

## ***Mycodrosophila* (Diptera: Drosophilidae) of Fiji and Vanuatu With Description of Nine New Species<sup>1</sup>**

SHANE F. McEVEY

*Australian Museum, 6 College Street, Sydney NSW 2010, Australia; email:  
shanem@austmus.gov.au*

MICHAL POLAK

*Department of Biological Sciences, University of Cincinnati,  
Cincinnati, Ohio 45221-0006, USA*

**Abstract.** Eleven species of the drosophilid genus *Mycodrosophila* were collected by us from fungus at two localities on Viti Levu, Fiji, and nine localities on Efate and Espiritu Santo, Vanuatu. Nine are described as new in the present study; one, *Mycodrosophila gratiosa* (de Meijere, 1911), is known to be widespread in southeast Asia and Oceania, and one is represented by a single specimen that appears to be very similar to *M. heterothrix* McEvey & Bock, 1982 from Australia and New Guinea. The most abundant species in Vanuatu, *M. vanuatuae* n.sp., is very similar to the Australian species *M. claudensis* Bock, 1980, the male genitalia for which has not previously been described; males of *M. claudensis* from the type and other Australian localities have been examined and illustrated in the present work. Two of the eleven species reported here belong to the subgenus *Promycodrosophila* the others to *Mycodrosophila* s.str., their addition to the Australasian and Oceanian fauna brings the total number of described species in those regions to 59; New Guinea has an abundance of species, many await description.

### **INTRODUCTION**

The genus *Mycodrosophila* was established by Oldenberg (1914) for *Amiota poecilogastra* Loew a European species associated with fungus. Since Oldenberg's paper, c. 120 other species have been described (<http://taxodros.unizh.ch/> August 2005) from various parts of the world. The majority (65%) are from the Oriental and Australasian Regions; there are 14 described species (15%) from the Afrotropical Region, five species from the Neotropical, 3 from the Nearctic and one from the Palaearctic. Before the present work, the species known from the Pacific represented 11% of the World *Mycodrosophila* fauna, with the inclusion of the new species described here, that proportion is now about 20% (22 species) and the genus overall expands to 127 species. We know of more than 20 undescribed species from Papua New Guinea, Madagascar and French Polynesia and predict many more await discovery in New Guinea, southeast Asia and islands of the southwest Pacific.

Bock (1980) summarized the taxonomy of the genus *Mycodrosophila* from the earliest descriptions to 1980; Malloch's (1930, 1934) descriptions of *nigrithorax* and *buxtoni* from Western Samoa and *halterata* from French Polynesia need to be added to his historical summary. Since 1980, 47 species have been described worldwide. From the Oriental Region, 22 new species have been reported from Java (Indonesia), Malaysia, Philippines, Singapore and Bonin Islands (Okada, 1986a,b); Burma (Wynn & Toda, 1990); China (Chen *et al.*, 1989; Chen & Toda, 1994); Vietnam (Sidorenko, 1999); and India (Sundaran

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& Gupta, 1991; Kumar & Gupta, 1992). From the Australasian Region 12 new species have been described from Papua New Guinea (Okada, 1986a,b) and Australia (Bock, 1982; McEvey & Bock, 1982). New species from the Afrotropical Region have type localities in South Africa (Tsacas, 1990), Tanzania and Zambia (Chassagnard *et al.*, 1997) and further north in Africa (Chassagnard & Lachaise, 2000). Tsacas & Chassagnard (1991) described four new *Mycodrosophila* species from New Caledonia (Oceania Region) and noted the existence of a fifth. In the Palearctic Region (Russian Far East) Sidorenko (1992) described *M. celesta*. The present study of *Mycodrosophila* in Fiji and Vanuatu is set in context to this overall biogeographic and historic knowledge and has led us to pay particular attention to all the *Mycodrosophila* species already described from the surrounding regions in the South West Pacific, Papua New Guinea, and Australia.

Species of *Mycodrosophila* are usually collected directly from a variety of fungal growths on logs and rotting tree stumps in damp or shaded habitats—often rainforests; ephemeral, pale, deliquescent varieties of fungus seem to be preferred, this is especially so in the tropics. Flies of this genus are seldom collected in malaise traps (at least not in the same numbers), yellow pans, or at light or rotting fruit traps. Frequently we have found that general sweeping, even when conducted within several meters of suitable fungal growths, fails to yield specimens of this genus, and that the flies are most easily obtained only when effort is focused directly on the fungus itself or on substrate within a few centimeters.

### TERMINOLOGY

The terms, abbreviations and indices that are used here have been given previously (McEvey, 1990). The frontal width (*fw*) is measured through the anterior ocellus, and the wing length from the humeral crossvein to the apex. The *orbito-index* relates the distance between the bases of the *or1* (proclinate fronto-orbital seta) and *or3* and the distance between the bases of the inner vertical (*iv*) and *or3*. Okada (1986a,b), in describing a number of *Mycodrosophila* species from New Guinea, made use of a comparative measure of the distance between the apical scutellars (*a-asc*) and the distance between the apical and basal scutellars (*a-bsc*), and we have done the same to facilitate comparison. Other abbreviations: *o*, the greatest diameter of the eye; *ch* greatest width of cheek; *j*, cheek width in same line as *o*; conform with conventional usage.

A measure of the degree to which the third and fourth longitudinal veins (*L3* and *L4*) converge apically or, in other words, a measure of the internal dilation of the first posterior cell, has been found to vary among the *Mycodrosophila* species presently under study. The proportion of the distance between the *L3* and *L4* measured across the cell adjacent to the posterior crossvein divided by the gap between those veins at their apices, produces the *lp-index*.

Unless otherwise indicated, distance measures (e.g., setal lengths, frontal width, dorso-central gap, etc.) are all given to the same scale to facilitate comparison—multiply each value  $\times 0.01$  for the true distance in millimeters.

In dried specimens the membranes and internal connective tissues between the abdominal tergites and sternites shrink, drawing them together and frequently curving the lateral parts of tergites from the dorsal to the ventral aspect. When describing the orientation of patterning on these incurved portions that have bent underneath, we use terms such

as “lateral margin” as if the tergites were fully distended and life-like, not incurved. Guided by this convention, the descriptions have more general utility and are applicable to freshly-caught specimens (or photos of them) and specimens preserved in alcohol.

Types and voucher specimens are deposited in the following museums: AM—Australian Museum, Sydney; AMNH—American Museum of Natural History, New York; BPBM—Bishop Museum, Honolulu; FNIC—Fiji National Insect Collection, Suva. Reference is made to material in the Museum National d’Histoire naturelle, Paris (MNHN). Specimens have been individually numbered and databased by McEvey, this label data is abbreviated “Reg.” below.

KEY TO *MYCODROSOPHILA* SPECIES OF FIJI AND VANUATU

- 1 Arista with six rays above plus terminal fork ..... *fascinata* **n.sp.**
- Arista with four rays above plus terminal fork ..... 2
  
- 2(1) Costal lappet absent or, at most, costa darkened at second incision ..... 3
- Costal lappet present ..... 4
  
- 3(2) Scutum entirely blackish; anepisternum hairless ..... *planata* **n.sp.**
- Scutum pale honey brown; anepisternum with a few small hairs centrally ..... sp. A
  
- 4(2) Pleura entirely dark (Fig. 1) ..... *melaniae* **n.sp.**
- Pleura entirely or largely pale ..... 5
  
- 5(4) Pleura not uniform pale tan, with some darkening below level of wing articulation, at least on anepimeron and katatergite ..... 6
- Pleura uniform pale tan below level of wing articulation ..... 7
  
- 6(5) Pleural band barely extending on to lower part of anepisternum (Fig. 21); T4 largely pale (Figs. 20, 22) ..... *gratiosa* de Meijere
- Pleura with distinct longitudinal band reaching fore coxa (Fig. 41); T4 black (Fig. 40) ..... *ocellata* **n.sp.**
  
- 7(5) Frons entirely mat black and carina narrow and wing entirely hyaline ... *caesia* **n.sp.**
- Frons with pale median area and carina broad or narrow, and wing with or without infusate basal patch behind lappet ..... 8
  
- 8(7) Carina broad and prominent below ..... 9
- Carina narrow ..... 10
  
- 9(8) T1 laterally and T2 anterolaterally blackened (Fig. 43) ..... *umbra* **n.sp.**
- T1 laterally and T2 anterolaterally not blackened (Fig. 49) ..... *palpalis* **n.sp.**
  
- 10(8) Halter knob entirely black ..... *delta* **n.sp.**
- Halter knob pale apically ..... *vanuatuatae* **n.sp.**

**Genus *MYCODROSOPHILA* Oldenberg**

*Mycodrosophila* Oldenberg, 1914: 4. Type species: *Amiota poecilogastra* Loew, 1874 [synonym: *Drosophila johni* Pokorný, 1896 (Oldenberg, 1914)]; monotypic. Type locality southern Russia.

**Subgenus *MYCODROSOPHILA* Oldenberg**

*Mycodrosophila* Oldenberg, 1914: 4, 41 (as genus). Type species: *Amiota poecilogastra* Loew, 1874, monotypic.

***Mycodrosophila (Mycodrosophila) melaniae* McEvey & Polak, new species**

(Figs. 1, 3, 4, 7–10, 22)

**Diagnosis.** A large fly with a dark pleura; legs and halter knob dark; abdominal patterning very similar to *gratiosa* with a narrow median band from T3 to T4 (obsolete posteriorly), and posterior marginal bands on T2–T5, the latter are continuous on T2, barely continuous on T3, incomplete on T4 and very broad on T5 (Fig. 22).

**Description.** Male. Body length 2.6 mm.

**Head.** Second and third antennal segments dark brown. Arista with 4 apically curved rays above and one straight ray below, plus terminal fork. Palpus large and black with apical and shorter subapical setae. Frons velvety black along vertex and in posterolateral parts, pale brown in diffusely demarcated area extending from ocellar triangle to anterior frontal corners; with white sheen centrally when viewed from most angles, fronto-orbital plate subshining dark brown; fw:fl = 1.6. Carina dark brown, large, flat; narrow above, broad below, with straight sides falling away very abruptly to face in upper 3/4 but from widest point to lowermost tip (lower 1/4) the carina merges into a raised lower facial margin. Concavities on either side of carina deep. Face dark brown. Cheek shining blackish brown, j:ch:o = 4:6:67; postgena with no white sheen. Length ratios of fronto-orbital and vertical setae:or1:or2:or3 = 20:10:26, or1:iv:ov = 20:28:26, or1:pv:oc = 20:14:27; orbito-index = 1.0.

**Thorax** (Figs. 1, 4). Scutum shining black, scutellum dull black. Postpronotum black. Thoracic pleura dark chocolate-brown, straight line of demarcation between lower dark brown and black of scutum and upper anepisternum well defined; katatergite, anatergite and mediotergite concolorous dark chocolate-brown. Sterno-index 0.5. Ratio of distance between apical scutellars to distance between apical and basal scutellars, a-asc:a-bsc = 25:14; length ratio of apical to basal setae, asc:bsc = 38:17. Acrostichal hairs in 8 rows posteriorly about 12 rows anteriorly. Halter stalk pale brown; knob black.

**Legs.** Femora and tibiae dark, articulation between femur and tibia paler; forefemur and foretibia especially dark; all tarsi pale.

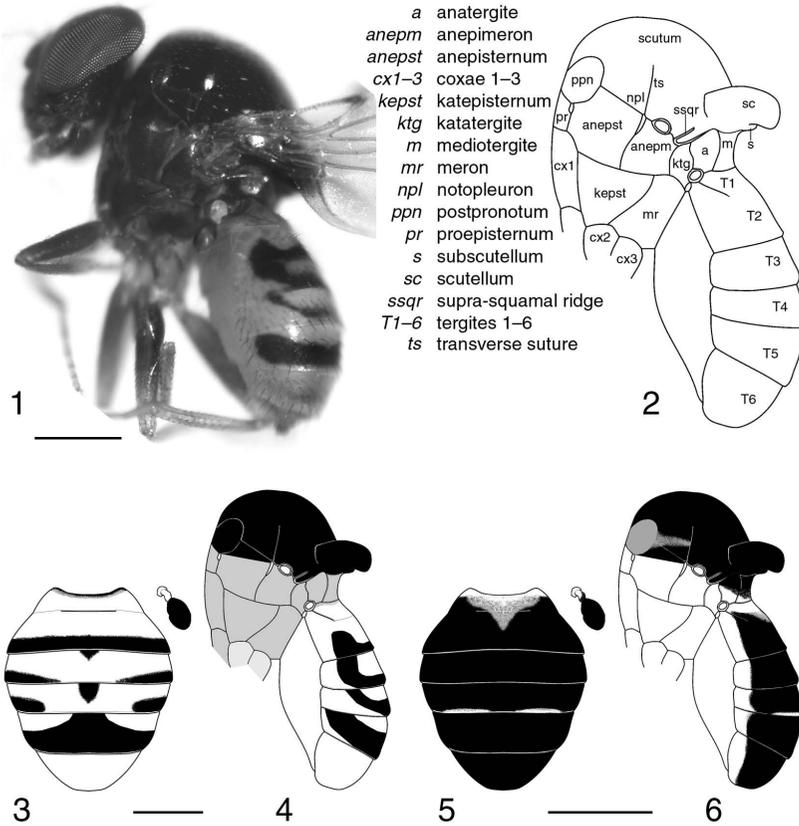
**Wing.** Faintly infusate, no darkly shaded area behind second costal incision. Costal lappet developed. C-index = 1.8, 4v-index = 2.5, 4c-index = 1.4, 5x-index = 2.3, M-index = 0.9, ac-index = 3.7, C3 fringe = 0.7. Wing length 2.0 mm.

**Abdomen** (Figs. 1, 3, 4, 22). T1 tan, slightly darker anteriorly. T2–T5 with black bands posteriorly not reaching lateral margin, and interrupted in midline of T3 and T4. All bands enlarged sublaterally, reaching anterior margin only in T3–T5. T3 and T4 with diffuse darkening anteromedially (variable among paratypes). T5 band greatly broadened, T5 anteriorly with narrow submedial pale areas.

**Genitalia** (Fig. 7–10). Surstylus with c. 9 large medial teeth and cluster of lower setae. Aedeagus with small apical bifurcation; aedeagal apodeme strongly curved.

Female. Egg guide slender with several apical teeth and a few long hairs.

**Types.** Holotype ♂ (Reg. 19382, AM K118300), VANUATU, **Espiritu Santo**, 25 km N Luganville, 6 Feb 2003 fungus, coll. Michal Polak. Paratypes (28): 1 ♀ and 1 (?sex) same data as holotype; 3 ♀ ♀, 2 ♂ ♂ and 11 (?sex), VANUATU, **Efate**, 3 km E Port Vila, 1 Feb 2003 fungus, coll. Michal Polak; 2 ♂ ♂ and 1 (?sex), VANUATU, Efate, 1.6 km N Epao, 3 Feb 2003 fungus, coll. Michal Polak.

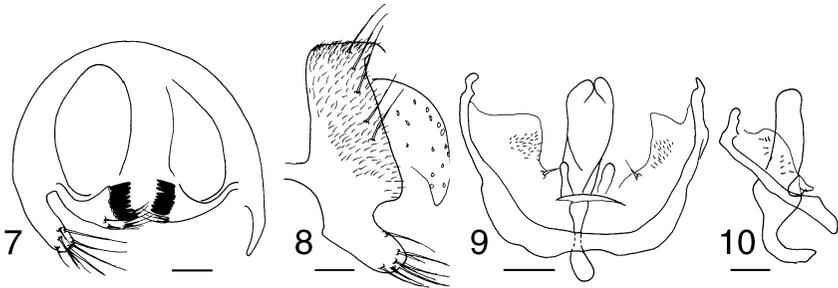


**Figs. 1-6.** Thoracic and abdominal morphology of *Mycodrosophila* species: **1-4**, *M. melaniae* n.sp.; **5-6**, *M. caesia* n.sp. Scales = 0.5 mm.

**Distribution.** Espiritu Santo and Efate, Vanuatu.

**Etymology.** The species is named after Melanie Cannon, for her valued friendship.

**Remarks.** The possession of an entirely dark pleura is a distinctive and uncommon trait among the many species of *Mycodrosophila* described from Australasia and Oceania. Of the Australian *Mycodrosophila* species only *Mycodrosophila scotos* Bock, 1980 has an entirely dark pleura. Specimens of *M. scotos* in the AM, from Kuranda and Palmerston National Park (northern Queensland), have been examined; *scotos* is smaller than *M. melaniae* n.sp. (body length 2.2 mm vs 2.6 mm) but differs most markedly in the abdominal patterning (compare Figs. 3-4, with Bock, 1980: fig. 75): *melaniae*, very like *gratiosa* (see Figs. 3, 20, 22), has complex abdominal markings of discontinuous apical black bands on T3-T4 whereas *scotos* has T3 entirely black dorsally. The *M. scotos* specimens we have examined have postgena and gena with very striking white sheen, unlike *M. melaniae* n.sp.



**Figs. 7–10.** *Mycodrosophila melaniae* n.sp. (Reg. 19060). 7–8, epandrium caudal and lateral views; 9–10, hypandrium dorsal and lateral views. Scales = 0.05 mm.

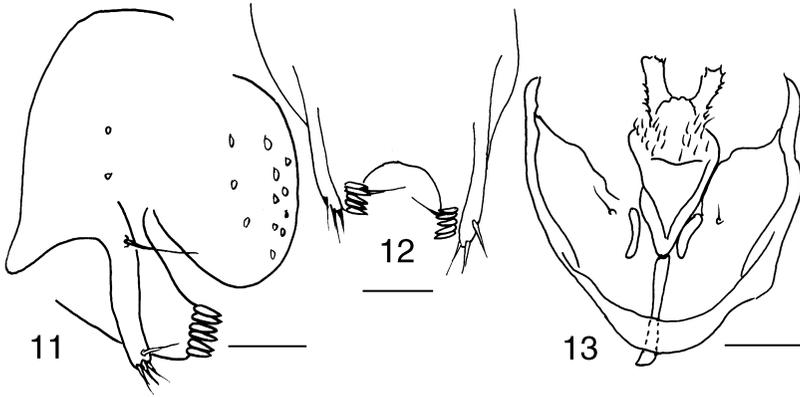
Of the Samoan *Mycodrosophila* species described by Malloch (1934), only *M. nigrithorax* has a dark thoracic pleura. We have examined a series of *nigrithorax* specimens from Upolu in the AM; they are very large flies (3.0–3.5 mm) and they each have pleurae and scutum concolorous black (not dark brown below changing abruptly to black above as in *melaniae* n.sp.); both the halter stalk and the knob are pale tan in *nigrithorax* (a useful character not described by Malloch, but noted by Okada, 1968: 330) whereas in *melaniae* n.sp. the halter knob is black.

*Mycodrosophila melaniae* n.sp. keys to couplet 5—to *M. ponapeae* Wheeler & Takada, 1964—in Wheeler & Takada's (1964) key to Micronesian *Mycodrosophila* species; but they describe *ponapeae* as a fly with only the sternopleuron (katepisternum) dark brown, the mesopleuron (anepisternum) and pteropleuron (anepimeron) they describe as pale. This thoracic pattern is quite unlike the all dark pleura found in *melaniae* n.sp.

In Okada's (1986b) key to the *Mycodrosophila* of southeast Asia and New Guinea, the following three species, known to have dark pleurae (the G=0 character state in Okada, 1986b), key to couplets 11 and 12: *M. takachihonis* Okada, 1956 (Japan, Korea) is described as having pale palpus (black in *melaniae* n.sp.); *M. papuana* Okada, 1986 (Papua New Guinea) and *M. malayana* Okada, 1986 (Malaysia) have males with long hairs on mid-tarsi, but males of *melaniae* n.sp. (Reg. 19169 and 19179) have no long tarsal hairs.

None of the species reported by Tsacas & Chassagnard (1991), or collected by us with Tom Starmer and Stuart Barker in 2000, from New Caledonia, have dark pleurae. However, two undescribed species of *Mycodrosophila* from French Polynesia that were first collected by Jean David in 1986 (typical specimens of the two taxa in the MNHM have Reg. numbers 10219 and 10255) and then again by one of us in 2004 (SMcE with Malcolm Schug, e.g., Reg. 23059–23077 in AM), share the “dark pleura” character with *melaniae* n.sp. Reference to the pattern of abdominal pigmentation, allows them to be easily distinguished from the present species, specimens conspecific with Reg. 10219 (i.e. Reg. 10220–10224, 10254, 10264–10280 MNHN) have halter knob and stalk pale and specimen Reg. 10255 has T1–T4 entirely black. David and McEvey are currently preparing descriptions of new French Polynesian Drosophilidae including these two new species of *Mycodrosophila*.

*Mycodrosophila atrithorax* Okada, 1968 from Japan has a black pleura but it also has unusually large anterior reclinate fronto-orbital setae, as large as the posterior reclinates—a length ratio not seen among the species presently under study.



**Figs. 11–13.** *Mycodrosophila caesia* n.sp. (Reg. 16428). 11–12, eandrium lateral and caudal views; 13, hypandrium dorsal view. Scales = 0.05 mm.

***Mycodrosophila (Mycodrosophila) caesia* McEvey & Polak, new species**  
(Figs. 5–6, 11–13)

**Diagnosis.** Frons entirely dark with bluish-gray tinge and no white sheen; pleura pale; carina narrow; lappet large; no infuscate wing mark; halter knob black.

**Description.** Male. Body length 2.1 mm.

**Head.** Second antennal segments pale basally, dark brown apically; 3rd segment dark dusky brown. Arista with 4 apically curved rays above and one straight ray below, plus terminal fork. Palpus dark dusky brown with two long subapical setae and several other shorter setae further back. Frons rather flat and square ( $fw:fl = 1.1$ ), entirely very dark gray, without a central pale triangular area, and with a distinctive bluish-green (not white) sheen when viewed from acute angles; fronto-orbital plates shining brown, well differentiated and extending forward further than half (66%) the frontal length ( $fl = 0.31$  mm,  $iv-or3 = 0.13$  mm,  $or1-or3 = 0.08$  mm); wide posteriorly. Carina present but small, narrow, only slightly wider below, descending gradually to lower facial margin, pale brown. Face concolorous pale brown, darker below; subshining. Prelabrum dark brown. Vibrissal angle slightly darker than lower facial margin. Gena dark brown at anterior end and with brilliant white sheen posteriorly and on postgena; narrow, about one tenth the greatest diameter of the eye,  $j:ch:o = 4:5:45$ . Length ratios of fronto-orbital and vertical setae: $or1:or2:or3 = 19:3:18$ ,  $or1:iv:ov = 19:19:18$ ;  $or1:pv:oc = 19:9:16$ ; orbito-index = 0.6.

**Thorax** (Fig. 6). Scutum shining blackish brown, scutellum dull velvety black; postpronotum pale brown, this lighter color extends in a weak narrow line back to the transverse suture (the line itself lies above and does not follow the suture line between the notopleuron and the anepisternum); weakly-developed microscopic alutaceous sculpturing is limited to the area around the postpronotum and lower parts of the notopleuron and then in a short narrow band along the posterior side of the transverse suture. Thoracic pleura entirely pale tan below level of wing articulation; anepimeron and katatergite also entirely pale. Anatergite and mediotergite entirely blackish brown, anteroventral corner of anatergite black. Sterno-index = 0.5. Ratio of distance between apical scutellars to distance between apical and basal scutellars,  $a-asc:a-bsc = 19:8$ ; length ratio of apical to basal setae,  $asc:bsc = 30:13$ . Acrostichal hairs in 8 rows between dorsocentrals; about 10 further forward on the scutum; the scutum is densely microtrichose posteriorly between the dorsocentral setae. Basal part of halter stalk pale, distal part (near knob) dark; knob entirely black.

**Legs** entirely pale, male mid tarsi without long hairs.

*Wing* hyaline, with no infuscation behind second costal incision. Costal lappet large. C-index = 1.1, 4v-index = 2.4, 4c-index = 2.0, 5x-index = 3.1, M-index = 0.8, ac-index = 3.9, C3 fringe = 0.5. First posterior cell not dilated near posterior crossvein, 1p-index = 1.0. Wing length 1.6 mm.

*Abdomen* (Figs. 5–6). Abdomen almost entirely blackish brown dorsally, paler dorsomedially near base. T4 with very narrow pale submedian apical band, not visible in all paratypes. The lateral incurved portions of tergites T2–T6 pale tan, the transition from dark to pale forms a more-or-less straight line of demarcation along the side of the abdomen.

*Genitalia* (Fig. 11–13, paratype Reg. 16428). Epandrium with very long finger-like extension below bearing a cluster of 2–3 short setae apically and 1 or 2 longer ones near the base. Surstylus with c. 6 long teeth. Aedeagus with large apical notch and short hairs and serrations as indicated in (Fig. 13), apodeme slightly curved; parandrites small. Hypandrium with small pair of submedian spines.

Female. Egg guide rather blunt with a few weakly developed apical teeth and a few rather short subterminal hairs.

**Types.** Holotype ♂ FIJI, **Viti Levu**, 6 km N Sigatoka, fungus, 8 Jun 2004, S.F. McEvey (Reg. 22387, AM K118304). Paratypes (44): 6 ♀♀ 15 ♂♂ same data as holotype; 4 ♀♀ 10 ♂♂, same data as holotype, but swept [near fungus] 10 Jun 2004; 6 ♀♀ 1 ♂ FIJI, **Viti Levu**, 1.5 km N Sigatoka, Sigatoka Valley Rd, 22 Oct 2001, fungus, Michal Polak; 1 ♀ 1 ♂, same as previous but collected 20 Oct 2001, bracket fungus, Michal Polak.

**Distribution.** Viti Levu, Fiji.

**Etymology.** The specific epithet derives from the Latin, *caesius* [= bluish gray], a reference to the bluish-gray frontal sheen.

**Remarks.** Among species from southeast Asia and New Guinea, Okada (1986b) classified more than 11 as possessing the frontal character “largely black” (C = 0); he included those species that have small or weak pale tan areas centrally on an otherwise black frons. *Mycodrosophila* (*Promycodrosophila*) *gracilis* Okada, 1986, *M. (M.) gressitti* Wheeler & Takada, 1964 and *M. (M.) caesia* n.sp. are exceptional in the Australasian and Oceanian regions because they have entirely black or dark frons. This is an uncommon trait among *Mycodrosophila* species and is useful diagnostically. The three species can be separated by reference, *inter alia*, to the following characters: *gracilis* has undeveloped lappets and *gressitti* has a pleural stripe. The bluish-gray sheen of *caesia* n.sp. is also exceptional but subtle.

Additionally this species is unusual because most of the abdomen is black dorsally, including the sixth tergite and a large part of the first. There appears to be no closely related species with which it could be confused. Despite these unusual characteristics, the fly is, in other respects, a typical member of *Mycodrosophila s. str.*

This species keys to couplet 21 in Okada’s (1986b) key to SE Asian and New Guinean species but is blocked there because it has neither a distinct wing cloud nor an undeveloped lappet.

This species approaches *M. rayi* Bock, 1980 but the T2 of *rayi* has small pale circles anterolaterally, these are absent in *caesia* n.sp.; the incurved portions of T5 are largely black in *rayi*, they are pale in *caesia* n.sp.; and the T6 is entirely pale in *rayi* but mostly black in *caesia* n.sp.

*Mycodrosophila caesia* n.sp. keys to *M. carola* Wheeler & Takada, 1964, in Wheeler & Takada’s (1964) key to Micronesian species, but, unlike *carola*, *caesia* n.sp. has no trace of darkening behind the wing lappet, whereas *carola* has “black area of costal lappet continued across wing as a stripe”.

This species is unlike any of the six species, including the undescribed “sp. A” (sp. aff. *aqua*) reported by Tsacas and Chassagnard (1991) from New Caledonia.

*Mycodrosophila (Mycodrosophila) delta* McEvey & Polak, **new species**

(Figs. 16–17)

**Diagnosis.** Halter knob black, stalk white; abdominal pattern triangulate in lateral view; C-index low; or1 and or3 close together and far from inner vertical (orbito-index very low); or2 minute (absent in some specimens).

**Description.** Male. Body length 2.0 mm.

*Head.* Second and third antennal segments brown. Arista large with 4 apically curved rays (rarely 5, e.g., Reg. 16214) above and one (rarely 2, e.g., Reg. 22386) straight ray below, plus terminal fork. Palpus pale basally slightly infusate apically, with exceptionally long fine apical seta. Frons mat black with small median pale brown area barely reaching ocellar triangle and anterior frontal margin; the pale area obscured by brilliant white sheen when viewed from most angles, fronto-orbital plate shining dark brown; fw:fl = 1.5. Carina well formed along length of face, but narrow and ridge-like, rounded but not greatly broadened below. Face brown, darker below; prelabrum and vibrissal angle blackish brown. Gena narrow, j:ch:o = 4:5:48. Length ratios of fronto-orbital and vertical setae or1:or2:or3 = 15:1:19 (or2 absent in some paratypes), or1:iv:ov = 15:21:21, or1:pv:oc = 15:9:18; orbito-index = 0.3.

*Thorax* (Fig. 17). Scutum shining black, scutellum velvety black. Notopleuron, postpronotum and upper part of anepisternum concolorous with scutum, subshining. Anatergite and mediotergite dark brown. Ratio of distance between apical scutellars to distance between apical and basal scutellars, a–asc:a–bsc = 20:8; length ratio of apical to basal setae, asc:bsc = 32:16. Thoracic pleura entirely pale below level of wing articulation. Sterno-index = 0.4–0.5. Acrostichal hairs in 6 rows posteriorly about 8 rows anteriorly. Halter stalk whitish, knob entirely black.

*Legs* entirely pale, long hairs absent.

*Wing* hyaline, except for small but distinct infusate patch behind second costal incision and another smaller infusate shade near anal (posterobasal) margin of the wing. Costal lappet very well developed. C-index = 0.9, 4v-index = 2.9, 4c-index = 2.5, 5x-index = 2.8, M-index = 1.0, ac-index = 4.3, C3 fringe = 0.6. Wing length 1.7 mm.

*Abdomen* (Figs. 16–17). T1 dark centrally. T2 pale spot centrally not reaching posterior margin, pale laterally. T3 and T4 black dorsally, pale lateral margins. T5 largely black dorsally with two pale marks submedially along anterior margin, pale laterally. T6 entirely pale. The dark markings laterally on T2–T4 together form a distinctive triangle.

*Genitalia* (Fig. 26–29). Epandrium pointed and with a cluster of long setae below, surstylus narrow basally with curved row of about 9 short teeth medially. Aedeagal apodeme very short, about half length of aedeagus, the latter with closed lobes apically.

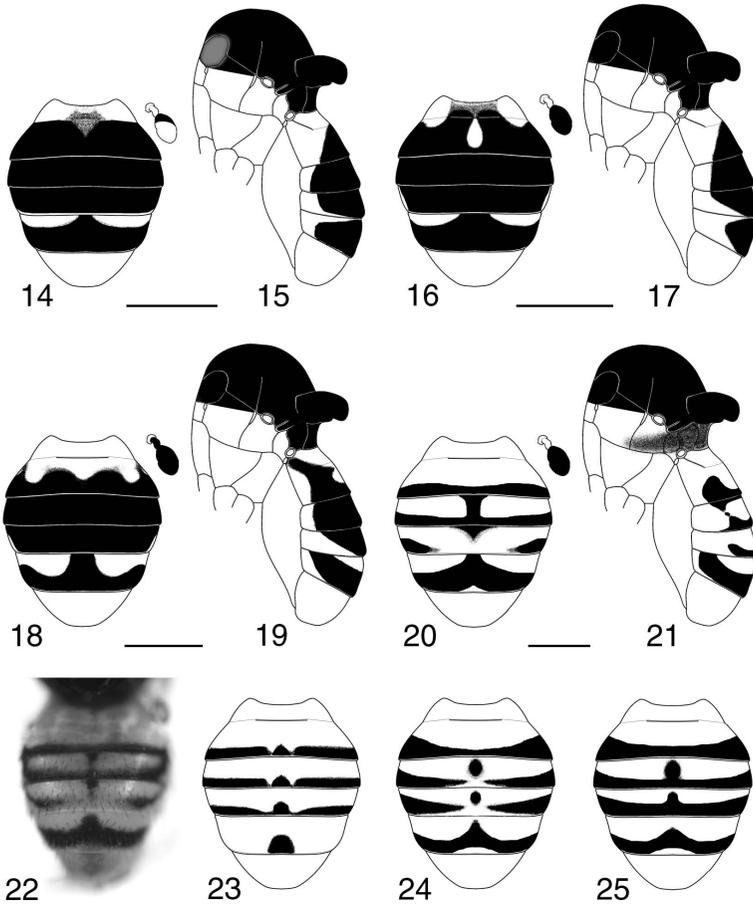
Female. Egg guide slender, pale, with numerous very small apical and subapical teeth and a few subterminal hairs.

**Types.** Holotype ♂ FIJI, **Viti Levu**, 1.5 km N Sigatoka, swept [near fungus] 10 Jun 2004, S.F. McEvey (Reg. 22562, AM K118299). Paratypes (43): 1 ♀ 3 ♂ same data as holotype; 2 ♀ ♀ type locality but collected 20 Oct 2001, bracket fungus, Michal Polak; 5 ♀ ♀ 12 ♂ ♂ type locality but collected 22 Oct 2001 fungus, Michal Polak; 2 ♀ ♀ 6 ♂ ♂ 5(?sex), Viti Levu, 6 km N Sigatoka, fungus 8 Jun 2004, S.F. McEvey; 4 ♀ ♀ 3 ♂ ♂ same locality as previous but swept [near fungus] 10 Jun 2004, S.F. McEvey.

**Distribution.** Viti Levu, Fiji.

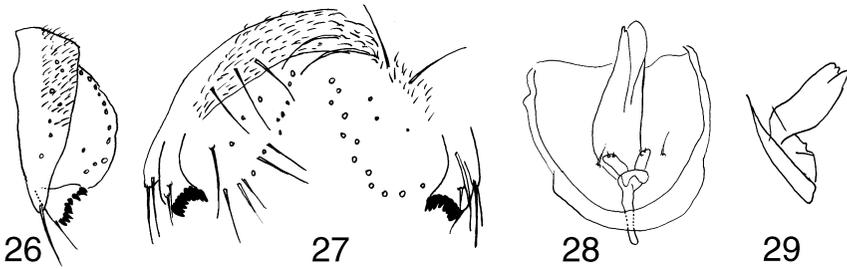
**Etymology.** The specific epithet is the Greek noun *delta* [= the shape of a triangle], a reference to the triangulate pattern visible in side view and formed by the lateral black markings on tergites 2 to 4.

**Remarks.** This species resembles *M. claudensis* Bock, 1980 (keying to it in Bock's [1980] key) and *M. vanuatauae* n.sp., but the halter knob of *claudensis* and of *vanuatauae* n.sp. is pale apically, it is entirely black in *delta* n.sp., the palp is dark brown in *claudensis* but



**Figs. 14–25.** Thoracic and abdominal morphology of *Mycodrosophila* species: **14–15**, *M. vanuatae* n.sp.; **16–17**, *M. delta* n.sp.; **18–19**, *M. fascinata* n.sp.; **20–21**, *M. gratiosa* (de Meijere); **22**, *M. melaniae* n.sp.; **23**, *M. halterata*, interpreted from Malloch's (1930) description, not drawn from a specimen; **24**, based on Okada's (1971, fig. 2) drawing of *gratiosa* from New Guinea; **25**, based on Okada's (1971, fig. 2) drawing of *gratiosa* from Java. Scales = 0.5 mm.

pale with slight infuscation apically in *delta* n.sp., and the fronto-orbital setae are in the ratio  $or1:or2:or3 = 7:2:7$  in *claudensis* in contrast to  $15:1:19$  (or  $15:0:19$  in some paratypes) in *delta* n.sp. There are subtle but consistent differences in the abdominal patterning in *delta* n.sp. and *vanuatae* n.sp., in particular the midline of T2 is pale in the former and very dark in the latter (compare Figs. 14 and 16). Apart from these differences in external morphology *delta* n.sp. has distinctive male terminalia, in particular the *delta* surstylus lacks a basal prominence (compare Figs. 26, 61 and 64).



**Figs. 26–29.** *Mycodrosophila delta* n.sp. 26–27, epandrium lateral (Reg. 16421) and caudal (specimen from alcohol sample, collected 6 km N Sigatoka, 8 June 2004) views; 28–29, hypandrium dorsal (paratype Reg. 16197) and lateral (Reg. 16421) views. Scales = 0.05 mm.

This species keys to *M. chazeau* Tsacas & Chassagnard, 1991 among the New Caledonian species, but apart from significant differences in the form of the “toe” of the epandrium *chazeau* has a relatively wide gena  $\text{o:j} = 5.4$  (vs. 11.3 in *delta* n.sp.); palpus with 2 setae (vs. 1 in *delta* n.sp.), acrostichals in 8–10 rows (vs. 6–8 in *delta* n.sp.), T1 entirely pale (vs. dark centrally in *delta* n.sp.).

*Mycodrosophila delta* n.sp. keys to *M. angularis* Okada, 1986, a species from Malaysia and Singapore but not known from Papua New Guinea or northern Australia. The periorbit, however, is mat black in *angularis* (vitreous in *delta* n.sp.), T5 caudal margin yellow (vs. black in *delta* n.sp.), C-index 1.0–1.2 (vs. 0.9 in *delta* n.sp.), 4v-index 2.1–2.5 (vs. 2.9 in *delta* n.sp.). There are also differences in the aedeagus apically—it has two angular processes in *angularis* and it is rounded in *delta* n.sp.

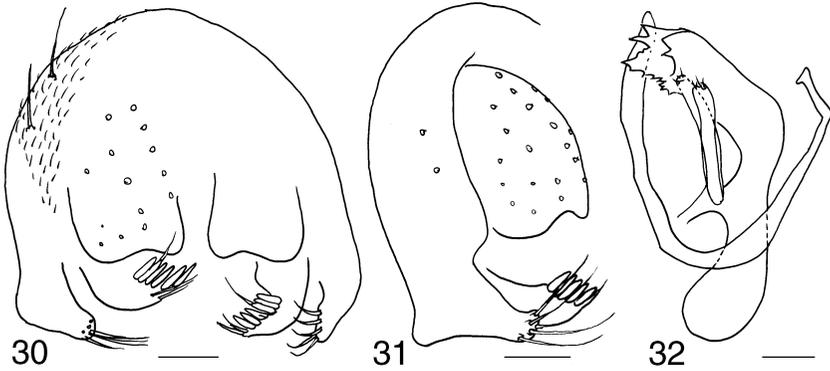
***Mycodrosophila (Mycodrosophila) fascinata* McEvey & Polak, new species**

(Figs. 18–19, 30–32)

**Diagnosis.** Arista with 6 (5 in some paratypes) rays above and one (2 in some paratypes) straight rays below, plus terminal fork; palps large black; male wing apex slightly infuscate; pleura entirely pale; halter knob black; postpronotum not paler than scutum; acrostichals in about 10 rows between dorsocentrals; parameres very long.

**Description.** Male. Body length 2.4 mm.

**Head.** Second and third antennal segments blackish brown, concolorous with front and face. Arista with 6 (5 in some paratypes) rays above and one (2 in some paratypes) straight rays below. Palpus black, large, flattened; with 2–3 short fine subapical setae. Frons mat blackish brown with no pale areas medially or along anterior edge; lacking a white sheen; fronto-orbital plate concolorous blackish brown, subshining, broad posteriorly constricted between or2 and or1 but expanding again around base of or1;  $\text{fw:fl} = 1.43$ . Carina blackish brown, flat, in the form of an elongate triangle, narrow above broad below, lower margin of triangle slightly curved; sides squared, rounded below; terminating rather abruptly well before the lower facial margin (maximum width of carina about equal to width of lower facial margin beneath carina); the lower facial margin is not raised. Face, prelabrum and vibrissal angle blackish brown. Genae less than a tenth maximum diameter of the eye,  $\text{j:ch:o} = 4:5:57$ ; blackish anteriorly changing abruptly to white with sheen posteriorly. Length ratios of fron-



**Figs. 30–32.** *Mycodrosophila fascinata* n.sp. 30–31, epandrium caudal and lateral views (Reg. 16192); 32, hypandrium (Reg. 16192). Scales = 0.05 mm.

to-orbital and vertical setae:or1:or2:or3 = 16:5:18, or1:iv:ov = 16:21:23, or1:pv:oc = 16:12:22, orbito-index = 1.1.

**Thorax** (Fig. 19). Scutum and scutellum black (blackish brown in some paratypes); scutum generally subshining but almost glossy, not microtrichose, posteriorly; postpronotum and notopleuron black (not paler than scutum). Thoracic pleura entirely pale below level of wing articulation; anepimeron and katatergite entirely pale; anatergite (except near halter base) and mediotergite blackish brown. Sterno-index 0.4. Ratio of distance between apical scutellars to distance between apical and basal scutellars, a-asc:a-bsc = 21:13; length ratio of apical to basal setae, asc:bsc = 35:17. Acrostichal hairs in about 10 rows posteriorly and about 14 rows anteriorly. Halter stalk white at base, darkened near knob; knob black.

**Legs** entirely pale, long hairs absent.

**Wing.** Faintly infusate apically and in a cloud (faint) behind second costal incision (the two areas of darkness in the wing are equally infusate); otherwise hyaline. Costal lappet large. C-index = 1.5, 4v-index = 2.3, 4c-index = 1.5, 5x-index = 2.0, M-index = 0.7, ac-index = 6.3, C3 fringe = 0.7. Wing length = 2.0 mm. The first posterior cell somewhat dilated—L3 and L4 are more than twice as far apart near the posterior crossvein than they are apically, 1p-index = 2.2.

**Abdomen** (Figs. 18–19). T1 pale. T2 and T5 with black posterior bands. T2 and T3 entirely black dorsally. T2–T5 pale along lateral margin. T2 with distinct pale patch behind halter, and in deep V centrally. T5 with prominent pale fascia along anterior margin on either side of midline and narrowly along posterolateral margin. T6 entirely pale.

**Genitalia** (Fig. 30–32). Epandrium very broad, hairless and rather squared below. Surstylus with c. 6 long teeth. Aedeagus coarsely serrate apically. Parameres very long.

**Female.** The female wing is entirely hyaline, it has neither apical nor basal darkening. Egg guide very long and slender (finger-like), pale, shining, with two short terminal and two short sub-terminal hairs; teeth barely developed.

**Types.** Holotype ♂ FIJI, **Viti Levu**, 1.5 km N Sigatoka, Sigatoka Valley Rd, 22 Oct 2001 fungus, Michal Polak (Reg. 19196, AM K118296). Paratypes (24 in AM, BPBM, AMNH): 18 ♂♂ 5 ♀♀ same data as holotype; 1 ♂ same locality as holotype but swept [near fungus] 10 Jun 2004, S.F. McEvey (with M. Schug, S. Gray-Smith & A. Kilon-Attwood), Reg. 22560.

**Distribution.** Viti Levu, Fiji.

**Etymology.** The specific epithet derives from the Latin *fascino*—charm, bewitch, enchant.

**Remarks.** This species is unique among the eleven *Mycodrosophila* species reported from Fiji and Vanuatu in having six dorsal arisal rays, all other species have either 4 or 3. The species pair: *Mycodrosophila legrandi* Tsacas & Chassagnard, 1991 and *M. tillieri* Tsacas & Chassagnard, 1991 from New Caledonia have 6–8 rays above and 2–3 rays below in addition to the terminal fork, but they are members of the subgenus *Promycodrosophila* and have a pale brown scutum with dark brown lateral margins, whereas *fascinata* n.sp. (*Mycodrosophila* s.st.) has a black scutum. *Mycodrosophila fascinata* is also unusual in being sexually dimorphic in the extent to which the wings are apically infuscate—only male wings are darkened apically and only males have a faint infuscate cloud behind the costal lappet. In all other respects this is a typical member of *Mycodrosophila* s.st.

Darkening of the wing apically is also known in the Australian species *Mycodrosophila stigma* Bock, 1980 but it is present in both males and females. The two species share other similarities: they have similar C- 4v- 5x- and M-indices, the abdominal, thoracic and halter markings are very similar, both species have large carinae and both species have male terminalia with long parameres; they are distinguished by reference to the number of dorsal arisal rays (4 in *stigma*, 6 in *fascinata*), the palpus (mid brown in *stigma*, large and black in *fascinata*) and the sexually dimorphic wing in *fascinata* but not in *stigma*.

*Mycodrosophila (Mycodrosophila) gratiosa* (de Meijere, 1911)

(Figs. 20–21, 24–25, 33–35)

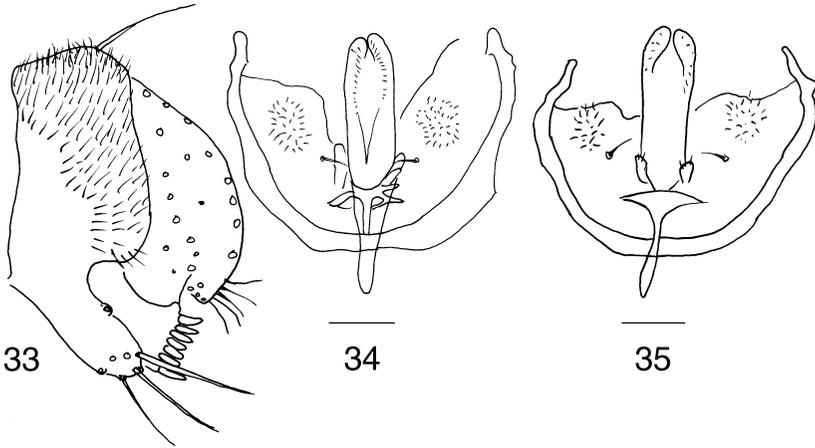
*Drosophila gratiosa* de Meijere, 1911, p. 404.

syn. *splendida* Okada, 1956, p. 48 (Okada, 1971, p. 68)

**Type localities:** Batavia (Jakarta) and Semarang (Java). **Syntype** ♀ in the Hungarian Natural History Museum, Budapest (Bächli, 1984).

*Mycodrosophila gratiosa* (de Meijere, 1911) was originally described from specimens collected in Batavia and Java (Indonesia) (Bächli, 1984). It is the only *Mycodrosophila* species previously reported from Fiji—Bezzi (1928) determined specimens collected at Lautoka by Greenwood (23.iv.1922) and Veitch (vii.1922) as *gratiosa*. It was collected in Samoa (Upolu and Savaii) in 1924 by Bryan, Buxton and Hopkins (Malloch, 1934). Wheeler & Takada (1964) reported it to be widespread on islands of Micronesia and Okada (1971) reported seeing specimens “probably of this species in the University of Texas, Autsin” from New Guinea. When Bock (1980) described the Australian *Mycodrosophila* fauna, *gratiosa* was, interestingly, not reported, despite the emerging picture that *gratiosa* was apparently a widespread species found to the West, North and East of tropical Australia. A very similar species—*M. aqua* Bock, 1980—was described from Australia. Later, Okada (1986a) reported *aqua* to be widespread in Asia and to be present also in New Guinea; he did not subsequently confirm the presence of *gratiosa* in Papua New Guinea (Okada, 1986a).

A series of Australian *aqua* and Oceanian *gratiosa* is now available to us for examination and we find that it is very difficult to know which name to use for the species rep-



**Figs. 33–35.** *Mycodrosophila gratiosa* (de Meijere). **33**, eandrium lateral view (Reg. 19020); **34**, hypandrium of specimen Reg. 19020; **35**, hypandrium of specimen Reg. 19094. Scales = 0.05 mm

resented in the collections from Vanuatu and Fiji. We have not examined the *gratiosa* syntype in Budapest. In addition to the strong similarities in abdominal markings of *aqua*, *gratiosa* and the specimens from the study area, we detect the presence of a weak infuscate area in the wing of the Fijian and Vanuatuan flies and this throws into doubt all earlier reports of *gratiosa* from the Pacific. Which species occurs throughout the Pacific from New Guinea eastwards?—*gratiosa*, *aqua*, both or neither.

Malloch gave diagnostic characters for *M. gratiosa* (de Meijere, 1911) in his 1934 key to the species of Samoa as follows: “Wing with no brown cloud below the apex of first vein [our italics] nor on sixth vein; knobs of halteres partly dark brown to black; palpi black; ultimate section of fifth vein much over half as long as the penultimate section of fourth [i.e. M-index “much over” 0.5]; abdomen pale yellow, with a rather broad black apical fascia on each tergite that extends forward to anterior margin in centre”

Wheeler & Takada (1964) redescribed *M. gratiosa* as follows: “Arista 4/1; proclinate and posterior reclinate orbitals of equal size, middle orbital minute. Frons dull tan in middle, much blacker behind and on sides, orbits shiny; frons whitish pruinose in both sexes when viewed from certain angles. Face, cheeks, and prelabrum light brown; palpi brown. Mesonotum shiny, black to dark brown; scutellum velvety black. Pleura wholly pale below level of prothoracic spiracle, some specimens with discoloration below wing base. Legs pale, tarsi without recurved hairs; underside of tarsi of middle legs with a row of short, black, stiff hairs. Knob of halter usually blackened. Abdomen yellow with prominent black bands: tergite 1 yellow, 2 to 4 with narrow apical black bands, those of 3 to 4 expanded in middle; 5 with a broad V-shaped band, rest of abdomen pale. Wings hyaline; distal costal incision deep, lappet broad, black. Second vein runs straight to costa. C-index 1.3–1.4; 4-index about 2.2; C3 fringe on about basal two-thirds. Body length up to 2.5 mm.” Wheeler & Takada (1964), in accord with Malloch (1934), describe the wing as hyaline making no mention of a cloud or patch of infuscation in the wing behind the lappet.

In describing *M. subgratiosa*, Okada (1965) noted that it closely resembled *M. gratiosa* (de Meijere) “especially in having silvery shining front, four upper and one lower branches of arista besides fork, black knob of halteres, *black spot below distal costal incision* [our italics], and apically swollen rod-shaped aedeagus, but differs from the allied species in having broader black abdominal bands, narrow caudal process of genital arch, and bare aedeagus.” Evidently Okada regarded a black wing spot as being typical for *gratiosa*.

Okada’s concept of *gratiosa* allowed for some variation, but apparently only in abdominal morphology, and he agreed (Okada, 1986a) with Bock (1980) that different abdominal patterns he had earlier (Okada, 1971) described as occurring in *gratiosa* were due to his inclusion of more than one species. Interestingly, when he isolated one of the variants and described it as the species *M. serrata* Okada, 1986, he noted that, apart from abdominal differences, it had “black patch below 2nd costal break weak”.

In Okada’s (1986) key to southeast Asian and New Guinean species a typographical error has resulted in *gratiosa* not appearing at all and *gracilis* erroneously appearing twice, once as a species in the subgenus *Promycodrosophila* (couplet 26) and once incorrectly as a member of *Mycodrosophila* s.st. (couplet 9), the latter instance, of “*gracilis*” in couplet 9, should be corrected to *gratiosa*, this adjustment would then allow the key to conform with his text, dendrogram (fig. 3) and overall classification.

When Bock (1980) started describing the Australian *Mycodrosophila* fauna very few species were reported from southeast Asia and only one (*M. gratiosa*, Okada, 1971) tentatively from New Guinea. He noted, however, that “there can be very little doubt ... that this apparent paucity merely reflects lack of collecting or processing of material already available; species of *Mycodrosophila* are certainly abundant in New Guinea (Bock and Parsons, unpublished data).”

Bock’s (1980) study of a large number (nearly half of all known *Mycodrosophila* species) of Australian specimens and species led him to conclude that “the genus *Mycodrosophila* is rather uniform morphologically and reports of variation within species have been few”. Bock went on to note that: “Okada (1971) summarized previous reports of considerable geographic variation in the abdominal pattern of *M. gratiosa* (de Meijere) ranging from almost completely black (Okinawa) to tan with weak black banding (New Guinea). Further study of the specimens concerned (carina, wing indices, genitalia) is highly desirable; it seems probable that the (sometimes considerably) different abdominal patterns described for ‘*M. gratiosa*’ from areas ranging from the Ivory Coast to New Guinea represent a series of different species. Duda (1926) also described a sexual dimorphism in the abdominal banding pattern of *M. parallelinervis* Duda (a Sumatran species described on the basis of two males and one female). Again, there is a clear possibility that different species were involved.” While no reference is made to the infuscation of wings it is, nevertheless, apparent that up until 1980 Okada treated *gratiosa* as a variable species.

Bock (1980) described *M. aqua* (“with trace of darkening behind lappet”) but at the time did not remark on its similarity to *M. gratiosa*. He possibly treated reports of *gratiosa* from Oceania with some skepticism given the variability attributed to it historically and the richness of the fauna he was becoming familiar with in tropical Australasia. Okada (1986) reported new localities for *M. aqua* in Papua New Guinea, Singapore, Philippines and Thailand. But in the same work it can be seen in the keys and dendrogram that Okada separates *gratiosa* and *aqua* on the character: “wing cloud below second costal break absent [*aqua*] or distinct [*gratiosa*]”. This reconciles with neither Malloch’s (1934) diagnosis of the Samoan “*gratiosa*” wing nor with Wheeler & Takada’s (1964) redescription; in both

instances they describe wings without clouds, in other words a species more like *aqua*.

We have collected a species throughout the tropical Australasian and Oceanian regions that we think is very close to, or synonymous with, *M. gratosia*: the specimens examined in the Australian Museum, are from Christmas Island (near the *gratosia* type locality—Java), Torres Strait (McEvey 1982), Cape York (McEvey 1993), Cape Tribulation (with Starmer and Wolf), Vanuatu, Fiji, Papua New Guinea, New Caledonia (Reg. 14747 and 14753 in AM, coll. with Starmer and Barker) and Western Samoa (with Schug and Gray Smith). The Australian records we have tentatively determined to be *M. aqua*, the others, including those from Vanuatu, Fiji, and New Caledonia we tentatively nominate as *M. gratosia*, but we are unable to offer a useful diagnostic character that will distinguish between them. Tsacas & Chassagnard (1991) also hesitated in their classification of a female specimen from New Caledonia, while noting its similarity to *M. aqua* they decided instead to reference it as “species a”. Clearly there is a need to establish the correct status of the Australian species *M. aqua* vis-à-vis *M. gratosia*, *M. halterata* (Fig. 23 is based on Malloch’s 1930 description), *M. serrata*, *M. subgratosia*, “species a” of Tsacas & Chassagnard and *M. splendida* and we have decided to defer that study.

**Specimens examined.** This species was found at most sites sampled in Fiji and Vanuatu (Table 1), specimens from the following localities have been examined: FIJI, **Viti Levu**, 30, 1.5 km N Sigatoka, 20 & 22 Oct 2001, fungus, coll. Michal Polak; 8, 6 km N Sigatoka, 8 & 10 Jun 2004, fungus, Shane McEvey. VANUATU (all in AM, collected from fungus by Michal Polak), **Efate**, 34, 3 km E Port Vila, 1 Feb 2003, fungus, coll. Michal Polak; 8, Efate, 6.5 km S Epao, 2 Feb 2003; 3, Efate, 9 km S Epao, 2 Feb 2003; 35, 1.6 km N Epao, 3 Feb 2003; 2—Efate, 6 km S Ulei, 3 Feb 2003; 10, 6.8 km S Epao, 3 Feb 2003; 2, 7.5 km W Port Vila, 3 Feb 2003; **Espiritu Santo** 6, 25 km N Luganville, 6 Feb 2003; 7, 34 km N Luganville, 6 Feb 2003. NEW CALEDONIA, **New Caledonia**, Mont Koghiis rainforest, 12.ii.2000, coll. Barker, McEvey Polak Starmer (Reg. 14747, 14753 in AM).

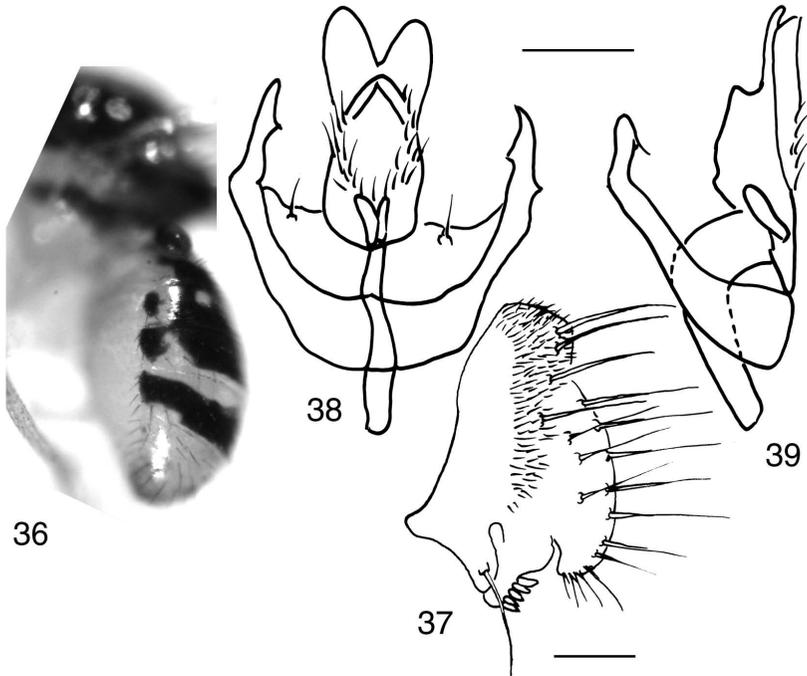
**Distribution.** Type locality Indonesia (Java); American Samoa, Belau, Fiji, Guam, Micronesia, Niue, Northern Marianas, Solomon Is, Western Samoa; China, Japan, Afrotropical, Oriental Regions (Evenhuis & Okada, 1989), Christmas Island (Indian Ocean) (Carson & Wheeler, 1973), Vanuatu **new locality**, and New Caledonia **new locality**.

*Mycodrosophila (Mycodrosophila) ocellata* McEvey & Polak, **new species**  
(Figs. 36–41)

**Diagnosis.** Third abdominal tergite black dorsally, with distinct pale submedial spots. Pleura with longitudinal band below level of wing articulation. Prominent lappet. Knob of halter black, stalk pale basally dark distally, near knob.

**Description.** Male. Body length 1.7 mm.

**Head.** Second and third antennal segments pale brown; third slightly dusky. Arista with 4 apically curved rays above and one straight ray below, plus terminal fork (trifurcate RHS apically in holotype). Palpus dark with several setae. Frons largely pale brown especially anteriorly, dark brown posterolaterally, blackish brown along vertex; fronto-orbital plate subshining brown; a large proportion of the frons shines white when viewed from certain angles; fw:fl = 1.4. Prelabrum shiny blackish brown. Carina short, obsolete above, prominent and rounded below, nose-like, falling away abruptly on sides but more gradually below (almost triangular in mid-section); the same color as the face—pale brown. Gena straight, pale along eye margin, darker along outside edge; postgena angular and whitish; j:ch:o = 3:6:41. Length ratios of fronto-orbital and vertical setae:or1:or2:or3 = 12:1:14, or1:iv:ov = 12:13:17, or1:pv:oc = 12:8:15, orbito-index = 0.6; anterior reclinate minute, arising midway between other fronto-orbital setae.



**Figs. 36–39.** *Mycodrosophila ocellata* n.sp. **36**, lateral view of abdomen and part of thorax; **37**, epandrium lateral view (Reg. 19567); **38–39**, hypandrium lateral and dorsal views (Reg. 19567) Scales = 0.05 mm.

*Thorax* (Fig. 36, 41). Scutum shining and scutellum dull blackish brown. Postpronotum pale brown, distinctively paler than scutum in lower half but not as pale as thoracic pleura. Thoracic pleura black above level of wing articulation, with distinct dark longitudinal band extending from katatergite across lower part of anepimeron, to at least half way across lower part of anepisternum; ending without fading. Sterno-index = 0.5. Ratio of distance between apical scutellars to distance between apical and basal scutellars, a–asc:a–bsc = 18:7; length ratio of apical to basal setae, asc:bsc = 24:12. Acrostichal hairs in 6–8 rows posteriorly between dorsocentrals and about 10 rows anteriorly. Halter stalk pale but with distinct black distal part (near knob); knob black.

*Legs.* Femora and tibia of all legs very pale, whitish, concolorous with lower parts of thorax; tarsi, however, are slightly darker—pale stramineous yellow.

*Wing* hyaline, almost devoid of infuscation behind second costal incision. Costal lappet black and very well developed. C-index = 1.0, 4v-index = 2.3, 4c-index = 1.9, 5x-index = 2.3, M-index = 0.7, ac-index = 4.4, C3 fringe = 0.6. L3 and L4 almost parallel along their entire length, 1p-index = 1.3. Wing length 1.4 mm.

*Abdomen* (Figs. 36, 40–41). Black with intricate pattern of white markings, most noticeably with large black marks on incurved sections of T3 and T4 and with a very distinctive whitish fascia, submedially on T3. T6 wholly pale.

*Genitalia* (Fig. 37–39). Epandrium broad below, toe with one long seta; surstylus with 5 strong teeth. Aedeagus bilobate apically, hirsute ventromedially and notched dorsomedially (see Fig. 38).

*Female.* Egg guide with a few long hairs apically and subapically; teeth not developed on that part of the guides visible in the two available females.

**Types.** Holotype ♂ VANUATU, **Efate**, 9 km S Epao, 2 Feb 2003 (Reg. 19086, AM K118305). Paratypes (4♂♂, 2♀♀, in AM and BPBM): 1♀ (Reg. 19087), 2♂♂ (Reg. 19088, 19092), same data as holotype; 1♀ (Reg. 19166), VANUATU, Efate, 1.6 km N Epao, 3 Feb 2003 fungus, coll. Michal Polak; 1♂ (Reg. 19269), VANUATU, Efate, 6.8 km S Epao, 3 Feb 2003 fungus, coll. Michal Polak; 1♂ (Reg. 19567), VANUATU, **Espiritu Santo**, 34 km N Luganville, 6 Feb 2003 fungus, coll. Michal Polak.

**Distribution.** Efate and Espiritu Santo, Vanuatu.

**Etymology.** The specific epithet derives from the Latin, *ocellatus* [= having little eyes, marked with spots], referring to the characteristic white spots on the third tergite in both males and females of this species.

**Remarks.** This is a distinctive species easily recognized by the intricate patterning of the abdominal tergites, particularly the white spots on the T3 together and the isolated black markings laterally on T3–T4, and the thoracic pleura is striped.

*Mycodrosophila ocellata* n.sp. keys to *M. minor* Bock, 1980 among the Australian species, both species have a pleural stripe but the male terminalia and abdominal markings are quite dissimilar. The new species keys to *M. gressitti* in Wheeler & Takada's (1964) among Micronesian species, but the 4v-index = 3.0–3.3 in *gressitti* (vs. 2.3 in *ocellata* n.sp.), the frons is black in *gressitti* (vs. largely pale in *ocellata* n.sp.), and the cheek is rather broad (vs. narrow in *ocellata* n.sp.).

*Mycodrosophila (Mycodrosophila) palpalis* McEvey & Polak, new species

(Figs. 44–49, 54–57)

**Diagnosis.** Carina prominent, bulbous below; palps large and dark; pleura pale below level of wing articulation; T3 entirely black dorsally; halter knob largely black, stalk pale.

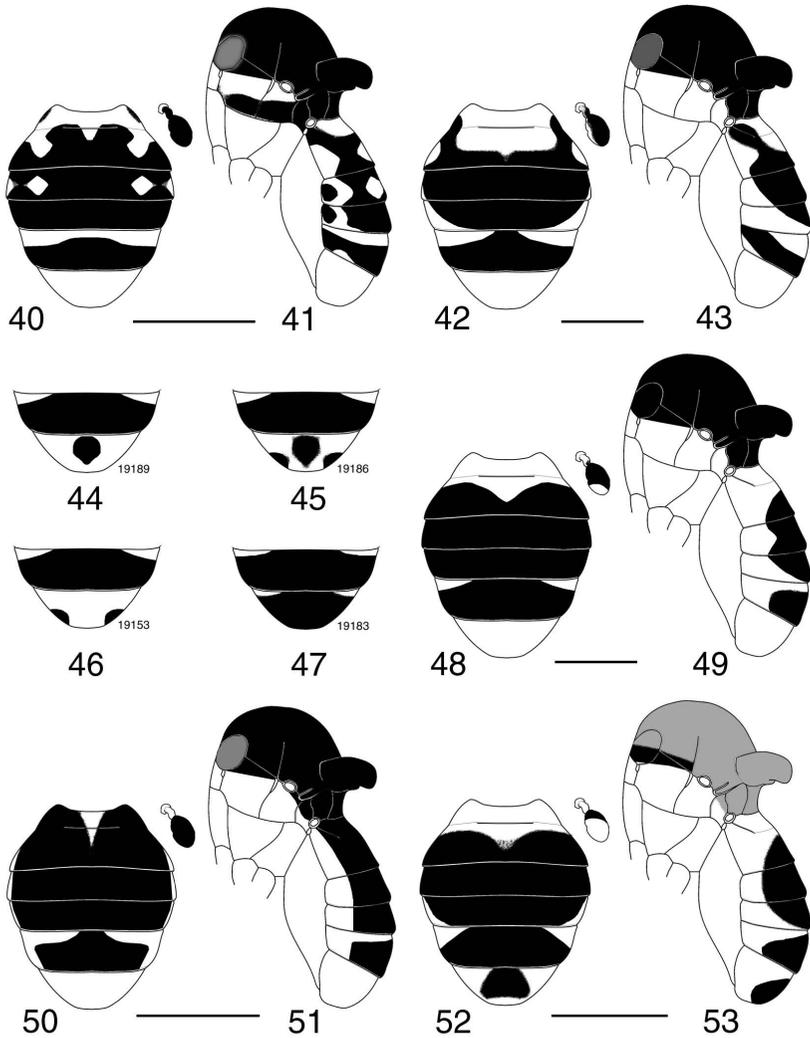
**Description.** Male. Body length 2.4 mm.

**Head:** second and third antennal segments dusky brown. Arista with 4 apically curved rays above and one straight ray below, plus terminal fork. Palpus dark brown in apical half, pale basally, broad and flattened. Frons mat black with median pale brown triangular area reaching ocellar triangle and anterior frontal corners; shining white centrally when viewed from acute angles, fronto-orbital plate (periorbit) subshining dark brown; frontal width (fw, measured through anterior ocellus) to frontal length (fl, measured from ptilinal suture to vertex) fw:fl = 1.4. Carina prominent, broad and bulbous below, gradually tapering into lower facial margin; lateral margins almost squared. Face dark brown. Gena blackish brown; ratio of maximum genal width (ch) and maximum eye diameter (o), j:ch:o = 7:8:56. Length ratios of fronto-orbital and vertical setae or1:or2:or3 = 18:5:21; or1:iv:ov = 18:23:23; or1:pv:oc = 18:11:16; orbito-index = 1.12.

**Thorax** (Fig. 49). Scutum (mesonotum) and scutellum blackish brown; the latter with dense short pile; postpronotum also blackish brown. Thoracic pleura entirely pale (stramineous yellow) below level of wing articulation; mediotergite dark. Sterno-index 0.45. Ratio of distance between apical scutellars to distance between apical and basal scutellars, a–asc:a–bsc = 19:11; length ratio of apical to basal setae, asc:bsc = 33:12. Acrostichal hairs in 8 rows posteriorly about 10 rows anteriorly. Halter stalk pale; knob largely black, pale on ventroapical part.

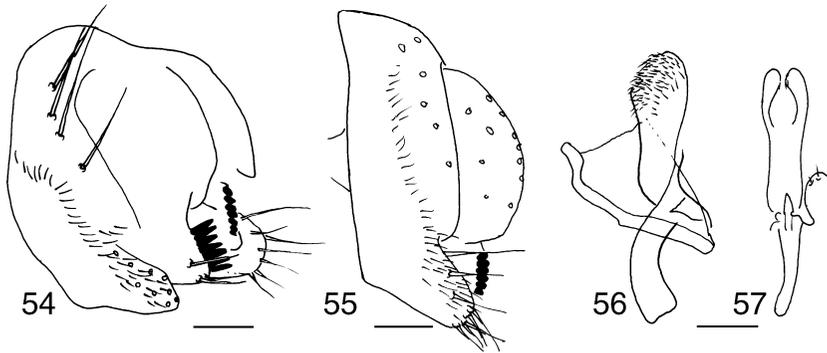
**Legs** entirely pale, without long curved hairs; mid-tibia with a long fine subapical hair anteroventrally in addition to subapical spur.

**Wing** hyaline, weakly infuscate behind second costal incision. Costal lappet small. C-index = 1.5, 4v-index = 2.5, 4c-index = 1.6, 5x-index = 2.6, M-index = 0.8, ac-index = 5.3, C3 fringe = 0.7. L3 and L4 are not convergent apically, 1p-index = 1.02. Wing length 1.9 mm.



**Figs. 40–53.** Thoracic and abdominal morphology of *Mycodrosophila* species: 40–41, *M. ocellata* n.sp.; 42–43, *M. umbra* n.sp.; 44–49, *M. palpalis* n.sp., 44–47, variation among female tergites T5–T6 (specimen numbers indicated); 50–51, *M. planata* n.sp.; 52–53, *Mycodrosophila* species a (aff. *heterothrix*). Scales = 0.5 mm.

*Abdomens* (Fig. 44–49): T1, and in males also T6, entirely pale; incurved portions of T2–T5 pale; T2 with broad black dorsal posterior band narrowing in midline and diminishes in width posterolaterally; T4 band diminishes in width anterolaterally; T5 band reaches anterior margin only dorsomedially.



**Figs. 54–57.** *Mycodrosophila palpalis* n.sp. **54–55**, epandrium lateral and caudal views; **56**, hypantrium lateral view (Reg. 19193); **57**, aedeagus dorsal view (Reg. 19193). Scales = 0.05 mm.

**Genitalia** (Figs. 54–57). The toe of the epandrium is large and hirsute, also with numerous setae near the apex. The surstylus has 7 long strong teeth. The aedeagus is bilobate (lobes laterally flattened) and strongly hirsute in apical third, the gap between the lobes is small.

Female. T6 dark (Fig. 47, Reg. 19183) or with one dorsomedial dark patch (Fig. 44, Reg. 19189), two submedial patches (Fig. 46, Reg. 19153), or both medial and submedial patches (Fig. 45, Reg. 19186). Egg guide short with a few rather long apical teeth and several subapical hairs.

**Types.** Holotype ♂ VANUATU, 3 km E Port Vila, 1 Feb 2003 (Reg. 19007, AM K118297). Paratypes (34: 15 ♀ ♀, 8 ♂ ♂, 11[?sex], in AM, BPBM and AMNH): 1 ♂, same data as holotype; (15 ♀ ♀, 7 ♂ ♂, 11[?sex]), VANUATU, **Efate**, 1.6 km N Epao, 3 Feb 2003.

**Distribution.** Vanuatu.

**Etymology.** The specific epithet derives from the Latin, *palpo* [= feeler], referring to the characteristic large dark palpus in both males and females of this species.

**Remarks.** *Mycodrosophila palpalis* n.sp. closely resembles *M. carinata* Bock, 1980 (type locality Mossman Gorge, northern Queensland, Australia). Specimens of *carinata* in the AM from northern Queensland (including a paratype from Mossman Gorge, and specimens from Palmerston National Park and Lake Eacham) have been examined. The halter pigmentation is the most striking difference: the knob is pale with faint darkening basally in *carinata* but mostly black in *palpalis* n.sp. The weak infuscation behind the costal incision in *palpalis* is not at all present in *carinata*.

This species keys to *M. minor* Bock, 1980 in Okada's (1986b) key to species of southeast Asia and New Guinea, sharing with *minor*—no wing cloud and blackening on halter knob—but *minor* has a prominent pleural stripe and *palpalis* n.sp. does not.

Sexual dimorphism in abdominal patterning is uncommon but not unknown in the genus *Mycodrosophila*. Wheeler & Takada (1963, fig. 2) illustrate similar pattern variants in males and females of the North American species *M. claytonae* Wheeler & Takada, 1963 and *M. stalkerii* Wheeler & Takada, 1963; in *claytonae* the females are more heavily pigmented but in *stalkerii* the apical abdominal tergites are darker in males. Variation has previously been noted in the sixth tergite of *M. esakii* Wheeler & Takada, 1964 and of *M. amabilis* (de Meijere, 1911) (Okada, 1986b: 121). Figures 44–47 illustrate the pigmentation we have observed in four females of *M. palpalis* n.sp., we consider this varia-

tion to be intraspecific.

*Mycodrosophila (Mycodrosophila) umbra* McEvey & Polak, new species

(Figs. 42–43, 58–59)

**Diagnosis.** First tergite (T1) pale tan with darkening anterolaterally as if a shadow of the halter. Carina prominent, broad below, flat. Lappet large, wing with no distinct infusate mark. Halter stalk pale basally, knob blackened dorsally. 4v- and 5x-indices low.

**Description.** Male. Body length 2.4 mm.

*Head.* Second and third antennal segments pale brown. Arista with 4 apically curved rays above and one straight ray below, plus terminal fork. Palpus large, flattened, dark with 4–5 short apical and subapical setae. Frons pale centrally and in anterior half, darker towards posterior corners; ocellar triangle black, slightly raised; with slight white sheen; fronto-orbital plate subshining brown; fw:fl = 1.4. Carina pale; narrow above, greatly broadened below, forming an elongate triangle (almost straight base) in frontal view; flattened; not bulbous below; sides and, to a lesser extent, lower margin, squared, dropping away abruptly. Face and lower facial margin pale. Gena brown, paler posteriorly; postgena with strong white sheen; j:ch:o = 5:6:58. Length ratios of fronto-orbital and vertical setae: or1:or2:or3 = 18:6:20, or1:iv:ov = 18:23:25, or1:pv:oc = 18:14:24, orbito-index = 1.0.

*Thorax* (Fig. 43). Scutum shining dark brown; scutellum mat black but with a golden pruinescence or sheen when viewed from certain angles; postpronotum slightly paler. Thoracic pleura entirely pale below level of wing articulation. Anatergite blackened. Sterno-index = 0.6. Ratio of distance between apical scutellars to distance between apical and basal scutellars, a-asc:a-bsc = 23:11; length ratio of apical to basal setae, asc:bsc = 35:18. Acrostichal hairs in 8 rows posteriorly about 12 rows anteriorly. Halter stalk pale at its base, dusky near knob; the knob largely black dorsally, pale ventrally.

*Legs* entirely pale, tarsi without long hairs.

*Wing* hyaline, with trace only of darkness behind second costal incision; not darkened apically. Costal lappet large, black. C-index = 1.6, 4v-index = 2.0, 4c-index = 1.6, 5x-index = 1.9, M-index = 0.7, ac-index = 4.4, C3 fringe = 0.7. First posterior cell slightly dilated near posterior crossvein, 1p-index = 1.5. Wing length 1.9 mm.

*Abdomen* (Figs. 42–43). T1 pale, with darkening laterally. T2 with black posterior band terminating before lateral margin, and extending forward to T1 behind halter. T3 largely black, narrowly pale laterally. T4 black anterodorsally, pale tan laterally and along posterolateral margin. T5 black except in posterolateral corner and anterior margin submedially. T6 entirely tan. White lateral markings on T3–T5 forming broad, curved band in sideview.

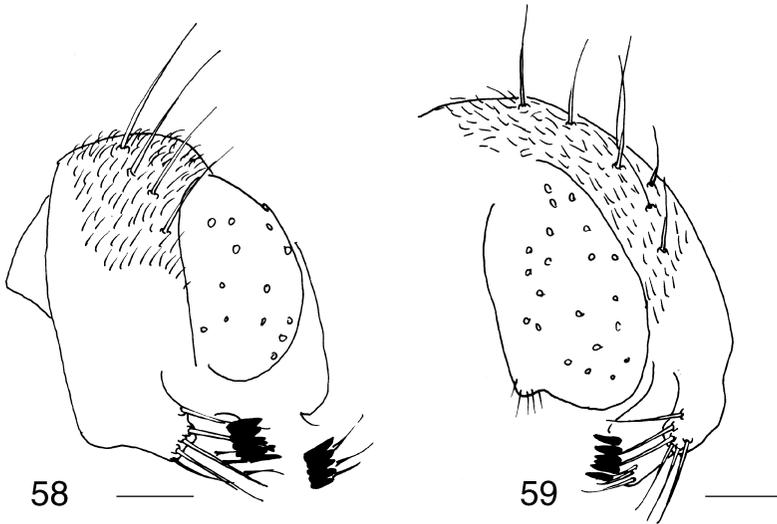
*Genitalia* (Fig. 58–59). The epandrium toe is rounded with long setae only near the tip; hirsute zone begins well up the side. Surstylus with five long strong teeth. Ventromedial corner of cercus slightly protruding with cluster of small fine setae.

Female. Egg guide of only available female (not dissected) is not smoothly rounded apically and appears to have no teeth, it does, however, have strong apical and subapical hairs.

**Types.** Holotype ♂ (Reg. 19081, AM K118303). VANUATU, Efate, 6.5 km S Epao, 2 Feb 2003 fungus, coll. Michal Polak. Paratypes (2 in AM): 1 ♂, Reg. 19192, VANUATU, Efate, 1.6 km N Epao, 3 Feb 2003 fungus, coll. Michal Polak; 1 ♀ Reg. 19280, VANUATU, Efate, 6.8 km S Epao, 3 Feb 2003 fungus, coll. Michal Polak.

**Distribution.** Efate, Vanuatu.

**Etymology.** The specific epithet derives from the Latin, *umbra* [= shade, shadow], referring to the darkness on the first and second tergites that silhouettes the halter in this species.



Figs. 58–59. *Mycodrosophila umbra* n.sp., eandrium lateral and caudal views (Reg. 19192). Scales = 0.05 mm.

**Remarks.** *Mycodrosophila umbra* n.sp. resembles the Australian species *M. carinata* Bock, 1980, and *M. simplex* Bock, 1980—species with very prominent carinae, halteres with knobs partially darkened and pale thoracic pleurae. The distinctive black marking laterally on the T1 (a lateral extension of the apical band of T2, see Figs. 42 and 43) in *M. umbra* n.sp. is completely absent in *carinata* (see Bock, 1980: fig. 73) and in *simplex* (see Bock, 1980: fig. 90). *Mycodrosophila umbra* n.sp. also resembles the previous species, *M. palpalis* n.sp., but can be separated from it again by reference to the “shadow” (*umbra*) on T1 and T2 behind the halter.

This species does not progress beyond couplets 6–10 in Okada’s (1986b) key to SE Asian and New Guinean *Mycodrosophila* species. *Mycodrosophila umbra* n.sp. has only a trace of darkness behind the second costal incision but is neither *M. minor* Bock, 1980 (with a pleural stripe) nor *M. aqua* with *gratiosa*-like abdominal patterning; the frons is pale centrally and in anterior half in *umbra* and in this respect somewhat resembles *serrata* but the latter has a row of many short surstyler teeth, not a few very long ones like *umbra*.

*Mycodrosophila umbra* n.sp. shares some similarities with *M. boudinoti* Tsacas & Chassagnard, 1991 from New Caledonia. In addition to the original description we have been able to examine 21 specimens of *boudinoti* collected by us (with Tom Starmer and Stuart Barker) at the type locality (Mt Koghis, New Caledonia) in 2000 (AM). The T1–T2 pigmentation pattern in *boudinoti* is invariable and quite different from the form we have observed in the present species from Vanuatu. In particular the small pale medial fascia of the *boudinoti* T2 is quite unlike the T2 of *umbra* n.sp. (Fig. 42).

Of the Micronesian species only *M. carola* Wheeler & Takada, 1964, has a costal lap-pet, entirely pale pleura, and dark halter knob like *umbra* n.sp.; but the *carola* wing is

described as having a distinctive dark band across the wing from the lappet (Wheeler & Takada, 1964, fig. 15a), and this is quite unlike the very weak shadow just visible in *umbra* n.sp.

*Mycodrosophila (Mycodrosophila) vanuatauae* McEvey & Polak, **new species**  
(Figs. 14–15, 60–62)

**Diagnosis.** Wing cloud distinctive infusate patch in wing, and dark shadow of darkness on the 6th vein. Halter stalk pale, knob dark basally pale apically. Frons with distinct pale fascia anteromedially, and a white sheen. Carina narrow, barely widened below T4 with very narrow uninterrupted white posterior band. The labella of the proboscis are white and prominent contrasting strongly with the blackish brown prelabrum and lower facial margin.

**Description.** Male. Body length 1.9 mm.

*Head.* Second antennal segments pale brown, third dark dusky brown. Arista with 4 apically curved rays above and one straight ray below, plus terminal fork. Palpus pale (paler than second antennal segment) with exceptionally long (as long as vibrissa) fine apical seta. The labella of the proboscis are white and protrude prominently beneath the blackish brown prelabrum. Frons pale brown centrally and anteriorly; mat black laterally and posteriorly, fronto-orbital plate shining dark brown; a brilliant white sheen (visible at most angles) covers the frons from the anterior margin to vertex, less so laterally;  $fw(a\ oc):fl = 1.2$  [ $fw(or2):fl$  (sensu Bock) = 1.2]. Carina pale brown, long and narrow; not greatly broadened and not protuberant below—rounded below in profile; lateral margins rounded. Face pale brown; lower margin dark brown; the latter slightly raised and higher than the deep antennal concavities either side of the carina. Gena dark brown anteriorly, whitish posteriorly, vibrissa very fine ( $or1:vb = 15:11$ );  $j:ch:o = 3:4:45$ . Length ratios of fronto-orbital and vertical setae:  $or1:or2:or3 = 15:2:16$ ,  $or1:iv:ov = 15:15:17$ ,  $or1:pv:oc = 15:9:15$ , orbito-index = 0.5.

*Thorax* (Fig. 15). Scutum shining, very dark brown (blackish brown in some paratypes); scutellum black and microtrichose; postpronotum not as dark—dark brown. Thoracic pleura entirely below level of wing articulation. Sterno-index = 0.6. Ratio of distance between apical scutellars to distance between apical and basal scutellars,  $a:asc:a:bsc = 17:10$ ; length ratio of apical and basal setae,  $asc:bsc = 30:13$ . Acrostichal hairs in c. 8 rows. Halter stalk whitish; knob black basally, whitish apically.

*Legs.* Entirely pale, tarsi not darker, without long hairs.

*Wing.* Hyaline, but with very distinct infusate cloud behind second costal incision and a dark suffusion along the course of the “sixth vein” (sensu Malloch, 1934). Costal lappet large, black, prominent. C-index = 1.0, 4v-index = 2.2, 4c-index = 1.8, 5x-index = 2.1, M-index = 0.7, ac-index = 4.81, C3 fringe = 0.6. Wing length = 2.2 mm; L3 and L4 almost parallel along their entire length, 1p-index = 1.3.

*Abdomen* (Figs. 14–15). T1 pale with small diffuse dark markings posteromedially; T2 black except for small diffuse medial triangle continuous with dark markings of T1 and pale laterally; T3 and T4 black dorsally pale laterally; T5 with broad black apical band extending forward to T4 margin narrowly in midline; T6 entirely pale.

*Genitalia* (Figs. 60–62). The toe of the epandrium is narrow when viewed from certain angles (Fig. 61). Surstylus with broadly rounded mediobasal prominence and seven strong teeth; a large setae arises from between the row of teeth and the prominence (cf. *M. claudensis*—Fig. 63, 64). The aedeagal apex is bilobate, coarsely serrate with a shallow notch (cf. bilobate, smoothly rounded with serration only on inner margins and deeply notched in *M. claudensis*—Fig. 65).

Female. Egg guide with a few apical teeth and hairs.

**Types.** Holotype ♂ (Reg. 19484, AM K118298), VANUATU, **Espiritu Santo**, 25

km N Luganville, 6 Feb 2003 fungus, coll. Michal Polak. Paratypes (79♀♀, 42♂♂, 43[?sex] all from fungus, coll. Michal Polak; in AM, BPBM and AMNH): 60♀♀, 33♂♂, 33(?sex), same data as holotype; 4♀♀, 2(?sex), VANUATU, 3 km E Port Vila, 1 Feb 2003; 2♂♂, VANUATU, **Efate**, 9 km S Epao, 2 Feb 2003; 5♀♀, 4♂♂ 1(?sex), VANUATU, 1.6 km N Epao, 3 Feb 2003; 8♀♀, 2♂♂ 7(?sex), VANUATU, 6.8 km S Epao, 3 Feb 2003; 1♀, VANUATU, 7.5 km W Port Vila, 3 Feb 2003; 1♀, 1♂, VANUATU, **Espiritu Santo**, 34 km N Luganville, 6 Feb 2003.

Specimens of *M. claudensis* examined: holotype (AM K73017) and paratype (AM K73018), AUSTRALIA: "Claudie R., 2 miles, S. Mt. Lamond, Qld., 5 Jan. 1972, mv light, D.K. McAlpine, G.A. Holloway"; "Gordon Ck [tributary of the Claudie River—type locality], Iron Range, 1.5 km E Cook's Hut, 12°43'S, 143°19'E N.Qld, ex rainforest fungus", 10–11.v.1981, S.F. McEvey; same as previous but 7–12.v.1981, S.F. McEvey (13 specimens AM K118306–318).

**Distribution.** Espiritu Santo and Efate, Vanuatu.

**Etymology.** The specific epithet *vanuatae* is a noun in apposition (genitive possessive case) referring to the type locality of this species.

**Remarks.** *Mycodrosophila vanuatae* n.sp. was the most common species found at fungus on Espiritu Santo and Efate (Vanuatu). It is reported here from six of the nine sites at which *Mycodrosophila* species were found (Table 1).

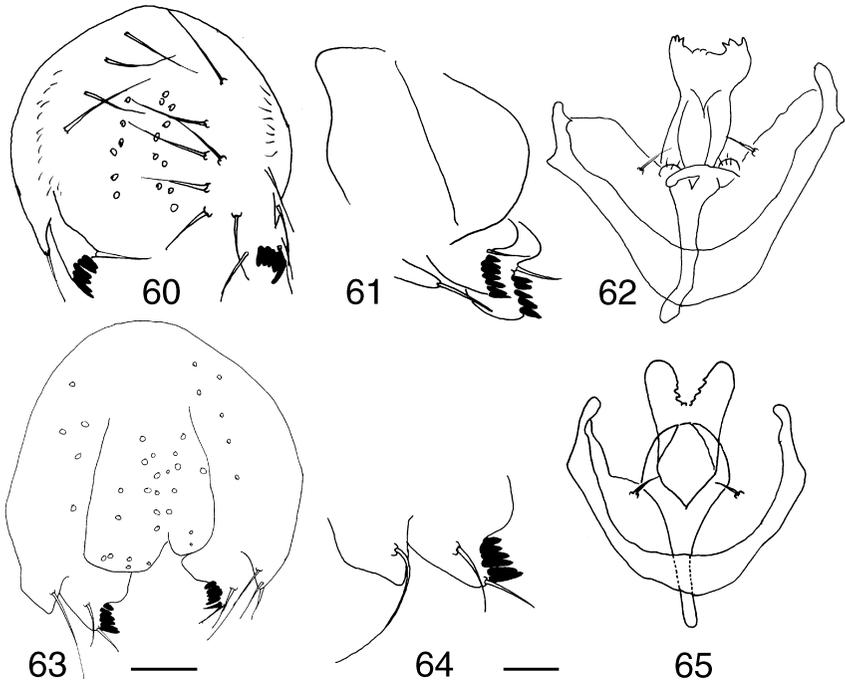
The external morphology of this species is very similar to *Mycodrosophila claudensis* Bock, 1980, originally described from two females collected at Iron Range, Cape York Peninsula, northern Queensland; a headless female from further south at Mossman Gorge was available but excluded from the type series (Bock, 1980). Males were subsequently collected at the type locality in 1981 (McEvey & Bock, 1982) and on numerous occasions at Cape Tribulation, northern Queensland (2000, 2003, 2004) by the authors with Starmer, Barker and Wolf. Specimens of this species have also been examined by us from Palmerston National Park and Kuranda (northern Queensland). Despite the similarities there are clear differences in the genitalia, especially in the form of the aedeagus terminally (compare Figs. 62 and 65).

This species is also very close to *Mycodrosophila delta* n.sp. from Fiji but differs most obviously in having the halter knob partially blackened only—in *delta* n.sp. the entire knob is black. There are also subtle differences in the pattern of abdominal markings and clear differences in the form of the aedeagus.

### Subgenus *PROMYCODROSOPHILA* Okada, 1986

*Promycodrosophila* Okada, 1986: 291. Type species: *Drosophila separata* de Meijere, 1911, by original designation.

Wheeler & Takada (1964) noted that *Mycodrosophila esakii*, *alienata*, *albicornis* and *separata* all lack the characteristic costal incision and protruding lappet of typical *Mycodrosophila* and suggested that they probably represent a valid subgenus. Okada and Carson discovered more species of this kind in Papua New Guinea and Okada (1986) erected the subgenus *Promycodrosophila*; he gave the diagnosis as costal lappet undeveloped, dark patch below 2nd costal break usually absent.



**Figs. 60–65.** *Mycodrosophila vanuatuae* n.sp. (above) and *M. claudensis* Bock (below): **60–61**, epantrium caudal (Reg. 19377) and lateral (Reg. 19544) views; **62**, hypandrium dorsal view (Reg. 19377). *Mycodrosophila claudensis* Bock: **63**, epantrium caudal view (Reg. 1550); **64**, surstylus and toe of epantrium (Reg. 1550); **65**, hypandrium dorsal view (Reg. 1550). Scales = 0.05 mm.

*Mycodrosophila (Promycodrosophila) planata* McEvey & Polak, **new species**  
(Figs. 50–51, 66–68)

**Diagnosis.** Small species; palps white; halter knob black; lappet barely developed; white frontal sheen absent; scutellum subshining black with no pale apex; T3 and T4 entirely black dorsally.

**Description.** Male. Body length 1.7 mm.

*Head.* Second and third antennal segments brown. Arista with 4 apically curved rays above and one straight ray below, plus terminal fork. Palpus very pale—whitish; with one short fine apical seta and several shorter subapical setae. Frons dull blackish brown posteriorly merging to brown anteriorly; white sheen not apparent; fronto-orbital plate subshining dark brown and well differentiated posteriorly, not well differentiated (and blackish brown in some paratypes) anteriorly; fw:fl = 1.4. Carina long, reaching to the very edge of the lower facial margin; very narrow above, greatly broadened below (reminiscent of the Eifel Tower profile); sides squared and dropping away abruptly; not bulbous or protuberant below, smoothly rounded and gradually becoming one with the lower facial margin; the latter, together with the vibrissal angle, blackish brown, forming a narrow blackish band

across the lower part of the face, the band runs through the lower part of the carina. Gena narrow and black anteriorly, very broad, angulate and with brilliant white sheen posteriorly; j:ch:o = 3:5:37. Length ratios of fronto-orbital and vertical setae: or1:or2:or3 = 11:5:12, or1:iv:ov = 11:12:15, or1:pv:oc = 11:11:12, iv-or3 = 9, or1-or2 = 4, or1-or3 = 7, or2-or3 = 4, orbito-index = 0.8.

**Thorax** (Fig. 51). Scutum subshining blackish brown, postpronotum paler; weakly-developed microscopic alutaceous sculpturing in area between the postpronotum and the transverse suture. Scutellum subshining, blackish; with no pale apex. The scutum is densely microtrichose posteriorly between the dorsocentrals. Thoracic pleura entirely pale below level of wing articulation; katatergite largely dark, narrowly pale below; anatergite and mediotergite darkened. Sterno-index = 0.4. Ratio of distance between apical scutellars to distance between apical and basal scutellars, a-asc:a-bsc = 15:7; length ratio of apical to basal setae, asc:bsc = 15:9. Acrostichal hairs in 6 irregular rows posteriorly, about 8 irregular rows anteriorly. Halter stalk entirely pale; knob black.

**Legs** entirely pale, tarsi with no long hairs.

**Wing** hyaline, not a trace of infuscation below second costal incision. The costa darkened and only slightly expanded distally in the first costal section, not producing a costal lappet, deep incision at second costal break absent. C-index = 1.4, 4v-index = 2.3, 4c-index = 1.6, 5x-index = 2.1, M-index = 0.8, ac-index = 4.3, C3 fringe = 0.6, 1p-index = 1.40. Wing length = 1.4 mm.

**Abdomen** (Figs. 50–51). T1 darkened, tan medially. T2 largely black dorsally, tan in small triangular region anteromedially, pale tan laterally. T3 and T4 entirely black dorsally, pale tan laterally. T5 largely black dorsally, pale tan laterally and in narrow band submedially along anterior margin. T6 entirely pale. In lateral view the border between pale and dark forms a more-or-less straight line along the entire length of the body from the T5 near the tip of the abdomen, through T1, the middle of the katatergite, the upper part of the anepisternum, the proepisternum and even passing along the side of the head in a defined borderline separating the white postgena below from the darker head above. Even the pale stem of the halter lies in the pale zone and the black knob in the dark zone.

**Genitalia** (Figs. 66–68). Lower margin of epandrium furrowed, tow with several long setae but not hirsute. Surstylus with a barely curved row of c. 12 of stout teeth, the upper 10 short the lower two about twice as long.

Female. Egg guide rounded apically with a rim of numerous short black teeth and a few sub-terminal hairs.

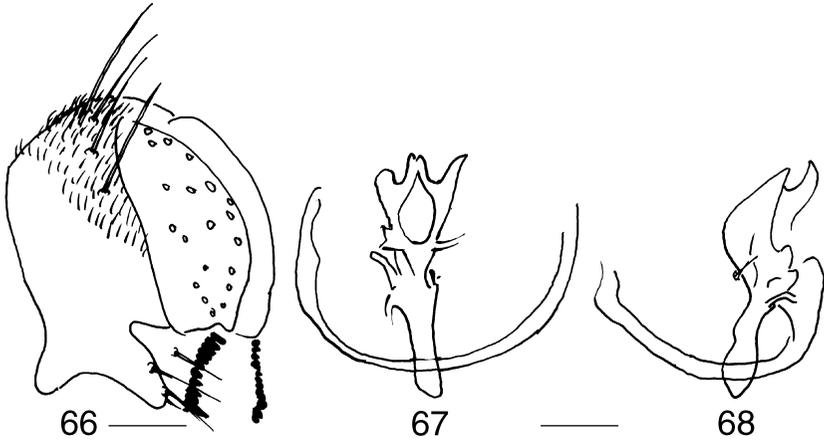
**Types.** Holotype ♂ (Reg. 19011, AM K118302); VANUATU, **Efate**, 3 km E Port Vila, 1 Feb 2003. Paratypes (7 in AM and BPBM): 2♂♂ 1♀, same data as holotype (Reg. 19009♀, 19010, 19012); 3♂♂ 1♀, **Efate**, 6.8 km S Epao, 3 Feb 2003 (Reg. 19272♀, 19281, 19288, 19291).

**Distribution.** Vanuatu.

**Etymology.** The specific epithet derives from the Latin, *planus* [= even, level, smooth] a reference to the smooth and even border between the dark upper and pale lower parts of the body of this species.

**Remarks.** This is a typical species of the *Mycodrosophila* subgenus *Promycodrosophila*—the costal lappet is undeveloped and the wing patch below the second costal incision is absent.

Nine species of *Mycodrosophila* (*Promycodrosophila*) have been reported from Australasia and Oceania; another four are listed incertae sedis with respect to subgenus (Appendix). A range of distinctive and easily observed characters of the external morphology allow *planata* n.sp. to be distinguished from these 13 species as follows: *annulipes* Okada, 1986, *esakii* Wheeler & Takada, 1964, and *heterothrix* McEvey & Bock, 1982, all have a pale tan scutum (blackish brown in *planata* n.sp.); *separata* de Meijere, 1911 has scutellum with pale apex (entirely black in *planata* n.sp.); *gracilis* Okada, 1986 has black palpi (white in *planata* n.sp.); *alienata* Duda, 1926, *quadrata* Okada, 1986, and *spinata* Okada, 1986 have pale halter knobs (black in *planata* n.sp.); *compacta* Bock,



**Figs. 66–68.** *Mycodrosophila planata* n.sp. 66, epandrium lateral view (Reg. 19010); 67–68, hypandrium dorsal and lateral views (Reg. 19010). Scales = 0.05 mm.

1980 has abdominal markings not forming a distinct lateral line and has C-index = 0.7 (1.4 in *planata* n.sp.); the species pair: *tillieri* Tsacas & Chassagnard, 1991 and *legrandi* Tsacas & Chassagnard, 1991 have barely developed facial carinae (facial carina prominent in *planata* n.sp.).

***Mycodrosophila (Promycodrosophila) species A***  
(Figs. 52–53)

This species is not being formally described here because of a lack of specimens and confusion concerning its identity relative to *M. heterothrix* and *M. esakii*.

**Diagnosis.** Scutum pale brown, dark brown narrowly on each side; lappet absent; wing with no infuscate cloud; anepisternum centrally with a small seta; ocellar and postverticals subequal.

**Description.** Male. Body length 1.8 mm.

**Head.** Second antennal segments pale tan, third dark brown. Arista with 4 rays above and one below, plus terminal fork. Palpus dark brown (same color as third antennal segment) with one long apical and a much shorter subapical seta. Frons pale tan, with a weak sheen visible at acute angles, the vertex not distinctly darker, anteriorly very pale tan; ocellar triangle lies within a larger tan triangle; fronto-orbital plate shining pale tan; fw:fl = 1.2. Carina very pale tan, very narrow, barely wider below, descending gradually to lower facial margin, sides falling away abruptly with rather squared edges. Face pale. Gena narrow, j:ch:o = 4:7:36. Length ratios of fronto-orbital and vertical setae: or1:or2:or3 = 15:3:15, or1:iv:ov = 15:15:16, or1:pv:oc = 15:11:11, orbito-index = 0.7.

**Thorax** (Fig. 53). Scutum (and postpronotum) uniformly subshining pale tan, with lateral margin—along notopleural suture and lower part of postpronotum—distinctly and narrowly dark brown;

scutellum concolorous, paler apically, with no trace of lateral darkening. Thoracic pleura entirely whitish tan below level of wing articulation, distinctly paler than scutum, line of demarcation abrupt. Anepisternum centrally with one very fine seta approximately subequal in size to the short setae in the lower part of the katepisternum. Sterno-index = 0.7. Ratio of distance between apical scutellars to distance between apical and basal scutellars, a-asc:a-bsc = 1.61; length ratio of apical to basal setae, asc:bsc = 24:9. Acrostichal hairs in 6 rows posteriorly about 8 rows anteriorly. Halter stalk and knob pale; the knob with trace only of basal darkening.

*Legs* entirely pale, fore tarsi with long recurved hairs.

*Wing* hyaline, not a trace of infuscation behind second costal incision. The costa not darkened and not expanded distally in the first costal section, not producing a costal lappet, deep incision at second costal break absent. C-index = 1.3, 4v-index = 1.6, 4c-index = 1.3, 5x-index = 1.8, M-index = 0.4, ac-index = 5.3, C3 fringe = 0.6 (hairs unusually long), 1p-index 1.5. Wing length = 1.5 mm.

*Abdomen* (Figs. 52–53). T1 entirely pale. T2 largely black dorsally, pale laterally, anteriorly and in triangular region anteromedially. T3 largely black dorsally, broadly pale tan laterally. T4 largely black dorsally, broadly pale laterally and along posterolateral margin. T5 largely black dorsally, broadly pale laterally and along anterolateral margin. T6 black dorsomedially, otherwise pale tan.

Female. Unknown.

**Material examined.** One ♂, VANUATU, **Espiritu Santo**, 25 km N Luganville, 6 Feb 2003 fungus, coll. Michal Polak (Reg. 19406, AM K118301).

**Distribution.** Espiritu Santo, Vanuatu.

**Remarks.** This species is very similar to, and possibly conspecific with, *Mycodrosophila heterothrix* McEvey & Bock, 1982 from northern Australia and Papua New Guinea. We have examined a number of *heterothrix* specimens in the AM from the type locality (Iron Range, Cape York Peninsula) and, in the external morphology, can find only a single difference between them and the specimen here under study. The *heterothrix* scutum is paler laterally, not darker, and there is therefore not the strongly defined line of demarcation between the pale tan of the thorax dorsally and the whitish tan of the pleura laterally in *heterothrix* (cf. strong demarcation in species A).

As noted by McEvey & Bock (1982) the presence of anepisternal setae is not only unusual in *Mycodrosophila* but indeed for the whole family Drosophilidae. These are very fine setae not larger than the katepisternal “hairs” and may have been overlooked in other studies. That the Australian and Vanuatu flies share this very rare trait tends to suggest that they belong to a single or, at most, two very closely related species. When more material becomes available from Vanuatu dissections of male genitalia should resolve the matter.

*Mycodrosophila* sp. A is very similar to *M. esakii* Wheeler & Takada having in common a scutum “subshining, rather translucent, light tan with a tendency to be paler in mid-line, and darker brown on each side” similar wing venation, overall coloration (except scutellum, see below), and size. We have not examined types of *esakii* but based on the description we note several important differences: *esakii* has legs of males lacking recurved hairs (vs. males with long hairs sp. A); scutellum blackened on each side (vs. entirely pale tan with no trace of lateral darkening); a wing cloud described as “a diffuse discoloration between costal break and fourth vein” (vs. wing entirely hyaline); and a C3 fringe on basal two-fifths (vs. basal half). *Mycodrosophila esakii* is known from the type series collected in Ponape, Caroline Islands, but Wheeler & Takada (1964) tentatively referred one female specimen from the Solomon Islands (Guadalcanal, Jan. 1945, C.O. Berg) to this species.

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**Table 1. Collection Event code numbers, Batch numbers** (McEvey's Register numbers, unique for every specimen, not all specimens within the number-ranges shown are *Mycodrosophila*), localities, dates, methods and collectors.

Event	Batch	Country	Locality	Date	Method	Collector
3482		Fiji	Lautoka	23-Jun-1922	fungus	Greenwood
3483		Fiji	Lautoka	Jul-1922		Veitch
1956	16296–16306	Fiji	Viti Levu, 1.5 km N Sigatoka	20-Oct-2001	fungus	Polak
1954	16178–16221	Fiji	Viti Levu, 1.5 km N Sigatoka	22-Oct-2001	fungus	Polak
1959	16402–16442	Fiji	Viti Levu, 1.5 km N Sigatoka	22-Oct-2001	fungus	Polak
2162	18993–19062	Vanuatu	3 km E Port Vila	01-Feb-2003	fungus	Polak
2164	19077–19085	Vanuatu	Efate, 6.5 km S Epao	02-Feb-2003	fungus	Polak
2165	19086–19095	Vanuatu	Efate, 9 km S Epao	02-Feb-2003	fungus	Polak
2172	19315–19331	Vanuatu	7.5 km W Port Vila	03-Feb-2003	fungus	Polak
2167	19115–19218	Vanuatu	1.6 km N Epao	03-Feb-2003	fungus	Polak
2170	19268–19305	Vanuatu	6.8 km S Epao	03-Feb-2003	fungus	Polak
2169	19234–19267	Vanuatu	Efate, 6 km S Ulei	03-Feb-2003	fungus	Polak
2174	19352–19566	Vanuatu	Santo, 25 km N Luganville	06-Feb-2003	fungus	Polak
2175	19567–19581	Vanuatu	Santo, 34 km N Luganville	06-Feb-2003	fungus	Polak
2209	22372–22431	Fiji	Viti Levu, 6 km N Sigatoka	08-Jun-2004	fungus	McEvey*
2213	22471–22518	Fiji	Viti Levu, 6 km N Sigatoka	10-Jun-2004	swept††	McEvey*
2215	22534–22570	Fiji	Viti Levu, 1.5 km N Sigatoka	10-Jun-2004	swept††	McEvey*

\* With Malcolm Schug, Shelly Gray Smith & Amanda Kilon-Attwood

†† Swept near fungal growths

## APPENDIX

List of *Mycodrosophila* species of Australasia and Oceania

This list builds on Evenhuis & Okada's (1989) list and includes four species described from New Caledonia (Tsacas & Chassagnard, 1991). We know of no other *Mycodrosophila* species having been reported from these regions since 1991 but our collections from Papua New Guinea, Western Samoa, and French Polynesia since 2000 (and those of Jean David previously in French Polynesia in 1986 and 1992) have undescribed species of *Mycodrosophila* not further discussed in this paper.

*Mycodrosophila aqua* Bock, 1980 and *M. gratiosa* are morphologically closer than previously realized and there are inconsistencies in the characters attributed to them in the literature. This throws doubt on (a) widespread distribution records given for *M. aqua* in southeast Asia (Okada, 1986a) and (b) the complete absence of reports of *M. gratiosa* from Australia (except Christmas Island near Java—Carson & Wheeler, 1973; McEvey, pers.obs.); until better material is available we prefer to regard *aqua* as restricted in range and leave open the question of the widespread occurrence of *gratiosa* including in northern Queensland.

## Subgenus MYCODROSOPHILA Oldenberg

- amabilis* de Meijere, 1911b: 405 (*Drosophila*). Indonesia (Java); Belau, PNG (PNG), Solomon Is; Indonesia (Sumatra), Malaysia (Pen), Singapore, Sri Lanka, Thailand.
- melaniae* McEvey & Polak, Vanuatu **new species**
- annulata* Bock, 1980a: 289. Australia (Qld).
- aqua* Bock, 1980a: 295. Australia (NT) [SE Asian localities uncertain]
- argentifrons* Malloch, 1927b: 1. Australia (NSW).
- boudinoti* Tsacas & Chassagnard, 1991: 312. New Caledonia
- buxtoni* Malloch, 1934d: 286. Western Samoa.
- caesia* McEvey & Polak, Fiji **new species**
- carinata* Bock, 1980a: 286. Australia (Qld).
- carola* Wheeler & Takada, 1964: 202. Belau; Micronesia.
- chazeaui* Tsacas & Chassagnard, 1991: 312. New Caledonia
- claudensis* Bock, 1980a: 292. Australia (Qld).
- delta* McEvey & Polak, Fiji **new species**
- dianae* Bock, 1980a: 270. Australia (NSW).
- diversa* Bock, 1980a: 284. Australia (Qld).
- fascinata* McEvey & Polak, Fiji **new species**
- gordoni* McEvey & Bock, 1982: 699. Australia (Qld).
- gratiosa* de Meijere, 1911b: 404 (*Drosophila*). Indonesia (Java); American Samoa, Belau, Fiji, Guam, Micronesia, Niue, Northern Marianas, Solomon Is, Western Samoa; China, Japan, Afrotrop., Oriental Regs. Vanuatu, **new loc.**  
syn. *splendida* Okada, 1956: 48. Japan.
- gressitti* Wheeler & Takada, 1964: 204. Belau; Solomon Is.
- halterata* Malloch, 1930h: 331. French Polynesia (Society Is); French Polynesia (Marquesas).
- helenae* Bock, 1980a: 279. Australia (Qld).
- joalaha* Bock, 1982: 125. Australia (Qld); Australia (NSW).
- margoae* Bock, 1980a: 268. Australia (NSW).
- marksae* Bock, 1980a: 275. Australia (Qld); Australia (NSW).
- minor* Bock, 1980a: 290. Australia (Qld); Singapore.

- missima* Okada, 1986a: 115. PNG (PNG).  
*mulgravensis* Bock, 1980a: 283. Australia (Qld).  
*nigrithorax* Malloch, 1934d: 284. Western Samoa.  
*ocellata* McEvey & Polak, Vanuatu **new species**  
*palpalis* McEvey & Polak, Vanuatu **new species**  
*papuana* Okada, 1986a: 112. PNG (PNG).  
*parallelinervis* Duda, 1926c: 57. Indonesia (Sumatra); PNG (PNG), Malaysia (Pen), Singapore, Thailand.  
*ponapeae* Wheeler & Takada, 1964: 201. Micronesia.  
*rayi* Bock, 1980a: 264. Australia (NSW); Australia (Qld).  
*recula* Wheeler & Kambysellis, 1966: 539. American Samoa.  
*rosemaryae* Bock, 1980a: 266. Australia (NSW); Australia (Qld), Norfolk I.  
*scotos* Bock, 1980a: 288. Australia (Qld).  
*serrata* Okada, 1986a: 122. Bonin Is; Philippines, Ryukyu Is.  
*simplex* Bock, 1980a: 294. Australia (Qld).  
*stigma* Bock, 1980a: 281. Australia (Qld); Australia (NSW).  
*subciliatipes* Okada, 1986a: 118. PNG (PNG).  
*umbra* McEvey & Polak, Vanuatu **new species**  
*vanuatuae* McEvey & Polak, Vanuatu **new species**  
*variata* Bock, 1980a: 277. Australia (Qld).  
*wassermani* Wheeler & Takada, 1964: 204. Micronesia; Ryukyu Is.

**Subgenus PROMYCODROSOPHILA Okada**

- alienata* Duda, 1926b: 58. Indonesia (Sumatra); PNG (PNG); Sri Lanka.  
*annulipes* Okada, 1986b: 292. PNG (PNG).  
*gracilis* Okada, 1986b: 291. PNG (PNG).  
*heterothrix* McEvey & Bock, 1982: 697. Australia (Qld); PNG (PNG).  
**species A** undescribed sp. aff. *heterothrix*, Vanuatu.  
*legrandi* Tsacas & Chassagnard, 1991: 319. New Caledonia.  
*planata* McEvey & Polak, Vanuatu **new species**  
*quadrata* Okada, 1986b: 294. PNG (PNG).  
*separata* de Meijere, 1911b: 406 (*Drosophila*). Indonesia (Java); Australia (Qld).  
*spinata* Okada, 1986b: 293. PNG (PNG).  
*tillieri* Tsacas & Chassagnard, 1991: 322. New Caledonia.

**Incertae sedis**

- esakii* Wheeler & Takada, 1964: 205. Micronesia; ?Solomon Is.\*  
*grandifrons* McEvey & Bock, 1982: 696. Australia (Qld).\*  
*compacta* Bock, 1980a: 273. Australia (Qld); PNG (PNG).†  
*costata* Okada, 1986b: 297. PNG (PNG).†

\* Species without a wing lappet placed in the subgenus *Promycodrosophila* by Okada (1986b: 297) and in *Mycodrosophila* s. str. by Evenhuis & Okada (1989).

† Described as “intermediate between the two subgenera” by Okada (1986b: 297)