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STUDIES ON BRAZILIAN SPECIES OF DROSOPHILA

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STUDIES ON BRAZILIAN SPECIES OF DROSOPHILA

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This paper contains descriptions of species of *Drosophila* found in the state of São Paulo and Federal District during the preliminary survey of the *Drosophila* fauna of these states in 1943. The purpose of this survey has been to find native Brazilian species of *Drosophila* favorable for genetic investigation. We have, consequently, limited ourselves to a single method of collecting: exposure of traps containing fermented banana as bait. The flies have been brought alive to the laboratory, and cultivated in the regular $\frac{1}{4}$ liter milk bottles on the banana agar medium. We have followed the standard scheme of description of species of *Drosophila* worked out by Sturtevant, Spencer, Patterson and Wheeler (1942). This scheme includes descriptions of the external morphology and anatomy of the adults, of the eggs, puparia, and chromosomes. We have, consequently, not described the species which failed to produce offspring in the laboratory. Such failures are due either to the unsuitability of the culture medium for certain species, or to the flies caught being too weak, old, or unfertilized females. We have no illusions as to the incompleteness of our work: there is no doubt whatever in that the number of species of *Drosophila* inhabiting only the states of São Paulo and Federal District is several times greater than the number described in this paper. In fact, we have collected at least twice as many species as we have been able to breed, and consequently to describe. The method adopted by our-

selves is obviously unorthodox from the standpoint of classical systematics, but it is suitable for the purpose of our work. It is, of course, to be hoped that future studies will cover the fauna of *Drosophila* more completely, by exploiting different methods of collections, as well as by making repeated trials of breeding species found on the standard and on modified culture media.

Up to now the sum total of the knowledge of Brazilian *Drosophilae* was contained in the paper of Duda (1925) on South-American *Drosophilidae*. Duda has worked exclusively with dry museum material, mostly from Peru and Bolivia, only to a limited extent from Brazil. Moreover, his descriptions are frequently based on very few or a single specimen. We have re-described in the new standard way the species found by us which are or seem to be identical with Duda's species. It seemed, however, useless in this paper to re-describe the cosmopolitan or semi-cosmopolitan species of *Drosophila* found in Brazil (such as *D.melanogaster*, *simulans*, *ananassae*, *busckii* and *immigrans*). These species are found mostly or only close to human habitations, in town and villages, and are not properly speaking members of the native Brazilian fauna. They are, however, included in the key for the determination of the species recorded by us.

Since the techniques of investigation used by us are those familiar to all students of *Drosophila* genetics, the following few remarks will be sufficient. All the descriptions and measurements have been made on etherized or freshly killed material; this is especially important for the measurement of body size, since the body of a *Drosophila* shrinks quite considerably on drying. All the measurements and all the drawings of adults, eggs, puparia, and spermathecae have been made by one of us (C. Pavan) and all the drawings of chromosomes by the other (Th. Dobzhansky). All the descriptions have, however, been checked by both authors. The measurement called length of the body has been made under a microscope with the aid of an ocular micrometer; it is the sum of the distance from the antenna to a point of

the junction on the dorsal side of the thorax and the abdomen, plus the distance from the latter point to the tip of the anal tubercle. Length of wing has been taken from the point of the insertion of the wing to the thorax (dorsally), to the extremity of the wing blade. All the wing vein measurements are taken as straight line distances between the midpoints of the width of the veins indicated by Sturtevant (1942).

Male individuals have been designated as types of all new species. The types are preserved in the Instituto de Zoologia, Museu Paulista, São Paulo, Brazil. The authors wish to express their thanks to Professor André Dreyfus of the University of São Paulo who aided the work in many ways and collected not a few of the specimens, to Dr. Frederico Lane of the Museu Paulista, to Professor Lauro Travassos of the Instituto Oswaldo Cruz, Rio de Janeiro, and to all other colleagues who have facilitated our work.

Drosophila willistoni Sturtevant

Drosophila willistoni Sturtevant, 1921, p. 89.

Drosophila pallida Williston 1896, not *Drosophila pallida* Zetterstedt 1847.

Drosophila willistoni Duda, 1925, p. 189.

♀, ♂. Arista with 10-11 branches. Antennae yellow, third segment with a rather dense and long pile. Front yellow. Anterior orbital 3/4, middle orbital 1/4 posterior. Two prominent about equally long oral bristles, third oral small. Face yellow. Carina short, gradually falling off below, not sulcate. Cheeks pale yellow, their greatest width about 1/6 greatest diameter of eye. Eyes cinnabar red with a short yellow pile.

Acrostichal hairs in 6 rows, regular. No prescutellars. Anterior scutellars slightly divergent. Thorax tannish yellow, shining, without pattern, pleurae lighter. Anterior sternopleural 1/4 to 1/3 posterior and much thinner, middle ster-

nopleural smaller than the anterior. Legs pale yellow; apical bristles on first and second tibiae, preapicals on all three.

Abdomen yellow with somewhat diffuse brown marginal bands broadened in the middle and fading out before reaching the lateral margins.

Wings clear. Two prominent bristles at apex of first costal section; third costal section with heavy bristles on its basal $2/5$. Costal index 1.7-2.0; 4th vein index 1.8-2.1; 5x index 1.6-2.0.

Length body 1.6-2.5 mm.; wings 1.5-2.1 mm.

Two anterior and two posterior Malpighian tubes, ends free.

Testes yellow with about 2 outer and 3 inner (vesiculae seminales) coils; in young males the distal portion of the testis much thinner than the proximal portion. Spermathecae spherical, rather weakly chitinized, with a small terminal indentation. (Plate 5, Fig. 95). Ventral receptacle a long tube forming a flat spiral bent into a W-shaped plate resting on the vagina.

Eggs — two filaments greatly expanded and flattened distally, about $1/2$ as long as the egg itself (Plate 5, Fig. 122).

Puparia — brownish yellow, horn very short, each anterior spiracle with 8-9 short branches.

Chromosomes — metaphase plates show two pairs of V's, one of which is distinctly shorter than the other, and a pair of rods (Plate I, Figs. 1-3).

Distribution: Villa Atlantica, Bertioga, Alto da Serra, Cantareira, Araras in the state of São Paulo; Corcovado, Jacarepaguá in the Federal District; apparently the commonest wild species of *Drosophila* in the vicinity of São Paulo and Rio de Janeiro.

Drosophila paulista, species nova

♀, ♂. Arista with 11-12 branches, 12 being the usual number. Antennae tannish yellow, third segment with a slight-

tly longer pile than in *D. willistoni*. Front yellow. Anterior orbital almost as long as posterior, middle orbital $\frac{1}{3}$ other two. Two prominent about equally long oral bristles, the third oral also prominent, up to $\frac{3}{4}$ the length of other two. Face yellow. Carina short, gradually falling off below, not sulcate. Cheeks yellow, their greatest width about $\frac{1}{8}$ greatest diameter of eye. Eyes cinnabar red with a short brownish pile.

Acrostichal hairs in 6 rows, slightly disarranged. Anterior scutellars slightly divergent. Thorax tannish yellow, shining, in some specimens with indications of a darker median stripe. Pleurae lighter. Anterior sternopleural as long as or shorter than the middle sternopleural, either of these $\frac{1}{4}$ to $\frac{1}{3}$ as long as the posterior and much thinner. Legs yellow; apical bristles on first and second tibiae, preapicals on all three.

Abdomen yellow with dark brown marginal bands broadened in the middle, narrowed toward the lateral margins of the tergites, which they may or may not reach.

Wings clear. Two prominent bristles at apex of first costal section; third costal section with heavy bristles on its basal $\frac{2}{5}$ to $\frac{1}{2}$. Costal index 2.0-2.2; 4th vein index 1.9-2.1; 5x index 1.6-1.9.

Length body 1.9-2.9 mm.; wings 1.9-2.5 mm.

Two anterior and two posterior Malpighian tubes, ends free.

Testes yellow with about 2 outer and 3 inner (vesiculae seminales) coils. Spermathecae shaped like a rounded cylinder with a diameter about equal to height, well chitinized, with a terminal indentation (Plate 5, Fig. 96). Ventral receptacle a long tube forming a flat spiral bent into a W-shaped plate resting on the vagina.

Eggs — two filaments greatly expanded and flattened distally, about $\frac{1}{2}$ as long as the egg itself (Plate 5, Fig. 123).

Puparia — brownish yellow, horn very short, each anterior spiracle with 9-11 short branches.

Chromosomes — metaphase plates show two pairs of V's, one of which is slightly longer than the other, and a pair of rods (Plate I, Figs. 4 and 5).

Distribution: Campinas, April 1943 (type locality) E. Nonato collector; Cantareira, Vila Atlantica, Bertiooga, Mogi das Cruzes, Araras, all in the state of São Paulo.

Relationships — very similar to *D. willistoni* Sturtevant, but differing in a number of characters among which we find the presence of three prominent oral bristles the most practical for distinguishing the adults. The specific distinction of *paulista* and *willistoni* is made quite certain by the observed differences in the disc patterns of the salivary gland chromosomes. The distinction of *paulista* and *capricorni* is easy, since the first of these species has a shiny and the second a dull thorax.

Drosophila fumipennis Duda

Drosophila fumipennis Duda, 1926, p. 220, 1925, p. 187.

♂, ♀. Arista with 12 - 14 branches, 13 being the usual number. Antennae tan, third segment darker, at least twice as long as wide, densely but very delicately pilose. Front tan, frontal lines velvety, space between the ocelli brown. Anterior orbital 4/5, middle orbital 1/3 posterior. Two prominent equally long oral bristles. Face yellow. Carina large, prominent, gradually falling off below, not sulcate. Cheeks yellow, their greatest diameter only about 1/10 greatest diameter of eyes. Palpus long, slender, with a single bristle on the tip. Eyes large, cinnabar red, with very short brownish pile.

Acrostichal hairs very short, quite irregular, either 6 or 8 rows can be counted. No prescutellars. Anterior scutellars divergent. Thorax dull tan with very slight indications of a darker pattern, scutellum darker. Pleurae yellow; anterior and middle sternopleurals 4/10 posterior and much thinner. Legs yellow, clear apicals only on second tibiae, pre-apicals on all three.

Abdomen yellow with brown to black marginal bands with indistinct outlines broadened in the middle almost to the anterior margin, rapidly narrowing laterally and far from reaching the lateral margins. The last tergite unbanded.

Wings uniformly dark brown, crossveins little if any darker. Two prominent bristles on apex of first costal section; third costal section with heavy bristles on its basal 2/3. Costal index 2.3-2.5; 4th vein index 1.5-1.7; 5x index 1.4-1.5.

Length body 2.6-3.5 mm.; wing 2.0-2.7 mm.

Anterior and posterior Malpighian tubes two, free.

Testes bright yellow, with 3 to 4 coils. Spermathecae spherical, well chitinized, with an indentation at top (Plate 5, Fig. 97). Ventral receptacle long and slender (though not as long as in species of saltans group), resembling a skein of wool folded in a plate having the shape of figure 3.

Eggs — two filaments slightly expanding distally, about 2/3 as long as the egg itself (Plate 5, Fig. 124).

Puparia — yellow brown, horn rudimentary, each spiracle with 9-10 short branches.

Chromosomes — metaphase plates show two pairs of V-shaped and one pair of rod-like chromosomes. One of the V-shaped pairs longer than the other and showing a strong secondary constriction at about 2/5 of the distance from the centromere to the free end (Plate I, Figs. 9-11).

Distribution — described from Costa Rica and indicated by Duda for Petropolis, state of Rio de Janeiro. Also Alto da Serra, April 1943, Cantareira, April 1943, Vila Atlantica, May 9, 1943, and Bertioga, May 30, 1943, all in the state of São Paulo.

Relationships — belongs to the willistoni group of the subgenus Sophophora. Clearly related to *D. capricorni*, from which it differs by its dark wings, pattern on the abdomen, and other characters.

Drosophila capricorni, species nova

♂, ♀. Arista with 11-12 branches. Antennae yellow, third joint a little less than twice as long as wide, rounded distally, with a short but dense and fine pubescence. Front tannish yellow, frontal lines broad, V-shaped, with a microstructure consisting of longitudinal striae. Anterior and posterior orbitals equally long, middle orbital $\frac{1}{3}$ other two. Face and cheeks yellow, the greatest width of the latter about $\frac{1}{8}$ greatest diameter of eyes. Carina prominent but narrow, gradually falling off below, not sulcate. Two prominent equally long oral bristles. Eyes large, broadly rounded, bright red, with a short but dense brown pile.

Acrostichal hairs in 6 rows, sometimes disarranged. No prescutellars. Anterior scutellars divergent. Thorax tannish yellow, opaque, not at all shining, without pattern, pleurae lighter. Anterior sternopleural about $\frac{1}{2}$ posterior and much thinner. Legs yellow; apical bristles on first and second tibiae, preapicals on all three.

Abdomen yellow, slightly shining, tergites with brown marginal bands expanded in the middle to about $\frac{1}{2}$ of the length of the tergite, narrowing laterally, not quite reaching the lateral margins in some individuals.

Wings very slightly fuscous, crossveins not clouded. Two prominent bristles at apex of first costal section. Third costal section with heavy bristles on its basal $\frac{1}{2}$ - $\frac{3}{5}$. Costal index 2.1-2.5; 4th vein index 1.5-1.7; 5x index 1.4-1.7.

Length body 2.6-2.9 mm.; wing 2.3-2.6 mm.

Two anterior and two posterior Malpighian tubes, ends free.

Testes amber yellow with 2 coils. The distal end of the testis, at least in young males, much thinner than other parts, containing early stages of spermatogenesis. Spermathecae slightly longer than wide, well chitinized, with an apical indentation (Plate 5, Fig. 98). Ventral receptacle a long slender tube (but not as long as in species of *D. saltans* group) forming a spiral shaped like the figure 3.

Eggs — two filaments greatly expanded and flattened distally, shaped like a golf club, about $2/3$ as long as the egg itself (Plate 5, Fig. 125).

Puparia — brownish yellow, horn very short, each anterior spiracle with 10-11 short branches (Plate 6, Fig. 143).

Chromosomes — metaphase plates show two pairs of V-shaped and a pair of rod-like chromosomes. The rod as long as or shorter than an arm of the V's (Plate I, Figs. 6-8).

Distribution — Vila Atlantica, near Praia Grande, May 1943 (type locality), Mogi das Cruzes, May 1943, Bertioga, June 1943, Iporanga, July 1943, state of São Paulo; Tijuca, Jacarepaguá, July 1943, Federal District.

Relationships — belongs to the *willistoni* group of the subgenus *Sophophora*. Using Duda's (1925) key, this species is determined as *D. kerteszi* *boliviensis* Duda, but it is doubtful that they are even closely related. Differs from *D. willistoni* and *D. paulista* by its larger size and the remarkable opaque thorax.

Drosophila sturtevantii Duda

Drosophila sturtevantii Duda, 1925, p. 167.

Arista with 9 branches. Antennae light brown, a part of the second and the third segment darker. Front velvety tan, basal portions of the frontal lines brownish black, apices of the ocellar triangle and orbits from the ocellars downward greyish yellow. Anterior orbital a little shorter than the posterior, middle orbital about $1/5$ other two. Three prominent oral bristles, the third of which is somewhat shorter than the first two. Carina narrow, rather short, not sulcate; about a dozen small bristles below carina. Face and cheeks light brown, but the margin of the cheeks carrying the oral bristles brownish black; the greatest width of the cheeks about $1/5$ greatest diameter of eye. Eyes dark red with a short dark pile.

Acrostichal hairs in 6 to 8 rows, irregular. No prescutellars. Anterior scutellars divergent or nearly parallel. Mesonotum dark brown with a lighter yellow brown pollinose stripe between the middle acrostichal rows which expands forward to occupy up to three acrostichal rows and expands rearward to a lesser extent, another lighter stripe in and just outside the dorsocentral rows, and a third stripe connected with the second at the suture; humeri light; scutellum dark brown with indistinct continuations of the lighter stripes of the mesonotum. Pleurae dark greyish brown to black, sutures lighter. Anterior sternopleural $1/3$ posterior and much thinner. Legs brownish yellow, coxae and femora partly darker. Apical bristles on first and second tibiae, preapicals on all three.

Abdomen black, each tergite with two yellow spots on the anterior margin separated by a black middorsal line and far from reaching the lateral margins. Opaque semicircular areas on the sides of the sixth tergite, situated closer to the lateral margin than to the middle.

Wings clear. Two well developed bristles at apex of first costal section; third costal section with heavy bristles on its basal $2/5$. Costal index 2.0-2.2. 4th vein index 1.6-1.8; 5x index 1.3-1.5.

Length body 2.4-2.7 mm.; wing 2.3-2.5 mm.

♀. Sixth abdominal tergite black, without opaque areas.

Two anterior and two posterior Malpighian tubes, ends free.

Testes amber yellow, with 7-8 gyres. Ventral receptacle long and slender, resembling a skein of wool that has been thrown, as a whole, in two conical spirals, each with about 3 coils, which lie on either side of the vagina connected by a flat ark-shaped bridge. Spermathecae spherical, weakly chitinized, with a "collar" at base and no indentation (Plate 5, Fig. 99).

Eggs — two filaments that are slightly longer than the egg, expanded distally to resemble in shape an oar, the blade

of the oar expanding suddenly at about the middle of the length of the filament (Plate 6, Fig. 129).

Puparia — reddish brown, horn so small that no horn index can be computed, each spiracle with 7-8 short branches.

Chromosomes — metaphase plates show two pairs of V's and a pair of rods that are distinctly shorter than an arm of the V-shaped chromosomes (Plate I, Figs. 12 and 13). Salivaries show that the rod and one of the V's are autosomes, while the other V is an X or a Y-chromosome.

Distribution — Bertioga, May 30, 1943, state of São Paulo, Rio de Janeiro, May 1943 (Hugo Souza Lopes, collector).

Relationships — apparently identical with the species described from a single museum specimen from Bolivia under the name *D. sturtevanti* Duda. Very close to and possibly synonymous with *D. biopaca* Sturtevant described from Guatemala and from Panamá.

Drosophila prosaltans Duda

Drosophila prosaltans Duda, 1925, p. 164

? *Drosophila sellata* Sturtevant, 1942, p. 39

♀. Arista with 9-10 branches. Antennae greyish brown, the second anteriorly and the whole third joint darker. Front velvety castaneous brown, basal portions of the frontal lines black, orbits, ocellar triangle, the anterior margin, and the anterior angles silvery pollinose. Anterior orbital a little shorter than the posterior, middle orbital 1/3 other two. Two prominent equally long oral bristles. Face tan, darker below carina; carina narrow, rather short, gradually falling off below, not sulcate; minute hairs below and on the lowermost part of the carina. Cheeks greyish yellow, their margin carrying the oral bristles darker, their greatest width about 1/2 greatest diameter of eyes. Palpus greyish yellow, with one long bristle at tip. Eyes bright red (blood red in old flies), with a short black pile.

Acrostichal hairs irregular, 6 or 8 rows may be counted, usually 8. No prescutellars. Anterior scutellars divergent or

parallel. Mesonotum brownish grey, pollinose, with a dark brown to black median streak in front of the anterior dorsocentrals, a pair of stripes inside the dorsocentral rows broadening posteriorly, and a stripe broken into three spots outside the dorsocentral rows. Scutellum dark brown, pollinose, with black spots at bases of bristles. Pleurae brownish black. Legs black, tibiae dark and tarsi light brown. Anterior sternopleural 1/2 posterior. Halteres pale yellow, third joint white. Apical bristles on first and second tibiae, preapicals on all three.

Abdomen black, polished, shining, each tergite with a silvery yellow pollinose basal band narrowed in the middle and far from reaching the lateral margins. Sixth tergite with a single dark opaque area on the posterior part, this area not narrowed in the middle and occupying 1/2 of the width of the tergite.

Wings clear. Tip of first costal section slightly darkened, with two well developed bristles; third costal section with heavy bristles on its basal 1/3. Costal index 1.9-2.3; 4th vein index 2.1-2.4; 5x index 1.8-2.2.

Length body 2.4-2.8 mm.; wing 2.1-2.4 mm.

♂. No opaque area on the sixth tergite.

Two anterior and two posterior Malpighian tubes, not fused at ends.

Testes amber yellow with 4 to 5 coils. Ventral receptacle long and slender, resembling a skein of wool that is folded, as a whole, into the shape of an M. Spermathecae well chitinized, dark brown, shaped like a compressed sphere, without indentation (Plate 5, Fig. 100).

Eggs — two filaments gradually expanding in their distal 2/3, each about 3/4 the length of the egg (Plate 6, Fig. 130).

Puparia — reddish brown, horn very small but somewhat larger than in *D. sturtevanti* Duda, with 7 short branches.

Chromosomes — metaphase plates show two pairs of V's and one pair of rods, the length of the latter being about equal

to the length of the arm of the V (Plate I, Figs. 14 and 15). Salivaries show five limbs; in the male it can be seen that two of these are X-chromosomes, one corresponding to the rod-like chromosome seen at metaphase, and the other united with an autosomal limb to form one of the two metaphasic V's.

Distribution — Bertioga, May 30, 1943, Itanhaem, July 1943, state of São Paulo; Jacarepaguá, Federal District, July 14, 1943. Described by Duda from Hohenau, Paraguay, and perhaps by Sturtevant from Mexico and Guatemala.

Relationships — the Brazilian material is, judging from description, identical with Duda's type specimen of *prosaltans*. The identity with Sturtevant's *D. sellata* is more doubtful, although Sturtevant himself has pointed out the lack of clear differences between his species and *D. prosaltans* Duda; examination of salivary gland chromosomes of *D. sellata* would probably be the surest method of establishing the identity of that species.

Drosophila polymorpha, species nova

♂, ♀. Arista with 8-10 branches, 9 being the usual number. Antennae yellow, third segment densely pilose. Front velvety yellow, ocellar triangle and orbits more shining and hence appearing lighter in color from some angles, ocelli darker. Anterior and posterior orbitals equal, middle orbital 1/4 other two, slender. Two prominent equally long oral bristles, the second sometimes thinner than the first. Face yellow, paler than the front. Carina large, not sulcate. Cheeks pale yellow, their greatest width about 1/5 diameter of eyes. Eyes red with short brown pile.

Acrostichal hairs in 6 rows, regular. No prescutellars. Anterior scutellars convergent. Thorax yellow, strongly shining, without pattern. Pleurae yellow, paler ventrally. Anterior sternopleural about 0.5 the length of posterior and much thinner. Legs yellow, apical bristles on first and second tibiae, preapicals on all three.

Abdomen polished, shining, with a variable color pattern. In the type form first tergite yellow, second yellow with a black marginal band interrupted in the middle and expanded laterally but far from reaching either the anterior or the lateral margins, third and fourth with progressively broader black bands interrupted in the middle and strongly expanded laterally to reach the anterior but not the lateral margin, fifth black with a yellow longitudinal stripe broadening anteriorly and a yellow lateral margin, sixth and seventh wholly black. In the pale form abdomen shining yellow with narrow black marginal bands on second to sixth tergites interrupted in the middle and not reaching the lateral margins. In some light ♀♀ the sixth and seventh tergites wholly yellow. The type (dark) and the pale forms connected by some intergrades, but most individuals classifiable as belonging to one or the other; both forms may appear in the offspring of a single mother.

Wings clear, crossveins not clouded. One prominent bristle at apex of first costal section; third costal section with heavy bristles on its basal 1/3. Costal index 3.8-4.1; 4th vein index 1.4-1.6; 5x index about 1.3.

Length body 2.5-3.2 mm.; wing 2.5 mm.

Anterior Malpighian tubes fused into a thick common trunk for about 1/3, then free and more slender for 2/3 of their length; posterior longer than anterior, their ends apposed without formation of continuous lumen.

Testes with 7 outer bright yellow and 5 inner grey (vesiculae seminales) coils, and very long and slender vasa efferentia. Sperm pump with two long diverticula. Ventral receptacle with about 27 slender and about 29 thicker coils. Spermathecae strongly chitinized, dark brown, resembling an inverted flower vase with the greatest diameter about equal to height, the neck of the vase being attached to the spermathecal duct (Plate 5, Fig. 101).

Eggs — four slender acuminate filaments about as long as the egg itself (Plate 6, Fig. 132).

Puparia — reddish brown. Horn slender and very delicate, frequently glued to the surface of the pupa case, horn index about 5, anterior spiracle with about 12 long and slender branches.

Chromosomes — metaphase plates show 2 pairs of V's, a pair of rods (X and Y), and a pair of small dots. The X about twice as long as the Y, with a subterminal centromere frequently separating a small satellite, and in prophases showing a deep secondary constriction at about the middle of its length. One of the V's may also show a strong secondary constriction at about the middle of one of its limbs (Plate 1, Figs. 16-18).

Distribution — Bertioga, May 30, 1943 (type locality, dark and light forms), Vila Atlantica, May 9, 1943, (light), Mogi das Cruzes, June 1943 (dark and light), Araras (dark), all in the state of São Paulo, Tijuca (dark), Jacarepaguá (dark), July 1943, Federal District.

Relationship — belongs to the cardini group of subgenus *Drosophila*, and is close to *D. cardini* Sturtevant, from which it differs in many characters including the chromosomes and the structure of the anterior Malpighian vessels.

Drosophila cardinoides, species nova.

♂. ♀. Arista with 9-10 branches, 9 being the usual number. Antennae tannish yellow, third segment densely but finely pilose. Front dark tan, frontal lines velvety, ocellar triangle and orbits more shining, space between the ocelli dark brown. Anterior and posterior orbitals about equal, middle orbital $1/4$ other two, slender. Two prominent about equally long oral bristles. Face tan; carina large, triangular, its surface flattened, not sulcate. Palpi brownish, with many bristles. Cheeks tan, their greatest width about $1/5$ greatest diameter of eyes. Eyes purplish red with a short brown pile.

Acrostichal hairs in 6 rows, regular. No prescutellars. Anterior scutellars convergent. Thorax dark tan, polished, strongly shining, without pattern. Pleurae tan, shining, pa-

ler ventrally. Anterior sternopleural $3/5$ posterior, much thinner in some specimens, equally thick in others. Legs yellow, apical bristles on first and second tibiae, preapicals on all three; a row of small peg-like bristles in the inside of the tarsus, this condition being most pronounced on middle tarsi.

Abdomen polished, shining, with a pattern as follows. First tergite yellow, sometimes with a narrow black basal band; second yellow with a black basal band interrupted in the middle and expanding laterally without reaching the lateral margin; third and fourth like the second but the black bands progressively wider, leaving less and less yellow laterally and reaching the anterior margin on the sides; fifth black with an yellow median spot; sixth and seventh (in the ♀ ♀) wholly black.

Wings clear or slightly fuscous, crossveins slightly clouded in some specimens. Apex of the first costal section darkened, with one prominent and one less prominent bristle; third costal section with heavy bristles on its basal $1/3$. Costal index 3.2-3.8; 4th vein index 1.7-2.1; 5x index 1.1-1.4.

Length body 2.7-3.5 mm.; wing 2.6-3.1 mm.

A single anterior Malpighian tube, branched only at distal end; posterior two, their ends apposed without formation of continuous lumen.

Testes with 7-8 outer bright yellow and 5 inner grey (vesiculae seminales) coils, and very long, slender, and colorless vasa efferentia. Sperm pump with 2 long diverticula. Spermathecae rather weakly chitinized, yellow, resembling an inverted flower vase with the greatest diameter less than the height (Plate 5, Fig. 102).

Eggs — four slender acuminate filaments shorter than the egg itself (Plate 6, Fig. 138).

Puparia — brownish yellow, horn slender, with 11-13 rather long branches, horn index about 8 (Plate 7, Fig. 150).

Chromosomes — metaphase plates show 2 pairs of V-shaped, a pair of rod-like, and a pair of dot-like chromo-

somes. The rod is clearly longer than an arm of either of the V's (Plate 1, Figs. 19-21).

Distribution — Iporanga, July 1943 (type locality), state of São Paulo; Jacarepaguá, July 1943, Federal District.

Relationships — closely related to *D. polymorpha* and to *D. cardini*. Differs from the former in the body color and the structure of the Malpighian vessels; from the latter at least in the chromosome complement.

Drosophila prosimilis Duda

Drosophila similis Williston, *prosimilis* Duda, 1925, p. 194.

♂, ♀. Arista with 11-13 branches, 12 being the usual number. Antennae brownish yellow, third segment similar in color to other two. Front uniformly velvety yellow, the space between the ocelli darker. Small hairs on the orbit and the anterior margin. Anterior orbital $\frac{2}{3}$ posterior, middle orbital minute, less than $\frac{1}{5}$ posterior and much thinner. Only one prominent oral bristle. Face pale greyish yellow. Carina moderately large, gradually broadening below, its sides straight, not sulcate. Cheeks very pale greyish yellow, their greatest diameter about $\frac{1}{5}$ greatest diameter of eyes. Eyes bright red with a very short yellow pile.

Acrostichal hairs in 6 rows, regular. No prescutellars. Anterior scutellars divergent. Thorax brownish yellow, very slightly shining, without pattern. Pleurae pale brownish or greyish yellow. Anterior sternopleural about $\frac{6}{10}$ the length of posterior and distinctly thinner. Legs yellow, apical bristles on first and second tibiae, preapical on all three. A bristle at the base of the first tarsal segment and two rows of small peg-like bristles on the inside of the tarsus of hind legs, but not on front or middle legs.

Abdomen yellow, slightly shining. Second and third, in some specimens also the fourth tergites with narrow black or brown bands which become indistinct laterally and may or may not be interrupted in the middle. The fifth to seventh tergites unbanded.

Wings slightly infusate, posterior crossvein distinctly clouded. One prominent bristle at apex of first costal section; third costal section with haevy bristles on its basal $1/3$. Costal index 4.0-4.4; 4th vein index about 1.3; 5x index about 0.9.

Length body 2.6-2.9 mm.; wings 2.4 mm.

Anterior Malpighian tubes two, free, posterior fused, lumen continuous.

Testes pale amber yellow with 5 coils not clearly differentiated into inner and outer ones. Spermathecae ovoidal, well chitinized, without indentation (Plate 5, Fig. 103). Ventral receptacle a spiral with about 30 coils.

Eggs — four thread-like filaments, their bases close together in a single line on one side of the egg, their length slightly greater than that of the egg itself (Plate 6, Fig. 135).

Puparia — yellowish brown, each anterior spiracle split in 12-16 branches, horn index about 4, horn slender, frequently deformed.

Chromosomes — metaphase plate shows 5 pairs of rods and a pair of small dots. Two pairs of rods are short; two others longer with subterminal centromeres separating tiny satellites at the proximal ends; the longest rods are X or Y chromosomes, the X frequently showing a strong secondary constriction at about $1/3$ from its proximal end (Plate 1, Figs 22 and 23).

Distribution — Vila Atlantica, near Praia Grande, May 1943; Iporanga, July 1943; state of São Paulo; Jacarepaguá, July 1943, Federal District.

Relationship — we identify this species with *D. pro-similis* Duda only with much hesitation, the description of Duda being quite inadequate.

Drosophila mediosignata, species nova

♂. Arista with 12 branches. Antennae tannish yellow, third segment similar in color to other two. Front uniformly tannish yellow, space between the ocelli brown.

Anterior orbital $3/4$ posterior, middle orbital minute, less than $1/5$ posterior and much thinner. One prominent oral bristle. Face dirty yellow. Carina large but rather flat, triangular, almost reaching the clypeal margin, not sulcate. Cheeks greyish yellow, their greatest width about $1/6$ greatest diameter of eyes. Eyes red with a short yellow pile.

Acrostichal hairs in 6 rows, irregular. No prescutellars. Anterior scutellars divergent. Thorax tan, slightly shining, without pattern. Pleurae much paler than the thorax, light yellowish grey. Anterior sternopleural about $6/10$ posterior and much thinner. Legs yellow, apicals on first and second tibiae, preapicals on all three. A bristle at the base of the first tarsal segment and two rows of small peg-like bristles on the inside of the tarsus of hind legs, but not on front of middle legs. Several long bristles on front femora and coxae, but no row of short stout bristles on lower apical part of front femora.

Abdomen yellow, slightly shining. Second and third tergites with a black marginal band broadly interrupted in the middle, rapidly narrowing laterally, and far from reaching the lateral margins; fourth and fifth tergites unmarked or with indistinct clouded areas on the midline; sixth tergite with an unpaired longitudinally oblong black spot reaching from the anterior margin to about $3/4$ of the length of the tergite, and with long, slender, and erect bristles on the posterior margin.

Wings slightly fuscous, posterior crossveins slightly clouded. One prominent bristle at apex of first costal section; third costal section with heavy bristles on its basal $2/5$. Costal index 4.4-4.6; 4th vein index 1.2-1.4; 5x index 0.9-1.1.

Length body 3.6 mm.; wing 3.2 mm.

♀. Second to fourth tergites with black marginal bands of the same type as in the ♂♂; posterior tergites unmarked.

Anterior Malpighian tubes two, free, posterior fused, lumen continuous.

Testes pale yellow with about 3 or 4 coils; sperm pump with 2 short diverticula. Spermathecae ovoidal, well chiti-

nized, without indentation (Plate 5, Fig. 105). Ventral receptacle an irregular spiral with about 24 coils.

Eggs — four slender thread-like filaments, longer than the egg itself (Plate 6, Fig. 131).

Puparia — yellowish brown, each anterior spiracle split in about 18 branches, horn index about 3.5, horn slender, frequently deformed.

Chromosomes — metaphase plates show 5 pairs or rods and a pair of large dots. Two pairs of rods are short without obvious satellites; one of the longer rods has a small and the other a large satellite (Plate 2, Figs. 27, 29 and 30).

Distribution — Apiai, June 1943 (type locality); Iporanga, July 1943, state of São Paulo; Jacarepaguá, July 1943, Federal District.

Relationships — appears close to, and yet clearly different from *D. medio-obscurata* Duda, a species described from Costa Rica. Among Brazilian species is close to *D. prosimilis* Duda, from which it is easily distinguishable by the abdominal markings. Is rather common in the state of São Paulo, but is very difficult to breed in the laboratory: in fact only once a culture with larvae has been obtained. Near Apiai this species has been collected in rather large numbers around wild mushrooms.

Drosophila mediopunctata, species nova

♂. Arista with 13-15 branches (the greatest number recorded in the genus). Antennae tannish yellow. Front uniformly tan. Anterior orbital $\frac{3}{4}$, middle orbital $\frac{1}{4}$ posterior. Two prominent oral bristles, the second about $\frac{4}{5}$ the first. Face greyish yellow, carina elongated triangular, far from reaching the clypeal margin, its surface flat, not sulcate. Cheeks greyish yellow, their greatest width about $\frac{1}{7}$ greatest diameter of eyes. Palpi with several long bristles. Eyes cinnabar red with a very short pile which is brown on the dorsal and pale yellow on the ventral part of the eye

(which fact makes the eye color to appear brighter ventrally than dorsally).

Acrostichal hairs in 8 rows, fairly regular. No prescutellars. Anterior scutellars divergent. Thorax dark tan, opaque, without pattern. Pleurae much paler than the thorax, whitish ventrally. Anterior sternopleural 6/10, middle sternopleurae 4/10 posterior and much thinner. Legs pale yellow, apicals on first and second tibiae, preapicals on all three. A strong bristle at the base of the first tarsal segment and one or two rows of small peg-like bristles on the inside of the tarsus on the hind legs and indications of this condition on middle legs. No row of special bristles on the lower apical part of the front femora.

Abdomen yellow, slightly shining. Second and third tergites with black marginal bands rapidly narrowing laterally and far from reaching the lateral margins; the band on the second tergite narrowed but not interrupted, that on the third broadly interrupted in the middle; fourth tergite with rudiments of the marginal band usually reduced to spots at the bases of the marginal bristles on either side of the middle; fifth tergite with a small black spot in the middle anteriorly (in the type) or unmarked; sixth tergite with a median black streak reaching from the anterior margin to about 1/2 of the length of the tergite; bristles on the margin of the sixth tergite slightly enlarged but not erect.

Wings slightly fuscous, crossveins rather distinctly clouded. One prominent and one relatively small bristle at apex of first costal section; third costal section with heavy bristles on its basal 1/2. Costal index 4.4-5.1; 4th vein index 1.1-1.2; 5x index 0.9-1.1.

Length body 3.5-4.3 mm.; wing 3.1-3.6 mm.

♀. Second to fourth tergites with black marginal bands, those on the third and fourth broadly interrupted in the middle; fifth and seventh tergites unmarked; sixth tergite with a small black streak anteriorly.

Anterior Malpighian tubes two, free, posterior ones fused, lumen continuous.

Testes amber yellow with about 7 coils and long and slender vasa efferentia. Sperm pump large with two short diverticula. Spermathecae ovoidal, well chitinized, without indentation (Plate 5, Fig. 120). Ventral receptacle an irregular spiral with about 45 coils, the diameter of the tube decreasing strikingly from the proximal to the distal end.

Eggs — four slender acuminate filaments, about as long as the egg itself.

Puparia — brownish red, horn index about 11, each anterior spiracle with 22-25 very slender and fairly long branches.

Chromosomes — metaphase plates show five pairs of rods and a pair of dots. X-chromosome is a rod almost twice as long as the autosomal rods; Y-chromosome also a rod, perceptibly shorter than the X but longer than the autosomes (Plate 3, Figs. 50-52).

Distribution — Itanhaem, July 1943, state of São Paulo (Edmundo Nonato collector).

Relationships — very similar to *D. mediosignata*, from which it is easily distinguished by the presence of two prominent oral bristles, 8 acrostichal rows, and a higher costal index; easily distinguished from *D. mediotriata* by the number of acrostichal rows, higher costal index, and absence of specialized bristles on the front femora.

Drosophila mediotriata Duda

Acanthophila mediotriata Duda, 1926, p. 63, 1925, p. 124

♂, ♀. Arista with 11-12 branches. Antennae tannish yellow; third joint a little less than twice as long as wide, with a fine pubescence. Front uniformly tannish yellow, space between the ocelli brown. Very small hairs on the orbits and on the anterior margin. Anterior orbital $\frac{3}{4}$ posterior, middle orbital minute. Two prominent oral bristles, the second being $\frac{2}{3}$ the length of first. Face yellow; carina large, elongate triangular, its surface flat, not sulcate. Cheeks

greyish yellow, their greatest width about $1/5$ greatest diameter of eyes. Eyes red with a very short yellow pile.

Acrostichal hairs in 6 rows, irregular. No prescutellars. Anterior scutellars divergent or parallel. Thorax tannish yellow, slightly shining, without pattern. Pleurae paler than the thorax, sutures darker. Anterior sternopleural about $6/10$ posterior and much thinner, middle sternopleural $2/3$ anterior. Legs yellow, apicals on first and second tibiae, preapicals on all three. A row of bristles on the apical half of the inside surface of the first femur (bristles longer but not as stout as the corresponding structure in *D. immigrans*); three strong bristles at the base of the first tarsal segment and a row of very minute peg-like bristles on the inside of the third tarsus, and indications of this condition on the middle tarsus.

Abdomen yellow, shining. Second, third, and fourth tergites with black marginal bands narrowed but not interrupted in the middle, somewhat narrowing laterally, and far from reaching the lateral margins; fifth tergite with a black marginal band expanded in the middle into a longitudinal streak; sixth tergite without a marginal band but with a large median black spot; seventh tergite (in ♀ ♀) unmarked; no erect bristles on the sixth tergite.

Wings very slightly fuscous, posterior crossveins barely perceptibly clouded. One prominent bristle at apex of first costal section; third costal section with heavy bristles on its basal $1/3-2/5$. Costal index 3.9-4.2; 4th vein index 1.4-1.6; 5x index 1.3-1.5.

Length body 2.8-3.3 mm.; wing 2.5-3.0 mm.

Anterior Malpighian tubes two, free; posterior two, with ends apposed without formation of continuous lumen.

Testes pale yellow with about 12 coils; sperm pump with two long diverticula. Spermathecae ovoidal, well chitinized, without indentation (Plate 5, Fig. 119).

Ventral receptacle a spiral with about 70 coils.

Eggs — four slender acuminate filaments about as long as the egg itself.

Puparia — orange yellow, elongate, horn slender, frequently irregularly bent, horn index about 4, each anterior spiracle with 20-22 slender long branches (Plate 7, Fig. 146).

Chromosomes — metaphase plates show a pair of very long rods, four pairs of much shorter rods, and a pair of dots. The long rods are X-chromosomes; Y is a rod shorter than the X but longer than the autosomes (Plate 3, Figs. 47-49).

Relationships — this representative of Duda's subgenus *Acanthophila* is evidently close to such members of the subgenus *Drosophila sensu stricto* as *D. mediosignata*, *prosimilis*, and *bandeirantorum*. The distinguishing character of *Acanthophila* — the presence of a row of strong bristles on the front femora — is, therefore, of no great systematic value. This row of bristles is also differently constructed in *D. mediodstriata* than in *D. immigrans*, which has been the best known representative of *Acanthophila*.

Drosophila bandeirantorum, species nova

♂. Arista with 12 or 13 branches. Antennae greyish brown, third segment a little lighter than the first two. Front velvety brownish yellow, ocellar triangle and a stripe on the orbits lighter, the space between the ocelli darker. Many small hairs on the orbits and on the clypeal margin. Anterior orbital $\frac{2}{3}$ posterior, middle orbital $\frac{1}{5}$ posterior. Two prominent oral bristles, the second $\frac{1}{2}$ to $\frac{7}{8}$ the first. Face greyish yellow. Carina moderately large, gradually broadening below, its sides straight, not sulcate. Cheeks greyish yellow, their greatest width about $\frac{1}{5}$ greatest diameter of eyes. Eyes red with a short dark pile.

Acrostichal hairs in 6 rows, slightly disarranged in some specimens. No prescutellars. Anterior scutellars divergent. Thorax dull brownish yellow, without pattern. Pleurae yellow. Anterior sternopleural $\frac{1}{2}$ the length of posterior and much thinner. Legs yellow, apical bristles on first and second tibiae, preapicals on all three. Two strong bristles at the base of the first tarsal segment, and two rows of small peg-

like bristles extending on the inside of the tarsus up to the fourth joint, this condition being most pronounced on the hind tarsi.

Abdomen greyish yellow, slightly shining. Second, third, and fourth tergites with black or brown marginal bands narrowing laterally and narrowed or interrupted in the middle; the fifth and sixth tergites with rounded or irregular black or brown spots on either side of the middorsal line, the spot on the sixth being definitely larger than that on the fifth tergite.

Wings slightly infusate, crossveins slightly clouded. One prominent bristle at apex of first costal section; third costal section with heavy bristles on its basal 1/4. Costal index 4.6-4.9; 4th vein index about 1.3; 5x index about 1.0.

Length body 3.5-3.7 mm.; wings 3.6 mm.

♀. Narrow marginal bands on the second to fourth abdominal tergites, narrowed or interrupted in the middle; the fifth to seventh tergites unbanded.

Anterior Malpighian tubes two, free, posterior fused, lumen continuous.

Testes lemon yellow with 3 inner and 3 outer coils. Spermathecae large, pear-shaped, well chitinized (Plate 5, Fig. 104). Ventral receptacle a spiral with about 29 coils.

Eggs — a single thick filament, bent into an S-figure, considerably longer than the egg itself, sometimes splitting at the distal end into 2 to 4 branches. This single filament is obviously a result of fusion of four separate filaments (Plate 6, Fig. 136).

Puparia — reddish brown. Each anterior spiracle split in about 15 branches, horn index about 5.

Chromosomes — metaphase plate shows 1 pair of V's with a small satellites at the end of one of the limbs, 4 pairs of rods 2 of which are longer than the other 2, and a pair of small dots (Plate 1, Fig. 25, Plate 2, Fig. 26 and 28).

Distribution — Mogi das Cruzes, May 1943, (type locality), Cantareira, April 1943, Alto da Serra, April 1943, Iporanga, July 1943, all in the state of São Paulo.

Relationships — related to *D. similis* Williston and *D. prosimilis* Duda. Differs from either by its much higher costal index. The structure of the egg filament not recorded elsewhere in the genus.

Drosophila pallidipennis, species nova

♂. Arista with 8-10 branches. Antennae yellow. Front tannish yellow, ocellar triangle and orbits lighter. Anterior orbital $\frac{7}{8}$, middle orbital $\frac{1}{4}$ posterior. Face and cheeks light yellow, the greatest width of the latter about $\frac{2}{5}$ the greatest diameter of eye. Carina large, prominent, its surface flat, not sulcate. Two prominent oral bristles, the second $\frac{3}{4}$ the first. Eyes cinnabar red with a dense yellow pile.

Acrostichal hairs in 8 rows, regular. A pair of prescutellars, $\frac{2}{3}$ as long as the anterior dorsocentrals. Anterior scutellars divergent. Thorax light tannish yellow, very finely pollinose, with a smoky sheen. Pleurae yellow, greyish ventrally. Anterior sternopleural $\frac{7}{10}$ posterior. Legs yellow, apical bristles on first and second tibiae, preapicals on all three; two rows of small peg-like bristles on the inside of the tarsus of middle and hind legs. Long bristles on first coxae and femora.

Abdomen yellow with a silky sheen. Each tergite with a very diffuse tan marginal stripe indistinctly interrupted in the middle and far from reaching the lateral margins; bristles on the first and the anterior portion of the second tergite short and erect; bristles on the posterior margins of other tergites long.

Wings clear, veins yellow except the crossveins that are brown. One more and one less prominent bristles at apex of first costal section; third costal section with heavy bristles on its basal $\frac{2}{5}$. Costal index 5.5-5.7; 4th vein index 1.2; 5x index 0.8-0.9.

Length body 4.3-4.6 mm.; wing 3.4-3.6 mm.

♀. Marginal stripes visible only on the second and third tergites.

Two anterior and two posterior Malpighian vessels, anterior ones free, posterior fused, lumen continuous; common stalks of the Malpighian vessels short.

Testes pale yellow, with about 4 1/2 outer and 4 inner (vesiculae seminales) coils. Sperm pump with two long diverticula. Spermathecae strongly chitinized, black, non-transparent, spherical (Plate 5, Fig. 121). Ventral receptacle a tight spiral with about 55 small coils.

Eggs — four acuminate filaments, considerably longer than the egg itself (Plate 5, Fig. 126).

Puparia — dark red brown, almost black before the emergence of the adult, only a little more than twice as long as wide, horn index 8, each anterior spiracle with 13 to 14 branches (Plate 6, Fig. 145).

Chromosomes — metaphase plates show a pair of very large V's, four pairs of rods, and a pair of very minute dots (Plate 2, Figs. 44 and 45). Prophases suggest that most of the material in the V's is heterochromatic.

Distribution — Iporanga, state of São Paulo, July 1943.

Relationships — the presence of prescutellar bristles places this species in Duda's subgenus *Paradrosophila*, wherein it seems closest to *Paradrosophila hyalipennis* Duda described from Cuzco, Perú. This subgenus is, however, not a natural group, and the species under discussion is clearly (although not closely) related to *D. prosimilis* and *D. bandeirantorum*. Its chromosome structure is very interesting but unfortunately could not be studied in detail since the species does not breed well on the standard culture medium, and only few offspring have been obtained.

Drosophila griseolineata Duda

Drosophila griseolineata Duda, 1925, p. 161.

♂, ♀. Arista with 11-12 branches, 11 being the usual number. Antennae yellow, base of the second and the third

segment darker. Front with a variable coloration: in some specimens greyish yellow with orbits posteriorly and the space between the ocelli dark brown and frontal lines castaneous, in other specimens uniformly greyish yellow with darker spots between the ocelli and between the orbital and postvertical bristles; in still others front dark brown with light spots at the top of the ocellar triangle and at the base of the orbitals. Frontal lines joined anteriorly. Anterior orbital $\frac{3}{4}$ posterior, middle orbital minute. Two prominent oral bristles, the second $\frac{3}{4}$ length the first. Face dirty yellow, slightly pollinose. Carina large, broad, its surface flattened, not sulcate. Cheeks fuscous yellow to dark brown, their greatest width about $\frac{1}{6}$ greatest diameter of eyes. Eyes bright red in young specimens, dark red in old ones, with a fine brown pile.

Acrostichal hairs in 6 rows, regular. No prescutellars. Anterior scutellars divergent. Thorax dark brown, pollinose, with a sharp yellowish grey pattern, as follows: a stripe between the 2nd and 3rd acrostichal rows usually not reaching the scutellum but greatly broadened anteriorly and frequently fused with the corresponding stripe on the other side of the thorax; a stripe just outside the dorsocentral rows which may or may not reach the scutellum and which tends to break into three longitudinal spots; a transverse stripe at the suture; several irregular spots above the base of wings. Pleurae dark brown with irregular pollinose spots; anterior sternopleural $\frac{2}{3}$ posterior, middle sternopleural usually small. Legs fuscous yellow to brown, coxae dark. Apical bristles on the first and second tibiae, preapicals on all three; one or two strong bristles at base of each tarsal joint, especially on hind legs. Fine recurved hairs on front tarsi in $\delta \delta$:

Abdomen dark brown, slightly shining, with yellow pollinose stripes which appear silvery when looked at sidewise on the anterior margins of the tergites, far from reaching the lateral margins and narrowed in the middle to produce a dark middorsal line. Posterior tergites in $\delta \delta$ wholly dark.

Wings yellowish, crossveins very strongly clouded, branching points of the 2nd and 3rd veins also clouded, tips of the 2nd, 3rd and 4th veins darkened. Two prominent bristles at apex of first costal section one of which is stronger than the other; third costal section with heavy bristles on its basal 2/5. Costal index 3.9-4.0; 4th vein index 1.7-2.1; 5x index 1.0-1.3.

Length body 3.0-3.4 mm., wing 2.2-2.6 mm.

Anterior Malpighian tubes two, free at ends, with a short common stalk; posterior two, with ends apposed without formation of continuous lumen.

Testes amber yellow, with about 7 coils. Sperm pump with 2 long diverticula. Ventral receptacle an irregular spiral with about 25 thicker and 25 thinner coils. Spermathecae rather weakly chitinized, light yellow, pear shaped, no indentation (Plate 5, Fig. 106).

Eggs — four filaments; the anterior pair shorter than and the posterior pair about as long as the egg itself.

Puparia — brownish yellow. Horn slender, frequently bent, horn index about 5, anterior spiracle with 18 to 20 slender branches.

Chromosomes — metaphase plates show 5 pairs of rods one of which is much longer than the others, and a pair of small dots (Plate 2, Figs. 31 and 32).

Distribution — Iporanga in the state of São Paulo, July 1943, Jacarepaguá, Federal District, July 1943.

Relationships — apparently identical with *D. griseolineata* described by Duda from Mapiri (Bolivia) and Petropolis (Rio de Janeiro). Forming a natural group with the three following species (*D. guaraní*, *guarú* and *guaramunú*); Duda's *D. ornatifrons* is probably also related. Belongs to the subgenus *Drosophila*, but is not clearly related to any particular group so far known from the North-American fauna (see Sturtevant 1942).

Drosophila guaraní, species nova

♀, ♂. Arista with 11-13 branches, 12 being the usual number. Antennae brownish yellow, third segment darker. Front cinnamon grey, strongly pollinose, frontal lines not pollinose converging but not joined anteriorly; darker spots at bases of bristles and between the ocelli. Anterior orbital $\frac{2}{3}$ posterior, middle orbital $\frac{1}{4}$ posterior. First and second oral bristles equally long, third about $\frac{2}{3}$ other two. Face greyish yellow, pollinose. Carina large, its surface flattened, not sulcate, sides sharply falling down to the level of the face. Cheeks yellow, their greatest width about $\frac{1}{8}$ greatest diameter of eye. Eyes red with a fine brownish pile.

Acrostichal hairs in 6 rows, regular. No prescutellars. Anterior scutellars divergent. Thorax cinnamon brown, pollinose, in live specimens with diffuse darker streaks just inside and just outside the dorsocentral rows and above the base of the wing, sometimes with an indication of a dark streak in the center; the streaks hardly visible in pinned specimens. Pleurae strongly pollinose, brown with bluish white powder, sutures darker. Anterior sternopleural $\frac{2}{3}$, middle sternopleural $\frac{1}{2}$ posterior. Legs dull yellow, coxae darker. Apical and preapical bristles on all tibiae, one or two strong bristles at base of each tarsal joint, especially on hind legs.

Abdomen dull yellow, somewhat shining, lateral and posterior margins of tergites very narrowly brown; dark brown stripes on posterior margins of second and third tergites broadly interrupted in the middle; fifth to seventh tergites without or with only very narrow marginal stripes.

Wings brownish, crossveins strongly clouded, tips of longitudinal veins and adjacent portions of wing membrane darkened. One prominent bristle at apex of first costal section; third costal section with heavy bristles on its basal $\frac{1}{5}$ to $\frac{1}{4}$. Costal index 4.1-4.8; 4th vein index 1.3-1.5; 5x index 1.1.

Length body 2.9-3.5 mm.; wings 2.6-3.0 mm.

Anterior Malpighian tubes fused in a common trunk for about $\frac{1}{3}$, then free for about $\frac{2}{3}$ of their length, the com-

mon trunk only a little thicker than the free parts; posterior fused, lumen continuous.

Testes with about 4 inner and 7 outer coils, amber yellow. Sperm pump with 2 long diverticula. Ventral receptacle with about 60 coils, gradually decreasing in width distally. Spermathecae weakly chitinized, light yellow, pear shaped, no indentation (Plate 5, Fig. 107).

Eggs — four slender acuminate filaments, two of which are inserted distinctly more posteriorly than the other two; the anterior filaments about $\frac{2}{3}$ as long, and the posterior ones about as long as the egg itself (Plate 6, Fig. 137).

Puparia — yellow brown. Horn slender and delicate, frequently bent, horn index about 5, anterior spiracles with 20 to 22 long and slender branches.

Chromosomes — metaphase plates show one pair of V's, sometimes with a terminal satellite in one limb, and 5 pairs of short rods, one of which has a distinctly subterminal centromere (Plate 2, Figs. 33-36).

Distribution — Cantareira near São Paulo, April 1943.

Relationships — related to *D. griseolineata* and the following two species. The names of this and the following two species are those of the Indian tribes which have inhabited the southern part of Brazil.

Drosophila guarú, species nova

♀, ♂. Arista with 12-13 branches, 12 being the usual number. Antennae brownish yellow, third segment darker. Front cinnamon grey, strongly pollinose, frontal lines not pollinose, sinuate, converging but not joined anteriorly. Anterior orbital $\frac{2}{3}$ posterior, middle orbital very small. Two prominent equally long oral bristles. Face light grey, pollinose. Carina large, not sulcate. Cheeks pale, their greatest width about $\frac{1}{6}$ greatest diameter of eye. Eyes bright red with a fine yellow pile.

Acrostichal hairs in 6 rows, but in some specimens 8 rows may be counted owing to a displacement inward of the dorsocentral row. Anterior scutellars divergent. Thorax cinnamon brown, strongly pollinose, with diffuse darker stripes inside and outside the dorsocentral rows, the outside stripe being broader than the inside one. Pleurae strongly pollinose, brown with bluish white powder, sutures darker. Anterior sternopleural $\frac{2}{3}$, middle sternopleural $\frac{1}{2}$ posterior. Legs pale yellow, coxae darker. Apical and preapical bristles on all tibiae, one or two strong bristles at base of each tarsal joint, especially on hind legs.

Abdomen pale yellow, somewhat shining, second and third tergites with dark brown stripes on the posterior margin, broadly interrupted in the middle and far from reaching the lateral margins; other tergites with small dark spots at the bases of bristles on the posterior margins or without dark pattern; lateral margins of the tergites very narrowly brown in some specimens.

Wings light brownish, crossveins strongly clouded, tips or longitudinal veins and adjacent portions of the wing membrane darkened. Apex of first costal section black with one prominent bristle; third costal sections with heavy bristles on its basal $\frac{1}{4}$ to $\frac{1}{3}$. Costal index 4.1-4.8; 4th vein index 1.3-1.4; 5x index 1.1-1.2.

Length body 2.9-3.7 mm.; wings 2.7-3.0 mm.

Anterior Malpighian tubes rather short, their end parts more slender than the basal ones, common trunk rather long; posterior fused, lumen continuous.

Testes with about 4 inner and 7 outer coils, amber yellow. Sperm pump with 2 long diverticula. Ventral receptacle with about 55 coils, gradually decreasing in width distally. Spermathecae weakly chitinized, light yellow, pear shaped, no indentation (Plate 5, Fig. 108).

Eggs — four slender acuminate filaments, two of which are inserted posteriorly to the other two (but not as much so as in *D. guaraní*), posterior filaments about as long as the egg itself, anterior ones somewhat shorter.

Puparia — brownish yellow, horn slender, horn index about 5, anterior spiracle with 20-23 branches.

Chromosomes — metaphase plates show one pair of V's with slightly unequal limbs, 4 pairs of rods, one of which has a distinctly subterminal centromere, and 1 pair of dots; X-chromosome is apparently a rod, the Y being shorter than the X (Plate 2, Figs. 37-39).

Distribution — Amália, June 1943, G. Schreiber collector (type locality); Iporanga, July 1943, state of São Paulo.

Relationship — closely related to *D. guaraní*, but clearly different from the latter in a series of characters including the chromosome complement.

Drosophila guaramunú, species nova

♀, ♂. Arista with 11-12 branches, 11 being the usual number. Antennae yellow, base of the second and the whole third segment darker. Front velvety castaneous brown, not pollinose, orbits lighter, space between the ocelli black, frontal lines converging and almost joined anteriorly. Anterior orbital 2/3 posterior, middle orbital minute. Two prominent oral bristles, the second 2/3 the length of first. Face brownish yellow, not pollinose. Carina large, very broad, its surface flattened, not sulcate. Cheeks fuscous yellow, much darkened on the margin carrying oral bristles, their width about 1/5 greatest diameter of eye. Eyes maroon red with a fine brownish yellow pile.

Acrostichal hairs in 6 to 8 rows, very irregular. No prescutellars. Anterior scutellars divergent. Thorax dark tan, very finely pollinose, with a velvety lustre, without a pattern or slightly darker along the midline. Pleurae very dark tan, somewhat more pollinose than the thorax on the dorsal side. Anterior sternopleural 2/3 posterior and much finer, middle sternopleural varying from very small to almost equal to the anterior. Legs brownish yellow, coxae dark tan. Apical bristles on first and second, very small ones on third

tibiae, preapicals on all three; one to four strong bristles at base of each tarsal joint, especially on hind legs; fine recurved hairs on fore tarsi, especially in males.

Abdomen brownish black, rather shining, with yellow stripes on anterior margins of tergites far from reaching the lateral margins, expanded along the middorsal line on the first to third and much narrowed on the posterior segments.

Wings almost clear, crossveins strongly clouded, tips of the longitudinal veins not darkened. Two prominent bristles at apex of first costal section one of which is stronger than the other; third costal section with heavy bristles on its basal $1/2$ to $3/5$. Costal index 4.2-4.5; 4th vein index 1.5-1.6; 5x index 1.2.

Length body 3.2-3.6 mm.; wings 2.9-3.2 mm.

Anterior Malpighian tubes two, simple; posterior two, with ends apposed without formation of continuous lumen.

Testes with about 4 inner and 6 outer coils, bright yellow. Sperm pump with 2 long diverticula. Ventral receptacle with about 55 coils, gradually decreasing in width distally. Spermathecae well chitinized, brown, shaped like an electric light bulb, no indentation (Plate 5, Fig. 109).

Eggs — four slender acuminate filaments, two of which are inserted posteriorly to the other two, all filaments about $8/10$ as long as the egg itself (Plate 6, Fig. 133).

Puparia — brownish yellow, horn slender, with 15-18 long branches, horn index about 4.5 (Plate 7, Fig. 148).

Chromosomes — metaphase plates show 5 pairs of rods one of which is much longer than the others, and a pair of small dots (Plate 2, Figs. 40-42).

Distribution — Amália in the state of São Paulo, June 1943, G. Schreiber collector (type locality), Jacarepaguá, Federal District, July 1943.

Drosophila onca, species nova

Arista with 8-9 branches which are not usually in the same plane. Antennae greyish yellow, second and third joint

darker anteriorly. Front grey, strongly pollinose, frontal lines bronze colored with a copper metallic shine, space between the ocelli dark brown, posterior orbitals and verticals stand on small black spots, orbits in front of the anterior orbitals with dark spots which merge into the bronze colored frontal lines. Anterior and posterior orbitals equally long, middle orbitals $\frac{1}{2}$ other two. One prominent oral bristle, the second $\frac{1}{3}$ or less the first. Face greyish yellow, carina large, prominent, elongated triangular, not sulcate, with a brown spot below. Palpi dark brown at base, yellow distally, with a long bristle at tip; proboscis dark brown. Cheeks grey, the margin carrying the oral bristles black, their greatest width about $\frac{1}{3}$ greatest diameter of eyes. Eyes maroon red with a short black pile.

Acrostichal hairs in 8 rows, regular. No prescutellars, but the acrostichals in the prescutellar position somewhat enlarged. Anterior scutellars convergent. Thorax yellow grey, pollinose, most bristles and hairs arising from dark chocolate brown spots partly fused to form the following complex pattern: two longitudinal stripes between the second and fourth acrostichal rows extending from the anterior margin to just in front of the anterior dorsocentrals; two stripes starting at the level of the anterior dorsocentrals and rapidly broadening posteriorly to include the posterior dorsocentrals but leaving a light midline; transverse spots in front of the suture; lanceolate spots outside the dorsocentral rows, dark areas on the suture, above the base of the wing, and around the humeral plates: many small spots between these larger dark areas. Scutellum yellowish grey, pollinose, dark spots at bases of the bristles and a dark V-shaped area anteriorly. Pleurae grey, pollinose, with dark brown stripes from the first coxae to the base of the halteres and across the sternopleural region. Anterior sternopleural $\frac{4}{5}$, middle sternopleural $\frac{1}{5}$ posterior. Legs yellow brown with darker rings at bases and tips of the tibiae, darker coxae and femora. Apical bristles on first and second tibiae, preapicals on all three. Halteres pale, darker spots on the first two joints.

Abdomen yellowish grey, silvery when looked at side-wise, 2nd to 5th tergites with dark brown to black marginal bands narrowly interrupted in the middle and leaving very large light spots laterally (only the lateral margins narrowly black). The black band on the 6th tergite reduced laterally, and absent on the 7th tergite (in the ♀♀).

Wings infusate, crossveins very slightly clouded. Apex of first costal section black, with 2 prominent bristles, third costal section with heavy bristles on its basal $2/5 - 1/2$. Costal index 2.3-2.6; 4th vein index 1.4-1.6; 5x index 1.2-1.4.

Length body 2.6-3.6 mm; wing 2.3-3.2 mm.

Two anterior Malpighian tubes free at ends; two posterior ones, ends apposed without formation of continuous lumen.

Testes dark amber yellow, with about 5 outer and 4 inner coils. Sperm pump small, without diverticula. Ventral receptacle a spiral with about 60 coils. Spermathecae rudimentary, not chitinized, smaller than the diameter of the proximal coils of the ventral receptacle.

Eggs — four slender filaments almost twice as long as the egg itself (Plate 5, Fig. 127).

Puparia — reddish brown, horn index about 16, each anterior spiracle with 8 rather short branches.

Chromosomes — metaphase plates show a pair of equal-armed V's, a pair of very unequal-armed V's, a pair of rods, and a pair of minute dots. The rods are X-chromosomes; Y-chromosome is an unequal-armed V which is larger in size than the X-chromosome (Plate 4, Figs. 87-90).

Distribution — Iporanga, July 1943, state of São Paulo.

Relationships — a member of the repleta group of subgenus *Drosophila*, not clearly related to any other form, except possibly to *D. ramsdeni* Sturtevant.

Drosophila fascioloides, species nova

♂, ♀. Arista with 8 branches. Antennae light greyish yellow, base of the first, the second anteriorly, and the

whole third joint darker. Front light grey, pollinose, frontal lines velvety, bronze colored, darker posteriorly, spots on the margin of the eye in front of the orbitals, at the bases of the posterior orbital, vertical, postvertical and ocellar bristles brown to black. Many small bristles in front of the orbitals and on the anterior parts of the frontal lines. Anterior orbital $\frac{5}{6}$, middle orbital $\frac{1}{2}$ posterior. One prominent oral bristle, the second $\frac{1}{3}$ the first. Face pale. Carina long, prominent but very narrow, rounded below, not sulcate. Palpi dirty yellow with a darker base and with three prominent bristles at tip. Cheeks dirty yellow, much darker at the lower eye margin, their greatest width about $\frac{1}{4}$ greatest diameter of eyes. Eyes cinnabar red with a black pile.

Acrostichal hairs in 8 rows, irregular. No prescutellars. Anterior scutellars convergent. Thorax light yellowish grey, pollinose, bristles and hairs arising from spots varying in color from chocolate to almost black; some spots are fused to form irregular stripes as follows: between the third and the fourth acrostichal rows from the anterior margin down to the level of the anterior dorsocentrals; between the first and second acrostichal rows from a level between the dorsocentrals to the scutellum, and two or three interrupted stripes laterally from the dorsocentral rows. Scutellum yellowish grey with a fuscous semicircular spot at base and dark brown spots at bases of the bristles. Pleurae dark brown with pale longitudinal stripes and spots. Anterior sternopleural only slightly shorter than posterior, middle sternopleural very small. Legs — coxae dark; femora dark at base, yellow distally, sometimes with a dark ring at $\frac{4}{5}$ of the length; tibiae yellow with a fuscous ring at base and close to the distal end; tarsi yellow. Apical bristles on first and second tibiae, preapicals on all three. Two strong bristles at base of the first joint on third tarsus.

Abdomen yellow, tergites with narrow but sharply delimited brown marginal bands expanded and broadly interrupted in the middle, on the 2nd to 4th tergites deflected toward the anterior margin far from the lateral angles; la-

teral margins brown, the brown coloration expanding posteriorly, so that yellow oblique stripes are left between the brown marginal bands; the bands on the 5th to the last tergites less developed than on the anterior ones.

Wings clear, apex of first costal section black with two prominent bristles, third costal section with heavy bristles on its basal 1/2. Costal index 2.1-2.5; 4th vein index 1.8-1.9; 5x index 1.5-1.6.

Length body 2.5-2.9 mm.; wings 2.3-2.7 mm.

Two anterior and two posterior Malpighian tubes, the former free, the latter with ends apposed without formation of continuous lumen.

Testes yellow with about 8 coils. Ventral receptacle an irregular spiral with 65-75 coils. Spermathecae quite rudimentary, their diameter about equal to that of the lower coils of the ventral receptacle, not chitinezed (Plate 5, Fig. 110).

Eggs — four slender filaments slightly shorter than the egg itself and uniform in length and thickness.

Puparia — brownish yellow, elongate, horn relatively short (horn index about 10), each anterior spiracle with 9 to 11 short branches.

Chromosomes — metaphase plates show 3 pairs of V's, one of which is longer than the other two, and a pair of small dots (Plate 3, Figs. 53 and 54).

Distribution — Bertioga in the state of São Paulo, May 30, 1943.

Relationships — belongs to the repleta group and resembles *D. fasciola* Williston from the West Indies, from which it differs by presence of 8 (instead of 6) acrostichal rows, a higher costal index, and other characters.

Drosophila inca, species nova

♂. Arista with 6-8 branches, 7 being the usual number. Antennae tan, second anteriorly and the whole third joint

darker. Front grey, strongly pollinose, frontal lines less pollinose, cinnamon colored, diffuse darker spots at bases of bristles. Anterior and posterior orbitals equal, middle orbital $\frac{2}{5}$ other two. One prominent oral bristle, the second oral $\frac{1}{2}$ the first. Face yellow grey, pollinose; carina elongated triangular, strongly sulcate, the sulcus rapidly broadening on the lower part of the carina. Palpi and proboscis yellow, the former with 3 long and thin bristles. Cheeks yellowish grey, their greatest width $\frac{2}{5}$ the greatest diameter of eyes. Eyes red with short but dense black pile.

Acrostichal hairs in 6 rows, regular. No prescutellars. Anterior scutellars parallel or slightly convergent. Thorax grey, strongly pollinose, with a silvery or an yellowish shade depending upon the angle of observation, bristles and hairs arising from small dark spots which are less distinct than in other members of the repleta group. Scutellum yellow grey, pollinose, with a washed out darker area in the middle. Pleurae brownish grey, pollinose with washed out darker areas; anterior sternopleural $\frac{6}{10}$ posterior and much thinner, middle sternopleural minute. Legs fuscous yellow, apical bristles on first and second tibiae, preapicals on all three. A few short thin recurved hairs on the front tarsi. Halteres pale, first two segments with fuscous spots.

Abdomen silvery yellow, with brown bands narrowly interrupted in the middle, leaving the posterior as well as the anterior margins of the tergites pale, and laterally deflected toward the anterior margin which they do not reach. Lateral margins of the tergites pale or very indistinctly brownish.

Wings clear, apex of first costal section very little or not at all darkened, with 2 prominent bristles; third costal section with heavy bristles on its basal $\frac{1}{4}$ - $\frac{1}{3}$. Costal index 2.9-3.3; 4th vein index 1.7-1.9; 5x index 1.3-1.4.

Length body 2.4-2.8 mm.; wing 2.3-2.7 mm.

♀. Abdomen yellow without silveriness, the brown bands on the tergites less developed and becoming indistinct laterally.

Two anterior Malpighian vessels, free; posterior ones fused, lumen continuous.

Testes dark amber yellow, 4 outer and 2 inner coils. Spermathecae very small but well chitinized, flat, soucer shaped (Plate 5, Fig. 115). Ventral receptacle with about 23 coils, its thickness decreasing little distally.

Eggs — 4 slender acuminate filaments about as long as the egg itself.

Puparia — brownish yellow, elongate, almost 3 times longer than wide, horn index about 11, each anterior spiracle with 10 rather short branches.

Chromosomes — five pairs of rods and one pair of J's, the latter being the longest chromosomes (Plate 3, Figs. 67 and 68).

Distribution — Huancayo, Perú, April 1943. Very common in a Cactus patch at the type locality.

Relationships — belongs to the repleta group of subgenus *Drosophila* and resembles *D. hamatofila* Patterson and Wheeler more than any other described species. *D. hamatofila* is native in the deserts of southwestern United States. *D. inca* differs from it by parallel anterior scutellar bristles, form of the spermatheca, and the chromosome complement.

Drosophila setosa, species nova

♀. ♂. Arista with 7 (seldom with 8) branches. Antennae yellow grey, a spot on the second anteriorly and most of the third joint darker. Front pollinose grey, frontal lines, space between and around the ocelli, spots at base of the posterior ocellar and anterior vertical bristles, and arrow-head-shaped spots in front of the anterior ocellar bristle dark brownish grey. Anterior and posterior orbitals equally long, middle orbital $1/2$ other two. Oral bristles large, the anterior prominent, the following ones $1/3 - 1/2$ as long as the anterior and appreciably thinner. Face grey; carina long prominent but narrow, not angular broadly sulcate; palpi yellow with 3 prominent but fine bristles. Cheeks grey pollinose, the

part carrying the anterior oral bristles darker, their greatest width about $\frac{2}{5}$ greatest diameter of eyes. Eyes dark red with dense black pile.

Acrostichal hairs unusually long and strong, better described as bristles rather than hairs, in 8 rows. No prescutellars. Anterior scutellars convergent. Thorax silvery pollinose, bristles arising from brown spots of various sizes, some spots, especially on the sides of the thorax fusing to form larger irregularly rounded spots, in some specimens an indistinct darker longitudinal stripe between the dorso-central rows. Scutellum brownish grey with a diffuse light grey spot in the middle anteriorly and similar light spots on the margin between the bristles. Pleurae yellowish grey, a fuscous diffuse stripe from halteres to fore coxae. Anterior sternopleural $\frac{5}{6}$ posterior, middle sternopleural very small. Halteres very pale yellow with darker spots on the first two segments. Legs yellow, indistinct fuscous rings near tips of the femora and near bases of tibiae. Apical bristles on first and second tibiae, preapicals on all three; little stout bristles on the inside and at tips of tarsal segments on middle legs; long recurved hairs on front tarsi in either sex, especially prominent in males.

Abdomen dark brown with silvery yellow posterior margins of the tergites, a midline, and broad anterior marginal bands which reaches laterally to $\frac{2}{3}$ of the width of the tergites; indistinct lighter spots on the sides of the second tergite.

Wings clear, veins light, two prominent bristles at apex of first costal section, third costal section with heavy bristles on its basal $\frac{2}{5}$. Costal index 2.9-3.4; 4th vein index 1.5-1.7; 5x index 1.0-1.2.

Length body 2.5-3.1 mm.; wing 2.5-2.9 mm.

Anterior Malpighian tubes two, free; posterior with ends apposed without formation of continuous lumen.

Testes bright yellow with about 6 outer and 9 inner coils. Ventral receptacle a spiral with about 250 coils bent into an irregular major spiral. Spermathecal ducts strikingly

broadened into vermiform tubes, the chitinous part only a small mushroom-shaped cover at the distal end (Plate 5, Fig. 116).

Eggs — four slender acuminate filaments a little shorter than the egg itself.

Puparia — yellow, about 3 times longer than wide, horn index 9, each anterior spiracle with 18-20 branches.

Chromosomes — metaphase plates show a pair of V-shaped, 4 pairs of rod-like, and a pair of small dot-like chromosome. The V is the X-chromosome; in males the Y-chromosome is seen as a rod with a distinctly subterminal centromere, longer than any of the autosomal rods (Plate 3, Figs. 69-71). Salivaries show five long and one very short strand. The strand representing the X has a large heterochromatic mass at the base, indicating that one arm of the V seen at metaphase is wholly or in large part composed of heterochromatin.

Distribution — Mogi das Cruzes, June 1943, state of São Paulo.

Relationships — belongs to the repleta group of subgenus *Drosophila*, and appears related to *D. nigrohydei* Patterson and Wheeler and to *D. bifurca* Patterson and Wheeler. Differs from either of the above species in the chromosome complement, structure of the spermatheca and a series of external characters. The structure of the spermatheca in *D. setosa* resembles only that found in *D. dreyfusi* (see below).

Drosophila betari, species nova

♂. Arista with 7-9 branches, 8 being the usual number. Antennae yellow, base of the first, a spot on the second anteriorly, and the whole third joint darker. Front light greyish yellow, frontal lines, arrowhead-shaped spots in front of the anterior orbital, spots at bases of the posterior orbital, vertical, ocellar, and postvertical bristles dark brown. Anterior and posterior orbitals equal, middle orbital 1/2 other two. One prominent oral bristle, the second 1/2 the first or less. Face grey, carina an elongated triangle, its surface flat, not

sulcate. Cheeks grey, brown at the base of the vibrissa, their greatest width $1/4 - 1/3$ the greatest diameter of the eye. Palpi pale. Eyes red with a rather long black pile.

Acrostichal hairs in 8 rows, irregular, 4 slightly enlarged hairs in prescutellar position, usually not forming a regular transverse file. Anterior scutellars convergent. Thorax golden yellow grey, strongly pollinose, bristles and hairs arising from dark brown spots. Little or no fusion of the spots. Scutellum brown, 5 yellow grey spots on the margin between the bristles and one on the disc reaching forward to the suture. Pleurae pale yellow grey, with irregular brownish grey spots forming a stripe from the first coxae to the base of the halteres and across the bases of the sternopleural bristles. Anterior sternopleural $7/10$ posterior. Legs pale yellow grey, indistinct darker rings at tips of femora and at bases of tibiae. Apical bristles on first and second tibiae, preapicals on all three. Few short recurved hairs on first tarsi. Halteres pale, first two segments with fuscous spots.

Abdomen pale yellow, tergites with dark grey or fuscous marginal bands interrupted in the middle and leaving pale triangular spots or oblique streaks laterally; the whole pattern very faint, despite the fact that the bands are sharply delimited.

Wings clear, apex of first costal section with 2 prominent bristles, third costal section with heavy bristles on its basal $2/5 - 1/2$. Costal index 2.7-3.1; 4th veins index 1.7-2.0; 5x index 1.4-1.6.

Length body 2.4-2.8 mm.; wing 2.4-2.6 mm.

♀. Lateral margins of the 6th and 7th tergites clear.

Anterior Malpighian vessels free, posterior fused, lumen continuous. Testes pale yellow with about 2 coils. Spermathecae very small, not chitinized, finger shaped. Ventral receptacle a relatively short irregularly coiled tube with 2 or 3 spiral coils at the tip.

Eggs — four filaments about as long as the egg itself (Plate 6, Fig. 139).

Puparia — brownish yellow, about three times as long

as wide, horn rather slender, horn index about 7, with 16-18 slender long branches.

Chromosomes — metaphase plates show one pair of V's, three pairs of rods, and a pair of large dots. The X-chromosome is a rod, markedly longer than the autosomal rods; Y-chromosome a dot, but larger than the autosomal dots (Plate 4, Figs. 72-74).

Distribution — Iporanga, July 1943, state of São Paulo.

Relationships — belongs to the repleta group of the subgenus *Drosophila*.

Drosophila austrorepleta, species nova

♂. Arista with 7 branches. Antennae greyish yellow, base of the first, a spot on the second anteriorly, and the whole third joint darker. Front yellowish grey, pollinose, frontal lines, arrowhead-shaped spots in front of the anterior orbitals, at bases of the posterior orbitals, of verticals, and around the ocelli brownish black. Anterior and posterior orbitals equal, middle orbital $2/5$ other two. One prominent oral bristle, the second $1/4$ of the first. Face brownish grey, pollinose; carina an elongated triangle, slightly sulcate. Palpi and proboscis dirty grey, the former with several long bristles. Cheeks yellowish grey, their greatest width about $1/4$ greatest diameter of eyes. Eyes dark red with a short black pile.

Acrostichal hairs in 8 rows, regular; 4 prescutellar bristles arranged in a transverse row in front of the scutellar suture (enlarged acrostichal hairs about $1/3$ as long as the anterior dorsocentrals). Anterior scutellars convergent. Thorax yellowish grey, pollinose, hairs and bristles arising from brownish black spots, some of the spots irregularly fused and tending to form longitudinal stripes inside and outside the dorsocentral rows, but always leaving a light midline. Scutellum grey, pollinose, dark spots at bases of the bristles, and in some individuals a dark semicircular area or a semicircle of dark spots on the anterior part. Pleurae grey, pol-

linose, a dark stripe from base of first coxae to the halteres. Anterior sternopleural about 8/10 posterior, middle sternopleural minute. Legs smoky yellow with indistinct dark areas at tips of femora and bases of tibiae. Apical bristles on first and second tibiae, preapicals on all three. Very few or no recurved hairs on first tarsi. Halteres pale, first two segments with dark spots.

Abdomen silvery yellow, tergites with broad and sharply delimited black marginal bands interrupted in the middle and leaving triangular yellow spots laterally.

Wings clear, apex of first costal section somewhat darker, with two prominent bristles, third costal section with heavy bristles on its basal $2/5 - 1/2$. Costal index 2.7-3.1; 4 th vein index 1.7-2.0; 5x index 1.3-1.5.

Length body 2.5-3.3 mm.; wing 2.4-2.9 mm.

♀. Dark bands on the abdomen less developed, yellow coloration present on all tergites.

Two anterior Malpighian vessels, free; posterior fused, lumen continuous.

Testes pale yellow with about 7 outer and 6 inner coils. Spermathecae large, finger-shaped, well chitinized, yellow brown in color (Plate 5, Fig. 111). Ventral receptacle with about 100 coils.

Eggs — four slender acuminate filaments, the anterior pair being slightly shorter and the posterior distinctly longer than the egg itself.

Puparia — yellow, elongate, 3 times longer than wide, horn index about 6, each anterior spiracle with 18-22 fairly long branches (Plate 6, Fig. 144).

Chromosomes — metaphase plates show five pairs of rods and a pair of large dots. The longest rod is the X-chromosome; the Y-chromosome a very short rod, only twice or thrice as long as the dot (Plate 3, Figs. 55-57).

Distribution — Mogi das Cruzes, April and June 1943, state of São Paulo.

Relationships — belongs to the repleta group of subgenus *Drosophila* and is related to *D. repleta* and *D. brunneipalpa*.

Drosophila pararepleta, species nova

Arista with 7-8 branches, 8 being the usual number. Antennae brownish yellow, base of the first, a spot on the second anteriorly, and the whole third joint darker. Front yellowish grey, pollinose, frontal lines forming a V, spots in front of anterior orbitals, at bases of posterior orbitals, of verticals, and around the ocelli dark brown. Anterior and posterior orbitals equal, middle orbital about $1/2$ other two. One prominent oral bristle, the second $1/2$ the first. Face yellow grey; carina an elongated triangle, prominent, not sulcate. Cheeks yellowish grey, their greatest width $1/4 - 1/3$ greatest diameter eyes. Eyes dark red with a short black pile.

Acrostichal hairs in 8 rows, regular; 4 slightly enlarged hairs in prescutellar position, usually not forming a regular transverse row, somewhat longer but hardly thicker than other acrostichals. Anterior scutellars convergent or subparallel. Thorax yellow grey, pollinose, hairs and bristles arising from dark brown spots, some of the spots irregularly fused and tending to form longitudinal stripes inside and outside the dorsocentral rows, but always leaving a light midline. Scutellum yellow grey, pollinose, dark spots at bases of the bristles, and in some individuals a dark ark or a semi-circle of dark spots on the anterior part. Pleurae grey pollinose, a dark stripe from base of first coxae to the halteres. Anterior sternopleural about $9/10$ posterior, middle sternopleural minute. Legs smoky yellow with dark rings at tips of femora and bases of tibiae, the rings sometimes indistincts. Apical bristles on first and second tibiae, preapical on all three. Some recurved hairs on first tarsi. Halteres pale, first two segments with dark spots.

Abdomen silvery yellow, tergites with broad and sharply delimited black marginal bands interrupted in the middle and leaving triangular yellow spots laterally.

Wing clear, apex of first costal section black, with two prominent bristles, third costal section with heavy bristles

on its basal $2/5 - 1/2$. Costal index 2.7-3.2; 4th vein index 1.7-1.9; 5x index 1.4-1.7.

Length body 2.7-3.6; wings 2.6-3.1 mm.

♀. Dark bands on the abdomen less developed, yellow coloration present on all tergites.

Two anterior Malpighian tubes free; posterior fused, lumen continuous.

Testes amber yellow, with $2\ 1/2$ coils. Spermathecae very small, non chitinized, elongate (Plate 5, Fig. 112). Ventral receptacle not a regular spiracle but a short (relative to other species of the repleta group) tube with about 9 irregular coils.

Eggs — four acuminate filaments about as long as the egg itself.

Puparia — yellow, elongate, 3 times longer than wide, horn index about 7, each anterior spiracle with about 18 fairly long branches.

Chromosomes — metaphase plates show one pair of V's, 3 pairs of rods, and a pair of large dots. The X-chromosome is a rod slightly longer than the other two rods; Y-chromosome is a very short rod, only about twice as long as the dot (Plate 3, Figs. 58, 62 and 63).

Distribution — Mogi das Cruzes, April 1943 (type locality), Apiaí, June 1943, state of São Paulo; Jacarepaguá, July 1943, Federal District.

Relationships — extremely close to *D. austrorepleta*, and externally hardly distinguishable from the latter; the distinction is quite clear in the female as well as male reproductive organs and in the chromosome complement. Having no material on the true *D. repleta* from North America for comparison, we can not describe with assurance the differences between that species and *D. pararepleta*, except that the chromosomal complements assure the specific distinction.

Drosophila brunneipalpa, species nova

♂. Arista with 7 branches. Antennae greyish yellow, base of the first, a spot on the anterior part of the second, and

the whole third joint dark. Front cinnamon grey, pollinose; frontal lines, arrowhead-shaped spots in front of the anterior orbitals, spots at the bases of the posterior orbitals and at the bases of vertical and post-vertical bristles dark brown; the spots are partly fused with the frontal lines and with each other, so that the front appears dark brown with grey spots. Anterior and posterior orbitals equally long, middle orbital $1/2$ other two. One prominent oral bristle, the second fine, about $1/4$ the first. Face dirty brown, carina large, forming an elongated triangle, slightly sulcate. Palpi brown, with several prominent bristles. Cheeks brownish grey, their greatest width about $1/4$ greatest diameter of eyes. Eyes purplish red with a short black pile.

Acrostichal hairs in 8 rows, some enlarged acrostichals in prescutellar position. Anterior scutellars convergent. Thorax brownish grey, pollinose, bristles and hairs arising from brownish black spots irregularly fused and leaving irregular light pollinose areas. Scutellum brownish grey, pollinose, with a V-shaped dark design leaving a light median spot at the suture, and dark spots at bases of each of the four scutellar bristles. Pleurae dark brown with indistinct pollinose lighter stripes. Anterior sternopleural $8/10$ posterior, middle sternopleural very small. Halteres light with brown spots. Legs pale with a smoky cast, fore coxae and femora darker; indistinct dark rings at apices of femora and at bases of tibiae. Apical bristles on first and second tibiae, preapicals on all three; a few recurved hairs on front tibiae.

Abdomen pale silvery yellow, each tergite with a dark brown marginal band interrupted in the middle, continued slightly forward at edge of interruption, reaching the anterior margin medianly from the angle of the tergite, and leaving lateral irregularly triangular yellow areas separated by brown color from the lateral margins. On the last two tergites the lateral yellow areas indistinct.

Wings clear, apex of first costal section darkened, with two prominent bristles; third costal section with heavy bris-

gles on its basal 2/5. Costal index 2.7-3.0; 4th vein index 1.7-1.9; 5x index 1.3-1.6.

Length body 2.8-3.5 mm.; wing 2.6-3.0 mm.

♀. The dark design on the abdomen less developed than in ♂ ♂.

Two anterior and two posterior Malpighian tubes, the former free, the latter fused, lumen continuous.

Testes pale yellow, with 4 outer and 4 inner coils. Spermathecae elongate oval, chitinized (Plate 5, Fig. 114); ventral receptacle with about 70 coils.

Eggs — four slender acuminate filaments, longer than the egg itself, posterior pair longer than the anterior.

Puparia — reddish brown, three times longer than wide, horn index about 3, each horn with about 18 medium long branches.

Chromosomes — metaphase plates show five pairs of rods and a pair of dots. The X-chromosome almost twice as long as the other rods, with a clearly subterminal centromere. Y-chromosome very much shorter, almost dot-like (Plate 3, Figs. 64-66).

Distribution — Apiaí, June 1943, state of São Paulo.

Relationships — close to *D. melanopalpa* Patterson and Wheeler described from Arizona, and to *D. neorepleta* Patterson and Wheeler described from Guatemala.

Drosophila novemaristata, species nova.

♂. Arista with 9 branches. Antennae greyish yellow, the second anteriorly and the whole third joint darker. Front greyish yellow, strongly pollinose, frontal lines yellow brown, spots at bases of the posterior orbital, postvertical, vertical and ocellar bristles and in front of the anterior orbitals brownish black. Anterior orbital a little shorter than posterior, middle orbital 2/5 other two. One prominent oral bristle, the second 1/3 the first. Face yellow grey, pollinose; carina large, elongated triangular, strongly sulcate throughout. Palpi and proboscis grey, the former with 2 long bristles.

Cheeks grey, their greatest width $1/3$ greatest diameter of eyes. Eyes dark red with a short black pile.

Acrostichal hairs in 8 rows, regular. No prescutellars. Anterior scutellars convergent. Mesonotum yellowish grey with a bluish pollinosity, hairs and bristles arising from brownish black spots, some of the spots fused to form two pairs of larger elongated spots within the dorsocentral rows on the anterior position of the mesonotum, and several larger spots outside the dorsocentral rows. Scutellum grey, pollinose, with diffuse dark spots at bases of bristles. Pleurae dark brown, pollinose, with diffuse darker and lighter areas. Halteres, pale, first and second joints with fuscous spots. Anterior sternopleural $8/10$ posterior, middle sternopleural minute. Legs smoky yellow with black rings at bases of tibiae. Apical bristles on first and second tibiae, preapicals on all three. Numerous recurved hairs on first tarsi.

Abdomen silvery yellow, tergites with sharply defined dark brown marginal bands broadly interrupted in the middle, leaving the posterior margin pale, sharply expanded toward the lateral margin, but enclosing diffuse brownish yellow lateral spots on all or on all but the last segment.

Wings slightly fuscous, apex of first costal section somewhat darkened, with 2 prominent bristles, third costal section with heavy bristles on its basal $1/3$. Costal index 3.0-3.3; 4th vein index 1.5-1.6; 5x index 1.1-1.2.

Length body 3.6-4.1 mm.; wing 3.5-3.9 mm.

♀. Thorax darker than in ♂♂. Bands on abdominal tergites black, lateral parts solid except the second and sometimes the third tergite which may have diffuse brown lateral spots.

Two anterior Malpighian vessels, free; posterior fused, lumen continuous.

Testes partly lemon yellow, partly greenish yellow, with about 17 outer and 24 inner coils. Ventral receptacle a spiral with about 340 coils, forming a second, major, spiral; the whole mass is greater than that of the vagina and the oviducts combined. Spermathecal ducts broadened into tubes,

spermatheca slightly chitinized, cylindrical, its diameter only slightly larger than that of the duct itself, with a small broadening at tip (Plate 5, Fig. 113).

Eggs — four slender acuminate filaments longer than the egg itself.

Puparia — yellow brown, more than 3 times as long as wide, horn index about 7, each anterior spiracle with about 20 rather long branches (Plate 7, Fig. 147).

Chromosomes — metaphase plates show five pairs of rods and one pair of very large dots which may also be described as very small rods. Among the five longer pairs of rods none is outstanding in length, although two pairs appear to be shorter than the other three (Plate 3, Figs. 59-61).

Distribution — Huancayo, Perú, April 1943, in a Cactus patch.

Relationships — belongs to the repleta group of the subgenus *Drosophila*, and appears to be close to *D. bifurca* Patterson and Wheeler described from Texas and Arizona. Differs from *D. bifurca* in a lower costal index, smaller size, the recurved hairs on front tarsi being short, fewer coils in the ventral receptacle, and the shape of the spermatheca. Spermatheca of *D. novemmaristata* is intermediate between that normally found in species of *Drosophila* and the aberrant type found in *D. dreifusi* and *D. inca*.

Drosophila annulimana Duda

Paradrosophila annulimana Duda, 1925, p. 117.

♂, ♀. Arista with 8 branches. Antennae tan, second joint anteriorly and the whole third joint dark brown. Front velvety black with silvery pollinose spots in front of the ocellar bristles, laterally from the postverticals, at the tip of the ocellar triangle, on the anterior angles, and along the ocular margin; orbits silvery pollinose, but the posterior orbital and postvertical bristles stand on dark spots. Anterior orbital a little shorter than posterior, middle orbital 2/3 of posterior, the base of the middle orbital in front of and laterally from

that of the anterior. Face brown with silvery pollinose spots, carina large, prominent, shaped like an elongated triangle, strongly sulcate; an elevated line from the end of the carina to the clypeal margin. Palpi and proboscis brown. Cheeks dark brown, pollinose ventrally, lighter dorsally, their greatest width about $1/4$ greatest diameter of eyes. Eyes dark wine red with a long black pile.

Acrostichal hairs irregular, 8 to 10 rows can be counted. Two prescutellars about as long as the anterior dorsocentrals. Anterior scutellars convergent. Mesonotum yellowish silvery, strongly pollinose, all bristles and hairs arising from black spots that are in part irregularly fused without formation of longitudinal stripes. Scutellum brownish black, pollinose, with three light silvery spots on the middle and five similar spots on the margin in front of and between the scutellar bristles. Pleurae brownish black with indistinct silvery pollinose spots. Anterior sternopleural $8/10$ - $9/10$ posterior, middle sternopleural minute. Halteres light yellow with brown spots on all joints. Legs dark brown to black, tarsi yellow with black rings at tip of each joint especially broad on the first and the last. Apical bristles on first and second tibiae, preapicals on all three.

Abdomen dark brown with uniformly narrow silvery pollinose stripes on the posterior margins and diffuse brownish silvery spots on the anterior margins of the first to fifth tergites on either side of the midline.

Wings fuscous yellow, apex of first costal section black with two small bristles relatively more prominent than the others; third costal section with heavy bristles on its basal $3/5$. Crossveins distinctly clouded. Costal index 3.6-4.3; 4th vein index 1.4-1.5; 5x index 0.9-1.1.

Length of body 4.4-5.4 mm.; wing 3.6-4.4 mm.

Two anterior Malpighian vessels, ends free; the two posterior ones fused, lumen continuous.

Testes dark amber yellow, with 6 outer and 5 inner coils; vasa efferentia very long and slender; vas deferens relatively short and broad; sperm pump small with 2 very long

diverticula. Ventral receptacle with about 190 coils folded in a "major" spiral. Spermathecae rather weakly chitinized, pale yellow, with a microstructure consisting of irregular circular ridges on the proximal and of small spines on the distal portion, vase-shaped (Plate 5, Fig. 117). Spermathecal duct only a little longer than the length of the spermatheca, very broad.

Eggs — four filaments, the two anterior ones slender and much shorter than the egg, the posterior ones much thicker and as long as or longer than the egg itself (Plate 6, Fig. 134).

Puparia — dark brown, a little more than twice as long as wide, horn index about 14, each anterior spiracle with about 15 rather short branches (Plate 7, Fig. 151).

Chromosomes — metaphase plates show one pair of large V's, 3 pairs of much smaller V's, and a pair of small rods or J's; the latter are X-chromosomes, since only one rod without a partner is present in the ♂♂ (XO) (Plate 4, Figs. 75-77). Salivaries show 8 relatively long and one short chromosome strands.

Distribution — Iporanga, July 1943, state of São Paulo. Described by Duda from Bolivia.

Relationships — this extremely large and beautiful species is placed by Duda in his subgenus *Paradrosophila*, characterized by the presence of prescutellar bristles. However, *D. annulimana* is much closer to species of the *repleta* group of the subgenus *Drosophila* than to such representatives of *Paradrosophila* as *D. mirim*. We regard *D. annulimana* an aberrant member of the *repleta* group.

Drosophila andina, species nova

♂. Arista with 8 to 11 branches, 9 being the usual number. Antennae brown, third joint darker. Front cinnamom brown, ocellar triangle and orbits brownish pollinose; small bristles between the ocelli, on the orbits and on the anterior margin. Anterior and posterior orbitals almost equally long, middle orbital $2/5$ other two. One prominent

oral bristle. Face light brown, slightly pollinose. Carina large, broad below, flat or very slightly sulcate. Cheeks greyish, their greatest width about $\frac{1}{3}$ greatest diameter of eyes. Eyes dark purplish red with short dark pile.

Acrostichal hairs in 8 rows, regular. No prescutellars. Anterior scutellars divergent. Thorax dark greyish brown, pollinose, with fairly obvious dark longitudinal stripes occupying the space between the first and the second acrostichal rows and continuing into the scutellum, and indistinct dark stripes in the dorsocentral rows tending to break up into three spots. Pleurae greyish brown, with two very indistinct darker stripes. Anterior sternopleural $\frac{4}{5}$ posterior and only a little thinner. Legs brownish yellow, apical bristles on the first and second tibiae, preapicals on all three.

Abdomen yellow with broad black marginal bands interrupted in the middle and expanded laterally to reach the anterior margins of the tergites; lateral margin of the second tergite yellowish.

Wings clear, crossveins slightly clouded. Two prominent bristles at apex of first costal section; third costal section with heavy bristles on its basal $\frac{1}{5}$ or $\frac{1}{4}$; costal index 3.1-3.3; 4th vein index about 1.4; 5x index about 0.8.

Length body 3.1-3.7 mm.; wing 2.7-3.0 mm.

♀. Marginal bands on abdominal tergites less broad than in the male, sixth and seventh tergites very narrowly black on the posterior margins.

Anterior Malpighian tubes two, free, posterior fused, lumen continuous.

Testes bright yellow with 4-4 $\frac{1}{2}$ coils, the distal ends inflated into bulbs containing spermatogonia. Spermathecae shaped like a pear or a pepper fruit, broader at base than distally, well chitinized, with a small indentation. Ventral receptacle a spiral with about 40 coils.

Eggs — four acuminate filaments which are shorter than the egg itself (Plate 6, Fig. 140).

Puparia — reddish brown, very long and slender (the

length-width ratio about 3.6), each anterior spiracle with about 15 branches, horn index about 6.6.

Chromosomes — metaphase plate shows 1 pair of V's and four pairs of rods, the longest of the latter being the X; Y-chromosome a rod, about half as long as the X (Plate 4, Figs. 78-80). In some plates the X shows a strong, secondary constriction at about 1/3 from the proximal end.

Distribution — Huançayo, Perú, April 10, 1943, in a Cactus patch.

Relationship — appears related to *D. annularis* Sturtevant and a group of South-American species described by Duda (*mesophragmatica*, *fuscolineata*, *atrolineata*) but clearly distinct from all.

Drosophila dreyfusi, species nova

♂, ♀. Arista with 9-10 branches. Antennae greyish brown, third segment little if any darker than the first two. Front brown, triangle and the clypeal margin dark brown. Anterior and posterior orbitals equally long, middle orbital about 1/3 other two. Only one prominent oral bristle, the second oral less than 1/3 the first. Face yellowish brown. Carina broad below, rounded, moderately sulcate. Cheeks yellowish brown, their greatest width about 1/6 greatest diameter of eyes. Eyes dark red with short dark pile.

Acrostichal hairs in 8 rows. No prescutellars, but the acrostichals immediately in front of the scutellar suture larger than elsewhere on the thorax. Anterior scutellars divergent. Thorax dark brown, dull, without pattern, pleurae slightly lighter. Anterior sternopleural 0.6 the length of posterior. Legs brownish yellow. Apical bristles on first and second tibiae, preapicals on all three.

Abdomen yellowish brown, the second, third, and fourth tergites with a rather narrow marginal band interrupted or narrowed in the middle and not expanded laterally.

Wings uniformly brown, crossveins not or only barely perceptibly darker. Two prominent bristles at apex of first

costal section; third costal section with heavy bristles on its basal 2/5. Costal index 3.6-3.9; 4th vein index about 1.4; 5x index about 0.95.

Length body 5.2 mm.; wings 3.7 mm.

Anterior Malpighian tubes two, simple; posterior fused, lumen continuous.

Testes lemon yellow, with about 6 coils. Ventral receptacle a spiral with about 100 coils. The structure of the spermathecae unique: the spermathecal ducts expanded into broad, weakly chitinized and irregularly coiled tubes with a mushroom-shaped, weakly chitinized, enlargement at the end.

Eggs — four filaments, two of them about twice as long and twice as thick as the other two, acuminate at ends. The longer ones longer than the egg itself (Plate 5, Fig. 128).

Puparia — dark brown, horn index about 4.2. Each anterior spiracle with 15-20 closely apposed branches (Plate 7, Fig. 149).

Chromosomes — metaphase plate shows one pair of long V's with a large satellite at the end of one of the limbs, one pair of smaller V's, and a pair of J's, the later being X or Y chromosomes (Plate 4, Figs. 81-83). Salivaries excellent, five long and one short branches with very clear disc patterns, chromocenter weak.

Distribution — one female collected at Mogi das Cruzes, São Paulo, April 1943. This female produced a large offspring which has, however, refused to breed further.

Relationship — close to *D. lugubripennis* Duda and *D. fuscipennis* Duda described from Perú, but differs from either by its large size, coloration, and other characters. Named in the honor of Professor André Dreyfus of the University of São Paulo.

Drosophila mirim, species nova

♂, ♀. Arista with 8-9 branches (4 above and 2 to 3 below the terminal fork). Antennae yellow, third segment a little darker, with a short pilosity. Front yellow, the small

equilateral ocellar triangle and orbits from the anterior orbital down a little paler. Anterior and posterior orbitals about equal, middle orbital $1/3$ other two, of about the same thickness. One prominent oral bristle. Face yellow, paler than the front. Carina moderately large, prominent, its surface and outline rounded, not angular, not sulcate. Cheeks pale yellow, rather uniformly broad throughout, their width about $1/8$ of the greatest diameter of eyes. Proboscis rather long. Eyes more rounded than usual, red, with a very short yellow pile.

Acrostichal hairs in 8 rows, regular. A pair of prescutellar bristles that are $1/2$ as long as anterior dorsocentrals, which are $2/5$ as long as posterior dorsocentrals. Anterior dorsocentrals $1/2$ as far from posterior ones as the latter are from each other. Anterior scutellars convergent. Thorax tannish yellow, slightly shining, with a very fine pollinosity. Pleurae yellow; anterior and middle sternopleurals $7/10$ - $8/10$ the length of posterior. Legs yellow, apical bristles on first and second tibiae, preapicals on all three.

Abdomen yellow with very broad black bands that leave the anterior as well as the posterior margins of the tergites yellow; the bands are narrowed in their middle on the 2nd and 3rd, expanded on the posterior tergites. The pigmented portion of the chitin opaque, the unpigmented thinner and shining. The bands in the $\delta \delta$ are broader than in the $\text{♀} \text{♀}$, so that male abdomen appears almost black.

Wings clear. Two prominent bristles at apex of first costal section; third costal section with heavy bristles on its basal $3/4$. Costal index 1.1-1.4; 4th vein index 2.2-2.4; 5x index 2.0-2.4.

Length body 1.9-2.3 mm.; wing 1.6-1.9 mm.

Anterior Malpighian vessels much longer than posterior, both with common trunks about $1/2$ of their total length, the tips of the anterior ones free, those of the posterior ones apposed without formation of continuous lumen.

Testes deep amber yellow, ellipsoidal (about the same shape as in *D. pseudoobscura*), vesiculae seminales grown

together proximally, vas deferens short and thick, sperm pump very small. Spermathecae shaped like flattened hemispheres, with a thick cover of epithelial cells, no indentation (Plate 5, Fig. 118). Ventral receptacle a finger-like rudiment, much shorter than the spermathecal ducts. Parovaria large.

Eggs — six very slender acuminate filaments a little shorter than the egg itself (Plate 6, Fig. 141).

Puparia — brownish yellow, without “horns”. Only the 5 branches of the larval anterior spiracle are extruded during pupation (Plate 6, Fig. 142).

Chromosomes — metaphase plates show 3 pairs of V-shaped chromosomes and no dots. One pair seems a little larger than the other two (Plate 4, Figs. 84-86). Salivaries with 6 strands two of which represent the X-chromosome, and, consequently, are pale in males.

Distribution — Bertioga, May 30, 1943, State of São Paulo (type locality).

Relationships — apparently close to *D. bromeliae* Sturtevant, from which it differs by a much lower costal index; it is also smaller than *D. bromeliae* (Sturtevant's description indicates the body length in *D. bromeliae* 2.2 mm., but this corresponds to a greater size in live specimens). The wing of *D. mirim* is exactly like that of *Dasydrosophila glabrifrons* according to Duda's (1925, p. 112) photograph. However, *D. mirim* clearly does not belong to the subgenus *Hirtodrosophila* (= *Dasydrosophila*). “Mirim” means small in Tupi-Guarani language; *D. mirim* is the smallest species encountered by us in Brazil.

The following is a key to the species of *Drosophila* described on the foregoing pages, with the inclusion of the cosmopolitan forms encountered in southern Brazil.

1. Mesonotum grey pollinose, each bristle and hair arising from a dark spot, these spots sometimes partly fused with each other; anterior scutellar bristles convergent (*repleta* group) 27
 - Mesonotum not as above, without a color pattern or with a pattern consisting of longitudinal stripes 2
2. Anterior scutellar bristles convergent 3
 - Anterior scutellar bristles divergent or parallel 10
3. Two prescutellar bristles; costal index below 1.5; abdomen with broad black bands which are narrowed in the middle on the 2nd and 3rd, broadened on the 4th to 6th tergites. Body length below 2.4 mm. *mirim*, sp. n.
 - No prescutellar bristles 4
4. Mesonotum with dark longitudinal stripes, the median stripe bifid posteriorly; dark bands on the abdominal tergites interrupted in the middle and laterally; no clear preapical bristles on first and second tibiae *busckii* Coquillett
 - No sharply outlined stripes on the mesonotum; preapical bristles on all tibiae 5
5. A row of peg-like bristles on the inside of the front femur; dark marginal bands on the abdomen interrupted in the middle *immigrans* Sturtevant
 - No row of specialized bristles on the front femur 6
6. Acrostichal hairs in 8 rows; costal index below 2.5; dark marginal bands on the abdomen not interrupted in the middle (*melanogaster* group) 7
 - Acrostichal hairs in 6 rows; costal index above 3.2; dark marginal bands on the 2nd to 4th abdominal tergites interrupted in the middle; thorax highly polished, shining (*cardini* group) 9
7. Costal index 2.0-2.4; sex combs on front tarsi in males .. 8
 - Costal index 1.3-1.7; no sex combs *anassae* Doleschall
8. Male genital arch with a small paired process
 - *melanogaster* Meigen
 - Male genital arch with a large paired process

- *simulans* Sturtevant
9. Thorax yellow or light tan; costal index 3.8-4.1
..... *polymorpha*, sp. n.
— Thorax dark tan; costal index 3.2-3.8 .. *cardinoides*, sp. n.
10. Two or three prominent oral bristles 11
— Only one prominent oral bristle; dark bands on abdominal tergites narrowed or interrupted in the middle 24
11. The sixth abdominal tergite light with a median black spot and no dark marginal band; thorax without a color pattern ... 12
— The sixth abdominal tergite without a median black mark, with or without a dark marginal band 13
12. Acrostichal hairs in 6 rows; costal index 3.9-4.2; a row of bristles on the apical half of the inside surface of the front femur *mediostriata* Duda
— Acrostichal hairs in 8 rows; costal index 4.4-5.1; no row of specialized bristles on the front femur *mediopunctata*, sp. n.
13. Crossveins more or less strongly clouded; thorax and pleurae pollinose (guarani group) 14
— Crossveins very slightly or not at all clouded 17
14. Abdomen dark brown to black with light spots on the anterior margins of the tergites 15
— Abdomen light with dark stripes on the posterior margins of at least the second and third tergites 16
15. Mesonotum dark brown with sharp yellowish grey longitudinal stripes *griseolineata* Duda
— Mesonotum tan, without a pattern or with only indistinct longitudinal stripes *guaramunú*, sp. n.
16. Lateral margins of the abdominal tergites brown
..... *guarani*, sp. n.
— Lateral margins of the abdominal tergites light .. *guarú*, sp. n.
17. Mesonotum dark with a pattern consisting of more or less sharp longitudinal stripes; small bristles below carina (saltans group) 18
— Mesonotum without a clear pattern; no bristles below carina 19
18. Mesonotum with a median dark spot or streak
..... *prosaltans* Duda
— Mesonotum without a median dark spot or streak
..... *sturtevanti* Duda
19. The dark marginal bands on the abdominal tergites interrupted in the middle or indistinct 20
— The dark marginal bands on the abdominal tergites not interrupted in the middle (willistoni group) 21
20. A pair of prescutellar bristles; marginal bands on the abdomen diffuse *pallidipennis*, sp. n.

- No prescutellar bristles; marginal bands not diffuse
bandeirantorum, sp. n.
21. Thorax more or less shining; wings clear; costal index usually below 2.2; small species 22
- Thorax opaque; costal index usually above 2.2; larger species 23
22. The third oral bristle $1/2 - 3/4$ the length of the first two; arista usually with 12 branches; costal index usually above 2.0
paulista, sp. n.
- The third oral bristle much smaller than the first two; arista with 10-11 branches; costal index usually below 2.0
willistoni Sturtevant
23. Wings dark brown; thorax dark tan *fumipennis* Duda
- Wings clear or only slightly fuscous; thorax yellow or light tan *capricorni*, sp. n.
24. Acrostichal hairs in 6 rows; thorax yellow or tan 25
- Acrostichal hairs in 8 rows; thorax brown 26
25. The sixth abdominal tergite in the male with a median dark spot; costal index 4.4-4.6 *mediosignata*, sp. n.
- The sixth abdominal tergite without dark markings in either sex; costal index 4.0-4.4 *prosimilis* Duda
26. Thorax without obvious dark longitudinal stripes; wings brown; dark marginal bands on the abdominal tergites not expanded laterally *dreyfusi*, sp. n.
- Thorax with dark longitudinal stripes; wings clear with slightly clouded crossveins; dark marginal bands greatly expanded laterally *andina*, sp. n.
27. Two prescutellar bristles; a very large species (body length more than 4.4 mm.) *annulimana* Duda
- No prescutellar bristles, or else enlarged acrostichal hairs in the prescutellar position 28
28. Acrostichal hairs in 6 rows *inca*, sp. n.
- Acrostichal hairs in 8 rows 29
29. Lateral areas of abdominal tergites solid brown to black, carina strongly sulcate 30
- Lateral areas of abdominal tergites with pale spots included in the broadened dark marginal bands 31
30. Arista with 7, seldom with 8, branches; spots on the mesonotum do not tend to fuse in longitudinal bands; acrostichal hairs large and strong *setosa*, sp. n.
- Arista with 9 branches; spots on the mesonotum tend to form dark longitudinal stripes; acrostichal hairs normal (♀)
novemaristata, sp. n.
31. Spots on the mesonotum partly fused to form a series of

- sharply outlined stripes; arista with 8-9 branches; costal index 2.3-2.6; crossveins slightly clouded; carina not sulcate ... *onca*, sp. n.
- Spots on the mesonotum do or do not form more or less distinct longitudinal stripes, but if they do the fly is not entirely as above; crossveins never clouded 32
32. Costal index below 2.5; some fusion of spots on the mesonotum to form longitudinal stripes; eyes cinnabar red; carina not sulcate *fascioloides*, sp. n.
- Costal index above 2.6 33
33. Carina strongly sulcate; arista with 9 branches; light lateral spots on the abdominal tergites diffuse; costal index 3.0 or higher (δ) *novemaristata*, sp. n.
- Not entirely as above 34
34. Marginal bands on the abdominal tergites sharply delimited but faint, grey or fuscous; palpi pale; arista usually with 8 branches *betari*, sp. n.
- Marginal bands on the abdominal tergites dark brown or black; arista usually with 7 branches 35
35. Palpi brown; no fusion of spots on the mesonotum to form longitudinal stripes *brunneipalpa*, sp. n.
- Palpi grey; some fusion of spots on the mesonotum to form indications of longitudinal stripes 36
36. Carina slightly sulcate; testes with about 13 coils; spermatheca large, well chitinized; ventral receptacle with about 70 coils ..
..... *austrorepleta*, sp. n.
- Carina not sulcate; testes with about 2 1/2 coils; spermatheca very small, not chitinized; ventral receptacle with about 9 coils
..... *pararepleta*, sp. n.

Plate 1

*Metaphase chromosome plates in the cells of the larval brains
of various species of Drosophila*

Figs. 1-3 — *Drosophila willistoni* Sturtevant.

Figs. 4-5 — *D. paulista*, sp. n.

Figs. 6-8 — *D. capricorni*, sp. n.

Figs. 9-11 — *D. fumipennis* Duda.

Figs. 12 and 13 — *D. sturtevanti* Duda.

Figs. 14 and 15 — *D. prosaltans* Duda.

Figs. 16-18 — *D. polymorpha*, sp. n.; Fig. 16 represents a prophase in a female cell; note the strong constrictions in the rod-shaped X and in one of the V-shaped autosomes which make the chromosomes appear fragmented; Figs. 17 and 18 show male cells.

Figs. 19-21 — *D. cardinoides*, sp. n.; Fig. 19 — ♂; Figs. 20 and 21 — ♀♀.

Figs. 22 and 23 — *D. prosimilis* Duda, ♂♂; Fig. 24 — ♀.

Fig. 25 — *D. bandeirantum*, sp. n.

The scale shows 10 micra, and is common to all figures.

Plate 2

Metaphase chromosome plates in the cells of the larval brains of various species of Drosophila.

Fig. 26 — *Drosophila bandeirantum*, sp. n.

Fig. 27 — *D. mediosignata*, sp. n., ♂; note the satellites in seven of the chromosomes, some of which appear as fragments separated from main bodies of the chromosomes to which they belong.

Fig. 28 — prophase in *D. bandeirantum*, sp. n.

Figs. 29 and 30 — *D. mediosignata*, sp. n.

Figs. 31 and 32 — *D. griseolineata* Duda.

Figs. 33, 35 and 36 — *D. guarani*, sp. n.; Fig. 34 prophase in the same species.

Figs. 37-39 — *D. guarú*, sp. n.

Figs. 40-42 — *D. guaramunú*, sp. n.

Figs. 43-45 — *D. pallidipennis*, sp. n.; Fig. 45 shows a prophase configuration.

Plate 3

Metaphase chromosome plates in the cells of the larval brains of various species of Drosophila.

Fig. 46 — *Drosophila pallidipennis*, sp. n.

Fig. 47 — *D. mediotriata* Duda, ♀; Figs. 48 and 49 — *D. mediotriata* Duda ♂♂.

Fig. 50 — *D. mediopunctata*, sp. n., ♀. Figs. 51 and 52 — *D. mediopunctata* ♂♂.

Figs. 53 and 54 — *D. fascioides*, sp. n.

Fig. 55 — *D. austrorepleta*, sp. n., ♀; Figs. 56 and 57 — *D. austrorepleta* ♂♂; in Fig. 57 the Y-chromosome shows the equational split making it V-shaped.

Figs. 58 — *D. pararepleta*, sp. n., ♀.

Figs. 59-61 — *D. novemaristata*, sp. n.

Figs. 62 and 63 — *D. pararepleta*, sp. n. ♂♂.

Figs. 64-66 — *D. brunneipalpa*, sp. n. (Fig. 64 — ♀; Figs. 65 and 66 — ♂♂).

Figs. 67 and 68 — *D. inca*, sp. n.

Figs. 69 - 71 — *D. setosa*, sp. n.

The scale represents 10 micra, and is common to all figures.

Plate 4

Metaphase chromosome plates in the cells of the larval brains of various species of Drosophila.

Figs. 72 - 74 — *Drosophila betari*, sp. n. (Fig. 72 — ♀, Figs. 73 and 74 — ♂♂).

Figs. 75 - 77 — *D. annulimana* Duda (Figs. 75 and 76 — ♀♀, Fig. 77 — ♂).

Figs. 78 - 80 — *D. andina*, sp. n. (Fig. 78 — ♀, Figs. 79 and 80 — ♂♂; in Fig. 72 note the sharp constrictions in the X-chromosomes which make these chromosomes appear broken each into two segments).

Figs. 81 - 83 — *D. dreyfusi*, sp. n.; note the large satellites at the end of one of the arms of a V-shaped chromosome which appear in some cases as separate fragments.

Figs. 84 - 86 — *D. mirim*, sp. n.

Figs. 87 - 90 — *D. onca*, sp. n.; Figs. 87 and 90 — ♀♀, 88 and 89 — ♂♂; Fig. 88 represents a late prophase and shows clearly the fine structure of the Y-chromosome.

Figs. 91 - 93 — *D. calloptera* Schiner; Fig. 91 — ♀, Figs. 92 and 93 — ♂♂.

Fig. 94 — tarsus of a third leg of *Drosophila bandeirantorum*, sp. n.

The scale below represents 10 micra, and is common to Figs. 72 - 93.

Plate 5

Figs. 95 - 121 — spermathecae of various species of Drosophila; the scale to the right of Fig. 121 represents 200 micra.

Fig. 95 — *D. willistoni* Sturtevant.

Fig. 96 — *D. paulista*, sp. n.

Fig. 97 — *D. fumipennis* Duda.

Fig. 98 — *D. capricorni*, sp. n.

Fig. 99 — *D. sturtevanti* Duda.

Fig. 100 — *D. prosaltans* Duda.

Fig. 101 — *D. polymorpha*, sp. n.

Fig. 102 — *D. cardinoides*, sp. n.

Fig. 103 — *D. prosimilis* Duda.

- Fig. 104 — *D. bandeirantium*, sp. n.
Fig. 105 — *D. mediosignata*, sp. n.
Fig. 106 — *D. griseolineata*, Duda.
Fig. 107 — *D. guaraní*, sp. n.
Fig. 108 — *D. guarú*, sp. n.
Fig. 109 — *D. guaramunú*, sp. n.
Fig. 110 — *D. fascioides*, sp. n.
Fig. 111 — *D. austrorepleta*, sp. n.
Fig. 112 — *D. pararepleta*, sp. n.
Fig. 113 — *D. novemaristata*, sp. n.
Fig. 114 — *D. brunneipalpa*, sp. n.
Fig. 115 — *D. inca*, sp. n.
Fig. 116 — *D. setosa*, sp. n.
Fig. 117 — *D. annulimana*, sp. n.
Fig. 118 — *D. mirim*, sp. n.
Fig. 119 — *D. mediotriata* Duda.
Fig. 120 — *D. mediopunctata*, sp. n.
Fig. 121 — *D. pallidipennis*, sp. n.
Figs. 122 - 128 — eggs of various species of *Drosophila*; the scale to the right of Fig. 128 represents 0,5 mm.
Fig. 122 — *D. willistoni* Sturtevant.
Fig. 123 — *D. paulista*, sp. n.
Fig. 124 — *D. fumipennis* Duda.
Fig. 125 — *D. capricorni*, sp. n.
Fig. 126 — *D. pallidipennis*, sp. n.
Fig. 127 — *D. onca*, sp. n.
Fig. 128 — *D. dreyfusi*, sp. n.

Plate 6

Figs. 129 - 141 — eggs of various species of Drosophila; the scale to the right of Fig. 133 represents 0,5 mm.

- Fig. 129 — *D. sturtevanti* Duda.
Fig. 130 — *D. prosaltans* Duda.
Fig. 131 — *D. mediosignata*, sp. n.
Fig. 132 — *D. polymorpha*, sp. n.
Fig. 133 — *D. guaramunú*, sp. n.
Fig. 134 — *D. annulimana* Duda.
Fig. 135 — *D. prosimilis* Duda.
Fig. 136 — *D. bandeirantium*, sp. n.
Fig. 137 — *D. guaraní*, sp. n.
Fig. 138 — *D. cardinoides*, sp. n.
Fig. 139 — *D. betari*, sp. n.

Fig. 140 — *D. andina*, sp. n.

Fig. 141 — *D. mirim*, sp. n.

Figs. 142 - 145 — pupae of various species of Drosophila; the scale below represents 1.0 mm.

Fig. 142 — *D. mirim*, sp. n.

Fig. 143 — *D. capricorni*, sp. n.

Fig. 144 — *D. austrorepleta*, sp. n.

Fig. 145 — *D. pallidipennis*, sp. n.

Plate 7

Pupae of various species of Drosophila; the scale represents 1.0 mm.

Fig. 146 — *D. mediostrata* Duda.

Fig. 147 — *D. novemaristata*, sp. n.

Fig. 148 — *D. guaramunú*, sp. n.

Fig. 149 — *D. dreyfusi*, sp. n.

Fig. 150 — *D. cardinoides*, sp. n.

Fig. 151 — *D. annulimana* Duda.

BIBLIOGRAPHY:

Duda, O. 1925. Die Costaricanischen Drosophiliden des Ungarischen National-Museums zu Budapest. *Ann. Hist.-Natur. Musei Nat. Hungarici*, vol. 22, pp. 149-229.

Duda, O. 1925. Die südamerikanischen Drosophiliden Dipteren unter Berücksichtigung auch der anderen neotropischen sowie nearktischen Arten. *Arch. Naturgesch.*, vol. 91, 11, pp. 1-228.

Patterson, J. T., and M. R. Wheeler. 1942. Description of new species of the subgenera *Hirtodrosophila* and *Drosophila*. *Univ. Texas Public.*, No. 4213, pp. 67-109.

Sturtevant, A. H., 1921. The North American species of *Drosophila*. *Carnegie Inst. Washington, Public.* 301, pp. 1-150.

Sturtevant, A. H., 1942. The classification of the genus *Drosophila* with descriptions of nine new species. *Univ. Texas Public.*, No. 4213, pp. 5-51.

Williston, S. W., 1896. On the Diptera of St. Vincent. *Trans. Entom. Soc. London*, 1896, pp. 253-446.

PLATE 1

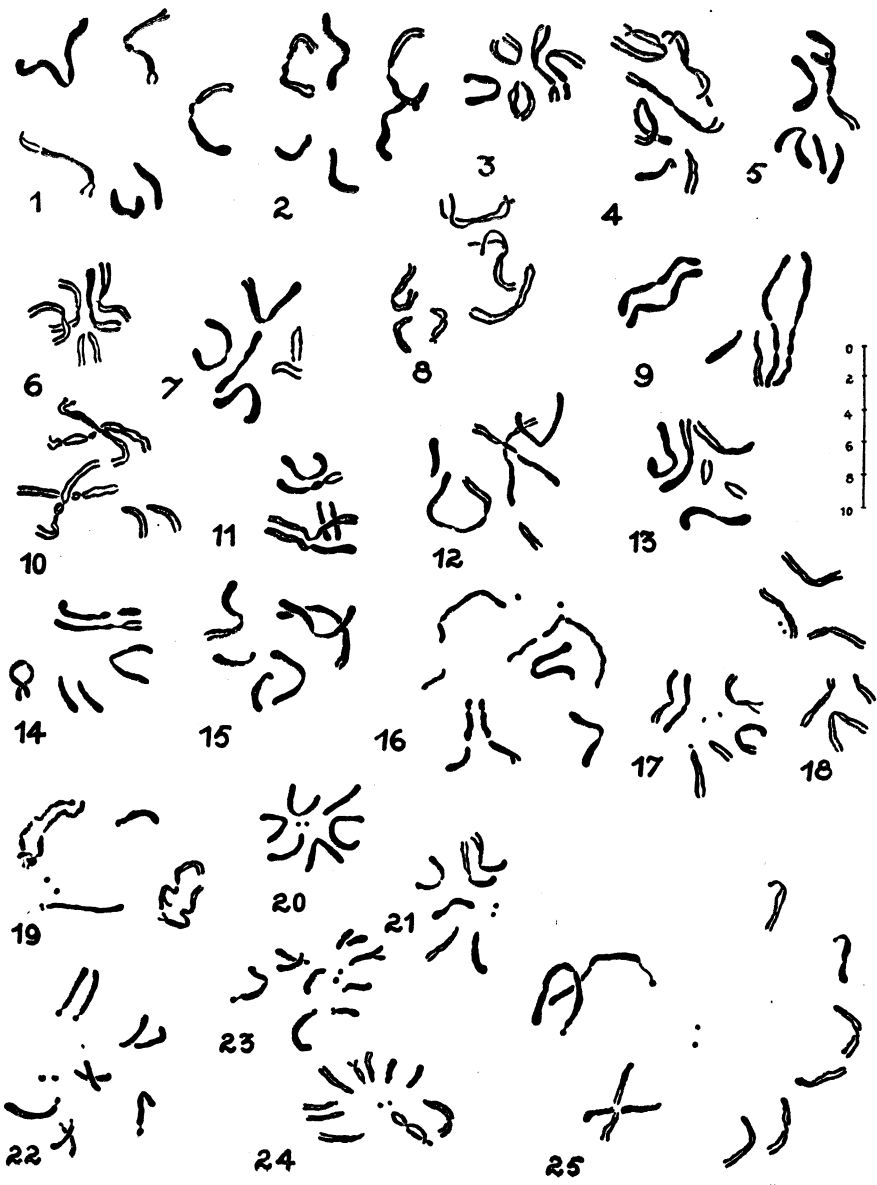


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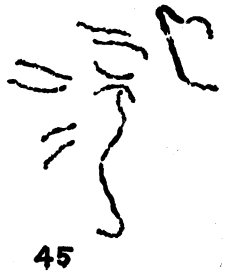
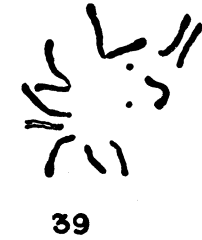
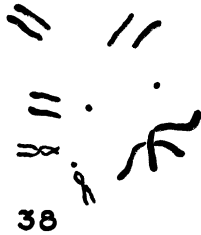
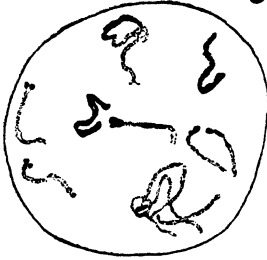
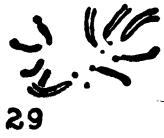
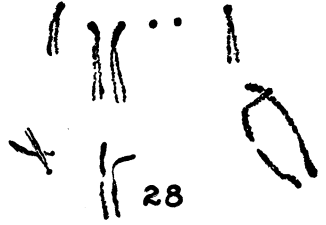
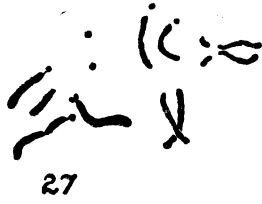
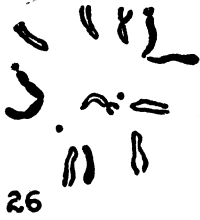


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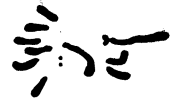
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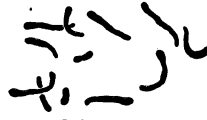
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PLATE 4



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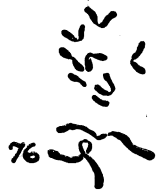
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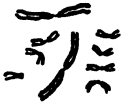
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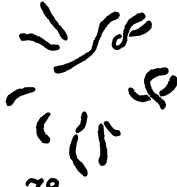
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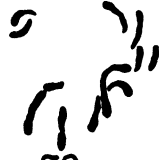
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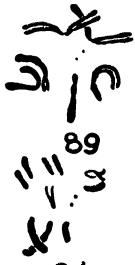
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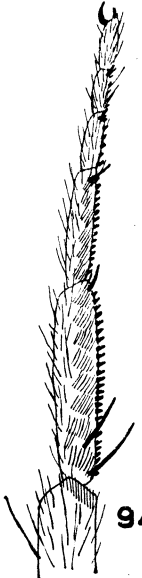
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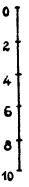


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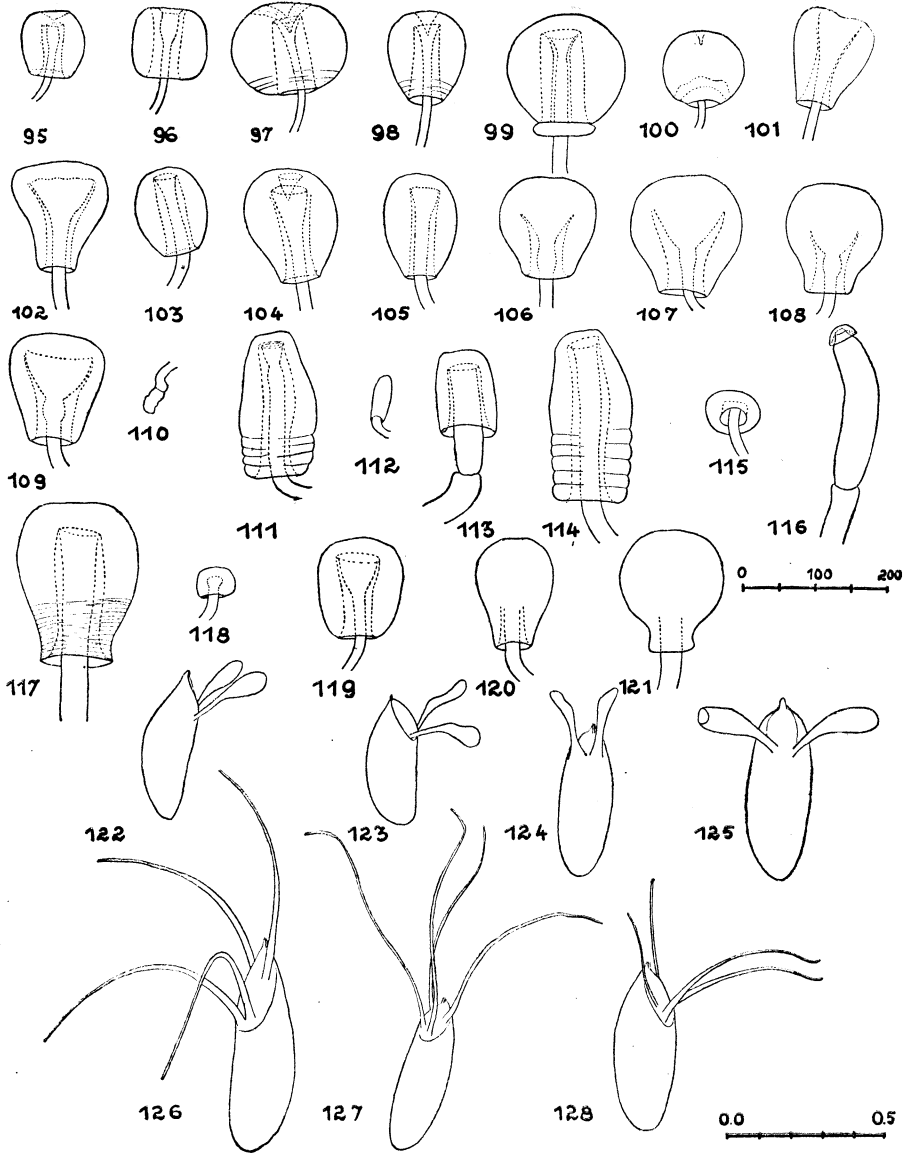


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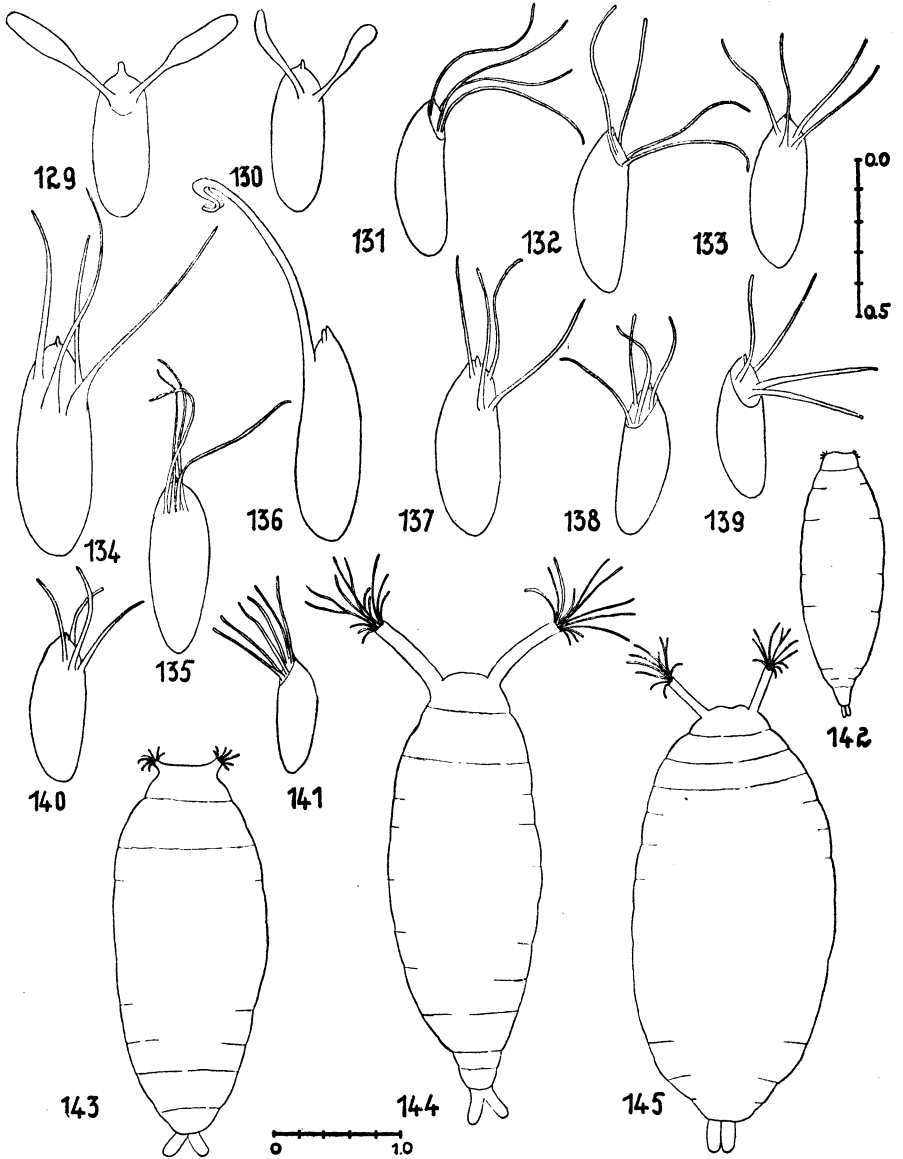
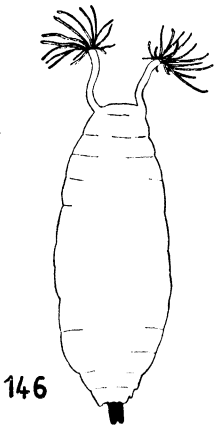
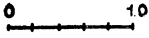
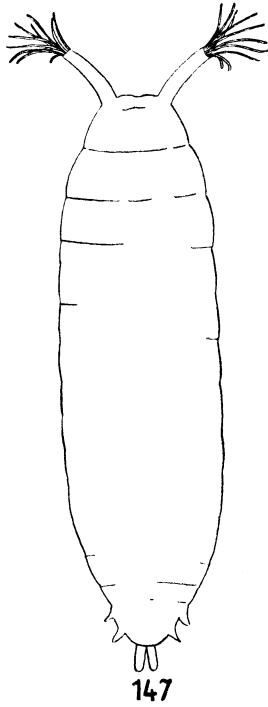


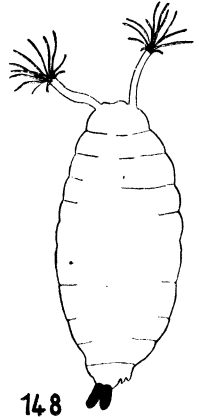
PLATE 7



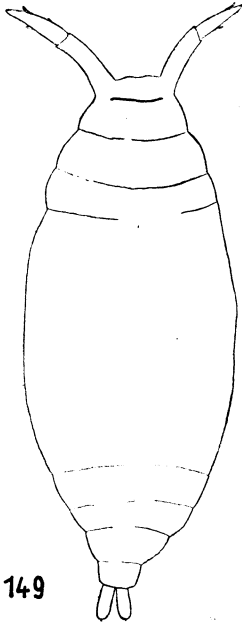
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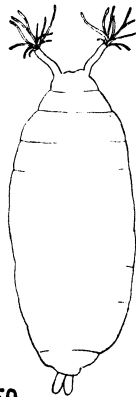
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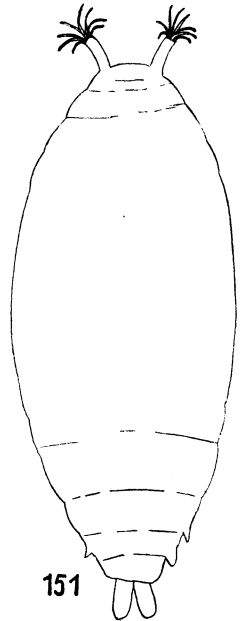
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