

Technical Reports of the Australian Museum

The Australian Museum Lord Howe Island Expedition 2017

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The Australian Museum Lord Howe Island Expedition 2017—Drosophilidae (Diptera)

SHANE F. MCEVEY

Australian Museum Research Institute,
Australian Museum, 1 William Street, Sydney NSW 2010, Australia

ABSTRACT. Twelve species of Drosophilidae (Diptera) have now been reported from Lord Howe Island in the Tasman Sea 600 km east of the Australian mainland. There are two endemic species: *Scaptodrosophila howensis* and an undescribed species of *Leucophenga*. Six species are peridomestic worldwide or widespread in the Australian Region. During the Australian Museum expeditions to the island in 2000–2002, 2009 and 2017, the number of species in the known fauna has doubled. The level of endemism is less than the more isolated and larger Norfolk Island, which has 4 endemics (6 spp in total), New Caledonia has 35 endemics (52 in total). The number of Lord Howe Island species is a small fraction of the total fauna of Australia (278 spp), about 140 species occur at the same latitude ($\pm 2^\circ$) on the Australia mainland. The first high resolution micrographs of *Mycodrosophila stigma*, *M. rosemaryae*, *Scaptodrosophila howensis*, *S. fungi*, *Dettopsomyia nigrovittata*, *Drosophila serrata* and *Drosophila busckii* are published here for the first time.

KEYWORDS. Diptera, Drosophilidae, Lord Howe Island, *Mycodrosophila*, *Leucophenga*, *Scaptodrosophila*

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New Guinea and the tropical north of Australia have been a single land mass for most of the last 200 thousand years (Williams, 2001), 37 genera of Drosophilidae are known from this region making it the most bio-diverse place in the world for this fly family. This can be compared to the entire Neotropical Region which has 34 drosophilid genera, the Afrotropical Region with 29 genera, and the Palaearctic with 28. Species richness attenuates southwards in a narrow corridor of suitable humid rainforest or wet sclerophyll forest habitats along the eastern seaboard of Australia (McEvey, 1994). Attenuation in species richness also occurs in an easterly direction across islands and archipelagos of the South Pacific, but insular endemism occurs on larger subequatorial islands like New Caledonia, Fiji, Samoa, and the Marquesas and Society Islands (McEvey & Polak,

2005; McEvey & Schiffer, 2015). New Zealand has a depauperate drosophilid fauna (16 spp, 4 genera) possibly due to its isolation and distance from New Guinea and its cooler climate.

Entomological surveys of the two small islands between New Zealand and Australia: Norfolk Island ($-29^\circ 167^\circ$) and Lord Howe Island ($-31^\circ 159^\circ$) have been conducted during the last 50 years. Norfolk Island is less well surveyed, has six species, 4 of which are endemic, and one of which represents a genetically isolated variant—*Drosophila ananassae* dark form—typical of islands to the north (McEvey & Schiffer, 2015). The Australian Museum expeditions to Lord Howe Island in 1971, 1974, 2000–2002, 2009 and 2017 (Table 1) have each produced interesting results summarized in the present report. An early study (Parsons & Bock, 1980)



Figures 1–4. Lord Howe Island drosophilid habitats: high-humidity, low solar radiation, still air, dense overstorey. (1) humid forest floor with minimal penetration of sunlight, littered with dead foliage, branches, fruits and flowers; drosophilids are abundant in such habitats especially on or near fungal fructifications and decaying fruit; (2) shelf or bracket fungus; (3) white crust fungus; (4) jelly ear *Auricularia* sp fungus.

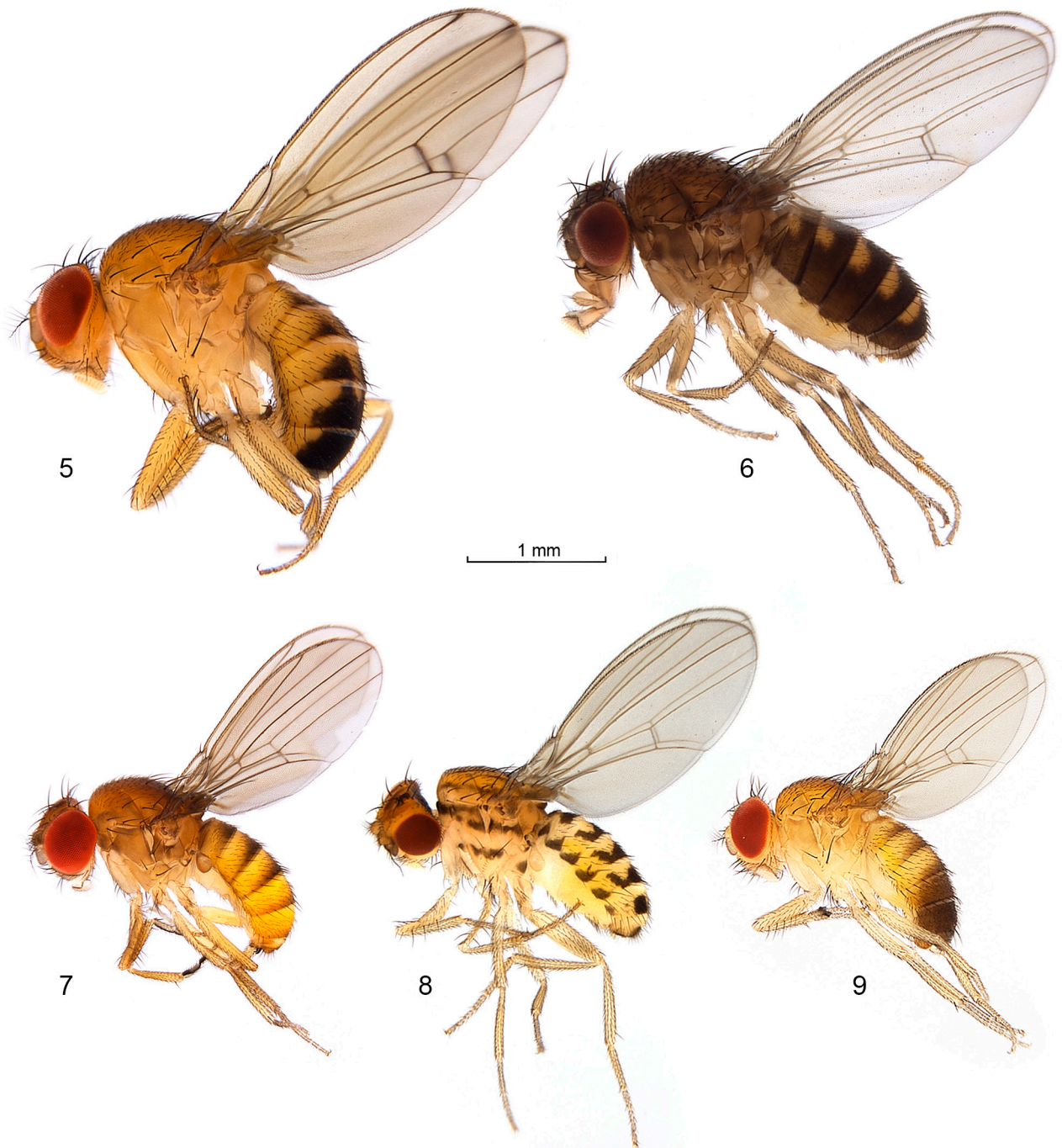
focused on genus *Drosophila* (the species of which are attracted to fruit-baits) and 4 species were reported. Five drosophilid species are reported here for the first time from Lord Howe Island (Table 2): *Dettopsomyia nigrovittata* (Malloch, 1924:352); *Drosophila busckii* Coquillett, 1901:18; *Mycodrosophila rosemaryae* Bock, 1980:266; *M. stigma* Bock, 1980:281; and *Scaptodrosophila fungi* (Bock & Parsons, 1978:343).

Materials and method

All specimens collected during the Australian Museum expeditions are preserved at the museum either as pinned material (coll. McAlpine, Holloway, and the author) or in alcohol (coll. Hutton, Reid, and the author). Drosophilidae from Lord Howe Island are, as far as is known, only housed in the Australian Museum (AM, Sydney) or in the Australian

Table 1. Entomologists or geneticists who have surveyed acalyprate flies generally or species of *Drosophila* in particular (*) on Lord Howe Island—a chronological listing since 1971. A single specimen from Lord Howe Island (*Drosophila hydei*) with no date, was possibly collected early in the 20th century; apart from which all that we know derives from the fieldwork of these 7 collectors. Specimens collected during the AM Lord Howe Invertebrate Survey (LHIS) have labels without named collectors.

D. K. McAlpine	Feb 1971	Australian Museum
G. A. Holloway	Mar 1974	Australian Museum
P. A. Parsons *	Nov 1978	La Trobe University, Melbourne
P. Cranston	Dec 1993	CSIRO ANIC, Canberra
AM staff LHIS	Nov 2000–Dec 2000	Australian Museum
I. Hutton	2000–2002	Lord Howe Island Museum
S. F. McEvey	Apr 2009	Australian Museum
C. Reid	Feb 2017	Australian Museum



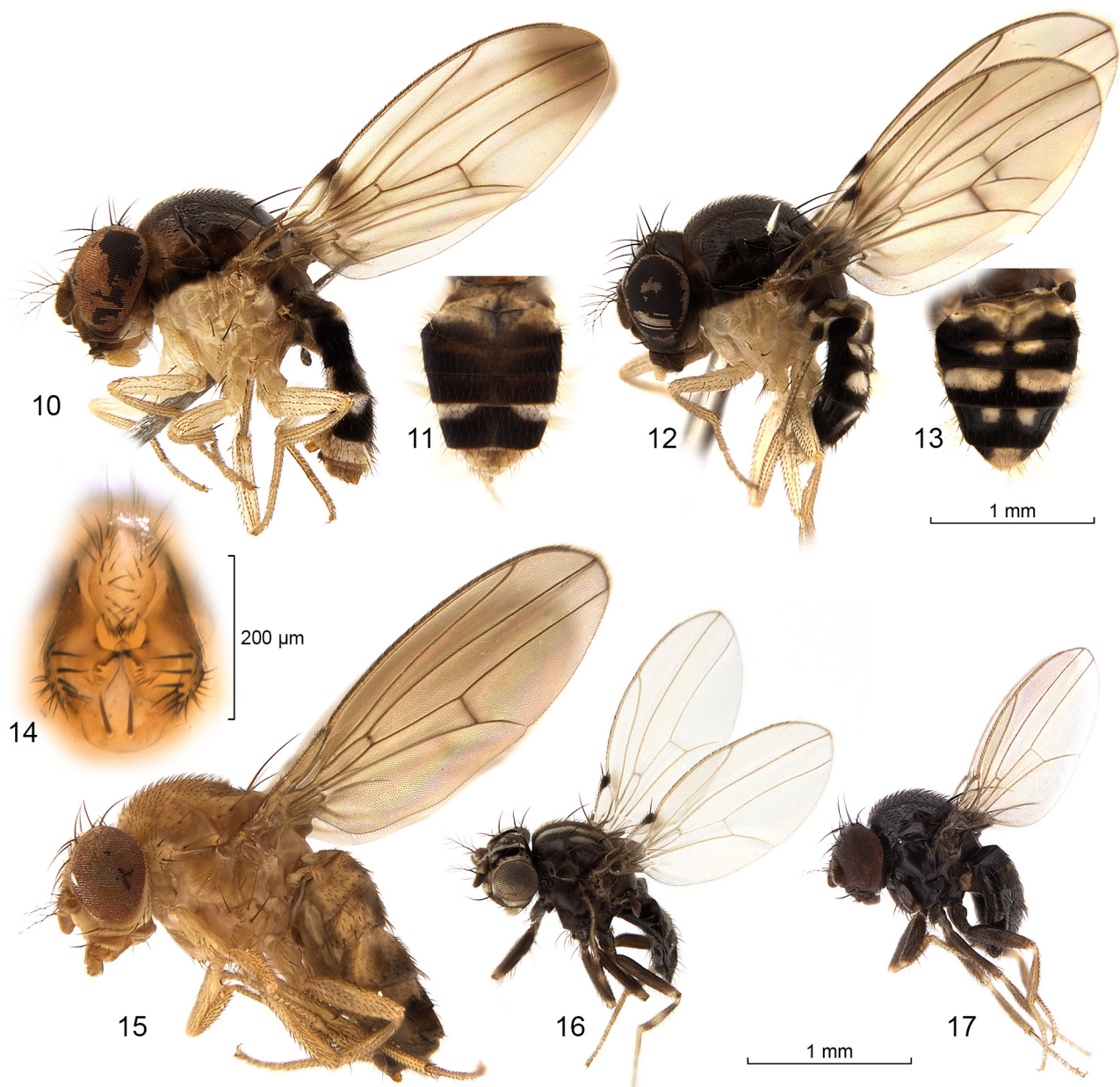
Figures 5–9. The five species of *Drosophila* currently reported from Lord Howe Island (with label-data of specimen used for photo): (5) *Drosophila immigrans* (NSW Stroud garden 40 m | -32.4079° 151.9672°±20 m | rotting fruit 11–12.iv.2015 | Shane F. McEvey); (6) *Drosophila hydei* (VIC Wandin | hydei H2 05-12-13 | Katherine Mitchell [& Michele Schiffer]); (7) *Drosophila serrata* (QLD Lake Placid | Tourist Park | Nov. 2014 | M. Schiffer strain M55); (8) *Drosophila busckii* (NSW Coffs Harbour | “The Big Banana” | 10–12 Sep. 2011 | M. Schiffer CBB); and (9) *Drosophila simulans* (NSW Stroud garden | off Cocos palm fruit | 17.iii.2013 | Shane F. McEvey). (Photos by McEvey, using Leica M205A microscope with Leica DFC 500 and Leica Application Suite version 3.8 montaging software—LASv3.8).

National Insect Collection (ANIC, CSIRO, Canberra). Fruit baits were used only by Parsons (Parsons & Bock, 1980) and by McEvey (Table 1). Only during the 2009 survey (Table 1) were specimens collected directly from fungus (Figs. 2–4). A combination of Malaise trapping, direct aspiration from fungus, fruit-baiting and general net-sweeping in damp habitats (Fig. 1) and through blossom yield the highest drosophilid species diversity. Pitfall trapping, yellow-pan trapping, light-trapping, and leaf-litter filtering generally yield very low levels of drosophilid species diversity. Nevertheless, on a large scale, the latter methods will eventually yield useful results.

All specimen records are available in full as a dataset published separately (McEvey, 2017).

Species accounts

Dettopsomyia nigrovittata (Malloch, 1924:352) (Fig. 16). This species is attracted to the rotting stems of cut banana palm. It is a very small and rare species found worldwide, but first discovered in Sydney in 1921. It is seldom encountered by entomologists and occurs nearly always in association with decaying banana palms. One specimen collected on the east side of Rocky Run.



Figures 10–17. Species of Drosophilidae (Diptera) reported from Lord Howe Island: (10–11) *Mycodrosophila stigma*, with dorsal view of abdomen (AM K472413 | LORD HOWE ISLAND | Transit Hill | 31.5287°S 159.0708°E | 30–40 m 18 April 2009 | on fungus S. F. McEvey); (12–13) *Mycodrosophila rosemaryae*, with dorsal view of abdomen (AM K472443 | NSW ... Stroud [garden, q.v.] | ... malaise trap 14-17.iv.2001 | S.F. McEvey & Tara Sassé); (14–15) the only endemic drosophilid—*Scaptodrosophila howensis*, with detail of male terminalia (paratype female: AM K72934 [paratype female] | Lord Howe Island | mushroom bait | 1.xii.1978 | P. A. Parsons; and male: NSW; Ledge at base of main cliff of Mt | Lidgbird; -31:34:1; 159:4:57; 10-May- | 2001; Ian Hutton; IH009A leaf litter ex | *Macropiper hooglandii*, *Cryplocarya* | *gregsonii*, *Elatostema*); (16) *Dettopsomyia nigrovittata*, (AM K354360 | NSW Stroud garden [q.v.] | covered [banana palm rot] compost | 24 Sept. 2005 | Shane F. McEvey); (17) *Scaptodrosophila fungi* (AM K472456 | LORD HOWE ISLAND | Dawsons Point Ridge | 31.5170°S 159.0522°E | 122 m 19 April 2009 | on fungus S. F. McEvey). (Photos by McEvey).

Drosophila busckii Coquillett, 1901:18 (Fig. 8). Throughout the world this species can be found in gardens and near or in household compost. Its presence on the island is not unexpected, found at 3 localities: Stevens Reserve, Malabar Hill track, and Dawsons Point Ridge.

Drosophila immigrans Sturtevant, 1921:83 (Fig. 5). A large and common species found in all urban areas of eastern Australia and New Zealand, especially on fermenting fruit. The wings have slight darkening at the tips of the 2nd and 3rd longitudinal veins (Fig. 5). Found at many Lord Howe Island localities including on Mt Gower near the summit.

Drosophila serrata Malloch, 1927:6 (Fig. 7). This species has been collected in very large numbers at fruit bait on the island. Closely related and very similar species occur in Australia, one of which *D. kikkawai* Burla, 1954:47 has worldwide distribution occurring in Australia, Fiji and French Polynesia. The identity of the species on Lord Howe has been confirmed by dissection of the male terminalia (Schiffer & McEvey, 2006).

Drosophila simulans Sturtevant, 1919:153 (Fig. 9). This species and its close congener *Drosophila melanogaster* Meigen, 1830:85 occur around the world in and near human

Table 2. List of all species of Drosophilidae (Diptera) known from Lord Howe Island. *Leucophenga* sp 11921 is an undescribed species from Lord Howe island. Species first discovered during Australian Museum expeditions (2000–2002, 2009 and 2017) are marked (*); *1st report*—date of first record of this species on the island; *recent rep.*—most recent record of this species on the island.

species	1st report	recent rep.	specimens
* <i>Dettopsomyia nigrovittata</i> (Malloch, 1924:352)	25/08/2001	25/08/2001	1
* <i>Drosophila busckii</i> Coquillett, 1901:18	1/12/2000	30/09/2001	5
<i>Drosophila hydei</i> Sturtevant, 1921:101	c. 1900–1940	30/06/1961	4
<i>Drosophila immigrans</i> Sturtevant, 1921:83	1/11/1978	20/04/2009	58
<i>Drosophila serrata</i> Malloch, 1927:6	18/02/1971	7/02/2017	981
<i>Drosophila simulans</i> Sturtevant, 1919:153	1/11/1978	20/04/2009	78
<i>Leucophenga</i> sp11921. McEvey	3/03/1974	18/05/2002	14
* <i>Mycodrosophila rosemaryae</i> Bock, 1980:266	1/01/2000	23/04/2009	8
* <i>Mycodrosophila stigma</i> Bock, 1980:281	18/04/2009	25/04/2009	19
* <i>Scaptodrosophila fungi</i> (Bock & Parsons, 1978:343)	25/06/2001	8/02/2017	34
<i>Scaptodrosophila howensis</i> (Parsons & Bock, 1980:978)	21/02/1971	7/02/2017	44
<i>Scaptomyza elmoi</i> Takada, 1970:144	20/02/1971	24/11/2000	4

dwelling. The absence of the latter is not significant and more extensive baiting over prolonged periods in and around the settlement will no doubt eventually produce evidence of its presence. In kitchens it is often found near ripe fruit or the alcohols produced by fermentation, e.g., banana skins in a bin, and near wine or beer. Because this species will enter a building it can contaminate fruit or leaf litter samples brought back to a lab from a remote field site. Conversely it will penetrate (probably transported by wind) into native forest habitats adjacent to built up areas.

***Leucophenga* sp 11921.** Parsons & Bock (Parsons & Bock, 1980:375) wrote: “Two other Drosophilidae were also collected at mushroom baits during the course of the present investigation. Both specimens are females of an undetermined (and probably undescribed) species of *Leucophenga* belonging to the dimorphic palp complex (“Group 3” in Bock, 1979)”. The La Trobe University collection (in which Bock and Parsons placed most of their material) was incorporated into the Australian Museum collection in 1990. Two *Leucophenga* specimens with label-data: “Lord Howe Island | November 1978 | P.A. Parsons” are now registered AM specimens: K472459 (= McE11921) and K472460 (= McE11922). About 14 additional specimens, including males, from various Lord Howe Island localities, are now available and the species will be described in another publication.

Mycodrosophila stigma Bock, 1980:281 (Figs 10–11). Species of this genus have not previously been reported from the island. Generally they are only collected by direct aspiration from fungus (see, for example, Figs 2–4). Unlike all other species in this genus the wing tips are distinctly darkened in *M. stigma* (Fig 10). It occurs on the Australian mainland from Cape York to 31°S.

Mycodrosophila rosemaryae Bock, 1980:266 (Figs 12–13). The two *Mycodrosophila* species of Lord Howe Island both have a white pleura sharply demarcated from a blackish or blackish-brown mesoscutum. Unlike *M. stigma*, *M.*

rosemaryae has hyaline wings and a distinctive patterning of the third and fourth tergites (Fig. 13). *Mycodrosophila rosemaryae* occurs on fungus in rainforests or wet sclerophyll forests from near Cairns to eastern Victoria, and is reported here from Lord Howe Island for the first time.

Scaptodrosophila fungi (Bock & Parsons, 1978:343) (Fig. 17). This tiny black fly is found from New Guinea to Stroud (32.4°S) in New South Wales on fungus. It can be very common especially at deliquescent fructifications, but because of its diminutive size it is often overlooked. Rotting-mushrooms can be used as an effective lure.

Scaptodrosophila howensis (Parsons & Bock, 1980:978). During a 1978 survey (Table 1) of *Drosophila* species of Lord Howe Island, Peter Parsons collected *S. howensis*, which was recognized as a new species endemic to the island (Parsons & Bock, 1980). Parsons and Bock wrote: “[*Scaptodrosophila howensis* is very similar to *[S.] specensis* and to *[S.] enigma* ... both of which occur at latitudes on the Australian mainland similar to that of Lord Howe Island. It can therefore be surmised that *[S.] howensis* is derived from these mainland forms. ... The male genitalia of *howensis* (especially the setation of the clasper) further distinguish it from *enigma* and *specensis*.” The male terminalia is pictured here, showing the setation of the clasper (Fig. 14). On Lord Howe Island it was collected at mushroom-baits by Parsons, in leaf-litter by Hutton, in a Malaise trap by Reid, and by sweeping over compost by the author. It occurs across the island at numerous sites and elevations.

Scaptomyza elmoi Takada, 1970:144. This species is separated from *S. australis* Malloch, 1923 (a very common Australian species) most readily by a count of the number of ventral arisal rays: two in *S. australis* and one in *S. elmoi*. Bock (1982) cited Takada as source of distribution records for *S. elmoi* that include Japan, Taiwan, Hawaii, Australia and New Zealand.

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