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Professor Okada
with my compliments
Shane McEvey

A key to Drosophilidae (Insecta: Diptera) collected in areas of human settlement in southern Africa

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A key is provided for 23 species of Drosophilidae, 21 of which have been found in areas of human settlement in southern Africa; seven of these species are cosmopolitan and eight others are widespread in Africa. Also included in the key are the seven southern African species of the small genus *Apenethecia* Tsacas and the common species of the *Drosophila melanogaster* subgroup and of the genus *Zaprionus* Coquillett which are often found in or near human dwellings. Species in eight genera are keyed and reference is made to three additional genera. Several cryptic species are included, their identification requiring examination of male genitalia; all other species key on features of external morphology. Notes are given explaining special terms.

INTRODUCTION

Drosophilid flies are common insects in and near human habitations; they are often abundant at ripe fruit in kitchens, decaying vegetable matter in bins and compost in gardens. The family Drosophilidae comprises more than 60 genera of which *Drosophila* Fallén, 1823 is by far the largest and the genus most often encountered in the abovementioned situations. In Africa *Leucophenga* Mik, 1886 and *Zaprionus* Coquillett, 1902 are the next most diverse genera and both comprise many species endemic to the Afrotropical Region. Most *Drosophila* species are also endemic; some are cosmopolitan or with distributions across at least several biogeographic regions; a range attributed to their close association with man (David & Tsacas 1981).

In places near human settlement in southern Africa, whether this be in large cities or in farmyards and remote agricultural areas, cosmopolitan and widespread species of *Drosophila* and *Zaprionus* are frequently encountered. In Johannesburg and Pretoria nine species of *Drosophila* (seven of the eight cosmopolitan species and one widespread species) and four of *Zaprionus* are common; eight species belonging to the genera *Apenethecia* Tsacas, 1983; *Amiota* Loew, 1862; *Cacoxenus* Loew, 1858; *Luzonimyia* Malloch, 1926; *Leucophenga*; *Drosophila*; *Microdrosophila* Malloch, 1921 and *Mycodrosophila*

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Oldenberg, 1914, may also be collected but are much less common. Many of these species will probably also be found in other cities and smaller settlements in the region (e.g. Harare, Maputo, Mbabane, Durban, and Cape Town). A species of *Lissocephala* Malloch, 1929 is known from Harare. In indigenous forest habitats of southern Africa a much greater diversity of species is known, the total number being greater than 100, many of which are undescribed.

Although obvious characters are available for differentiating between most of the species, a 'difficult group' exists whose species are barely distinguishable using external anatomy alone. These flies happen to be the most interesting in terms of genetic and ecological research (and teaching), so it is fortunate that they are also the ones which are most readily cultured and which, as a result, yield large numbers of specimens for dissection. The species in question are members of four groups of cryptic species: the *D. melanogaster*, *D. repleta*, *Z. tuberculatus* and *Z. vittiger* groups.

Despite their potential research value, Drosophilidae remain little studied in southern Africa, an area which is particularly interesting biologically. Notable local studies are those of Nolte (1958) on eye-pigmentation in natural southern African populations of the *D. melanogaster* subgroup, Herrmann (1983) and, in part, Lachaise & Tsacas (1984) on *D. flavohirta* Malloch, 1924 and its association with *Eucalyptus* flowers, David *et al.* (1986) on alcohol tolerance in African and European populations of *D. melanogaster*, Agnew (1976) on myophily involving Drosophilidae and Hackman (1960) on species collected during 1950–1951 by Brinck and Rudebeck. The difficulty of sure identification seems to be a major hindrance. A key is thus provided to make accessible part of this valuable and convenient experimental resource. To facilitate its application, notes and figures are provided to explain the terminology; in the majority of couplets characters which can be seen without dissection are used. Bock's (1976) key to Australian Drosophilidae has been used extensively in the preparation of this key. His formulae for the calculation of wing indices are used. Details of terminology are given by Bock (1976), but, since these are standard terms, general texts treating the Diptera will suffice (e.g. Barraclough & Londt 1986).

MATERIALS and METHODS

Collections in six scattered suburbs of Johannesburg and Pretoria were carried out from February until June 1985 (GR & SW). The results of these surveys and records from drosophilid collections made between 1982 and 1985 (SMcE & AP) were used to compile a list of species present in areas of southern Africa close to human settlement (Table 1). Tsacas (1980a) gives a list of Drosophilidae reported from the Afrotropical Region which contains 62 species from southern Africa, and Tsacas & Saitta (1985) list six species from Swaziland. Swaziland is now known to have at least 26 species (McEvey, unpublished data) many of which are, however, probably restricted to forest habitats and not found in suburban or agricultural areas. Several undescribed taxa were found during the recent surveys; they are held in the collections of the Natal Museum, Pietermaritzburg, and the Muséum National d'Histoire Naturelle, Paris, and are presently under study.

The family Drosophilidae is a diverse group of flies which utilize a wide range of food resources; collecting them efficiently therefore requires application of a range of techniques. The following three methods were used: (1) fruit baiting, indoors and outdoors with naturally fermented bananas held in inverted, partially sealed, plastic containers (flies are aspirated out after becoming trapped in the upper parts); (2)

sweeping over garden compost and rotting cactus (*Opuntia* sp.); (3) direct aspiration from various fungal growths on rotting logs (e.g. shelf fungus) or from flowers (e.g. *Aloe*, *Eucalyptus*, or the stapeliad *Caralluma*).

Identifications are most easily made when specimens are pin-mounted (minutes in pith). However, it is necessary to examine the colour or form of testes in the species of the *D. repleta* and *Z. tuberculatus* groups respectively, and this, of course, can only be done with freshly-killed specimens. Although a feature of external morphology is given to distinguish *D. melanogaster* and *D. simulans*, these species are usually separated by reference to the male genitalia. In fresh specimens the genitalic differences are clear without dissection, but in pinned specimens the genitalia are often withdrawn and it will be necessary to dissect out these organs for microscopic examination. For dissection the following method may be used: moisten the specimen with water, cut off the posterior part of the abdomen; place it in a drop of potassium hydroxide (1 N KOH) solution for a few minutes and then in a drop of water. With dissecting needles or slender jewellers' forceps remove most of the tissues surrounding the genitalia; place genitalia in a drop of glycerine on a slide for (compound) microscopic examination.

Reference collections of the more common species have been lodged at the Natal Museum (Pietermaritzburg), the National Insect Collection (Pretoria), The National Museum (Bulawayo), the museum of the Zoology Department at The University of the Witwatersrand (Johannesburg), and the Zoology Department at Rhodes University.

KEY TO SUBURBAN DROSOPHILIDAE OF SOUTHERN AFRICA

There are more than 2500 described species of Drosophilidae throughout the world (Wheeler 1986). It is difficult to describe the family definitively, but among the species listed in the present study none is exceptional, and several features may be given which allow this group of flies to be identified. Wheeler's (1981, 1986) catalogue of the world's fauna can be used to locate original descriptions. The following species are typical drosophilids in that they have a twice-broken costa (see Fig. 6), a completely bare mesopleuron, one proclinate and two reclinate orbital bristles (the posterior reclinate is modified in *Apenthecia* and in the South African species of *Amiota*), reddish eyes, and, usually, a plumose arista (see Fig. 3; the arista is, however, completely bare in *Apenthecia* (Fig. 4), micropubescent (Fig. 5) in the rare species of *Cacoxenus* and *Luzonimyia*, and with short basal rays only in *Amiota*).

- 1 Arista bare (Fig. 4) or finely micropubescent (Fig. 5) 17
- Arista plumose with dorsal and ventral rays (Fig. 3) 2
- 2 (1) Thorax black above, white or very pale tan laterally and ventrally; anterior dorsocentral bristles small barely larger than acrostichal hairs *Mycodrosophila* spp
Tsacas (1980a) lists two species from southern Africa although it is now known that there are at least five (McEvey, unpublished data). Species are usually found on large fungal growths, especially under shelf fungus on rotting logs in humid places. A species has been collected in suburban Johannesburg; J. David (pers. comm.) has found a species on fungus in the Cape Town city gardens.
- Thorax not black above and white laterally and below; both anterior and posterior dorsocentral bristles much larger than acrostichal hairs. 3
- 3 (2) Anterior dorsocentral bristle far forward, close to transverse suture; C-index c. 1.0 *Microdrosophila* sp.
The C-index is the ratio of the lengths of the second costal section on the third (i.e. A/B, Fig. 6). In the single species found in Johannesburg, the wings have a distinctive black flange or lappet at the second costal incision, an entirely black body and faint submedian

pollinose mesonotal bands. The presence of a wing-lappet is typical of *Mycodrosophila* spp but is unusual in *Microdrosophila*. Only a single specimen of this relatively rare genus was collected (at a 'compost heap' in Van Riebeck Park, Johannesburg). The genus was not recorded from southern Africa by Tsacas (1980a).

- Anterior dorsocentral bristle not far forward, closer to posterior dorsocentral than to transverse suture; *C*-index greater than 1,0 4
 - 4 (3) Mesonotum and frons with aligned, vivid, silvery-white, longitudinal stripes; wings never with dark patches or patterns 14 (*Zaprionus* spp)
 - Mesonotum and frons without such striping or, at most, with diffuse brown bands; wings hyaline or with pigmented patches 5
 - 5 (4) Costa reaching only to apex of the third longitudinal vein (cf. Fig. 6) or slightly beyond; proclinate and reclinate orbital bristles subequal; prescutellar bristles well-developed *Leucophenga* spp
 - At least 17 species of *Leucophenga* have been recorded from southern Africa (Tsacas 1980a). The species are often quite markedly sexually dimorphic. Two species have been collected in Johannesburg, and the type-locality of *L. flavopuncta* Malloch, 1925 is Durban, but the *Leucophenga* fauna in areas close to human settlement is probably more diverse than this suggests; they are more often collected by sweeping and this method was the least often used in the present surveys. Keys and further details of the taxonomy and biology of this genus may be found in Bock (1979) and Bächli (1971).
 - Costa reaching apex of the fourth longitudinal vein (e.g. Fig. 6); anterior reclinate usually relatively small; prescutellars absent 6
 - The *Drosophila* subgenus *Scaptodrosophila* has well-developed prescutellar bristles; species of this subgenus are usually restricted to undisturbed forest habitats.
 - 6 (5) Mesonotum pale tan with diffuse dark median and submedian longitudinal bands; or dark grey with mottled pattern of pale or dark spots 7
 - Mesonotum not patterned with dark or light bands or spots; uniformly pale tan or brown 11
 - Entire body yellowish. (Body small; hairs, bristles and arista translucent yellowish; males without sex-comb on anterior leg; eyes greenish; associated with *Eucalyptus* flowers) *Drosophila (Sophophora) flavohirta* Malloch, 1924: 354
 - Further notes on *D. flavohirta* and its association with *E. grandis* and *E. paniculata* may be found in Lachaise & Tsacas (1984) and Herrmann (1983).
 - One genus, *Scaptomyza*, although not found in the present surveys, may be encountered in suburban or agricultural areas of southern Africa. Two species in particular are likely to be found: *S. pallida*, which has a silvery-grey mesonotum, and *S. graminum*. Both will key to this triplet. They are unlike other drosophilids in having only two rows of acrostichal hairs. They are very widespread species and have often been found close to areas of human activity elsewhere (Hackman 1959).
 - 7 (6) Wings with four dark patches on the third longitudinal vein, on both crossveins and distally on the third and fourth longitudinal veins *Drosophila (Drosophila) punctatonervosa* Frey, 1954: 32
 - Wings with no dark patches or markings 8
 - 8 (7) Mesonotum with diffuse dark bands: a median band forked posteriorly, flanked by non-forked submedian bands; carina not sulcate (i.e. not with concavity) *Drosophila (Dorsilopha) busckii* Coquillett, 1901: 18
 - Mesonotum dark grey with numerous irregular small pale and dark patches rendering it motley; carina slightly sulcate 9
 - 9 (8) Third costal section (B, Fig. 6) with heavy setation on basal 0,3; *M*-index c. 0,5–0,6 *Drosophila (Drosophila) buzzatii* Patterson & Wheeler, 1942: 97
 - Third costal section with heavy setation on basal 0,4 (e.g. Fig. 6, arrowed); *M*-index c. 0,4 10
- The *M*-index (Bock 1976) is the ratio of the lengths of the ultimate section of the fifth longitudinal vein on the penultimate section of the fourth.

- 10 (9) C-index c. 3.0; greatest width of cheek c. 0.25 of greatest diameter of eye
 *Drosophila (Drosophila) repleta* Wollaston, 1858: 117
- C-index c. 3.3; greatest width of cheek c. 0.35 of greatest diameter of eye
 *Drosophila (Drosophila) hydei* Sturtevant, 1921: 101
- 11 (6) Dark bands on anterior abdominal tergites not interrupted in midline; males with
 distinctive sex comb (e.g. Fig. 16) on first tarsal segment of anterior leg 12
- Sex combs are a specific character present on the tarsi of males of many species in the
Drosophila subgenus *Sophophora*. At least 10 species known from indigenous forest
 habitats of southern Africa have well-developed sex combs in males. Such combs always
 consist of short, thick, black setae very closely spaced together forming a short (e.g.
D. yakuba, Fig. 16) or long comb or several combs. The femoral comb is a feature of males
 of many species in the subgenus *Drosophila*; it consists, usually, of very short spines
 widely spaced (e.g. *D. immigrans*, Fig. 15).
- Apical band on anterior abdominal tergites interrupted in midline; males with no sex
 comb on anterior tarsus 13
- Species of the genus *Lissocephala* key to this couplet; they have glossy black abdomens.
 The description of the type species *L. unipuncta* Malloch, 1929: 251 is based on two
 specimens from Harare (Zimbabwe), the holotype was collected 'under fig-tree'.
 Malloch (1929: 251) describes it as having 'head, thorax, legs, and halteres, shining
 fulvous-yellow . . . abdomen glossy blue-black.' All 15 species of the Afrotropical Region
 are associated with *Ficus* usually not under domestic cultivation (Lachaise pers. comm.)
- 12 (11) Cheek narrower than widest part of anterior tibia (c. 0.18 of greatest diameter of eye);
 epandrium with large protuberant discoid process (arrowed in Fig. 1)
 *Drosophila (Sophophora) simulans* Sturtevant, 1919: 153
- Cheek broader than widest part of anterior tibia (c. 0.25 of greatest diameter of eye);
 male genitalia with small trapezoidal process (arrowed in Fig. 2)
 *Drosophila (Sophophora) melanogaster* Meigen, 1830: 85
- The discoid process (surstyler extension or surstylus) of *D. simulans* can usually be seen
 in dried or pinned specimens without dissection but is more readily seen when males are
 anaesthetized or freshly killed. A third species, *D. yakuba* Burla, 1954, closely resembles
D. simulans and *D. melanogaster* and occurs in southern Africa (Bock & Wheeler 1972).
 Bock & Wheeler (1972) have shown that *D. yakuba* has fewer teeth in the sex comb
 (range 6–9, mean 7.42, n = 50) than *D. melanogaster* or *D. simulans* (ranges 7–12 and
 7–11, means 9.7 and 9.3 respectively); furthermore, the genitalia have the anal plate
 with median furrow. As far as can be ascertained, specimens of *D. yakuba* have only been
 collected in relatively undisturbed habitats away from areas of human activity. *D. yakuba*
 was collected by one of us (McE) in Swaziland in 1983 and 1985. Paterson (pers. comm.)
 has identified flies collected by Nolte from Inhaca (Mozambique) as *D. yakuba*.
- 13 (11) Row of very short spines (femoral comb, Fig. 15) present on anterior femur; orbital
 bristles in straight line *Drosophila (Drosophila) immigrans* Sturtevant, 1921: 83
- Femoral comb absent; anterior reclinate orbital bristle posterolateral to proclinate
 bristle *Drosophila (Drosophila) funebris* (Fabricius, 1787: 345)
- 14 (4) Ventral surface of anterior femur with a single prominent tubercle which has a short
 spine accompanied by a long, strong bristle (Fig. 11, short spine not visible in this figure)
 15
- Ventral surface of anterior femur with a row of four tubercles each with a short spine
 accompanied by a long, strong bristle (Fig. 12) 16
- 15 (14) Testes long and repeatedly coiled (Fig. 7); egg-filaments equal in length, basal pair
 thickened along entire length (Fig. 9) *Zaprionus tuberculatus* Malloch, 1932: 11
- Testes short, thicker and less coiled (Fig. 8); egg-filaments unequal in length, apical pair
 short and slender, basal pair greatly broadened and pallet-shaped apically (Fig. 10) . .
 *Zaprionus sepsoides* Duda, 1939: 17

- 16 (14) Collar of phallus rounded and serrated basally (Fig. 13), junction of phallus and phalldeme indistinct *Zaprius vittiger* Coquillett, 1902: 32
 — Collar of phallus pointed and not serrated basally (Fig. 14), junction of phallus and phalldeme distinct *Zaprius indianus* Gupta, 1970: 63
 Further information about these species is given by Tsacas (1980b). Several very similar species occur in southern Africa, but only the above two are known to occur in domestic habitats. *Z. collarti* Tsacas, 1980b: 684 is a synonym of *Z. indianus* Gupta (Tsacas 1985).
- 17 (1) Arista bare (Fig. 4); posterior reclinate orbital bristle either flattened forming a very distinctive scale, or thickened forming a short swollen bristle approximately equal to or shorter than the anterior reclinate orbital (illustrated by Hackman 1960) 18 (*Apenthesia* spp)
Apenthesia has nine described species, seven of which are known only from South Africa. At least three occur in Johannesburg and Pretoria: *A. argentata* has been swept from garden compost, *A. imperfecta* has been attracted to fruit baits, and *A. brincki* has been found in *Aloe* flowers.
- Arista micropubescent (Fig. 5); posterior reclinate orbital bristle not thickened or scale-like 24 (*Amiota*, *Luzoninyia* and *Cacoxenus*)
Amiota and *Apenthesia* are closely related genera. *Amiota* is represented in southern Africa by two species: *Am. fenestrata* (Duda, 1939: 14) (*Phortica*) which also occurs in Uganda, and *Am. flavithorax* (Duda, 1939: 16) (*Phortica*) which is apparently restricted to southern Africa. These two species have the arista fringed with a graded series of short dorsal rays and very short ventral rays. This genus was not found by us in the present surveys.
- 18 (17) Submedian dark annuli of mid- and posterior tibiae long, almost as long as a third of the length of the tibia (Figs 19 and 20); posterior reclinate orbital bristle thickened but not scale-like. 19
 — Submedian or median dark annuli of mid- and posterior tibiae short (Figs 17 and 18), only as long as width of tibia; posterior reclinate orbital either scale-like or short and thickened 20
- 19 (18) Front rusty-brown; orbits grey pollinose; posterior reclinate orbital bristle thickened and reclinate towards the eye; yellow subdistal band of posterior tibia shorter than dark distal band (Fig. 20) *Apenthesia latifascia* Tsacas, 1983: 341
 — Front red; orbits slight, brownish pollinose; posterior reclinate orbital bristle short, thickened and straight; yellow subdistal band of posterior tibia as long as dark distal annulus (Fig. 19) *Apenthesia ambigua* Tsacas, 1983: 335
- 20 (18) Front and face entirely covered with dense silvery pollinosity, less distinct in females; posterior reclinate orbital bristle transformed into a distinct scale 21
 — Front and face with slight, incomplete pollinosity; posterior reclinate orbital bristle either scale-like or thickened 22
- 21 (20) Subdistal yellow band of posterior tibia as long as dark, distal annulus
 — Subdistal yellow band of posterior tibia longer than dark, distal annulus (Fig. 18)
 *Apenthesia argentata* Tsacas, 1983: 336
- 22 (20) Scutellum brown; yellow on posterior edge, this not reaching the base of the anterior scutellars; posterior reclinate orbital bristle swollen but not distinctly flattened and scale-like, not flabelliform (illustrated in Hackman 1960)
 *Apenthesia brincki* (Hackman, 1960: 387)
- Scutellum paler apically but without a well-marked border; posterior reclinate orbital bristle transformed into a distinctly flattened scale, apically pointed and nearly flabelliform 23
- 23 (22) Mesonotum with 5 brown, interrupted longitudinal bands (posterior tibia like *A. imperfecta*, Fig. 17) *Apenthesia vittata* Tsacas, 1983: 344
 — Mesonotum with 3 brown, interrupted bands (tibia, Fig. 17)
 *Apenthesia imperfecta* Tsacas, 1983: 340

- 24 (17) Thorax densely greyish pollinose, pleura not banded; abdomen yellow with large conspicuous black patches; ocellar bristles minute *Luzonimyia nigropuncta* Malloch, 1926: 491
 The genus *Luzonimyia* has only two species. The other species, *L. cineracea* Bock, 1982: 27, is Australian. *L. nigropuncta* was thought to be restricted to the Philippines. A single specimen has been collected in a garden near buildings at a farm near Nylsvley in South Africa. This is the first record of this genus outside the southeast Asian-Australasian Region.
- Thorax without dense greyish pollinosity, with many small brown spots on paler base colour; pleura banded; abdomen not yellow with black patches; ocellar bristles large *Cacoxenus perspicax* (Knab, 1914: 166)
Cacoxenus perspicax is almost cosmopolitan, being found from Hawaii through southeast Asia and Australia to central and southern Africa (Wheeler 1981); the larvae are known to be predaceous on mealy bugs of the genus *Pseudococcus* (Knab 1914 cited by Bock 1982: 16), and although *C. perspicax* has not been collected by us in southern Africa it is recorded by Malloch (1930) from Weenen, Natal. This species is sometimes placed in the genus *Gitonides* Knab, 1914 (e.g. Tsacas 1980a).

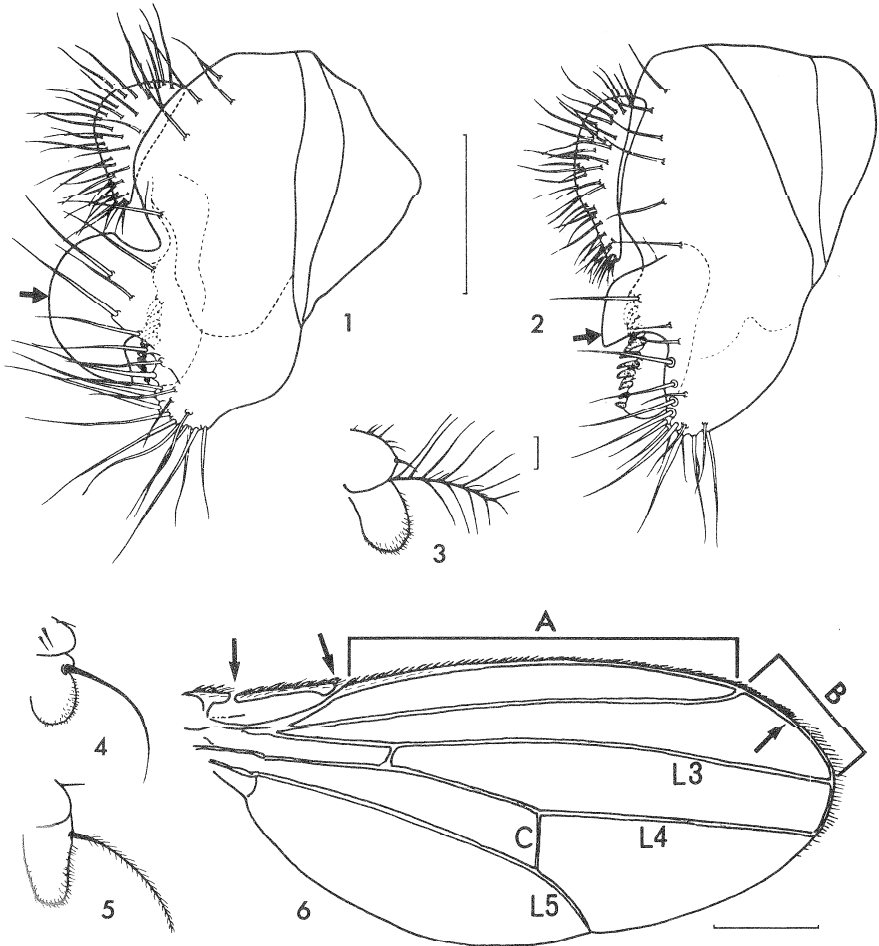
Table 1. A list of the species and genera of Drosophilidae which are identified in the key. Several taxa (*) are discussed in the text and included in this table although they were not collected by us in the present surveys.

STEGANINAE

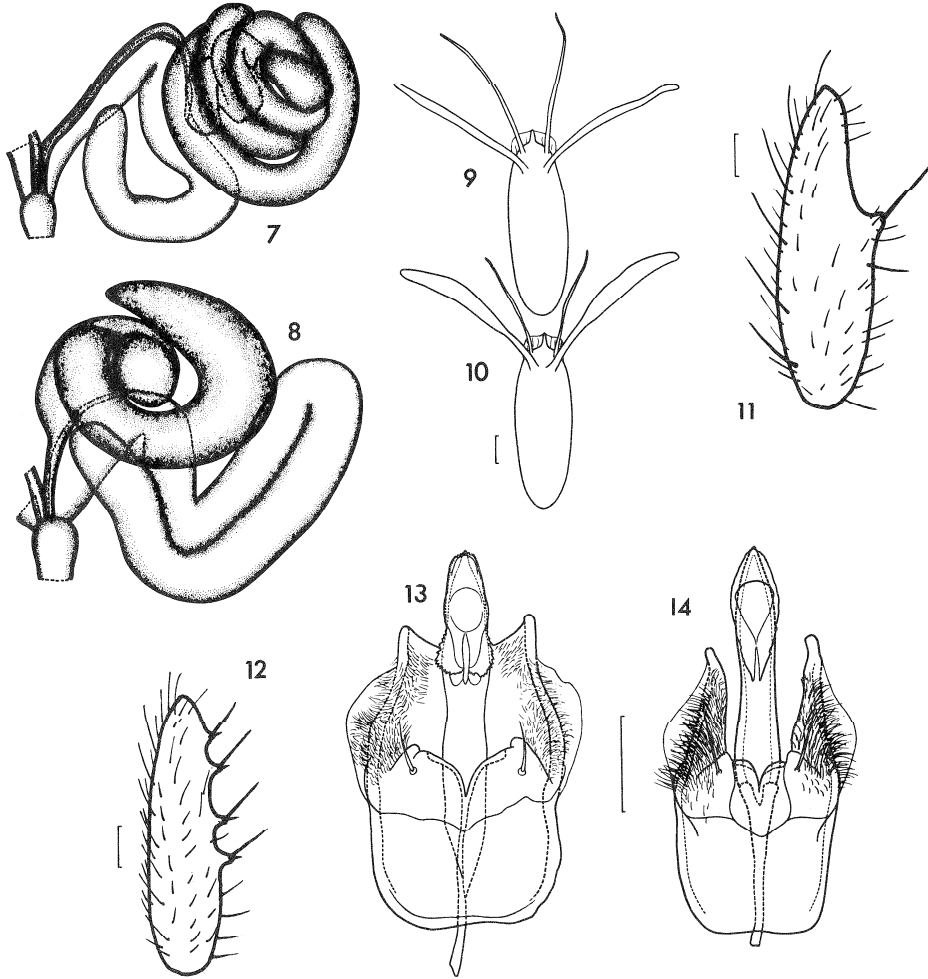
- Amiota* (two species in southern Africa)*
Apenthesia ambigua Tsacas, 1983: 335*
Apenthesia argentata Tsacas, 1983: 336
Apenthesia brincki (Hackman, 1960: 387)
Apenthesia crassiseia (Hackman, 1960: 386)*
Apenthesia imperfecta Tsacas, 1983: 340
Apenthesia latifascia Tsacas, 1983: 341*
Apenthesia vittata Tsacas, 1983: 344*
Cacoxenus perspicax (Knab, 1914: 166)*
Leucophenga (at least 17 taxa in southern Africa)
Luzonimyia nigropuncta Malloch, 1926: 491

DROSOPHILINAE

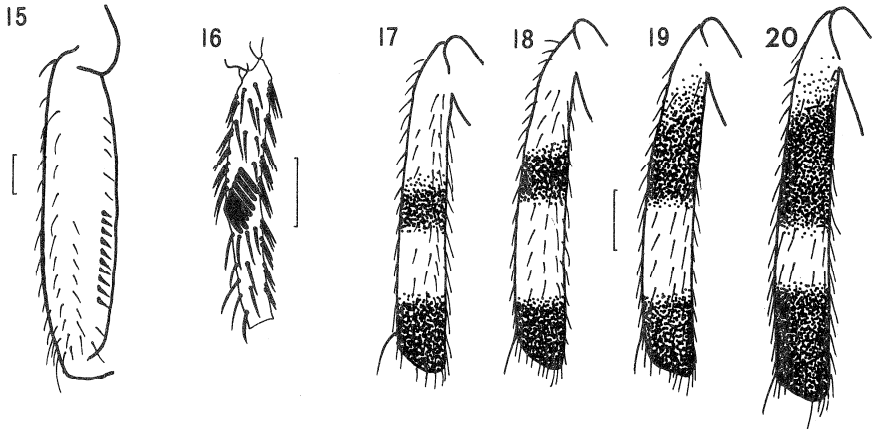
- Drosophila* (*Dorsilopha*) *busckii* Coquillett, 1901: 18
Drosophila (*Drosophila*) *buzzatii* Patterson & Wheeler, 1942: 97
Drosophila (*Drosophila*) *funebria* (Fabricius, 1787: 345)
Drosophila (*Drosophila*) *hydei* Sturtevant, 1921: 101
Drosophila (*Drosophila*) *immigrans* Sturtevant, 1921: 83
Drosophila (*Drosophila*) *punctatonevosa* Frey, 1954: 32
Drosophila (*Drosophila*) *repleta* Wollaston, 1858: 117
Drosophila (*Sophophora*) *flavohirta* Malloch, 1924: 354*
Drosophila (*Sophophora*) *melanogaster* Meigen, 1830: 85
Drosophila (*Sophophora*) *simulans* Sturtevant, 1919: 153
Drosophila (*Sophophora*) *yakuba* Burla, 1954: 161*
Lissocephala unipuncta Malloch, 1929: 251*
Microdrosophila (several taxa known in southern Africa)
Mycodrosophila (five taxa known in southern Africa)
Scaptomyza (*Parasaptomyza*) *pallida* Zetterstedt, 1847: 2571*
Scaptomyza (*Scaptomyza*) *graminum* Fallén, 1823: 8*
Zaprionus indianus Gupta, 1970: 63
Zaprionus sepsoides Duda, 1939: 17
Zaprionus tuberculatus Malloch, 1932: 11
Zaprionus vittiger Coquillett, 1902: 32



Figs 1-6. Some features of drosophilid anatomy. Male genitalia: 1, *Drosophila simulans**; 2, *D. melanogaster**. Aristae: 3, *D. funebris*; 4, *Apenthecia argentata*; 5, *Luzonimyia nigropuncta*. 6, wing, *D. repleta*; proximal and distal costal incisions arrowed; A, second costal section; B, third costal section (end of heavy setation arrowed near apex); C, posterior crossvein; L3, L4, L5 - third, fourth and fifth longitudinal veins. Vertical scale bars = 0,1 mm, horizontal scale bar = 0,5 mm. (* From Tsacas & Bocquet 1976.)



Figs 7-14. Some anatomical features of four species of *Zaprionus*. Testes (coiled structures): 7, *Z. tuberculatus**; 8, *Z. sepsoides**. Eggs: 9, *Z. tuberculatus**; 10, *Z. sepsoides**. Femur of fore-leg: 11, *Z. tuberculatus*; 12, *Z. vittiger*. Phallic organs: 13, *Z. vittiger*♂; 14, *Z. indianus*♂. Scale bars = 0,1 mm. (* From Tsacas et al. 1977; ♂ from Tsacas 1980b).



Figs 15-20. Some features of drosophilid legs. 15, femoral comb, *D. immigrans*. 16, sex comb, *D. yakuba*. Tibia of posterior leg: 17, *Apenthetia imperfecta*; 18, *A. argentata*; 19, *A. ambigua*; 20, *A. latifascia*. Scale bars = 0,1 mm.

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