Vitela, Carlos Ribeiro. A revision of the *Drosophila repleta* species group (Diptera, Drosophilidae).

Contents

Introduction .......................................................... 1
Methods and materials ............................................. 3
Definition of the *Drosophila repleta* species group ............... 4
The *fasciata* subgroup ............................................. 4
The *hydei* subgroup ............................................... 28
The *mercurarium* subgroup ..................................... 37
The *mulleri* subgroup ............................................ 45
The *repleta* subgroup ............................................ 82
Species not assigned to subgroup ................................ 93
Species removed from the *repleta* group ......................... 102
Discussion .......................................................... 103
Acknowledgments .................................................... 106
References .......................................................... 107
Species index ....................................................... 112
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A REVISION OF THE DROSOPHILA REPLETA SPECIES GROUP (DIPTERA, DROSOPHILIDAE)

Carlos Ribeiro Vieira

ABSTRACT

The repleta group of the Genus Drosophila is revised. The source material was museum collections, isofemale lines, and specimens collected for the purpose of this revision.

Thirteen new species are described; lectotypes are designated for 23 nominal species and nine recently proposed synonyms are discussed. Previously published diagnoses of the five recognized subgroups are brought up to date. Proposals are made to exclude D. sericennis from the repleta group and to transfer D. linearepleta from the repleta subgroup to the fasciota subgroup. D. peninsularis from the repleta subgroup to the mercatorum subgroup, as well as D. peruensis from the repleta group to the guarani group.

The morphology of male genitalia is the main character utilized to distinguish between species. This character is described and illustrated for all but one described species. The comparative analyses of male genitalia have in most cases confirmed the species phylogenetic relationships previously identified by polytene chromosome inversion analyses.

The repleta group, currently comprising 76 described species, has wide geographical distribution, being endemic to the Americas and West Indies. The geographical distribution analysis of its subgroups suggests that speciation by geographical isolation has been responsible for most of the patterns observed and that radiations have occurred in the probable area of origin of the group (Mexico) as well as in the secondarily reached areas (West Indies, Central and South America).

INTRODUCTION

The Drosophila repleta species group, currently comprising five subgroups and several species not assigned to any subgroup, was formally proposed 41 years ago by Sturtevant (1942) who based his classification of the Genus Drosophila upon morphological grounds.

The group was tentatively divided into three subgroups (hydei, repleta and mulleri) by Patterson (1943). An additional subgroup (mercatorum) was recognized by Wharton (1944) based upon genetic and morphological similarities. Wasserman (1962) based on cytological and morphological studies recognized a fifth subgroup (fasciota) and added cytological data to the diagnosis of the remaining subgroups except repleta.

Although the fasciota subgroup was formally defined in 1962, it has first appeared in the literature in a previous paper by Wasserman (1960).

Most of the species of the repleta group, especially those of the mulleri subgroup, are castrophic flies and have been extensively used in evolutive and genetic studies. However, most of these species are not readily identified as the result of a great number of sibling species and a high morphological polymorphism among different populations of the same species or even within the same population.

It seems appropriate, on the basis of the numerous published papers dealing with one or more species and the new material available, to provide a revision of the repleta group in the belief that this will be of some assistance in future research on members of the group.

1. This paper is part of the author's thesis submitted to the "Departamento de Biologia, Instituto de Biociências, Universidade de São Paulo" in partial fulfillment of the requirements for the degree of Doctor in Sciences.

2. Departamento de Biologia, IFRUSP, Caixa Postal 11.461, 05499 São Paulo, SP, Brasil.
METHODS AND MATERIALS

During this study, over 2,800 specimens and 700 isofemale lines were examined. These materials came from three sources: newly wild-caught specimens, laboratory cultures and old pinned collections from different museums.

The trips to collect new specimens were made in several morpho-climatic domains of South America (from April 1976 to November 1981). Most of the localities of collections were already plotted on maps in previously published papers (Sene et al., 1980; Vilela et al., 1980). Additional localities will be detailed on forthcoming papers. Flies were collected mainly on orange and banana baits fermented with baker's yeast set in different ways according to the characteristics of the environment (Sene et al., 1981).

I have examined stocks currently maintained by two institutions: "Departamento de Biologia, Instituto de Biociências da Universidade de São Paulo", São Paulo (DBUSP) and Department of Zoology, University of Texas at Austin (DZUT).

I have also analyzed several specimens, including type-series of most nominated species, from the following repositories: American Museum of Natural History, New York (AMNH); British Museum (Natural History), London (BMNH); Drosophila Type and Reference Collection, Austin (DTRC); "Instituto Miguel Lillo", San Miguel de Tucumán (IML); "Museu de Zoologia da Universidade de São Paulo", São Paulo (MZUSP); National Museum of Natural History, Washington, D.C. (NMNH). Where appropriate, lectotypes were designated as indicated in the text.

In the DTRC, besides the specimens cited above, I have had the opportunity to analyze the slide collection which was prepared and used by Wasserman in his series of papers published in 1962.

Each specimen was analyzed regarding to its genitalia and external morphology. Label data for each specimen were recorded, condensed and organized alphabetically under each species according to Country, State or Province, etc. The acronym of their repository is cited parenthetically, so is the number of specimens bearing the same label data. Strain numbers appear in the labels of some pinned flies of the DTRC whenever the specimens were not wild-caught ones. Name of collectors and collection dates were omitted. However, label data accompanying each examined type specimen were recorded as given, with slashes to separate data of one label from another (my own comments or notes are included parenthetically). Unless otherwise noted, I have followed Wheeler (1931b) for the distribution data of each species.

In order to identify the wild-caught females, they were each isolated and the genitalia of the male offspring were checked.

Previously undescribed species were described when at least a male specimen was present. For the descriptions of new species, I brought up to date the model proposed by Sturtevant (1942). The characters employed in this study are well-known and need no explanation. However, some of them are illustrated in figure 1 to avoid confusion. Wherever possible, measurements or ratios cited in the descriptions were based on the entire type-series.

In preparing the male and female genitalia I followed Wheeler and Kamhyseelis (1966) and Kaneshiro (1969). The abdominal structures including the dissected

Fig. 1. Diagrammatic sketches of male genitalia, puparium and wing:
(a) male genitalia, lateroblique aspect: A, micropubesence; B, cercus; C, epan- drium; D, stylius; E, primary teeth; F, marginal bristles; G, secondary teeth; H, concha of hypandrium; I, hypandrium; J, aedeagus; K, suture; L, aedeagal apode- me.
(b) aedeagus, lateroblique aspect: M, tip; N, dorsal crest; O, dorsal margin; P, ventral rod; Q, gonopod; R, ventral margin.
(c) aedeagus, lateral aspect: S/T, philosomal index.
(d) puparium, dorsal aspect: W/Y, horn index.
(e) right wing, dorsal aspect: 1/2, costal index; 3/4, 4th vein index; 5/6, 5x index; 2/4, 4c index; 5/4, M index; 7/7 + 8, third costal section with heavy bristles; Z, length of wing.
genitalia, accompany the appropriate specimen in an attached microvial, pinned by the stopper. The terminology of male genitalia is that of Hsu (1949) and Kaneshiro (1969) modified to be in according to McAlpine (1981).

Illustrations were drawn using a compound microscope equipped with a camera lucida. Unless otherwise indicated, all illustrations under the same figure number were drawn to the same scale.

The item “other specimens examined” which appears, under some of the new species descriptions means these specimens have been examined after the description has been done; therefore, they are not being considered as paratypes.

Under the item “strains examined” I have just listed those from DZUT, which have been usually cited by several authors. The published or new ecological data for each species except for these described as new in this work are not being cited as they will be subject of a forthcoming paper (Pereira et al., in press).

The diagnosis of each subgroup are up-to-date versions of those proposed by Wheeler (1949) and Wasserman (1962 a, b, c, d).

DEFINITION OF THE D. REPLETA SPECIES GROUP

Sturtevant (1942) proposed his definition of the repleta group on the basis of 27 species then known. Many species described since the publication of Sturtevant’s definition, or included in this work as new, are apparently members of the same major line of descent as those repleta group species known to Sturtevant, and they agree mostly but not completely with Sturtevant’s criteria.

A modified diagnosis of the repleta group is proposed although it is realized that discovery of further new species in the future may again necessitate revision of the definition. Since we have no information on polyploid chromosome banding for most of the species described in this work, the homzygous inversions which according to Wasserman (1982) characterize the repleta group are not being considered in the diagnosis.

Species included (76) — fasciola subgroup (18); hydei subgroup (6); mercatorum subgroup (4); mulleri subgroup (34); repleta subgroup (6); not assigned to subgroup (8).

Diagnosis — Graysish or brownish mesonorum, each hair and bristle arising from a black or dark brown spot, sometimes absent or fused to form more or less elaborate patterns; wings clear, 3rd and 4th longitudinal veins not convergent; costal index ranging from 1.9 to 3.9; tests with number of coils ranging from 3.5 to 5.1; ventral receptacle with number of coils ranging from 6 to 755; surstylus not micropubescent, usually without secondary teeth; gonopod with one to three sensilla (absent in D. inca), usually linked to concha of hypandrium by membranous tissue.

Geographical distribution — This group is endemic to the New World; however, some of its species became geographically widespread probably due to human activities.

THE FASCIOLA SUBGROUP

Species included (18) — Drosophila caroliniae, sp. nov.; D. coricina Wasserman; D. diligni, sp. nov.; D. fasciola Williston; D. fascioloides Dobshansky & Pavan; D. fulvatacena Patterson & Wheeler; D. hermitanae, sp. nov.; D. inca, sp. nov.; D. linearepleta Patterson & Wheeler; D. moja Pavan; D. mojoides Wasserman; D. onca Dobshansky & Pavan; D. paraguayana Thompson; D. picta Wasserman; D. pictura Wasserman; D. quercubinae, sp. nov.; D. rostiae, sp. nov.; D. senei, sp. nov.

Diagnosis — Spots of mesonorum absent or fused to form more or less elaborate patterns. Costal index ranging from 1.9 to 3.9; tests with moderate number of coils, ranging from 8 to 15; ventral receptacle with number of coils ranging from 20 to 83; phallomeral index varying from 0.9 to 2.4. Anterior margin of cercl fused to posterior margin of epandrium in various degree (free in D. quercubinae); surstylus without secondary teeth and number of primary teeth ranging from 8 to 12; concha of hypandrium bearing one anterior bristle; aedeagus usually with a
pair of ventral posterior spurs; gonopod with one to three tiny sensilla, linked to concha of hypandrium by membranous tissue.

Geographical distribution — The species of this subgroup occur between 37°N (USA, Utah) and 28°S latitude (Argentina, Catamarca) of the New World and prefer the wet areas of the West Indies, Central and South America.

\textit{Drosophila (Drosophila) carolinae}, sp. nov. (Fig. 2)

Undescribed M. Vilela 	extit{et al.}, 1983.

\textit{Type Material} — Holotype male, labelled: "BRASIL — SP, Est. biol. Boracéia, 23°40'S, 45°50'W, F. C. Val col., 04.vi.1978 / HOLOTIPO Drosophila carolinae \(\alpha\)". Sixteen paratypes as follows: (1 \(\alpha\)) same data as holotype; (12 \(\varphi\)) ibidem except date: 10 in 14.ix. 1978 and 2 in xi. 1978; (1 \(\varphi\)): "BRASIL — PR, 14 Km Morretes, 25°22'S, 48°53'W, F. C. Val col., 24-27. xii. 1978"; (2 \(\varphi\)): "BRA-SIL — SP, Ibiuna, 23°39'S, 47°13'W, C. Pavan col., 13. ii. 1978". All specimens in MZUSP (São Paulo), dissected. Type locality: Estação Biológica de Boracéia (23°40'S, 45°50'W), Salesópolis, São Paulo, Brazil.

\textit{External characters of imagines} \(\alpha\) — Arista with 3-4 dorsal and 2 ventral branches plus terminal fork. Antennae brown. Front brown, pollinose, distally darker; orbits anteriorly yellow, dark brown from median region of fronto-orbital row to posterior vertexals. Occular triangle blackish brown, except at base of postvertexals. Posterior orbital and anterior vertical arising from dark brown

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\textbf{Fig. 2.} \textit{Drosophila carolinae}, sp. nov. (holotype): a. male genitalia, laterodorsal aspect; b-d, aedeagus, several aspects.
spots. Anterior and middle orbitals arising from yellowish area. Middle orbital about 1/2 of other two. Second orbital about 1/2 of first. Face brown. Carina prominent, not sulcate, yellow. Palpi pollinose, brown, dorsally lighter, with bristles on ventral surface. Cheeks brown, their greatest width 2/5 greatest diameter of eyes. Eyes brown, with short black piles.

Acrostichal hairs in 6 irregular rows. No prescutellars. Anterior scutellars convergent. Mesonotum yellowish brown, pollinose, bristles arising from brown spots, which are larger and darker on dorsocentral rows. Some spots are fused to form: a circle anteriorly to transverse suture; a lanceolate spot outside anterior dorsocentrals; four longitudinal stripes inside dorsocentral rows, two extending from anterior margin to middle area of mesonotum, and two from anterior dorsocentrals to posterior margin of mesonotum. Scutellum brown with bristles arising from dark brown spots. Pleurae dark brown with an irregular darker longitudinal stripe from base of first coxae to halteres; an upper dark brown stripe from propodeum to base of wings. Sterno index about 0.8. Halteres pale yellow. Coxae and femora dark brown, yellowish distally. Tibiae yellow with two dark brown rings; tarsi yellow. Apical bristles on first and second tibiae, preapicals on all three.

Abdomen yellow, 2nd to 5th tergite with a medially enlarged and interrupted posterior blackish brown band which bends toward and reaches anterior margin at angle of tergite, leaving a yellow area laterally; 6th tergite with a narrower, fainter band.

Wings clear. Costal index about 2.5; 4th vein index about 1.7; 5x index about 1.3; 4c index about 0.9; M index about 0.5. Third costal section with heavy bristles on its basal half.

Wing length about 2.4 mm.

Genitalia ♂ — Epandrium with about 9 lower and 4 upper bristles. Cerci fused at lower half. Surstylus with about 12 primary teeth and 9 marginal bristles (Fig. 2a).

Hyandrium as long as epandrium.

Aedeagus with a pair of subapical, roundish spurs; dorsal cleft about 2/3 of length. Aedeagal apodeme almost straight, laterally flattened. Ventral rod absent. Gonopods with two tiny sensilla (Fig. 2b-d). Phallosomal index about 1.1.

Eggs, puparia, chromosomes and ♀ — Unknown.

Relationship — Belongs to the fasciola subgroup of the repleta group. It is closely related to D. onca Dobzhansky & Pavan, from which it differs chiefly in the shape of aedeagus.

Distribution — Brazil (São Paulo, Parana).

Etymology — Named after Francisco Carolina do Val from the "Museu de Zoologia da Universidade de São Paulo", who collected most of the type specimens.

Note — All the known specimens were collected at rain forest localities.

Drosophila (Drosophila) coroica Wasserman

(Fig. 3)

Drosophila (Drosophila) sp L. Wasserman, 1950.
Drosophila (Drosophila) coroica Wasserman, 1962d; 125.


General characters — Described by Wasserman (1962d).

Genitalia ♂ — Epandrium with about 11 lower and 3 upper bristles. Cerci fused at lower half. Surstylus with about 11 primary teeth and 9 marginal bristles (Fig. 3a).

Hyandrium longer than epandrium.

Aedeagus with a pair of long, straight, subapical spurs; dorsal cleft about 2/3 of length. Aedeagal apodemes laterally flattened; anterior region expanded. Ventral rod rudimentary. Gonopods boomerang-shaped with one tiny sensillum, linked to each other by membranous tissue (Fig. 3b-d). Phallosomal index about 1.6.
Other specimens examined (187) — ARGENTINA: Catamarca: 2 Km N of La Viña (5 ♂, 3 ♀, IML; 5 ♂, 10 ♀, MZUSB); Tucuman: 14 Km N of San Miguel de Tucuman (3 ♂, 3 ♀, IML; 51 ♂, 4 ♀, MZUSB). BRAZIL (MZUSB): Mato Grosso do Sul: Campo Grande (1 ♂); Paraná: Fazenda Palmital (1 ♂); São Paulo: 2 Km NW of Piracicununga (1 ♂). 10 Km S of Santa Maria da Serra (2 ♂).

Fig. 3. Drosophila curioica Wasserman (paratypes): a, male genitalia, laterooblique aspect; b-d, aedeagus, several aspects.

Relationship — It is related to D. sensi, sp. nov., from which it differs chiefly in the shape of aedeagus.

Distribution — Brazil (Mato Grosso do Sul, São Paulo, Paraná — Villela et al., 1983), Bolivia (La Paz), Argentina (Catamarca, Tucuman — Villela et al., 1980).

Note — The table 1 of Villela et al. (1980) misprinted D. coroica as occurring in Puerto Tirol (Province of Chaco). The 292 specimens referred to as D. coroica are in reality D. simulans.

*Drosophila* (Drosophila) ellisoni, sp. nov.

(Fig. 4)

Type-Material — Holotype male, labelled: "Drosophila ellisoni Mar-Apr 1959 / Belem, Pará, Brazil, M. Wasserman col. / Stock H336.9 HOLOTYPE ♂ " in NMNH (Washington, D.C.), No. 763701. Twenty-seven paratypes as follows: (2 ♂, 3 ♀) in NMNH, (10 ♂, 10 ♀) in DTRC (Austin), (1 ♂, 1 ♀) in MZUSP (São Paulo); same data as holotype. All type-specimens were obtained from DZUT culture H336.9 in 1979. Type-locality: Belem, Pará, Brazil.

External characters of imagines ♂, ♀ — Arista with 4 dorsal and 2-3 ventral branches plus terminal fork. Antennae brown. Front brown, pollinose; orbits, ocellar triangle and anterior region lighter. Posterior orbital, ocellar and vertical bristles arising from dark brown spots. Middle orbital about 2/3 of anterior and 1/2 of posterior. Second oral about 1/2 length of first. Face pale yellow. Carina prominent, narrow, not sulcate. Palpi pollinose, light brown, with bristles on ventral surface. Cheeks light brown, darker at lower eye margin, their greatest width 1/3 greatest diameter of eyes. Eyes cherry red, with short black piles.

Acrostichal hairs in 8 irregular rows. No prescutellars, anterior scutellars convergent. Mesonotum yellowish brown, pollinose, bristles arising from dark brown spots, which are larger on dorso-central rows. Some spots are fused to form: 4 irregular stripes inside dorso-central rows and 2 interrupted stripes outside to the dorso-central rows. Scutellum light brown with bristles arising from dark large brown spots. Pleurac brown with an irregular darker longitudinal stripe from base of first coxae to halteres. Sterna index about 0.9. Halteres pale yellow. Coxae dark brown, femora dark brown at base, yellowish distally, with a distal dark brown ring. Tibiae yellow with two dark brown rings; tarsi yellow. Apical bristles on first and second tibiae, preapicals on all three.

Abdomen yellow, 2nd to 5th tergite with a medianly enlarged and interrupted posterior blackish brown band which bends toward and reaches anterior margin at angle of tergite, leaving a triangular yellow area laterally; 6th tergite with a narrower, fainter band.

Fig. 4. Drosophila ellisoni, sp. nov. (strain H336.9): a, male genitalia, latero-blique aspect; b-d, aedeagus, several aspects.
Wings clear. Costal index about 2.1; 4th vein index about 1.8; 5x index about 1.4; 4c index about 1.1; M index about 0.6. Third costal section with heavy bristles on its basal 2/3.

Wing length 1.8-2.1 mm (♂ and ♀).

Body length (etherized) 2.5-2.7 mm (♂), 3.0-3.5 mm (♀).

Internal characters of imagines and genitalia (♂) — Tesis yellow, with about 4 inner and 6 outer coils. Epandrium with about 11 lower and none upper bristles. Cerci fused at lower 2/3. Sursylus with about 12 primary teeth and 11 marginal bristles (Fig. 4a).

Hypandrium as long as epandrium.

Aedeagus with a pair of long subapical spurs; dorsal cleft about 3/5 of length. Aedeagal apodeme straight, laterally flattened. Ventral rod absent. Gonopod well-developed with one tiny sensillum (Fig. 4b-d). Phallosomal index about 1.8.

(♀) — Ventral receptacle an irregular spiral with about 38 tight coils. Ovipositor apically pointed with about 25 marginal and 5 discal teeth. Spermathecae almost cylindrical, weakly sclerotized; duct slightly invaginated.

Eggs — Four filaments, slightly longer than egg; egg length about 1 mm.

Puparia — Brownish yellow; horn index about 7; each anterior spiral with about 12 branches.

Chromosomes — Not studied, but according to the literature, there are two types of metaphase karyotypes, which were figured by Wasserman (1962: Figs. 37, 38) as Drosophila fascioloides Dobzhansky & Pavan.

Other specimens examined (28) — BRAZIL (MZUSP): Amazonas: Manaus (1♂). Santa Catarina: Pirabembari (1♂). COLOMBIA: Magdalena: Sierra Nevada de Santa Marta, El Recuerdo (1♂, 2♀), DRTC, H185.54. COSTA RICA: Cartago: Turrialba (2♂, 2♀), DRTC, H163.28; 1♂NMNH. HONDURAS: Atlántida: Tela, Lancetilla (4♂, 4♀), DRTC, H51.5. PANAMA: Panama: Cerro La Campana (2♂, 1♀), DRTC, H182.37; Canal Zone: Barro Colorado Is. (2♂, 4♀), DRTC, H181.43; 1♂, MZUSP.

Relationship — Belongs to the fascioloid subgroup of the repleta group. It is closely related to D. fascioloides Dobzhansky & Pavan, from which it differs chiefly in the shape and size of aedeagus.

Distribution — Honduras (Atlántida, Costa Rica (Cartago), Panamá (Canal Zone, Panamá), Colombia (Magdalena), Ecuador? (Wasserman, 1962d), Brazil (Amazonas, Pará, Santa Catarina).

Etymology — Named after John R. Ellison from the Department of Zoology, University of Texas at Austin, acting Director of the National Drosophila Species Resource Center.

**Drosophila (Drosophila) fasciola Williston**

(Fig. 5)


**Type-Material** — Lectotype male (HERE DESIGNSATED), labelled: "Cotype/ Windeware side, St. Vincent, W. I., H. H. Smith / W. Indies / 1907-66. Drosophila fasciola Will. (folded) / LECTOTYPE Drosophila fasciola Williston by C. R. Vilela", in BMNH (London). Paralectotype male (HERE DESIGNATED): "Drosophila fasciola Will. ♂ / Am. Mus. Nat. Hist. Dept. Invert. Zool. N°..... (nothing written) AMNH / small black label) / 500 feet / PARALECTOTYPE Drosophila fasciola Williston ♂ by C. R. Vilela", in AMNH (New York). N° 20531. According to Williston (1896), the type-series should have 5 specimens; however, two of them were not located. The British Museum has an additional specimen (sex unknown, abdomen missing and probably destroyed by dermestids) which is not being considered as paralectotype as it seems to belong to another species; some label as lectotype except latter two. Type-locality: Windeware side, Saint Vincent, West Indies.

**General characters** — Described by Williston (1896).
Genitalia ♂ — Epandrium with about 10 lower and 4 upper bristles. Cerchi fused at lower half. Surstylus with about 11 primary teeth and 9 marginal bristles (Fig. 5a).

Hypantrium slightly longer than epandrium.

Aedeagus with a pair of wide, long, bent, weakly sclerotized on anterior half, subapical spurs; dorsal cleft about 2/3 of length. Aedeagal apodeme slightly bent, laterally flattened. Ventral rod rudimentary. Penetrap well-developed with one tiny sensillum (Fig. 5b-d). Phalosommal index about 2.4.

Other specimens examined (24) — COLOMBIA: Magdalena: 70 Km S of Santa Marta (1 ♂, DTRC, H103.30). EL SALVADOR: La Libertad: 12 Km NW of Santa Tecla (1 ♂, DTRC, H46.19). GUYANA: Georgetown (1 ♂, DTRC, H231.12). WEST INDIES: Dominica: Clark Hall (1 ♂, NMNH), Manets Gutter (1 ♂, NMNH); Granada (1 ♂, DTRC, H239.4); Martinica (1 ♂, DTRC); Saint Lucia (1 ♂, DTRC, H124.8); Saint Vincent (1 ♂, DTRC, H245.41).

Relationship — It seems to be related to D. querubimae, sp. nov., from which it differs chiefly in the shape of aedeagus.

Distribution — West Indies, El Salvador to Guyana.

Fig. 5. Drosophila fasciola Williston: a (Granada), male genitalia, lateroblique aspect; b-d (Saint Lucia), aedeagus, several aspects.

Drosophila (Drosophila) fascioloides Dobzhansky & Pavan
(Fig. 6)

Drosophila (Drosophila) fascioloides Dobzhansky & Pavan, 1943: 42.

Paratypes (2 ♂, 1 ♀) in MZUSP, (1 ♂, 1 ♀) in DTRC (Austin): same data as holotype; (1 ♂, 3 ♀) in MZUSP: same data as holotype except date (iv. 943). Holotype and 2 male paratypes dissected. Type-locality: Bertioga, São Paulo, Brazil.

General characters — Described by Dohzansky & Pavan (1943).
Genitalia ♂ — Epantrium with about 13 lower and 2 upper bristles. Cerci fused at lower half. Sustylus with about 10 primary teeth and 10 marginal bristles (Fig. 6a).

Hypantrium slightly longer than epandrium.

Aedeagus with a pair of short, bent, pointed, subapical spurs; dorsal cleft about 3/5 of length. Aedeagal apodeme laterally flattened. Ventral rod rudimentary. Gonopod with one tiny sensillum (Fig. 6b-d). Phallosomal index about 1.6.

Other specimens examined (36, MZUSP) — BRASIL: Paraná: Caioá (9 ♂, 6 ♀), 14 Km of Morretes (1 ♂); Santa Catarina: Pirahaíra (2 ♂, 1 ♀); São Paulo: Rio Guaratuba (10 ♂, 2 ♀), Estação Biológica de Boracéia, Salesópolis (2 ♂), Ibituna (1 ♀), 14 Km NE of Peruibe (2 ♂).

Fig. 6. Drosophila fascioloides Dohzansky & Pavan (paratype): a, male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.
Relationship — It is closely related to D. ellisoni, sp. nov., from which it differs chiefly in the shape and size of aedeagus.

Distribution — Brazil (São Paulo, Paraná, Santa Catarina).

Note: — This species has been wrongly cited as occurring in several Central and South American countries (Wheeler, 1970, 1981b, for example). For details see original description of its sibling D. ellisoni, sp. nov.

**Drosophila (Drosophila) fulvalinea**ta Patterson & Wheeler
(Fig. 7)

*Drosophila (Drosophila) fulvalinea*ta Patterson & Wheeler, 1942: 106.
*Drosophila (Drosophila) fulvalinea*ta (SIC), Wasserman, 1953, 1967.

Type-Material — Lectotype female (HERE DESIGNATED), labelled: "D. fulvalinea *ta* Cave Creek Ariz., G. B. Mainland col. 1940. TYPE / LECTOTYPE Drosophila fulvalinea*ta* Patterson & Wheeler by C. R. Vilela", in AMNH (New York). Type-locality: Cave Creek, Arizona, United States.

General characters — Described by Patterson & Wheeler (1942).

*Genitalia* α — Epandrium with about 15 lower and 3 upper bristles. Cercl fused at lower 3/4. Surstylus with about 10 primary teeth and 9 marginal bristles (Fig. 7a).

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**Fig. 7.** *Drosophila fulvalinea*ta Patterson & Wheeler: a (4 m S. Patagonia), male genitalia, laterooblique aspect; b-d (Patagonia), aedeagus, several aspects.
Hypandrium 3/4 length of epandrium. Aedeagus ventrally expanded, dorsally incised and slightly serrated; dorsal cleft about 2/3 of length. Aedeagal apodeme laterally flattened. Ventral rod about 1/5 length of gonopods. Gonopod with one sensillum (Fig. 7b-d). Phallosomal index about 2:1.

Other specimens examined (2, DTRC) — USA: Arizona: 4 mi S of Patagonia (1♂ 2358.7); New Mexico: 2 mi S of Cliff (1♂ 2075.9).

Strain examined — USA: Arizona, Patagonia (A24).

Relationship — It is related to D. linearepleta Patterson & Wheeler and D. hirminoneae, sp. nov., from which it differs, chiefly in the shape of aedeagus and the mesonotum pattern. In D. fulvalineata, the mesonotum is striped but not spotted.

**Drosophila (Drosophila) hermioneae, sp. nov.**

(Fig. 8)

Type-Material — Holotype male labelled: “Tenancingo Mexico / A. H. Sturtevant collection, 1970 / HOLOTYPE Drosophila hermioneae ♂” in NMNH (Washington, D.C.). N° 100216. Paratypes (3♂ 5♀): same data as holotype; one female paratype has an additional label “D. striped repleta”, in NMNH. Holotype and two paratypes (1♂ 1♀) dissected; four paratypes (1♂ 3♀) partially destroyed, probably by dermestids. Type-locality: Tenancingo, Mexico, Mexico. External characters of imagines ♂, ♀ — Arista with 3-4 dorsal and 2 ventral branches plus terminal fork. Antennae brown. Front brown, pollinose; orbits anteriorly yellow, dark brown from median region of fronto-orbital row to anterior verticals. Ocellar triangle dark brown. Posterior orbital and verticals arising from

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**Fig. 8.** *Drosophila hermioneae*, sp. nov. (holotype): a, male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.
dark brown spots. Anterior and middle orbitals arising from gray area. Middle orbital about half other two. Second orbital about 1/2 of first. Face brown. Carina prominent, sulcate, brown. Palpi pollinose brown, with bristles on ventral surface. Cheeks brown, their greatest width 1/2 greatest diameter of eyes. Eyes red, with short black pits.

Acrostichal hairs in 8 irregular rows. No prescutellars. Anterior scutellars convergent. Mesonotum yellowish brown, pollinose, bristles arising from dark brown spots, which are larger and darker on dorsocentral rows. Some spots are fused to form a circle anteriorly to the transverse sulure; a lanceolate spot outside anterior dorsocentals; four longitudinal stripes inside dorsocentral rows, two extending from anterior margin to middle area of mesonotum and, two from anterior dorsocentals to posterior margin of mesonotum. Scutellum brown, yellowish in the margins; anterior scutellars arising from a large dark brown triangular area. Pleurae brown, with an irregular darker longitudinal stripe from base of first coxae to halteres; an upper dark brown stripe from propodeum to base of wings. Siereno index about 0.7. Halteres missing in all specimens. Coxae dark brown; femora brown, yellowish distally with a dark brown ring. Tibiae yellowish distally with a dark brown ring; tarsi yellow. Apical bristles on first and second tibiae, precapitils on all three. Abdomen yellow, 2nd to 5th tergite with a medianley enlarged and interrupted posterior blackish brown band which bends toward and reaches anterior margin at angle of tergite.

Wings clear; crossveins slightly smoky. Costal index about 2.6; 4th vein index about 1.6; 5x index about 1.3; 4c index about 0.9; M index about 0.5. Third costal section with heavy bristles on its basal 1/3.

Wing length about 2.4 mm.

Genitalia (♂) — Epandrium with about 17 lower and 3 upper bristles. Cercl fused. Sustylus with about 9 primary teeth and 12 marginal bristles (Fig. 8a).

Hypantrium shorter than epandrium.

Aedeagus ventrally well-expanded; dorsally serrated; dorsal cleft about 4/5 of length. Aedeagal apodeme laterally flattened. Ventral rod about 1/3 length of gonopod. Gonopod with one sensillum (Fig. 8b-d). Phallosomal index about 1.9.

♀ — Ovipositer apically pointed, with about 18 marginal and 5 discal teeth. Spermathecae almost cylindrical; duct deeply invaginated.

Eggs, pusaria and chromosomes — Unknown.

Relationship — Belongs to the fasciola subgroup of the replicata group. It is closely related to D. lineuropleta Patterson & Wheeler, from which it differs chiefly in the shape of aedeagus. My comments under D. fulvilinea also apply here.

Distribution — Presently known from the type-locality only.

Etymology — Named after Hermione E.M.C. Bicudo from the “Departamento de Biologia, Instituto de Biociências, Letras e Ciências Exatas de São José do Rio Preto, Universidade Estadual Paulista Julio de Mesquita Filho”.

Drosophila (Drosophila) ivai, sp. nov.

(Fig. 9)


External characters of imagines ♂ — Arista with 3-4 dorsal and 2-5 ventral branches plus terminal fork. Antennae brown. Front brown, pollinose, posteriorly darker; orbits anteriorly yellow, brown from median region of frons-orbital row to posterior verticals. Ocular triangle dark brown, except at base of postverticals. Anterior verticals arising from dark brown spots. Posterior verticals and orbitals arising from yellow area. Middle orbital about 1/2 other two. Second oral about
1/2 of first. Face brown. Carina prominent, not sulcate, pollinose, yellowish brown. Palpi pollinose, brown, with bristles on ventral surface. Cheeks brown, their greatest width 1/3 greatest diameter of eyes. Eyes red, with short black piles.

Acrostichal hairs in 8 irregular rows. No prescutellars. Anterior scutellars convergent. Mesonotum yellowish brown, pollinose, bristles arising from dark brown spots, which are larger and darker on dorsocentral rows. Some spots are fused to form: a circle anteriorly to the transverse suture; a lanceolate spot outside anterior dorsocentra; four longitudinal stripes inside dorsocentral rows, two extending from anterior margin to middle area of mesonotum and two from anterior dorsocentra to posterior margin of mesonotum. Scutellum brown, anteriorly lighter; scutellars arising from dark brown areas. Pleurae brown, with an irregular darker longitudinal stripe from base of first coxae to halteres; an upper dark brown stripe from propodeum to base of wings. Sterno index about 0.8. Halteres yellow. Coxae and femora brown, first pair darker. Tibiae brown with dark brown rings; tarsi brown. Apical bristles on first and second tibiae, preapicals on all three.

Abdomen yellow, 2nd to 5th tergite with a medianly enlarged and interrupted posterior blackish brown band which bends toward and reaches anterior margin.

Fig. 9. Drosophila ival, sp. nov. (holotype): a, male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.
at angle of tergite, leaving a yellow area laterally; 6th tergite with a narrower, fainter band.

Wings clear. Costal index about 2.2; 4th vein index about 1.6; 5x index about 1.3; 4c index about 1.0; M index about 0.5. Third costal section with heavy bristles on its basal 1/2.

Wing length about 2.3 mm.

*Genitalia* ♂ — Epandrium with about 15 lower and 4 upper bristles. Cerci fused at lower 1/2. Surtysylus with about 9 primary teeth and 11 marginal bristles (Fig. 9a).

Hypandrium as long as epandrium.

Aedeagus with a pair of subapical, pointed, bent spurs; dorsal cleft about 2/3 of length. Aedeagal apodeme roshaped. Ventral rod absent. Gonopod with one tiny sensillum (Fig. 9b-d). Phallosomal index about 1.3.

Eggs, puparia, chromosomes and ♀ — Unknown.

Relationship — Belongs to the fasciola subgroup of the repleta group. It is closely related to *D. pictilis* Wasserman, *D. pictura* Wasserman and *D. rosinae*, sp. nov., from which it differs in the shape of aedeagus.

Distribution — Brazil (Mato Grosso do Sul, Paraná).

Etymology — The species name refers to the toponym “Rio Ivaí”, where the holotype and some paratypes have been collected.

**Drosophila (Drosophila) linearepleta** Patterson & Wheeler

(Fig. 10)

*Drosophila (Drosophila) linearepleta* Patterson & Wheeler, 1942: 79.

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**Fig. 10. Drosophila linearepleta** Patterson & Wheeler (lectotype): a, male genitalia, laterolobique aspect; b-d, aedeagus, several aspects.

General characters — Described by Patterson & Wheeler (1942).

Genitalia ♂ — Epandrium with about 14 lower and 4 upper bristles. Cerci fused at lower 1/3. Surstylus with about 9 primary teeth and 8 marginal bristles (Fig. 10a).

Hypantrium 2/3 length of epandrium.

Aedeagus ventrally expanded, with tiny teeth in and along median ventral edge, dorsally serrated; dorsal cleft about 7/8 of length. Aedeagal apodeme straight, laterally flattened. Ventral rod about 1/4 length of gonopod. Gonopod with one sensillum (Fig. 10b-d). Phallosomal index about 1.1.

Relationship — This species has been considered a member of the repleta subgroup since Wheeler’s paper (1943); however, the meconotum pattern and the male genitalia clearly relate this species to the members of the fasciata subgroup to which I am proposing its transference. D. linearepleta is closely related to D. hermioneae, sp. nov., from which it differs chiefly in the shape of aedeagus. My comments under D. fulvalineata also apply here.

Fig. 11. Drosophila moju Pavan: a (strain H80.12), male genitalia, lateroblique aspect; b-d (lectotype), aedeagus, several aspects.
**Distribution** — Guatemala, ? Mexico.

**Notes** — The previously known distribution of this species in Antigua (Guatemala, type-locality) was extended to several states of Mexico by Patterson (1943: 73). However, I think that the Mexican specimens Patterson identified as *D. linearepléta* could in fact belong to its sibling form described in this paper as *D. hermionēnē*. On the other hand, I have analyzed in the NMNH one specimen from Jamaica, closely related to *D. linearepléta* and *D. hermionēnē*, which I was not able to assign to any of those species.

*Drosophila (Drosophila) moju Pavan*  
(Fig. 11)

*Drosophila (Drosophila) moju* (SiC) Pavan, 1950: 19.

**Type-Material** — Lectotype male (HERE DESIGNATED), labelled: “*D. moju Pavan* Belém 1948 / LECTOTIPO Drosophila moju Pavan por C.R. Vilela”. Paralectotypes (2 α, 3 ¼ ; HERE DESIGNATED): same data as lectotype. All specimens in MZUSP (São Paulo); all males dissected. The original type-series has 7 specimens, but one (male) of them does not belong to the same species as do the lectotype and parallectotype above designated and therefore is no longer being considered. Such a specimen in fact belongs to the sibling species *D. mojuoides* Wasserman. Type-locality: Belém, Pará, Brazil.

**General characters** — Described by Pavan (1950).

**Genitalia** α — Epandrium with about 11 lower and 5 upper bristles. Cerci fused at lower 4/5. Surstylus with about 11 primary teeth and 8 marginal bristles (Fig. 11a).

Hypantrium shorter than epandrium.

Aedeagus roundish at tip with a pair of subapical, pointed spurs; dorsal cleft about 3/5 of length. Aedeagal apodeme slightly curved, laterally flattened. Ventral rod rudimentary. Genopod with one tiny sensillum (Fig. 11b-d). Phallosomal index about 1.1.

**Strains examined (5)** — COLOMBIA: Meta: Villaviciencio (H194.33). PANAMA: Canal Zone: Barro Colorado I. (H80.12); Panama: Cerro La Campana (H183.23).  
**Relationship** — It is closely related to *D. mojuoides* Wasserman, from which it differs chiefly in the shape of aedeagus.

**Distribution** — Costa Rica to Brazil and Bolivia.

*Drosophila (Drosophila) mojuoides* Wasserman  
(Fig. 12)

*Drosophila (Drosophila) moju* Pavan (in part), 1950.


**General characters** — Described by Wasserman (1962d)

**Genitalia** α — Epandrium with about 10 lower and 2 upper bristles. Cerci fused at lower 2/3. Surstylus with about 8 primary teeth and 11 marginal bristles (Fig. 12a).

Hypantrium 1 and 1/2 length of epandrium.

Aedeagus pointed at tip with a pair of long, subapical, pointed spurs; dorsal cleft about 2/3 of length. Aedeagal apodeme anteriorly expanded, laterally flattened. Ventral rod absent. Genopod with one tiny sensillum (Fig. 12b-d). Phallosomal index about 1.3.

**Other specimen examined** — BRAZIL: Pará: Belém (1 α, MZUSP); see type material of *D. moju*.

**Strains examined (2)** — TRINIDAD: Arima Valley (H107.7), Maravel (H552.9).
Fig. 12. *Drosophila mojuoides* Wasserman (strain H332.9): a, male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.

**Relationship** — It is closely related to *D. moju* Pavan, from which it differs chiefly in the shape of the aedeagus.

**Distribution** — Trinidad, Brazil (Pará, NEW RECORD).

*Drosophila (Drosophila) onca* Dobzhansky & Pavan
(Fig. 13)

*Drosophila (Drosophila) onca* Dobzhansky & Pavan, 1943: 40.

**Type-Material** — Holotype male, labelled: "Iporanga, São Paulo, VII — 1943 / *Drosophila onca* TYPE / HOLOTIPO ♂ ", in MZUSP (São Paulo), dissected. Paratypes (3 ♀) in MZUSP, (2 ♂) in DTRC (Austin); same data as holotype.

**Type-locality** — Iporanga, São Paulo, Brazil.

**General characters** — Described by Dobzhansky & Pavan (1943).
*Ceratitis* ♂ — Epandrium with about 12 lower and 7 upper bristles. Cerci fused at lower half. Surstylus with about 11 primary teeth and 9 marginal bristles (Fig. 13a).

Hypantrium slightly shorter than epandrium.

Aedeagus with a pair of short, subapical spurs; dorsal cleft about 3/5 of length. Aedeagal apodeme almost straight, laterally flattened. Ventral rod absent. Gonopod with three tiny sensilla (Fig. 13b–d). Phallozoal index about 0.9.

*Other specimens examined* (72, MZUSP) — BRAZIL: Paraná: 14 Km of Morretes (2 ♂), Fazenda Palmiral (10 ♂); Santa Catarina: 12 Km NW of Timbó do Sul (1 ♂); São Paulo: Rio Guaraúba (2 ♂). Santa Maria da Serra (45 ♂, 1 ♀), São Paulo (4 ♂).

*Relationship* — This species was tentatively assigned to the *repleta* subgroup by Wheeler (1949); however, as it has the mesonotum pattern and the male genitalia very similar to those of the members of the *fasciola* subgroup, it was recently transferred to this forest-dwelling subgroup by Vieira et al. (1985). *D. onca* is closely related to *D. caroliniae*, sp. nov., from which it differs in the shape of aedeagus.

*Distribution* — Brazil (São Paulo, Paraná, Santa Catarina).

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**Fig. 13.** *Drosophila onca* Dobzhansky & Pavan (14 Km of Morretes): a, male genitalia, lateroblique aspect; b–d, aedeagus, several aspects.
Drosophila (Drosophila) paraguttata Thompson
(Fig. 14)


Genitalia ♂ — Epandrium with about 23 lower and 3 upper bristles. Cerci fused at lower 1/3. Surstylus with about 11 primary teeth and 9 marginal bristles (Fig. 14a).

Fig. 14. Drosophila paraguttata Thompson (Bath, Jamaica): a, male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.
Hypandrium as long as epandrium.
Aedeagus pointed at tip, with a pair of subapical, pointed spurs; dorsal cleft about 3/4 of length. Aedeagal apodeme curved. Ventral rod 1/2 length of gonopod. Gonopod with one tiny sensillum. (Fig. 14b-d). Phalloosomal index about 1.0.
Other specimens examined (3, DTRC) — JAMAICA: Bath (3 ♂ ; HJ56.34).
Strain examined — WEST INDIES: Jamaica: Hardware Gap (HJ56.18).
Relationship — It is related to D. moju Pavan and D. mojucoides Wasserman, from which it differs chiefly in the shape of aedeagus and the mesonotum pattern. In D. paraguayana the mesonotum is faintly striped but not spotted.
Distribution — Jamaica.

Drosophila (Drosophila) pictilis Wasserman
(Fig. 15)


Genitalia ♂ — Epandrium with about 12 lower and 3 upper bristles. Cerci fused

![Diagram](image)

Fig. 15. Drosophila pictilis Wasserman: a (paratype), male genitalia, lateroblique aspect; b-d (Lago Pichichuela), aedeagus, several aspects.
at lower 2/3. Suturae with about 9 primary teeth and 8 marginal bristles (Fig. 15a).

Hypandrium as long as epandrium.

Aedeagus with a pair of curved, subapical, pointed spurs; dorsal cleft about 3/5 of length. Aedegal apodeme laterally flattened. Vertical rod absent. Genopod with one tiny sensillum, laterally covered with small bristles (Fig. 15b-d). Phallosomal index about 1.8.

Other specimens examined (4) — El Salvador: La Libertad: Lago Pichicheula (3 ♂, DTRC: H27.2). Panama: Bocas del Toro: Chiriqui (1 ♂, NMNH).

Strain examined — El Salvador: La Libertad: Lago Pichicheula (H27.2).

Relationship — It is closely related to *D. pictura* Wasserman, *D. ivai*, sp. nov., and *D. roseae*, sp. nov., from which it differs chiefly in the shape of aedeagus.

Distribution — El Salvador, Panama (Bocas del Toro, NEW RECORD).

*Drosophila* (Drosophila) *pictura* Wasserman

(Fig. 16)


Fig. 16. *Drosophila pictura* Wasserman (paratypes): a, male genitalia, lateral oblique aspect; b-d, aedeagus, several aspects.
*Genitalia* ♂ — Epandrium with about 6 lower and 3 upper bristles. Ceri fused at lower 3/4. Surstylus with about 9 primary teeth and 7 marginal bristles (Fig. 16a).  

*Hypandrium* as long as epandrium.  
Aedeagus with a pair of subsapical, pointed spurs; dorsal cleft about 3/4 of length. Aedeagal apodeme laterally flattened. Vertical rod absent. Gonopod with one tiny sensillum (Fig. 16b-d). Phallosomal index about 2.0.  
*Other specimen examined (DTRC) — BOLIVIA: Santa Cruz: Monteiro (1 ♀, H343.14).  
Strain examined — TRINIDAD: St. George: Port of Spain (H109.28).  
*Relationship* — It is closely related to *D. pictilis* Wasserman, *D. nov.* sp. nov., and *D. rosinae*, sp. nov., from which it differs chiefly in the shape of aedeagus.  
*Distribution* — Trinidad, ? Bolivia.  
*Note* — The specimens from Trinidad and Bolivia are slightly different with respect to the male genitalia and therefore may belong to distinct species.

^ Drosophila (Drosophila) querubimae, sp. nov. (Fig. 17)

Undescribed K, Vilela et al., 1983.  

Acrostichal hairs in 8 irregular rows. No prescutellar. Anterior scutellars convergent. Mesonotum yellowish brown, pollinose, bristles arising from brown spots, which are larger and darker on dorsocentral rows. Some spots are fused to form: four longitudinal stripes inside dorsocentral rows, two extending from anterior margin to middle area of mesonotum and two from anterior dorsocentrales to posterior margin of mesonotum; two irregular spots outside dorsocentral

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**Fig. 17.** *Drosophila querubimae*, sp. nov., (holotype): a. external male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.
row. Scutellum brown with a Y-shaped yellow area; bristles arising from dark brown spots. Pleurae brown, pollinose with an irregular darker longitudinal stripe from base of first coxae to halters. Sterno index about 0.8. Halteres pale yellow. Coxae brown; femora brown with a dark brown ring. Tibiae yellow with two brown rings; tarsi yellow. Apical bristles on first and second tibiae, preapicals on all three.

Abdomen yellow, 2nd to 5th tergite with a medianly enlarged and interrupted posterior dark brown band which bends toward and reaches anterior margin at angle of tergite, leaving a yellow area laterally.

Wings clear. Costal index about 2.3; 4th vein index about 1.6; 5x index about 1.3; 4c index about 0.9; M index about 0.5. Third costal section with heavy bristles and its basal half.

Wing length about 1.8 mm.

Genitalia — Epandrium with about 9 lower and 5 upper bristles. Cerci not fused. Surnstylus with about 12 primary teeth and 10 marginal bristles (Fig. 17a).

Hypandrium long as epandrium.

Aedeagus with a pair of long, pointed, subapical spurs; dorsal lobe about 2/3 of length. Aedeagal apodeme rod-shaped, Ventral rod absent. Gonopod well-developed with some tiny sensillula (Fig. 17b-d). Phallosomal index about 1.8.

Eggs, puparia, chromosomes and γ — Unknown.

Relationship — Belongs to the fasciata subgroup of the repleta group. It seems to be related to D. fasciata Williston, from which it differs chiefly in the shape of aedegus.

Distribution — Presently known from the type-locality only.

Etymology — Named after Maria Augusta Quebrum Rodrigues Pereira from the “Departamento de Biologia, Instituto de Biociências, Universidade de São Paulo”, one of the collectors of the holotype.

**Drosophila (Drosophila) rosinae, sp. nov.**

(Fig. 18)

Undescribed G. Vilela et al., 1983.


**External characters of imagines △, ♀** — Arista with 4-5 dorsal and 2 ventral branches plus terminal fork. Antennae brown. Front brown, pollinose, distally darker. Orbits anteriorly yellow, brown from median region of fronto-orbitals to posterior verticals. Ocellar triangle dark brown, except at base of postverticals. Verticals and posterior orbital arising from dark brown spots. Anterior and middle orbitals arising from yellow area. Middle orbital about 2/3 other two. Second oral about 1/2 of first. Face brown. Carina prominent, not sulcate, pollinose, yellowish brown. Palpi pollinose, brown, with bristles on ventral surface. Cheeks brown, their greatest width 1/3 greatest diameter of eyes. Eyes red, with short black piles.

Acrostichal hairs in 8 irregular rows. No prescutellars. Anterior scutellars convergent. Mesonotum yellowish brown, pollinose, bristles arising from brown spots, which are larger and darker on dorsocentral rows. Some spots are fused to form: a circle anteriorly to the transversal suture; a lanceolate spot outside anterior dorsocentrals; four longitudinal stripes inside dorsocentral rows, two extending
from anterior margin to middle area of mesonotum and two from anterior dorsocentrals to posterior margin of mesonotum. Scutellum pollinose, brown, scutellars arising from dark brown areas. Pleurae pollinose, brown, with an irregular darker longitudinal stripe from base of first coxae to halteres; an upper dark brown stripe from propleurae to base of wings. Sterno index about 0.8. Halteres yellow. Coxae and femora dark brown, distally yellow. Tibiae yellow with two dark brown rings; tarsi yellow. Apical bristles on first and second tibiae, preapicals on all three.

Abdomen yellow, 2nd to 5th tergite with a medianly enlarged and interrupted posterior dark brown band which bends toward and reaches anterior margin at angle of tergite, leaving a yellow area laterally; 6th tergite with a narrower, fainter band.

Wings clear. Costal index about 2.4; 4th vein index about 1.7; 5x index about 1.5; 4c index about 1.0; M index about 0.6. Third costal section with heavy bristles on its basal 1/2.

Wing length about 2.3 mm.

**Internal characters of imagines and genitalia (♂)** — Testis yellow, with about 7 inner and 8 outer coils. Epandrium with about 13 lower and 2 upper bristles. Cerci

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**Fig. 18. Drosophila rosinae**, sp. nov.: a (holotype), male genitalia, lateroblique aspect; b-d (paratype), acedeagus, several aspects.
fused at lower half. Surstylus with about 11 primary teeth and 10 marginal bristles (Fig. 18a).

_Hypandrium as long as epandrium._

Aedeagus with a pair of subapical, pointed, bent spurs; dorsal cleft about 1/2 of length. Aedeagal apodeme laterally flattened. Ventral rod absent. Gonopod with one tiny sensillum (Fig. 18b-d). Phallosomal index about 2.2. (♀) — Ventral receptacle an irregular spiral with about 83 tight coils. Ovipositor apically pointed with about 18 marginal and 6 distal teeth. Spermathaco rudimentary, weakly sclerotized; duct slightly invaginated.

_Eggs_ — Four filaments, slightly longer than egg.

_Pupa and_ — Reddish brown; horn index about 13; each anterior spiracle with about 8 branches.

**Chromosomes** — Not studied.

**Relationship** — Belongs to the _fuscata_ subgroup of the _repleta_ group. It is closely related to _D. ivai_, sp. nov., _D. pictilis_ Wasserstein, and _D. pictura_ Wasserstein, from which it differs chiefly in the shape of aedeagus.

**Distribution** — Brazil (Bahia, Esprito Santo, Rio de Janeiro, Sao Paulo).

**Etymology** — Named after Rosina de Barros, former member of the "Departamento de Biologia, Instituto de Biotecnologia, Universidade de Sao Paulo".

**Note** — This species has been collected mainly at strand vegetation on the coast nearby but never in the Atlantic Forest.

_Drosophila_ (Drosophilidae) _senei_, sp. nov.

(Fig. 19)

**Type Material** — Holotype male, labelled: "BRASIL — SP, Ibiuna, 23°59'S, 47°13'W, C. Pavan col., 05. xii. 1976 / HOLOTYPE Drosophila senei q. Paratypes: same data as holotype. Both specimens collected over passionflower fruit (Passiflora sp.); in MZUSP (Sao Paulo), dissected. Type-locality: Sitio Maria Cristina, Bairro dos Alves, Ibiuna (23°59'S, 47°13'W), Sao Paulo, Brazil.


Acrrostichal hairs in 8 irregular rows. No prescutellars. Anterior scuellar convergent. Mesonotum yellowish brown, pollinose, bristles arising from brown spots. Some spots are fused to form: a lanceolate spot outside anterior dorsecentrals; an irregular interrupted spot near the transverse suture; a small circle by the supra-alaris; four longitudinal stripes inside dorsecentrals. Scutellum yellowish brown, with bristles arising from brown spots. Pleurae brown, pollinose, with an irregular darker longitudinal stripe from base of first coxae to halteres: an upper dark brown stripe from propleurae to base of wings. Sternum index about 0.8. Halteres pale yellow. Coxae brown, femora dark brown, distally yellow with a brown ring. Tibiae yellow with two brown rings; tarsi yellow. Apical bristles on first and second tibiae, preapicals on all three.

Abdomen yellow, 2nd to 5th tergite with a medianly enlarged and interrupted dark brown band which bends toward and reaches anterior margin at angle of tergite, leaving a yellow area laterally; 6th tergite with a narrower, fainter band.

Wings clear. Costal index about 2.4; 4th vein index about 1.7; 5x index about 1.5; 4c index about 1.0; M index about 0.5. Third costal section with heavy bristles on its basal 1/2.

Wing length about 2.6 mm.

_Genitalia q_ — Epandrium with about 15 lower and 5 upper bristles. Cori fased at lower 1/3. Surstylus with about 12 primary teeth and 11 marginal bristles (Fig. 19a).

_Hypandrium as long as epandrium._
Aedeagus with a pair of waved, pointed, very long, subpical spurs; dorsal cleft about 3/5 of length. Aedeagal apodeme slightly bent, laterally flattened. Ventral rod short. Gonopod with one tiny sensillum (Fig. 19b-d). Phallosomal index about 1.4.

Eggs, puparia, chromosomes and ? — Unknown.

Relationship — Belongs to the fasciata subgroup of the repleta group. It seems to be related to the D. coroica Wasserman, from which it differs chiefly in the size and shape of aedeagus.

Distribution — The type-locality is the only site where this species has been collected.

Etymology — Named after Fabio de Melo Sene from the "Departamento de Biologia, Instituto de Biociências, Universidade de São Paulo".

Fig. 19. Drosophila senei, sp. nov.: a (holotype), male genitalia, posterior aspect; b-d (paratype), aedeagus, several aspects.

THE HYDEI SUBGROUP

Species included (6) — Drosophila bifurca Patterson & Wheeler, D. eohydei Wasserman; D. hydei Sturtevant; D. neohydei Wasserman; D. nigrohydei Patterson & Wheeler; D. novemarisita Dohshansky & Pavan.

Diagnosis — Costal index ranging from 3.0 to 3.6; testis with many coils, ranging from a total of 22 to 51; ventral receptacle very long and with many coils, ranging from about 245 to 735; phallosomal index varying from 1.9 to 2.8. Ante-
rior margin of cerci fused to posterior margin of epandrium in various degree; surstylus without secondary teeth, in most species the number of primary teeth is about 11; concha of hypandrium usually bearing one anterior bristle (bare in *D. bifurca*); aedeagus usually with a pair of posterior ventral spurs; gonopod with one to two tiny sensilla, linked to concha of hypandrium by membranous tissue; lateral areas of abdominal tergites usually solid in color.

**Geographical distribution** — The species of this subgroup inhabit cacti areas between Southwestern North America (18°N; USA, Texas) and Northwestern South America (17°S; Peru, Junin) in altitudes varying from the sea level to more than 3,000 m. *D. neothysei* also occurs in the West Indies and *D. hydei* is cosmopolitan.

**Drosophila (Drosophila) bifurca** Patterson & Wheeler

(Fig. 20)

*Drosophila (Drosophila) bifurca* Patterson & Wheeler, 1942: 85.


**Type-locality**: Wild Rose Canyon, Texas, USA.

**General characters** — Described by Patterson & Wheeler (1942).

**Genitalia ♂** — Epandrium with about 12 lower and 2 upper bristles. Cerci fused at lower 1/4. Surstylus with about 11 primary teeth and 12 marginal bristles (Fig. 20a).

Hypandrium shorter than epandrium, strongly sclerotized; anterior margin strongly concave (Fig. 20a).

![Fig. 20](image-url)

*Fig. 20. Drosophila bifurca* Patterson & Wheeler (strain A8.10 x A2): a, male genitalia, laterooblique aspect; b-d, aedeagus, several aspects.
Aedeagus bow-shaped; dorsal cleft longer than 1/2 of length. Aedeagal apodemal bent, anteriorly splitted; laterally flattened. Ventral rod slightly shorter than gonopod. Gonopod long with one sensillum (Fig. 20b-d). Phallosomal index about 1.9.

Other specimen examined — USA: Arizona: 5 mi SW of Portal (1♂, NMNH).
Strains examined (2) — USA: Arizona: Arravaïpa Valley x Paragonia (A8.10 x A2), Paragonia (A2).

Relationship — It is related to D. nigrorhydei Patterson & Wheeler and D. novenarietisata Dobzhansky & Pavan, from which it differs chiefly in the shape of aedeagus.

Distribution — sw. USA, n. Mexico.

**Drosophila (Drosophila) eohydei** Wasserman

(Fig. 21)


**Type-Material** — Holotype male, labelled: "HOLOTYPE / H191.67♂ / D. eohydei" in NMNH (Washington, D. C.). Paratypes (2♂, 3♀): same data as holotype; (2♂, 2♀): idem with an additional label: "Bucaramanga, Colombia", in DTRC (Austin). Type-locality: Bucaramanga, Santander, Colombia.

**General characters** — Described by Wasserman (1962b).

**Genitalia ♀** — Epandrium with about 17 lower and 4 upper bristles. cerci fused at lower 2/3. Surstylus with about 11 primary teeth and 11 marginal bristles (Fig. 21a).

**Hypandrium** slightly shorter than epandrium.

**Aedeagus** with a pair of pointed, bent spurs; slightly splitted at tip; dorsal

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**Fig. 21.** *Drosophila eohydei* Wasserman (strain H191.47): a, male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.
Drosophila (Drosophila) hydei Sturtevant
(Figs. 22, 23)

Drosophila (Drosophila) hydei, Sturtevant, 1939: 139.
Drosophila (Drosophila) hydei yeucatanensis Spencer, 1940: 159.
Drosophila (Drosophila) serosa Dobzhansky & Pavan, 1943: 46; (preocc.) nec Villeneuve (synonymized by Wharton, 1944: 178).

Type-Material — Holotype male, labelled: "Drosophila hydei Sturtevant / ac. 5497 / TYPE / Stock Lakeland Fla. 1919", in AMNH (New York), cited as in

Fig. 22. Drosophila hydei Sturtevant (strain E22.1A): a, male genitalia, latero-blique aspect; b-d, aedeagus, several aspects.
UNNM (Washington, D.C.) by Bock (1976: 8). Paratypes (6 ♂, 4 ♀; one male dissected) in NMNH (Washington, D.C.); (1 ♂) in DTRC (Austin); same data as holotype. Type-locality: Lakeland, Florida, USA.

Holotype male of junior synonym D. setosa: "Mogi das Cruzes, São Paulo, IV.943 / Drosophila setosa sp. n. TYPE / HOLOTIPO", dissected (Fig. 23). Paratypes (3 ♂, 1 ♀): same data as holotype. All type specimens in MZUSP (São Paulo). Type-locality: Mogi das Cruzes, São Paulo, Brazil.

Holotype female of probable synonym D. marmorata (type-locality: Auckland, New Zealand) in Canterbury Museum (Christchurch, New Zealand), not analyzed. According to Dr. Harrison (personal communication) the specimen, which appears to be the sole representative of the species, is in poor condition (its head and one of its wings are missing).

The type-series of the subspecies D. hydei yucatanensis should be in the College of Wooster, Wooster, Ohio, USA; not analyzed.

General characters — Described by Sturtevant (1921), redescribed by Patterson (1943).

Genitalia ♂ — Epandrium with about 75 lower and 5 upper bristles. Cerci fused at lower half. Surstylus with about 11 primary teeth and 10 marginal bristles (Fig. 22a).

Hypandrium shorter than epandrium.

Aedeagus with a pair of pointed, bent, long spurs; serrated at tip; dorsal cleft about 3/4 of length. Aedeagal epandrium laterally flattened, anteriorly expanded. Ventral rod 3/4 length of gonopod. Gonopod with one tiny sensillum (Fig. 22b-d). Phalloosomal index about 22.

Other specimens examined (138) — ARGENTINA: Catamarca: 2 Km N of La Viña (2 ♂, 4 ♀, IML; 2 ♂, 4 ♀, MZUSP); Chaco: 10 Km N of Puerto Tirol (3 ♂, MZUSP); 7 Km NE of Resistencia (3 ♂, 3 ♀, IML; 2 ♂, 4 ♀, MZUSP); La Rioja: 5 Km S of Chiciaco (1 ♂, MZUSP); 8 Km N of Famatina (1 ♂, MZUSP); Tucuman: 2 Km N of Tepia (1 ♂, 1 ♀, IML; 4 ♂, 3 ♀, MZUSP); 14 Km N of Tucuman (2 ♂, IML). BRAZIL (MZUSP): Bahia: 27

Fig. 23. Drosophila setosa Dobzhansky & Pavan (holotype): a-c, aedeagus, several aspects.
Km W of Barreiras (2♂), 61 Km W of Barreiras (4♂), 79 Km W of Barreiras (3♂), Cachoeira dos Monteiros (10♂), 3 Km NW of Milagres (30♂); Espirito Santo: Vitória (1♂), Maio Grosso do Sul: 30 Km S of Campo Grande (1♂); Minas Gerais: 18 Km NW of Cardeal Mota (2♂), 12 Km N of Iabuticambas (1♂); Paraiba: 1 Km E of Jajuba (1♂); São Paulo: Rio Guaramirim (1♂), 14 Km NE of Peruíbe (2♂, 1♀), São Paulo (1♂). COSTA RICA: Pedregoso (1♂, NMNH). ITALY: Sicily: Palermo (1♂, NMNH). MEXICO: Yucatan (1♂, NMNH). USA (NMNH, unless otherwise noted): Arizona: Tucson (1♂); California: Buena Park (1♂), Chico (1♂); Forest Home (1♂), Laguna Beach (1♂), Lancaster (1♂), Los Angeles (1♂); S. Fork Sta. Ana (1♂), Spreckels (2♂); Connecticut: Redding (1♂); Florida: Georgetown (1♂), Homestead (1♂, AMNH); 1♂, NMNH), Jacksonville (1♂), St. Augustine (1♂), Winter Garden (2♂); Hawaii: Maui (1♂); Massachusetts: Woodhole (1♂); Michigan: Detroit (2♂); Grosse Ile (5♂); Shelby (1♂); North Carolina: Penland (1♂); Oklahoma: Mill Creek (1♂); Texas: Dallas (1♂), Del Rio (1♂), Paris (1♂); Virginia: Falls Church (1♂); West Virginia: Cacapon St. PK (1♂). Strains examined (3) — BRAZIL: (E22, 1A). MEXICO: D.F.; Mexico City (1797-8); Veracruz: San Juan de la Punta (1385.11).

Relationship — It is related to D. eohydei Wasserman and D. neohydei Wasserman, from which it differs chiefly in the shape of aedeagus.

Distribution — Cosmopolitan.

Drosophila (Drosophila) neohydei Wasserman
(Fig. 24)


Drosophila (Drosophila) neohydei Wasserman 1962b: 75.

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Fig. 24. *Drosophila neohydei* Wasserman (strain H207.26): a, male genitalia, laterobasal aspect; b-d, aedeagus, several aspects.

General characters — Described by Wasserman (1962b).

Genitalia ♂ — Epandrium with about 15 lower and 2 upper bristles. Carpi fused at lower 2/3. Surstylist with about 11 primary teeth and 3 marginal bristles (Fig. 24a).

Hypantrium as long as epandrium.

Aedeagus bent, posteriorly expanded; slightly serrated at tip: dorsal cleft about 3/5 of length. Aedeagal apodeme bent, laterally flattened. Ventral rod 3/4 length of gonopod with one tiny sensillum (Fig. 24b-d). Phallosomal index about 2:2.

Other specimens examined (8) — VENEZUELA: D.F.: near Macuto (1 ♂ , 6 ♀ , MZUSP). WEST INDIES: Dominica: Clark Hall (1 ♂ , NMNH).

Strain examined — VENEZUELA: Anzoategui: Carpentaro (H207.26).

Relationship — It is related to D. neozygocn Wasserman and D. hydei Sturtevant, from which it differs chiefly in the shape of aedeagus.

Distribution — Venezuela (Anzoategui, D.F.). West Indies (Dominica, NEW RECORD).

Drosophila (Drosophila) neozygocn Patterson & Wheeler
(Figs. 25, 26)

Fig. 25. Drosophila neozygocn Patterson & Wheeler (lectotype): a, male genitalia, laterooblique aspect; b-d, aedeagus, several aspects.
Drosophila (Drosophila hydoides) SIC, Hsu, 1949.


Lectotype male of synonym D. hydoidea (HERE DESIGNATED): “D. hydoides ♂ San Isidrico, Nuevo Leon, Mex. 1940, TYPE / LECTOTYPE Drosophila hydoides Patterson & Wheeler by C.R. Vilela”, dissected (Fig. 26), in AMNH (New York). Type-locality: San Isidrico, Nuevo Leon, Mexico (I was not able to find this locality on maps).

General characters — Described by Patterson & Wheeler (1942).
Genitalia ♂ — Epandrium with about 11 lower and no upper bristles. Ceri fused at lower half. Surstylus with about 9 primary teeth and 9 marginal bristles (Fig. 25a).

Hypantrium as long as epandrium.

Aedeagus bent with a pair of pointed spurs; posterior end ventrally expanded, splitted and weakly sclerotized at tip, dorsal cleft about 3/5 of length. Aedeagal apodeme laterally flattened. Ventral rod slightly shorter than gonopod. Gonopod with one tiny sensillum (Fig. 25h-d). Phalloceleal index about 2.8.

Other specimens examined (5) — EL SALVADOR: San Salvador; Crater El Bosquero (2 ♂, DTRG). MEXICO: Amecameca (1 ♂, NMNH).

Fig. 26. Drosophila hydoides Patterson & Wheeler (lectotype): a, male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.
**Strains examined (2)** — GUATEMALA: Antigua Road (2510.1), USA. Arizona: Chiricahua Mountains (AJ3y.9).

**Relationship** — It is closely related to *D. novemaristata* Dobzhansky & Pavan, from which it differs chiefly in the shape of aedeagus.

**Distribution** — sw. USA, Mexico, Guatemala, El Salvador (NEW RECORD).

**Note** — *D. nigrohydret* and *D. hydeoides* were synonymized on basis of morphological grounds (compare figures 25 and 26).

**Drosophila (Drosophila) novemaristata** Dobzhansky & Pavan
(Fig. 27)


**Type-Material** — Holotype male, labelled: "Huancayo Perú, IV — 943 / Drosophila novemaristata TYPE / HOLOTYPE". Paratypes (3 ♂, 1 ♀): same data as holotype. **Type-series in MZUSP (São Paulo)**. Holotype and male paratypes dissected. **Type-locality**: Huancayo, Junín, Peru.

**General characters** — Described by Dobzhansky & Pavan (1945).

**Genitalia ♂** — Epandrium with about 12 lower and 1 upper bristles. Cerci fused at lower 1/3. Surfylus with about 11 primary teeth and 10 marginal bristles (Fig. 27a).

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**Fig. 27.** *Drosophila novemaristata* Dobzhansky & Pavan (paratypes): a, male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.
Hypandrium shorter than epandrium.

Aedeagus with a pair of pointed, long spurs; posterior end ventrally expanded, split and weakly sclerotized at tip; dorsal leaf slightly longer than half length. Aedeagal apodeme anteriorly expanded, laterally flattened. Ventral rod about 3/4 length of gonopod. Gonopod with one tiny sensillum (Fig. 27b-d). Phallosomal index about 2.5.

Relationship — It is closely related to D. nigrohydei Patterson & Wheeler, from which it differs chiefly in the shape of aedeagus.

Distribution — The type-locality is the only site where this species has been collected.

THE MERCATORUM SUBGROUP

Species included (4) — Drosophila carcinophila Wheeler; D. mercatorum Patterson & Wheeler; D. paranaensis Barros; D. peninsularis Patterson & Wheeler.

Diagnosis — Costal index ranging from 2.0 to 2.8; testis with low number of coils, ranging from a total of 4 to 7; ventral receptacle short and with few coils, ranging from about 6 to 24; phallosomal index varying from 1.7 to 2.6. Anterior margin of cerci fused to posterior margin of epandrium in various degree; surstylus without secondary teeth and number of primary teeth ranging from 7 to 12; concha of hypandrium bare except in D. peninsularis; gonopod triangle-shaped and with one to two sensilla, linked to concha of hypandrium by membranous tissue.

Geographical distribution — D. mercatorum is semicosmopolitan; D. carcinophila is endemic to the West Indies; D. peninsularis occurs in the West Indies and Florida peninsula; D. paranaensis is to be found from 24°N (Mexico, Tamaulipas) to 27°S (Argentina, Chaco) of the New World.

Drosophila (Drosophila) carcinophila Wheeler

(Fig. 28)


Type-Material — Holotype male, labelled: "Drosophila carcinophila Wheeler;"
Drosophila carinata Grimshaw, 1901: 70 (synonymized by Hardy, 1965: 204). This name has been suppressed and placed on the Official Index ofRejected and Invalid Specific Names in Zoology with the Name Number 1023 (I.C.Z.N., 1977).

Drosophila (Drosophila) mercatorum Patterson & Wheeler, 1942: 93. This name has been placed on the Official List of Specific Names in Zoology with the Name Number 2525 (I.C.Z.N., 1977).

Drosophila (Drosophila) pararepleta Dobzhansky & Pavan, 1943: 52.

Drosophila (Drosophila) mercatorum pararepleta (change of status by Wharton, 1944c, 185).


Holotype male of subspecies \( D. m. pararepleta: \) "Mogi das Cruzes, São Paulo V., 1943 / Drosophila pararepleta TYPE / HOLOTIPO / (male genitalia in a small slide)". Paratypes (2 \( \delta \), 1 \( \Phi \) ); same data as holotype. Type-series in MZUSP (São Paulo). Type-locality: Mogi das Cruzes, São Paulo, Brazil.

Holotype of synonym \( D. carinata \) not designated; one female syntype in BMNH (London), according to Rocha Pité & Tsacas (1979). Type-locality: Kona, Hawaii I., Hawaii.

General characters — Described by Patterson & Wheeler (1942) and Dobzhansky & Pavan (1943).

Genitalia \( \delta \) — Epandrium with about 11 lower and 3 upper bristles. Ceri fused at lower half. Surstylus with about 12 primary teeth and 8 marginal bristles (Fig. 29a).

Epandrium as long as epandrium.

Aedeagus ventrally expanded, split at tip, with posterior ventral margin serrated; dorsal cleft with about 2/3 of length. Aedeagal apodeme anteriorly expanded, laterally flattened. Ventral rod slightly shorter than gonopod. Gonopod with one sensillum (Fig. 29b, d). Phallosoomal index about 2.6.

Other specimens examined (890): ARGENTINA: Catamarca: 2 Km N of La Viña (3 \( \delta \), IMI; 12 \( \delta \), MZUSP): Chaco: 10 Km N of Puerto Tirol (2 \( \delta \),
Fig. 29. *Drosophila mercatorum* Patterson & Wheeler: a (strain B13.1E), male genitalia, laterooblique aspect; b-d (strain E8.26A), acedangus, several aspects.
Drosophila (Drosophila) paraanaensis Barros (Figs. 30-32)


Type-Material — Holotype male, labelled: "Drosophila paraanaensis n. sp, Ros. Barros, holotipo / HOLOTIPO / (aedeagus in a small slide) / (epandrium in a small slide)". Allotype female and paratypes (4♂, 4♀): same data as holotype. Holotype, allotype and paratypes cited above in MZUSP (São Paulo). The original description also listed 10 other paratypes (5♂, 5♀) in "Museu Nacional do Rio de Janeiro" (Rio de Janeiro). Type-locality: Porto Capitão Heitor, Paraná, Brazil (I was not able to find this locality on maps).

Holotype male of synonym D. paraanaensis: "♂ D. paraanaensis. TIPO, Campo Grande, MT, col. S. Ferreira, 1973 / HOLOTIPO", dissected (Fig. 31). Paratypes (2♂, 2♀): same data as holotype. All specimens in MZUSP (São Paulo). The original description just cited one paratype, but I have found four specimens labelled as such. Type-locality: Campo Grande, Mato Grosso do Sul, Brazil.

Fig. 30. *Drosophila paraenseis* Barros (strain H400.8): male genitalia, latero-blique aspect.
**General characters** — Described by Barros (1930).

**Genitalia♂** — Epandrium with about 13 lower and 3 upper bristles. Cerci fused at lower 2/3. Surstylus with about 11 primary teeth and 8 marginal bristles (Fig. 30).

Hyandrium slightly shorter than epandrium.

Aedeagus ventrally expanded, sometimes split at tip, weakly sclerotized at dorsal end, with posterior ventral margin serrated and bearing a pair of tiny pointed spurs; dorsal cleft about 1/2 of length. Aedegal apodeme bent, laterally flattened. Ventril rod as long as gonopod. Gonopod with one sensillum. Phallosomal index about 2.1.

**Other specimens examined (51)** — BRAZIL (MZUSP): Amazonas: Humaitá (2♂); Bahia: 16 Km NW of Largo (1♂); D.F.: Brasilia (2♂); Goiás: 6 Km E of Luziania (4♂); Mato Grosso: Rio Cuiabá (10♂); Mato Grosso do Sul: 30 Km SW of B. Vista (1♂), 30 Km S of Campo Grande (15♂); Paraná: 12 Km NE of Cianorte (2♂, 2♀); Santa Catarina: Nova Teutônia (1♂); São Paulo: 10 Km N of Conchal (4♂), Rio Guaratuba (1♀), 2 Km NW of Piranununga (2♂); 5 Km SE of São Carlos (2♂), PARAGUAY: Guaira: Villarica (1♂), NMNH: TRINIDAD: Simla (1♂), NMNH.

**Specimens examined (16)** — BRAZIL: Mato Grosso do Sul: Campo Grande (3335.1, -2), COLOMBIA: Amazonas: Leticia (H435, 50, -60); Magdalena: S. N. of S. Marta (H186.33); Meta: Villavicencio (H194.44); Valle del Cauca: Palmira (H442.14), COSTA RICA: Heredia: Heredia (H75.10), Palmar de Norte (H400.8), EL SALVADOR: Chalatenango: La Palma (H62.31), MEXICO: Puebla: Teziutlan (2263.13), Veracruz: Minatitlan (H378.6), PANAMA: Canal Zone: Barro Colorado I. (4.89), Las Cruces Trail (H303.19), Chiriqui: Boquete (H407.119), TRINIDAD: Maravel (H332.11).

**Relationship** — It is closely related to *D. mercatorum* Patterson & Wheeler, from which it differs chiefly in the shape of aedagus.

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Fig. 31. *Drosophila paramecatorum* Magalhães & Malogolowkin-Cohen (holotype): a, male genitalia, lateroblique aspect; b-d, aedagus, several aspects.
Distribution — Mexico to Brazil, Paraguay (NEW RECORD), Argentina (Vilela et al., 1986).

Note — *D. paraanensis*, *D. parauncertum* and *D. pseudomercatorum* cross freely in both directions producing fertile offspring (Carson, personal communication) and show no morphological difference. Hence they were synonymized on basis of genetic and morphological grounds.

![Diagram of *Drosophila*](image)

**Fig. 32.** *Drosophila pseudomercatorum* Magalhães & Malogolowkin-Cohen (holotype): a, male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.

*Drosophila (Drosophila) peninsularis* Patterson & Wheeler
(Fig. 33)

*Drosophila (Drosophila) peninsularis* Patterson & Wheeler, 1942: 92.


**General characters** — Described by Patterson & Wheeler (1942).

**Genitalia ♂** — Eparandrium with about 14 lower and 3 upper bristles. Cerci fused at lower half. Sustylus with about 11 primary teeth and 10 marginal bristles (Fig. 33a).
Hypandrium shorter than epandrium; concha bearing one anterior bristle.
Aedeagus slightly incised at tip; dorsal cleft 5/7 of length. Aedeagal apodeme
rod-shaped. Ventral rod as long as gonopod. Gonopod with one sensillum (Fig.
33b-e). Phallosomal index about 1.7.

Other specimens examined (29) — USA: Florida: Highlands Co. (2 ♀, NMNH).
Royal Palm Pk. (2 ♂, NMNH). WEST INDIES: Cuba: Guantanamo (3 ♂, 
NMNH), Guantaramo (1 ♂, NMNH); Havana (2 ♂, NMNH); Heredia (3 ♂, 
AMNH); Jamaica: Runaway Bay (5 ♂, NMNH); Puerto Rico: Arecibo (9 ♂, 
AMNH).

Strains examined (2) — USA: Florida: Tarpon Springs (3371.2). WEST INDIES:
Puerto Rico: Rio Pedras Experimental Station (H130.3).

Relationship — It is related to D. carinipennis Wheeler, from which it differs 
chiefly in the number of primary teeth of surstylus and size of aedeagus.

Distribution — 66, USA, West Indies.

Note — Drosophila peninsularis, formerly a member of the mercatorum 
subgroup (Wharton, 1944) was transferred to the mulleri subgroup by Wheeler (1949) and 
later removed from it by Wasserman (1960) who, at that time considered it not 
assigned to any subgroup. Recently, Wasserman (1982) included it in the repleta 
subgroup. In spite of having 2nd and 3rd chromosomes not fused, D. peninsularis 
is morphologically closer to D. carinipennis Wheeler than to any other described 
species. D. peninsularis is hereby transferred back to the mercatorum subgroup 
where it seems to fit better.

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Fig. 33  Drosophila peninsularis Patterson & Wheeler (strain H130.3): a, male 
genitalia, lateroblique aspect; b-e, aedeagus, several aspects.
THE MULLERI SUBGROUP

Species included (38) — Drosophila aldrichii Patterson; D. anceps Patterson & Mainland; D. borborema Vieira & Sene; D. buzzatti Patterson & Wheeler; D. detritum Wasserman; D. eremophila Wasserman; D. hamatafalla Patterson & Wheeler; D. hexastigma Patterson & Mainland; D. leonis Patterson & Wheeler; D. longicornis Patterson & Wheeler; D. mainlandi Patterson; D. marrensis Wasserman & Wilson; D. malhisi, sp. nov.; D. meridiana Patterson & Wheeler; D. meridionalis Wasserman; D. mulleri Heed; D. mottavensis Patterson; D. mulleri Sturtevant; D. nigricurta Patterson & Mainland; D. nigrosplacca Patterson & Wheeler; D. pachucha Wasserman; D. pegasa Wasserman; D. promeridiana Wasserman; D. prosplacca Wasserman; D. racemosa Patterson & Mainland; D. richardsoni, sp. nov.; D. ritae Patterson & Wheeler; D. serido Vieira & Sene; D. spenceri Patterson; D. stalkeri Wheeler; D. starneri Wasserman, Koepfer & Ward; D. subviridis Patterson & Mainland; D. uniseta Wasserman, Koepfer & Ward; D. wheeleri Patterson & Alexander, and at least five undescribed species that will be described in the near future by different authors.

Diagnosis — Costal index ranging from 2.5 to 3.8; testis with few coils, ranging from 3 and 1/2 to 18; ventral receptacle short with few coils, ranging from 12 to 20; phallosomal index varying from 0.7 to 3.8. Anterior margin of cerci fused to posterior margin of epandrium in various degree (free in D. borborema, D. marrensis, D. serido and D. starneri); surstylus without secondary teeth (except in D. aldrichii, D. mulleri and D. wheeleri) and number of primary teeth ranging from 8 to 15; gonopod with one to two sensilla.

Geographical distribution — Members of this group are frequently associated with plant species of the family Cactaceae and are to be found from 37°N (United States, Utah) to 30°S (Argentina, La Rioja) of the New World and also in the West Indies. D. buzzatti and D. aldrichii are also present in other biogeographical regions where cacti have been introduced.

Drosophila (Drosophila) aldrichii Patterson
(Fig. 34)

Drosophila aldrichii Patterson in Patterson & Crow, 1940: 251.
Drosophila (Drosophila) aldrichii Patterson & Crow in Patterson & Wheeler, 1942: 94.


General characters — Described by Patterson & Wheeler (1942).

Genitalia α — Epandrium with about 9 lower and 2 upper bristles. Cerci fused at lower half. Surstylus with about 12 primary teeth, 3 bristle-shaped secondary teeth and 9 marginal bristles (Fig. 34a).

Hypantrium 1 and 1/2 longer than epandrium; conchia bearing one anterior bristle.

Aedeagus long, micropubescent at posterior ventral margin, split at tip; dorsal cleft about 2/3 of length. Aedeagal apodeme laterally flattened. Ventral rod about 3/4 length of gonopod. Gonopod with one sensillum (Fig. 34b-d). Phallosomal index about 2.3.

Other specimens examined (24) — BRAZIL: Amazonas: Humaitá (7 α, 2 η, MZUSP), Manaus (1 α, 1 η, MZUSP), Mato Grosso do Sul: near Corumbá (1 α, NMNH), Paranhós: 12 km NE of Clarônia (2 α, MZUSP); USA (NMNH): Texas: San Antonio (8 α, ), Victoria (2 α, ).

Strains examined (18) — EL SALVADOR: Usulutan: Puerto Trujillo (1152.12).
MEXICO: Cochitata: Pánuca (1781.4); D.F.; Mexico City (3267.1); Hidalgo: Venados (E43.1, -2, -2, -2); Nuevo Leon: Sabina Hidalgo (E4.1); Oaxaca: Tehuan-
tepec (W-8, 113.4), Totolapan (W-3); Puebla: Acatlan (W-5); Sonora: Alamos (E-37-3), Navojoa (E-2-5, b-3.1); Tamaulipas: Francisco Medrano (E-31-3). USA: Texas: Austin (?), Dilley (E-3.1), Lake Travis (E-1.1), Weslaco (E-3.1).

Relationship — It is closely related to D. wheeleri Patterson & Alexander, D. mulleri Sturtevant and one undescribed species from Venezuela. It differs from the latter two, but not from the former, chiefly in the shape of aedeagus.


Note — D. aldrichi was first recorded from Brazil in 1983 (Vilela et al.). However, the colonization of D. aldrichi in Brazil could have occurred much earlier if one considers that according to the label data, the specimen from Brazil (near Corumbá) cited above was collected in the State of Mato Grosso in 29. xii. 1919 by R. G. Harris.

![Fig. 34. Drosophila aldrichi Patterson (lectotype): a, male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.](image)

**Drosophila (Drosophila) aniceps Patterson & Mainland**

(Fig. 35)

*Drosophila (Drosophila) aniceps* Patterson & Mainland, 1944: 39.


General characters — Described by Patterson & Mainland (1944).
Fig. 35. *Drosophila aniceps* Patterson & Mainland (strain E13.2): a. male genitalia, lateroblique aspect; b-d. aedeagus, several aspects.

Fig. 36. *Drosophila bororema* Vilela & Sene (holotype): a, male genitalia, lateroblique aspect; b-d. aedeagus, several aspects.
Genitalia — Epandrium with about 10 lower and 2 upper bristles. Cerci fused at lower half. Surstylus with about 10 primary teeth and 8 marginal bristles (Fig. 35a).

Hyandrium as long as epandrium; concha bearing one anterior bristle.

Aedeagus dorsoventrally flattened, with posterior dorsal margin slightly serrated; dorsal cleft about 1/2 of length. Aedeagal apodeme bent, laterally flattened. Ventral rod absent. Gonopod with one sensillum (Fig. 53b-c). Phalloesial index about 1.8.

Other specimens examined (10, DTRC) — MEXICO: Puebla: Petatlancingo (3♂, 5♀; 1380.13).

Strains examined (2) — MEXICO: Oaxaca (1803.14b); Pachuca: Hidalgo (E15.2).

Distribution — Mexico.

**Drosophila (Drosophila) horboreuma** Vilela & Sene
(Fig. 56)


Type-Material — Holotype male, labelled: "BRASIL — BA, 3 Km NW of Milagres, 12°51'S, 39°53'W, Sene et alii col. 24. xi - 3. xii. 1976 / HOLOTIPO Drosophila horboreuma ♂ "", dissected. Paratypes (13♂, 1♀; one dissected): same data as holotype. All specimens in MZUSP (São Paulo). Type-locality: 3 Km NW of Milagres, Bahia, Brazil.


Genitalia — Epandrium with about 8 lower and none upper bristles. Cerci not fused. Surstylus with about 9 primary teeth and 7 marginal bristles (Fig. 36a).

Hyandrium shorter than epandrium; concha bare.

Aedeagus splitted about 1/4 of length, with posterior dorsal margin serrated, laterally covered with tiny teeth at posterior end, ventrally expanded; dorsal cleft about 1/2 of length. Aedeagal apodeme anteriorly bent, laterally flattened. Ventral rod as long as gonopod. Gonopod with one sensillum (Fig. 56b-c). Phalloesial index about 2.2.

Other specimens examined (98, MZUSP) — BRAZIL: Bahia: 15 Km E of America Dourada (10♂, 1♀); 3 Km NW of Milagres (20♂); Cachoeira dos Monteuros (24♂), 9 Km NW of Paulo Afonso (2♀); Paraíba: 1 Km E of Ilumco do Seridó (35♂); Pernambuco: 5 Km NW of Petrolina (1♂, 2♀); Rio Grande do Norte: 7 Km SW of Bom Jesus (3♀).


Relationship — It is closely related to *D. serido* Vilela & Sene, from which it differs chiefly in the shape of aedeagus.

Distribution — ne. Brazil.

**Drosophila (Drosophila) buzzatii** Patterson & Wheeler
(Fig. 37)


*Drosophila (Drosophila) buzzatii* (SIC), Spleid, 1952.


*Drosophila (Drosophila)* sp 18, David & Tscas, 1975 (personal communication of L. Tscas).

Type-Material — Lectotype male (HERE DESIGNATED), labelled: "*D. buzzatii* (SIC) ♂, Cordoba, Argentina, S. Horowitz col., 1939 TYPE / LECTOTYPE Drosophila buzzatii Patterson & Wheeler by C. R. Vilela", cited as holotype by

Type and cotype of synonym D. tigrina not analyzed, in "Istituto di Zoologia e Genetica della R. Università di Pavia" (Italy). Type-locality: Trapani, Sicily, Italy.

Holotype of synonym D. versicolor not analyzed, in Australian Museum (Sydney). Paratypes (2 \( \sigma^* \), 2 \( \varphi \)) in NMNH (Washington, D.C.). Type-locality: Moggill, Queensland, Australia.

General characters. — Described by Patterson & Wheeler (1942).

Genitalia \( \varphi \) — Epandrium with about 11 lower and none upper bristles. Cerci fused at lower 2/3. Surstylus with about 11 primary teeth and 10 marginal bristles (Fig. 37a).

Hypandrium about 3/4 length of epandrium; concha bare.

Aedeagus slightly invaginated at tip; dorsal cleft about 2/3 of length. Aedeagal apodeme bent, laterally flattened. Ventral rod as long as gonopod. Gonopod with one sensillum (Fig. 37b-d). Phallosommal index, about 2.0.

Other specimens examined (157) — ARGENTINA: Catamarca: 2 Km N of La Viña (3 \( \sigma^* \), 3 \( \varphi \), IML; 10 \( \sigma^* \), 10 \( \varphi \), MZUSP); Chaco: 10 Km N of Puerto Tirol (5 \( \sigma^* \), 3 \( \varphi \), IML; 13 \( \sigma^* \), 6 \( \varphi \), MZUSP), 7 Km NE of Resistencia (3 \( \sigma^* \), IML; 5 \( \varphi \), MZUSP); La Rioja: 14 Km SE of Catanzaco (3 \( \sigma^* \), 3 \( \varphi \), IML; 10 \( \sigma^* \), 10 \( \varphi \), MZUSP), 5 Km S of Chilicito (3 \( \sigma^* \), 3 \( \varphi \), IML; 10 \( \sigma^* \), 10 \( \varphi \), MZUSP), 4 Km S of Famatina (3 \( \sigma^* \), 3 \( \varphi \), IML; 10 \( \sigma^* \), 10 \( \varphi \), MZUSP), 8 Km S of Famatina (1 \( \sigma^* \), 1 \( \varphi \), IML; 12 \( \sigma^* \), 2 \( \varphi \), MZUSP), 3

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Fig. 37. Drosophila buzzatti Patterson & Wheeler (strain 1732.4): a, male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.
Drosophila (Drosophila) desertorum Wasserman
(Fig. 38)


Fig. 38. Drosophila desertorum Wasserman (strain E42.1-2): a, male genitalia, lateroblique aspect; b, internal male genitalia, lateroblique aspect; c-e,edeagus, several aspects.
General characters — Described by Wasserman (1962c).

Genitalia ♂ — Epandrium with about 12 lower and 1 upper bristles. Cerci fused at lower 2/3. Surstylus with about 13 primary teeth and 11 marginal bristles (Fig. 38a).

Hypandrium as long as epandrium; concha bare, posteriorly expanded and serrated at posterior inner margin (Fig. 38b).

Aedeagus with two pairs of posterior tiny spurs and slightly invaginated at tip; dorsal cleft shorter than length. Aedeagal apodeme bent, laterally flattened. Ventral rod posteriorly expanded, about 1 and 1/2 longer than gonopod. Gonopod with one sensillum (Fig. 38c-e). Phallosomal index about 1.7.

Strain examined — MEXICO: Hidalgo: San Pedro Mines (F42.1-2).

Distribution — Mexico.

**Drosophila (Drosophila) eremophila** Wasserman
(Fig. 39)


*Drosophila (Drosophila) eremophila* Wasserman, 1962c: 94.


General characters — Described by Wasserman (1962c).

Genitalia ♂ — Epandrium with about 14 lower and 1 upper bristles. Cerci fused at lower half. Surstylus with about 12 primary teeth and 8 marginal bristles (Fig. 39a).

Hypandrium about 2/3 length of epandrium; concha bearing one anterior bristle.

Aedeagus micropubescent at posterior ventral margin, posteriorly expanded; dorsal cleft about 3/4 of length. Aedeagal apodeme rod-shaped. Ventral rod about 1/3 length of gonopod, laterally flattened. Gonopod posteriorly pointed.

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Fig. 39. *Drosophila eremophila* Wasserman (strain E52.7): a, male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.
with two tiny sensilla: fused to concha (Fig. 39b-d). Phallosomal index about 2.4.
Strains examined (2) — MEXICO: Puebla: Acatlan (H381.22A); Tamaulipas:
Gueyaveo (E52.7).
Relationship — It is related to D. metleri Neid, from which it differs chiefly in
the shape of aedeagus.
Distribution — Mexico.

Drosophila (Drosophila) hamatofila Patterson & Wheeler
(Fig. 40)

Drosophila (Drosophila) hamatofila (SIC), Hsu, 1949.

Type-Material — Lectotype male (HERE DESIGNATED), labelled: "D. hamato-
fila ♂, Round Rock Tex., J. T. Patterson coll., 1940, TYPE / LECTOTYPE
Drosophila hamatofila Patterson & Wheeler by C.R. Vilula". Paralectotype female
(HERE DESIGNATED): "$D. hamatofila ♀ / PARALECTOTYPE Drosophila
hamatofila Patterson & Wheeler by C.R. Vilula". Both specimens in AMNH
(New York). Type-locality: Round Rock, Texas, USA.
General characters — Described by Patterson & Wheeler (1942).
Genitalia ♂ — Epandrium with about 8 lower and 1 upper bristles. Ceri fused.
Surstylius with about 12 primary teeth and 7 marginal bristles (Fig. 40a).
Hyandrium shorter than epandrium; concha bearing one anterior bristle.
Aedeagus pointed at tip, laterally rough in anterior region; dorsal cleft about
as long as aedeagus. Aedeagal apodeme anteriorly expanded. Ventral rod slightly
shorter than gonopod. Gonopod with two sensilla (Fig. 40b-c). Phallosomal index
about 2.3.
Other specimens examined (3, NMNH) — USA: Arizona: Tucson (1 ♂ ); Cali-
ifornia: Vermonet (1 ♂ ); Texas: San Antonio (1 ♂ ).
Strains examined (3) — USA: Arizona: Portal (E32.2); Texas: Fort Davis (1981.1).
MEXICO: Baja California: Ensenada (E10.7).

Fig. 40. Drosophila hamatofila Patterson & Wheeler: a (strain E32.2), male
genitalia, latero-oblique aspect; b-e (strain E10.7), aedeagus, several as-
pects.
Drosophila (Drosophila) hexastigma Patterson & Mainland
(Fig. 41)

Drosophila (Drosophila) hexastigma Patterson & Mainland, 1944: 43.


**General characters** — Described by Patterson & Mainland (1944).

**Genitalia ♂** — Epandrium with about 9 lower and 4 upper bristles. Cerci fused at lower 1/3. Surstylus with about 10 primary teeth and 9 marginal bristles; dorsal region strongly sclerotized (Fig. 41a).

Hypantrium as long as epandrium; concha posteriorly rough, bearing one anterior bristle.

Aedeagus with a rectangle-shaped ventral expansion; dorsal cleft about 3/4 of length. Aedeagal apodeme slightly bent. Ventral rod as long as gonopod. Gonopod with one sensillum (Fig. 41b-d). Phallosomal index about 2.0.

**Other specimens examined** — MEXICO: Oaxaca; Oaxaca (1 ♂, DTRC).

**Strain examined** — MEXICO: San Luis Potosi; San Luis Potosi (E30.1).

**Distribution** — Mexico.

Drosophila (Drosophila) leonis Patterson & Wheeler
(Fig. 42)

Drosophila (Drosophila) leonis Patterson & Wheeler, 1942: 82.


**General characters** — Described by Patterson & Wheeler (1942).

**Genitalia ♂** — Epandrium with about 8 lower and 1 upper bristles. Cerci fused. Surstylus with about 10 primary teeth and 10 marginal bristles (Fig. 42a).

Hypantrium slightly shorter than epandrium; concha with one anterior bristle.

Aedeagus ventrally expanded, dorsally covered with tiny teeth on middle region, split at tip. Dorsal cleft about half of length. Aedeagal apodeme laterally flattened. Ventral rod absent. Gonopod with one sensillum (Fig. 42b-d). Phallosomal index about 2.3.

**Distribution** — Mexico.

Drosophila (Drosophila) longicornis Patterson & Wheeler
(Fig. 43)

Drosophila (Drosophila) longicornis Patterson & Wheeler, 1942: 90.


**General characters** — Described by Patterson & Wheeler (1942).

**Genitalia ♂** — Epandrium with about 14 lower and 2 upper bristles. Cerci fused at lower half. Surstylus with about 11 primary teeth and 8 marginal bristles (Fig. 43a).

Hypantrium longer than epandrium; concha bearing one anterior bristle.

Aedeagus pubescent and expanded at posterior ventral region, serrated at tip. Dorsal cleft as long as aedeagus. Aedeagal apodeme laterally flattened. Ventral
Fig. 41. *Drosophila hexastigma* Patterson & Mainland (strain E30.1): a, male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.

Fig. 42. *Drosophila leonis* Patterson & Wheeler (lectotype): a, male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.
Fig. 43. *Drosophila longicornis* Patterson & Wheeler (labeled type): a. male genitalia latero-roblique aspect; b-d. aedeagus, several aspects.

Fig. 44. *Drosophila mainlandi* Patterson (strain A519.2): a. male genitalia, latero-roblique aspect; b-d. aedeagus, several aspects.
rod about 3/4 length of gonopod. Gonopod with one sensillum (Fig. 43b-d). Phallosomal index about 2:1.

Other specimens examined (4, NMNH) — USA: Texas: San Antonio (4♂️). Strains examined (10) — USA: Arizona: Tucson (A286); Texas: Austin (E25.1F, 2513.1); MEXICO: Coahuila: Cuatro Ciéregas (E67.6, -6.0, -6G); Hidalgo: San Pedro Mines (E47.36E, E26.12); San Luis Potosí: San Luis Potosí (E30.6); Sonora: Alamos (E37.2).

Relationship — It is closely related to D. mainlandi Patterson, D. pachucha Wasserman and D. propachucha Wasserman. It differs from the former chiefly in the shape and size of aedeagus; however, I was not able to find differences from the latter two, with which it may be conspecific.


**Drosophila (Drosophila) mainlandi** Patterson (Fig. 44)

*Drosophila (Drosophila) mainlandi* Patterson, 1943: 147.

Type-Material — Not located, probably lost. Type-locality: Bel, California, USA.

General characters — Described by Patterson (1943). Gentilula ♂️ — Epandrium with about 15 lower and 1 upper bristles. Cerci fused at lower 4/5. Sursystylus with about 11 primary teeth and 8 marginal bristles (Fig. 44a).

Hypantrum twice as long as epandrium; concha bearing one anterior bristle.

Aedeagus ventrally pubescent at middle region and tip; dorsal cleft as long as aedeagus. Aedeagal epipyleum laterally flattened. Ventral rod about 2/3 length of gonopod. Gonopod with one sensillum (Fig. 44b-d). Phallosomal index about 2:1.

Specimen examined — USA: California: Los Angeles (1♂️, NMNH). Strain examined — MEXICO: Baja California: Arroyo Socorro (A519.2).

Relationship — My comments under *D. longicornis* apply here too.


**Drosophila (Drosophila) martensis** Wasserman & Wilson (Fig. 45)

![0.1 mm](image)

Fig. 45. *Drosophila martensis* Wasserman & Wilson (strain 511.3A): a. male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.

Type-Material — Holotype male, labelled: "martensis / HOLOTYPE / Santa Marta, Colombia / H188.12 σ 6 " , in NMNH (Washington, D.C.), Paratype (4 σ 5 Φ ); same data as holotype, in DTRC (Austin). Type-locality: Santa Marta, Magdalena, Colombia.


Genitalia σ 6 — Epandrium with about 12 lower and 1 upper bristles. Cerci not fused. Surstylus with about 11 primary teeth and 9 marginal bristles; dorsal region strongly sclerotized (Fig. 45a).

Hypandrium shorter than epandrium; concha bare, posteriorly rough.

Aedeagus laterally serrated at middle region; ventrally expanded, slightly invaginated at tip; dorsal cleft about half of length. Aedeagal apodeme bent, laterally flattened. Ventral rod as long as gonopod. Gonopod with one sensillum (Fig. 45b-d).

Phallosomal index about 1.5.

Strains examined (3) — COLOMBIA: Magdalena; Santa Marta (H188.12). VENEZUELA: Anzoategui; Barcelona (511.3A); Lara; Barquisimeto (H208.1).

Distribution — Colombia, Venezuela.

Drosophila (Drosophila) mathisi, sp. nov.

(Fig. 46)


Fig. 46  Drosophila mathisi, sp. nov.: a (holotype), male genitalia, lateroblique aspect; b-d (paratype), aedeagus, several aspects.
Undescribed from Arizona, Wasserman, 1982.
Undescribed M2, Pereira et al., in press.


External characters of imagines ♂ — Arista with 3-4 dorsal and 2-3 ventral branches plus terminal fork. Antennae brown, pollinose. Front brown, pollinose, anteriorly lighter; orbits gray. Ocellar triangle dark brown. Middle and posterior orbital, verticals and postverticals arising from brown spots. Middle orbital about 1/2 of other two. Second ocellar about half of first. Face yellow. Carina expanded at lower portion, sulcate. Palpi pollinose, light yellow, with bristles on ventral surface. Cheeks light brown, their greatest width 1/3 greatest diameter of eyes. Eyes red, with short black piles.

Acrostichal hairs in 8 irregular rows. No prescutellars. Anterior scutellars convergent. Mesonotum brown, pollinose; bristles arising from dark brown spots; middle region with one narrow gray stripe. Scutellum brown with bristles arising from dark brown spots. Pleurae brown with an upper dark brown stripe from base of first coxae to halteres. Sterno index about 0.7. Halteres yellow. Coxae yellow, femora yellow with one brown ring. Tibiae yellow with two brown rings; first to third tarsi yellow, fourth and fifth brown. Apical bristles on first and second tibias, preapicals on all three.

Abdomen yellow, tergites with an medianly enlarged and interrupted posterior brown band which bends toward and reaches anterior margin at angle of tergite; lateral areas solid in color.

Wings clear. Costal index about 3.1; 4th vein index about 1.7; 5th index about 1.4; 4c index about 0.8; M index about 0.9. Third costal section with heavy bristles on its basal half.

Wing length about 2.2 mm.

Internal characters of imagines and genitalia (♂) — Testis with 2 outer and 1 and 1/2 inner coils. Epandrium with about 12 lower and 3 upper bristles. Cerci fused at lower 2/3. Surstylus with about 15 primary teeth and 6 marginal bristles (Fig. 46a).

Hypandrium as long as epandrium; concha bearing one anterior bristle.

Aedeagus pointed and slightly bifid at tip, dorsal margin slightly serrated at middle region; dorsal cleft slightly shorter than length. Aedeagal apodeme bent, laterally flattened. Ventral rod as long as gonopod. Gonopod with one sensillum; dorsal region irregular and weakly sclerotized (Fig. 46b-d). Phallosomal index about 2.4. (♀) — Ventral receptacle with about 15 coils.

Eggs, puparia — Not known.

Chromosomes — Metaphase plate shows five pair of rods, one pair of dots. The X chromosome is a rod and the Y is L-shaped.

Strains examined (2) — USA: Arizona: Patagonia (A64); New Mexico: Whitewater (2360.2).

Relationship — It belongs to the mulieri subgroup of the repleta group. It is related to D. ritaё Patterson & Wheeler, from which it differs chiefly in the shape of aedeagus.

Distribution — USA (Arizona, New Mexico).

Etymology — Named after Wayne N. Mathis from the National Museum of Natural History, Smithsonian Institution (Washington, D.C.).

Note — The data on chromosomes, testis and ventral receptacle represent my interpretation of those from Wasserman (1962c) who misidentified D. mathisi (then undescribed) as D. ritaё Patterson & Wheeler.

Drosophila (Drosophila) meridiana Patterson & Wheeler
(Fig. 47)

Drosophila (Drosophila) meridiana rioensis Patterson, 1943: 152.

Types of subspecies D.m. rioensis not located, probably lost. Type-locality: Eagle Pass, Texas, USA.

General characters — Described by Patterson & Wheeler (1942) and Patterson (1943).

Genitalia ♀ — Epandrium with about 9 lower and 2 upper bristles. Cerci fused at lower half. Surnstylus with about 11 primary teeth and 7 marginal bristles (Fig. 47a).

Hypantrium about 2/3 length of epandrium: concha bare.

Aedeagus splitted at tip, laterally micropubescent at posterior end, ventrally expanded at middle region. Aedeagal apodeme bent, rod-shaped. Ventral rod as long as gonopod. Gonopod with one sensillum (Fig. 47b-d). Phallosomal index about 1.6.

Other specimens examined (3, AMNH) — USA: Texas: Brownsville (3 ♂♂).

Strains examined (2) — MEXICO: Puebla: Acatlan (H381.8), USA: Texas: Palmetto State Park (E64.1).

Relationship — It is closely related to D. meridionalis Wasserman and D. promeridiana Wasserman, from which it slightly differs in the shape of aedeagus.

Distribution — sw. USA, n. Mexico.

Fig. 47. Drosophila meridiana Patterson & Wheeler (lectotype): a. male genitalia, lateroblique aspect; b-d. aedeagus, several aspects.
Drosophila (Drosophila) meridionalis Wasserman

(Fig. 48)

Drosophila (Drosophila) sp E. Viella et al., 1980.

Type-Material — Holotype male, labelled: "HOLOTYPE / 2507.21 / D. meridionalis / Angra dos Reis, São Paulo (SIC), Brazil", in NMNH (Washington, D.C.). Paratypes (4 ♂ , 5 ♀ ; one male dissected): same data as holotype, in DTRC (Austin). Type-locality: Angra dos Reis, Rio de Janeiro, Brazil.

General characters — Described by Wasserman (1962c).

Genitalia ♂ — Epandrium with about 5 lower and 3 upper bristles. Ceri fused at lower half. Sustylus with about 11 primary teeth and 8 marginal bristles (Fig. 48a).

Hypantrium about 2/3 length of epandrium; concha bare.

Aedeagus split at tip, laterally micropubescent at posterior end, ventrally expanded at middle region. Aedeagal apodeme bent, rod-shaped. Ventral rod as long as gonopod. Gonopod with one sensillum (Fig. 48b-d). Phallosomal index about 1.3.

Other specimens examined (124) — ARGENTINA: Catamarca: 2 Km N of La Viña (2 ♂ , 5 ♀ , MZUSP); Chaco: 7 Km NE of Resistencia (2 ♀ , MZUSP), 10 Km N of Puerto Tirol (3 ♂ , 1ML; 8 ♂ , 5 ♀ , MZUSP); Santiago del Estero: 3 Km SW of Santa Catalina (1 ♂ , MZUSP), BRAZIL (MZUSP): Bahia: Cachoeira dos Monteiros (1 ♂ ); Espírito Santo: Vitória (1 ♂ ); Mato Grosso do

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Fig. 48. Drosophila meridionalis Wasserman: a (strain 2507.21), male genitalia, lateroblique aspect; b-d (paratype), aedeagus, several aspects.
Sul: 30 Km of Miranda (3 μm), 48 Km NW of Miranda (1 μm); Minas Gerais: 11 Km NW of Cardeal Mota (1 μm); Paraíba: 10 Km SE of S. José de Espinharas (1 μm); Paraná: 12 Km NW of Guarani (2 μm); Rio Grande do Sul: 4 Km E of Capão da Canoa (4 μm), 14 Km NW of Ibaguari (2 μm); Torres (7 μm, 1 μm); 6 Km E of Treman-dai (4 μm); Rio de Janeiro: Arraial do Cabo (29 μm), 2 Km N of Barra de São João (1 μm); Santa Catarina: Ilha Velha (5 μm, 1 μm), 7 Km N of Pântano do Sul (2 μm); São Paulo: 6 Km NW of Cubreúva (14 μm), 6 Km Guatauba (7 μm). PARAGUAY (MZUSP). Asuncion: 5 Km SE of Bella Vista (1 μm).

Strain examined — BRAZIL: Rio de Janeiro: Angra dos Reis (2507.21).

Relationship — My comments under D. meridiana apply here too.

Distribution — Brazil, Paraguay (NEW RECORD), Argentina (as D. sp. E, Vilela et al., 1980).

Note — As far as the genitalia is concerned, the specimens dissected in 1979 from the strain (type-strain) cited above are somewhat different from the paratype obtained from the same strain more than twenty years ago. Whether this is a case of contamination or modification under laboratory conditions remains an open question.

**Drosophila (Drosophila) mettleri** Heed

(Fig. 49)

*Drosophila (Drosophila)* nigrospiraculata-like, Heed et al., 1962.
*Drosophila (Drosophila)* undescribed species, Kaneshiro et al., 1973.
*Drosophila (Drosophila)* sp M, Heed et al., 1976.

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**Fig. 49.** *Drosophila mettleri* Heed (strain H52.2): a. male genitalia, latero-oblique aspect; b-d, aedeagus, several aspects.

General characters — Described by Heed (1977).

Genitalia ♂ — Epandrium with about 10 lower and 2 upper bristles. Cerci fused at lower half. Surstylus with about 11 primary teeth and 12 marginal bristles (Fig. 49a).

Hypandrium about 2/3 length of epandrium; concha bearing one anterior bristle.

Aedeagus slightly split at tip, expanded and micropubescent at posterior end. Aedengal apodeme anteriorly expanded. Ventral rod weakly sclerotized, as long as gonopod, with which is posteriorly fused. Gonopod with two tiny sensilla, fused to concha (Fig. 49b-d). Phallosomal index about 3.8.

Strain examined — USA: Arizona: Tucson (H52.2).

Relationship — It is related to D. eremophila Wasserman, from which it differs chiefly in the shape of aedeagus.

Distribution — sw. USA, n. Mexico.

**Drosophila (Drosophila) mojavensis** Patterson
(Figs. 50, 51)

*Drosophila (Drosophila) mojavensis* Patterson in Patterson & Crow, 1940: 251.

*Drosophila (Drosophila) mojavensis* (change of status by Patterson & Wheeler, 1942: 95).

*Drosophila (Drosophila) arizonensis* Patterson & Wheeler, 1942: 96 nec other American authors (synonymized by Vilela In Wheeler, 1961b: 19).


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Fig. 50. *Drosophila mojavensis* Patterson (lectotype): a, male genitalia, latero-blique aspect; b-d, aedeagus, several aspects.


Types of subspecies *D.m. baja* not located, probably lost. Type-locality: not stated (Baja California, Mexico is implied).

**General characters** — Described by Patterson & Wheeler (1942).

**Genitalia ♂** — Epandrium with about 10 lower and 3 upper bristles. Cerci fused at lower half. Sursylus with about 12 primary teeth and 8 marginal bristles; ventral region weakly sclerotized (Fig. 50a).

Hyandrium as long as epandrium; concha bearing one anterior bristle.

Fig. 51. *Drosophila arizonensis* Patterson & Wheeler (lectotype): a, male genitalia, laterooblique aspect; b-d, acedeagus, several aspects.
Aedeagus pointed, weakly sclerotized at tip with a pair of bent, ventrally fused spurs; dorsal cleft about 5/6 of length. Aedeagal apodeme laterally flattened. Ventral rod about half length of gonopod. Gonopod with one sensillum (Fig. 50b-d). Phallicosomal index about 2.9.

Strains examined (20) — MEXICO: Baja California: Ensenada (E10.1); San Borja (A350); San Felipe (A211); Todos Santos (A374); Baja California Sur: Cuñao (A202); Punta Conepeter (A352); Punta Pescadero (A372); San Ignacio (A367); San Lucas (A422); Gulf of California: San Esteban I. (A132); Tiburon I. (A123.1); Sinaloa: Los Mochis (A337); Sonora: Cabo de Gata (A319); El Desemboque (A361); Esperanza (A116.4); Hermosillo (A240); Rio Bavispe (A130.1). USA: Arizona: Senita Basin (A360); California: Anza Borrego Desert (3340.4), Chocolate Mountains, Riverside Co. (2533.1).

Relationship — It is closely related to D. arizonensis sensu American authors (an undescribed species mac Patterson & Wheeler, 1942), from which it differs chiefly in the shape of aedeagus.

Distribution — w. USA, n.w. Mexico.

Notes — D. mojavensis mojavensis has also been called D. mojavensis race A (Mettler & Nagle, 1966) and occurs in deserts of Southern California and Northern Baja California. D. m. baja is also known as D. mojavensis race B. (Mettler & Nagle, 1966) and occurs in two geographically distinct zones: 1) Southern Arizona, Sonora and Northern Sinaloa (subrace B1; Zouros, 1973); 2) Baja California and Gulf of California Islands (subrace B11; Zouros, 1973).

D. arizonensis sensu American authors is an undescribed and extensively-studied species of the repelata group which has been misidentified as D. arizonensis Patterson & Wheeler for about 40 years. As shown by the analysis of the lecto-

Fig. 52. Drosophila mulleri Sturtevant: a (strain 3370.1), male genitalia, lateral-blique aspect; b-d (strain H409.16), aedeagus, several aspects.
Drosophila (Drosophila) mulleri Sturtevant

(Fig. 52)

_Drosophila repleta_ variety a, Metz, 1916b.
_Drosophila (Drosophila) mulleri_, Sturtevant, 1939: 139.

**Type-Material** — Holotype male, labelled: "_Drosophila mulleri_ Sturtevant / ac. 5497 / TYPE / Houston, Tex. 1915", in AMNH (New York). Paratypes 1 ♂, in DTRC (Austin); 1 ♀, in NMNH (Washington, D.C.): same data as holotype.

**Type-locality:** Houston, Texas, USA.

**General characters** — Described by Sturtevant (1921), redescribed by Patterson (1943).

**Genitalia ♂** — Epandrium with about 8 lower and one upper bristles. Cerci fused at lower 2/3. Sustylus with about 10 primary teeth, 10 secondary teeth and 8 marginal bristles (Fig. 52a).

**Hypantrium** slightly shorter than epandrium; concha bearing one anterior bristle.

**Fig. 52.** _Drosophila nigricruris_ Patterson & Mainland (strain H75.11): a, male genitalia, latero-oblique aspect; b-d, aedeagus, several aspects.
Aedeagus slightly bifid at tip, ventrally expanded, micropubescent at posterior ventral margin; dorsal cleft about 1/3 of length. Aedegal apodeme laterally flattened. Ventral rod about 2/3 length of gonopod. Gonopod with one sensillum (Fig. 52b-d). Phallosomal index about 1.7.

Other specimens examined (5, NMNH) — USA: Florida: Saint Augustine (1 ♂); Texas: Camp Stanley, Bexar Co. (1 ♂), San Antonio (3 ♂). Strains examined (2) — HAITI: Petionville (H409.16). USA: Texas: Roy Farm Austin (3370.1).

Relationship — It is closely related to D. aldrichi Patterson and D. wheeleri Patterson & Alexander, from which it differs chiefly in the shape of aedeagus and number of secondary teeth of surstylus.

Distribution — s. USA, Mexico, West Indies (Jamaica, Cuba, Haiti (Wasserman, 1882)).

**Drosophila (Drosophila) nigricurra** Patterson & Mainland

(Fig. 53)


**Type-Material** — Not located, probably lost. Type-locality: El Mediuñena; Jalisco, Mexico.

Types of synonym *D. hoekeri* not analyzed, in “Facultad de Medicina, Universidad de Chile” (Santiago). Type-locality: Azapa, Arica, Chile.

**General characters** — Described by Patterson & Mainland (Patterson, 1943).

**Genitalia♂** — Epandrium with about 11 lower and 2 upper bristles. Cereri fused at lower half. Surstylus with about 8 primary teeth and 8 marginal bristles (Fig. 53a).

Hypandrium slightly shorter than epandrium; concha bearing one anterior bristle.

Aedeagus pointed, ventrally expanded, slightly bifid at tip and serrated at posterior ventral margin; dorsal cleft about 3/5 of length. Aedegal apodeme bent, laterally flattened. Ventral rod slightly shorter than gonopod. Gonopod with one sensillum (Fig. 53b-d). Phallosomal index about 1.5.

**Specimens examined (18) — BRAZIL (MZUSP): Bahia: 61 Km W of Barreiras (1 ♂); Minas Gerais: 27 Km NW of Cardeal Mota (1 ♂), São Paulo: 10 Km N of Conchal (5 ♂, 7 ♂), 2 Km NW of Piraquiuanga (3 ♂). GUATEMALA (NMNH): Guatemala City (1 ♂).**

**Strains examined (4) — COSTA RICA: Heredia: Heredia (H75.11). MEXICO: Michoacan: Morelia (1796.2). Puebla: Tehuacan (2261.7). PERU: Lima: Lima (2595.1).**

**Distribution** — Mexico to Chile, Brazil (Dobzhansky & Pavan, 1950).

**Drosophila (Drosophila) nigrosquarula** Patterson & Wheeler

(Fig. 54)

*Drosophila (Drosophila) nigrosquarula* Patterson & Wheeler, 1942: 81.


**General characters** — Described by Patterson & Wheeler (1942).

**Genitalia♂** — Epandrium with about 8 lower and none upper bristles. Cereri fused at lower half. Surstylus with about 12 primary teeth and 14 marginal bristles (Fig. 54a).
Hymenidium shorter than epandum; concha bare.

Aedeagus pointed at tip and at middle dorsal region; dorsal cleft about 3/5 of length. Aedeagal epandrium dorsoventrally flattened. Ventral rod rudimentary. Gonopod with one sensillum (Fig. 54b-d). Phallosomal index about 3.2.


Distribution — sw. USA, n. Mexico.

**Drosophila (Drosophila) pachuca Wasserman**

(Fig. 55)


General characters — Described by Wasserman (1962c).

Genitalia ♀ — Very similar to *D. longicornis* Patterson & Wheeler (Fig. 55a-d).

Strains examined (15) — MEXICO: Hidalgo: Pachuca (E16.1, -1A; E29.17; 401.

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**Fig. 54.** *Drosophila nigrospiracula* Patterson & Wheeler (strain A42.2A): a, male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.
Drosophila (Drosophila) pegasa Wasserman

(Fig. 56)


General characters — Described by Wasserman (1962c).
Genitalia ♂♂ — Epandrium with about 7 lower and none upper bristles. Cerci fused at lower 4/5. Surstylus with about 15 primary teeth and 6 marginal bristles (Fig. 56a).

Hypantrium slightly shorter than epandrium; concha bearing one anterior bristle.

Aedeagus ventrally expanded, weakly sclerotized at posterior end, slightly bifid and narrowed at tip, micropubescent at posterior ventral margin, dorsal cleft about 3/4 of length. Aedeagal apodeme anteriorly expanded, laterally flattened. Ventral rod about half length of gonopod. Gonopod with one sensillum (Fig. 56b-d). Phallosomal index about 2.6.
Strain examined — MEXICO: Hidalgo: Pachuca (2519.14).
Distribution — Mexico.

Fig. 56. Drosophila pegasa Wasserman (strain 2519.14): a, male genitalia, latero-blique aspect; b-d, aedeagus, several aspects.

Drosophila (Drosophila) promeridiana Wasserman
(Fig. 57)

Drosophila (Drosophila) sp C. Wasserman, 1960.


General characters — Described by Wasserman (1962c).

Gentilia ♂ — Epandrium with about 7 lower and none upper bristles. Cerci fused at lower 2/3. Surstylus with about 12 primary teeth and 5 marginal bristles (Fig. 57a).

Hypantrium about 2/3 length of epandrium; concha here.

Aedeagus slightly different of that of D. meridionalis (Fig. 57b. c). Phalloosomal index about 1.1.

Strain examined — COLOMBIA: Valle del Cauca: Palmira (H318.4).
Relationship — It is closely related to D. meridiana Patterson & Wheeler and D. meridionalis Wasserman, from which it slightly differs in the shape of aedeagus.

Distribution — Presently known from the type-locality only.
Fig. 57. Drosophila promeridiana Wasserman (paratypes): a. male genitalia, laterolobique aspect; b, c, aedeagus, two aspects.

**Drosophila (Drosophila) propachucha Wasserman**
(Fig. 58)


**General characters** — Described by Wasserman (1962c).

**Genitalia ♂** — Very similar to *D. longicornis* Patterson & Wheeler (Fig. 58a-d).

**Other specimens examined (2, DTRC)** — MEXICO: Hidalgo: Pachuca (2 ♂, 2519, 21).

**Strains examined (10)** — MEXICO: D.F.: Mexico City (E7.7A); Hidalgo: Pachuca (E13.1A, 2519.18, E29.1, E16.2A), San Pedro Mines (E26 3-2), Venados (E28 2D); Mexico: Chapingo (E14.1, E18.3); San Luis Potosi: San Luis Potosi (E30.7).
Fig. 58. *Drosophila propachuca* Wasserman: a (paratype), male genitalia, laterobasal aspect; b-d (strain 2519.18), aedeagus, several aspects.

**Relationship** — My comments under *D. longicornis* apply here too.

**Distribution** — Mexico.

**Note** — See my comments under *D. pachuca*.

*Drosophila (Drosophila) racemova* Patterson & Mainland (Fig. 59)

*Drosophila (Drosophila) racemova* Patterson & Mainland, 1944: 44.

**Type-Material** — Not located, probably lost. **Type-locality**: Jalapa, Hidalgo, Mexico.

**General characters** — Described by Patterson & Mainland (1944).

**Genitalia ♂** — Epandrium with about 12 lower and none upper bristles. Cerci fused at lower 2/3. Sustentacular bristles with about 14 primary teeth and 15 marginal bristles (Fig. 59a).

Hypandrium slightly shorter than epandrium; concha bare.

Aedeagus ventrally expanded at posterior end, slightly serrated at tip. Aedeagal apodeme laterally flattened. Ventral rod as long as gonopod. Gonopod with one senseillum (Fig. 59b-d). Phallosomal index about 2.2.

**Specimens examined** (5) — MEXICO: Hidalgo: Pachuca (2 ♂, 2519.15, DTRC); Oaxaca: Cupatitzal (2 ♂, NMNH). USA: Arizona: Petal (1 ♂, NMNH).

**Distribution** — Mexico, USA (NEW RECORD).

† *Drosophila (Drosophila) richardsoni*, sp. nov.

(Fig. 60)

Undescribed from Puerto Rico, Wasserman, 1982.

Undescribed F2, Pereira et al., in press.

**Type-Material** — Holotype male, labelled: "*Drosophila richardsoni*, D. Bruck col. / La Parguera, Mayaguez, Puerto Rico, Feb. 1972 / Stock E. 24 HOLOTYPE ♂", in NMNH (Washington, D.C.), No. 763702. Twenty-seven paratypes as follows: (2 ♂, 3 ♀) in NMNH, (20 ♂, 10 ♀) in DTRC (Austin), (1 ♂, 1 ♀) in MZUSP (São Paulo): same data as holotype. All type specimens obtained from
**Drosophila racemosa** Patterson & Mainland: a (strain 2519, 15), male genitalia, lateroblique aspect; b-d (Pachuca, Mexico), aedeagus, several aspects.

Fig. 50. *Drosophila racemosa* Patterson & Mainland: a (strain 2519, 15), male genitalia, lateroblique aspect; b-d (Pachuca, Mexico), aedeagus, several aspects.

**DZUT culture E.24** in 1979. Type-locality: La Parguera, Mayaguez, Puerto Rico.

*External characters of imagines* ♂, ♀ — Arista with 3 dorsal and 1-2 ventral branches plus terminal fork. Antennae brown. Front brown, pollinose; orbits, ocellar triangle and anterior region lighter. Posterior orbital, verticals and postverticals arising from dark brown spots. Middle orbital about 1/2 of other two. Second orbital about 1/2 of first. Face pale yellow. Carina prominent, sulcate, slightly expanded at ventral region. Palpi pale yellow, pollinose, with bristles on ventral surface. Cheeks pale yellow; their greatest width 1/3 greatest diameter of eyes. Eyes red, with short black piles.

Acrostichal hairs in 8 irregular rows. No prescutellars. Anterior scutellars convergent. Mesonotum yellowish brown, pollinose, bristles arising from dark brown spots, which are irregularly fused anteriorly to transverse suture. Scutellum light brown, with one large X-shaped dark brown area; bristles arising from dark brown spots. Pleurae brown, pollinose, with an irregular darker longitudinal stripe from base of first coxae to haltere. Sternal index about 0.8. Halteres pale yellow. Coxae and femora light brown, the latter with distal darker ring. Tibiae light brown with proximal darker ring; tarsi light brown. Apical bristles on first and second tibiae, preapicals on all three.

Abdomen yellow, 2nd to 6th tergite with a medianly enlarged and interrupted posterior dark brown band which bends toward and reaches anterior margin at angle of tergite, leaving a yellow area laterally, which in females increases in size from 2nd to 6th tergite; band of 6th tergite in males does not reach anterior margin.
Wings clear. Costal index about 2.9; 4th vein index about 2.0; 5x index about 1.6; 4c index about 1.0; M index about 0.6. Third costal section with heavy bristles on its basal 2/5.

Body length (etherized) 2.2-2.8 mm (♂), 2.4-3.2 mm (♀).

Wing length 2.1-2.2 mm (♂, ♀).

Internal characters of imagines and genitalia (♂) — Testis dark yellow, with about 1 and 1/2 inner and 2 and 1/2 outer coils. Epandrium with about 10 lower and none upper bristles. Cerci fused at lower 2/3. Sustylus with about 9 primary teeth and 10 marginal bristles (Fig. 60a).

Hypandrium as long as epandrium; concha bare.

Aedeagus split about 2/7 of length, with posterior dorsal margin serrated, ventrally expanded at middle region, laterally expanded at anterior region; dorsal cleft about 1/2 of length. Aegeagal apodeme laterally flattened. Ventral rod as long as gonopod. Gonopod with one sensillum (Fig. 60b-d). Phalloso mal index about 1.7. (♀) — Ventral receptacle an irregular spiral with about 14 loose coils. Ovipositor apically rounded with about 18 marginal and 2 discal teeth. Spermatheca campanula-shaped, weakly sclerotized; duct slightly invaginated.

Eggs — Four filaments slightly longer than egg; egg length about 1 mm.

Puparia — Brown; horn index about 2.1; each anterior spiracle with about 13 branches.

Chromosomes — Not analyzed, but according to Wasserman (1982), the metaphase plate of D. richardsoni (as undescribed species from Puerto Rico), shows five pair of rods, one pair of dots. It is similar to that of D. stalkeri Wheeler, from which it differs in having the long arm of J-shaped Y chromosome slighter shorter than X (equal to the X in D. stalkeri).
Other specimens examined (5) — WEST INDIES: Dominica: Macoucheri (4 ♂, NMNH); Puerto Rico: Mona I. (1 ♂, AMNH).
Strains examined (3) — WEST INDIES: Puerto Rico (E20.2, E.24, 3371.1).
Relationship — Belongs to the multieri subgroup of the repleta group. It is related to *D. borbonica* Vilela & Sene, *D. serido* Vilela & Sene and *D. sikkimensis* Wheeler, from which it differs chiefly in the shape of aedeagus.
Distribution — West Indies (Puerto Rico, Dominica).
Etymology — Named after Richard H. Richardson from the Department of Zoology, University of Texas at Austin.
Note — According to Dr. Richardson (personal communication) the original female, which originated the strain E. 24, was collected from a rot pocket of organpipe cactus.

*Drosophila* (*Drosophila*) *rita* Patterson & Wheeler
(Fig. 61)


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**Fig. 61.** *Drosophila rita* Patterson & Wheeler (llectotype): a, male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.


General characters — Described by Patterson & Wheeler (1942).

Genitalia ♂ — Epandrium with about 16 lower and 4 upper bristles. Cerci fused at lower half. Sustylus with about 15 primary teeth and 8 marginal bristles (Fig. 61a).

Hypantrium longer than epandrium; concha weakly sclerotized, bare; posterior region expanded.

Aedeagus pointed at tip, dorsal margin of posterior end serrated; dorsal cleft slightly shorter than aedeagus. Aedeagal apodeme laterally expanded at anterior region. Ventral rod strongly sclerotized, longer than gonopod, laterally expanded, linked to hypantrium by membranous tissue (Fig. 61b-d). Phallosomal index about 1:9.

Other specimens examined (2, NMNH) — USA: Arizona; Portal (2 ♂). Strains examined (6) — MEXICO: D.F.; Mexico City (2521.22); Hidalgo; Pachuca (401.4C), San Pedro Mines (E26.3-3); Puebla; Tehuacan (402.4). USA: Arizona; Cave Creek, Chiricahua Mountains (A385), Portal (E32.3).

Relationship — It is related to D. matutini, sp. nov. (D. rita sensu Wassereman) from which it differs chiefly in the shape of aedeagus and sclerotization of ventral rod.

Distribution — sw. USA, n. Mexico.

Note — D. tira was described by Wassereman as a new species, probably because he misidentified D. rita. These species were synonymized on basis of morphological grounds.

Drosophila (Drosophila) serido Vilela & Sene
(Fig. 62)


Type Material — Holotype male, labelled: "BRASIL — BA, 3 Km NW of Milagros. 12°51'S, 39°53'W. Sene et alii coll., 24-xii-1976 / HOLOTOPO Drosophila serido ♂ ", dissected. Paratypes (15 ♂): same data as holotype. All specimens in MZUSP (São Paulo). Type-locality: 3 Km NW of Milagros, Bahia, Brazil.


Genitalia ♂ — Epandrium with about 12 lower and none upper bristles. Cerci not fused. Sustylus with about 11 primary teeth and 7 marginal bristles (Fig. 62a).

Aedeagus shorter than epandrium; concha bare.

Hypantrium shorter than epandrium; concha bare. Aedeagus subdivided about 1/4 of length, with posterior dorsal margin serrated; posterior end laterally covered with tiny teeth; ventrally expanded; dorsal cleft about 3/5 of length. Aedeagal apodeme anteriorly bent and divided, laterally flattened. Ventral rod as long as gonopod. Gonopod with one sensillum (Fig. 62b-d). Phallosomal index about 2:8.

Other specimens examined (351) — ARGENTINA (MZUSP): La Rioja: 8 Km S of Famatina (3 ♂); 3 Km W of Miranda (3 ♂); Tucuman: 2 Km N of Tapia (5 ♂); BRAZIL (MZUSP): Bahia: 13 Km W of Barreiras (3 ♂); 26 Km E of Ibitipoca (8 ♂); 3 Km NW of Milagros (115 ♂); Cachoeira dos Monteziris (4 ♂); Espirito Santo: Vitória (12 ♂); Mato Grosso do Sul: 30 Km NW of Miranda (2 ♂); Minas Gerais: 11 Km NW of Cardeal Mota (1 ♂, 1 ♀); 15 Km NW of Cardeal Mota (3 ♂, 7 ♀); Paraiba: 1 Km E of Junco do Seridó (60 ♂); 10 Km SE of São José de Espinharas (3 ♂); Rio Grande do Norte: 7 Km SW of Bom Jesus (5 ♂); 3 Km S of Maxaranguape (7 ♂); Rio Grande
Fig. 62 *Drosophila serido* Vilela & Sene (holotype): a, male genitalia, laterooblino aspect; b-d, aedeagus, several aspects.

do Sul: 4 Km E of Capão da Canoa (1 ♂), 3 Km NW of Jaguari (6 ♂), 14 Km NW of Jaguari (14 ♂), 3 Km S of São José (1 ♂), 6 Km E of Tramandaí (7 ♂); Rio de Janeiro: Arraial do Cabo (61 ♂); Santa Catarina: Barra Velha (7 ♂), 7 Km N of Pitangueira do Sul (1 ♂); São Paulo: Rio Guaratuba (1 ♂), 14 Km N of Peruíbe (3 ♂, 1 ♀). PARAGUAY: Villarrica (3 ♂, NMNH); Amambay: 13 Km SE of Bella Vista (1 ♀, MZUSP).


*Relationship* — It is closely related to *D. borborema* Vilela & Sene, from which it differs chiefly in the shape of aedeagus.

*Distribution* — Brazil, Paraguay (NEW RECORD), Argentina (Vilela et al., 1980).

*Note* — This is a polytypic species and the aedeagi of males from throughout its distribution are slightly different (Silva, 1981). The populations from Western Argentina and Serra do Cipó (State of Minas Gerais) could represent subspecies or even species in *status nascendi*.

*Drosophila (Drosophila) spenceri* Patterson

(Fig. 63)

*Drosophila (Drosophila) spenceri* Patterson, 1943: 160.

*Type-Material* — Holotype (sex unknown), labelled: "1540.12 / spenceri / HOLOTYPE / G. B. Mainland, july 1942 / Rio Chalus (SIC), Morelos, Mexico".
Fig. 63. Drosophila spenceri: Patterson (strain 310.1): a, male genitalia, lateral-oblique aspect; b-d, aedeagus, several aspects.


General characters — Described by Patterson (1943).

Gentilia ♂ — Epandrium with about 14 lower and none upper bristles. Cerci fused at lower half. Surstylus with about 12 primary teeth and 9 marginal bristles (Fig. 63a).

Hypantrium shorter than epandrium; concha bearing one anterior bristle.

Aedeagus slightly invaginated at tip, ventrally expanded; dorsal lobe about 2/3 of length. Aedeagal apodeme laterally flattened. Ventral rod as long as gonopod. Gonopod with one sensillum (Fig. 63b-d). Phallosomal index about 1.9.

Strain examined — MEXICO: Baja California; Cuñaro (310.1).

Distribution — Mexico.

Drosophila (Drosophila) stalkeri: Wheeler

(Fig. 64)


Paratypes (8 ♂, 7 ♀): same data as holotype, in DTRC (Austin). Type-locality: Saint Petersburg, Florida, USA.
Fig. 64. *Drosophila stalkeri* Wheeler (strain 2213.1): a, male genitalia, latero-oblique aspect; b-d, aedeagus, several aspects.

Fig. 65. *Drosophila starmarit* Wasserman, Koeppel & Ward (strain W-12), male genitalia, latero-oblique aspect; b-d (strain W-17), aedeagus, several aspects.
Genitalia ♂ — Epandrium with about 12 lower and none upper bristles. Cerci fused at lower half. Survedus with about 11 primary teeth and 7 marginal bristles (Fig. 65a).

Hypandrium shorter than epandrium, concha bare.
Aedeagus split about 1/3 of length; ventrally expanded, dorsal region with well-developed anteriorly pointed wing-shaped expansions; dorsal cleft about 2/3 of length. Aedeagal apodeme bent, laterally flattened. Ventral rod as long as gonopod. Gonopod with one sensillum (Fig. 65b–d). Phallosomal index about 2.7.

Other specimens examined (12) — USA (NMNH): Florida: Sanibel Is., Lee Co. (8 ♀), Royal Palm Pk. (1 ♂); Tavernier Key Large (1 ♂). WEST INDIES: Bahamas: Green Turtle Cay, New Plymouth (1 ♂, AMNH); Jamaica: Runaway Bay (1 ♂, NMNH).


Relationship — It is related to D. richardsoni, sp. nov., from which it differs chiefly in the shape of aedeagus.

Distribution — see. USA, Bahamas (NEW RECORD), Jamaica (NEW RECORD).

**Drosophila (Drosophila) starneri** Wasserman, Koepfer & Ward (Fig. 65)


**Type-Material** — Not located, although the original description states DTRC (Austin) and NMNH (Washington, D.C.) as repositories. Type-locality: 10 Km W of Barquisimeto, Lara, Venezuela.

Genitalia ♂ — Epandrium with about 13 lower and none upper bristles. Cerci not fused. Survedus with about 12 primary teeth and 10 marginal bristles (Fig. 65a).

Hypandrium as long as epandrium, anterior margin strongly concave; concha bare (Fig. 65a).
Aedeagus bow-shaped; dorsal cleft as long as length, strongly narrowed near middle region. Aedeagal apodeme anteriorly split, laterally flattened. Ventral rod about 3/4 length of gonopod. Gonopod with one sensillum, fused to concha (Fig. 65b–d). Phallosomal index about 2.7.

Specimens examined (9, MZUSP) — VENEZUELA: D.F.: near Macuto (9 ♀).
Strains examined (2) — VENEZUELA: Lara: Barquisimeto (W-12); Carabobo: Puerto Caballo (W-17).

Relationship — It is related to _D. uniseta_ Wasserman, Koepfer & Ward, from which it differs chiefly in the shape of aedeagus and of primary teeth row of survedus.

Distribution — Venezuela.

**Drosophila (Drosophila) subviridis** Patterson & Mainland (Fig. 66)

_Drosophila (Drosophila) subviridis_ Patterson & Mainland in Patterson, 1943: 140.

**Type-Material** — Not located, probably lost. Type-locality: Mexico City, D.F., Mexico.

**General characters** — Described by Patterson & Mainland (Patterson, 1943).

Genitalia ♂ — Epandrium with about 15 lower and 5 upper bristles. Cerci fused at lower half. Survedus with about 12 primary teeth and 11 marginal bristles (Fig. 66a).

Hypandrium 3/4 length of epandrium; concha bearing one anterior bristle.
Aedeagus slightly invaginated and weakly sclerotized at dorsal tip, laterally expanded at middle dorsal region; dorsal cleft about 1/6 of length. Aedeagal apodeme bent, laterally flattened. Ventral rod as long as gonopod. Gonopod with one sensillum (Fig. 66b–d). Phallosomal index about 0.7.

Specimens examined (2, DTRC) — EL SALVADOR: Santa Ana: Cerro Monte-
Fig. 66. *Drosophila subviridis* Patterson & Mainland: a (Monte Vyuka), male genitalia, lateroblique aspect; b-d (Cerro Montecristo), aedeagus, several aspects.

cristo (1 σ♂ , 44.26). HONDURAS: Tegucigalpa: 10 Km NW of Zamorano, Monte Vyuka (1 σ♂, 49.24).

*Distribution* — Mexico, El Salvador (NEW RECORD), Honduras (NEW RECORD).

*Drosophila (Drosophila) uniseta* Wasserman, Koepfer & Ward
(Fig. 67)


*Type-Material* — Not located, although the original description states DTRC (Austin) and NMNH (Washington, D. C.) as repositories. Type-locality: 2 Km E of Coro, Falcon, Venezuela.
Drosophila (Drosophila) wheeleri Patterson & Alexander (Fig. 68)


General characters — Described by Patterson & Alexander (1952).

Genitalia — Very similar to D. aldrichi Patterson & Wheeler (Fig. 68a-d).

Strain examined — MEXICO: Baja California; Arroyo Socorro (A519.1).
Fig. 68. *Drosophila wheeleri* Patterson & Alexander (strain A519.1): a, male genitalia, laterooblique aspect; b-d, aedeagus, several aspects.

Relationship — My comments under *D. aldrichi* also apply here.

Distribution — U.S.A., n.w. Mexico.

Note — As pointed out above I was not able to find any remarkable difference between the male genitalia of the type-specimens of *D. wheeleri* and *D. aldrichi*. Whether these forms have the same status remains an open question.

THE REPLETA SUBGROUP

Species included (6) — *Drosophila fulminicola* Patterson & Mainland; *D. fulviusculus* Wasserman & Wilson; *D. limbensis* Pavan & Patterson; *D. neorepleta* Patterson & Wheeler; *D. repleta* Wollaston; *D. zeteli*, sp. nov.

Diagnosis — Costal index ranging from 2.7 to 3.0; testis with moderate number of coils, ranging from 6 to 12; ventral receptacle with number of coils ranging from 40 to 108; phallosomal index varying from 1.1 to 2.1. Anterior margin of cerci fused in various degree; surstyles without secondary teeth and 10-11 primary teeth; concha of hypandrium usually bare; gonopod with one sensillum, linked to concha of hypandrium by membranous tissue.

Geographical distribution — The species of this subgroup occur between 32°N (USA, Arizona) and 27°S (Brazil, Rio Grande do Sul) of the New World; *D. repleta* is cosmopolitan.
**Drosophila (Drosophilina) fulvimacula** Patterson & Mainland  
(Fig. 69)

*Drosophila (Drosophilina) fulvimacula* Patterson & Mainland, 1944: 42.  
*Drosophila (Drosophilina) fulcamacula* (SIC), Hsu, 1949.  
*Drosophila (Drosophilina) fulvamacula* (SIC), Hsu, 1949.  
*Drosophila (Drosophilina) fulvimacula fluorepleta* Patterson & Pavan in Patterson, 1952: 114.  
*Drosophila (Drosophilina) fulvimacula* (SIC), Pilares & Vásquez, 1977.

*Type-Material* — Holotype male, labelled: “fulvimacula / HOLOTYPE / 1406.15  
♂”, in NMNH (Washington, D.C.); according to the field book (DZU.T), 1406.15  
means a strain from Sedeno Cañon (near Jalapa), Veracruz, Aug. 17, 1945, C. B.  
Mainland col. The remaining specimens of the original type-series have been lost  
(Wasserman & Wilson, 1957: 736). Type-locality: Sedeno Cañon (near Jalapa),  
Veracruz, Mexico.

Holotype male of subspecies *D. f. fluorepleta*: “fluorepleta / 1975.5  
♂ / HOLOTYPE / Belém, Pará, Brasil”, in NMNH (Washington, D.C.). Paratypes  
(4 ♂, 5 ♀): same data as holotype, in DTRC (Austin); in the original description  
the strain number is cited as 1980.1, rather than 1975.5 as on the label. Type-  
locality: Belém, Pará, Brazil.

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**Fig. 69. Drosophila fulvimacula** Patterson & Mainland (strain 1808.37):  
a, male genitalia, lateroblique aspect; b-d, pupa, several aspects.
General characters — Described by Patterson & Mainland (1944).
Genitalia ♂ — Epandrium with about 10 lower and one upper bristles. Cerci fused at lower half. Surstylus with about 10 primary teeth and 10 marginal bristles (Fig. 69a).

Hypandrium slightly shorter than epandrium; concha bearing one anterior bristle.

Aedeagus ventrally expanded, slightly invaginated at tip; ventral margin of posterior end slightly serrated; dorsal cleft about 2/3 of length. Aedeagal apodeme bent, rod-shaped. Ventral rod slightly shorter than gonopod. Gonopod with one sensillum (Fig. 69b-d). Phallosomal index about 2.1.


Relationship — It is closely related to D. fulvimaculoides Wasserman & Wilson, from which it differs chiefly in the shape of aedeagus.

Distribution — Mexico to Brazil.

**Drosophila (Drosophila) fulvimaculoides Wasserman & Wilson**
(Fig. 70)

_Drosophila (Drosophila) fulvimaculoides Wasserman & Wilson, 1957: 137._

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Fig. 70. _Drosophila fulvimaculoides_ Wasserman & Wilson (strain H163.31): a, male genitalia, lateroblique aspect; b–d, aedeagus, several aspects.


Genitalia ♂ — Epandrium with about 11 lower and 2 upper bristles. Cerci fused at lower 2/3. Surstylus with about 10 primary teeth and 13 marginal bristles (Fig. 70a).

Hypantrum slightly shorter than epandrium.

Aedeagus ventrally expanded; ventral margin serrated at posterior end; dorsal cleft about 1/2 of length. Aedeagal apodeme bent, rod-shaped. Ventral rod weakly sclerotized, about half length of gonopod. Gonopod with one sensillum (Fig. 70b-d). Phallosomal index about 1.7.

Strain examined — COSTA RICA: Cartago: Turrialba (1165.31).

Relationship — It is closely related to D. juvinaculae Patterson & Mainland, from which it differs chiefly in the shape of aedeagus.


Drosophila (Drosophila) limensis Pavan & Patterson

(Fig. 71)

Drosophila (Drosophila) limensis Pavan & Patterson in Pavan & Cunha, 1947: 45.

Type-Material — Holotype male, labelled: "D. limensis Pava (SIC) — Patterson TIPO Lima P. / HOLOTIPO". Paratypes (2♂, 2♀; males dissected); same data as holotype. All specimens in MZUSP (São Paulo). Type-locality: Lima, Lima, Peru.

Fig. 71. Drosophila limensis Pavan & Patterson (paratype): a. male genitalia, lateroblique aspect; b-d. aedeagus, several aspects.
**General characters** - Described by Pavan & Patterson (Pavan & Cunha, 1947).

*Genitalia* - Epandrium with about 9 lower and one upper bristles. Cerci fused at lower 1/3. Surstylus with about 11 primary teeth and 10 marginal bristles (Fig. 71a).

Hypandrium 2/3 length of epandrium.

*Aedeagus* slightly invaginated at tip; dorsal clasp about 1/2 of length. Aedegal apodeme rod-shaped. Ventral rod slightly shorter gonopod. Gonopod with one sensillum (Fig. 71b-d). Phallosomal index about 1.4.

**Strain examined** - PERU: Lima: Lima (1529.2A).

**Relationship** - It is closely related to *D. repieuta* Wollaston and also related to *D. neorepleta* Patterson & Wheeler from which it differs chiefly in the shape of aedeagus.

**Distribution** - Peru, ? Brazil.

**Drosophila (Drosophila) neorepleta** Patterson & Wheeler

(Figs. 72, 73)

*Drosophila (Drosophila) neorepleta* Patterson & Wheeler, 1942: 78.


*Drosophila (Drosophila) melanopalpa*, some authors (see Patterson & Wheeler, 1942: 77).

**Type-Material** - Lectotype male (HERE DESIGNATED), labelled: "D. neorepleta♂, Sanpedro, Guatemala, T. Dobzhansky col. 1938 TYPE / LECTOTYPE Drosophila neorepleta Patterson & Wheeler by C.R. Vilela", dissected. Paralec-

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**Fig. 72.** *Drosophila neorepleta* Patterson & Wheeler (lectotype): a, male genitalia, laterooblique aspect; b-d, aedeagus, several aspects.

Lectotype male of synonym D. canapalpa (HERE DESIGNATED): 1402.17 ♂ / La Placita, Hidalgo, Mexico, Aug. 12, 1943, G.B. Mainland col. / LECTOTYPE Drosophila canapalpa Patterson & Mainland by C. R. Villela", dissected (Fig. 73), in NMNH (Washington, D.C.). Paralectotypes (2 ♂, 3 ♀; HERE DESIGNATED): same data as lectotype, in DTRC (Austin). Type-locality: La Placita (near Jocotitla), Hidalgo, Mexico.

General characters — Described by Patterson & Wheeler (1942).

Genitalia ♂ — Epeandrium with about 12 lower and one upper bristles. Cerci fused at lower half. Surstylus with about 10 primary teeth and 8 marginal bristles (Fig. 72a).

Hypandrium 3/4 length of epandrium.

Aedeagus slightly invaginated at tip, weakly sclerotized at posterior end, dorsal region well-developed with anteriorly pointed, wing-shaped expansions; dorsal cleft about 1/4 of length. Aedeagal apodeme bent, rod-shaped. Ventral rod as long as gonopod. Gonopod with one sensillum (Fig. 72b-d). Phallosomal index about 1.1.

Other specimen examined — GUATEMALA: El Quiche: Sacapulas (1 ♂, NMNH).

Stains examined (2) — MEXICO: Hidalgo: La Placita (1402.17), USA: Arizona: Coronado National Forest (2160.15).

Relationship — It is related to D. limensis Pavan & Patterson and D. repleta Wollaston from which it differs chiefly in the shape of aedeagus.

Distribution — USA, Mexico, Guatemala.
Note — *D. neorepleta* and *D. canapalpa* were synonymized on basis of morphological grounds.

**Drosophila (Drosophila) repleta** Wollaston
(Figs. 74-76)

*Drosophila repleta* Wollaston, 1858: 117.


*Drosophila punctata* Loew (SIC), Johnson, 1913.
*Drosophila repleta* prorepleta Duda, 1925: 210 (described as variety; considered as subspecies by Wheeler, 1981b).

*Drosophila (Drosophila) repleta*, Sturtevant, 1939: 139.


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**Fig. 74.** *Drosophila repleta* Wollaston (lectotype): a, male genitalia, posterior aspect; b-d, aedeagus, several aspects.


Holotype male of synonym D. austrarepleta: “Mogi das Cruzes, São Paulo, iv 943 / Drosophila austrarepleta TYPE / HOLOTIPO”, head missing, dissected (Fig. 75a-c). Paratypes (3 ♀ , 1 ♂ ); same data as holotype. All specimens in MZUSP (São Paulo). Type-locality: Mogi das Cruzes, São Paulo, Brazil.

Lectotype male of synonym D. betari (HERE DESIGNATED): “Iporanga, São Paulo, vii. 1943 / LECTOTYPE Drosophila betari Dobzhansky & Pavan by C. R. Vilela”, dissected (Fig. 75d). Paratypes (3 ♂ , 4 ♀ , HERE DESIGNATED); same data as lectotype. One male dissected. All specimens in MZUSP (São Paulo). Type-locality: Iporanga, São Paulo, Brazil.

Holotype male of synonym D. brunnipalpa: “Aphai, São Paulo, vi-1943 / Drosophila brunnipalpa TYPE / HOLOTIPO”, dissected. Paratypes (4 ♂ , 3 ♀ ); same data as holotype, one male dissected (Fig. 75e-g). All specimens in MZUSP (São Paulo). Type-locality: Aphai, São Paulo, Brazil.

Lectotype male of synonym D. melanopala (HERE DESIGNATED): “D. melanopala ex Cave Creek Ariz., G. B. Mainland col. 1940, TYPE / LECTOTYPE Drosophila melanopala Patterson & Wheeler by C. R. Vilela”, dissected (Fig. 76). Paratype female (HERE DESIGNATED): “D. melanopala ♀ / PARALECTOTYPE Drosophila melanopala Patterson & Wheeler by C. R. Vilela”. Both specimens in AMNH (New York: Type-locality: Cave Creek, Chiricahua Mountains, Arizona, USA.

Types of synonyms D. adspersa (Type-locality: Vienna, Austria), D. maculiventris (Type-locality: Kekisawa, Sri Lanka), D. marmorata (Type-locality: Auckland, New Zealand), D. nigropunctata (Type-locality: Java), D. punctulata (Type-locality: Cuba) and subspecies D. r. prorepleta (Type-locality: Costa Rica), D. r. pumiliaris (Type-locality: Mexico), were not analyzed. The whereabouts of types of D. prorepleta which should originally be in the National Museum in Budapest, is not known (Wheeler, 1983). According to Rocha Pité & Tsacas (1979): holotype of D. punctulata was not designated, not located; holotype of D. adspersa not designated, synonyms in “Naturhistorisches Museum” (Vienna); holotype ♂ of D. nigropunctata, not located, probably lost; holotype ♀ of D. maculiventris (Type-locality cited as Kekisawa), not located.

General characters — Described by Wollaston (1858); redescribed by Patterson (1943).

Genitalia ♂ — Epandrium with about 13 lower and 3 upper bristles. Cerci fused at lower half. Surstylus with about 10 primary teeth and 7 marginal bristles (Fig. 74a).

Hypantrum 2/5 length of epandrium. 
Aedeagus slightly invaginated at tip, dorsal region with anteriorly pointed expansions; dorsal cleft about 1/6 of length. Aedeagal epodeme rod-shaped. Ventral rod as long as gonopod. Gonopod with one sensillum (Fig. 74b-d). Phallosomal index about 1.5.
Fig. 76. *Drosophila melanopala* Patterson & Wheeler (lectotype): a, male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.

Other specimens examined (75) — ARGENTINA: Chaco: 7 Km NE of Resistencia (3 ♂ , MZUSP); Missiones: Iguazu (1 ♂ , NMNH). BERMUDAS: St. George (7 ♂ , NMNH). BRAZIL: Missiones (1 ♂ , MZUSP); Bahia: 3 Km NW of Milagres (1 ♂ ); Goiás: 6 Km E of Luzania (1 ♂ ); Mato Grosso: Ilha Taimatã, Rio Paraguay (2 ♂ , 2 ♀ ); Mato Grosso do Sul: Campo Grande (1 ♂ ); Rio de Janeiro: Arraial do Cabo (4 ♂ ); Santa Catarina: 3 Km of Campo Alegre (4 ♂ , 1 ♀ ); São Paulo: Rio Guaratiba (1 ♀ ), Serra da Bocaina (7 ♂ ). INDIA: Digboi Assam (4 ♂ , NMNH). MADEIRA: Funchal (1 ♂ , NMNH). MEXICO: Tamaulipas: Tampico (1 ♂ , NMNH). NICARAGUA: Matagalpa: Santa Maria de Ostuma (2 ♂ , NMNH). PANAMÁ: Chiriquí (1 ♂ , NMNH). RYUKYU: Okinawa (4 ♂ , NMNH). USA (NMNH, unless noted): Maine: Portland (1 ♂ ); Maryland: Portn-

Fig. 75. a-c, *Drosophila australrepleta* Dobzhansky & Pavan (holotype), aedeagus, several aspects; d-f, *Drosophila betari* Dobzhansky & Pavan (lectotype), aedeagus, several aspects; g-i, *Drosophila brunneipala* Dobzhansky & Pavan (holotype), aedeagus, several aspects.
Drosophila (Drosophila) zotii, sp. nov.
(Fig. 77)

Undescribed J, Pereira et al., in press.

Fig. 77. Drosophila zotii, sp. nov. (Holotype): a, male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.


Apical bristles on first and second tibiae, precapitales on all three. Abdomen yellow, 3rd to 5th tergite with a medially enlarged and interrupted brown band which bends toward and reaches anterior margin at angle of tergite, leaving a pale yellow area laterally; 2nd tergite with a fainter ind 6th with a larger band.

Wings clear. Costal index about 2.9; 4th vein index about 1.6; 5th index about 1.5; 4c index about 0.8; M index about 0.3. Third costal section with heavy bristles on its basal half.

Body length (torpidized) about 3.4 mm (♂), 3.6 mm (♀).

Wing length about 2.7 mm (♂, ♀).

Internal characters of imagines and genitalia (♂) — Testis yellow with about 2 inner and 3 outer cells. Epiandrium with about 15 lower and 2 upper cells. Ceri fused at lower half. Sustylus with about 9 primary teeth and 8 marginal bristles (Fig. 77a).

Hypantrum shorter than epiandrium; concha bare.

Aedeagus slightly invaginated at tip, weakly sclerotized at middle dorsal surface, ventrally expanded; dorsal cleft about 1/2 of length. Aedeagal apodeme anteriorly expanded, laterally flattened. Ventral rod longer than gonopod. Gonopod with one sensillum (Fig. 77b-d). Phallosomal index about 1.2.

(♀) — Ventral receptacle an irregular spiral with about 29 coils. Ovipositor apically pointed, with about 16 marginal and 5 discal teeth. Spermathecae cocon-shaped, weakly sclerotized; duct not invaginated.

Eggs — Four filaments about as long.

Pupa — Yellowish brown; horn index about 3.9; each anterior spiracle with about 17 branches.

Chromosomes — Not studied.

Other specimens examined (2 MZUSP) — BRAZIL: Rio Grande do Sul: Parque Florestal do Turvo (1 ♂); São Paulo: Guararema (1 ♂) reared from loquat fruit Erionotyma japonica (Thoum.)

Relationship — It belongs to the repleta subgroup of the repleta group. It is related to D. fulvimaculata Patterson & Mainland and D. fulvimaculoides Wasserman & Wilson from which it differs chiefly in the shape of aedeagus and the gonapods.

Distribution — Brazil (Rio Grande do Sul, São Paulo).

Etymology — Named after Alycio R. Ribeiro (Zotti), who collected most of the paratypes.

SPECIES NOT ASSIGNED TO SUBGROUP

Species not assigned to subgroup (8) — Drosophila brevicarinata Patterson &
Drosophila (Drosophila) brevicarinata Patterson & Wheeler


Type-Material — Not located, probably lost. Type-locality: San Josecito, Nuevo Leon, Mexico (I was not able to find this locality on maps).

General characters — Described by Patterson & Wheeler (1942).

Relationship — It is related to D. riteae Patterson & Wheeler (1942: 89). I was not able to locate any specimen labelled as D. brevicarinata so that the phylogenetic relationships could not be checked. Through the analysis of the original description it seems to be related to D. muthisi, sp. nov., from which it differs with respect to the metaphase plate (Wharton, 1944: 314).

Distribution — Mexico.

Drosophila (Drosophila) californica Sturtevant

(Fig. 78)

Drosophila (Drosophila) californica, Sturtevant, 1939: 140.

Fig. 78. Drosophila californica Sturtevant: a (NE of Gold Beach), male genitalia, laterooblique aspect; b-d (Mather), aedeagus, several aspects.
Type-Material — Holotype male, labelled: "Drosophila californica Sturtevant / ac. 2415 / TYPE / Pacific Grove, Cal., vii.2.20", in AMNH (New York). Paratypes (1 σ, 1 ♀, male dissected): "Drosophila californica Sturtevant / A.H. Sturtevant collection 1970 / californica PARATYPE / Pacific Grove, Cal., v.2.20". (2 ♀): same data as other paratypes except date: vii.20.20 and vii.2.28. in NMNH (Washington, D.C.). Type-locality: Pacific Grove, California, USA.

Types of synonym D. fuliginea not located, probably lost. Type-locality: Silver City, New Mexico, USA.

General characters — Described by Sturtevant (1923).

Genitalia σ — Epandrium with about 15 lower and one upper bristles. Cerci fused at lower 2/3. Surstylus with about 12 primary teeth and 9 marginal bristles (Fig. 78a).

Hypantrium slightly shorter than epandrium; concha bearing one anterior bristle.

Aedeagus invaginated at tip, with a pair of ventral spurs linked to each other by wavy bridge; dorsal cleft about 1/2 of length. Aedeagal apodeme rod-shaped. Ventral rod 3/4 length of genopod. Genopod with two sensilla (Fig. 78b-d). Phallosomal index about 1.5.

Other specimens examined (3) — USA: California: Berkeley (1 σ♀, NMNH). Montana: (1 σ♀, DTSC). Oregon: NE of Gold Beach (1 σ♀, DTSC).

Relationship — It belongs to the repleta group of the subgenus Drosophila.

Distribution — w. USA. n. Mexico.

Fig. 79. Drosophila icteroscuta Wheeler (holotype): a. male genitalia, lateral-blike aspect; b-d. aedeagus, several aspects.
**Drosophila (Drosophila) icteroscuta** Wheeler
(Fig. 79)


**General characters** — Described by Wheeler (1949).

*Genitalia♂* — Epandrium with about 12 lower and 2 upper bristles. Cerci fused at lower 2/3. Sustylus with about 12 primary teeth and 7 marginal bristles (Fig. 79a).

Hypandrium slightly longer epandrium; concha bare.

Aedeagus weakly sclerotized at dorsal tip, with a pair of long curved, pointed spurs; dorsal sheath about 3/4 of length. Aedeagal apodeme bent, laterally flattened. Ventral rod very thin, 3/4 length of genopod. Genopod well-developed with one sensillum (Fig. 79b-c). Phallosoomal index about 1.8.

**Relationship** — The mesonotum pattern and the morphology of male genitalia seems to relate this species to the members of the *fuscata* subgroup. However, its affinities remain uncertain, mainly due to the presence of unique and well-developed genopods.

**Distribution** — Presently known from the type locality only.

**Drosophila (Drosophila) inca** Dobzhansky & Pavan
(Fig. 80)

*Drosophila (Drosophila) inca* Dobzhansky & Pavan, 1943: 44.

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Fig. 80. *Drosophila inca* Dobzhansky & Pavan (paratypes): a, male genitalia, latero-oblique aspect; b-e, aedeagus, several aspects.

General characters — Described by Dobzhansky & Pavan (1943).

Genitalia ♂ — Ectopleuron with about 11 lower and 3 upper bristles. Cerci fused at lower half. Sustylus with about 12 primary teeth and 14 marginal bristles (Fig. 80a).

Hypantrum longer than epandrium; connexa bare.

Aedeagus with a pair of pointed spurs; ventral margin posteriorly serrated; dorsal cleft about half of length. Aedeagal apodeme bent, rod-shaped. Ventral rod rudimentary. Gonopod bare (Fig. 80b-e). Phallocosomal index about 1.0.

Relationship — It belongs to the repleta group of the subgenus Drosophila.

Distribution — Presently known from the type-locality only.

Drosophila (Drosophila) mariettae, sp. nov. (Fig. 81)

Type-Material — Holotype male, labelled: “Monte Vyvca, 10 Km (SIC) NW Zamorano, 5000', 49.15'W / MAR 22, 1954, W. B. HEED / Rep. de Honduras / D. mariettae HOLOTYPE”, in NMNH (Washington, D.C.). Paratypes: (3 ♂, 1 ♀) in DTRC (Austin); (5 ♂, 3 ♀) in MZUSP (São Paulo), 5 males and one female dissected; (1 ♂, 2 ♀) in NMNH: same data as holotype. Type-locality: Monte Vyvca (10 Km NW of Zamorano), Tegucigalpa, Honduras.

External characters of imagines ♂, ♀ — Arista with about 3-5 dorsal and 2 ventral branches plus terminal fork. Antennae brown. Front dark brown, auto-

Fig. 81. Drosophila mariettae, sp. nov. (paratypes): a, male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.
riorly lighter. Middle orbital about 1/2 other two. Second oral about 1/2 of first. Face pale yellow. Carina sulcate, ventrally expanded. Palpi pollenose, pale yellow. Cheeks yellow, their greatest width 2/5 greatest diameter of eyes. Eyes red, with short black piles.


Abdomen yellow, 2nd to 4th tergite with medially enlarged slightly dark brown band; 5th tergite (♂) yellow with two submedian interrupted spots; 6th tergite hyaline.

Wings clear. Costal index about 3.2; 4th vein index about 1.6; 5x index about 1.3; 4x index about 0.8; M index about 0.4. Third costal section with heavy bristles on its basal 1/3.

Wing length 2.9-3.6 mm.

Gnatalla (♀) — Epandrium with about 15 lower and 4 upper bristles. Carci fused at lower half. Surstylus with about 15 primary teeth and 14 marginal bristles (Fig. 81a).

Hyandrium as long as epandrium; concha bearing one anterior bristle.

Aedeagus slightly invaginated at tip, ventrally expanded, dorsoventrally rough at middle region; dorsal cleft about 1/2 of length. Aedeagal apodeme rod-shaped. Ventral rod rudimentary. Conoed with one sensillum (Fig. 81b-d). Phallosomal index about 1.4.

(♀) — Ovipositor apically pointed with about 24 marginal and 8 discal teeth. Spermathecae elongate, weakly sclerotized; duct deeply invaginated.

Eggs, puparia and chromosomes — Not studied.

Relationship — It resembles D. fulvilineata Patterson & Wheeler and it is tentatively assigned to the repleta group.

Distribution — The type-locality is the only site where this species has been collected.

Etymology — Named after Marietta Reveley, former curator of the National Drosophila Species Resource Center, Department of Zoology, University of Texas at Austin.

Drosophila (Drosophila) mayaguana, sp. nov.

(Fig. 82)


External characters of imagines ♀ — Arista with 3 dorsal and 2 ventral branches plus terminal fork. Antennae brown, pollenose. Front brown, pollenose; orbits and anterior region lighter. Ocellar triangle dark brown. Posterior orbital and anterior vertical arising from dark brown spots. Middle orbital about 1/2 other two. Second oral about 1/2 of first. Face light yellow. Carina slightly prominent, ventrally expanded, slightly sulcate. Palpi pollenose, yellow, with bristles on ventral surface. Cheeks light brown, their greatest width about 1/2 greatest diameter of eyes. Eyes red, with short black piles.


Abdomen yellow, 2nd to 5th tergite with a medially enlarged and interrupted brown band which bends toward and reaches anterior margin at angle of tergite, leaving a pale yellow area laterally.
Fig. 82. *Drosophila mayaguana*, sp. nov. (holotype): a, male genitalia, lateroblique aspect; b-d, aedeagus, several aspects.

Wings clear. Costal index about 2.6; 4th vein index about 2.2; 5x index about 1.4; 4t index about 1.2; M index about 0.7. Third costal section with heavy bristles on its basal 2/3.

 Wing length 2.6 mm.

Genitalia — Epandrium with about 14 lower and 4 upper bristles. Ceri fused at lower half. Surstylus with about 13 primary teeth and 7 marginal bristles (Fig. 82a).

Hypantrum as long as epandrium; concha bearing one anterior bristle. Aedeagus pointed at tip, ventrally expanded, membranous and densely micro-pubescent at posterior ventral region, slightly serrated at posterior dorsal margin; dorsally concave at posterior region; dorsal leaf slightly shorter than length. Aedeagal apodeme bent, laterally flattened. Ventral rod longer than gonopod, reaches hypandrium. Gonopod with one sensillum (Fig. 82b-d). Phalloosomal index about 1.7.

Eggs, puparia, chromosomes and ♀ — Unknown.

Relationship — It belongs to the repleta group of the subgenus *Drosophila*.

Distribution — The type-locality is the only site where this species has been collected.

Etymology — The specific name refers to the toponym Mayaguana Island (Type-locality).

*Drosophila* (Drosophila) ramsdeni Sturtevant
(Fig. 83)

*Drosophila* sp A, Metz, 1914.

**Drosophila ramsdent** Sturtevant (paratype): a, male genitalia, laterooblique aspect; b-d, aedeagus, several aspects.

**ramsdent St.** / PARATYPE N.° 50003 USNM xii. 28-13 bred pineapple Sturtevant / Guantanamo Cuba", dissected; (1 ♀ 1); same data as paratype ♂ but number. Both specimens in NMNH (Washington, D.C.). Type locality: Guantanamo, Cuba, West Indies.

**General characters** — Described by Sturtevant (1916).

**Genitalia ♂** — Epandrium with about 8 lower and none upper bristles. Cerci fused. Sustylus with about 11 primary teeth and 8 marginal bristles (Fig. 83a).

Hypantrum shorter than epandrium; concha bare.

Aedeagus ventrally expanded, weakly sclerotized at dorsal region, ventral margin slightly serrated at posterior region; dorsal cleft about 1/5 of length. Aedeagal apodeme red-shaped. Ventral rod about 1/3 length of gonopod. Gonopod with one sensillum (Fig. 83b-d). Phallosomal index about 2.1.

**Relationship** — Morphologically it resembles *O. meridiana* Patterson & Wheeler, although the relationship is not clear.

**Distribution** — Presently known from the type- locality only.

♂ **Drosophila (Drosophila) vicentinae**, sp. nov.

(Fig. 84)

Undescribed C2. Pereira et al., in press.

Fig. 84. *Drosophila vicentinae*, sp. nov. (holotype): a, male genitalia, latero-oblique aspect; b-d, acceages, several aspects.


Acrostichal hairs in 8 irregular rows. No prescutellars. Anterior scutellars convergent. Mesonotum yellowish brown, pollinose, bristles arising from brown spots. Some spots are fused to form: two irregular anterior stripes inside
dorsocentral rows; four roundish spots outside dorsocentral rows, two placed anterily and two posteriorly to transverse suture. Scutellum brown, pollinose; bristles arising from dark brown spots. Pleurae brown, pollinose, with an irregular darker longitudinal stripe from base of first coxae to halteres. Sterno index about 0.8, Halteres pale yellow. Coxae and femora yellow. Tibiae yellow with a proximal dark brown ring; first yellow. Apical bristles on first and second tibiae, preapicalis on all three.

Abdomen yellow; 2nd to 5th tergite with a medianly enlarged and interrupted posterior dark brown band which bends toward and reaches anterior margin at angle of tergite, leaving a yellow area laterally.

Wings clear. Costal index about 3.1; 4th vein index about 1.6; 5x index about 1.4; 4e index about 0.8; M index about 0.3. Third costal section with heavy bristles on its basal half.

Wing length about 3.0 mm.

Genitalia (♂) — Epandrium with about 17 lower and none upper bristles. Ceri fused at lower 1/3. Surstylus with about 9 primary teeth and 3 marginal bristles (Fig. 84a).

Hypantrium shorter than epandrium; concha bare.

Aedeagus ventrally expanded, strongly pointed and slightly invaginated at tip; dorsal clifit about 1/2 of length. Aedeagal apodeme rod-shaped. Ventral rod rudimentary. Gonopod with one sensillum (Fig. 84b-d). Phallosomal index about 3.4. (♀) — Ovipositor slightly pointed with about 17 marginal and 6 discal teeth.

Eggs, puparia and chromosomes — Unknown.

Relationship — It belongs to the repleta group of the subgenus Drosophila.

Distribution — El Salvador, Venezuela.

Etymology — Named after Vicentina R. Pessina de Silveira, from the "Departamento de Biologia, Instituto de Biociências, Universidade de São Paulo".

Note — It is likely that the three paratypes cited above, originally belonged to the 15 specimens reared from Inga spuria and referred to as D. fulvicostata by Heed (1957: 68).

SPECIES REMOVED FROM THE REPLETA GROUP

During the past 41 years, since its establishment by Sturtevant (1942), several main species of thorax species has been misplaced in the repleta group; they are as follows:

D. obsoleta Malloch (1923) and D. poecilithorax Malloch (1923), both endemic to Australia, were considered members of the repleta group by Wheeler (1949) on basis of their original descriptions. Beck (1976) transferred the former to the subgenus Scaptodrosophila and regarded the latter as one species tentatively placed in the genus Drosophila rather than as a repleta group species.

D. annulata Duda (1977), first regarded as an aberrant member of the repleta group by Dobzhansky & Pavan (1943), was later removed and used to name a new species group (Breuer & Pavan, 1950).

D. peruviana Wheeler, 1959 (as D. maculipennis Duda, 1927 nec Gimmerthal, 1847) was tentatively assigned to the repleta group by Sturtevant (1942) and since then has been regarded as a true member of such group (Patterson & Wheeler, 1949; Patterson & Stone, 1952). In 1979, I analyzed the holotype female of Drosophila peruviana, which had been loaned to the DTRC (Austin) by the Dresdenener Museum (Dresden). Although faintened, the holotype is in relatively good condition, and seems to be conspecific with those specimens we have collected in Argentina in 1978 and identified as D. peruviana (Vilela et al., 1980). The pattern of the wings, the morphology of arieta and the male genitalia, suggest close relationship to the members of the guarani group (figured by Val, 1982) to which I am proposing its transference. Details on the morphology and relationship of this species will be presented in a forthcoming paper.

The castrophile D. pachaea Patterson & Wheeler (1942), formerly a member of the hydai subgroup (Patterson, 1943), was later transferred to the subgenus Sophophora (Mettlar, 1962), and it is currently considered to be a member of the nanomopera group (Ward & Heed, 1970), of the subgenus Drosophila (Throckmorton, 1975).
The oriental species *D. chinoi* Okada (1956) described as a probable *hydei* subgroup species is currently (Wheeler, 1981b) considered a synonym of *D. repletoides* Hsu (1945), an ungrouped species.

*D. aureola* Wheeler (1957), first tentatively assigned to the *repleta* group, was later removed from this group (Throckmorton, 1962), and it is now regarded as a monotypic group (Wasserman, 1982).

*D. serenensis* Brncic (1957), described as a *repleta* group species, is hereby removed from this group. The shape of epandrium, the unique cerci, the type of fusion gonopod-concha of hypandrium, the general configuration of aedeagus (Fig. 85) and the wandering behavior of adults, seem to be enough reasons to place this species together with those of uncertain affinity of the subgenus *Drosophila*.

**DISCUSSION**

I have enumerated or described, in the preceding pages, 76 *repleta* group species for which 98 binomials (see index) have been published; so far 22 synonyms have been recognized in this group. The highest number of synonyms (seven,
two additional ones being doubtful) were given to D. repleta Wallaston, a geographically widespread species often closely associated with human activities.

The subgenus Drosophila up to now comprises over 760 species, 276 of which occur in the Neotropical Region (Val et al., 1981; Wheeler, 1981b); hence ca. 25% of described species of the subgenus in the Neotropics belong to the repleta group.

The repleta group, as currently understood, consists of five subgroups (fasciola, hydei, mercatorum, mulieri and repleta) and eight species unassigned to the subgroups. The last are in fact quite distinctive and not closely related to any other species to permit recognition of species subgroup consisting of several members.

The forest-dwelling fasciola subgroup is the dominant one in South America, whereas the desert-dwelling mulieri subgroup is the best represented in the Mexican Transitional Zone. The species of the hydei subgroup inhabit from Southern North America to Northwestern South America, whereas the repleta subgroup species are to be found in North as well as Central and South America. The smallest subgroup, namely mercatorum, inhabits chiefly West Indies, Central and South America.

According to Wasserman (1982) who made a discussion on inter-subgroup relationships within the repleta group, mainly based on chromosomal banding analysis, the fasciola subgroup is closely related to the mulieri and the mercatorum to the repleta; the hydei subgroup would represent an independent line. All analyzed species belonging to these subgroups share some identical inversions and could have arisen from a common ancestor.

There are at least five phyletic units in the group, represented by the subgroups. The populations ancestral at each of these subgroups presumably arose in or around the Mexican Transitional Zone, where most species occur (Patterson & Stone, 1952).

The subgroups are mostly sympatric throughout their geographical range. Within each subgroup, however, many of the species are generally allopatric. The analysis of geographical distribution of closely related species suggests speciation by the orthogon model of geographical isolation. Nevertheless, it should be pointed out that many of the so far known allopatric distribution of closely related species may just be a reflection of poorly or not surveyed areas. For instance, D. mojito and D. mojavoides, closely related species previously thought to be allopatric in their ranges (Wasserman, 1982), are sympatric at Belém (Brazil).

Flies of the repleta group, mainly those of the mulieri subgroup, are frequently associated with plant species of the family Cactaceae although none of them is known to be truly monophagous.

It may, in the absence of more comprehensive ecological studies, be somewhat premature to perform a detailed discussion of relationships and origin of the subgroups and their members, but a few points can be made on the basis of the morphological and cytological evidence and known geographical distribution. They are presented below under each subgroup.

fasciola subgroup — D. julvalineata, a morphologically and cytologically primitive member of the fasciola subgroup, unlike the majority of the mesophylic species of this subgroup, is a desert dweller, suggesting that this form could have split off prior to the adaptation to wet conditions has been initiated (Wasserman, 1962d).

Throckmorton (1975) proposes an alternative hypothesis, consistent with the cytological, morphological, ecological and distributional evidence, that the fasciola subgroup species, as rain-forest dwellers, would represent the primitive type out of which the repleta radiation evolved, originating the desert-adapted species of D. lineatipennis, heretofore considered a repleta subgroup member, together with its sibling D. hexamoeonea, has the typical mesonorm pattern of the fasciola subgroup. The analysis of the male genitalia of both species showed a remarkable similarity with that of D. julvalineata. These facts suggest that the former could be a link between D. julvalineata and the remaining fasciola subgroup species. Chromosomal banding analysis are desirable to help clarifying these relationships.

Through geographical distribution analysis, it is possible to recognize at least three expansion nucleuses in the fasciola subgroup. The first one on the southwestern
USA, Mexican Transitional Zone and Northern Central America, where the three
most primitive members are present (D. fulvulinea, D. herminaeae and D. linea-
reperta). The second one in the rain forests of Central America, Northwestern South
America and West Indies, where seven described species are to be found (D. eli-
Finally there is a third nucleus represented by 8 species inhabiting the Atlantic
Forest, its adjacent areas and inland rain forest of Southern Brazil, Bolivia, and
Northwestern Argentina (D. carolinae, D. coriacea, D. fascioides, D. ivai, D. onca,
D. quinquinae, D. rusinae and D. senec). According to Ab'Saber (1977) the paleoclimatic studies of South America
show, during the Quaternary, rapid and drastic recurrent cycles of cold-dry
episodes followed by hot-wet weather. During the cold-dry events, the hyalaea and
the Atlantic Forest became isolated and reduced to small "islands" allowing the
forest dwellers species to differentiate during isolation (Haffer, 1969; Vanzolini
& Williams, 1970). As most of the fasciola subgroup species seems to be stenocines
species, the cycles cited above could have played important role in the speciation
events underwent by this subgroup in South America.

Ecological information concerned the breeding sites of the majority of fas-
ciola subgroup species is scanty or absent, but at least one species (D. onca) was
reared out of an epiphytic cactus of the genus Rhipsalis (Sene et al., 1977). Whether
or not other species restrict to rain forests use this genus of cactus as feeding
and or breeding sites remains an open question.

hylaei subgroup — As far as it is known, the geographical distribution of four
species of the hylaei subgroup do not overlap. This allopatry observed between the
members of closely related pair of species (D. neohyaei-D. echohyaei and D. ni-
grohyaei-D. novemaristata) suggests speciation by the model of geographic isolation.

According to Patterson & Wagner (1943) and Patterson & Mainland (1944),
D. hyaei is much more "wild" in Mexico where it has probably originated, than
in USA where it should be introduced. If this is true, D. hyaei would be formerly
also allotopic with its closely related species D. echohyaei and D. neohyaei.

The relationships between D. nigrohyaei and D. novemaristata, first suggested
by Wasserman (1962b), on the basis of the shape of spermathecae, are confirmed
in the present study by the noticeable similarity of their male genitalia.

This subgroup seems to have originated somewhere in or around the Mexican
Transitional Zone, where two out of three species considered morphologically and
cytologically primitive (D. biforea and D. nigrohyaei) occur sympatrially (Wass-
erman, 1982).

Apart from the polyphagous condition of D. hylaei and from the fact that D.
novemaristata has been collected on cactus, nothing else is known of the ecology
of the hyaei subgroup species.

mercatorum subgroup — The mercatorum subgroup consists of four species, which
are sympatric two by two.

D. carinophila and D. peninsularis occur sympatrically in the West Indies,
and the latter also reaches Southeastern United States. The former is a high specia-
lized form and its distribution depends on that of its host crab Gecarcinus ruricola
(Carson, 1957).

D. mercatorum and D. paranaensis are widespread species and occur sympatri-
cally in the continental tropical America; the former is also found in other
biogeographical zones where it is clearly an introduced species. Allopatry occurs
between the subspecies of D. mercatorum (Carson, 1965).

mulleri subgroup — The desert-dwelling mulleri subgroup currently consists of
34 described species and has been extensively studied mainly by Wasserman (1982)
who proposed its subdivision into several complexes and clusters of related
species.

Unlike the remaining subgroups, the mulleri consists of several phylectic
units and their relationships are still not well-established. As I do not have enough
new data on the members of this subgroup, any further discussion in the present

However, it should be stressed that in this and other subgroups, the comparative analysis of male genitalia have, with few exceptions, confirmed the phylogenetic relationships previously identified by polypene chromosome inversion analysis, which in turn had confirmed those first evidenced by genetic and general morphology analysis.

*repleta* subgroup -- Since the forties, the species of the *repleta* subgroup have been misidentified by different authors. This fact became evident as I analyzed old previously identified pinned specimens of several museum collections. Hence, it does not seem advisable to use old geographical distribution data from the literature to prepare distribution patterns and try to understand them.

The most likely picture that therefore emerges regarding the evolution of the *repleta* group is one of the origin and initial speciation in the Mexican Transitional Zone; the most successful species expanded their ranges and underwent further burst of speciation. Representatives of all subgroups, mainly the *fasciata*, reached South America through both Central America and West Indies and speculated there.

As far as South America is concerned, the climate alternation during the Quaternary seems to have played an important role in the differentiation of species and populations.

A few species have become adapted to the special conditions about human activities and habitations and have apparently become very widespread in association with them.

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The following table lists species of the genus *Drosophila* included, or originally described, in the *repleta* group with figure-number and or page-number. Names removed in this or earlier papers by synonymy, homonymy, transfer to another group or subgenus, etc. are asterisked. The subgroups are indicated as follows: fa, fasciola; hy, hydei; me, mercatorum; mu, mulieri; re, repleta.

<p>| <em>adversa</em> Mtk | — | 88 | re |
| aldriehi Patterson | 34 | 46 | mu |
| anepp Patterson &amp; Mainland | 35 | 46 | mu |
| <em>annulimana</em> Dade | — | 102 | — |
| <em>arizonensis</em> Patterson &amp; Wheeler | 31 | 62 | mu |
| <em>aurea</em> Wheeler | — | 105 | — |
| <em>australepla</em> Dobzhansky &amp; Pavan | 75a-c | 88 | re |
| <em>betrari</em> Dobzhansky &amp; Pavan | 75d-f | 88 | re |
| <em>bifrons</em> Patterson &amp; Wheeler | 20 | 29 | hy |
| <em>borborema</em> Vilela &amp; Sene | 36 | 48 | mu |
| <em>brevicarinata</em> Patterson &amp; Wheeler | — | 94 | — |
| <em>brunneipalpa</em> Dobzhansky &amp; Pavan | 75g-i | 89 | re |
| buzzati Patterson &amp; Wheeler | 37 | 48 | mu |
| <em>californica</em> Sturtevant | 78 | 94 | — |
| <em>canapala</em> Patterson &amp; Mainland | 73 | 86 | re |
| <em>carcinophila</em> Wheeler | 28 | 37 | me |
| <em>carolinata</em> Grimshaw | — | 38 | mu |
| carolinac. sp. nov. | 2 | 5 | fa |
| <em>chinoi</em> Okada | — | 103 | — |
| <em>corioca</em> Wasserman | 3 | 6 | fa |
| desckerum Wasserman | 38 | 50 | mu |
| ellisoni, sp. nov. | 4 | 7 | fa |
| eohydei Wasserman | 21 | 30 | hy |
| eremophila Wasserman | 39 | 51 | mu |
| fasciota Williston | 5 | 9 | fa |
| fascioloides Dobzhansky &amp; Pavan | 6 | 10 | fa |
| <em>fulginea</em> Patterson &amp; Wheeler | — | 94 | — |
| fulvalineata Patterson &amp; Wheeler | 7 | 12 | fa |
| fulvimacula Patterson &amp; Mainland | 69 | 83 | re |
| fulvimaculata flavorepleta Patterson | — | 83 | re |
| fulvimaculoides Wasserman &amp; Wilson | 70 | 84 | re |
| hamatofila Patterson &amp; Wheeler | 40 | 52 | mu |
| henninova. sp. nov. | 8 | 13 | fa |
| hexastigmata Patterson &amp; Mainland | 41 | 53 | mu |
| <em>hockeri</em> Brncic | — | 66 | mu |
| hydei Sturtevant | 22 | 31 | hy |</p>
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<td>starmeri Wasserman, Koepfer &amp; Ward</td>
<td>65</td>
<td>79</td>
<td>mu</td>
</tr>
<tr>
<td>subviridis Patterson &amp; Mainland</td>
<td>66</td>
<td>79</td>
<td>mu</td>
</tr>
<tr>
<td>* figrina Buzzati-Traverso</td>
<td>--</td>
<td>48</td>
<td>mu</td>
</tr>
<tr>
<td>* itra Wasserman</td>
<td>--</td>
<td>74</td>
<td>mu</td>
</tr>
<tr>
<td>unisetata Wasserman, Koepfer &amp; Ward</td>
<td>67</td>
<td>80</td>
<td>mu</td>
</tr>
<tr>
<td>* versicolor Mather</td>
<td>--</td>
<td>48</td>
<td>mu</td>
</tr>
<tr>
<td>victoriae, sp. nov.</td>
<td>84</td>
<td>100</td>
<td>--</td>
</tr>
<tr>
<td>wheeleri Patterson &amp; Alexander</td>
<td>68</td>
<td>81</td>
<td>mu</td>
</tr>
<tr>
<td>zottii, sp. nov.</td>
<td>77</td>
<td>92</td>
<td>re</td>
</tr>
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