

D. silvistriata: A New Species of
Drosophila from New Guinea

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Introduction

A new species of *Drosophila*, *D. argentostrata* (Bock, 1966), was recently described from Bisianumu, Papua. A closely related species has been recovered from New Guinea, which together with *D. argentostrata* forms a new species group in the subgenus *Sophophora*. Cytogenetically, the new species is more promising than *D. argentostrata*. The following is a description of the new species.

Type material

Holotype and allotype (pinned material): deposited at the Australian Museum, Sydney. Paratypes: British Museum (Natural History); U.S. National Museum; C.S.I.R.O. Division of Entomology, Canberra; Queensland Museum; School of Public Health and Tropical Medicine, University of Sydney.

Techniques

Techniques used were similar to those described for *D. argentostrata* (Bock, 1966); larval salivary squashes were made on larvae raised at 65°F.

DROSOPHILA SILVISTRIATA sp. nov.

General. Very similar to *D. argentostrciata* but smaller on the average. Males easily distinguishable from females macroscopically by the fact that the posterior sections of the male abdomens (posterodorsal section of fifth tergite, all sixth tergite except antero-inferior corners) are black; the same area in females, and in both sexes of *D. argentostrciata*, is the same colour as the rest of the abdomen, pale yellowish-brown.

Cultures—Type source. Bulolo, New Guinea, 1965. Easy to maintain in culture.

Body length. ♂, 3.5 mm; ♀, 3.8 mm.

Head ♂ and ♀. Arista with 9–11 branches, including the terminal fork. Front (Fig. 1A), essentially the same as in *D. argentostrciata*, having 3 narrow silvery stripes, lateral 2 along margins of eyes, median one splitting posteriorly about ocellar triangle, and broader, shiny, reddish-brown bands between stripes, these bands darkening strongly at their medial and lateral edges. Ocelli pale orange. Eye colour (Maerz & Paul, 1950) 2K5. Orbital bristles in ratio of 8:3:7. Greatest width of cheek 0.18–0.2 greatest diameter of eye. Carina flat.

Thorax ♂ and ♀. The thorax possesses the same number of silvery stripes as *D. argentostrciata*, but in *D. silvistriata* these stripes are relatively wider; 5 complete stripes on dorsum of thorax, lateral 2 continuing along lateral edges of scutellum, median one continuing along midline of scutellum (Fig. 1A). Bands on dorsum of thorax between silvery stripes dark brown in colour, slightly lighter at their edges where they meet stripes. Thorax paler brown laterally. Two lateral silvery stripes in addition to the 5 complete ones extending as far forward as transverse suture. Two short, triangular, silvery stripes in humeral region of thorax. Lateral thoracic sclerites show poorly defined alternating yellow and pale charcoal bands. Acrostichal hairs in 6 regular rows on brown bands of thorax in front of dorsocentral bristles, 4 rows between dorsocentral bristles. Anterior dorsocentrals 2/3 length of posterior dorsocentrals. Sterno-index 0.4. Preapical bristles on first and third tibiae; apicals on first and second tibiae. No sex-combs. Posteromedial border of first femur with row of approximately 12 small bristles. The 2 bands on scutellum between silvery stripes are dark brown, as in rest of thorax, except anteromedially at their junction with central silvery stripe, where colour fades to a light brown. Posterior scutellar bristles crossed.

Wings ♂ and ♀. Transparent, faintly clouded. Costal index 5.8; fourth vein index 1.4; 5X index 1.0; 4C index 0.5. Third costal section with heavy bristles on basal 1/3. The costal index is unusually high. This is due to the fact that the second longitudinal vein, which in most species is slightly curved terminally towards the costal vein, is curved back towards the third longitudinal vein in *D. silvistriata*, running almost parallel to it, thus reducing the length of the third costal section and increasing the length of the second costal section, and hence greatly increasing the ratio C2/C3, the costal index. Wing length ♂, 2.9 mm; ♀, 2.8 mm.

Periphallic organs (Fig. 1B). Anterior margin of genital arch slightly rounded; genital arch hirsute, broader laterally than dorsally, dusky-black in colour. No heel or toe. Anal plate oval, same colour as genital arch. Approximately 28 large bristles on anal plate in 3 irregular longitudinal rows; numerous tiny hairs in addition to these. Claspers black, with 3 sets of large black bristles: a medial row of 4 very long pointed chaetae; a row of 3 large blunt bristles about rear angle; and a row of 5–6 smaller blunt bristles along inferior margin. No fine hairs on claspers. Decasternum consisting only of 2 minute oval sclerotized plates embedded in membrane.

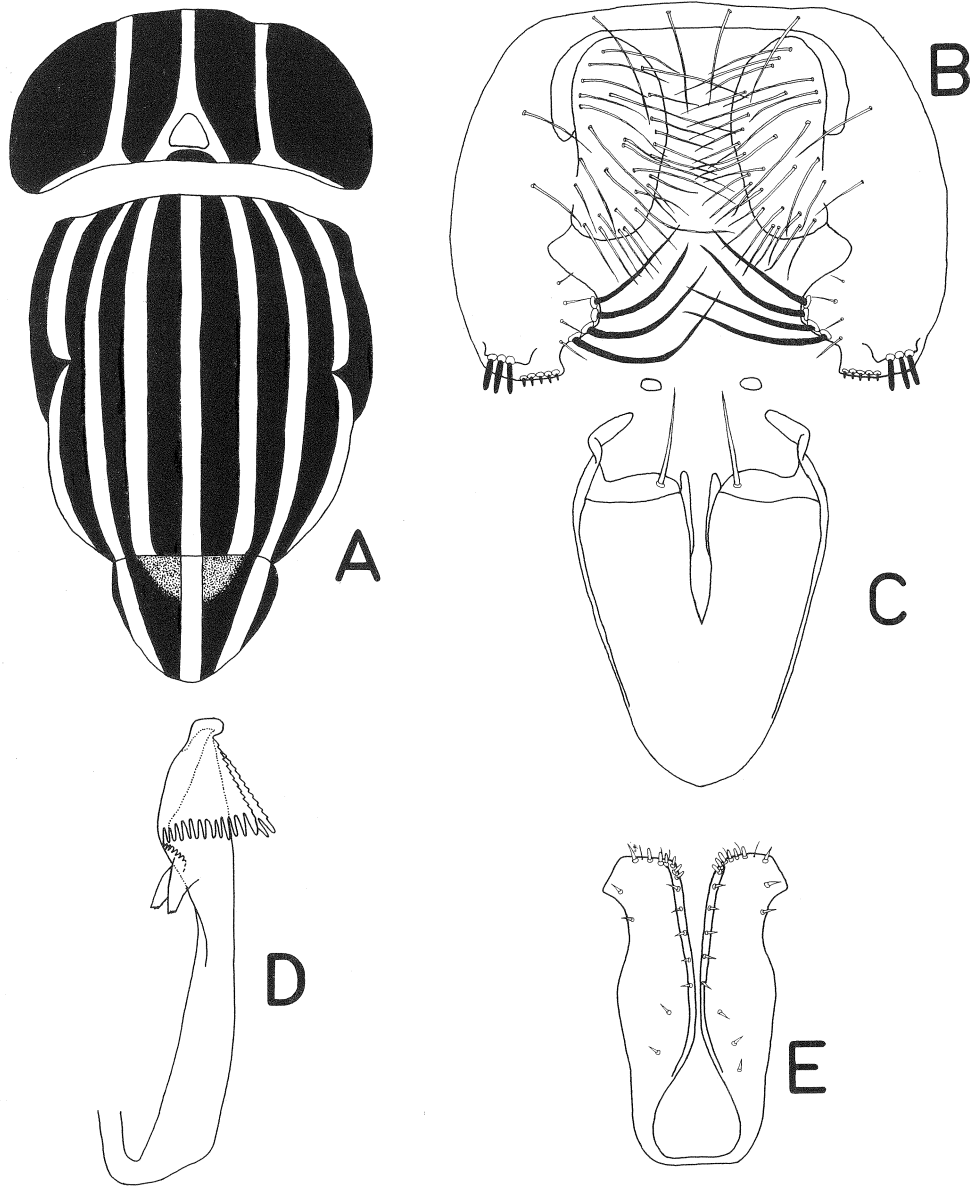


FIG. 1.—*A*, head and thorax, dorsal aspect; *B*, peripheral organs; *C*, phallic organs; *D*, aedeagus; *E*, egg guides (diagrammatic, sides flattened apically).

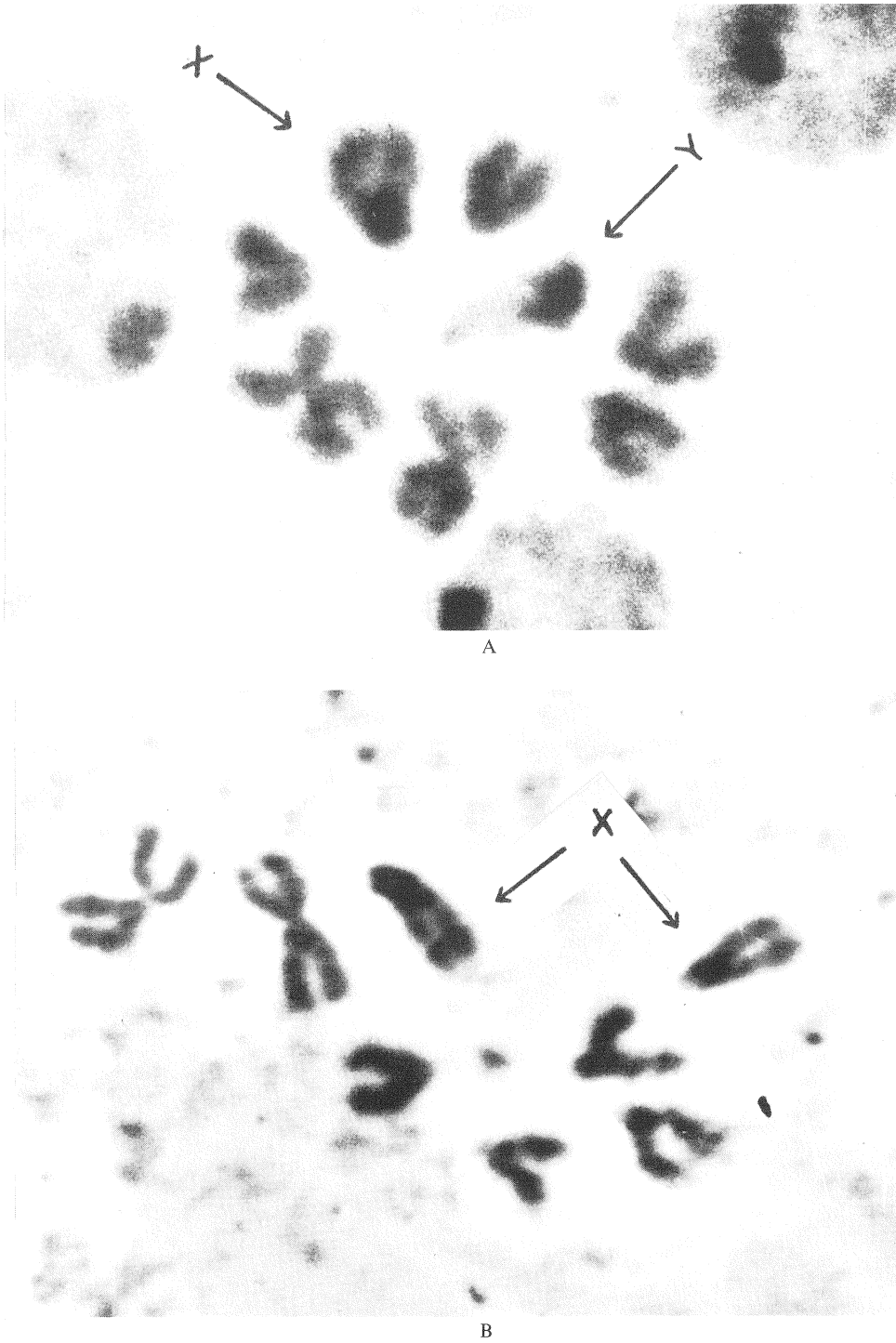


FIG. 2.—Metaphase plate chromosomes. *A*, male metaphase plate—sex-chromosomes indicated by arrows. *B*, female metaphase plate—sex-chromosomes indicated by arrows.

Phallic organs (Fig. 1C). Aedeagus long, yellow, tubular, straight except for posterior end, which curves ventrally. Apical portion of aedeagus expanded into a hood which is cleft above with fine serrations along each edge, strongly toothed posteriorly; 2 large spines just behind and below apical hood bearing fine distal serrations (Fig. 1D). Portion of aedeagus proximal to large spines smooth, without ornaments. Ventral fragma quadrate, rounded ventrally. Phallic formula (Okada, 1956) abCDef₀GHikLMn. Phallosomal index 2.0.

Egg guides. Brown, pointed, with approximately 16 teeth (those about inner angle blunt) and 3 subterminal hairs. Basal isthmus $1/8$ length of lobe (Fig. 1E).

Internal structures ♂ and ♀. Intestinal coiling index 1.5. Rectal index 1.0. Malpighian tubules 2 anterior, free, common trunk less than 0.1 total length; 2 posterior, fused, common trunk less than 0.1 total length. Anterior longer than posterior.

Internal genitalia ♂. Testes long, white-yellow, greatly coiled. Sperm pump poorly developed, no caeca. Accessory glands large.

Internal genitalia ♀. Ventral receptacle short, coiled. Spermathecae strongly sclerotized, truncated-pyramidal.

Egg filaments. Two, expanded and flattened at apices.

Pupae. Anterior spiracles divergent, with approximately 8 branches. Posterior spiracles $1/20$ pupal body length. Ratio pupal stalk/pupal body length $1/7$.

Life cycle (75°F). Larval tunnels are evident in the culture medium 1–2 days after fertilized eggs have been laid; the larvae feed for 10–12 days before pupating. Adults emerge 6–7 days later—the period of pupal metamorphosis in this species is long, as in the related species *D. argentostrata*.

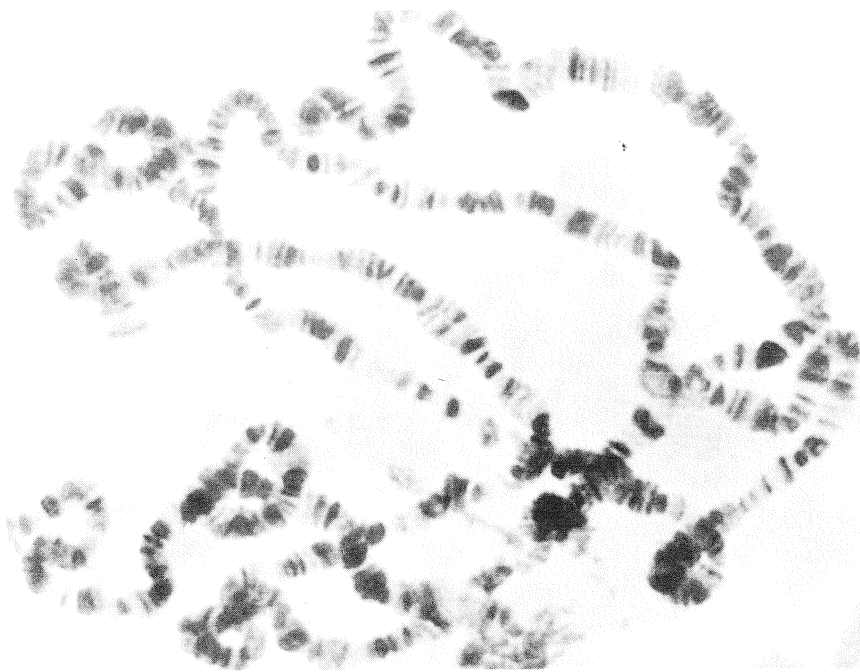


FIG. 3.—Larval salivary gland chromosomes

Chromosomes. Larval ganglion squashes have revealed 4 pairs of autosomes and a pair of sex-chromosomes. The autosomes consist of 1 pair of V's, 2 pairs of rods, and 1 pair of dots. The sex-chromosomes in the male consist of one long rod and one short rod, (indicated by arrows in Fig. 2A); in the female the sex-chromosomes consist of a pair of long rods (indicated by arrows in Fig. 2B). The salivary gland figure (Fig. 3) consists of 5 long arms and 1 short arm. A chromocentre is also visible. Several of the larvae examined for salivary gland chromosomes have shown inversions. In general the preparation of polytene chromosomes in this species is relatively easy.

Relationships. The species described above is closely related to *D. argentostrata* (Bock, 1966) which was described as belonging to the *Sophophora* subgenus but not to any known species group of this subgenus. In both *D. argentostrata* and *D. silvestriata* the abdominal tergites possess poorly developed posterior dark bands (posterior dark bands on the abdominal tergites are a characteristic of the subgenus *Sophophora* as defined by Patterson & Stone, 1952); in *D. silvestriata* these bands are barely present. It is therefore considered that the two species *D. argentostrata* and *D. silvestriata* are marginal members of the subgenus *Sophophora* and constitute a new species group within this subgenus: species group *argentostrata* sp. gr. nov. The species group may be defined briefly as follows:

Sp. gr. ARGENTOSTRIATA sp. gr. nov.

Medium-sized to large flies; conspicuously coloured in having 5 complete silvery stripes along dorsum of thorax; head and scutellum also striped. Abdomen pale brownish-yellow. Six rows of acrostichal hairs. Two pairs of dorsocentral bristles, anterior somewhat smaller than posterior. Anterior scutellar bristles convergent. No sex-comb. Wings transparent. Eggs with 2 filaments, expanded and flattened apically. Larval development slow; long period of pupation.

Comparison of *D. argentostrata* and *D. silvestriata*

Superficially the 2 species are very similar, but may be conveniently distinguished in the laboratory by inspection of the third costal sections of the wings. This segment in *D. argentostrata* bears heavy setation along the basal 1/2 or a little more, while in *D. silvestriata* the third costal section bears heavy setation along the basal 1/3 only; also in the latter species the third costal section is relatively short. Males are, of course, distinguishable macroscopically, since in *D. silvestriata* the posterior end of the abdomen is black. The mid-scutellar stripe is not a reliable feature for discrimination between the 2 species since, although always strongly developed and continuous in *D. silvestriata*, and usually only poorly developed and discontinuous in *D. argentostrata*, specimens of the latter species are occasionally encountered in which the mid-scutellar stripe is continuous and more or less well developed. The two species may, however, be distinguished by the colouration of the bands between the silvery stripes on the dorsum of the thorax: pale brown in *D. argentostrata*, dark brown (and relatively narrower) in *D. silvestriata*. In addition to the above characters, *D. argentostrata* and *D. silvestriata* differ in a large number of subtle features, both external and internal, e.g., eye colour (slightly lighter in *D. silvestriata*), wing indices, relative breadth of thoracic silvery stripes (broader in *D. silvestriata*), number of acrostichal hairs (fewer in *D. silvestriata*), shape of spermathecae, etc., and details of karyotype: the metaphase plate of *D. argentostrata* shows 5 pairs of rods and 1 pair of dots, while the metaphase plate of *D. silvestriata* shows 1 pair of V's, 3 pairs of rods, and 1 pair of dots. Both species possess the same polytene chromosomal configuration of 5 long arms and 1 short arm.

The greatest structural difference between the two species lies in the detailed structure of the male genitalia, particularly the aedeagus (although the many differences here are of a "frivolous" nature) but the basic features of the periphallid and phallic organs are similar in the two species, as may be noted by comparing the phallic formulae. The decastrum is also similar in both species. The number, size, and arrangement of bristles on the claspers, and the shape of the aedeagus, differ greatly in both species: an explanation of this type of phenomenon is to be found in Mayr (1963). It is postulated that the minute structural detail of the male genitalia of *Drosophila* species is of little significance as long as the organ functions in insemination. Immediately after reproductive isolation has occurred in phylogeny, selection is probably mainly along physiological lines, and natural selection for genes pleiotropic for minor, insignificant morphological characters, as well as the important physiological features, would produce the seemingly pointless minor morphological differences observed between many closely related species in structure of male genitalia. The same type of explanation would be applicable to the origin of the other minor, apparently insignificant structural differences between the two species listed above, assuming common ancestry.

Attempts to hybridize *D. argentostrata* and *D. silvestriata* have to date been unsuccessful.

Acknowledgment

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