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**Drosophilidae (Diptera) of Southeast Asia collected by the
Thai-Japanese Biological Expedition 1961-62**

Toyohi OKADA

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Concerning the drosophilid fauna of Southeast Asia, vast range of the areas still remains never or only poorly explored, although a few regions, such as Java, Sumatra, Formosa, Philippine Islands and Seychelles, have been rather extensively surveyed by de Meijère (1908-1916), Lamb (1914), Duda (1922-1931), Sturtevant (1927), and other investigators. Especially, nothing seems to have been known about the fauna of the large island, Borneo. Moreover, even with detailed descriptions, the records about known species are not always sufficient in respect of current taxonomic requirement. Consequently, any result of further surveys in these areas would be a matter of special interest and value. In this meaning, the excellent material brought about by the joint Thai-Japanese expedition of the Osaka City University, Kyoto University, Chulalongkorn University and Kasetsart University to the broad areas of Southeast Asia in 1961 and 1962 is extremely precious, enabling gaps of the drosophilid fauna to be filled, various characteristics of poorly known species to be clarified, and insufficiently defined systematic positions of these species to be determined. The material presented before the author was mostly collected by Dr. Gentaro Imadaté, a member of the expedition, of the Tokyo Medical and Dental University. It comprises a total of 332 dried flies, which can be assigned to three genera and fourteen species of Drosophilidae, including three new and two unnamed species. About eighty per cent of the specimens came from Borneo, and remainings from Thailand with exceptional one specimen from Viet-Nam.

The author is deeply indebted to Dr. G. Imadaté, who has given him a good opportunity of examining valuable and interesting specimens. His cordial thanks are also due to Dr. F. A. Turk, "Shang-ri la" Reskadinnick, Camborne, Cornwall, England, for his kindness of sending to him precious literature concerning the drosophilid fauna of Southeast Asia, by which the present work has been enabled. Valuable material of some Indian species has been bestowed to the author by Dr. P. Banerji of the Calcutta University and Dr. R. Parshad of the Punjab University, for which he thanks them most sincerely.

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The result of examination of two of these Indian species was introduced into the present study for comparison.

Genus *Liodrosophila* DUDA, 1922

Liodrosophila nitida var. *marginifrons* DUDA, 1922 (Fig. 1A-E)

Liodrosophila marginifrons DUDA, 1922. *Arch. Naturg.* 88A (4): 157. (Annam)

Liodrosophila nitida DUDA, 1922. *Arch. Naturg.* 88A (4): 157 (part.).

Liodrosophila nitida var. *marginifrons* DUDA, 1926. *Suppl. Ent.* 14: 53.
(Sumatra)

Male and female General features as described by Duda (1922). Body about 1.5-2 mm. Eyes dark red, almost bare. Antenna with 2nd joint reddish brown, 3rd paler. Arista with about 8 or 9 branches including 2 lower and a fork. Palpus greyish brown, with a few long setae below. Ocellar triangle black. Periorbits broad above, convex, extending below to about 3/4 length of front, outer margin greyish, pollinose. Front glossy brown, about half as broad as the head width at the level of ocellar triangle. Face orange. Carina short. Cheek brown, its greatest width about 1/5 the greatest diameter of eye. Lower reclinate orbital minute, equally distant from upper reclinate and proclinate; proclinate about 2/3 upper reclinate in length, which is situated outside other orbitals. Second oral slightly shorter than vibrissa.

Mesonotum glossy castaneous brown, with minute punctures and grey pubescence. Scutellum mat velvety black, apically greyish. Thoracic pleura dark brown, paler above. Humeral three, subequal. Acrostichal hairs in two rows. Anterior scutellars about half the length of posteriors, slightly convergent. Sterno-index about 0.6. Legs pale yellow, femora dark brown, fore femur with a longitudinal row of about 12-20 black spinules. Preapicals on all tibiae, though weak, apicals on 2nd, stout. Wings (Fig. 1A) extensively fuscous, especially on anterior half. R_{2+3} distinctly curved forward to costa at tip. R_{4+5} and M distally convergent. First costal section with only one terminal stout bristle; 3rd costal section with heavy bristles on its basal 1/2-2/3. C-index about 1.6; Ac-index* about 4.7; 4C-index about 1.7; 4V-index about 2.4; 5x-index about 1.7. Abdominal tergites dark brownish black. Cerci paler.

Periphallic organs (Fig. 1B): Genital arch narrow, dark brown, paler and somewhat broader below; lower tip truncate and with about 6 long setae; hind margin with about 5 long setae. Clasper one, fuscous, oblong, inserted on the lower caudal end of genital arch, with a straight row of about 12 black teeth

* Ac-index (acrocostal index): length of 3rd costal section divided by the length of 4th (devised by BURLA 1956, *Mitt. Zool. Mus. Berlin* 32: 193).

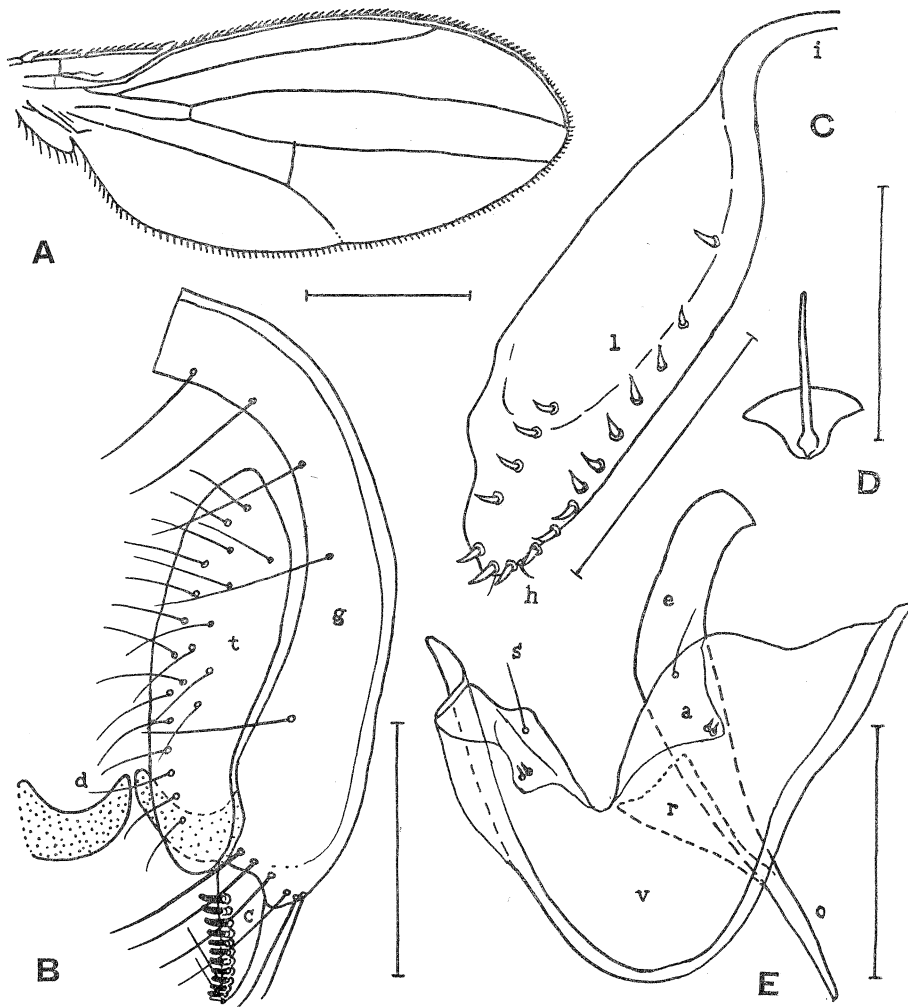


Fig. 1 *Liodrosophila nitida* var. *marginifrons* DUDA

A, Wing. B, Periphallallic organs (lateral aspect). C, Egg-guide. D, Ejaculatory apodeme (ventral aspect). E, Phallic organs (ventral aspect). Scale 0.5 mm in wing, 0.1 mm in other figures.

along the caudal margin. Anal plate separated from genital arch, large, oblong, brownish grey, darker below and hairy. Decasternum in two dark crescent bows. Phallic organs (Fig. 1E): Aedeagus dark brown, rod-like, gently curved dorsally at meson, apex hooked dorsally. Phallosomal index* about 1.0. Vertical rod distally broadened. Anterior parameres fused to hypandrium, trian-

* Phallosomal index: ratio in length of aedeagus and its apodeme.

gular, with about 2 sensilla. Ventral fragma triangular, marginally darker, with rather deep acute median notch. Submedian spines distinct. Posterior parameres seemingly absent. Ejaculatory apodeme (Fig. 1D) pale, with triangular plate and narrow stalk. Egg-guide (Fig. 1C) with lobe slender, orange brown, distally darker, apically gently pointed, marginally with about 14 and discally with about 4 orange pointed teeth.

Specimens examined 3 males and 5 females, Amo, Brunei, 22 II '62 (G. Imadaté leg.).

Distribution Borneo (new loc.), Viet-Nam, Sumatra. Nominal species from Viet-Nam and Formosa.

Remarks Dark castaneous and pubescent mesonotum, velvety black scutellum, two rows of acrostichal hairs, broad periorbits, etc. are the characteristics of this variety, although demarcation between this and nominal species as well as *L. pusilla* DE MEIJÈRE and *L. dimidiata* DUDA is thought by Duda (1926. *Suppl. Ent.* 14:54) still obscure due to considerable individual variability in various features, even the number of acrostichal rows.

Genus *Zaprionus* COQUILLET, 1902

Zaprionus obscuricornis (DE MEIJÈRE, 1915), n. comb. (Fig. 2A-D)

Stegana obscuricornis DE MEIJÈRE, 1915. *Tijd. v. Ent.* 58 (Suppl.): 94. (Java)

Drosophila obscuricornis: DUDA, 1924. *Arch. Naturg.* 90A (2): 221. (Java)

Drosophila obscuricornis: DUDA, 1926. *Suppl. Ent.* 14: 107, 96. (Sumatra; redescription)

Drosophila obscuricornis: WHEELER, 1959. *Univ. Texas Publ.* 5914: 185 (Nomenclature, uncertain homonymy)

Zaprionus multistriata STURTEVANT, 1927. *Phil. J. Sci.* 32: 365. (Philippine Islands)

nec *Drosophila obscuricornis* GRIMSHAW, 1901. *Fauna Haw.* 3: 72.

Male and female Antenna fuscous, 3rd joint slightly longer than broad. Arista with about 7 rather long branches including 2 lower branches and a small fork. Palpus yellow, with one terminal and a few ventral rather long setae. Carina exceedingly swollen (generic character), broader below, lower tip rounded and reaches buccal margin. Front about half as broad as head width at the level of ocellar triangle, dark orange brown, anteriorly paler, with three longitudinal whitish stripes. Three orbitals nearly equally distant from eye margin. Lower reclinate orbital about half the length of proclinate and about 1/3 upper reclinate.

Mesonotum dark brown, with 9 white longitudinal stripes as described in detail by Duda (1926) and Sturtevant (1927). Scutellum dark brown, with 3

white longitudinal stripes. Humerals 2, subequal in size. Acrostichal hairs in 6 rows. Anterior dorsocentrals about half the length of posteriors; cross distance of dorsocentrals about twice the length distance. Anterior scutellars nearly parallel, slightly shorter than posteriors. Sterno-index about 0.3. Legs yellow; mid and hind tarsi except ultimate joints laterally with a row of minute cuneiform black bristles coincident with bristle type 3 of de Castro (1953. *Rev. Brazil. Biol.* 13: 363). Male fore metatarsus swollen and inferiorly with dense short hair tuft as seen in *Drosophila immigrans* STURTEVANT. Pre-apicals on all tibiae; apicals prominent on 2nd. Wings (Fig. 2A) hyaline, veins brownish, crossveins clear. C-index about 5.6; Ac-index about 1.2; 4C-index about 0.5; 4V-index about 1.5; 5x-index about 1.4. First costal section terminally with only one stout bristle; 3rd costal section with heavy bristles on basal 2/7-1/4.

Periphallic organs (Fig. 2B) dark brown in most parts. Genital arch paler below, pubescent, nearly parallel-sided in side view, ventrally narrowing and curved anteriorly, apically with a thick stout black bristle and about 3 longer thinner black bristles, which are directed caudally. Clasper one, located near the apex of genital arch, large, quadrate, slightly narrowing distally, apically truncate and with about 3 very long and one shorter stout sinuated black bristles, ventrally with a few short discal setae. Anal plate small, fusiform, fused to genital arch at lower half, pubescent and with about 30 long hairs. Phallic organs (Fig. 2D) pale orange yellow, ventral fragma and apodeme of aedeagus paler. Aedeagus stout, rod-like, gently curved dorsally, apically with a pair of marginally serrate triangular flaps, ventro-subapically with a pair of small triangular slightly serrate flaps. Apodeme of aedeagus laterally compressed, half as broad as long. Vertical rod slightly shorter than apodeme. Phallosomal index about 2.0. Novasternum small, pubescent, each with rather long submedian spine. Anterior parameres small, conical, attached to novasternum, with a few sensilla. Ventral fragma oblong, laterally fuscous, apically sinuated at sides. Posterior parameres seemingly represented by an obscure cross bar connecting lateral corners of ventral fragma. Median notch of ventral fragma shallow and not prominent. Egg-guide (Fig. 2C) greyish yellow, apically conical and enlarged, with about 10 upper marginal and 2 upper discal brownish black bristles. Subterminal hair distinct. Basal isthmus narrow, straight.

Specimens examined 3 males and 3 females, Amo, Brunei, 22 II '62; 1 female, Valley of Bukit Berdawan, Sarawak, 30 I '62 (G. Imadaté leg.).

Distribution Borneo (new loc.), Sumatra, Java, Philippine Islands.

Remarks Detailed description especially of mesonotal whitish stripes by Sturtevant (1927) about his *Z. multistriata* clearly indicate this species to be conspecific with de Meijère's *obscuricornis*, and the author recognizes the former as junior synonym of the latter. Wheeler's assumption (1959) that

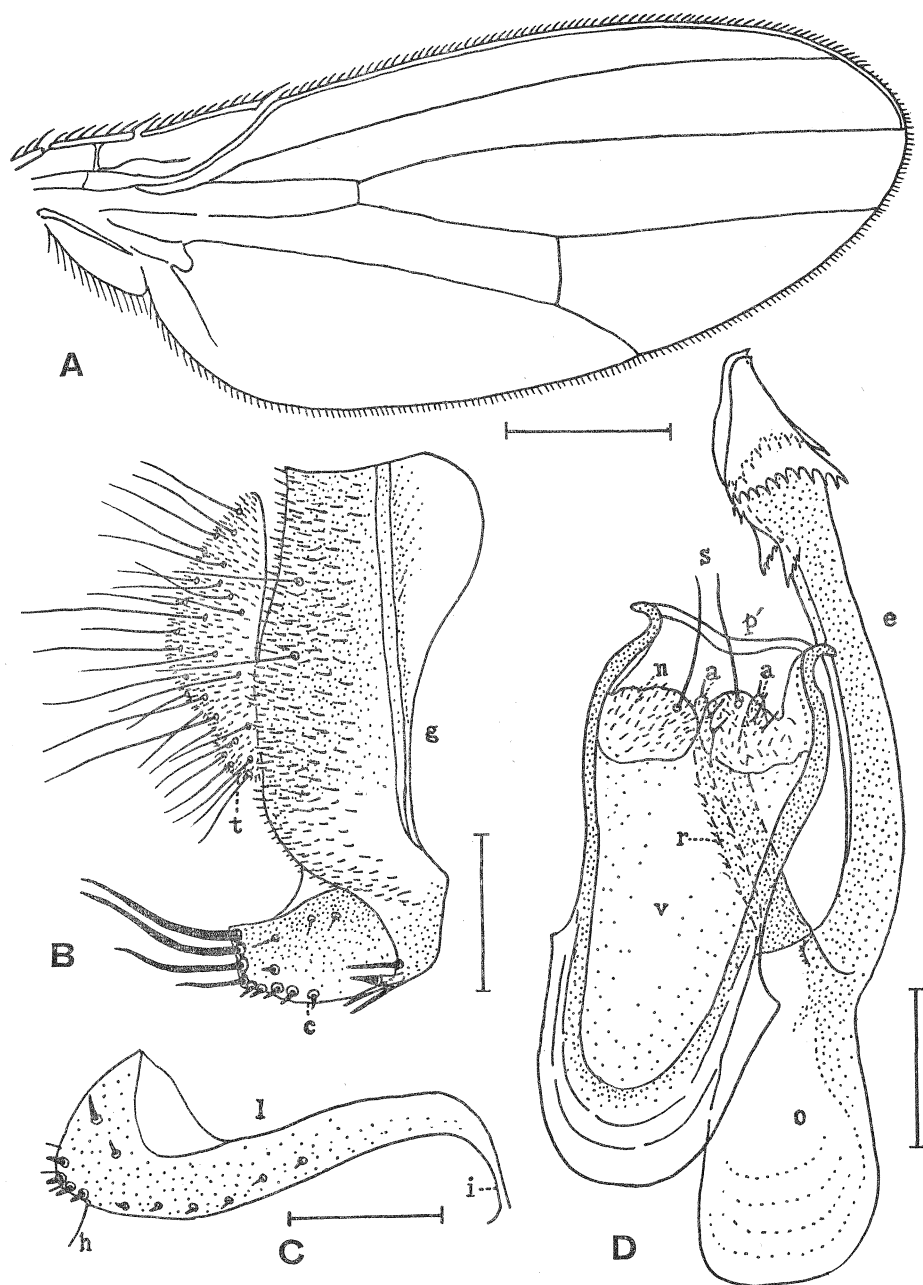


Fig. 2. *Zaprionus obscuricornis* (DE MEIJÈRE)

A, Wing. B, Periphallic organs (lateral aspect). C, Egg-guide. D, Phallic organs (ventrolateral aspect). Scale 0.5 mm in wing, 0.1 mm in other figures.

Duda's placement of de Meijère's *obscuricornis* in the genus *Drosophila* is doubtful becomes proved and it was transferred here to the genus *Zaprionus*. It follows that this species is not to be treated as a secondary junior homonym of *Drosophila obscuricornis* GRIMSHAW, 1901. A row of cuneiform bristles of de Castro's type 3 on mid and hind tarsi seems to be a generic character, as it has been found in African species as well as in the present one.

Genus *Drosophila* FALLÉN, 1823

Subgenus *Paradrosophila* DUDA, 1924

Drosophila (Paradrosophila) brunnea DE MEIJÈRE, 1911 (Fig. 3G, H)

Drosophila brunnea DE MEIJÈRE, 1911. *Tijd. v. Ent.* 54: 401. (Java)

Drosophila (Paradrosophila) brunnea: DUDA, 1924. *Arch. Naturg.* 90A (2): 206. (Java)

Drosophila (Paradrosophila) brunnea: DUDA, 1926. *Suppl. Ent.* 14: 79. (Sumatra)

Drosophila (Paradrosophila) scutellimago DUDA, 1924. *Arch. Naturg.* 90A (2): 209; 90A (3): 243. (Formosa)

?*Drosophila (Pholadoris) brunnea*: BURLA, 1954. *Rev. Suisse. Zool.* 61: 153. (Ivory Coast)

Female General features as described by de Meijère (1911) and redescribed by Duda (1924). Front anteriorly pale orange, about 4/9 as broad as head width at the level of ocellar triangle. Clypeus brown. Buccal margin not convex. Carina high, broader below, white pruinose in cephalic view, dark brown below. Cheek narrow, about 1/10 as broad as the greatest diameter of eye. Lower reclinate orbital less than 1/3 upper one in length, which is longer than proclinate. Proclinate inside other orbitals.

Mesonotum red brown. Scutellum red brown, laterally black, proximally somewhat paler, apically white. Cross distance of dorsocentrals longer than twice the length distance. Abdominal tergites yellowish brown, each medially with broad straightly demarcate non-interrupted black cross band. Egg-guide (Fig. 3G) lobe orange yellow, very slender and pointed, with about 30 yellow pointed marginal teeth, which cover almost entire length of ventral margin and distal half of dorsal margin. Basal isthmus thick, straight. Subterminal hair short. Heavy bristles of costa ending near the tip of R_{4+5} (Fig. 3H).

Specimen examined 1 female, Valley of Bukit Berdawan, Sarawak, 30 I '62 (G. Imadaté leg.).

Distribution Borneo (new loc.), Java, Sumatra, Formosa, W. Africa (?).

Remarks West African form reported by Burla (1952) somewhat differs from the present form in having 1) no black patches on lateral sides of scutel-

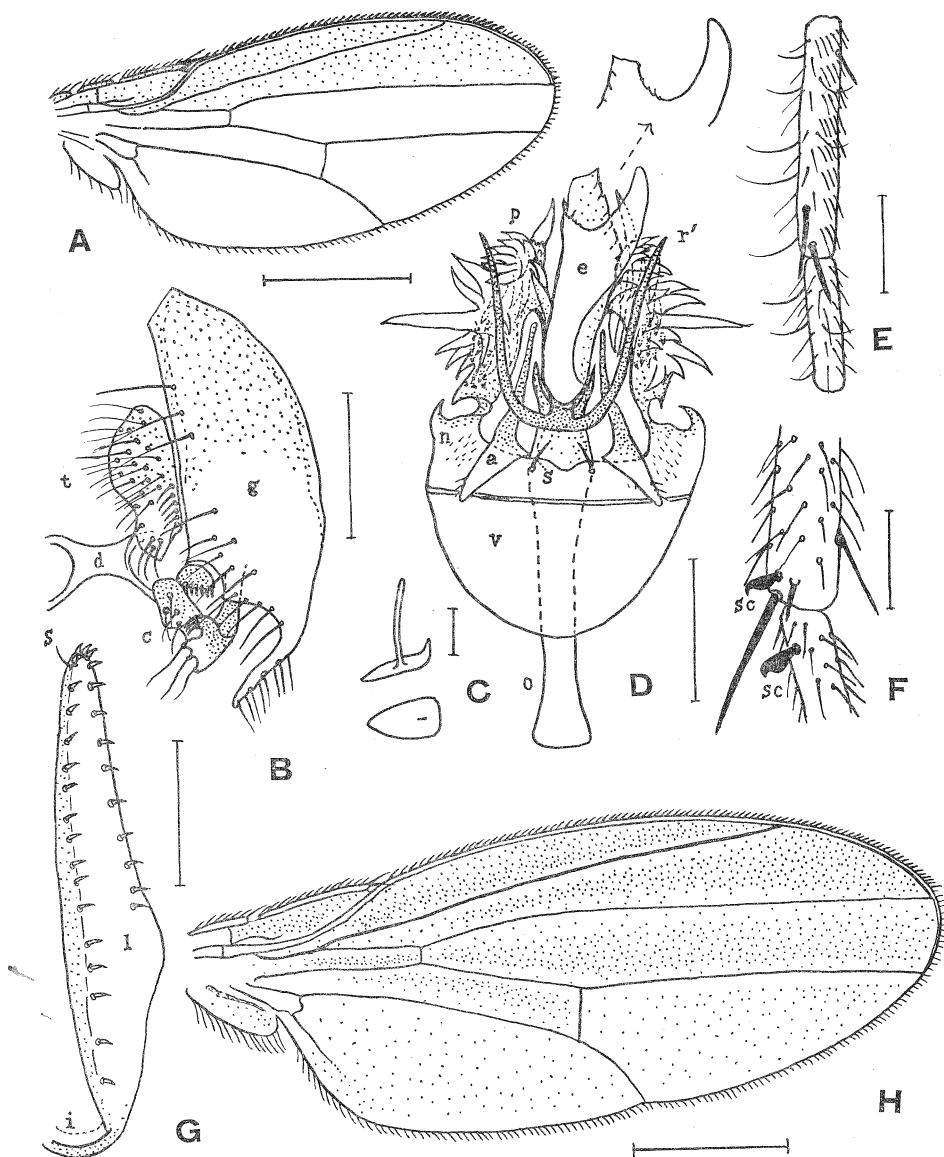


Fig. 3 A-F *Drosophila (Tanygastrella) gracilis* (DUDA)

A, Wing. B, Peripheral phallic organs (lateral aspect). C, Ejaculatory apodeme (upper: lateral, lower: ventral aspects). D, Phallic organs (ventral aspect). E, Metatarsus and 2nd tarsal joint of male fore leg. F, Tibia and metatarsus of male mid leg.

G-H *Drosophila (Paradrosophila) brunnea* DE MEIJÈRE

G, Egg-guide. H, Wing. Scale 0.5 mm in wings, 0.5 mm in other figures.

lum, 2) C-index much smaller; 4V-index much larger, 3) only two strong sternopleurals, and 4) broader egg-guide with fewer teeth. He figured male genital organs, to which the present author could not compare that of Oriental form, as only a female was available for examination. Therefore, it should be premature to establish homonymy.

Subgenus *Tanygastrella* DUDA, 1924

Drosophila (Tanygastrella) gracilis (DUDA, 1924) (Figs. 3A-F)

Tanygastrella gracilis DUDA, 1924. *Arch. Naturg.* 90A (2): 192; 215; 90A (3): 253. (Java)

Drosophila (Tanygastrella) gracilis: DUDA, 1926. *Suppl. Ent.* 14: 99. (Sumatra; redescription with figures)

Drosophila (Tanygastrella) gracilis: DUDA, 1929. *Treubia* 7: 420. (Buru: Moluccas)

Male General features as reported by Duda (1924, 1926). Palpus with only one prominent apical bristle. Lower reclinate orbital about 1/3 others in length, nearly equally apart from upper reclinate and proclinate which is placed inside other orbitals. Upper reclinate slightly nearer to inner vertical than to proclinate. Sterno-index about 0.4. Median sterno-pleural as long as posteriors. Legs (Fig. 3 E, F): fore metatarsus subapically with 2 rather long stout black bristles arranged in a longitudinal row on the inner surface. Mid tibia apicoventrally with a broad apically hooked scaly bristle on each side of apical bristle; mid metatarsus proximally with a similar scaly bristle on the mid-dorsal line. Wings (Fig. 3A) somewhat fuscous on the anterior half. C-index about 2.0; Ac-index about 2.7; 4C-index about 1.4; 4V-index about 2.5; 5x-index about 2.1. First costal section with 2 terminal subequal bristles. Third costal section with heavy bristles on its basal 3/5.

Periphallic organs (Fig. 3B): Genital arch narrowing above, dark brown, paler on ventral half, antero-ventrally abruptly narrowing and extending below; upper distal margin with about 6 setae; lower portion with about 15 long setae. Claspers in 2 sets, fuscous. Upper clasper small and semicircular, with about 6 black teeth arranged in a straight row on entire length of distal margin. Lower clasper larger, distally exceedingly broadened and setigerous, folded upward and outward, apically hooked, with about 3 black teeth on the apical hooked process. Anal plate brown, hairy, separated from genital arch; distal margin medially concaved; proximal margin with a series of short setae on ventral half; ventral tip with short curved setae. Decasternum quadrate, with all four sides concaved. Phallic organs (Fig. 3D) red brown, complicated in structure. Aedeagus laterally compressed, distally broadened and divided into 2 lobes, upper lobe truncate and marginally serrate, lower one tapering and

curved upward. Vertical rod (?) terminally bifurcated into slender caudally directed freely ending processes. Apodeme of aedeagus rather long. Phallosomal index about 0.5. Anterior parameres short and conical, pale, inserted on novasternum, subterminally with a few sensilla, proximally with long apophyse, which seem to be loosely contiguous to aedeagus. Posterior parameres large, with numerous long and short conical projections, laterally contiguous to lateral processes of novasternum, dorsally folded back and contiguous to the base of aedeagus. Ventral fragma pale, proximally rounded, with shallow small median notch and stout but short submedian hairs. Hypandrial plate laterally pubescent. Ejaculatory apodeme (Fig. 3C) pale orange, plate long triangular, stalk slightly longer than plate and inserted near the middle of plate.

Specimens examined 6 males, Valley of Bukit Berdawan, Sarawak, 30 I '62; 1 male, Kelati, Sarawak, 30 I '62 (G. Imadaté leg.).

Distribution Borneo (new loc.), Sumatra, Java, Moluccas.

Remarks As pointed out by Wheeler (1959. *Univ. Texas Publ.* 5914: 185), the position of *Tanygastrella* DUDA in the genus *Drosophila* has not been clearly determined. So far as the present species is concerned, however, it should be located at least near the subgenus *Sophophora*, having complete sets of phallic organs, stalk of ejaculatory apodeme inserted on the surface, not on the edge, of the plate, and special stout bristles on the inner surface of male fore metatarsus. Elongate abdomen and deep incision of outer costal break, which are considered to be the generic or subgeneric characteristics by Duda, are not decisively significant. Moreover, the occurrence of special scaly bristles on the male mid tibia and metatarsus in this species shows its close relationships to the *takahashii*, *suzukii* and *ficuspila* subgroups of the *melanogaster* species group, as the males of the species belonging to these subgroups examined so far* are provided with the similar bristles (Fig. 4F-H). Consequently, *Tanygastrella* seems better to be grouped into *melanogaster* group, but before further informations about another species of *Tanygastrella*, *hypopygialis* DUDA, 1924, are obtained, the author wishes to retain it as a subgenus of *Drosophila*, as done by Duda (1926). In this relation, *Drosophila hypopygialis* MALLOCH, 1934 becomes a junior homonym of *Drosophila (Tanygastrella) hypopygialis* (DUDA, 1924). The author accordingly replaces the specific name of the former by a new name, *nasutoides*, basing on Malloch's citation that the species in question is very similar to *D. nasuta* LAMB, 1914. Nomenclatorial sequence is as summarised below.

* Except *D. unipectinata* DUDA, 1924, which has been assigned to the *suzukii* species subgroup.

✓ *Drosophila (Drosophila) nasutooides* OKADA nom. nov.

- Drosophila hypopygialis* MALLOCH, 1934. *Ins. Samoa* **VI**, 8: 307. (Samoa)
Drosophila (Drosophila) hypopygialis: HARRISON, 1954. *Trans. Roy. Ent. Soc. London* **105**: 108. (Samoa; redescription)
Drosophila hypopygialis: WHEELER, 1959. *Univ. Texas Publ.* **5914**: 185. (secondary homonym of uncertain validity)
nec *Drosophila (Tanygastrella) hypopygialis* (DUDA, 1924). *Arch. Naturg.* **90A** (2): 192; 223. (as *Tanigastrella*; Sumatra)

Subgenus *Sophophora* STURTEVANT, 1939

melanogaster species group, STURTEVANT, 1942

takahashii species subgroup, HSU, 1949

Drosophila (Sophophora) takahashii STURTEVANT, 1927

- Drosophila takahashii* STURTEVANT, 1927. *Phil. J. Sci.* **32**: 371. (Formosa)
Specimens examined 3 males, Amo, Brunei, 22 II '62 (G. Imadaté leg.).
Distribution Borneo (new loc.), Formosa, Nepal, China, Manchuria, Japan.

ananassae species subgroup, HSU, 1949

Drosophila (Sophophora) ananassae DOLESCHALL, 1858

- Drosophila ananassae* DOLESCHALL, 1858. *Nat. Tijds. Ned. Ind.* **17**: 128.
Specimens examined 32 males and 11 females, 17 XI '61, and 3 males and 5 females, 26 XI '61, Chiang Mai, Thailand; 8 males and 5 females, Nakon Santum, Thailand, 13 X '61; 1 female, Saigon, Viet-Nam, 17 XI '61; 8 males and 5 females, Rambai, Brunei, 11 II '62; 2 males and 1 female, Valley of Bukit Berdawan, Sarawak, 30 I '62 (G. Imadaté leg.).
Distribution Widely distributed in the tropical and subtropical regions of the world.

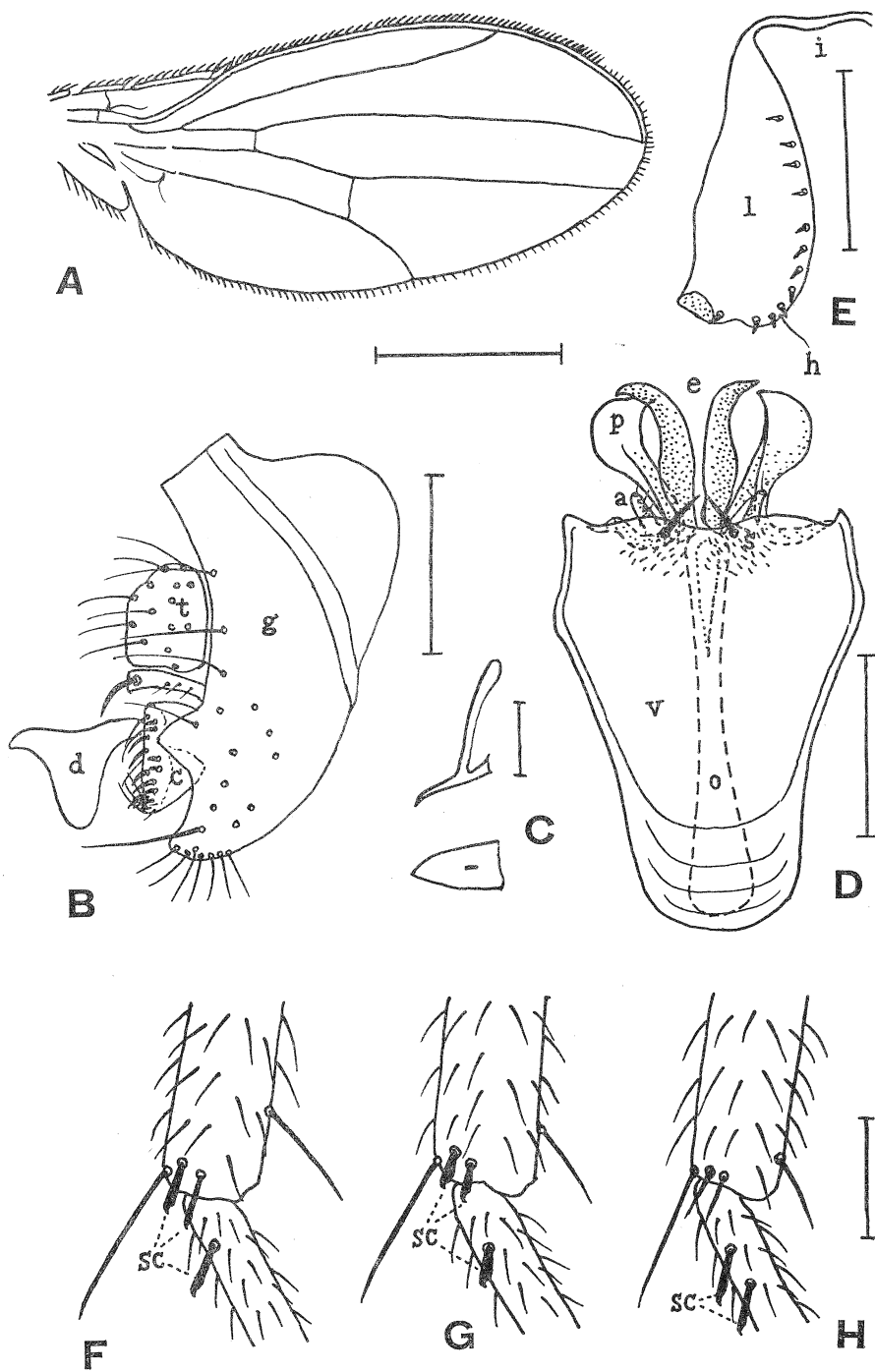
Drosophila (Sophophora) bipectinata DUDA, 1923

- Drosophila bipectinata* DUDA, 1923. *Ann. Mus. Nat. Hung.* **20**: 52. (India)
Specimens examined 15 males, Valley of Bukit Berdawan, Sarawak, 30 I '62 (G. Imadaté leg.).
Distribution Borneo (new loc.), Sumatra, India, Nepal, Formosa, Micronesia.

Drosophila (Sophophora) sp. (Fig. 4A-E)

Male and female Body about 1.5 mm, pale yellow. Eyes red, with thick

= *malerhotliana*
Parshad & Parshad 1964
Res. Bull. (ms). Punjab
Univ. 15: 235. (India)



piles. Antenna with 2nd joint anteriorly brown, 3rd yellowish grey and slightly longer than broad. Arista with about 8 branches including 2 lower branches and a large fork. Palpus yellowish orange, with only one long black terminal seta. Ocelli bright red. Ocellar triangle black. Periorbits yellowish grey. Front brown, anteriorly orange, about half as broad as the head width at the level of ocellar triangle. Clypeus brown. Carina high, not reaching buccal margin, which is somewhat swollen. Cheek yellow, about 1/6 as broad as the greatest diameter of eye. Lower reclinate orbital about 1/3 as long as upper, slightly nearer to proclinate than to upper reclinate, which is twice nearer to proclinate than to inner vertical. Proclinate inside other orbitals. Second oral 2/3 as long as vibrissa, 3rd as long as 2nd.

Mesonotum and scutellum uniformly yellowish brown, slightly glossy; thoracic pleura paler. Humerals 2, long, subequal in size. Acrostichal hairs in 6 rows, somewhat irregularly arranged. Anterior dorsocentrals about 2/3 posteriors; cross distance of dorsocentrals about twice the length distance. Sterno-index about 0.7. Anterior sternopleurals much thinner than posteriors. Scutellars long; posterior scutellars longer than anteriors, which are nearly parallel. Legs yellow; male fore metatarsus subapically with two transverse sex-combs of 2 and 3 black teeth, succeeding tarsal joint with a similar comb of about 3 teeth. Metatarsus as long as 2 succeeding tarsal joints taken together in all legs. Preapicals on all tibiae, apicals prominent on 2nd. No hooked scaly bristles on male mid tibia and metatarsus. Wings (Fig. 4A) hyaline, veins pale. R_{2+3} slightly curved toward costa at tip; R_{4+5} and M apically slightly convergent. C-index about 1.4; Ac-index about 4.0; 4C-index about 1.9; 4V-index about 2.5; 5x-index about 2.0. First costal section with 2 subequal stout bristles. Third costal section with heavy bristles on its basal half. Halteres yellowish white. Abdominal tergites yellowish brown, somewhat glossy, with medially not interrupted black caudal bands, which are narrow in female, broader in caudal segments in male.

Periphallic organs (Fig. 4B) pale yellow. Genital arch without pubescence, narrowing below; lower tip conical and somewhat caudally curved: caudal margin medially projected triangularly at the base of clasper; upper margin

Fig. 4 A-E *Drosophila (Sophophora)* sp.

A, Wing. B, Periphallic organs (lateral aspect). C, Ejaculatory apodeme (upper: lateral, lower: ventral aspects). D, Phallic organs (ventral aspect). E, Egg-guide.

F-H Hooked scaly bristles on the tibia and metatarsus of male mid legs of some *melanogaster* group species. F, *D. suzukii* (MATSUMURA), from Japan (*suzukii* subgroup). G, *D. nepalensis* OKADA, from Nepal (*takahashii* subgroup). H, *D. ficusphila* KIKKAWA & PENG, from Japan (*ficusphila* subgroup). Scale 0.5 mm in wing, 0.1 mm in other figures.

with about 5 long setae; lower portion with about 10 such hairs; lower tip with several short hairs. Claspers in two sets. Primary clasper semicircular, with about 4 short pointed black teeth arranged in a medially interrupted row along distal margin and several curved black marginal setae. Secondary clasper rod-shaped, located between anal plate and primary clasper, apically with a large stout ventrally curved bristle. Anal plate separated from genital arch, semielliptical, truncate below, hairy but without microtrichia. Decasternum triangular. Phallic organs (Fig. 4D): Aedeagus orange brown, bifid into elongate, medio-dorsally swollen, apically curved and pointed lobes. Apodeme of aedeagus long, straight. Phallosomal index about 0.4. Anterior parameres minute, U-shaped, attached on novasternum, apically paler and with a few sensilla. Posterior parameres pale yellow, apically swollen ventrally, basally contiguous and also to the lateral corners of novasternum by means of lateral roots. Ventral fragma oblong, pale, apically pubescent, without median notch. Submedian spines stout, black, rather short. Ejaculatory apodeme (Fig. 4C) pale; plate elongate triangular, slightly shorter than stalk, which is straight, slender, and obliquely attached on the surface of plate. Egg-guide (Fig. 4E) hyaline; lobe broad, truncate and somewhat concaved at apex, with about 13 brown lower marginal teeth, terminal teeth widely isolated from penultimate; basal isthmus rather long, straight, about $2/5$ as long as lobe.

Specimens examined 1 male and 3 females, Kelati, Sarawak, 30 I '62; 10 males and 25 females, Valley of Bukit Berdawan, Sarawak, 30 I '62; 3 males and 9 females, Amo, Brunei, 22 II '62 (G. Imadaté leg.).

Distribution Borneo, India.

Remarks The author could recently examine an Indian species sent by Dr. R. Parshad of Punjab University and found it strictly identical to the present species. It is to be described as a new species by Dr. Parshad. Closely resembling *D. szentivani* DOBZHANSKY and MATHER, 1962 (*Pacific Ins.* 14: 247) from New Guinea, but distinguishable in having smaller sex-combs.

montium species subgroup, Hsu, 1949

✓ *Drosophila (Sophophora) tanorum* sp. nov. (Fig. 5A-C)

Male Body about 1.5 mm, pale yellowish brown. Eye red, with dense pile. Antenna yellowish brown; 2nd joint somewhat darker. Arista with about 7 branches, including 2 lower branches and a fork. Palpus slender, yellow, with only one prominent terminal seta. Ocellar triangle greyish brown, darker than front. Periorbits greyish brown, darker than front, narrow, anteriorly curved inward slightly, reaching about $3/4$ length of front. Front orange brown, anterior margin light orange, about half as broad as head width at the level of ocellar triangle. Clypeus orange brown, face greyish brown.

Carina narrow, long and high. Cheek narrow, yellowish brown, about $1/10$ as broad as the greatest diameter of eye. Lower reclinate orbital about $2/5$ as long as proclinate, nearer to proclinate than to upper reclinate, which is nearly equally distant from proclinate and inner vertical. Proclinate inside other orbitals.

Mesonotum and scutellum yellowish brown, slightly glossy. Humerals 2, subequal in size. Acrostichal hairs in 6 rows. Cross distance of dorsocentrals about twice the length distance. Anterior scutellars slightly divergent, as long as posteriors. Legs yellowish; fore metatarsus as long as two succeeding tarsal joints taken together, subapically with two transverse rows of sex-combs composed of about 4 or 5 black teeth each. Second tarsal joint with similar three sets of combs composed of about 1, 3 and 4 teeth from upper downward, respectively. Preapicals on all three tibiae, apicals on 2nd. Wings (Fig. 5A) hyaline, crossveins clear. R_{2+3} nearly straight, apically somewhat curved forward to costa. R_{4+5} and M nearly parallel. First costal section with 2 subequal bristles; 3rd costal section with heavy bristles on its basal half. C-index about 1.7; Ac-index about 3.1; 4C-index about 1.6; 4V-index about 2.4; 5x-index about 2.3. Abdominal tergites yellowish brown, with medially not interrupted caudal black bands.

Periphallalic organs (Fig. 5B): Genital arch dark brown, paler and tapering below, terminally curved caudally and somewhat twisted outward; upper margin with about 10 long setae; lower portion with about 20 setae. Primary clasper large, fan-shaped, lower half folded back outward and upward, distally with a row of about 6 stout curved black pointed teeth, discally with several paler curved bristles on inner surface. Secondary clasper triangular, attached to anal plate, with about 14 stout curved black bristles, arranged in about 3 rows. Anal plate oval, hairy, dark brown, without microtrichia, separated from genital arch. Decasternum fuscous, oblong, truncate below, proximally with lateral wings. Phallic organs (Fig. 5C): Aedeagus brown, rod-shaped, proximally broadened, apically paler and somewhat swollen and dorsally curved. Apodeme of aedeagus long, apically swollen. Phallosomal index about 0.6. Anterior parameres black, long, pointed at tip, subapically swollen and with a few sensilla, proximally contiguous to aedeagus. Posterior parameres pale, apically broadened semicircularly, basally granulous in appearance, attached to aedeagus and also to the corners of novasternum by means of lateral roots. Ventral fragma pale brown, triangular, caudal margin gently concaved and medially somewhat swollen. Submedian spines stout, black, rather short.

Holotype Male, Amo, Brunei, 22 II '62 (G. Imadaté leg.), deposited at the Department of Biology, Tokyo Metropolitan University.

Distribution Borneo.

Relationships Two sets of setigerous claspers and compact rod-like aede-

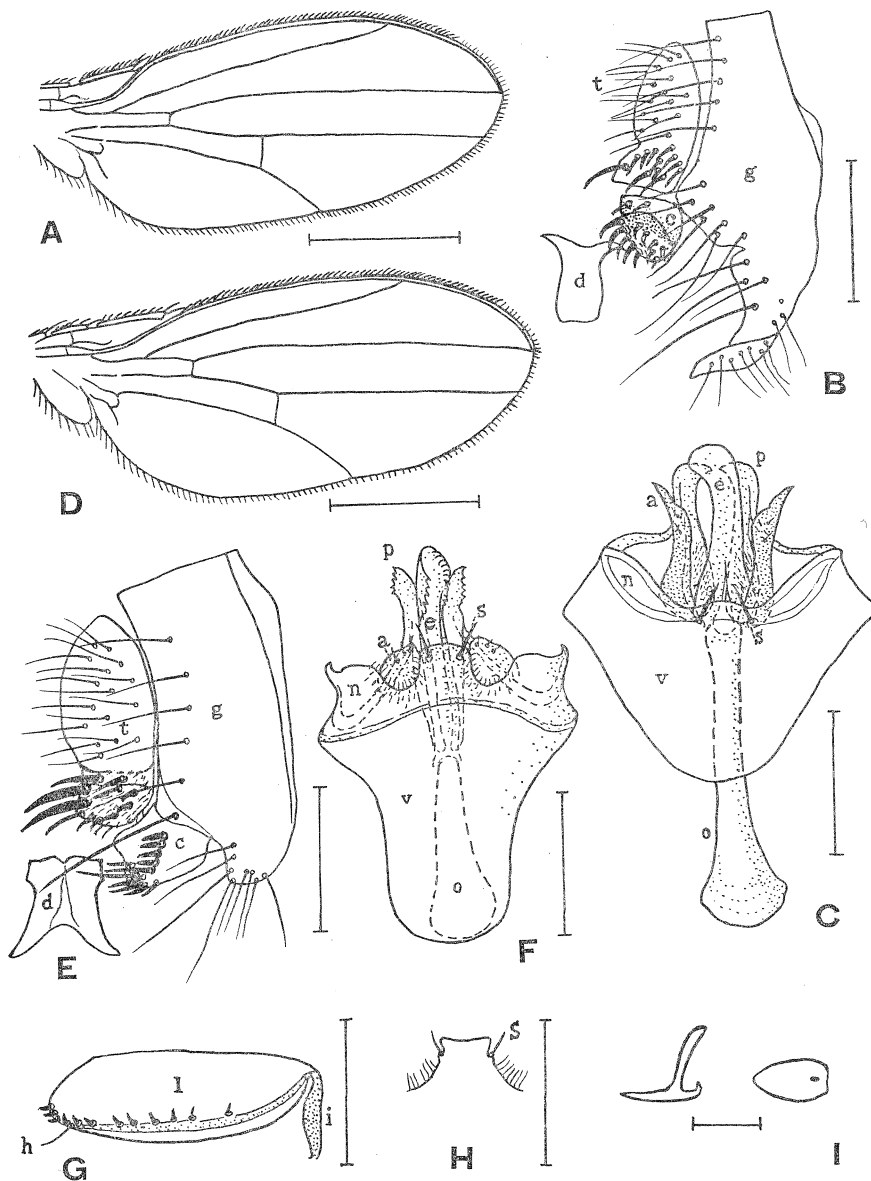


Fig. 5 A-C *Drosophila (Sophophora) tanorum* sp. nov.

A, Wing. B, Peripheral phallic organs (lateral aspect). C, Phallic organs (ventral aspect).

D-F *Drosophila (Sophophora) truncata* sp. nov., from Borneo

D, Wing. E, Peripheral phallic organs (lateral aspect). F, Phallic organs (ventral aspect).

G-I *Drosophila (Sophophora) truncata* sp. nov., from India

G, Egg-guide. H, Median process of novosternum of male phallic organs (ventral aspect). I, Ejaculatory apodeme (left: lateral, right: ventral aspects). Scale 0.5 mm in wings, 0.1 mm in other figures.

agus of this species are the characteristics of the *montium* species subgroup. Resembles, however, *takahashii* subgroup in having long black pointed anterior parameres, curved tapering genital arch, and small transverse sex-combs. In the combination of these features this species can easily be separated from other known members of the *melanogaster* species group.

Remarks The specific name is forwarded to Mr. Kok Tong Tan and Mr. Yee Chin Tan of Brunei Town, who are collaborators of the present expedition.

✓ *Drosophila (Sophophora) truncata* sp. nov. (Fig. 5D-I)

Male Body about 1.5 mm, pale yellowish brown. Antenna with 2nd joint anteriorly dark brown, 3rd with grey pubescence. Arista with about 10 long branches including 2 lower branches and a fork. Palpus yellow, slender, with only one very long and stout terminal seta, nearly as long as palpus itself. Ocellar triangle reddish brown. Periorbits greyish brown, somewhat glossy, not reaching anterior margin of front. Front deep orange brown, anteriorly prominently narrowing and orange, about half as broad as the head width at the level of ocellar triangle. Carina narrow, ending before buccal margin. Face dark yellowish brown, more or less pollinose. Clypeus dark brown. Cheek yellowish white, narrow, about 1/8 as broad as the greatest diameter of eye. Lower reclinate orbital about 1/4 others in length, slightly nearer to proclinate than to upper reclinate, which is nearer to proclinate than to inner vertical. Proclinate inside other orbitals. Two long orals.

Mesonotum and scutellum dark yellowish brown, somewhat glossy; thoracic pleura paler. Two long humerals, lower longer. Acrostichal hairs in 6 rows. Anterior dorsocentrals about half the length of posteriors; cross distance of dorsocentrals about twice the length distance. Scutellars long, anterior pair seemingly convergent, posterior pair longer, slightly nearer to each other than to anteriors. Sterno-index about 0.5. Legs yellowish grey. Preapicals on all tibiae, apicals on 2nd. Sex-combs two, large, longitudinal, composed of about 22 and 14 black teeth on 1st and 2nd tarsal joints, respectively. No hooked scaly bristles on mid tibia and metatarsus. Wings (Fig. 5D) hyaline, veins pale. R_{2+3} nearly straight, only slightly curved to costa at tip. R_{4+5} and M parallel. C-index about 1.6; Ac-index about 4.0; 4C-index about 1.7; 4V-index about 2.8; 5x-index about 3.0. First costal section with 2 stout subequal bristles; 3rd costal section with heavy bristles on its basal 1/2-2/3. Halteres yellowish brown. Abdominal tergites yellowish brown, 2nd to 4th tergites caudally with black rather broad medially not interrupted laterally narrowing bands, 5th tergite largely yellow. The setae on 5th and 6th tergites stout.

Periphallic organs (Fig. 5E): Genital arch entirely pale yellow, without microtrichia, broad, but abruptly narrowing below, ending in conical toe directed

caudoventrally; upper margin with about 6 setae; lower margin with about 10. Primary clasper conical, distally with a row of several pointed black teeth and about 10 black setae, of which one is exceedingly long. Secondary clasper loosely contiguous to anal plate, truncate below, pubescent and with about 10 stout curved black bristles arranged in nearly 3 rows, 2 marginal bristles exceedingly stout. Anal plate separated from genital arch, elliptical, pale yellow, hairy but without microtrichia. Decasternum pale yellow, distally broadened laterally. Phallic organs (Fig. 5F) pale yellow. Aedeagus rod-like, apically rounded and serrate. Phallosomal index about 1.0. Anterior parameres oval, inserted on novasternum, subapically with a few sensilla. Posterior parameres pale, laterally compressed, apicoventrally with fine serration, basally attached to aedeagus, and also to novasternum by means of lateral roots. Ventral fragma distally broadened, caudally pubescent, with broadly truncate median process, on the lateral corner of which inserted stout black submedian spines.

Holotype Male, Amo, Brunei, 22 II '62 (G. Imadaté leg.). Deposited at the Department of Biology, Tokyo Metropolitan University.

Other specimens examined 1 male, collected together with holotype. Several male and female in a stock from Calcutta, India (P. Banerji leg.).

Distribution Borneo, India.

Relationships Closely allied to *D. seguii* SMART from Africa, especially in the shape of periphallic organs, but distinguishable from the latter in having smaller C-index and broadly truncate median process of novasternum (pointed in *seguui*).

Remarks The specific name, *truncata*, is erected to indicate broadly truncate median process of novasternum of male phallic organs.

The Indian form sent to the author by Dr. P. Banerji in 1955 has been kept as a stock in the genetics laboratory of the Tokyo Metropolitan University. It only slightly differs from the present form of Brunei in the broader and somewhat concaved tip of truncate median process (Fig. 5H). Supplementary descriptions with the Indian form are as follows.

Egg-guide (Fig. 5G) lobe yellow, broad, apically triangular, with about 12 yellowish brown lower marginal teeth and a prominent subterminal hair. Basal isthmus black, broad, medially broadened. Ejaculatory apodeme (Fig. 5I) yellowish brown, plate elongate oval, stalk as long as plate and inserted on the surface of the plate. Malpighian tubules bright yellow, with common stalks moderate in size, posterior branches ending free. Mid-intestine folded 2.5-3 times. Rectal papillae oval, pointed. Testis bright yellow, with about 4 or 5 coils. Vas* with one countercoil, distally semicircularly swollen. Para-

* In the sense of Throckmorton (1962. *Univ. Texas Publ.* 6205:214).

gonia large, banana-shaped, proximally folded once. Spermatheca with head hyaline, oval, covered by granulous hyaline sheath. Ventral receptacle with about 6 transverse semicircular folds. Parovaria with stem much longer than that of spermatheca, with head minute and rounded. Egg with two rather long slender filaments.

***Drosophila (Sophophora) kikkawai* BURLA, 1954**

Drosophila (Sophophora) kikkawai BURLA, 1954. *Rev. Brasil. Biol.* **14**: 47.

Specimens examined 1 male and 3 females, Kelati, Sarawak, 30 I '62; 2 males and 2 females, Valley of Bukit Berdawan, Sarawak, 30 I '62; 1 female, Amo, Brunei, 22 II '62 (G. Imadaté leg.).

Distribution Borneo (new loc.), Sumatra, Viet-Nam, India, Ryukyu, China, Japan, Micronesia, Samoa ?, Brasil, Colombia.*

***Drosophila (Sophophora)* sp. cf *kikkawai* BURLA**

Imadaté

Male Different from *D. kikkawai* BURLA in having median process of novasternum much broader and apically gently pointed triangularly and submedian spines much shorter and stouter. Periphalllic organs are closely similar to that of *D. kikkawai*.

Specimen examined 1 male, Amo, Brunei, 22 II '62 (G. Imadaté leg.).

Subgenus ***Drosophila*** FALLÉN, 1923 ⁸

***immigrans* species group, STURTEVANT, 1942**

***Drosophila (Drosophila) signata* DUDA, 1923 (Fig. 6A-C)**

Drosophila (Spinulophila) signata DUDA, 1923. *Ann. Mus. Nat. Hung.* **20**: 48. (Formosa)

Drosophila (Spinulophila) signata: DUDA, 1924. *Arch. Naturg.* **90A** (2): 209. (Formosa)

Drosophila (Acanthophila) signata: DUDA, 1926. *Suppl. Ent.* **14**: 83. (Formosa)

Drosophila (Spinulophila) signata: STURTEVANT, 1927. *Phil. J. Sci.* **32**: 366. (designated as the type species of the subgenus *Spinulophila*)

Female Body about 3 mm, reddish brown. Eye red, very sparsely pubescent. Antenna with 3rd joint darker. Arista with about 11 long branches including 3 lower branches and a fork. Palpus with only one prominent terminal seta. Ocellar triangle dark at middle. Postverticals long. Front

* The Colombian specimens recently sent to the author from Dr. A. S. Hunter, University of the Andes, have been identified to the present species.

flat, velvety reddish brown, narrowing anteriorly, somewhat concaved along mid-longitudinal line. Periorbits grey, ending before apex of front. Carina high, narrow, broadened below, anteriorly black. Cheek yellow, about 1/10 as broad as the greatest diameter of eye. Mouthparts reddish. Lower reclinate orbital about 1/3 proclinate in length, equally distant from proclinate and upper reclinate, which is nearer to inner vertical than to proclinate. Two long orals.

Mesonotum dark yellowish brown, unicolorous. Humerals 2, lower longer. Acrostichal hairs in 8 regular rows. Cross distance of dorsocentrals more than twice the length distance. Scutellum dark yellowish brown. Hind scutellars slightly convergent. Sternopleurals long, middle one only slightly shorter than anteriors. Sterno-index about 0.7. Legs yellow; fore femur with a row of about 12 minute bristles on its inner surface. Proximal 2 tarsal joints of male fore leg short, thick, provided with thick golden hair tufts. Fore metatarsus with an apical long hair, which is as long as the joint itself. Preapicals on all three tibiae, weak on 1st. Apicals prominent and long on 2nd. Wings (Fig. 6A) hyaline, somewhat fuscous along anterior margin, posterior cross vein clouded. R_{2+3} nearly straight; R_{4+5} and M nearly parallel. C-index about 2.5; Ac-index about 2.5; 4C-index about 0.9; 4V-index about 1.5; 5x-index about 1.0. First costal section with 2 subequal terminal stout setae; 3rd costal section with heavy bristles on its basal 9/10. Halteres yellow.

Periphallic organs (Fig. 6B): Genital arch black, without microtrichia, deeply concaved at mid-dorsal line, markedly narrowing below, ending in two thick stout black bristles; upper margin without microtrichia; lower portion with only one long seta. Clasper large, apparently divided into caudoexterior and anteroinferior quadrate flaps; former distally with about 3 thick black truncate teeth which are seemingly confluent side by side; latter distally with a straight row of about 7 truncate black teeth and discally with numerous recurved brownish bristles on inner surface. Anal plate large, oval, broadened below, hairy but without microtrichia, partially fused to genital arch. Decasternum trapezoid, distal margin concaved. Phallic organs (Fig. 6C) generally dark brown. Aedeagus cylindrical, somewhat sinuated dorsally at middle, apical half swollen dorsally and with numerous fine thorn-like processes. Phallosomal index about 1.0. Anterior parameres attached to the lateral corners of novasternum, black and with irregular serration and a few sensilla. Ventral fragma quadrate, with deep and acute median notch, lateral corners acutely pointed. Submedian spines stout, long and black.

Specimen examined 1 male, Amo, Brunei, 22 II '62 (G. Imadaté leg.).

Distribution Borneo (new loc.), Formosa.

Remarks The present species has several features rather uncommon among the *immigrans* species group or even among the genus *Drosophila* as

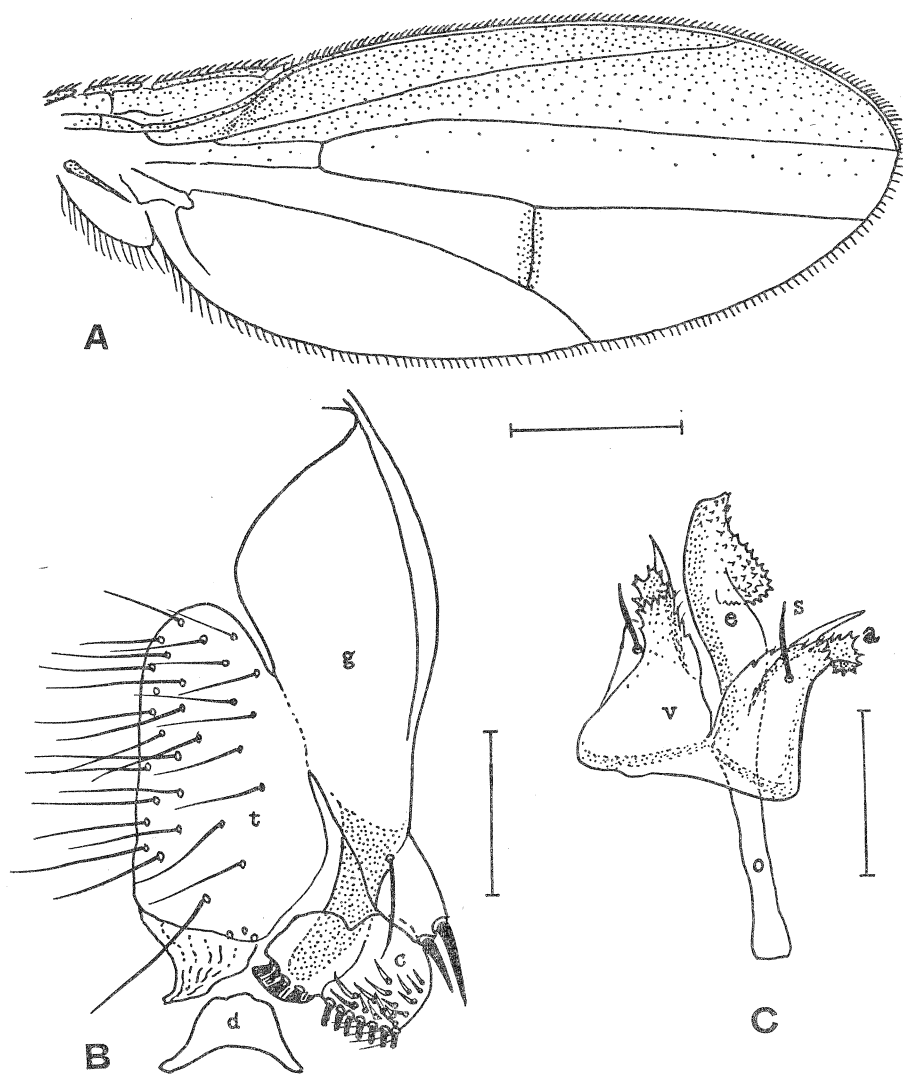


Fig. 6 *Drosophila (Drosophila) signata* DUDA

A, Wing. B, Peripheralallic organs (lateral aspect). C, Phallic organs (ventro-lateral aspect). Scale 0.5 mm in wing, 0.1 mm in other figures.

well as the subfamily Drosophilinae, as follows. 1) Fusion of anal plate to the genital arch is a feature essential to the *virilis* section of the subgenus *Drosophila*. The fact verifies the treatment of Patterson and Stone* to place the *immigrans* group near the *robusta* group which belongs to the *virilis* section,

* PATTERSON and STONE 1952. Evolution in the genus *Drosophila*: 81 (Diagram of the relationships in *Drosophila*, modified after STURTEVANT 1942).

and at least that of Throckmorton (1962. *Univ. Texas Publ.* 6205: 318) to locate it at the base of *quinaria* section, near the point of its separation from *virilis* section. 2) Fusion of anterior parameres to the lateral corners of novasternum seems to be unique among the genus *Drosophila*. 3) Upper reclinate located nearer to inner vertical orbital than to proclinate orbital is a feature characteristic of Steganinae and uncommon among Drosophilinae.

***Drosophila (Drosophila) synpanishi* sp. nov.** (Fig. 7A-F)

Male and female Body about 2.8-3 mm, yellowish brown to dark brown, female darker than male. Eyes dark red, with short piles. Antenna with 2nd joint dark orange brown, 3rd yellowish brown, whitish in anterior view. Arista with about 10-14 branches including 2-4 lower branches and a small fork. Palpus yellow, with a few black rather short ventral setae. Ocellar triangle short, greyish brown. Periorbits dark brown, short, about 1/3 as long as front. Front orange brown, anteriorly concaved and bright orange, about half as broad as the head width at the level of ocellar triangle. Clypeus greyish brown. Carina yellow, high, narrow. Face greyish brown. Cheek uniformly yellow, about 1/6 as broad as the greatest diameter of eye. Lower reclinate orbital stout, about half the length of proclinate, equally apart from proclinate and upper reclinate, which is as long as proclinate and 1.5 times nearer to proclinate than to inner vertical. Proclinate inside other orbitals. Two long orals.

Mesonotum dark orange brown, lateroanterior corners paler. Thoracic pleura yellowish brown. Humerals 2, equal in size. Acrostichal hairs in 8 rows. Anterior dorsocentrals about 3/5 as long as posteriors; cross distance of dorsocentrals slightly more than twice the length distance. Anterior scutellars parallel, about 5/6 as long as posteriors. Sterno-index about 0.5. Legs yellowish grey; fore femur with a longitudinal row of about 10 short bristles on mesal 1/3 of inner surface. Metatarsus longer than two succeeding tarsal joints taken together in all legs. Male fore tarsi anteriorly with about 20 exceedingly long recurved hairs distributed on their entire length. Preapicals on all three tibiae, strong on 2nd, weak on 1st, thin on 3rd. Apicals strong on 2nd. Wings (Fig. 7A) somewhat fuscous, crossveins clouded, longitudinal veins without apical dark spots. R_{2+3} gently convex medially, only slightly curved to costa at tip. R_{4+5} and M nearly parallel. C-index about 3.3; Ac-index about 1.7; 4C-index about 0.7; 4V-index about 1.1; 5x-index about 1.1. First costal section with 2 terminal subequal stout bristles; 3rd costal section with heavy bristles on its basal 2/3-3/5. Halteres grey. Abdominal tergites yellowish grey to yellowish brown, with narrow or broad not sharply demarcated caudal black bands which are medially weakly interrupted. Posterior

mesonotum
darker in ♀

tergites of male almost entirely black.

Periphallic organs (Fig. 7B): Genital arch pale brown, partially pubescent; upper margin with about 7 long setae; lower portion with about 5 setae; heel low, rectangular; toe ventral, rectangular; caudal margin projected triangularly just above the insertion of clasper. Clasper crescent, projected below genital arch, with a row of about 12 black pointed teeth occupying entire length of concaved distal margin. Anal plate pale yellow, pubescent and hairy, separated from genital arch, slightly constricted near lower tip. Decasternum distally exceedingly broadened to become a triangular flap, basally with thick vertical rod. Phallic organs (Fig. 7C; D): Anterior parameres long, proximally broadened and inserted on novasternum, distally tapering and with numerous thorn-like processes, medioinferiorly with small conical process on which a few sensilla are present. Posterior parameres (?) large, fused with each other at bases and contiguous to the base of aedeagus, distally bifurcated into setigerous dorsoventrally convoluted processes, medially with short acute lateral processes. Ventral fragma triangular, deeply and broadly notched on caudal margin and with rather long submedian spines. Ejaculatory apodeme (Fig. 7E) with plate pale yellow, oval, distal half narrow; stalk as long as plate, darker and distally swollen. Phallosomal index about 1.3. Egg-guide (Fig. 7F) with lobe pale yellow, slender and tapering distally, with about 22 pale yellow pointed teeth, including a few upper discal teeth.

Holotype Male, Amo, Brunei, 22 II '62 (G. Imadaté leg.). Deposited at the Department of Biology, Tokyo Metropolitan University.

Allotopotype Female, collected and deposited together with holotype.

Paratypes 5 males and 5 females, collected together with holotype.

Other specimens examined 18 males and 16 females, collected together with holotype.

Distribution Borneo.

Relationships Resembles *D. immigrans* var. *formosana* DUDA, 1926 (STURTEVANT 1927*) especially in having long recurved hairs on the male fore tarsi, but differs from the latter in having no long paired filiform male genital appendages such as mentioned by Duda. According to Sturtevant (1927), *formosana* differs from the original form of *immigrans* only in the feature of

* In describing *D. immigrans* var. *formosana* from Formosa, Sturtevant (1927. *Phil. J. Sci.* 23: 368) stated "Duda also recognized this form from Formosa, but he failed to give it a name". It happened that just before that time Duda (1926. *Ann. Mus. Nat. Hung.* 23) independently reported it from Formosa under the same variety name: *D. tripunctata* BECKER var. *formosana*. As *tripunctata* BECKER, 1908, is preoccupied by *tripunctata* LOEW, 1862, and synonymous with *immigrans* STURTEVANT, 1921 (cf. STURTEVANT 1927. *Phil. J. Sci.* 32: 367), *formosana* STURTEVANT becomes a junior "synonym" of *formosana* DUDA as stated by Wheeler (1959. *Univ. Texas Publ.* 5914: 190).

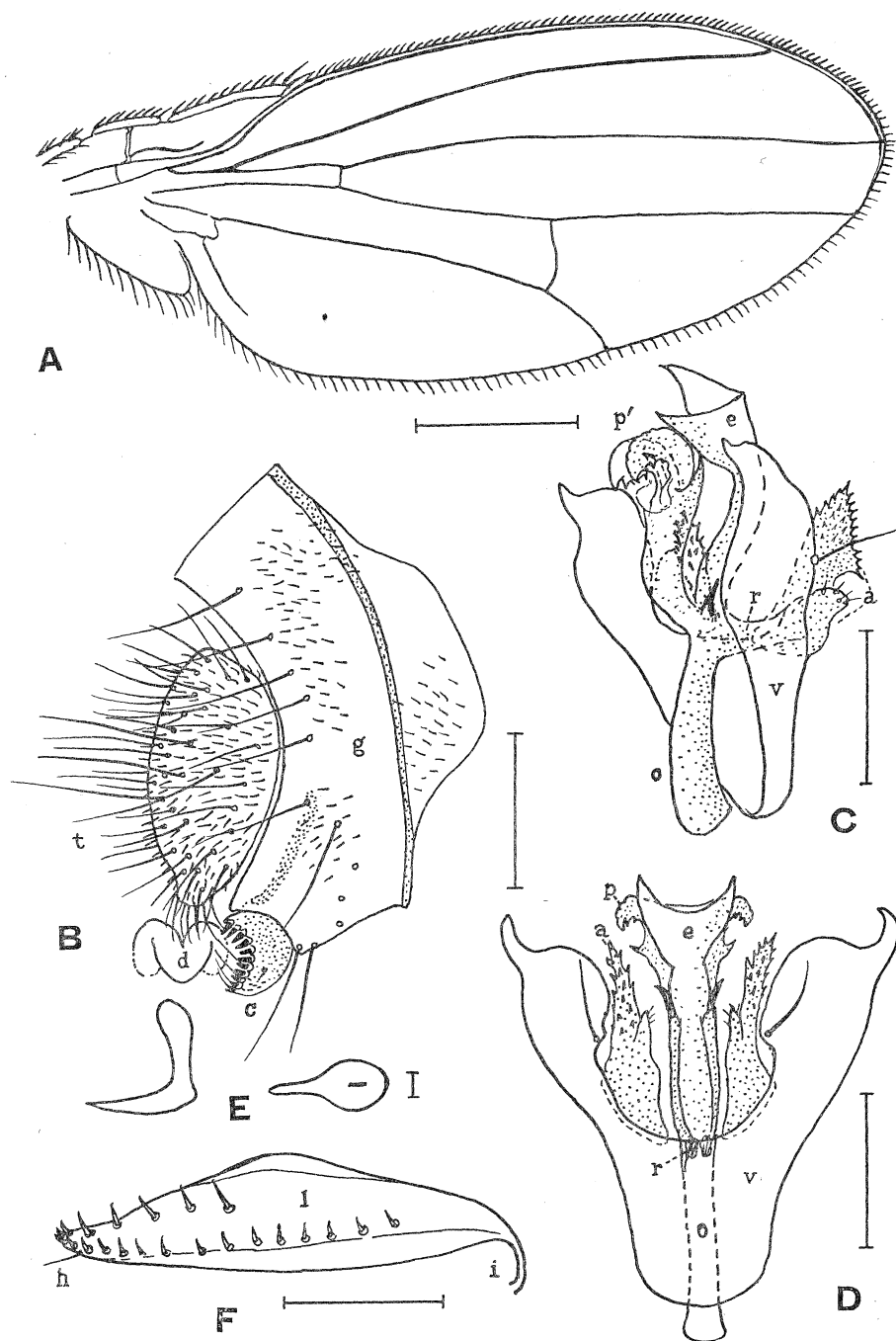


Fig. 7 *Drosophila (Drosophila) synpanishi* sp. nov.

A, Wing. B, Periphallalic organs (lateral aspect). C, Phallic organs (ventrolateral aspect). D, Phallic organs (ventral aspect). E, Ejaculatory apodeme (left: lateral, right: ventral aspects). F, Egg-guide. Scale 0.5 mm in wing, 0.1 mm in other figures.

male tarsal hairs. If so, *formosana* should have black spots at the apices of anterior longitudinal veins and triangular abdominal black spots, which are characteristic of *immigrans* and in the absence of which the present species is easily separable from *immigrans* as well as *formosana*. It resembles also *D. unicolor* DE MEIJÈRE, 1914, from Java (*Tijd. v. Ent.* 27: 266) in having long recurved tarsal hairs in male fore legs, but differs from the latter in having no thick hair tufts on the inner surface of proximal two tarsal joints of male fore legs.

Remarks Specific name is forwarded to Mr. Thamnoon Synpanish, a member of the Expedition, Chulalongkorn University, Thailand.

***Drosophila (Drosophila) nasuta* LAMB, 1914 (Fig. 8A-G)**

- Drosophila nasuta* LAMB, 1914. *Trans. Linn. Soc.* 16: 346. (Seychelles)
Drosophila (Spinulophila) nasuta: STURTEVANT, 1927. *Phil. J. Sci.* 32: 369. (Formosa, Seychelles)
Spinulophila nasuta: MALLOCH, 1934. *Ins. Samoa* VI, 8: 311. (Samoa)
Drosophila (Acanthophila) nasuta: DUDA, 1940. *Ann. Mus. Nat. Hung.* 33: 23. (Formosa, Seychelles)
Drosophila nasuta: HARRISON, 1954. *Trans. Roy. Ent. Soc. London* 105: 107. (Samoa)
Drosophila (Spinulophila) albomicans DUDA, 1923. *Ann. Mus. Nat. Hung.* 20: 47. (Formosa, New Guinea)
Drosophila (Spinulophila) albomicans: DUDA, 1924. *Arch. Nat.* 90A (2): 209; (3): 245. (Formosa, New Guinea)
Drosophila (Acanthophila) albomicans: DUDA, 1926. *Suppl. Ent.* 14: 89. (Sumatra)
Drosophila (Spinulophila) sulfurigaster DUDA, 1923. *Ann. Mus. Nat. Hung.* 20: 48. (New Guinea)
Drosophila (Acanthophila) albovittata DUDA, 1926. *Suppl. Ent.* 14: 87. (unjustified emendation of specific name, *sulfurigaster*; Sumatra)
Drosophila (Acanthophila) albovittata: DUDA, 1929. *Trèubia* 7: 420. (Moluccas)
Drosophila bilimbata BEZZI, 1928. *Dipt. Fiji Isl.* 159. (Fiji)

Male and female General features strictly identical to those described by Lamb (1914) and redescribed by Duda (1926) as well as Harrison (1954). Body about 2.5 mm, yellowish brown. Eyes red, with thick short pile. Antenna with 2nd joint yellow, 3rd dark brown, slightly pointed apically. Arista with about 11 long branches including rather short fork and about 3 lower branches. Palpus yellow, with a few ventral setae. Ocellar triangle medially brownish black. Periorbits reaching 2/3 length of front. Front orange brown, about

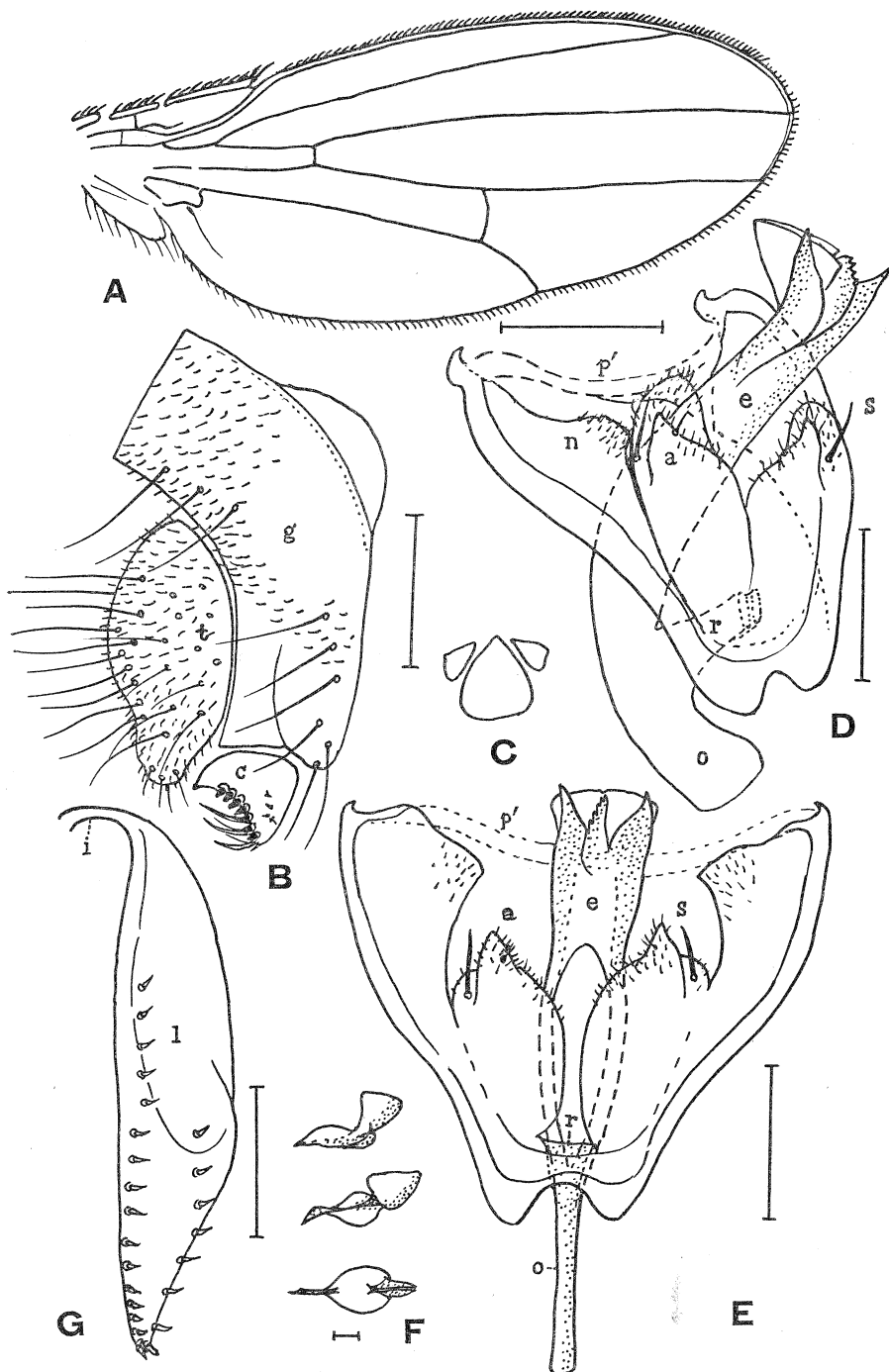


Fig. 8 *Drosophila (Drosophila) nasuta* LAMB

A, Wing. B, Periphallalic organs (lateral aspect). C, Decasternum. D, Phallic organs (lateral aspect). E, Phallic organs (ventral aspect). F, Ejaculatory apodeme (upper: lateral, middle: ventrolateral, lower: ventral aspect). G, Egg-guide. Scale 0.5 mm in wing, 0.1 mm in other figures.

half as broad as the head width at the level of ocellar triangle, laterally broadly silver in male, anteriorly as broad as median length, posteriorly broader. Cheek yellow, about $1/8$ as broad as the greatest diameter of eye. Carina large, yellowish brown, convex, exceedingly broadened below, gradually shifting to buccal margin. Lower reclinate orbital about half as long as proclinate, which is slightly shorter than upper reclinate. Lower reclinate slightly nearer to proclinate than to upper reclinate, which is slightly nearer to proclinate than to inner vertical. Proclinate inside other orbitals. Two long orals, 2nd slightly shorter.

Mesonotum yellowish brown, more or less glossy. Thoracic pleura paler, especially at ventral half. Two long humerals. Acrostichal hairs in 8 rows. Anterior dorsocentrals about $3/4$ posteriors; cross distance of dorsocentrals about thrice the length distance. Anterior scutellars slightly convergent, as long as posteriors. Sterno-index about 0.5. Legs yellowish grey; fore femur with about 8-10 spinules. Fore metatarsus as long as 3 successive tarsal joints taken together, mid and hind metatarsi longer. No special hair tufts and long recurved hairs on male fore tarsi. Preapicals on all three tibiae, apicals on 2nd. Wings (Fig. 8A) somewhat fuscous, crossveins clouded. R_{2+3} nearly straight. R_{4+5} and M nearly parallel. C-index about 3.4; Ac-index about 1.8; 4C-index about 0.7; 4V-index about 1.6; 5x-index about 1.3. First costal section with only one stout terminal bristle; 3rd costal section with heavy bristles on its basal $4/7$. Abdominal tergites yellow, with narrow medially interrupted caudal bands.

Periphallic organs (Fig. 8B) pale yellow. Genital arch broad, nearly parallel-sided, partially pubescent; upper margin with about 3 setae; lower portion with about 6; lower tip truncate. Clasper semielliptical, projected below genital arch, with about 7 black pointed teeth arranged in a concaved row and several recurved marginal setae; inferior surface with a few minute discal setae. Anal plate fusiform, separated from genital arch, pubescent and hairy, slightly constricted near lower tip. Decasternum (Fig. 8C) triangular, with proximal lateral wings seemingly separated. Ejaculatory apodeme (Fig. 8F) with plate oval, apically narrowly pointed; stalk short, thick, apically broad. Phallic organs (Fig. 8D, E) largely bright yellow. Aedeagus cylindrical, robust, apically divided into a median dorsal fan-shaped flap (, Form eines Schuhs' of Duda), paired lateral acutely pointed processes, and a median ventral serrated conical process. Vertical rod developed. Phallosomal index about 2.7. Anterior parameres conical, attached to inner side of novasternum, pubescent, with a few sensilla on inner border. Posterior parameres apparently represented by a thin cross bar, connecting lateral tips of novasternum. Submedian spines stout, outside anterior parameres. Ventral fragma triangular, proximal end concaved, deeply notched. Egg-guide (Fig. 8G) lobe exceedingly

slender, pale yellow, with about 25 pale yellow pointed marginal teeth and a few similar upper discal teeth.

Specimens examined 37 males and 62 females, Valley of Bukit Berdawan, Sarawak, 30 I '62; 1 male, Amo, Brunei, 22 II '62 (G. Imadaté leg.).

Distribution Borneo (new loc.), Sumatra, Seychelles, Formosa, Moluccas, New Guinea, Samoa, Fiji.

Remarks Presence in this species of thin membranous cross bar connecting lateral tips of novasternum, which is thought to be homologous to distal bow to hypandrium, representing posterior parameres, shows certain connection to the *tripunctata* species group. According to Frotta Pessoa (1954. *Arquiv. Mus. Paranaense Curitiba* 10: 264), this group differs from the *immigrans* species group only in having well developed distal bow.

ABBREVIATION USED IN FIGURES

- a anterior parameres (phallic organs)
 - b clasper (periphallic organs)
 - d decastrum (periphallic organs)
 - e aedeagus (phallic organs)
 - g genital arch (periphallic organs)
 - h subterminal hair (egg-guide)
 - i basal isthmus (egg-guide)
 - l lobe (egg-guide)
 - n novasternum or hypandrial plate (phallic organs)
 - o apodeme of aedeagus (phallic organs)
 - p posterior parameres (phallic organs)
 - p' an organ probably homologous to posterior paramere (phallic organs)
 - r vertical rod (phallic organs)
 - r' vertical rod? (phallic organs)
 - s submedian spine (phallic organs)
 - sc hooked scaly bristles (male mid tibia and metatarsus)
 - t anal plate (periphallic organs)
 - v ventral fragma (phallic organs)
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