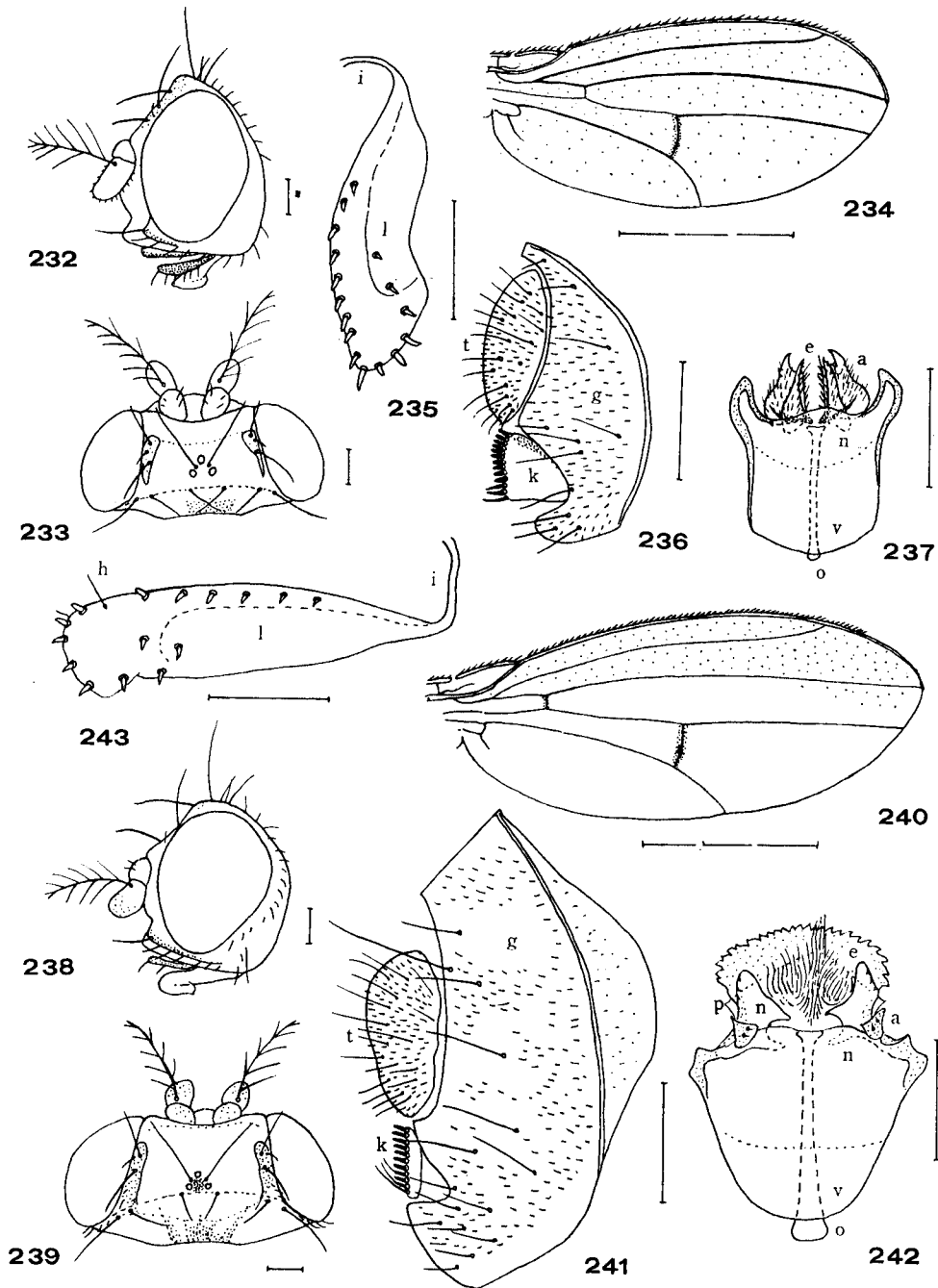
Paratypes: 1 ♂, 1 ♀, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962; 1 ♂, 3 ♀, same data as holotype; 1 ♀, river banks below Tamrang Bridge, c. 5,500', x-xi.1961; 1 ♂, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961 (R.L.C.), BMNH.

Somewhat resembles *D. (S.) coei*, in having broad front, minute anterior reclinate orbitals, broad cheeks, hairy aedeagus, and hairy anterior paramere, but differs from it in having paler body, white face, unicolorous mesonotum, clouded wings, and clouded crossveins. It differs also in the details of genital organs.

### *Drosophila (Sophophora) serriflabella* sp. n.

(Text-figs. 238-243)

♂, ♀. Body about 2.5 mm. Head as broad as thorax. Eyes deep purplish red, fusiform at lateral aspect, relatively small, pilose. Antennae with second segment dark yellowish orange; third greyish brown, oval, as broad as long, basally paler. Arista with about five dorsal and three ventral branches and a small terminal fork. Palpus narrow, yellowish brown, with a



FIGS. 232-243. 232-237, *Drosophila (Sophophora) zonaria* sp. n. 232, ♂ head, lateral aspect ; 233, ♂ head, dorsal aspect ; 234, ♂ wing ; 235, ♀ egg-guide ; 236, periphallic organs, lateral aspect ; 237, phallic organs, ventral aspect. 238-243, *Drosophila (Sophophora) serriflabella* sp. n. 238, ♂ head, lateral aspect ; 239, ♂ head, dorsal aspect ; 240, ♂ wing ; 241, periphallic organs, lateral aspect ; 242, phallic organs, ventral aspect ; 243, ♀ egg-guide.

long apical and two ventral black setae. Ocellar triangle small, glossy brown. Periorbit glossy grey-brown, broad, posteriorly pale, anteriorly rounded, three-fourths as long as front. Front matt orange-brown, broad, nearly parallel-sided, anteriorly one and a half times as broad as length down middle, posteriorly three-fifths as broad as head width. Face greyish yellow, concave, whitish along eye margin. Carina high, short, half as long as face. Clypeus grey-brown. Cheeks yellowish brown, broad, about two-sevenths as broad as the greatest diameter of eye. Occiput yellowish brown, ventromedially orange. Postverticals moderate in size. Anterior reclinate orbital very fine, outside proclinate, twice as distant from proclinate as from posterior reclinate, which is one and a half times as long as proclinate. Vibrissae long, second oral one-third as long as vibrissa.

Mesonotum glossy yellowish brown, strongly convex. Scutellum glossy yellowish brown. Thoracic pleura paler. Two humerals, upper much shorter, two-fifths as long as lower. Acrostichal hairs in six rows. Anterior dorsocentrals half as long as posteriors; distance between anterior and posterior dorsocentrals about half distance between anterior pair. Anterior scutellars divergent, slightly longer than posteriors; posteriors nearer to each other than to anteriors. Sterno-index about 0.5; median sternopleural as long as anteriors. Legs fuscous yellow; femora paler above. All metatarsi as long as other segments together. Preapicals on all legs; apicals on fore and mid legs. Wings relatively large, tip slightly pointed, somewhat fuscous along *costa*; crossveins clouded.  $R_{2+3}$  medially gently convex anteriorly, apically strongly curved to *costa*;  $R_{4+5}$  and *M* parallel. C-index about 2.4; 4V-index about 1.5; 4C-index about 1.0; 5x-index about 1.7; Ac-index about 3.0. C<sub>1</sub>-bristles two; C<sub>3</sub>-fringe on basal three-eighths. Halteres dark yellowish brown. Abdominal tergites glossy yellowish brown with sharply demarcated caudal black bands, which medially jut out triangularly in front. The triangular patches increasingly larger on the more caudal tergites; 1T yellowish brown; 6T mostly black.

Periphallallic organs yellowish brown. Genital arch large, distally wider, setigerous and pubescent, ventrally curved posteriorly, subapically with deep incision on caudal margin, with a low triangular process above insertion of clasper. Clasper small, triangular, distal margin broad and straight, with a row of about ten long black teeth, occupying nearly entire distal margin. Anal plate relatively small, pubescent and setigerous, fusiform. Phallic organs: Aedeagus short, thickly hairy. Apodeme straight, twice as long as aedeagus. PI = 0.4. Anterior paramere small, conical, medially with a few sensilla. Posterior parameres fused to form a large fan-shaped marginally finely serrated yellowish orange lobe. Hypandrial plate large, conically projected posteriorly. Ventral fragma triangular. p.f. = ABCdefgHiKLMN. Egg-guide lobe brownish black, proximally tapering, distal margin broadly truncate, with about twelve marginal and two discal large brown teeth. Subterminal hair prominent. Basal isthmus black, about one-fifth as long as lobe.

Holotype ♂. EAST NEPAL: Taplejung District, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', x-xi.1961 (R.L.C.), BMNH.

Allotype ♀. Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 (R.L.C.), BMNH.

Paratypes: Taplejung District, 1 ♂, same data as holotype; 1 ♀, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961; 2 ♂, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', i-ii.1962 (R.L.C.), BMNH, and the Tokyo Metropolitan University (1 ♂ from between Sangu and Tamrang).

Closely resembles *D. fruhstorferi* Duda, 1924 (India), especially in having broad front, only one long oral, clouded crossveins, and medially triangularly projected black caudal bands of abdominal tergites, but differs from it in having three ventral branches of arista (only one in *fruhstorferi*).

THE *MELANOGASTER* GROUPTHE *SUZUKII* SUBGROUP*Drosophila (Sophophora) immacularis* sp. n.

(Text-figs. 244-250)

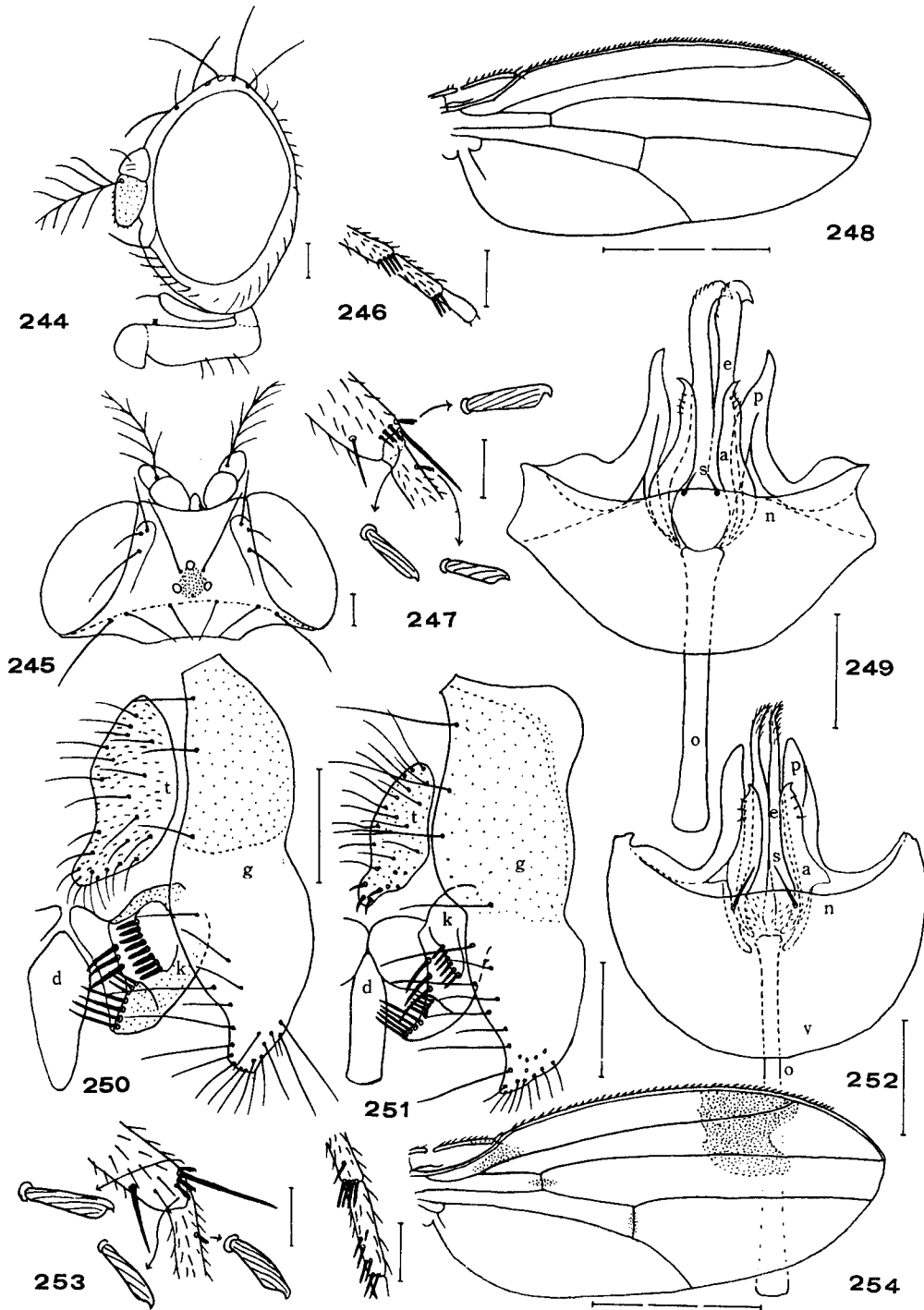
♂. Body about 2 mm. Head as broad as thorax. Eyes dark red. Antennae with second segment yellowish orange, third yellowish grey, one and a half times as long as broad. Arista with about four dorsal and three ventral branches and a large terminal fork. Palpus yellow, with an apical seta. Ocellar triangle dark reddish brown. Periorbit greyish brown, posteriorly narrowing, anteriorly rounded, not reaching anterior margin of front. Front somewhat glossy greyish brown, anteriorly orange and as broad as length down middle, posteriorly broadened and about four-ninths as broad as head width. Clypeus pale brown. Face greyish white, parallel sided. Carina high, long, anteriorly somewhat broadened. Cheeks yellowish orange, one-sixth as broad as the greatest diameter of eye. Occiput yellowish brown, fuscous below. Anterior reclinate orbital about half posterior reclinate and two-thirds as long as proclinate, twice as far from posterior reclinate as from proclinate. Proclinate inside others. Postverticals long. Second oral half as long as vibrissa, succeeding orals shorter.

Mesonotum dark yellowish brown, somewhat glossy, medially with a darker longitudinal stripe. Scutellum greyish brown, slightly glossy. Thoracic pleura paler, unicolorous. Two long subequal humerals. Acrostichal hairs in six rows. Anterior dorsocentrals half as long as posteriors; distance between anterior and posterior dorsocentrals about two-fifths distance between anterior pair. Anterior scutellars convergent, as long as posteriors, which are nearer to each other than to anteriors. Sterno-index about 0.7. Median sternopleural slightly shorter than anteriors. Legs yellow; ♂ fore tarsus with a terminal transverse sex-comb composed of five black bristles; second tarsal segment with a similar sex-comb of two bristles. All metatarsi subequal to the next three segments together. Male mid leg with black hooked scaly bristles, four at the apex of tibia and one at the proximal end of metatarsus. Preapicals on all legs; apicals on fore and mid legs. Wings hyaline, crossveins clear; costa weak beyond  $R_{4+5}$ ;  $R_{2+3}$  apically weakly curved to *costa*;  $R_{4+5}$  and *M* parallel. C-index about 2.9; 4V-index about 2.2; 4C-index about 2.5; 5x-index about 2.2; Ac-index about 2.5. C1-bristles two, long; C3-fringe on basal four-ninths. Halteres yellowish orange. Abdominal tergites yellowish brown, each with a broad black medially entire cross-band; 1T pale.

Periphallalic organs: Genital arch elongate, fusiform, medially somewhat constricted, dorsal half black, dorsal end narrowing, ventral half yellowish grey, posteriorly triangularly projected, setigerous on posterior margin and ventral tip. Claspers two. Primary clasper large, brown lower tip recurved, with a row of about ten long black bristles on distal margin; secondary clasper quadrate, situated above primary clasper, with a row of about eight large black teeth along distal margin. Anal plate setigerous, fusiform, ventrocaudally narrowly projected. Phallic organs: Aedeagus pale yellowish grey, rod-shaped, subapically pubescent, apically curved and pointed dorsally; apodeme black, straight, curved and pointed dorsally; apodeme black, straight, slightly longer than aedeagus. PI = 1.0. Anterior paramere black, rod-shaped, basally curved to attach the base of aedeagus, apically narrowly pointed and curved, subapically with a few sensilla. Posterior paramere pale yellowish grey, nearly as long as anterior paramere, apically pointed, basally bilobed to attach aedeagus by one arm and to ventral fragma by another. Ventral fragma quadrate, distal margin nearly straight, with a pair of short submedian spines, which are close to each other. p.f. = ABcDEfGHIKLMN.

Holotype ♂. EAST NEPAL: Taplejung District, between Sangu and Tamrang, shrubs by path, c. 5,800', 6.xi.1961 (R.L.C.), BMNH.

Closely allied to *D. (S.) suzukii* (Matsumura, 1931) (China and Japan), especially similar in phallic and periphallalic organs, but differs in having ♂ wings without black patch and aedeagus distally pubescent.



FIGS. 244-254. 244-250, *Drosophila (Sophophora) immacularis* sp. n., ♂. 244, head, lateral aspect ; 245, head, dorsal aspect ; 246, sex-combs on proximal two tarsal joints of fore leg ; 247, hooked scaly bristles on tibia and metatarsus of mid leg ; 248, wing ; 249, phallic organs, ventral aspects ; 250, periphallallic organs, lateral aspect. 251-254, *Drosophila (Sophophora) pulchrella* Tan, Hsu, and Sheng, ♂. 251, periphallallic organs, lateral aspect ; 252, phallic organs, ventral aspect ; 253, left : hooked scaly bristles on tibia and metatarsus of mid leg ; right : sex-combs on proximal two tarsal joints of fore leg ; 254, wing.



***Drosophila (Sophophora) pulchrella*** Tan, Hsu, and Sheng  
(Text-figs. 251-254)

*Drosophila (Sophophora) pulchrella* Tan, Hsu, and Sheng, 1949 : 198 (China) ; Okada, 1956 : 106 (Japan).

♂, ♀. General features as described by Tan, Hsu, and Sheng (1949) and redescribed by Okada (1956). Head as broad as thorax. Ocellar triangle grey. Periorbit grey, glossy, constricted near caudal end. Front yellowish grey, slightly narrowing anteriorly, where it is as broad as length down middle, posteriorly four-ninths as broad as head width. Face white. Anterior dorsocentral half as long as posteriors. Anterior scutellars convergent, as long as posteriors, which are slightly nearer to each other than to anteriors. All metatarsi subequal to next three segments together. ♂ mid leg with hooked scaly bristles, four on tibia, one on metatarsus. Wings with a large distal costal patch and small basal black spots, one below  $R_{2+3}$ , one on anterior crossvein. PI = 0.7. p.f. = ABcDEfGHIKLMN.

Taplejung District. Sangu, yellow blooms of cultivated composite (*Guizotia abyssinica* Cassini), c. 6,200', 16-20.x.1961, 1 ♂ ; *ibid.*, clearing in small wood, c. 6,200', 25.xi.1961, 1 ♂ ; *ibid.*, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962, 7 ♂, 4 ♀ ; *ibid.*, mixed vegetation in deep gully, c. 6,200', 2.i-13.ii.1962, 2 ♀ ; between Sangu and Tamrang, in tree shade by hill stream, mossy ground under bushes, c. 5,500', 20.x.1961, 1 ♂, 1 ♀, 23.x.1961, 1 ♀ ; *ibid.*, mixed plants by damp cliff in deep river gorge, c. 5,200', i-ii.1962, 2 ♀ ; *ibid.*, mixed shrubs in deep gorge, c. 5,200', x-xi.1961, 1 ♂ ; below Sangu, edge of small mixed wood, c. 6,000', 4.xi.1961, 1 ♀ ; above Sangu, ex *Lycopodium* sp. on slope, c. 7,800', 11-14.i.1962, 1 ♂ ; *ibid.*, mixed vegetation in dried-up ravine, c. 6,800', 16.ii.1962, 1 ♂, 4 ♀ ; *ibid.*, old mixed forest, c. 6,200', 25-28.x.1961, 1 ♀ ; Dobhan, evergreen trees overhanging stream in gully, c. 3,500', 30.i.1962, 1 ♂ ; *ibid.*, east bank of River Tamur, mixed vegetation by stream in deep gully, c. 3,500', i-ii.1962, 1 ♂ (R.L.C.).

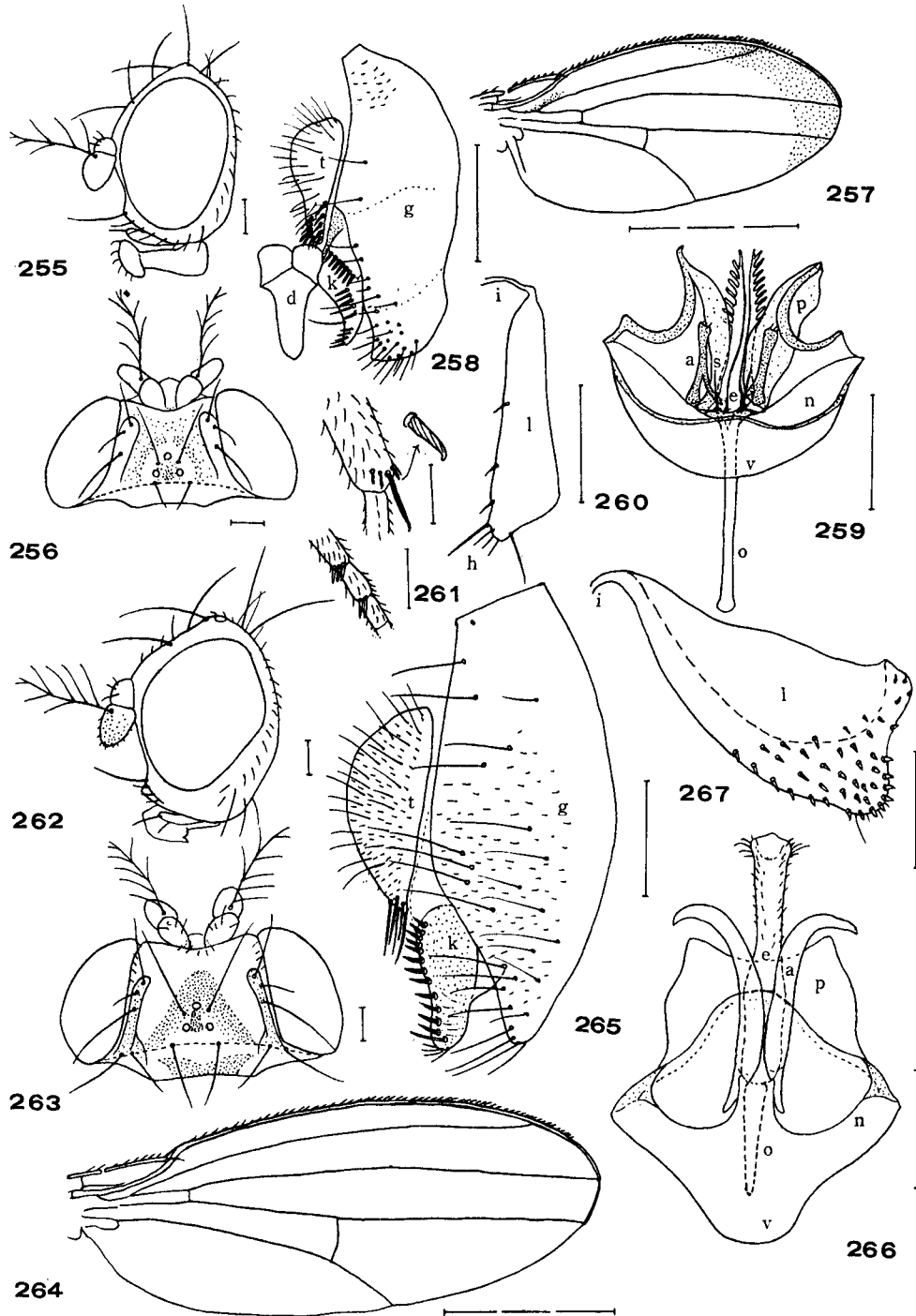
Distribution : Nepal (new locality), China, Japan.

The ♂ has two small black markings near the wing base besides a large distal costal black marking. This type of wing pattern is the same as in the original form (China) (Tan, Hsu, and Sheng, 1949). In the Japanese form, however, the basal black markings are absent or very weak except in a form from the southern island, Yakushima, Kyushu, collected by the author in summer, 1962.

***Drosophila (Sophophora) tristipennis*** Duda  
(Text-figs. 255-261)

*Drosophila tristipennis* Duda, 1924a : 215 ; 1924b : 247 (Formosa) ; Sturtevant, 1927 : 371 (India).

♂, ♀. Body about 1.7 mm. Head as broad as thorax. Eyes dark red, pilose. Antennae with second segment yellow and third grey in female, second white and third pale yellowish white in ♂ ; third oval. Arista with three dorsal and two ventral branches and a large terminal fork. Palpus yellow, apically broadened, with an apical prominent and a few ventral shorter setae. Ocellar triangle grey, posteriorly black. Periorbit grey, glossy in ♀, milky white in ♂. Front yellowish grey, frontal triangle with brown margin in ♀, milky white and posteriorly somewhat orange in ♂, anteriorly one and one-third times as broad as length down middle, posteriorly slightly broader than half head width. Face matt greyish white. Carina long,



FIGS. 255-267. 255-261, *Drosophila (Sophophora) tristipennis* Duda. 255, ♂ head, lateral aspect ; 256, ♂ head, dorsal aspect ; 257, ♂ wing ; 258, periphallallic organs, lateral aspect ; 259, phallic organs, ventral aspect ; 260, ♀ egg-guide ; 261, hooked scaly bristles on ♂ mid tibia (upper), sex-combs on proximal two tarsal joints of ♂ fore leg (lower). 262-267, *Drosophila (Hirtodrosophila) tripartita* sp. n. 262, ♂ head, lateral aspect ; 263, ♂ head, dorsal aspect ; 264, ♂ wing ; 265, periphallallic organs, lateral aspect ; 266 phallic organs, ventral aspect ; 267, ♀ egg-guide.

narrow, low. Clypeus greyish yellow. Cheeks white in ♂, yellowish grey in ♀, about one-sixth as broad as the greatest diameter of eye. Occiput yellow, medially black. Anterior reclinate orbital five-eighths as long as others, twice as distant from posterior reclinate as from proclinate. Vibrissae long; second oral half as long as vibrissa; succeeding orals shorter.

Mesonotum yellowish grey, somewhat glossy, nearly unicolorous. Scutellum pale yellowish brown, somewhat glossy. Thoracic pleura pale yellowish brown; humeral callus pale. Two long humerals. Acrostichal hairs in six rows. Anterior dorsocentrals about half as long as posteriors; distance between anterior and posterior dorsocentrals about two-fifths distance between anterior pair. Anterior scutellars convergent, slightly shorter than posteriors, which are nearer to each other than to anteriors. Sterno-index about 0.7. Legs yellowish white; fore femur ventrally with several long hairs; mid tibia apically with four hooked scaly bristles; metatarsus without such bristles. Front and hind metatarsi as long as next three segments together, mid metatarsi as long as the other segments together. Preapicals on all legs; apicals prominent on mid leg. Wings hyaline, broad, in ♂ with a crescentic black patch along outer margin and a black stripe below  $R_1$ , in ♀ with a black spot at the apex of  $R_{2+3}$ . *Costa* reaching  $M$ ,  $R_{2+3}$  straight, not curved to *costa* at tip;  $R_{4+5}$  and  $M$  parallel. C-index about 2.0; 4V-index about 2.7; 4C-index about 1.6; 5x-index about 4.0; Ac-index about 3.1. C1-bristles two; C3-fringe on basal one-fourth. Halteres yellow. Abdominal tergites mostly black; 1T yellow, 2T yellow on anterior half. Female cercus dark brown.

Periphallalic organs: Genital arch black, medially widely pale, mediocaudally gently projected, dorsally exceedingly narrowing, ventrally truncate, pubescent at dorsal tip, setigerous along caudal margin. Clasper pale yellow, elongate, ventrally narrowing, subapically with a row of about five large teeth on distal margin. Secondary clasper present, above the primary clasper, with a straight row of about seven large black teeth on entire distal margin. Anal plate black, setigerous, rounded above, ventrally narrowing and with a few thick black bristles. Phallic organs: Aedeagus slender, bifid, orange, marginally with long serration; basal apodeme slightly longer than aedeagus. P.I. = 0.7. Anterior paramere short, rod-like, black, attached to aedeagus basally, apically somewhat broadened and with a few sensilla. Posterior paramere pale, broad, fusiform in lateral aspect, proximally bilobed, attached to aedeagus by one arm and to the lateral corner of ventral fragma by the other. Ventral fragma semicircular, with a pair of short submedian spines; hypandria pubescent. p.f. = AbCd'EfGHIKIMN. Egg-guide lobe pale yellow, oblong, subapically swollen dorsally, with about eight marginal black slender setae, ventrosubapical one longest. Basal isthmus yellow, one-sixth as long as lobe.

Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x.1961, 1 ♀, xi.1961-i.1962, 1 ♂; edge of mixed forest above Sangu, c. 6,500', 17.x-i.xi.1961, 11 ♂, 8 ♀; between Sangu and Tamrang, dense vegetation in tree shade by hill stream, c. 5,500', 23.x.1961, 1 ♂, 2 ♀; *ibid.*, mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961, 1 ♀; Dobhan, evergreen trees overhanging stream in deep gully, c. 3,500', 30.i.1962, 1 ♂ (*R.L.C.*).

Distribution: Nepal (new locality), India, Formosa.

Differs somewhat from the original form (Formosa) in having six rows of acrostichal hairs (eight in original form), and posteriorly black ocellar triangle (yellowish white in original form). The pectinate aedeagus shows a close relationship to the members of the *melanogaster*-subgroup.

### *Drosophila (Sophophora) nepalensis* Okada

*Drosophila nepalensis* Okada, 1955: 388 (Nepal).

♂, ♀. Body dark brown, especially dark in ♂. Head as broad as thorax. Arista with about four dorsal and three ventral long branches and a moderate terminal fork. Front matt yellowish grey, with silver-white pollinosity, anteriorly narrowing and somewhat broader than length

down middle. Ocellar triangle black, outer margin also black. Periorbit black, two-thirds as long as front, posteriorly narrowing, anterior end rounded. Anterior scutellars nearly as long as posteriors, which are equidistant from each other and from anteriors. All metatarsi subequal to next three segments together. Face deep black above, white below. Egg-guide lobe yellow, broadly truncate apically, with about twenty pointed black marginal teeth, ultimate three teeth widely apart from each other. Basal isthmus brown, long, nearly half as long as lobe. Sub-terminal hair long. Other features as described by Okada (1955).

Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x. 1961, 1 ♀; *ibid.*, rotten fruits of Bhor trees on ground, c. 6,200', 7-31.x.1961, 10 ♂, 3 ♀. Arun Valley, below Tumlingtar, River Sabhaya, west shore, fermented millet seeds on shore, c. 1,800', 24.xii.1961, 4 ♂, 1 ♀ (*R.L.C.*).

Distribution : Nepal, India.

#### THE TAKAHASHII SUBGROUP

##### *Drosophila (Sophophora) takahashii* Sturtevant

*Drosophila takahashii* Sturtevant, 1927 : 371 (Formosa) ; Chino, 1927 : 473 (Japan) ; Peng 1937 : 27 (China) ; Kikkawa and Peng, 1938 : 534 (Formosa, Manchuria) ; Okada, 1955 : 388 (Nepal).

*Drosophila (Sophophora) takahashii* Sturtevant ; Sturtevant, 1942 : 29 ; Okada, 1956 : 109 (Japan) ; Okada, 1964a, : 111 (Japan : Amami) ; Okada, 1964b : 449 (Borneo) ; Wheeler and Takada, 1964 : 174 (Mariana Is.).

Taplejung District, Sangu, rotten fruits of Bhor tree on ground, c. 6,200', 7-31.x. 1961, 15 ♂, 6 ♀ (*R.L.C.*).

Distribution : Nepal, Formosa, China, Ryukyu, Manchuria, Japan, Mariana Is.

#### THE MELANOGASTER SUBGROUP

##### *Drosophila (Sophophora) melanogaster* Meigen

*Drosophila melanogaster* Meigen, 1830 : 85 (Europe).

Taplejung District, Sangu, from rotten Naspiti fruits in traps, c. 6,200', 8-31.x. 1961, 13 ♂, 6 ♀; *ibid.*, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962, 1 ♀; *ibid.*, from rotten bananas in traps, c. 6,200', x-xii.1961, 20 ♂, 16 ♀; between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961, 1 ♀ (*R.L.C.*).

Distribution : Nepal, India, China, Manchuria, Korea, Formosa, Japan, Micronesia, Hawaii, Australia, Africa, Europe, N. America, S. America.

#### THE MONTIUM SUBGROUP

##### *Drosophila (Sophophora) kikkawai* Burla

*Drosophila (Sophophora) kikkawai* Burla, 1954a : 47 (Japan, China, Brazil, Hawaii?, Samoa?) ; Okada, 1955 : 387 (Nepal) ; Okada, 1956 : 118 (Japan) ; Okada, 1964b : 457 (Borneo) ; Kang, Chung, and Lee, 1959 : 62 (Korea) ; Wheeler and Takada, 1964 : 176 (Mariana Is., Palau, Ponape).

*Drosophila montium* de Meijere, 1917 ; Duda, 1923 : 53 (Formosa, India) ; Duda, 1924 : 215 ; 247 (Java, Formosa, India) ; Duda, 1926 : 99 (Sumatra) ; Chino, 1927 : 473 (Japan) ;

Kikkawa and Peng, 1938 : 530 (Japan, Korea, Manchuria, Saipan) ; Pavan and da Cunha, 1947 : 20 ; 23 (Brazil) ; Tan, Hsu, and Sheng, 1949 : 197 (China). [Mis-identification].

Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x. 1961, 1 ♂, 1 ♀ ; *ibid.*, rotting fruits of Bhor tree on ground, c. 6,200', 7-31.x.1961, 2 ♂, 3 ♀ ; *ibid.*, from rotten Naspatti fruits in traps, c. 6,200', 8-31.x.1961, 18 ♂, 10 ♀, 1 puparium ; *ibid.*, from rotten bananas in traps, c. 6,200', x-xii.1961, 33 ♂, 4 ♀ ; *ibid.*, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962, 1 ♀ ; between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961, 1 ♀ ; Arun Valley, below Tumlingtar, River Sabhaya, west shore, fermented millet seeds on shore, c. 1,800', 24.xii.1961, 14 ♂, 11 ♀ ; east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 1 ♂ (*R.L.C.*).

Distribution : Nepal, India, Java, Borneo, Sumatra, Viet-Nam, Formosa, China, Japan, Korea, Micronesia, Hawaii, Samoa.

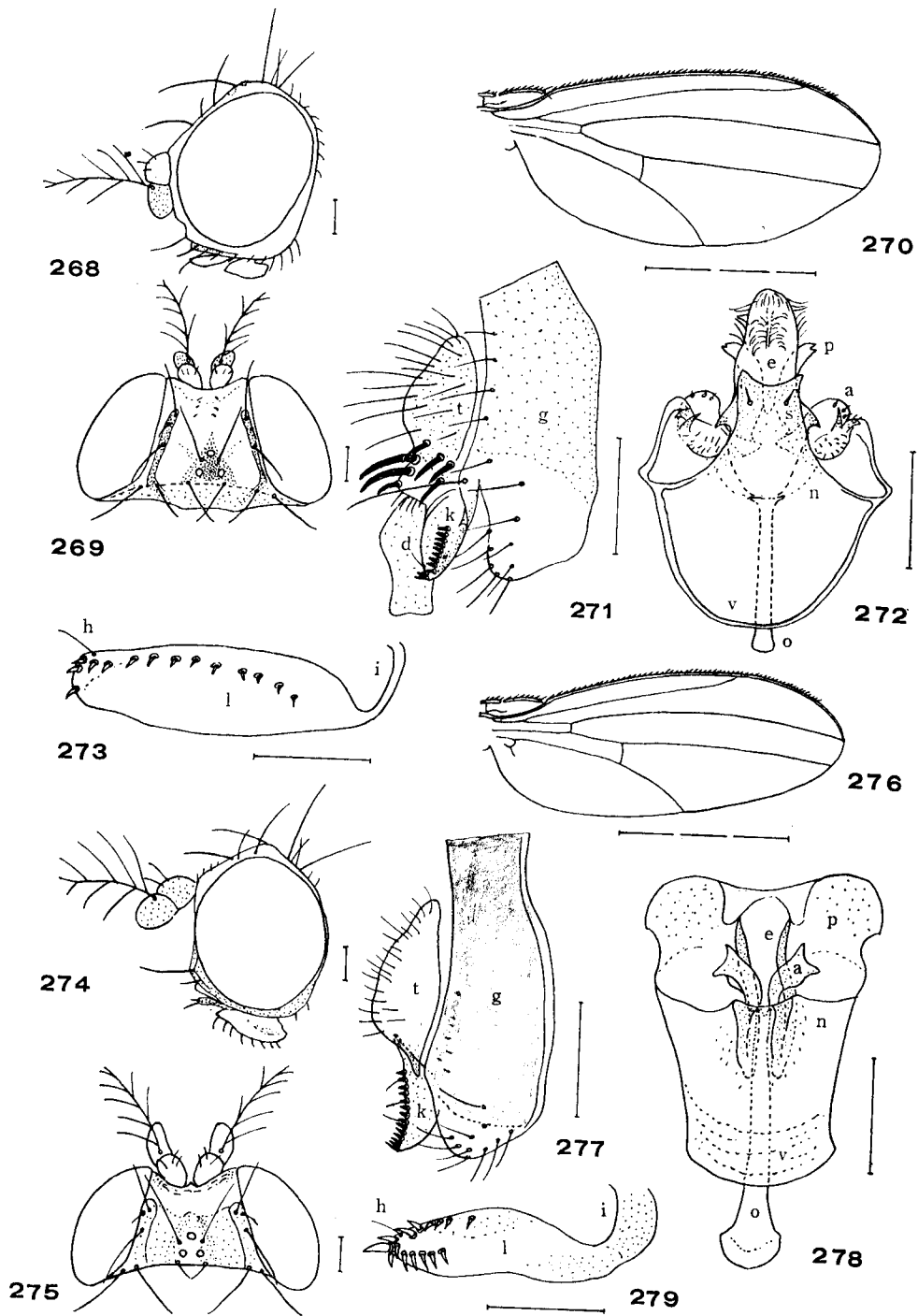
The males and some females from Arun Valley are evidently smaller and darker than those from Taplejung, the former having sex-combs composed of lesser number of teeth (17 and 16 in the first and second tarsal joints, respectively) than in the latter (33 and 23), and the egg-guide teeth also few in number (12 to 16) than in the latter (20). These two forms agree however in the general features of phallic and periphallallic organs.

### *Drosophila (Sophophora) trapezifrons* sp. n.

(Text-figs. 268-273)

♂, ♀. Body about 2 mm. Head slightly broader than thorax. Eyes oval, dark reddish brown, thickly pilose. Antennae with second segment yellowish orange ; third greyish brown, slightly longer than broad. Arista with about four dorsal and two ventral long branches and a small terminal fork. Palpus yellow, slender, with only one apical seta. Ocellar triangle black, somewhat glossy ; frontal triangle black. Periorbit black, narrow, straight, five-sevenths as long as front. Front dark orange-yellow, anteriorly paler and much convergent, anteriorly about two-thirds as broad as length down middle, posteriorly about half as long as head width. Face black, pollinose greyish white, paler along eye margin. Clypeus pale brown. Carina high, white, anteriorly broadened and fuscous, laterally fuscous. Cheek whitish grey, fuscous above, about one-seventh as broad as the greatest diameter of eye. Occiput brownish black, medially darker. Postverticals long. Anterior reclinate orbital about one-third as long as posterior reclinate, one and a half times as distant from posterior reclinate as from proclinate ; three orbitals nearly equidistant from eye margin, proclinate slightly inside others. Two long orals, succeeding orals finer.

Mesonotum dark yellowish brown, glossy, posteriorly darker. Scutellum dark yellowish brown, slightly pollinose. Thoracic pleura yellowish grey, paler below. Two humerals, upper longer. Acrostichal hairs in six rows. Anterior dorsocentrals half as long as posteriors ; distance between anterior and posterior dorsocentrals two-fifths distance between anterior pair. Anterior scutellars divergent, slightly shorter than posteriors, which are slightly nearer to each other than to anteriors. Sterno-index about 0.6 ; median sternopleural one-third as long as posteriors. Legs yellow ; all metatarsi as long as next three segments together. Male fore leg with large longitudinal sex-combs, composed of about twenty-one black teeth on metatarsi and eighteen similar teeth on the second segment. Preapicals on all legs ; apicals on mid and hind legs. Wing hyaline, veins brown, crossveins clear. *Costa* reaching *M* ; *R*<sub>4+5</sub> and *M* nearly parallel ; *R*<sub>2+3</sub> straight, not curved to *costa* at tip. C-index about 2.8 ; 4V-index about



FIGS. 268-279. 268-273, *Drosophila (Sophophora) trapezifrons* sp. n. 268, ♂ head, lateral aspect; 269, ♂ head, dorsal aspect; 270, ♂ wing; 271, periphallallic organs, lateral aspect; 272, phallic organs, ventral aspect; 273, ♀ egg-guide. 274-279, *Diathoneura ripa* sp. n. 274, ♂ head, lateral aspect; 275, ♂ head, dorsal aspect; 276, ♂ wing; 277, periphallallic organs, lateral aspect; 278, phallic organs, ventral aspect; 279, ♀ egg-guide.

3.4 ; 4C-index about 1.4 ; 5x-index about 3.7 ; Ac-index about 2.2. C1-bristles two, subequal ; C3-fringe on basal two-sevenths. Halteres yellow. Tergites yellowish brown, with broad black cross-band towards tip of abdomen.

Periphallial organs : Genital arch broad, black, pale grey at lower one third, caudal margin setigerous and gently convex below middle. Clasper in two sets : primary clasper ventrally narrowing, triangular, grey, with about ten small black teeth in a straight row on lower two-thirds of distal margin ; secondary clasper quadrate, above the primary one, partly attached to the lower tip of anal plate, with two large and one small black ventrally curved stout bristles on distal margin and a strong spine on inner margin, lower margin hairy. Anal plate separated from genital arch, oval, setigerous, with about three strong black bristles below. Phallic organs : Aedeagus compact, hairy, distally somewhat narrowing, subbasally with paired lateral black acute projections ; basal apodeme slightly shorter than aedeagus, straight, pale yellowish orange. PI = 1.4. Anterior paramere conical, black, rounded and with a few sensilla apically, with two acute projections medially, basally prolonged to join the base of aedeagus. Posterior paramere elongate, pale orange, gently curved outward, apically tapering. Ventral fragma quadrate, pale, with a large broad caudomedian process, which is apically shallowly concave and subapically with a pair of short submedian spines. p.f. = aBcDefGHIKIMN. Egg-guide lobe yellowish brown, oblong, gently narrowing apically and broadly truncate, with about fourteen black pointed marginal teeth, last tooth well removed from penultimate. Subterminal hair distinct. Basal isthmus black, one fourth as long as lobe.

Holotype ♂. EAST NEPAL : Taplejung District, Sangu, rotten fruits of Bhor tree on ground, c. 6,200', 7-31.x.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes : Taplejung District, 1 ♂, 1 ♀, same data as holotype ; 1 ♂, between Sangu and Tamrang, mossy ground under bushes by hill stream, c. 5,500', 20.x.1961 ; 4 ♂, *ibid.*, mixed shrubs in deep gorge, c. 5,200', x-xi.1961 ; 1 ♂, old mixed forest above Sangu, c. 6,200', 25-28.x.1961 ; 1 ♀, Sangu, from rotten Naspatei fruits in traps, c. 6,200', 8-31.x.1961 ; 2 ♀, *ibid.*, from rotten bananas in traps, c. 6,200', x-xii.1961 ; 1 ♀, *ibid.*, mixed vegetation by stream in gully, c. 6,200', ix-x.1961 ; 1 ♀, below Sangu, mixed vegetation on sheltered slopes above river, c. 4,000', 3.i.1962 ; 1 ♂, between Sangu and Tamrang, deep river gorge, c. 5,200', x-xi.1961 ; 1 ♂, *ibid.* mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961 ; 1 ♀, Dobhan, shady places on shrubby slope above River Tamar, c. 3,500', 21-27.i.1962 ; 1 ♀, above Sangu, mixed vegetation in dried-up ravine, c. 6,800', 16.ii.1962 (R.L.C.), BMNH ; 2 ♂ (from Sangu and between Sangu and Tamrang) deposited at the Tokyo Metropolitan University.

Resembles *D. (S.) auraria* Peng, 1937 (China and adjacent countries) in having trapezoid front and laterally clawed aedeagus, but differs in having ♂ face not whitish, periorbit black (grey in *auraria*), aedeagus hairy (bare in *a.*), anterior paramere conical and hairy (elongate and not hairy in *a.*), and caudal margin of genital arch without prominent conical projection.

#### THE ANANASSAE SUBGROUP

### *Drosophila (Sophophora) bipectinata* Duda

*Drosophila bipectinata* Duda, 1923 : 52 (India).

No specimens were found in the present collection. The author (1955) recorded it from Central Nepal.

Distribution : Nepal, India, Borneo, Formosa, Ryukyu, Japan (Amami Is.).

Subgenus *DROSOPHILA* Fallén

*Drosophila* Fallén, 1823 : 4.

Type-species : *Musca funebris* Fabricius, 1787 : 345.

KEY TO SPECIES

- 1 Body and legs dark brownish black. ♂ anal plate contiguous with genital arch  
*virilis section, robusta group* . . . *lacertosa* (p. 97)
- Body and legs usually yellowish or yellowish brown, if dark brown, fore femur with a row of spinules. ♂ anal plate separated from genital arch *quinaria section* 2
- 2 Fore femur antero-ventrally with a longitudinal row of short stout spinules  
*immigrans group* 7
- Fore femur antero-ventrally without a row of spinules . . . . . 3
- 3 Second oral as long as or only slightly shorter than vibrissa. Palpus with a few prominent ventral setae . . . . . 4
- Second oral small or minute, at most half as long as vibrissa. Palpus with only one long apical seta . . . . . *grandis group* 5
- 4 Two long sternopleurals. Posterior parameres fused to form a large distal bow  
*bizonata group* . . . *trizonata* (p. 97)
- Three long sternopleurals. Posterior parameres apparently absent  
*histrion group, part* . . . *trisetosa* (p. 99)
- 5 Mesonotum with six dark longitudinal stripes . . . . . *editinares* (p. 103)
- Mesonotum without distinct dark longitudinal stripes . . . . . 9
- 6 Thoracic pleura with three distinct dark longitudinal stripes . . . *acutissima* (p. 101)
- Thoracic pleura without distinct dark longitudinal stripes, with only one faint small dark patch above . . . . . *flexicauda* (p. 101)
- 7 Front and thoracic pleura with distinct dark longitudinal stripes . . . . . 8
- Front and thoracic pleura without distinct dark longitudinal stripes . . . . . 11
- 8 Mesonotum and scutellum brownish black ; humeral callus and lateral sides of scutellum yellow. Wing slightly fuscous along *costa* . . . *cubicivittata* (p. 105)
- Mesonotum and scutellum pale yellowish brown, with dark longitudinal stripes . . . 9
- 9 Mesonotum with six dark longitudinal stripes. Scutellum with two dark longitudinal stripes. Arista with only five branches including a ventral branch and a terminal fork . . . . . *notostriata* (p. 107)
- Mesonotum with five or seven dark longitudinal stripes. Scutellum with or without distinct dark longitudinal stripes . . . . . 10
- 10 Mesonotum with seven dark longitudinal stripes. Scutellum with two dark longitudinal stripes. Legs with dark ring . . . . . *annulipes* (p. 110)
- Mesonotum with five dark longitudinal stripes. Scutellum without distinct dark longitudinal stripes. Legs without dark ring . . . . . *pentastrigata* (p. 109)
- 11 Wing intensively clouded along *costa*. Posterior half of mesonotum and scutellum largely brownish black. Femora largely black . . . . . *fuscicostata* (p. 111)
- Wing without dark clouds along *costa*. Mesonotum uniformly yellowish brown or yellowish orange. Femora yellow . . . . . 12
- 12 Tips of longitudinal veins  $R_{2+3}$ ,  $R_{4+5}$  and  $M$  black. ♂ front not silvery shining. ♂ fore metatarsi thick and with a tuft of long hairs . . . . . *immigrans* (p. 112)
- Tips of longitudinal veins not black. ♂ front silvery shining. ♂ fore metatarsi not thick and without a tuft of long hairs . . . . . *nasuta* (p. 112)



THE *VIRILIS* SECTIONTHE *ROBUSTA* GROUP***Drosophila (Drosophila) lacertosa* Okada**

*Drosophila (Drosophila) lacertosa* Okada, 1956 : 158 (Japan).

*Drosophila lacertosa* Okada ; Takada and Lee, 1958 : 114 (Korea).

♂, ♀. Body about 3.5 mm., brownish black. Head as broad as thorax. Ocellar triangle glossy greyish black, strongly convex. Periorbit glossy greyish black, anteriorly rounded, posteriorly narrowing. Front anteriorly broader than length down middle. Anterior reclinate orbital slightly nearer to proclinate than to posterior reclinate. Anterior dorsocentral three fourths as long as posteriors. Front metatarsi as long as next three segments together, mid and hind metatarsi much longer than the other segments.  $R_{2+3}$  nearly straight. p.f. = aBCdef<sub>0</sub>g<sub>0</sub>H1kLmn. PI = 3.5. Other features as described by Okada (1956) for the Japanese form.

Taplejung District, Sangu, from rotten Naspatti fruits in traps, c. 6,200', 8-31.x. 1961, 1 ♂ ; *ibid.*, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962, 1 ♀ ; above Sangu, old mixed forest, c. 6,200', 25-28.x.1961, 1 ♀ ; between Sangu and Tamrang, spray-splashed rocks in deep gorge, c. 5,200', 6-28.xi.1961, 3 ♂ ; Dobhan, spray-splashed rocks in River Maewa, c. 3,500', 25.i.1962, 1 ♀ (*R.L.C.*).

Distribution : Nepal (new locality), Japan, Korea.

THE *QUINARIA* SECTIONTHE *BIZONATA* GROUP

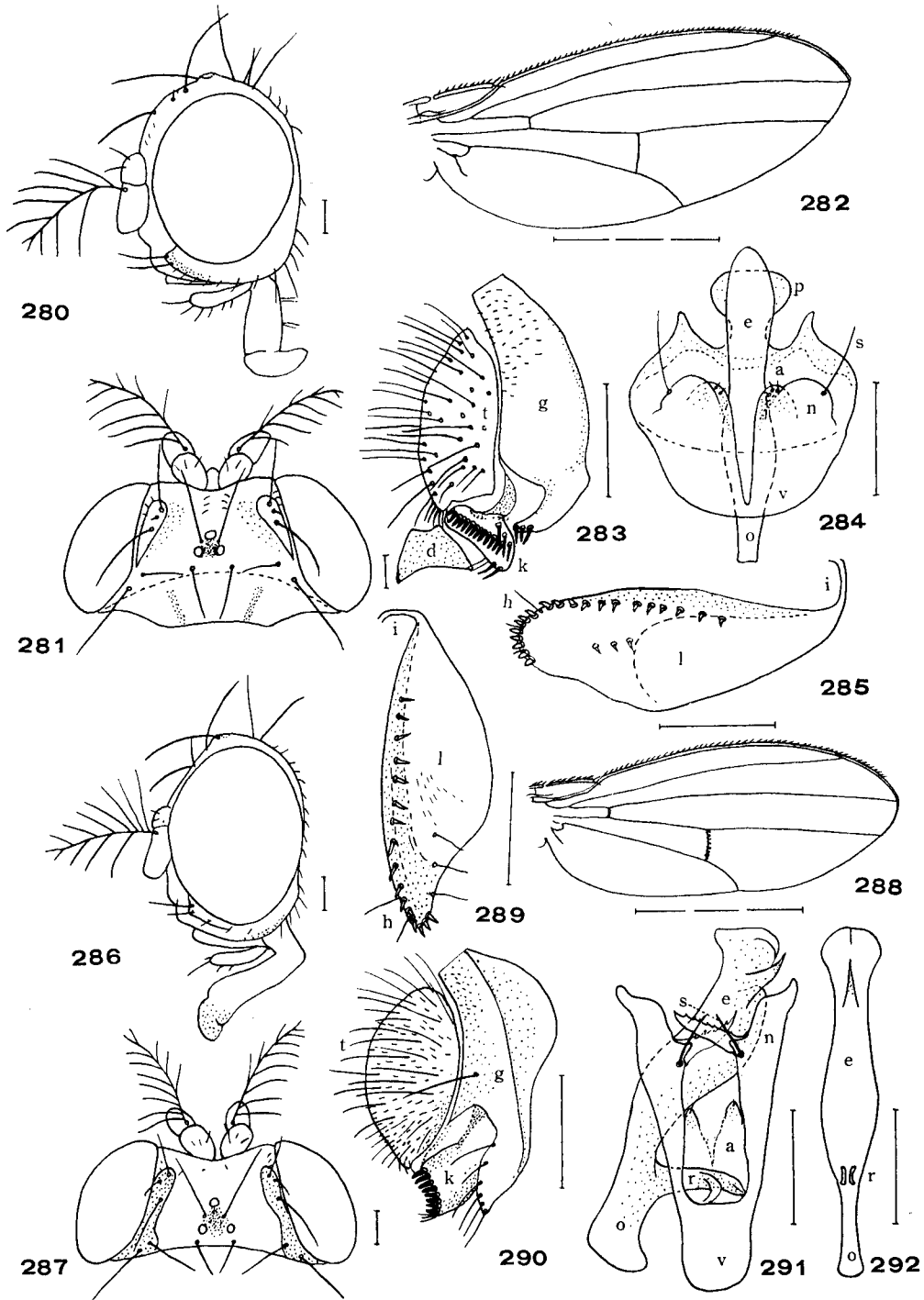
Anterior reclinate orbital minute. Second oral long. Palpus with a few prominent ventral setae. Posterior parameres present, fused to form a broad distal bow.

***Drosophila (Drosophila) trizonata* sp. n.**

(Text-figs. 280-285)

♂, ♀. Body about 2 mm. Head slightly broader than thorax. Eyes bright red, large, pilose. Antennae with second segment orange-yellow ; third greyish orange, apically rounded, about twice as long as broad. Arista with about five dorsal and three ventral branches and a small terminal fork. Palpus yellow, distally broadened, ventrally with a few long black setae. Ocellar triangle reddish brown ; inner margin of ocelli black. Periorbit orange-grey, somewhat glossy, posteriorly narrowing, anteriorly rounded and ending before the anterior margin of front. Front matt velvety orange, flat, laterally somewhat fuscous, anteriorly slightly narrowing and one and one-third times as broad as length down middle, posteriorly slightly more than twice as broad as head width. A few frontal hairs present. Clypeus yellowish brown. Face yellowish grey. Cheeks yellowish brown, about one-fourth as broad as the greatest diameter of eye. Occiput yellowish brown. Orbitals nearly equally distant from eye margin ; anterior reclinate orbital minute, not distinguished from neighbouring hairs, slightly nearer to proclinate than to posterior reclinate. Proclinate orbital slightly shorter than posterior reclinate. Postverticals long. Two long subequal orals, succeeding orals much shorter.

Mesonotum glossy pale yellowish brown, medially and laterally with obscure fuscous patches. Scutellum yellowish brown, mediolaterally fuscous. Thoracic pleura yellowish brown, paler than mesonotum, with obscure fuscous patches on mesepisternum and sternepisternum. Two long humerals, lower one slightly longer. Acrostichal hairs in six rows. Anterior dorsocentrals half as long as posteriors ; distance between anterior and posterior dorsocentrals half distance



FIGS. 280-292. 280-285, *Drosophila (Drosophila) trizonata* sp. n. 280, ♂ head, lateral aspect ; 281, ♂ head, dorsal aspect ; 282, wing ; 283, peripheral organs, lateral aspect ; 284, phallic organs, ventral aspect ; 285, ♀ egg-guide. 286-292, *Drosophila (Drosophila) trisetosa* sp. n. 286, ♂ head, lateral aspect ; 287, ♂ head, dorsal aspect ; 288, ♂ wing ; 289, ♀ egg-guide ; 290, peripheral organs, lateral aspect ; 291, phallic organs, ventral aspect, with aedeagus laterally placed ; 292, aedeagus, ventral aspect.

between anterior pair. Anterior scutellars convergent, as long as posteriors, which are upright and nearer to each other than to anteriors. Sterno-index about 0.5; median sternopleural short. Legs yellow, all metatarsi as long as the next segments together. Preapicals on all legs; apicals on mid leg. Wings hyaline, crossveins clear. *Costa* reaching *M*, weak beyond  $R_{4+5}$ .  $R_{4+5}$  and *M* parallel;  $R_{2+3}$  gently curved to *costa* at tip. C-index about 3.2; 4V-index about 1.8; 4C-index about 0.8; 5x-index about 1.4; Ac-index about 2.1. C1-bristles two; C3-fringe on basal two-sevenths. Halteres dark yellowish brown. Abdominal tergites glossy yellowish brown, each with a caudal black transverse band which is broadly interrupted at middle and narrowing laterally and is especially large on 2-4T, somewhat triangular on 2T.

Periphallalic organs: Genital arch pale yellowish brown, dorsally pubescent and not distinctly narrowing, ventrally narrowing abruptly and directed posteroventrally like a finger, apically with about four strong black setae. Clasper basally brown, short and broad, with a straight row of about thirteen long black teeth on entire outer margin, medially with about two strong black bristles. Anal plate large, pale yellowish brown, setigerous, dorsally pointed, ventrally broadly truncate, ventrocaudally with a short projection on which are inserted a few short stout setae. Phallic organs: Aedeagus dark orange, straight, rod-like, apically rounded. Anterior paramere brown, conical, partly fused to hypandrium, distally with a few sensilla. Posterior parameres fused to make a brownish, horizontally flattened, laterally deeply concave flap. Hypandrial plate oval, terminally with a long submedian spine. Ventral fragma triangular, pale brown, with deep acute median notch. p.f. = aBCdefgHIkLMN. PI = 2.0. Egg-guide lobe yellow, elliptical, broadly rounded apically, with about twenty marginal and three discal yellowish orange short thick teeth, ventrally with a short subterminal hair. Basal isthmus orange-brown, narrow, about one-fifth as long as lobe.

Holotype ♂. EAST NEPAL: Taplejung District, old mixed forest above Sangu, c. 6,200', 25-29.x.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes: Taplejung District, 2 ♂, same data as holotype (R.L.C.), one at BMNH, the other at the Tokyo Metropolitan University.

Closely resembles *D. (D.) bizonata* Kikkawa and Peng, 1938 (Japan and neighbouring countries), in having several long ventral setae on palpus, two long orals, glossy yellowish brown mesonotum and in general similar features of periphallalic and phallic organs, but distinguished from it by having flat front, upright posterior scutellars, aedeagus less dilated distally, ventrally narrowing genital arch, somewhat triangular black bands on tergites, and clear crossveins.

#### THE *HISTRIO* GROUP

Anterior reclinate orbital minute or small, about one-third to one-fifth as long as proclinate. Second oral nearly as long as vibrissa. Palpus with a few prominent ventral setae. Posterior parameres apparently absent. Including *histrio* Meigen, 1830, *sternopleuralis* Okada and Kurokawa, 1957, and *trisetosa* Okada in this paper.

#### *Drosophila (Drosophila) trisetosa* sp. n.

(Text-figs. 286-292)

♂, ♀. Body about 1.8 mm. Head slightly broader than thorax. Eyes red, pilose. Antennae with second segment orange-brown, third greyish brown with rounded tip. Arista with about seven dorsal and four ventral branches and a small terminal fork. Palpus orange-brown, rounded at tip, with a long terminal and a few ventral black setae. Ocellar triangle black.

marginally grey pollinose. Periorbit greyish brown, somewhat glossy, anteriorly blunt and not reaching anterior margin of front. Front matt orange-grey, anteriorly orange, and one and one-third times as broad as long, posteriorly half as broad as head width. Clypeus brown. Face greyish yellow, laterally concave. Carina high, long, laterally fuscous. Cheeks greyish yellow, about one-eighth as broad as the greatest diameter of eye. Occiput yellowish brown. Anterior reclinate orbital outside other orbitals, about one-third as long as posterior reclinate, half as long as proclinate, twice as distant from posterior reclinate as from proclinate. Postverticals moderate in size. Second oral nearly as long as vibrissa, succeeding orals short.

Mesonotum and scutellum matt yellowish brown, somewhat pollinose; humeral callus paler. Thoracic pleura greyish brown, sometimes with two broad obscurely demarcated dark brown longitudinal patches. Two humerals, lower longer. Acrostichal hairs in six rows. Anterior dorsocentrals less than half as long as posteriors; distance between anterior and posterior dorsocentrals half distance between anterior pair. Anterior scutellars parallel, longer than posteriors, which are slightly nearer to each other than to anteriors. Sterno-index about 0.5. Median sternopleural strong, longer than anteriors, but shorter than posteriors. Legs fuscous yellow. Front metatarsi as long as next three segments together, mid and hind metatarsi as long as the other segments together. Preapicals on all legs; apicals on mid leg. Wings hyaline, crossveins clouded. *Costa* reaching *M*.  $R_{2+3}$  gently convex at middle, apically nearly straight.  $R_{4+5}$  and *M* parallel. C-index about 3.3; 4V-index about 1.8; 4C-index about 0.8; 5x-index about 1.6; Ac-index about 1.7. C<sub>1</sub>-bristles two, subequal; C<sub>3</sub>-fringe on basal two-thirds. Halteres yellow. Abdominal tergites matt yellowish grey, each with a medially interrupted clearly indicated straight black caudal band; caudal tergites mostly black.

Periphallalic organs: Genital arch brownish black, caudal margin medially protruded triangularly and with a few long hairs, deeply and broadly concave at the base of clasper, narrowing below. Clasper brownish black, quadrate, large, with a slightly concave row of about eight black teeth on nearly entire length of distal margin. Anal plate oval, setigerous and pubescent, ventrally somewhat pointed and with a tuft of short hairs. Phallic organs: Aedeagus robust, yellowish orange, rod-like, apicodorsally with a short acute projection, which is directed caudally, apically somewhat dilated, basally with a large vertical rod. Apodeme of aedeagus thick, short, about one-third as long as aedeagus. PI = 3.0. Anterior paramere pale, narrow, apically with a long sensilla. Ventral fragma long, narrow, triangular. Hypandrial plate slender, laterally serrated, apically curved, basally attached on lateral arm of ventral fragma. A stout long submedian spine inserted below hypandrial plate. Median notch of ventral fragma very deep and wide. p.f. = ab'Cdefg<sub>0</sub>HIklmn. Egg-guide lobe yellowish brown, apically narrowing, with about sixteen marginal yellow teeth and three slender dorsal and discal setae.

Holotype ♂. EAST NEPAL: Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes: 33 ♂, 20 ♀, same data as holotype; 1 ♂, river banks below Tamrang Bridge, c. 5,500', x-xi.1961; 1 ♀, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961; 1 ♀, Arun Valley, above River Sabhaya, east shore, swept from dwarf bamboos in deep ravine, c. 2,000', 12.xii.1961; 2 ♂, 6 ♀, below Tumlingtar, River Sabhaya, west shore, evergreen shrubs on sandy shore, c. 1,800', 9-17.xii.1961; 4 ♂, 4 ♀, *ibid.*, west shore, fermented millet seeds on shore, c. 1,800', 24.xii.1961; 2 ♀, Dobhan, east bank of River Tamur, mixed vegetation by stream in deep gully, c. 3,500', i-ii.1962 (R.L.C.), BMNH, and 1 ♂, 1 ♀ at the Tokyo Metropolitan University.

Closely allied to *D. (D.) sternopleuralis* Okada and Kurokawa, 1957 (Japan and

Korea) in general features of ♂ and ♀ genitalia, in having three long sternopleurals, and dark patches of thoracic pleura, but differs from it in the details of phallic and periphallic organs : lower tip of genital arch pointed (rounded in *sternopleuralis*), aedeagus more robust, and hypandrial plate serrated (non-serrated in s.).

#### THE *GRANDIS* GROUP

Yellowish brown or dark brown species, with black patches or stripes on thoracic pleura. Anterior reclinate orbital small, less than one-third as long as posterior reclinate. Second oral much shorter than vibrissa. Phallic organs without posterior parameres. Including *D. (D.) grandis* Kikkawa and Peng, 1938, *tenuicauda* Okada, 1956, *acutissima* Okada, *flexicauda* Okada, and *editinares* Okada, the latter three species included in this paper.

#### *Drosophila (Drosophila) acutissima* Okada

(Text-figs. 293–298)

*Drosophila (Drosophila) acutissima* Okada, 1956 : 139 (Japan).

Taplejung District, between Sangu and Tamrang, dense vegetation in tree shade by hill stream, c. 5,500', 23.x.1961, 1 ♂ ; *ibid.*, mixed shrubs in deep gorge, c. 5,200', x–xi.1961, 4 ♂, 3 ♀ ; *ibid.*, mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961, 4 ♂, 3 ♀ ; below Sangu, edge of small mixed wood, c. 6,000', 4.xi.1961, 1 ♀ ; Sangu, mixed vegetation by stream in gulley, c. 6,200', xi.1961–i.1962, 7 ♂, 8 ♀ ; above Sangu, mixed vegetation in dried-up ravine, c. 6,800', 16.ii.1962, 3 ♂ (*R.L.C.*).

Distribution : Nepal (new locality), Japan.

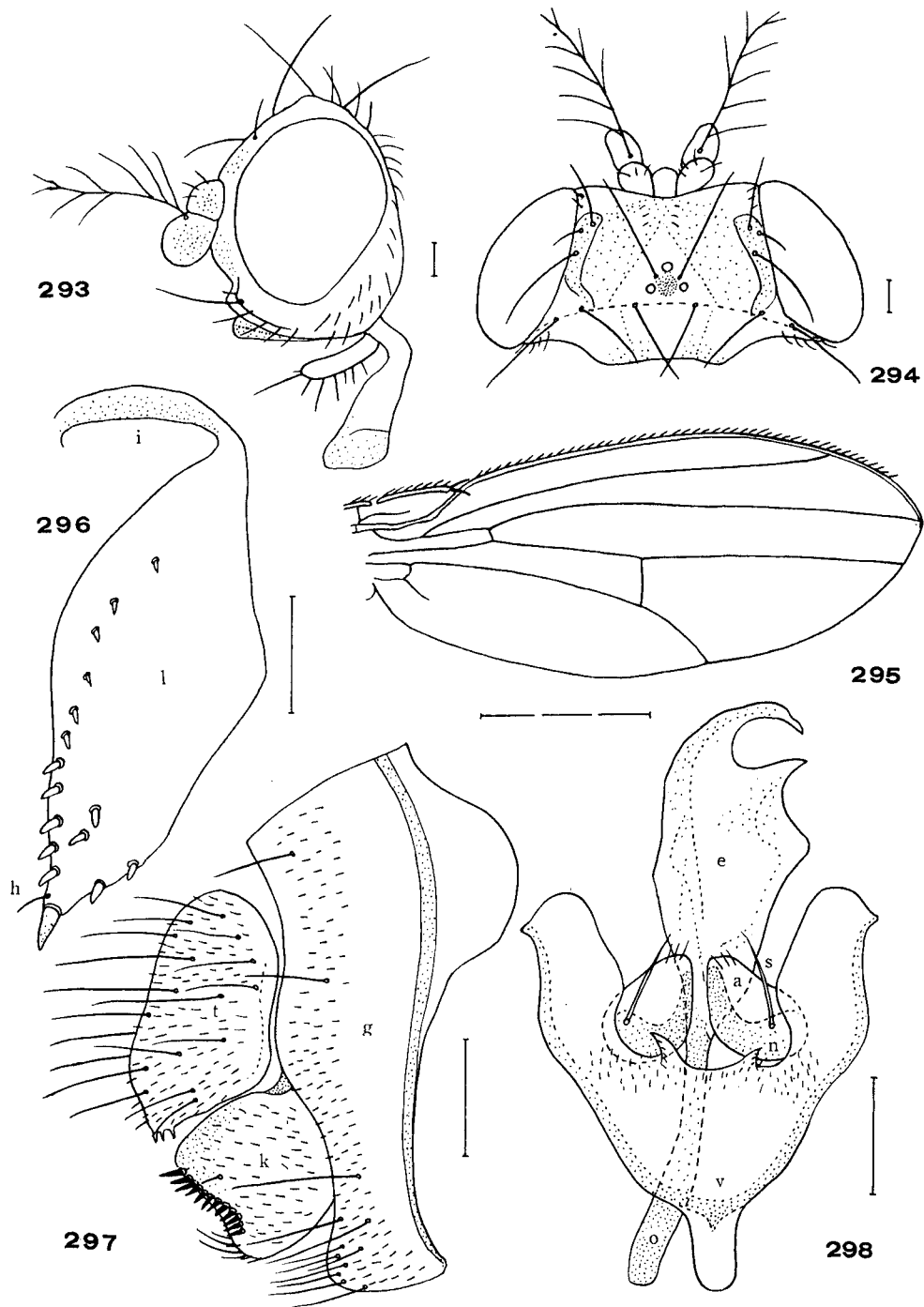
Slightly differing from original form (Japan) in having medioventrally swollen aedeagus and no distinct lateral lobe of aedeagus. Other features strictly agree with those of the Japanese form.

#### *Drosophila (Drosophila) flexicauda* sp. n.

(Text-figs. 299–305)

♂, ♀. Body 1.5–2 mm. Head somewhat narrower than thorax. Eyes oval, small, purplish red, pilose. Antennae with second segment orange-grey, third yellowish grey, apically somewhat narrowing. Arista with about six dorsal and two ventral branches and a small terminal fork. Palpus yellowish grey, slender, rounded at tip, with a long apical seta. Ocellar triangle black, small. Ocelli pale yellow. Periorbit pale greyish yellow, broad, anteriorly extending near the anterior margin of front. Front broad, yellowish grey, anteriorly orange-yellow and broader than length down middle, nearly parallel-sided, posteriorly about three-fifths as broad as head width. A few frontal hairs present. Clypeus orange-grey. Face yellowish white. Carina broad, high. Cheeks yellowish white, dark at the insertion of orals, more than one-third as broad as the greatest diameter of eye. Occiput yellowish grey. Postverticals moderate in size. One strong oral, much longer than posterior reclinate orbital ; succeeding orals very slender.

Mesonotum and scutellum uniformly yellowish brown, somewhat glossy. Thoracic pleura paler, with diffuse dark patch below humerus. Two humerals, upper longer. Acrostichal hairs



FIGS. 293-298. *Drosophila (Drosophila) acutissima* Okada. 293, ♂ head, lateral aspect ; 294, ♂ head, dorsal aspect ; 295, ♂ wing ; 296, ♀ egg-guide ; 297, peripheral phallic organs, lateral aspect ; 298, phallic organs, ventral aspect, with aedeagus laterally placed.

in six rows. Anterior dorsocentrals two-thirds as long as posteriors; distance between anterior and posterior dorsocentrals three-fourths distance between anterior pair. Anterior scutellars long, divergent; posterior scutellars shorter than anteriors, as long as posterior dorsocentral. Sterno-index about 0.6. Legs yellow; fore femur ventrally with about three very long setae; all metatarsi nearly as long as the other segments together. Preapicals on all legs; apicals on mid leg. Wings hyaline; veins yellowish brown; crossveins clear. *Costa* reaching slightly beyond  $R_{4+5}$ .  $R_{2+3}$  only weakly curved to *costa* apically;  $R_{4+5}$  and *M* nearly parallel. C-index about 2.7; 4V-index about 2.2; 4C-index about 1.1; 5x-index about 2.1; Ac-index about 2.5. C1-bristles two, subequal; C3-fringe on basal one-third. Halteres yellowish white. Abdominal tergites pale yellow, each with a broad black entire caudal band.

Periphallalic organs pale yellowish grey. Genital arch narrowly pointed ventrally, setigerous along caudal margin and on ventral tip, caudal margin acutely projected caudally above insertion of clasper, with a straight row of about eight long black teeth occupying ventral three-fifths of distal margin. Anal plate oval, large, with short hairs, ventrally broadened and truncate. Decasternum flat, triangular. Phallic organs pale brown. Aedeagus rod-shaped, straight, apically tapering and recurved dorso-anteriorly, two basally inserted elongate distally tapering appendages; apodeme shorter than aedeagus, apically swollen. PI = 2.5. Anterior paramere slender, as long as lateral appendages of aedeagus, proximally tapering and attached to the base of aedeagus, apically with a few sensilla. Hypandrial plate large, oval, basally with a stout submedian spine. Ventral fragma V-shaped, with deep median notch. Posterior paramere apparently absent. p.f. = aBCdEfg<sub>0</sub>HIklmn. Egg-guide lobe yellowish orange, ventrally dark, elongate fusiform, with about fifteen marginal and four orange-brown discal teeth, distal marginal teeth large. Basal isthmus yellowish brown, medially much swollen, more than one-third as long as lobe.

Holotype ♂. EAST NEPAL: Taplejung District, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961 (R.L.C.), BMNH.

Allotype ♀. Taplejung District, above Sangu, mixed vegetation in dried-up ravine, c. 6,800', 16.ii.1962 (R.L.C.), BMNH.

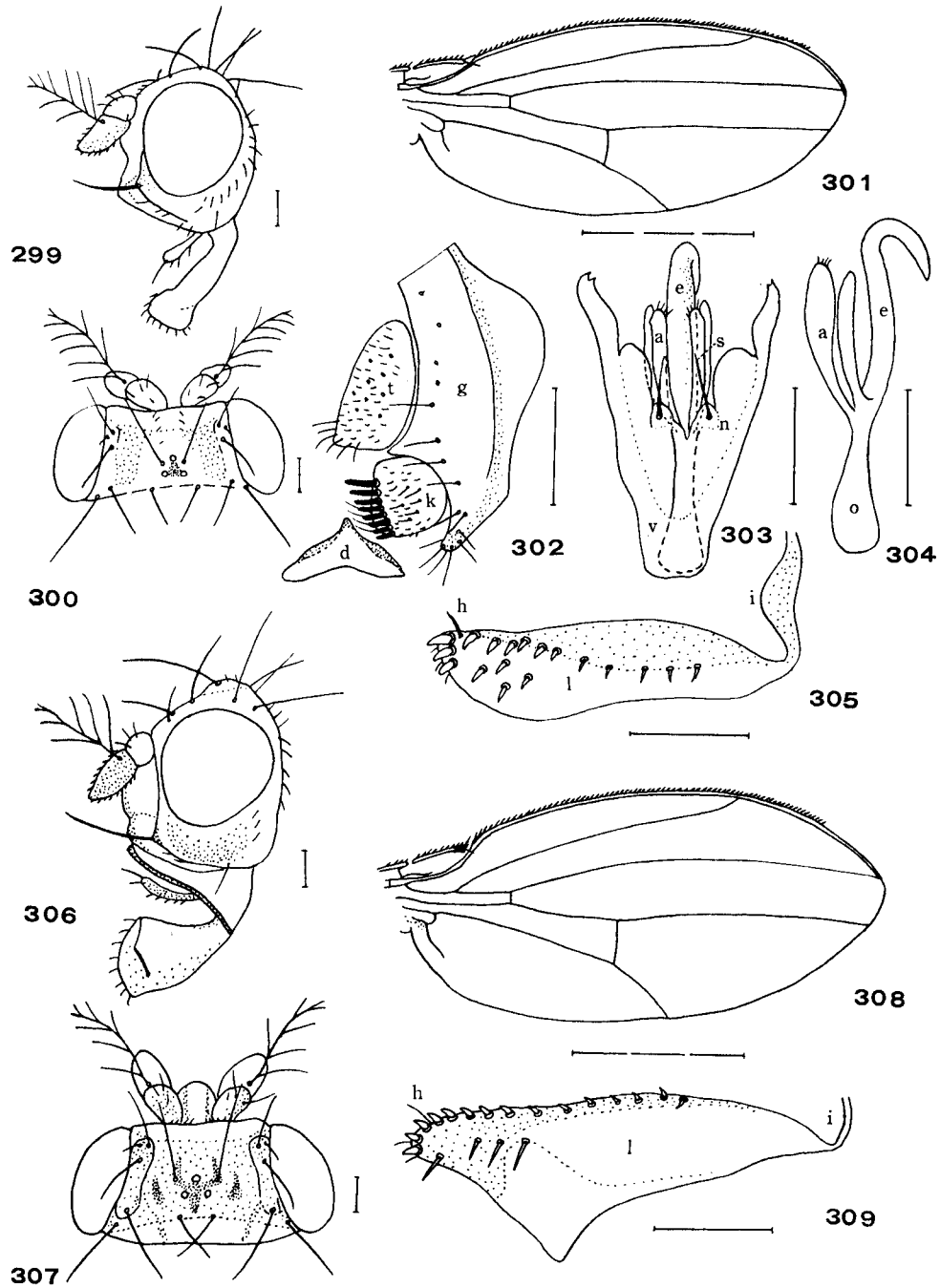
Paratypes: Taplejung District, 2 ♂, 2 ♀, 1 ex., between Sangu and Tamrang, deep river gorge, c. 5,200', x-xi.1961; 1 ♂, Sangu, mixed vegetation in deep gully, c. 6,200', 2.i-13.ii.1962. 1 ♂, Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961 (R.L.C.), BMNH, 1 ♂, 1 ♀, from between Sangu and Tamrang deposited at the Tokyo Metropolitan University.

Closely resembles *D. (D) tenuicauda* Okada, 1956 (Japan), especially in general structure of ♂ and ♀ genital apparatus, and in having anterior reclinate orbital minute, only one strong oral, and a long apical seta of palpus, but distinguished from it by having non-striped mesopleura and apically recurved aedeagus.

### *Drosophila (Drosophila) editinares* sp. n.

(Text-figs. 306-309)

♀. Body about 1.4 mm. Head greyish yellow, as broad as thorax. Eyes dark purplish red, pilose. Antennae with second segment pale brown, third dark brown, oval, tip rounded. Arista with about four dorsal and two ventral branches and a small terminal fork. Palpus slender, dark brown, with a long apical seta. Ocellar triangle black, convex. Periorbit somewhat glossy grey, convex, relatively broad, medially narrowing, anteriorly almost reaching the anterior margin of front. Front broad, yellowish grey, matt, darker between ocellar triangle



FIGS. 299-309. 299-305, *Drosophila (Drosophila) flexicauda* sp. n. 299, ♂ head, lateral aspect; 300, ♂ head, dorsal aspect; 301, ♂ wing; 302, peripheral organs, lateral aspect; 303, phallic organs, ventral aspect; 304, aedeagus, lateral aspect, dextral side dorsal; 305, ♀ egg-guide. 306-309, *Drosophila (Drosophila) editinares* sp. n., ♀. 306, head, lateral aspect; 307, head, dorsal aspect; 308, wing; 309, egg-guide.



and periorbits, parallel-sided, anteriorly paler and one and a half times as broad as length down middle, posteriorly three-fifths as broad as head width. Clypeus greyish yellow, medially with a narrow dark transverse stripe. Face broad, pale yellowish grey, paler along eye margin, parallel-sided. Carina very large, broad, high, and long. Cheeks glossy yellowish grey, black at the insertion of vibrissa, nearly half as broad as the greatest diameter of eye. Anterior reclinate orbital half as long as proclinate, one-fourth as long as posterior reclinate, situated outside proclinate, twice as distant from posterior reclinate as from proclinate. Vibrissae very long and black, succeeding orals slender. Postverticals relatively short, half as broad as inner verticals.

Mesonotum yellowish grey, with three pairs of brownish longitudinal stripes, median pair broadest and reaching to the tip of scutellum, which is yellowish in ground colour. Thoracic pleura yellowish grey, with three longitudinal brownish stripes. Two humerals, lower weaker. Acrostichal hairs in six rows. Anterior dorsocentrals three-fourths as long as posteriors; distance between anterior and posterior dorsocentrals equal to distance between anterior pair or slightly shorter. Anterior scutellars divergent, posteriors four-fifths as long as anteriors and somewhat nearer to each other than to anteriors. Legs yellow; fore femur with several long setae below; all metatarsi subequal in length to next three segments together. Preapicals on all legs; apicals on mid leg. Wings broad, hyaline; crossveins clear, tip of second costal section somewhat swollen and black.  $R_{2+3}$  not prominently curved to *costa* at tip;  $R_{4+5}$  and  $M$  parallel; *costa* weak beyond  $R_{4+5}$ . C-index about 1.7; 4V-index about 2.3; 4C-index about 1.5; 5x-index about 1.6; Ac-index about 3.1. C1-bristles two, subequal; C3-fringe on basal half. Halteres yellowish white. Abdominal tergites yellowish grey, each with a broad entire caudal black band. Egg-guide lobe orange-yellow, apically narrowing and rounded, with about sixteen orange-brown thick marginal teeth and four slender discal teeth. Basal isthmus black, short, about one-eighth as long as lobe.

Holotype ♀. EAST NEPAL: Taplejung District, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961. (R.L.C.), BMNH.

Resembles *D. grandis* Kikkawa and Peng, 1938 (Japan), in having striped mesonotum and thoracic pleura, but differs from it in the swollen tip of second costal section and rounded tip of egg-guide.

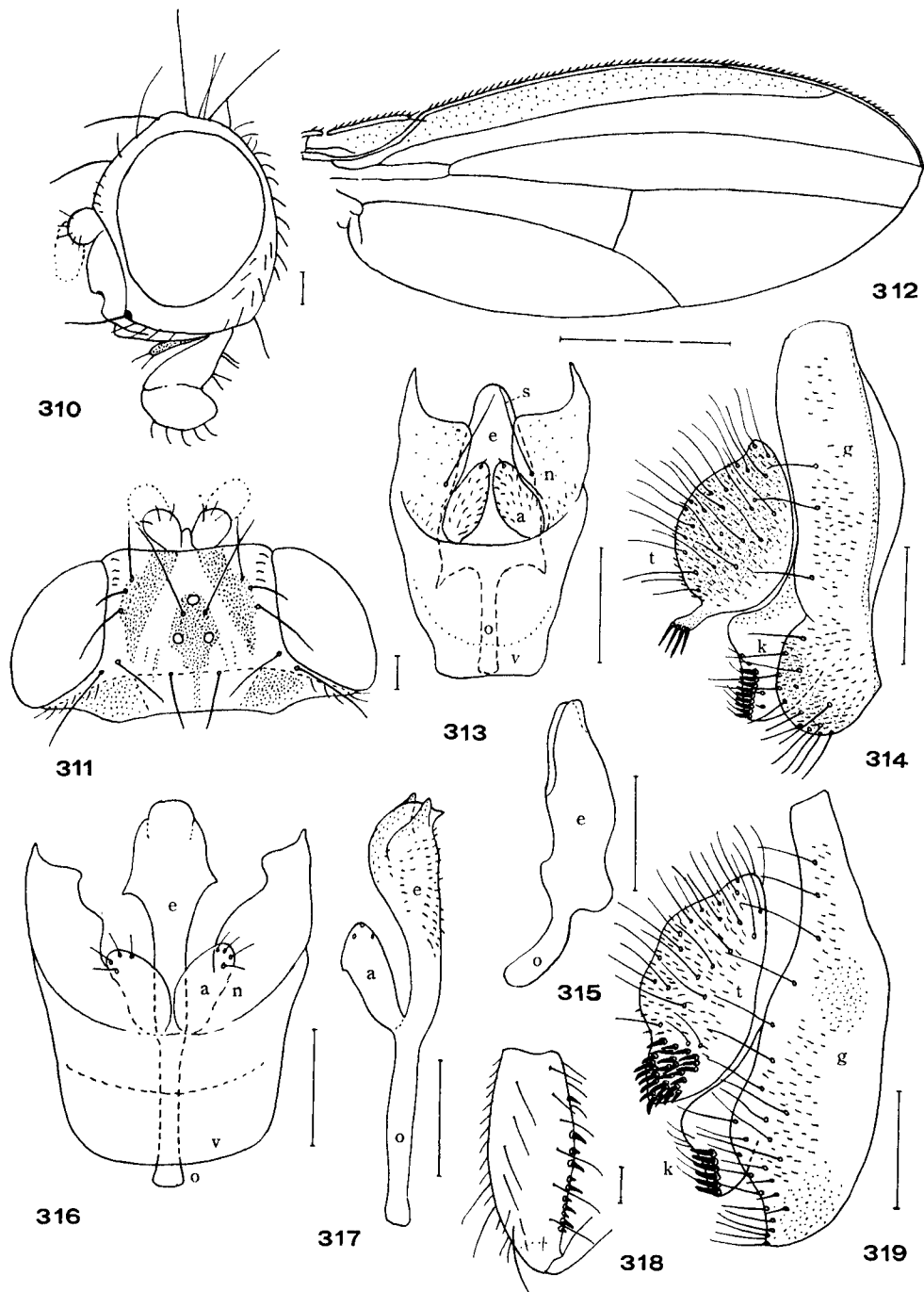
#### THE IMMIGRANS GROUP

### *Drosophila (Drosophila) cubicivittata* sp. n.

(Text-figs. 310-315)

♂. Body about 2.8 mm. Head as broad as thorax. Eyes dark brownish red, with grey pollinosity and pilose. Antennae with second segment greyish brown, third segment and arista missing. Palpus black, slender, with a long apical seta and a ventral one. Ocellar triangle glossy black, the black spot extending caudally to vertex. Periorbit yellowish white, obscurely limited, dark along either side between orbitals. Front matt yellowish white, with a pair of broad dark anteriorly convergent longitudinal stripes, parallel-sided, anteriorly broader than length down middle, posteriorly slightly broader than half head width. Clypeus pale brown, small. Face yellowish grey, somewhat glossy. Carina high, long, yellowish white, with a small brownish spot at lower tip. Postverticals moderate in size. Occiput yellowish grey, laterally black. Cheeks yellowish white, somewhat glossy, about one-fourth as broad as the greatest diameter of eye. Anterior reclinate orbital about half as long as proclinate, one-third as long as posterior reclinate, slightly nearer to proclinate than to posterior reclinate. Proclinate slightly inside other orbitals. Vibrissae long, succeeding orals less than half as long as vibrissa.

Mesonotum dark chestnut-black, grey pollinose. Humeral callus yellow. Scutellum dark chestnut-black, pollinose, laterally yellow. Thoracic pleura pale yellowish grey, with three



FIGS. 310-319. 310-315, *Drosophila (Drosophila) cubicivittata* sp. n., ♂. 310, head, lateral aspect; 311, head, dorsal aspect; 312, wing; 313, phallic organs, ventral aspect; 314, periphallallic organs, lateral aspect; 315, aedeagus, lateral aspect, dextral side dorsal. 316-319, *Drosophila (Drosophila) notostriata* sp. n., ♂. 316, phallic organs, ventral aspect; 317, aedeagus, lateral aspect, dextral side dorsal; 318, fore femur; 319, periphallallic organs, lateral aspect.

dark brown longitudinal stripes, upper two anteriorly convergent and fused. Two humerals, upper longer. Acrostichal hairs in six rows. Anterior dorsocentrals half as long as posteriors; distance between anterior and posterior dorsocentrals half distance between anterior pair. Anterior scutellars divergent, posteriors missing. Sterno-index about 0.6; median sternopleural as long as anteriors. Legs yellow; all metatarsi subequal in length to the other segments together. Fore femur anteroventrally with a row of about ten short stout black spinules on distal two-thirds. Preapicals on all legs; apicals on mid leg. Wings hyaline, somewhat fuscous along *costa*. *C* reaching *M*;  $R_{2+3}$  medially convex forward, gently curved to *costa* apically;  $R_{4+5}$  and *M* nearly parallel. C-index about 3.9; 4V-index about 1.6; 4C-index about 0.6; 5x-index about 1.4; Ac-index about 2.1. C<sub>1</sub>-bristles two; C<sub>3</sub>-fringe on basal half. Halteres white. Abdominal tergites matt yellowish white, each with four large quadrate caudal black patches, 1T yellowish white. Abdominal sternites yellowish grey.

Periphallallic organs: Genital arch pale grey, pubescent and setigerous, anterior and posterior margins nearly straight and parallel, ventrally rounded and darker. Clasper pale grey, nearly quadrate, distal margin convex caudally on upper half and with a straight row of about eight black teeth on lower half. Anal plate brown, oval, setigerous and pubescent, narrowly projected caudoventrally, apically with about four stout black pointed bristles. Phallic organs: Aedeagus yellowish orange, elliptical at lateral aspect, laterally flattened, ventro-anteriorly projected roundly; basal apodeme rod-like, half as long as aedeagus. Anterior paramere small, conical, pubescent, attached to aedeagus basally, apically with a few sensilla. Ventral fragma quadrate, pale grey; hypandrial plate large, quadrate, pale grey; median notch deep and broad. PI = 2.2. p.f. = aBCdEfg<sub>0</sub>HIklmn.

Holotype ♂. EAST NEPAL: Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 (R.L.C.), BMNH.

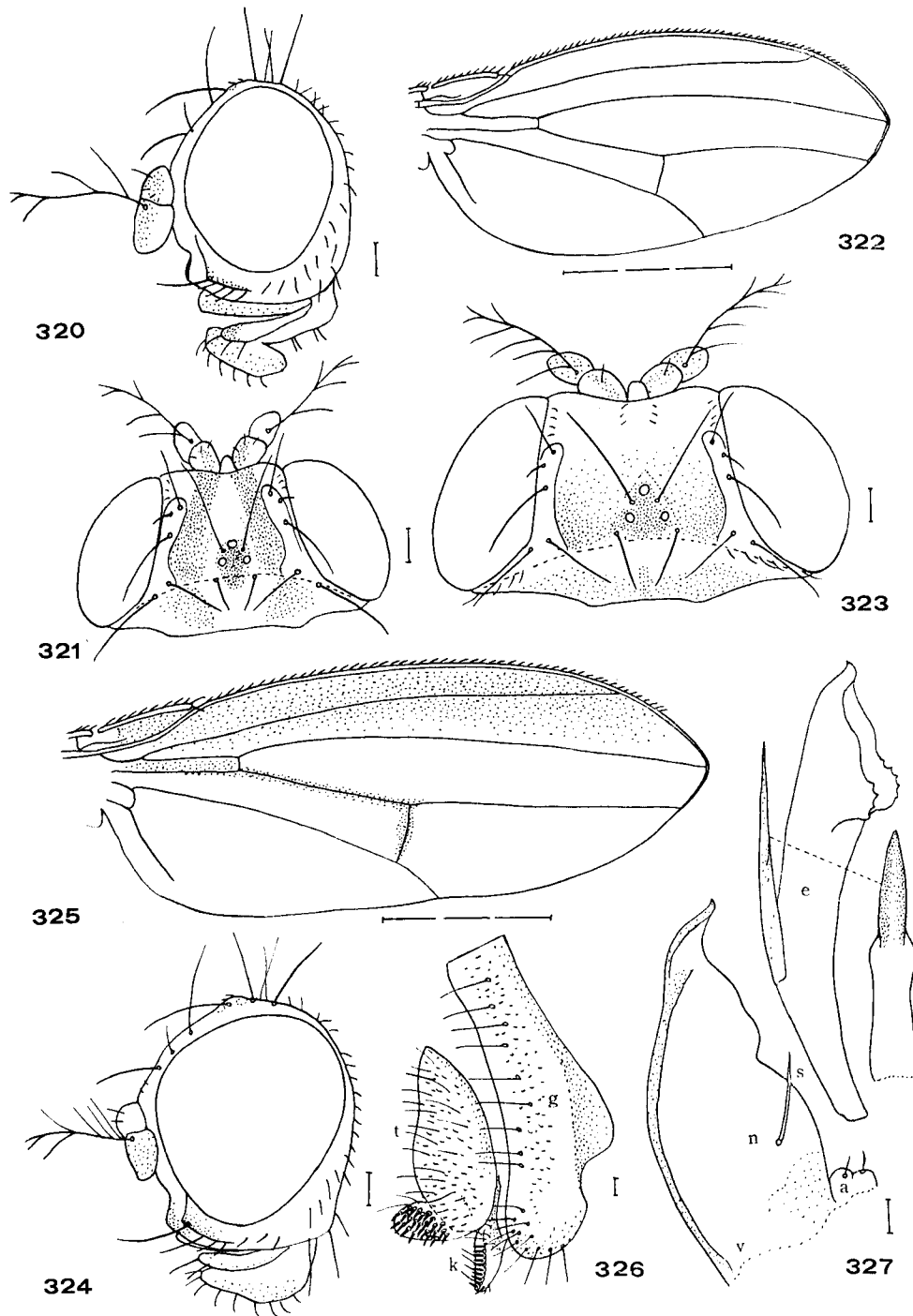
Peculiar among the *immigrans*-group in having black mesonotum, striped front, and anal plate ventrally narrowly projected with stout apical bristles. *D. (D.) annulipes* Duda, 1924 and *D. (D.) circumdata* Duda, 1924, as well as the two succeeding species in this paper, have also striped fronts, but their mesonota are similarly striped, thus differing from the present species.

### *Drosophila (Drosophila) notostriata* sp. n.

(Text-figs. 316-322)

♂. Body about 2.6 mm. Head slightly narrower than thorax. Eyes dark brownish red, pilose. Antennae with second segment dark brown, especially anteriorly; third yellowish orange, anteriorly black. Arista with only two dorsal and one ventral branches and a large terminal fork. Palpus yellowish brown, distally broadened, apically darker, with a few stout ventral and an apical setae. Ocellar triangle black. Periorbit dull yellow, medially slightly narrowing, anteriorly somewhat curved inward and blunt, about two-thirds as long as front. Front yellowish orange, matt, with a pair of broad anteriorly convergent dark brown stripes, anteriorly somewhat narrowing, as broad as length down middle, posteriorly slightly narrower than half head width. Clypeus reddish brown, with a black median spot on buccal margin. Face yellowish grey. Carina high, grey, relatively short. Cheeks yellowish brown, about one-fifth as broad as the greatest diameter of eye. Occiput yellowish brown, laterally dark. Postverticals relatively short. Anterior reclinate orbital one-third as long as posterior reclinate and of proclinate, slightly nearer to proclinate than to posterior reclinate. Proclinate inside others. Second oral about one-third as long as vibrissa; succeeding orals shorter.

Mesonotum dull yellow, matt, with six narrow brownish black longitudinal stripes, outermost pair interrupted at sutures. Scutellum dull yellow, matt, with two broad brown longitudinal stripes. Thoracic pleura brownish black, grey pollinose, paler at sutures. Two long humerals,



FIGS. 320-327. 320-322, *Drosophila (Drosophila) notostriata* sp. n., ♂. 320, head, lateral aspect; 321, head, dorsal aspect; 322, wing. 323-327, *Drosophila (Drosophila) fuscicostata* sp. n., ♂. 323, head, dorsal aspect; 324, head, lateral aspect; 325, wing; 326, periphallallic organs, lateral aspect; 327, phallic organs.

subequal. Acrostichal hairs in six rows. Anterior dorsocentrals half as long as posteriors ; distance between anterior and posterior dorsocentrals half distance between anterior pair. Anterior scutellars divergent, as long as posteriors, which are somewhat nearer to anteriors than to each other. Sterno-index about 0.6 ; median sternopleural slender. Legs yellow ; fore femur anteroventrally with a row of about ten stout black spinules on distal two-thirds, larger and smaller teeth alternating. Preapicals and apicals on all legs. All metatarsi subequal in length to the next three segments together. Wings hyaline, vein *Cu* and posterior crossvein darker but not clouded, tip slightly pointed.  $R_{2+3}$  nearly straight ;  $R_{4+5}$  and *M* slightly convergent apically. C-index about 3.1 ; 4V-index about 1.6 ; 4C-index about 0.8 ; 5x-index about 1.5 ; Ac-index about 2.3. C1-bristles two ; C3-fringe on basal two-sevenths. Halteres yellow. Abdominal tergites matt yellow, each with a medially widely interrupted, and laterally somewhat broadened, posterior black transverse band, which is sometimes divided into four spots on posterior tergites.

Periphallallic organs greyish brown. Genital arch tapering above, swollen subventrally, somewhat caudally curved apically, setigerous and pubescent, apically with several stout setae. Clasper triangular, somewhat caudally projected on upper half, with a straight row of about six stout black teeth along lower half of distal margin. Anal plate separated from genital arch as usual, fusiform, setigerous and pubescent, with about thirty-five short stout black pointed bristles in several rows ventro-apically. Phallic organs pale yellowish brown. Aedeagus straight, pubescent, distally swollen and club-shaped, laterally angulated, with a few short conical processes apically. Anterior paramere oval, half as long as aedeagus, with a few prominent sensilla apically, basally attached to aedeagus. Posterior parameres apparently fused to form a broad quadrate lobe. Ventral fragma quadrate ; hypandrial plate large and fusiform. Apodeme of aedeagus slender, straight, as long as aedeagus. PI = 1.2. p.f. = ab'CdEfgHiklmN.

Holotype ♂. EAST NEPAL : Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200' xi.1961-i.1962 (R.L.C.), BMNH.

Allied to *D. hexastriata* Tan, Hsu, and Sheng, 1949 (China), but differs from it in having dark longitudinal stripes on front, branches of arista much fewer, second oral shorter, and acrostichal hairs in six rows (eight in *hexastriata*). The presence of a "sinous bow" or "distal bow" of fused posterior parameres in this species suggests a connection with the *tripunctata*-group. Although some species of this group have the row of spinules on fore femur, like the members of the *immigrans*-group, this resemblance was considered by Frota-Pessoa (1954 : 265) to be superficial, since the latter group lacks the distal bow.

### ***Drosophila (Drosophila) pentastriata* sp. n.**

(Text-figs. 192-195, p. 68, 219-220, p. 75)

♂. Body about 2.4 mm., relatively slender. Head slightly broader than thorax. Eyes deep red, thickly pilose. Antennae with second segment dark yellow ; third broader, oval, yellow with anterior half black. Arista with about three dorsal and one ventral very long branches and a very large terminal fork. Palpus and mouth-parts unfortunately missing. Ocellar triangle black. Periorbit yellowish grey, somewhat glossy, somewhat narrowing anteriorly, four-fifths as long as front. Front orange-yellow, with two broad dark brown anteriorly convergent longitudinal stripes, proximal half of these diffusely dilated inferiorly. Front anteriorly narrowing and as broad as length down middle, posteriorly slightly narrower than half head width. Clypeus yellow, medially with a narrow brownish transverse band. Face wide, greyish white, parallel-sided, white along eye margin. Carina high, long, narrow, yellowish white. No frontal hairs. Cheeks yellowish white, about two-sevenths as broad as the greatest diameter of eye.

Occiput yellowish orange. Postverticals moderate in size. Anterior reclinate orbital about half as long as others, nearly equally spaced from posterior reclinate and from proclinate, which is inside others. Only one long oral, others much shorter.

Mesonotum orange-brown, with five narrow dark brown longitudinal stripes, median one faint and ending before posterior extremity, lateral one interrupted at suture, becoming more dorsal behind suture. Scutellum yellowish brown, pollinose. Thoracic pleura paler than mesonotum, with two narrow obscurely dark longitudinal stripes, upper one longer and reaching propleura anteriorly. Two humerals, upper much shorter. Acrostichal hairs in six rows. Anterior dorsocentrals half as long as posteriors; distance between anterior and posterior dorsocentrals subequal to distance between anterior pair. Anterior scutellars divergent, as long as posteriors, which are slightly nearer to each other than to anteriors. Sterno-index about 0.5; anterior sternopleural much thinner; median one as long as anteriors. Legs yellow; front and mid metatarsi subequal in length to next three segments together, mid metatarsi slightly longer than next three segments together. Preapicals on all legs; apicals on fore and mid legs. Fore femur anteroventrally with a row of small black equal-sized spinules on median half. Wings hyaline, *costa* reaching *M*; *R*<sub>2+3</sub> straight; *R*<sub>4+5</sub> and *M* gently convergent distally. C-index about 3.0; 4V-index about 1.5; 4C-index about 0.8; 5x-index about 1.3; Ac-index about 2.7. Cr-bristles two; 3C-fringe on basal one-fourth. Halteres yellow. Abdominal tergites dark yellowish orange; 1T pale, others each with a broad black, medially narrowly interrupted, posterior transverse band.

Periphallalic organs: Genital arch pale yellowish grey, relatively narrow, swollen and oval ventrally, pubescent and setigerous. Clasper pale brown, triangular, proximally narrowing, narrowly projected upward dorsally to reach the lower tip of anal plate, with a straight row of about eight stout blunt black teeth on entire distal margin. Anal plate large, fusiform, setigerous and pubescent, ventrally with a tuft of a few short stout black setae directed ventrally. Decasternum pale, broad, triangular. Phallic organs pale yellow. Aedeagus robust, apically blunt, rhombic and basally swollen upward in lateral aspect. Basal apodeme of aedeagus straight, half as long as aedeagus. Anterior parameres oval, small, close to each other, finely pubescent, basally attached to aedeagus, subapically with about two sensilla. Hypandrial plate quadrate, finely pubescent, medially with a long submedian spine. Ventral fragma elongate, quadrate; lateral corners sharply pointed apically. PI = 2.0. p.f. = aBCdefg<sub>0</sub>HIklmn.

Holotype ♂. EAST NEPAL: Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 (R.L.C.), BMNH.

Allied to *notostriata* in having striped front and mesonotum as well as thoracic pleura, but differing from it in having an odd number of mesonotal stripes, larger fork of arista, rounded wing tip, equal-sized short spinules on fore femur, non-pubescent aedeagus, and in the details of ♂ genital armatures.

### *Drosophila (Drosophila) annulipes* Duda

*Drosophila annulipes* Duda, 1924a: 209; 221 (Formosa); Duda, 1923: 58 [nom. nud.], (Formosa); Wheeler and Takada, 1964: 183 (Bonin Is.).

*Drosophila (Drosophila) virgata* Tan, Hsu, and Sheng, 1949: 203 (China); Okada, 1956: 149 (Japan); Kim, 1963: 73 (Korea).

Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x. 1961, 1 ♂; *ibid.*, xi.1961-i.1962, 1 ♂; below Sangu, by stream in shady ravine, c. 6,000', 30.x.1961, 1 ♀; above Sangu, old mixed forest, c. 6,200', 25-28.x.1961, 1 ♀; *ibid.*, mixed vegetation in dried-up ravine, c. 6,800', 16.ii.1962, 1 ♀ (R.L.C.).

Distribution: Nepal (new locality), Formosa, China, Korea, Japan, Bonin Is.

*Drosophila (Drosophila) fuscicostata* sp. n.

(Text-figs. 323-327)

♂. Body about 3 mm. Head as broad as thorax. Antennae with second segment brown; third greyish brown, slightly longer than broad. Arista with about four dorsal and one ventral branches and a large terminal fork. Palpus yellowish brown, ventrally with about two black setae. Ocellar triangle black, marginally grey pollinose. Periorbit glossy greyish brown, posteriorly broadened, two-thirds as long as front. Front orange, anteriorly somewhat narrowing and slightly broader than length down middle, posteriorly fuscous and broader than half head width, caudolaterally black and grey pollinose outside insertion of postverticals. Face glossy brown; buccal margin strongly convex. Carina high, short, medially whitish grey, broader below. Cheeks yellowish grey, dark at bases of orals, broad, about two-ninths as broad as the greatest diameter of eye. Occiput yellowish grey, black below. Anterior reclinate orbital slender, about one-third as long as posterior reclinate, half proclinate, slightly nearer to proclinate than to posterior reclinate; proclinate inside others. Postvertical moderate in size. Second oral fine, about two-fifths as long as vibrissa; succeeding orals finer.

Mesonotum orange-brown, matt, posteriorly and laterally dark glossy brown. Scutellum brown, anterolaterally and apically yellowish orange, with two diffuse black stripes. Thoracic pleura black, grey pollinose, pale along suture. Only one long humeral. Acrostichal hairs in six rows. Distance between anterior and posterior dorsocentrals about half distance between anterior pairs. Scutellars missing. Posterior scutellars nearer to each other than to anteriors. Sterno-index about 0.6; median sternopleural half as long as anteriors. Legs yellowish grey; fore femur anteroventrally with a row of about twelve black spinules on distal two thirds; femora black except at ends; tibiae fuscous, with indistinct dark rings subbasally and subapically. Front and mid metatarsi subequal in length to next three segments together, hind metatarsi longer than the rest of segments together. Wings extensively fuscous from costal margin up to below  $R_{2+3}$ , in the cell  $R_{4+5}$  before anterior crossvein, along  $M$ , and along crossveins.  $R_{2+3}$  straight, not curved to *costa* apically;  $R_{4+5}$  and  $M$  somewhat convergent distally. C-index about 3.8; 4V-index about 1.7; 4C-index about 0.7; 5x-index about 1.1; Ac-index about 2.3. C1-bristles two; C3-fringe on basal two-thirds. Halteres yellow. Abdominal tergites matt yellowish grey, each with a glossy black caudal transverse band, which is laterally curved anteriorly, medially interrupted on 2-3T, medially contiguous and projected anteriorly on 4-5T; 1T mostly yellow; 6T black.

Periphallallic organs brownish black. Genital arch not narrowing above, ventrally rounded, setigerous and pubescent. Clasper projected below genital arch, ventrally prolonged, with a slightly concave row of about ten stout black teeth occupying nearly entire distal margin. Anal plate setigerous and pubescent, dorsally tapering, ventrally broadened and with numerous short stout black bristles. Phallic organs: Aedeagus orange-brown, straight, subapically broadened and dentated on lateral sides, proximally tapering, subbasally with an elongate distally black and caudally pointed dorsal appendage. Anterior paramere small, conical, distally with about two sensilla. Hypandrial plate pale yellow, marginally black, broad, elliptical, with a stout submedian spine. p.f. = ab'Cdefg<sub>0</sub>HIklMn.

Holotype ♂. EAST NEPAL: Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 (R.L.C.), BMNH.

Somewhat resembles *D. hypocausta* Osten Sacken, 1882 (Philippines, Java, Sumatra, and Caroline Islands) in having black femora, black thoracic pleura, and apically pale scutellum, but differs from it in having six rows of acrostichal hairs (eight in *hypocausta*), only one strong oral (two strong in *h.*), anteriorly fuscous wings, only one ventral branch of arista (four in *h.*), ventrally setigerous anal plate and long dorsal projection of aedeagus.

***Drosophila (Drosophila) immigrans* Sturtevant**

*Drosophila immigrans* Sturtevant, 1921 : 83 (N. America).

Taplejung District, Sangu, rotting fruits of Bhor tree on ground, c. 6,200', 7-31.x. 1961, 19 ♂, 15 ♀; *ibid.*, from rotten bananas in traps, c. 6,200', x-xii.1961, 2 ♀; *ibid.*, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962, 1 ♀; between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961, 1 ♀. Arun Valley, below Tumlingtar, River Sabhaya, west shore, from rotten bananas in traps, c. 1,800', x-xii.1961, 13 ♂, 27 ♀; *ibid.*, evergreen shrubs on sandy shore, 9-17.xii.1961, 1 ♀; *ibid.*, fermented millet seeds on shore, c. 1,800', 24.xii.1961, 2 ♀; *ibid.*, east shore of River Arun, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 1 ♀ (*R.L.C.*).

Distribution : Nepal, India, Formosa, China, Korea, Japan, Philippines, Micronesia, Hawaii, Australia, Africa, Europe, N. America, S. America.

***Drosophila (Drosophila) nasuta* Lamb**

*Drosophila nasuta* Lamb, 1914 : 346 (Seychelles).

*Drosophila (Drosophila) nasuta* Lamb : Okada, 1964b : 463 (Borneo) [synonymy]; Wheeler and Takada, 1964 : 180 (Mariana Is., Truk, Ponape, Kusaie, Wake Is.) [synonymy].

Taplejung District, Sangu, rotting fruits of Bhor tree on ground, c. 6,200', 7-31.x. 1961, 16 ♂, 11 ♀; between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961, 1 ♀. Arun Valley, below Tumlingtar, River Sabhaya, west shore, from rotten bananas in traps, c. 1,800', x-xii.1961, 1 ♀ (*R.L.C.*).

Distribution : Nepal (new locality), Borneo, Sumatra, Seychelles, Formosa, Japan, Moluccas, New Guinea, Micronesia, Samoa, Fiji, Hawaii.

## GEOGRAPHICAL DISTRIBUTION OF THE NEPALESE SPECIES

Table 1 shows that the drosophilid fauna of Nepal seems to be most closely related to that of Formosa, nearly one-third of the known Nepalese species being in common (twenty-five species). Much fewer Nepalese species have been found in common with the adjacent areas, India, Viet-Nam or China, and this is certainly due mainly to the poor knowledge of the fauna in these areas as compared with the relatively rich records from Formosa. Similar relationships between the number of species in common and the degree of survey can be recognized among the islands of Java, Sumatra, and Borneo. Of these, Java has been best surveyed and is richest in the number of species in common (fourteen species), while Borneo is poorest in the degree of survey as well as in the number of species in common (three).

Japan comes next to Formosa in the number of species in common (nineteen species), which is about one-fourth of the total Nepalese species. This is undoubtedly due partly to the extensive surveys made in Japan and partly to the biogeographical similarity between the two countries. The latter has frequently been proved concerning various groups of insects and plants, e.g., *Epiophlebia* (Anisozygoptera, Odonata) and *Deuterophlebia* (Deuterophlebiidae, Diptera) in insects and *Balanophora*, *Burmannia*, and *Hydrobryum* in Angiosperms, referring only to special



cases. In regard to the drosophilid fauna, *Cryptochaetum nipponense*, *Drosophila acutissima* and *D. lacertosa*, which are common to both countries and are so-called "wild species", and *D. trizonaria* and *D. trisetosa*, which are closely related to the Japanese species, *D. bizonata* and *D. sternopleuralis* respectively, should be the examples proving connection between fauna of the two countries. Table 2 shows that one hundred and twenty-seven species, so far known from Japan, belong to sixteen genera, of which ten also occur in Nepal. The remaining six genera, *Curtonotum*, *Amiota*, *Mycodrosophila*, *Dettopsomyia*, *Lissocephala*, and *Chymomyza* have not been found in Nepal, while five genera, *Campichoeta*, *Apsinota*, *Lissodrosophila*, *Diathoneura* and *Paramycodrosophila*, recorded from Nepal in this paper, have not been found in Japan. Six subgenera of the genus *Drosophila* (*Scaptodrosophila*, *Dichaetophora*, *Hirtodrosophila*, *Dorsilopha*, *Sophophora*, and *Drosophila* s. str.) occur in both countries. The subgenus *Lordiphosa* is absent from Nepal, while occurring in Japan. The occurrence of an originally African subgenus, *Dichaetophora*, in both Nepal and Japan is rather easily interpreted biogeographically, but the discovery of an originally South American genus, *Diathoneura*, is harder to explain. This might be a phenomenon of "trans-palaeo-equatorial distribution" (Maekawa, 1963).

The Nepalese species which also occur in Europe (five species), Australia (eight), Africa (nine), N. America (four), and S. America (five) are mostly cosmopolitan or circumtropical, except *Campichoeta obscuripennis* and *Leucophenga leucozona*, which, outside Nepal, are found only in Europe and Australia, respectively. The genus *Leucophenga* and the *melanogaster*-group are the taxa flourishing especially in the Oriental Region and seem to have spread simultaneously to Nepal and Japan, which have several species in common.





TABLE I (Continued)

54. D. zonaria	Nepal	1																							
55. D. serriflavella	India		1																						
56. D. immacularis	China			1																					
57. D. pulchrella	India		1																						
58. D. tristipennis	India		1																						
59. D. nepalensis	India		1																						
60. D. takashii	India		1																						
61. D. melanogaster	India		1																						
62. D. kikawai	India		1																						
63. D. trapezifrons	India		1																						
64. D. bipectinata	India		1																						
65. D. lacertosa	India		1																						
66. D. trizonata	India		1																						
67. D. trisetosa	India		1																						
68. D. acutissima	India		1																						
69. D. flexicauda	India		1																						
70. D. editinares	India		1																						
71. D. cubicivittata	India		1																						
72. D. notostriata	India		1																						
73. D. pentastrata	India		1																						
74. D. annulipes	India		1																						
75. D. fuscicostata	India		1																						
76. D. immigrans	India		1																						
77. D. nasuta	India		1																						
Total		77	5	9	9	9	19	25	3	11	14	3	3	3	10	5	8	9	5	4	5				

TABLE 2  
Comparison of Nepalese and Japanese drosophilid faunae

Genus and Subgenus	Nepalese species	Japanese species	Species in common
<i>Cryptochaetum</i>	1	1	1
<i>Diastata</i>	2	2	1
<i>Campichoeta</i>	1	0	0
<i>Apsinota</i>	2	0	0
<i>Stegana</i>	1	3	0
<i>Leucophenga</i>	16	12	4
<i>Microdrosophila</i>	6	6	0
<i>Lissodrosophila</i>	1	0	0
<i>Hypselothyrea</i>	1	1	0
<i>Liodrosophila</i>	4	2	0
<i>Paramycodrosophila</i>	1	0	0
<i>Chaetodrosophillela</i>	1	1	0
<i>Diathoneura</i>	1	0	0
<i>Scaptomyza</i>	4	8	1
<i>Drosophila</i>	35	65	12
Other six genera	0	26	0
Total	77	127	19
<i>Scaptodrosophila</i>	5	5	0
<i>Dichaetophora</i>	2	1	1
<i>Hirtodrosophila</i>	2	9	0
<i>Dorsilopha</i>	1	1	1
<i>Sophophora</i>	12	17	5
<i>Drosophila</i> s. str.	13	31	5
<i>Lordiphosa</i>	0	1	0

#### ECOLOGICAL DISTRIBUTION OF THE NEPALESE SPECIES

Following is a summarized list of the collection data recorded by Mr. R. L. Coe for the present material. The numbers following the generic and subgeneric names are those given to the species in Table 1.

#### Taplejung Districts

Sangu, c. 6,200'.

Mixed vegetation by stream in gully. *Leucophenga* (8, 17, 20, 23), *Microdrosophila* (26, 28, 29), *Liodrosophila* (32, 33, 34, 35), *Chaetodrosophillela* (37), *Scaptomyza* (38, 39), *Drosophila* (43, 44, 48, 49, 50, 53, 54, 55, 57, 58, 59, 61, 62, 63, 65, 68, 71, 72, 73, 74, 75, 76, 77).

Rotting fruits of Bhor tree on ground. *Hypselothyrea* (31), *Liodrosophila* (33), *Drosophila* (59, 60, 62, 63, 76, 77).

Mixed vegetation in deep gully. *Liodrosophila* (34), *Chaetodrosophillela* (37), *Scaptomyza* (39), *Drosophila* (53, 69).

Clearing in small wood. *Scaptomyza* (39, 40), *Drosophila* (53, 57).

Yellow blooms of cultivated Composite (*Guizotia abyssinica* Cassini). *Scaptomyza* (38), *Drosophila* (47, 57).

From rotten Naspati fruits in traps. *Drosophila* (52, 61, 62, 63, 65).

From rotten bananas in traps. *Drosophila* (52, 61, 62, 63, 76).

By stream in gully. *Drosophila* (53).

Above Sangu.

Old mixed forest, c. 6,200'. *Leucophenga* (21, 23), *Microdrosophila* (27), *Liodrosophila* (35), *Scaptomyza* (39), *Drosophila* (53, 57, 63, 65, 66, 74).

Mixed vegetation in dried-up ravine, c. 6,800'. *Microdrosophila* (28), *Chaetodrosophilella* (37), *Scaptomyza* (38, 39), *Drosophila* (50, 53, 57, 63, 68, 69, 74).

Damp evergreen oak forest, c. 9,200'. *Cryptochaetum* (1), *Diastata* (3), *Scaptomyza* (39, 40, 41), *Drosophila* (53).

Ex *Lycopodium* sp. on slope, c. 7,800'. *Scaptomyza* (38, 40), *Drosophila* (57).

Evergreen scrub, c. 6,500'. *Leucophenga* (22), *Chaetodrosophilella* (37).

Edge of mixed forest, c. 6,500'. *Liodrosophila* (34), *Drosophila* (58).

Below Sangu.

By stream in shady ravine, c. 6,000'. *Cryptochaetum* (1), *Leucophenga* (8), *Lissodrosophila* (30), *Hypselothyrea* (31), *Liodrosophila* (32, 33, 34, 35), *Drosophila* (52, 53, 74).

Mixed vegetation on sheltered slopes above river, c. 4,000'. *Diastata* (2), *Leucophenga* (10, 21, 23), *Liodrosophila* (34), *Scaptomyza* (38, 39), *Diathoneura* (42), *Drosophila* (53, 63).

Edge of small mixed wood, c. 6,000'. *Leucophenga* (21, 23), *Liodrosophila* (35), *Scaptomyza* (39), *Drosophila* (57, 68).

Below stream in shady ravine, c. 6,200'. *Scaptomyza* (39).

North of Sangu.

Dry grass above river bank, c. 5,000'. *Leucophenga* (20), *Drosophila* (53).

Mossy ground under bushes by hill stream, c. 5,500'. *Leucophenga* (20), *Drosophila* (53, 63).

Between Sangu and Tamrang.

Mixed shrubs in deep gorge, c. 5,200'. *Campichoeta* (4), *Leucophenga* (9, 13, 17, 20, 21, 22), *Liodrosophila* (33, 34), *Chaetodrosophilella* (37), *Drosophila* (46, 50, 53, 54, 55, 57, 62, 63, 67, 68, 70, 76, 77).

Mixed plants by damp cliff in deep river gorge, c. 5,200'. *Stegana* (7), *Leucophenga* (17, 20), *Microdrosophila* (28), *Liodrosophila* (34), *Chaetodrosophilella* (37), *Drosophila* (46, 48, 51, 53, 54, 55, 57, 58, 61, 63, 68, 69).

Dense vegetation in tree shade by hill stream, c. 5,500'. *Leucophenga* (21), *Drosophila* (53, 58, 68).

Shrubs by path, 5,800'. *Leucophenga* (17), *Drosophila* (56).

In tree shade by hill stream, c. 5,500'. *Drosophila* (57).

Spray-splashed rocks in deep gorge, c. 5,200'. *Drosophila* (65).

Deep river gorge, c. 5,200'. *Drosophila* (63, 69).

Below Tamrang Bridge.

River banks, c. 5,500'. *Leucophenga* (10), *Liodrosophila* (34), *Scaptomyza* (39), *Diathoneura* (42), *Drosophila* (48, 52, 53, 54, 67).

Dobhan, c. 3,500'.

East bank of River Tamur, mixed vegetation by stream in deep gully. *Microdrosophila* (24), *Liodrosophila* (35), *Scaptomyza* (39), *Drosophila* (57, 67).

Evergreen trees overhanging stream in deep gully. *Leucophenga* (15, 20), *Drosophila* (57, 58).

Shady places on shrubby slope above River Tamur. *Leucophenga* (10), *Scaptomyza* (38), *Drosophila* (63).

Small pockets of plants on arid slopes above River Maewa. *Leucophenga* (10), *Microdrosophila* (29).

Spray-splashed rocks in River Maewa. *Drosophila* (65).

Mixed vegetation in dry gully on wooded slope. *Leucophenga* (19).

#### Arun Valley

Below Tumlingtar.

East shore of River Arun, evergreen shrubs bordering dry stream-beds, c. 1,800'. *Apsinota* (6), *Leucophenga* (8, 9, 10, 11, 13, 15, 16, 18, 19, 21, 22), *Microdrosophila* (28), *Liodrosophila* (33, 34, 35), *Scaptomyza* (38), *Drosophila* (45, 48, 62, 67, 69, 76).

East shore of River Arun, swept from *Ricinus communis* L, c. 1,800'. *Scaptomyza* (38).

West shore of River Arun, evergreen shrubs bordering dry stream-beds, c. 1,800'. *Leucophenga* (14).

River Sabhaya, west shore, fermented millet seeds on shore, c. 1,800'. *Liodrosophila* (33, 35), *Drosophila* (59, 62, 67, 76).

River Sabhaya, west shore, evergreen shrubs on sandy shore, c. 1,800'. *Apsinota* (5), *Leucophenga* (17), *Liodrosophila* (33), *Drosophila* (76).

River Sabhaya, west shore, from rotten bananas in traps, c. 1,800'. *Drosophila* (76, 77).

Tumlingtar

Bare rocky slopes above River Sabhaya, west bank, c. 1,900'. *Apsinota* (5).

Above River Sabhaya.

East shore, swept from dwarf bamboos in deep ravine, c. 2,000'. *Leucophenga* (12, 15), *Liodrosophila* (33, 35), *Diathoneura* (36), *Drosophila* (67).

#### NOTES ON SOME SPECIAL DIAGNOSTIC CHARACTERS

##### A. ARCHESTINIC CHARACTERS

Stenzel (1963) proposed the terms "archestinic" and "archekastic" for the diagnostic generic characters which occur in *some* and *all* of the member taxa, respectively. The idea "archestinic" can be ascribed to the polythetic principle

of the Neo-Adansonian school (Sneath, 1961) or of numerical taxonomy (Sokal and Sneath, 1963). Although much conflict and dispute has been raised between the orthodox or phylogenetic taxonomists and the Neo-Adansonians, the principle claiming overall similarity or using the "greatest possible number of characters" in classification is unequivocally accepted by most of the current phylogenetic as well as numerical taxonomists. The archestinic character should be of taxonomic importance in this context (Kiriakoff, 1965 : 64 ; Mayr, 1965 : 73).

Some examples of the archestinic characters can be cited from the present investigation. The subgenus *Dichaetophora* of the genus *Drosophila* has necessarily been characterized by the absence or abbreviation of the anterior dorsocentrals, while *D. rotundicornis* possesses rather well developed anterior dorsocentrals, which can be explained as archestinic. Likewise, the occurrence of six rows of acrostichal hairs in *Chaetodrosophilella coei* should be archestinic, because the genus *Chaetodrosophilella* shows essentially two or four rows of acrostichal hairs (Wheeler and Takada 1964). Incidentally, accepting the overall similarity principle, the author agrees with L. H. Throckmorton (personal communication) to treat *Drosophila subtilis* Kikkawa and Peng, 1938, from Japan as a member of the subgenus *Scaptodrosophila*, although this species differs from ordinary species of *Scaptodrosophila* in having no prescutellars.

#### B. HOMEOTIC EXPRESSION OF THE HOOKED SCALY BRISTLES

The "hooked scaly bristles" (Okada, 1963) are special thick bristles of a secondary sexual character found on the male tibia and metatarsus of the mid leg in some *melanogaster* group species belonging to the *suzukii*, *takahashii*, and *fusciphila* subgroups and in *Drosophila (Tanigastrella) gracilis* (Duda, 1924) (Okada, 1964b). It was proved that amongst present material, *D. (Sophophora) tristipennis* and *D. (S.) immacularis*, both belonging to the *suzukii* subgroup, also have such bristles. So far as examined by the author, the species possessing the hooked scaly bristles have, without exception, also sex-combs on the male fore legs, but the species having sex-combs do not always possess the hooked scaly bristles. This fact makes it plausible that the occurrence of the hooked scaly bristles pre-requires the possession of the sex-combs and that the development of the sex-combs on the fore leg homeotically induce the hooked scaly bristles on the homonymial organ, the mid leg. The excessive development of the sex-combs, however, seems to diminish the homeotic expression of the hooked scaly bristles through "enantiomorphosis" (Okada, 1960c) or through "material compensation" (Rensch, 1954). The compensation would be manifested in two such structures with the same function as these two kinds of bristles of similar secondary sexual character. The same is true for the reversal correlation found by Prevosti (1954) between the number of sex-comb teeth and of clasper teeth among the species of the *obscura* group as well as among the natural populations of *Drosophila subobscura* Collin, 1936 in Europe.

The homeotic and compensatory developments of the hooked scaly bristles and sex-combs can be divided into five stages (Text-fig. 328). Stage 1. Both sex-combs and hooked scaly bristles are absent (*willistoni* and *mommai* groups). Stage



2. Sex-combs are present but the hooked scaly bristles absent (*ananassae* and *melanogaster* subgroups, *obscura* group). Stage 3. Sex-combs are better developed, inducing homeotic expression of the hooked scaly bristles (*suzukii* and *takahashii* subgroups, *D. (T.) gracilis*). Stage 4. Sex-combs are further well developed, the hooked scaly bristles being compensatorily weakened in expression (*ficuspbila* subgroup). Stage 5. Further compensation is pronounced, resulting in disappearance or non-development of the hooked scaly bristles (*montium* and *nipponica* subgroups).

Fig. 328

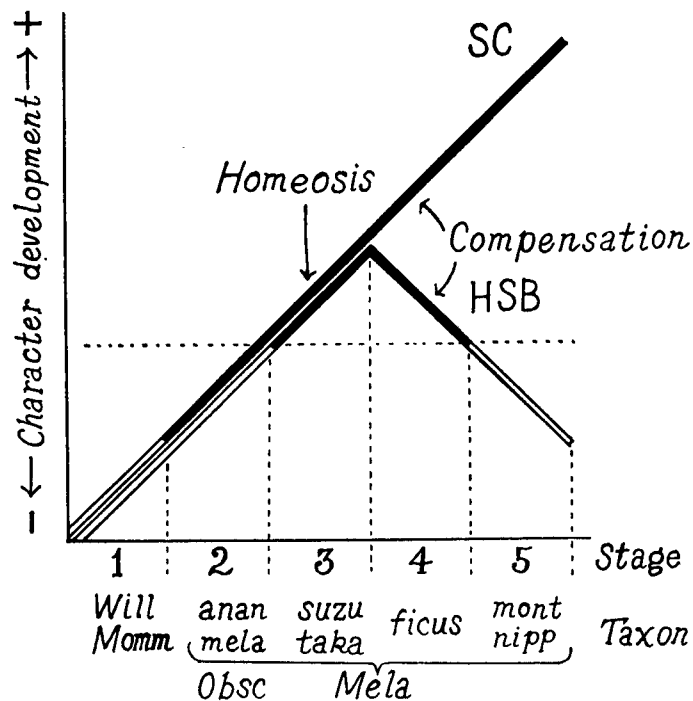


FIG. 328. Homeotic and compensatory relationships between the hooked scaly bristles (HSB) of male mid leg and the sex-combs (SC) of male fore leg. *Mela.*, *melanogaster* group; *Obsc.*, *obscura* group; *Momm.*, *momma* group; *Will.*, *willistoni* group; *anan.*, *ananassae* subgroup; *ficus.*, *ficuspbila* subgroup; *mela.*, *melanogaster* subgroup; *mont.*, *montium* subgroup; *nipp.*, *nipponica* subgroup; *suzu.*, *suzukii* subgroup; *taka.*, *takahashii* subgroup. For further explanations see text.

#### C. HOMOLGY IN THE COMPONENTS OF PHALLIC ORGANS AND THE SYSTEMATIC ANALYSIS OF PHALLIC FORMULAE

As is frequently stressed, the phallic organs of insects are systematically and diagnostically essential key characters. Their extensive diversification, however, makes it often difficult to establish homology of their components even between closely related taxa. Those of *Drosophilidae* are not exceptional, e.g., the present author (1956) considered the ventral recurved process of aedeagus (u) of the genus

*Leucophenga* (p. 17) to be the main part of the aedeagus. The present research revealed the real homology in the components of aedeagus between the genera *Leucophenga* and *Microdrosophila*. *Microdrosophila nigrohalterata* (p. 41) and *M. marginata* (p. 42) have the ventral recurved process well developed as in *Leucophenga*, and the former species shows the posterior parameres contiguous to the subapical part of aedeagus (Text-fig. 117) as in *Leucophenga*. The facts indicate that these two genera are closely related, and this is confirmed by the analysis of phallic formulae.

As a means to analyse phallic formulae the ideas of "divergency index" (d.i.) and "difference value" (d.v.) (Okada, 1954, 1956) have been taken into consideration. The d.i. is a sum of values 0, 0.5, 1.0, and 2.0 afforded to a large letter, small letter with dash, small letter, and small letter with attached <sub>0</sub> respectively, in the phallic formula. The phallic formula of a higher taxon is obtained by calculating mean value for each letter of the member species. The d.v. means a sum of differences in value for each of corresponding letters between two taxa.

The phallic formula and d.i. thus determined for each genus or subgenus are as listed below. The d.v. between every two genera or subgenera is shown in Tables 3 and 4.

Genus or Subgenus	Number of species examined	phallic formula	d.i.
<i>Cryptochaetum</i>	1	a' B C d <sub>0</sub> E f <sub>0</sub> g <sub>0</sub> H I k L m n	9.5
<i>Diastata</i>	1	a B C D E f g H i k L m N	6.0
<i>Campichoeta</i>	1	A B C D E F g H i k L M N	3.0
<i>Apsinota</i>	1	a B C d e f g <sub>0</sub> H i k l M N	9.0
<i>Leucophenga</i>	10	A B C D e F g H i k L m N	5.0
<i>Microdrosophila</i>	2	a b' C d e F g H i k' l' m n	8.5
<i>Lioldrosophila</i>	4	a B C d E f g <sub>0</sub> H I k l m N	8.0
<i>Paramycoedrosophila</i>	1	a b C d E f g H I k l m' N	7.5
<i>Chaetodrosophilella</i>	1	a B C d E f g H I K l M N	5.0
<i>Scaptomyza</i>	3	a b' C d E f g <sub>0</sub> H i k L m n	9.5
<i>Diathoneura</i>	1	a B C d E f <sub>0</sub> g H i K L m N	7.0
<i>Drosophila</i>	21	a' B c' d' e' f g H i' k' l' m N	6.5
<i>Scaptodrosophila</i>	3	A B C d' e' f' g H I k' L M N	3.5
<i>Dichaetophora</i>	2	a B C d' e' f' g <sub>0</sub> H I k l' m' n'	7.0
<i>Hirtodrosophila</i>	1	a B c D E f <sub>0</sub> g H i K l M N	7.0
<i>Sophophora</i>	7	A B c' D E f g H i' K L M N	3.0
<i>Drosophila</i> s. str.	8	a B C d e' f g <sub>0</sub> H I k l m' n'	8.5

The genus *Leucophenga* shows d.v. with *Microdrosophila* 4.5, which is the lowest among the values shown between *Leucophenga* and any genus of Drosophilinae (Table 3). Although the d.v. between *Leucophenga* and *Drosophila* is also 4.5, this low value is due to high diversification of the phallic organs among the species of *Drosophila*. Indeed, except with the subgenus *Scaptodrosophila*, *Leucophenga* shows d.v. higher than 4.5 with each subgenus of *Drosophila*.

The analysis of phallic formulae also indicates that among the genera of Diastatidae, *Diastata* is nearer to *Campichoeta* than to *Apsinota*, the d.v. between *Diastata* and *Campichoeta* (3.0) being smaller than that between *Campichoeta* and *Apsinota*

(6.0) and between *Diastata* and *Apsinota* (5.0), and that among the genera of Drosophilinae, *Liodrosophila*, *Paramycodrosophila*, and *Chaetodrosophilella* are mutually closely related and the subgenus *Dichaetophora* is closer to *Drosophila* s. str. than to any other subgenus of the genus *Drosophila* (Tables 3 and 4).

TABLE 3

The difference value (d.v.) of phallic formulae between every two genera.

Cryptochaetum	0												
Diastata	6.5	0											
Campichoeta	8.5	3.0	0										
Apsinota	7.5	5.0	6.0	0									
Leucophenga	8.5	3.0	2.0	6.0	0								
Microdrosophila	10.0	5.5	6.5	5.5	4.5	0							
Liodrosophila	4.5	4.0	7.0	3.0	7.0	6.5	0						
Paramycodrosophila	7.0	4.5	6.5	4.5	7.5	7.0	2.5	0					
Chaetodrosophilella	7.5	5.0	6.0	4.0	8.0	6.5	3.0	2.5	0				
Scaptomyza	6.0	3.5	6.5	4.5	6.5	4.0	3.5	5.0	6.5	0			
Diathoneura	5.5	5.0	6.0	6.0	6.0	5.5	5.0	5.5	4.0	4.5	0		
Drosophila	7.0	3.5	5.5	5.5	4.5	5.0	4.5	5.0	4.5	6.0	4.5	0	

Cryptochaetum													
Diastata													
Campichoeta													
Apsinota													
Leucophenga													
Microdrosophila													
Liodrosophila													
Paramycodrosophila													
Chaetodrosophilella													
Scaptomyza													
Diathoneura													
Drosophila													

TABLE 4

The difference value (d.v.) of phallic formulae between every two subgenera of the genus *Drosophila*, and between each subgenus and *Leucophenga*.

Leucophenga	0								
Scaptodrosophila	3.5	0							
Dichaetophora	6.0	4.5	0						
Hirtodrosophila	8.0	7.5	7.5	0					
Sophophora	5.0	3.5	7.0	7.5	0				
Drosophila	7.5	5.5	1.5	7.5	7.5	0			

Leucophenga						
Scaptodrosophila						
Dichaetophora						
Hirtodrosophila						
Sophophora						
Drosophila s. str.						

## REFERENCES

- BASDEN, E. B. 1952. Some Drosophilidae (Diptera) of the British Isles. *Entomologist's mon. Mag.* **88** : 200-201.
- 1954. The distribution and biology of Drosophilidae (Diptera) in Scotland, including a new species of "*Drosophila*". *Trans. R. Soc. Edinb.* **72** : 603-654, 2 pls., 9 text-figs.
- BASDEN, E. B. & COLLIN, J. E. 1958. On the examination of some Meigen and Zetterstedt specimens of *Campichaeta* Macquart (Diptera : Diastatidae). *Proc. R. ent. Soc. Lond.* (B) **27** : 133-144, 5 text-figs.
- BEZZI, M. 1928. *Diptera, Brachycera and Athericera of the Fiji Islands.* viii + 220 pp., 54 figs. Brit. Mus. (Nat. Hist.) London.
- BURLA, H. 1954. Zur Kenntnis der Drosophiliden der Elfenbeinküste (Französisch West-Afrika). *Rev. Suis. Zool.* **61** (Suppl.) : 1-218, 224 text-figs.
- 1954a. Distinction between four species of the *melanogaster* group, *Drosophila seguyi* *D. montium*, *D. kikkawai* n.n. and *D. auraria* (Drosophilidae, Diptera). *Revta bras. Biol., Rio de Janeiro*, **14** : 41-54, 19 figs.
- 1956. Die Drosophilidengattung *Zygothrica* und ihre Beziehung zur *Drosophila*-Untergattung *Hirtodrosophila*. *Mitt. zool. Mus. Berl.* **32** : 189-321, 359 text-figs.
- CHINO, M. 1927. Genetic study of Japanese *Drosophila* (in Japanese). *Zool. Mag., Tokyo*, **39** : 472-476.
- COLLIN, J. E. 1953. On the British species of *Scaptomyza* Hardy and *Parascaptomyza* Duda. *Entomologist* **86** : 148-151.
- COQUILLET, D. W. 1898. Report on a collection of Japanese Diptera, presented to the U.S. National Museum by the Imperial University of Tokyo. *Proc. U.S. natn. Mus.*, **21** : 301-340.
- 1901. Three new species of Diptera. *Ent. News* **12** : 16-18.
- DUDA, O. 1921. Kritische Bemerkungen zur Gattung *Scaptomyza* Hardy (Diptera). *Jh. Ver. schles. Insektenk.* **13** : 57-69.
- 1922. *Liodrosophila* und *Sphaerogastrella*, zwei neue, zu den Drosophiliden und nicht zu den Camilliden gehörige Dipteren-Gattungen aus Südostasien. *Arch. Naturgesch.* **88** A (4) : 150-160.
- 1923. Die orientalischen und australischen Drosophiliden-Arten (Dipteren) des Ungarischen National Museums zu Budapest. *Annl. hist.-nat. Mus. natn. hung.* **20** : 24-59.
- 1924a. Beitrag zur Systematik der Drosophiliden unter besonderer Berücksichtigung der paläarktischen u. orientalischen Arten (Dipteren). *Arch. Naturgesch.* **90** A (3) : 172-234, 7 pls.
- 1924b. Die Drosophiliden (Dipteren) des Deutschen Entomologischen Institutes der Kaiser Wilhelm-Gesellschaft (früh. Deutsches Entomolog. Mus.) aus H. Sauter's Formosa Ausbeute. *Arch. Naturgesch.* **90** A (3) : 235-259.
- 1925. Die Costaricanischen Drosophiliden des Ungarischen National Museums zu Budapest. *Annl. hist.-nat. Mus. natn. hung.* **22** : 149-229.
- 1926. Fauna Sumatrensis, Beitrag N. 26. Drosophilidae (Dipt.), *Supplta ent.* **14** : 42-116, 23 text-figs.
- 1928. Beitrag zur Kenntnis der südostasiatischen Drosophilidengattung *Hypselothyrea* de Meijere (Dipt.). *Annl. hist.-nat. Mus. natn. hung.* **25** : 79-90, 5 text-figs.
- 1929. Fauna Buruana, Diptera, Acalyptrata (Overgedruktuit). *Treubia*, **7** : 415-422.
- 1931. Chloropidae, Drosophilidae. Dipterologischer Beitrag zu der von H. J. Feuerborn, F. Ruttner und A. Thienemann im Jahre 1928 und 1929 nach Java, Sumatra, und Bali unternommenen limnologischen Forschungsreise. *Arch. Hydrobiol., Suppl.* **9** : 192-198.
- 1934. Diastatidae, in Lindner, *Die Fliegen der Paläarkt.* *Reg.* **58** e : 1-18, 2 pls., 10 text-figs.
- 1935. Drosophilidae, in Lindner, *Die Fliegen der Paläarkt.* *Reg.* **58** g : 1-118, 5 pls., 30 text-figs.

- 1939. Revision der afrikanischen Drosophiliden (Diptera) I. *Annls hist.-nat. Mus. natn. hung.* **32** : 1-57, 7 text-figs.
- 1940. Revision der afrikanischen Drosophiliden (Diptera) II. *Annls hist.-nat. Mus. natn. hung.* **33** : 19-53, 6 text-figs.
- DUFOUR, L. 1839. Mémoire sur les métamorphoses de plusieurs Larves fongivores appartenant à des Diptères. *Ann. Sci. Nat. Paris*, **12** : 5-60.
- EDWARDS, F. W. 1921. A revision of the mosquitoes of the Palaearctic Region. *Bull. ent. Res.* **12** : 263-351, 18 text-figs.
- FABRICIUS, J. C. 1787. *Mantissa Insectorum*, **2**, 382 pp.
- FALLÉN, C. F. 1823. *Diptera Sueciae, Geomyzides* : 4, 1.
- FOOTE, R. H. & ARNAUD, P. H., Jr. 1958. Notes on the taxonomy and habits of *Cryptochaetum nipponense* (Tokunaga) in Japan. *Proc. ent. Soc. Wash.* **60** : 241-245, 5 text-figs.
- FROTA-PESSOA, O. 1947. Revisão do gênero *Clastopteryomyia* (em cuja sinonímia é colocada *Diathoneura*), com descrição de 9 espécies novas. *Summa bras. Biol.* **1** : 181-221, 9 pls.
- 1954. Revision of the *tripunctata* group of *Drosophila* with description of fifteen new species (Drosophilidae, Diptera). *Archos Mus. parana.* **10** : 253-330, 11 pls.
- HACKMAN, W. 1955. On the genera *Scaptomyza* Hardy and *Parascaptomyza* Duda (Dipt., Drosophilidae). *Notul. ent.* **35** : 74-91, 32 text-figs.
- 1959. On the genus *Scaptomyza* Hardy (Dipt., Drosophilidae) with descriptions of new species from various parts of the world. *Acta zool. fenn.* **97** : 1-73, 72 text-figs.
- HARDY, J. 1849. Note on Remedies for the Turnip-fly amongst the Ancients and on the Turnip-fly of New Holland, with Notice of a New Genus and Species of Diptera. *Proc. Berwickshire Nat. Club*, **2** : 359-362.
- HENDEL, F. 1914. Acalyptrate Musciden (Dipt.), 3. *Suppl. ent.* **3** : 90-117.
- HSU, T. C. 1949. The external genital apparatus of male Drosophilidae in relation to systematics. *Univ. Texs Publs* **4920** : 80-142, 18 pls., 1 text-fig.
- KANG, Y. S., CHUNG, O. K. & LEE, H. Y. 1959. Studies on the classification and the living conditions of Drosophilidae in Korea (2). "On the unrecorded species of *Drosophila* flies in Korea". *Korean J. Zool.* **2** : 61-65.
- KIKKAWA, H. & PENG, F. T. 1938. *Drosophila* species of Japan and adjacent localities. *Jap. J. Zool.* **7** : 507-552, 6 pls., 29 text-figs.
- KIM, K. W. 1963. Drosophilidae of Tol-San island, Korea. *Drosoph. Inf. Serv.* **38** : 73.
- KIRIAKOFF, S. G. 1956. Some remarks on Sokal and Smeath's Principles of Numerical Taxonomy. *Syst. Zool.* **14** : 61-64.
- KUWANA, I. 1922. Studies on Japanese Monophlebinae. *Bull. Dept. Pl. Quarant. Stn* **1** : 1-58; **2** : 1-43, 4 pls.
- LAMB, C. B. 1914. Reports of the Percy Sladen Trust Expedition, Diptera, No. 15. Heteroneuridae, Ortalidae, Trypetidae, Sepsidae, Micropezidae, Drosophilidae, Geomyzidae, Milichidae. *Trans. Linn. Soc. Lond.*, (2) **16** : 307-372, 3 pls., 48 text-figs.
- LEE, T. J. 1964. New and unrecorded species of Drosophilidae in Korea. *Korean J. Zool.* **7** : 37-40, 3 text-figs.
- LOEW, H. 1864. Ueber die europäischen Arten der Gattung *Diastata*. *Berl. ent. Z.* **8** : 357-368.
- MACQUART, M. 1833. *Histoire naturelle des Insectes (Diptères)*, **2** : 710 pp.
- MAEKAWA, F. 1963. Trans-palaeo-equatorial and bipolar distribution. *Sci. Rep. Tohoku Univ.* ser. IV, **29** : 355-363, 9 text-figs.
- MALLOCH, J. R. 1921. Some notes on Drosophilidae (Diptera). *Ent. News.* **32** : 311-312.
- 1934. *Diptera of Patagonia and South Chile based mainly on material in the British Museum (Natural History)*. Part **6** (5), *Acalypterata* (concluded) : 393-489, 1 pl.
- MATSUMURA, S. 1931. *Six thousand illustrated insects of Japan Empire*. lxii + 1694 pp., 10 pls., ca. 6000 text-figs. Tokyo.
- MAYER, K. 1935. Die Metamorphose einiger Drosophiliden aus Niederländisch-Indien. *Arch. Hydrobiol.*, Suppl. **13** (5) : 462-473, 19 text-figs.

- MAYR, E. 1965. Numerical phenetics and taxonomic theory. *Syst. Zool.* **14** : 73-79.
- MEIGEN, J. W. 1830. *Systematische Beschreibung der bekannten Europäischen zweiflügeligen Insekten*, **6** : 401 pp. Hamm.
- MEIJERE, J. C. H. DE. 1906. Über einige indo-australische Dipteren des Ungarischen National Museums, bez. des Naturhistorischen Museums zu Genua. *Annls hist.-nat. Mus. natn. hung.* **4** : 193-194.
- 1908. Studien über Südostasiatische Dipteren, II. *Tijdschr. Ent.* **51** : 106-180, 4 pls.
- 1911. Studien über Südostasiatische Dipteren, VI. *Tijdschr. Ent.* **54** : 258-432, 5 pls.
- 1914. Studien über Südostasiatische Dipteren, IX. *Tijdschr. Ent.* **57** : 137-275, 7 pls.
- MIK, J. 1886. Dipterologische Miscellen. *Wien. ent. Ztg.* **5** : 317.
- NATER, H. 1953. Vergleichend-morphologische Untersuchung des äusseren Geschlechtapparates innerhalb der Gattung *Drosophila*. *Zool. Jb. (Syst.)*, **81** : 437-486, 33 text-figs.
- OKADA, T. 1954. Comparative morphology of the drosophilid flies. I. Phallic organs of the *melanogaster* species group. *Kontyû*, **22** : 36-46, 2 pls.
- 1955. *Fauna and Flora of Nepal Himalaya. Drosophila*. *Scient. Results Jap. Exped. Nepal Himalaya, 1952-1953*, **1** : 387-390, 1 pl.
- 1956. *Systematic Study of Drosophilidae and allied families of Japan*. 183 pp., 83 text-figs., Gihôdo, Tokyo.
- 1960a. The genus *Microdrosophila* Malloch from Japan (Diptera, Drosophilidae). *Kontyû*, **28** : 211-222, 1 pl., 3 text-figs.
- 1960b. Notes on Diastatidae from Japan (Diptera), *Kontyû*, **28**, : 165-168, 2 text-figs.
- 1960c. Allomorphosis of the wing-veins vs. wing-membranes in insects. *Nat. Sci. Rep Ochanomizu Univ.*, **11** : 35-50, 24 text-figs.
- 1963. Hooked scaly bristles found on the male mid legs in some drosophilid flies. *Drosoph. Inf. Serv.* **38** : 38-39, 4 text-figs.
- 1964a. New and unrecorded species of Drosophilidae in the Amami Islands, Japan. *Kontyû*, **32** : 105-115, 13 text-figs.
- 1964b. Drosophilidae (Diptera) of South-east Asia, collected by the Thai-Japanese Biological Expedition 1961-62. *Nature and Life in South-east Asia*. **3** : 439-466, 8 text-figs.
- OKADA, T. & CHUNG, Y. J. 1960. Three species of Drosophilidae from South Korea. *Akitu*, **9** : 25-30, 3 text-figs.
- OKADA, T. & KUROKAWA, H. 1957. New or little known species of Drosophilidae of Japan (Diptera). *Kontyû*, **25** : 2-12, 2 text-figs.
- OKADA, T. & SASAKAWA, M. 1956. Leaf-mining species of Drosophilidae (Diptera). *Akitu*, **5** : 25-28, 7 text-figs.
- PAIK, Y. K. 1958. Seasonal changes in *Drosophila* populations at the two adjacent areas in Korea. *Commem. Theses sixtieth Birthday Dr. C. C. Woo. Apr. 1958* : 209-227.
- PENG, F. T. 1937. On some species of *Drosophila* from China. *Annotnes zool. jap.* **16** : 20-27, 5 text-figs.
- PREVOSTI, A. 1954. Genetical variability in natural population of *Drosophila subobscura*. *Atti IX Congr. internatn. genet. Bellagio (Como)* 660-663.
- RENSCH, B. 1954. *Neuere Probleme der Abstammungslehre, die transspezifische Evolution*. 2nd ed., xi + 436 pp., 113 text-figs., Ferdinand Enke, Stuttgart.
- RONDANI, C. 1875. Species Italicae ordinis Dipteriorum. *Boll. Soc. ent. ital.* **7** : 166-191.
- SCOPOLI, G. A. 1763. *Entomologia Carniolica*, 420 pp. Vindobonae.
- SOKAL, R. R. & SNEATH, P. H. A. 1963. *Principles of numerical Taxonomy*. xvi + 359 pp., 38 text-figs. Freeman & Co., San Francisco and London.
- SNEATH, P. H. A. 1961. Recent developments in theoretical and quantitative taxonomy. *Syst. Zool.* **10** : 118-139, 5 text-figs.
- STENZEL, H. B. 1963. A generic character, can it be lacking in a given Genus? *Syst. Zool.* **12** : 118-121, 2 text-figs.

- STURTEVANT, A. H. 1916. Notes on North American Drosophilidae with descriptions of 23 new species. *Ann. ent. Soc. Am.* **9** : 323-343.
- 1921. The North American species of *Drosophila*. *Publs Carnegie Instn.* **301** : 1-150, 3 pls., 49 text-figs.
- 1927. Philippine and other oriental Drosophilidae. *Philipp. J. Sci.* **32** : 361-374.
- 1939. On the subdivision of the genus *Drosophila*. *Proc. natn. Acad. Sci. U.S.A.* **25** : 137-141.
- 1942. The classification of the genus *Drosophila*, with descriptions of nine new species. *Univ. Texas Publs*, **4213** : 5-51.
- TAKADA, H. & LEE, J. J. 1958. A preliminary survey of the Drosophilidae from Kongju and its adjacent localities, South Korea. *Annotnes zool. jap.* **31** : 113-116, 3 text-figs.
- TAKADA, H. & OKADA, T. 1960. *Drosophila* survey of Hokkaido XI. A new species of *Drosophila* (*Sophophora*) from Japan. *Annotnes zool. jap.* **33** : 142-145, 5 text-figs.
- TAN, C. C., HSU, T. C. & SHENG, T. C. 1949. Known *Drosophila* species in China with descriptions of twelve new species. *Univ. Texas Publs*, **4920** : 196-206.
- TOKUNAGA, M. 1943. *Medical Entomology (Iyō Konchūgaku)* Vol. 2, ii + 727 pp., 250 text-figs. Kanehara Co. Ltd., Tokyo.
- WAKAHAMA, K. 1964. Some ecological studies in *Drosophila*. *Bull. Shimane Univ. (Nat. Sci.)*, No. **13** : 50-122, 64 text-figs.
- WAKAHAMA, K., KANEKO, A. & TOKUMITSU, T. 1963. *Drosophila* survey of Hokkaido XIX. Collection records in three localities of Hokkaido, with a note on the diurnal behaviour of certain species. *Annotnes zool. jap.* **36** : 92-96, 2 text-figs.
- WHEELER, M. R. 1952. The Drosophilidae of the Nearctic Region, exclusive of the genus *Drosophila*. *Univ. Texas Publs*, **5204** : 162-218, 1 text-fig.
- 1957. Taxonomic and distributional studies of Nearctic and Neotropical Drosophilidae. *Univ. Texas Publs*, **5721** : 97-114, 25 text-figs.
- 1959. A nomenclatural study of the genus *Drosophila*. *Univ. Texas Publs*, **5914** : 181-205, 1 text-fig.
- 1960. A new subgenus and species of *Stegana* Meigen (Diptera : Drosophilidae). *Proc. ent. Soc. Wash.* **62** : 109-111, 1 text-fig.
- WHEELER, M. R. & TAKADA, H. 1964. *Diptera : Drosophilidae*. *Insects of Micronesia*, **14**, No. 6 : 163-242, 28 text-figs, 1 map.
- WULP, F. M. VAN DER. 1887. Aanteekeningen betreffende Javaansche Diptera. *Tijdschr. Ent.* **30** : 175-180.
- ZETTERSTEDT, J. W. 1847. *Diptera Scandinaviae*, **6** : 2163-2580.

## INDEX

## Synonyms printed in italics

aberrans, 73	<i>Apsinota</i> , 8, 11
abbreviata, 17, 18	<i>argentata</i> , 17, 24
acutissima, 96, 101	<i>auraria</i> , 95
aerea, 53	
agbo, 73	<i>basdeni</i> , 8
albiceps, 18, 33, 36	<i>bimaculata</i> , 48
<i>albicineta</i> 27	<i>bipectinata</i> , 82, 95
albifascia 17, 22	<i>bizonata</i> , 99, 113
alternata, 67, 72	<i>bizonata</i> -group, 96, 97
ananassae-subgroup, 95	<i>brunnea</i> , 67
annulipes, 96, 107	<i>busckii</i> , 81

- Campichoeta, 8, 10  
*Chaetodrosophila* 57  
*Chaetodrosophilella*, 15, 57  
 circumdata, 107  
 Clastopteromyia, 66  
 coei (*Chaetodrosophilella*) 57  
 coei (*Sophophora*), 81, 82, 84  
 coeruleifrons, 48  
 coleoprata, 15  
 coracina, 70  
 costata, 17, 19  
 cristata, 40  
 Cryptochaetidae, 6  
 Cryptochaetum, 6  
 cubicivittata, 96, 105  
 curvipennis, 15  
*curvipila*, 30  
  
 denticeps, 79  
 Diastata, 8  
 Diastatidae, 8  
 Diathoneura, 14, 65  
 Dichaetophora, 66, 73  
 dimidiata, 47  
*disticha*, 59  
 Dorsilopha, 81  
 Dorsophila, 66  
 Drosophila, 15, 66  
 Drosophila s. str., 66, 96  
 Drosophilidae, 14  
 Drosophilinae, 14, 37  
  
 editinares, 96, 101, 103  
  
 flavipalpis, 34  
 flexicauda, 96, 101  
 fruhstorferi, 86  
 funebris, 66, 96  
 fuscicostata, 96, 111  
*fuscipennis* (*Leucophenga*), 30  
*fuscipennis* (*Liodrosophila*), 48, 51  
  
 grahami, 63  
 graminum, 58, 59, 62  
 grandicorne, 6  
 grandis, 101, 105  
 grandis-group, 96, 101  
 guttata, 47  
 guttiventris, 18, 30  
  
 halteropunctata, 17, 25  
 hexastriata, 109  
 hirticornis, 79  
  
 Hirtodrosophila, 66, 77  
 histrio, 99  
 histrio-group, 96, 99  
 hypocausta, 111  
 Hypselothyrea, 15, 47  
  
 immacularis, 82, 87  
 immigrans, 96, 112  
 immigrans-group, 96, 105  
 interrupta, 17, 21  
  
 kikkawai, 82, 92  
  
 lacertosa, 96, 97  
 Leucophenga, 14, 17  
 leucozona, 17, 21  
 limbicostata, 77, 97  
 Liodrosophila, 15, 47, 48  
 Lissocephala, 45  
 Lissodrosophila, 15, 45  
 longecrinita, 77  
 longicornis, 45  
  
 maculata (*Drosophila*), 17  
 maculata (*Microdrosophila*), 43  
*maculiventris*, 30  
 magnidentata, 73  
 marginata (*Microdrosophila*), 37, 42  
 marginata (*Scaptodrosophila*), 67, 70  
*marginifrons*, 54  
*mejerea*, 36  
*mejerei*, 36  
 melanissima, 58, 62  
 melanogaster, 81, 92  
 melanogaster-group, 81, 87  
 melanogaster-subgroup, 92  
 Microdrosophila, 14, 37, 40, 69  
 minima, 67, 69  
 mommai, 83  
 mommai-group, 81, 82  
*montium*, 92  
 montium-subgroup, 92  
  
 nasuta, 96, 112  
 nepalensis, 81, 91  
 nigriceps, 18, 31  
 nigrifrons, 15  
 nigripalpis (*Microdrosophila*), 37, 41, 42  
 nigripalpis (*Leucophenga*), 18, 28  
 nigrita, 65  
 nigrohalterata, 37, 41  
 nigroscutellata, 18, 19, 34  
 nipponense, 6



- nitida, 48, 54  
 notostriata, 96, 107, 110
- obscuripennis, 10  
 obscuripes, 13  
 onychopyga, 48, 50  
 ornata, 17, 21  
*ornatipennis*, 21  
 Oxystyloptera, 39, 40
- pallida, 58, 59  
*Paradrosophila*, 67  
 Paramycodrosophila, 15, 55  
 Parascaptomyza, 58, 59  
 parasplendens, 58, 59  
 pauciramosa, 37, 40  
 pectinata, 37  
 pentastrata, 96, 109  
*Pholadoris*, 67  
 pictipennis, 67  
 pictiventris, 11, 13  
 pictula, 55  
 pilicrus, 67  
 pulchrella, 81, 89  
 purpurata, 41
- quadrata, 37  
 quadrilineata, 58  
 quinaris-section, 96, 97
- raridentata, 73, 74, 76  
 rectinervis, 18, 33  
 ripa, 65  
 robusta-group, 96, 97  
 rotundicornis, 74  
 rufipes, 11  
 rugulosa, 51
- salatigae, 18, 27  
 Scaptomyza 15, 58, 59  
 Scaptodrosophila, 66, 67  
 scaptomyzoidea, 67  
*scutellimargo*, 67  
 serriflabella, 81, 84  
 silvata, 58, 63  
 Sophophora, 66, 81  
 sp., Microdrosophila, 39  
 Stegana, 14, 15  
 Steganina, 15  
 Steganinae, 14, 15  
 sternopleuralis, 99, 100, 101  
 Styloptera, 40  
 subpollinosa, 17, 21  
 subsplendens, 61  
 suruk, 73, 76  
 suzukii, 87  
 suzukii-subgroup, 87
- takahashii, 82, 92  
 takahashii-subgroup, 92  
 taeniatipennis, 65  
 tectifrons, 39  
 tenuicauda, 101, 103  
 trapezifrons, 82, 93  
 tripartita, 77, 79  
 tripunctata-group, 109  
 trisetosa, 96, 99  
 tristipennis, 81, 89  
 trizonata, 96, 97
- ussurica, 8
- vagans, 10  
*virgata*, 110  
 virilis-section, 96, 97
- zonaria, 81, 83