

## Southern and East African *Melitta* Kirby (Apoidea: Melittidae)

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Six species of *Melitta* Kirby are recorded from southern Africa and one from East Africa. Four names are placed into synonymy: *Melitta capensis*, *Melitta longicornis* and *Melitta turneri* are junior synonyms of *Melitta arrogans*, and *Melitta flavipes* is a junior synonym of *Melitta schultzei*. Three new species have been described from southern Africa: *Melitta whiteheadi* Eardley sp. n., *Melitta danae* Eardley sp. n. and *Melitta barbarae* Eardley sp. n., and one from East Africa, namely *Melitta katherinae* Eardley sp. n. *Melitta rufipes* Friese is transferred to *Rediviva*.

**Key words:** bee, pollinators, identification key, *Acacia*, *Asclepias*, *Augea*, *Berkheya*, *Cleome*, *Conicosia*, *Heliophila*, *Hermbstaedtia*, *Lebeckia*, *Oxalis*, *Ruschia*, *Wahlenbergia*, *Watsonia*, *Zygophyllum*, *Nomada*.

### INTRODUCTION

Many interesting Melittidae occur in southern Africa. The higher classification was reviewed by Michener (1981, 2000) and Engel (2001, 2005), but there is a need to determine the identity of the species and describe the diversity of the genera in order to understand their biology and ecological significance. This article deals only with *Melitta* Kirby, and is part of a larger study on the Melittidae.

*Melitta* occur through the Holarctic and Africa. Michener (2000) briefly described the global distribution of the genus and indicated the diversity in each area. It is most diverse in the Palearctic. In Africa the greatest diversity is in southern Africa, as described below.

*Melitta*, in large, are poorly known and this article should stimulate further collecting and identification of these bees, result in the discovery of the unknown sexes of three new species, provide better information on distribution patterns and host plant requirements and may lead to the discovery of new species. Following the synonymy of three species it is here concluded that six species of *Melitta* occur in southern Africa, namely *Melitta arrogans* (Smith), *Melitta barbarae* Eardley, *Melitta danae* Eardley, *Melitta whiteheadi* Eardley, *Melitta albida* Cockerell and *Melitta schultzei* Friese, and one in East Africa, *Melitta katherinae* Eardley. The new species are attributed only to Eardley. *Melitta rufipes* Friese (1913b) is transferred to *Rediviva*.

Gess (1996) recorded *Melitta capicola* Friese from southern Africa, but this was an error because such a species has not been described and the host plants she recorded are not among her material of *Melitta*.

*Melitta* is difficult to identify because it lacks unique features, and closely resembles *Rediviva* Friese, *Redivivoides* Michener and *Andrena* Fabricius. It is a short-tongued bee with one subantennal suture (Fig. 1) and no facial fovea in the females, as occur in *Andrena*, the first recurrent vein in the forewing meets Rs+m in the middle of the second submarginal cell (illustrated in Fig. 3) and is similar to *Rediviva*, *Redivivoides* and *Andrena*, the propodeum is declivous, which separates it from *Andrena*, the propodeal triangle is large (Fig. 2) and usually has granular sculpture and is not shiny, except in females of *M. barbarae* and *M. schultzei* the propodeal triangle weakly sculptured and a little shiny (these two characters separate it from *Rediviva* and *Redivivoides*).

In all female Afrotropical *Melitta* the vestiture on the face and mesosoma varies from brown, with a mixture of white, brown and black hairs, through pale yellow to orange above, and whitish below. The coxae, trochanters and femora are always concolorous with the mesosomal venter. The integument on the head and mesosoma, excluding the appendages, is black. Metasoma black, except for *M. arrogans* that has orangish parts on the metasomal dorsum. The eyes, in frontal view are more or less equidistant apart above and below. Males have pale facial vestiture with a narrow fringe of black laterally, except in *M. katherinae* this

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fringe is absent. The vestiture on the ventral surfaces of the tarsi is orange. The integument of the head (excluding antennal flagellum), mesosoma (excluding legs) and metasoma is black, and the vestiture ranges from white through pale orange to brown, except T4–T7 are black. The eyes, in frontal view, are more or less equidistant above and below.

Because there are only seven species the comparisons can be dealt with most concisely in one paragraph. The most conspicuous unique feature of the female of *M. arrogans* is the orange integument on the metasomal dorsum; in all other species the metasoma is black. Males and females also have long malar spaces, impunctate, glabrous ventral clypeal margins and strong, granular sculpture on the propodeal triangle. Occasionally the metasomal integument is completely black, but the other species with a similar propodeal triangle have a short malar space (*M. danae* and *M. albida*), or are much bigger (*M. whiteheadi*). *Melitta arrogans* is most closely related to *M. barbarae*, which is known only from the female and always has the metasomal integument black, a shiny propodeal triangle and a slightly raised vertex. In *M. whiteheadi* the clypeus punctation almost reaches the ventral clypeal margin, and it is much bigger than all the other species. *Melitta danae* and *M. albida* have short malar spaces and strongly sculptured propodeal triangles. In *M. danae* the proximal metasomal terga are completely covered with orangish pilosity, whereas in *M. albida* they are black anteriorly and white posteriorly. *Melitta schultzei* has a short malar space, shiny propodeal triangle and often orange vestiture at the distal end of the metasoma.

Males are more difficult to separate using external morphology, but their terminalia give conclusive identifications. The male of *M. arrogans* has a long malar space. The males of *M. barbarae* and *M. whiteheadi*, which are unknown, possibly also have long malar spaces, as in their females. The male of *M. whiteheadi* would most likely be large. In *M. schultzei* the propodeal triangle is shiny, and often the legs and antennal flagellum are orange. All these features are unique. In *M. katherinae* the vestiture on T3 is completely yellowish, in *M. danae* T3 has a mixture of yellow and black hairs and in *M. albida* T3 is black with a white distal fringe. *Melitta katherinae* does not have a narrow black, lateral fringe on the face and occurs in Kenya.

## METHODS

In the identification key and descriptions the metasoma terga and sterna are abbreviated T and S. In material examined grid references in brackets were not included on the specimen labels. The type depository acronyms are included in the acknowledgements.

### Key to the species of *Melitta* that occur in southern and East Africa

1. Malar space long (longer than scape width) ..... 2
  - Malar space short (shorter than scape width) ..... 4
2. Female large (14.2 mm long); hind tibia and tarsus black; male unknown. .... *Melitta whiteheadi*
  - Both sexes medium-sized (female 10.0–12.3, male 8.4–11.0 mm long); female hind tibia and tarsus orange or orangish. .... 3
3. Female metasoma commonly partly orange on T1–T2; propodeal triangle with coarse granular sculpture and matt appearance; male hind tibia swollen; terminalia as illustrated (Figs 5–8) ..... *Melitta arrogans*
  - Female metasoma completely black; propodeal triangle with fine sculpture and shiny; male unknown. .... *Melitta barbarae*
4. Occurring in Kenya; female unknown; male with vestiture on T3 completely yellowish, face without lateral, narrow, black fringes; S6–S8 and genital capsule as illustrated (Figs 21–24) ..... *Melitta katherinae*.
  - Occurring in southern Africa; male in most specimens with vestiture on T3 partly black, face with lateral, narrow, black fringes; S6–S8 and genital capsule different ..... 5
5. Female propodeum with fine sculpture and shiny; male terminalia as in Figs 25–28 ..... *Melitta schultzei*
  - Propodeum with granular sculpture and matt appearance in both sexes; male terminalia different ..... 6
6. Both sexes with vestiture on anterior part of T3 black anteriorly and white posteriorly; male S6–S8 and genital capsule as illustrated (Figs 16–19). .... *Melitta albida*
7. Both sexes with vestiture on anterior part of T3 at least partly orangish; male S6–S8 and genital capsule as illustrated (Figs 12–15) ..... *Melitta danae*

***Melitta arrogans* (Smith), Figs 1–9**

*Andrena arrogans* Smith, 1879: 56, female holotype (NHML) South Africa; Friese 1911a: 651.

*Andrena (Rediviva) arrogans* Smith: Friese 1911b: 671.

*Melitta arrogans* (Smith): Meade-Waldo 1916: 463; Cockerell 1935: 76.

*Melitta dimidiata* var. *capensis* Friese, 1909: 183, 4 female syntypes (ZMHU) South Africa; Brauns 1930: 43–46; Cockerell 1932: 449.

**Syn. nov.**

*Melitta capensis* Friese: Brauns 1930: 43–46; Rozen 1974: 6; Michener 1981: 40, 43, 46, 121; Struck 1992: 77; Struck 1994: 15.

*Melitta capensis* (Friese) [!]: Cockerell 1932: 449.

*Melitta longicornis* Friese, 1913b: 575, female and male syntypes (type depository unknown) South Africa; Friese 1913a: 588–589; Cockerell 1934: 449, 451–452; Cockerell 1935: 76; Michener 1981: 40. **Syn. nov.**

*Melitta turneri* Cockerell, 1935: 76 female holotype (NHML) Namibia; Meade-Waldo 1916: 463; Cockerell 1939: 181. **Syn. nov.**

All the type material has been studied, except that of *M. longicornis*, which has not been located, but Michener (1981) synonymized it with *capensis* and we concur following the study of the literature. *Melitta turneri* was not described by Brauns, as suggested by Meade-Waldo (1916), and the first description was the inclusion of this species in a key by Cockerell (1935). Cockerell (1939) synonymized it with *capensis*, which is here synonymized with *M. arrogans* making *longicornis* and *turneri* synonyms of *M. arrogans*.

*Melitta arrogans* resembles the African honey bee, except that the paler metasomal integument is yellowish in the honey bee and orange in *M. arrogans*. The presence of a corbicula in the honey bee and not in *Melitta* is the most conspicuous character for separating these two species.

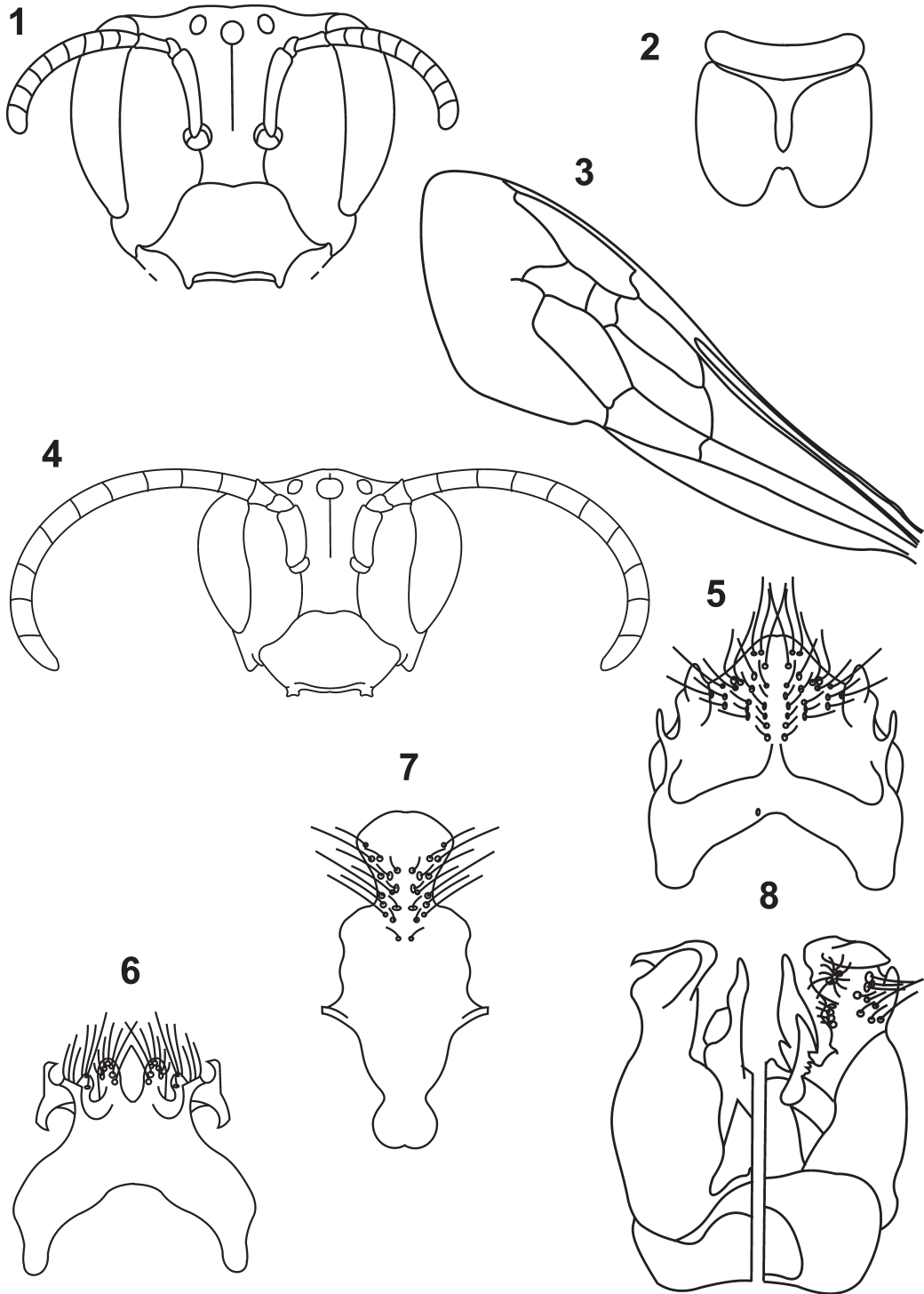
**Description**

**Female.** Size: head 2.9–3.2 mm; scutum 2.4–2.7 mm; forewing 8.7–9.0 mm; body 10.7–12.3 mm. Vestiture: mesosoma commonly brownish, seldom orange, which when occurs is most conspicuous on posterior part of mesosoma (scutum with black and orange hairs); fore and middle tibiae and tarsi black above and orange below; hind tibia and basitarsus mostly orange (orange hairs sometimes with weak blackish tinge), black near basitibial

plate and pencillus; remainder of tarsus black; metasomal dorsum with T1 orange; T2–T3 black and orange, with pallid distal fringes; T4 black anteriorly and white posteriorly; T5–T6 black; lateral region and venter white, except S5–S6 black. Integument: legs black, except hind tibia and basitarsus mostly orangish (proximal region of tibia and distal region of basitarsus blackish); T1–T3 orange with middle of dorsal surface black (black area decreases in size towards posterior end of metasoma); T4–T6 black; S1–S3 orange anteriorly and black posteriorly; S4–S6 black. Face with vertex about level with upper extreme of eye (Fig. 1); densely punctate, sculptured between punctures, shiny, except lower half of clypeus impunctate and glabrous; malar area long (malar area: eye = 1.0: 7.0); galea acutely pointed, with reticulate sculpture; glossa protrudes a little beyond galea and slightly longer than labial palpus; antennal scape as long as clypeus, reaching to upper extreme of lateral ocellus; flagellar segment 1 less than one-third scape length; labrum convex, punctate; forewing with first recurrent vein meeting Rs+m in middle of second submarginal cell, venation as illustrated (Fig. 2); propodeal triangle large (Fig. 3) with fine granular sculpture, and mat appearance.

**Male.** Size: head 2.4–2.8 mm; scutum 2.0–2.7 mm; forewing 7.5–8.3 mm; body 9.4–11.0 mm. Vestiture on face white with a narrow black lateral fringe; mesosoma, legs and metasoma pallid, white or pale orange (scutum with a few black hairs intermixed with pale vestiture), except posterior region of metasoma black (T4/T5–T6); outer surface of hind tibia sparsely pubescent. Integument of antennal flagellum black and legs blackish. Face with vertex about level with upper extreme of eye (Fig. 4); densely and very finely punctate, and shiny between punctures, except ventral region of clypeus impunctate and glabrous; malar area long (malar area: eye = 0.9:5.7); galea and glossa similar to female; antennal scape 0.9 times clypeus length; flagellar segment 1 one-half scape length, flagellum much longer than twice eye length; outer surface of hind tibia swollen; propodeal triangle with fine granular sculpture and matt appearance; S6–S8 and genital capsule as illustrated (Figs 5–8).

**Remarks.** Struck (1992, 1994) recorded it on flowers of *Conicosia elongata*, *Ruschia elineata* (both Aizoaceae), and here it is recorded on *Hemibstaedia glauca* (Amaranthaceae), *Asclepias buchenaiana* (Asclepiadaceae), *Augea capensis*, *Zygo-*



**Figs 1–8.** *Melitta arrogans*. 1–3, Female: 1, face, frontal view; 2, propodeum; posterior view; 3, forewing, showing venation. 4–8, Male: 4, face, frontal view; 5–7, sternite 6–8, respectively, ventral views; 8, gonocoxa, left dorsal view, right ventral view.

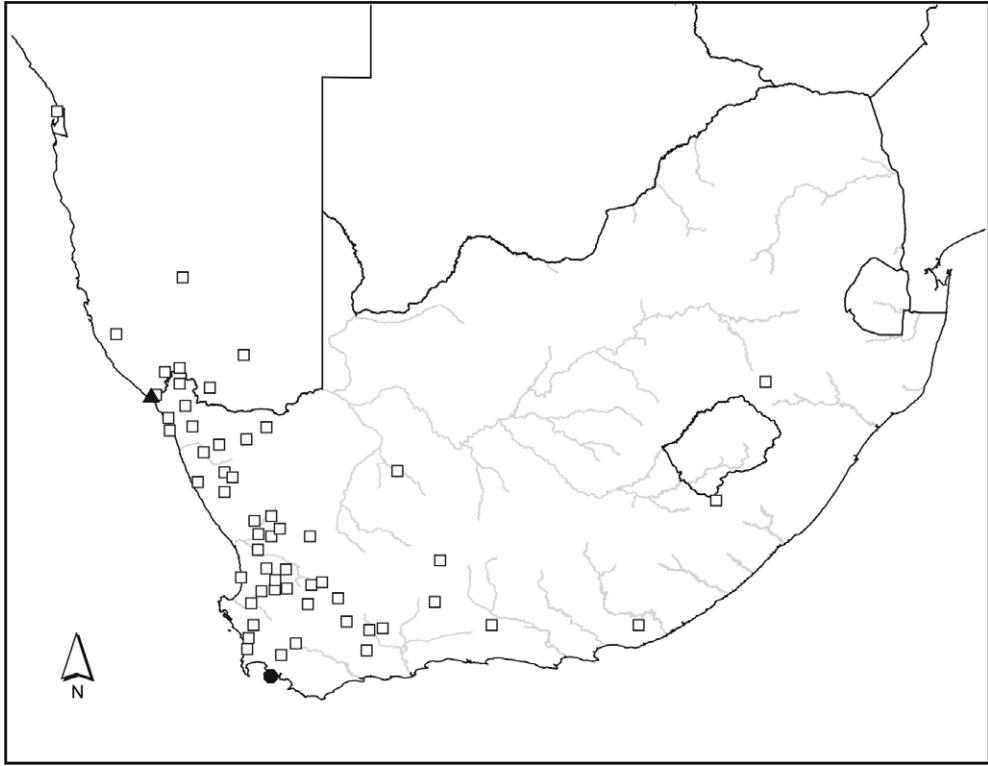


Fig. 9. Known distribution of *Melitta arrogans*, □, *M. barbarae*, ▲, and *M. whiteheadi*, ●.

*phyllum flexuosum*, *Zygophyllum prismatocarpum*, *Zygophyllum* cf. *morgsana*, *Zygophyllum meyeri*, *Zygophyllum stapffii* (Zygophyllaceae), *Lebeckia* sp. (Fabaceae), *Wahlenbergia* sp. (Campanulaceae), *Berkheya fruticosa* (Asteraceae), *Heliophila africana* (Brassicaceae) and *Cleome paxii* (Capparaceae). Brauns (1930) recorded it as the host of *Nomada gigas* Friese (Apidae).

**Distribution** (Fig. 9). This species' distribution is confined to southern Africa, expanding from East to West south of the 27 degree latitude. The vegetation types within its distribution range vary greatly. They have been most commonly collected in semi-desert, both summer and winter rainfall areas, with one record from montane grassland.

**Type material.** *Melitta dimidiata* var. *capensis*, male syntype: 'Willowmore, Capland, Dr H. Brauns 15.10.99; Type Friese.; Type *Melitta dimidiata* var. *capensis* Friese; TYPE Hym1934, *Melitta capensis* Friese', in ZMHU.

**Additional material.** NAMIBIA: Klinghardtberge (27.18S 15.45E), 15–22.x.1974, R.H. Watmough (1♀ 2♂ NCSA); Klinghardtberge, 20–21.x.1974, R.H. Watmough (3♀ NCSA); 51 km north Grünau

2718CB (27.44S 18.23E), V.B. Whitehead (1♂ SAMC); Boom River Canyon, 4 km north Orange River, 28.00S 17.03E 200 m, 25–30.x.1996 (2♀ NCSA); Great Karas Mountains (26.08S 17.07E), xi.1936 (1♀ SAMC); Obib Mountains (28.05S 16.45E), 27.x.1977, V.B. Whitehead (1♀ SAMC); Swakopmund, Swakop River at bridge, 22.42S 14.32E, 16.iii.1999, F.W. & S.K. Gess, On *Zygophyllum stapffii* (1♀ AMGC). SOUTH AFRICA: Harrismith, 28.17S 29.09E, i.1979, C. Eardley (1♂ NCSA); Naudesnek (30.44S 28.08E), 2500 m, 12.i.1985, K. Steiner, (1♀ SAMC); Strowan, Grahamstown (33.18S 26.32E), 19.xii.1971, F.W. Gess (1♀ AMGC); Willowmore (33.18S 23.30E), 31.x.1967, C. Jacot-Guillarmod (2♂ AMGC); Willowmore, different date, H.Brauns, (10♀ 8♂ TMSA); Blouberg Strand (33.48S 18.27E), 22.viii.1978, V.B. Whitehead, On *Zygophyllum flexuosum* (3♂ SAMC); Tankwa Karoo, Renoster River (32.25S 20.00E), xi.1952 (1♂ SAMC); Murraysberg district (32.33S 19.16E), xi.1935 (2♂ SAMC); Helskloof (28.18S 16.58E), 24.ix.1982, V.B. Whitehead (2♂ SAMC); between Nieuwoudtville and top Vanrhyn's Pass (31.27S 19.02E), 29–30.ix.1990, F.W.

- & S.K. Gess (2♀ 2♂ AMGC); 58 km south Alexander Bay, 29.02S 16.49E, 8.x.2000, F.W. & S.K. Gess, On *Lebeckia* sp. (2♀ 1♂ AMGC); Citrusdal, east bank of Olifants River, 32.26S 18.58E, 5.x.1997, F.W. & S.K. Gess, On *Wahlenbergia* sp. (1♀ AMGC); Between Annie and Dabie rivers, 28.20S 16.55E, 19.ix.1997, F.W. & S.K. Gess, On *Zygophyllum prismatocarpum* (1♀ 4♂ AMGC); Nieuwoudtville, Water Fall, 31.19S 19.07E, 23–30.ix.1994, F.W. & S.K. Gess, On *Zygophyllum* cf. *morgsana* (1♀ AMGC); 6.3 km north east Klawer (31.45S 18.40E), 13.ix.1984, V.B. Whitehead (8♂ SAMC); Garies, 9 km east Soutfontein, 31.17BA (30.36S 18.05E), 22.viii.1990, V.B. Whitehead & M. Macpherson (2♀ 1♂ SAMC); Garies, Welkom Farm, 30.18CA (30.37S 18.07E), 30.ix.1988, V.B. Whitehead (1♂ SAMC); Hex River Pass, 33.19BD (33.41S 19.27E), 18.x.1989, K. Steiner, V.B. Whitehead (2♀ SAMC); Struisputs, 33.50S 20.55E, 1.v.1985, V.B. Whitehead, M. Macpherson (3♀ SAMC); Dunes, Breekkerie, 30.07S 21.33E, 3–5.viii.1985, V.B. Whitehead, M. Macpherson (2♀ SAMC); Dunedin farm, Loxton, 31.22CD (31.58S 22.26E), 18.xii.1979, V.B. Whitehead (2♀ 1♂ SAMC); Hester Malan Nature Reserve, 29.17DB (29.38S 17.59E), 12.viii.1985, 17.ix.1985, 7.x.1986, 26.v.1985, M. Struck (3♀ 2♂ SAMC); Vanrhynsdorp, road to Gifberg (31.45S 18.45E), 2.viii.1988, V.B. Whitehead (1♀ SAMC); Vanrhynsdorp, Zandkraal, 31.18DA (31.16S 18.40E), 1.viii.1985, V.B. Whitehead (1♀ SAMC); 20 east Vanrhynsdorp, 31.28S 18.57E, 20.ix.2001, C. Eardley, (6♀ NCSA); 5 km north Clanwilliam, 32.08S 18.51E, 27.ix.2001, C. Eardley (3♀ NCSA); Ramskop Camp, Clanwilliam, 32.18BB (32.10S 18.52E), 22.viii.1984, V.B. Whitehead, M. Macpherson (4♀ SAMC); Wallekraal (32.23S 17.31E), x.1950 (3♀ SAMC); 10 km WNW Wallekraal, 30.21S 17.26E, 12.x.1994, F.W. & S.K. Gess, On *Berkheya fruticosa* (1♂ AMGC); Skouerfontein, 28.17CC (28.47S 17.10E), 6.x.1980, V.B. Whitehead (3♀ SAMC); Tygerberg, 33.18BC (33.18S 18.35E), 1.x.1990, K. Steiner, On *Heliophilla africana* (2♀ SAMC); Klipfontein, 29.17BA (29.44S 17.33E), 3.viii.1988, V.B. Whitehead (2♀ SAMC); north of Citrusdal (32.34S 19.01E), 8.viii.1984, V.B. Whitehead (2♀ SAMC); Hex River Pass, 33.19BD (33.41S 19.27E), K. Steiner (1♀ SAMC); 5 km South Bidouw, 32.19AA (32.13S 19.10E), 30.viii.1990, K. Steiner (1♀ SAMC); Rooikloof, 41 km south Sutherland, 22.20BC (32.45S 20.20E), 30.ix.1986, V.B. Whitehead (3♀ SAMC); Eland's Bay, Baboon Point (32.19S 18.19E), 13.xi.1979, V.B. Whitehead (1♀ SAMC); Hetkruis, Groenrivier (32.36S 18.45E), 11.viii.1988, V.B. Whitehead (1♀ SAMC); Buffelspoort, Ladismith, 32.20BD (32.26S 20.58E), 16.viii.1995, V.B. Whitehead (1♀ SAMC); Jakkalsvlei, Graafwater (32.16S 18.46E), 28.x.2001, V.B. Whitehead (1♀ SAMC); Nieuwoudtville Flower Reserve, 31.19AC (31.22S 19.07E), 25.ix.1986, V.B. Whitehead (1♀ SAMC); Numees, 28.16BD (28.16S 16.59E), 22.viii.1986, M. Struck (1♀ 1♂ SAMC); Lammerskraal, near Prince Albert (32.49S 22.19E), ix.1947, (2♂ SAMC); Atlantis (33.34S 18.29E), 16.ix.1985, V.B. Whitehead (1♀ SAMC); 9 km south Clanwilliam (32.15S 18.52E), 28.viii.1986, V.B. Whitehead, On *Zygophyllum* sp. (1♀ SAMC); Franschoek Pass, 6 km north DuToit's River bridge (33.55S 19.09E), 2.xi.1990, V.B. Whitehead (2♀ SAMC); O'okiep (29.35S 17.52E), ix.1890 (1♀ SAMC); Calvinia (31.28S 19.47E), ix.1947 (1♀ SAMC); Calvinia, Witsputs Farm, 3.9 km Middelpoos road, 31.19DB (31.28S 19.45E), 28.viii.1990, V.B. Whitehead (1♀ SAMC); Port Nolloth (29.17S 16.51E), viii.1890, R. Lightfoot, *Melitta dimidiata* v. *capensis*♀ 1910 H. Friese det. (1♀ SAMC); Vanrhynsdorp, Water Fall, 155m, 31.47S 18.45E, 15.ix.2005, C. Eardley (1♀ NCSA); north slope Touwsberg, 33.21CA (33.24S 20.58E), 6.x.1993, K. Steiner (1♀ SAMC); 30 km west Laingsberg, 32.20BA (33.14S 20.30E), 15.ix.1993, V.B. Whitehead (1♀ SAMC); Farm Vleiland, 33.21AC (33.22S 21.11E), 16.ix.1999, K. Steiner (1♀ SAMC); Sauer, Groenfontein, 32.18DC (32.51S 18.32E), V.B. Whitehead (1♀ SAMC); Komaan, 29.17AB (29.12S 17.19E), 3.x.1980, V.B. Whitehead (1♀ SAMC); Nieuwoudtville Botanical Gardens, 31.22S 19.07E, 9.ix.1987, C. Eardley (5♀ NCSA); Peerboomsloof Pass, 86 km E Ceres, 32.52S 19.42E, 24.ix.2001, C. Eardley (1♀ NCSA); Garies, 30.33S 17.59E, 29.ix.1990, C. Eardley (1♀ NCSA); Clanwilliam, Biedouw Valley, 32.08S 19.14E, 5–7.ix.1987, C. Eardley (1♀ NCSA); 2 km north west Algeria Forest Station, 32.22S 19.02E, 26.ix.1990, C. Eardley (1♀ NCSA); Knersvlakte, 20 km north Vanrhynsdorp, 31.26S 18.41E 20.ix.2001, C. Eardley (1♀ 1♂ NCSA); Helskloof, 28.50S 17.20E, 10.x.1974, R.H. Watmough (3♀ NCSA); Richtersveld, Paradysberg (28.19S 17.03E), 11.x.1974, R.H. Watmough (2♀ NCSA); Aggeneys, 29.13S 18.51E, 24.v.1989, R.Dean (1♀ NCSA); Farm Dassiefontein, near Kamieskroon, 30.09S, 17.59E, 1.x.1990, C. Eardley (1♀ NCSA); Richtersveld National Park, Pootjiespram, 28.05S 16.57E, 16.ix.1995, F.W. & S.K. Gess, On *Cleome paxii* (1♂ AMGC); Richtersveld National Park, Pachtvlei,

28.33S 16.34E, 15.ix.1995, F.W. & S.K. Gess, On *Cleome paxii* (1♂ AMGC); Richtersveld National Park, between hills north west Koeroegabvlakte, 28.08S 17.01E, 14.ix.1995, F.W. & S.K. Gess, On *Zygophyllum meyeri* (1♂ AMGC); Richtersveld National Park, Koeroegabvlakte, 28.11S 17.03E, 17–21.ix.1995, F.W. & S.K. Gess, On *Hermibstaedia glauca* (1♂ AMGC); 5 km from Kuboos (28.24S 17.41E), 9.x.1974, R.H. Watmough (1♀ NCSA); Pachtvlei E. Alexander Bay, 28.33S 16.34E, 10.x.2000, F.W. & S.K. Gess, On *Lebeckia* sp. (2♀ AMGC); 60 km E Springbok, 29.28S 18.26E, 1.x.1997, F.W. & S.K. Gess, On *Asclepias buchenaviana* (3♂ AMGC); Remhoogte, 30.14S 18.10E, Malaise, 15.ix. 3.x.2004, C. Mayer (1♀ MKMU); Knersvlakte, 31.17S 18.36E, Malaise, 3. 10.x.2001, U. Schmiedel (2♂ MKMU); Knersvlakte, 31.17S 18.36E, Malaise, 7. 14.xii.2001, U. Schmiedel (2♂ MKMU); Knersvlakte, Kalkgat, 31.07S 18.55E, Malaise, 20.ix. 15.x.2000, U. Schmiedel, M. Kuhlmann (2♂, 1♀ MKMU); Knersvlakte, Kalkgat, 31.07S 18.55E, Malaise, 27.viii. 20.ix.2000, U. Schmiedel, M. Kuhlmann (2♂, 1♀ MKMU); Knersvlakte, Kalkgat, 31.07S 18.55E, Malaise, 8. 18.viii.2000, U. Schmiedel, M. Kuhlmann (1♀ MKMU); Knersvlakte, Kalkgat, 31.07S 18.55E, Malaise, 18– 27.viii.2000, U. Schmiedel, M. Kuhlmann (2♀ MKMU); Nieuwoudtville, Flower Reserve, 31.21S 19.08E, 730 m, 1.ix.2002, M. Kuhlmann (1♀ MKMU); Nieuwoudtville, Flower Reserve, 31.21S 19.08E, 730 m, 13.ix.2002, M. Kuhlmann (1♀ MKMU); Nieuwoudtville, Flower Reserve, 31.21S 19.08E, 730 m, 29.v.2004, M. Kuhlmann (1♂ MKMU); Nieuwoudtville, Flower Reserve, 31.21S 19.08E, 730 m, 2.vi.2004, M. Kuhlmann (1♂ MKMU); Vanrhynsdorp, 31.36S 18.44E, 3.viii.2003, K. Timmermann (1♂ MKMU); Knersvlakte, 45 km NE Vanrhynsdorp, 31.03S 18.57E, 140 m, 20.vii.2003, K. Timmermann (2♂ MKMU); Knersvlakte, Kalkgat, 31.07S 18.56E, 140 m, 10.ix.2003, K. Timmermann (1♀ MKMU); Knersvlakte, Kalkgat, 31.07S 18.56E, 140 m, 18.ix.2003, K. Timmermann (1♀ MKMU); Knersvlakte, Kalkgat, 31.07S 18.56E, 140 m, 17.viii.2003, K. Timmermann (1♂ MKMU); Knersvlakte, Kalkgat, 31.07S 18.56E, 140 m, 31.vii.2003, K. Timmermann, on *Augea capensis* (2♂ MKMU); Knersvlakte, 30 km N Vanrhynsdorp, 31.22S 18.42E, 146 m, 22.viii.2003, K. Timmermann (2♀, 1♂ MKMU); Knersvlakte, 30 km N Vanrhynsdorp, 31.22S 18.42E, 146 m, 16.viii.2003, K. Timmermann (1♂ MKMU); Knersvlakte, 30 km N Vanrhynsdorp, 31.22S 18.42E, 146 m, 17.vii.2003, K. Timmermann

(1♂ MKMU); Knersvlakte, 30 km N Vanrhynsdorp, 31.22S 18.42E, 146 m, 19.vii.2003, K. Timmermann, on *Augea capensis* (1♀, 2♂ MKMU).

### ***Melitta barbarae* Eardley sp. n., Fig. 9**

#### *Description*

*Female.* Size: head 2.9 mm; scutum 2.4 mm; forewing 8.4 mm; body 11.0 mm. Similar to *M. arrogans* except as follows: vestiture on mesosoma pallid, not orange; all legs orange to blackish-orange; pallid vestiture on metasomal beige, never orange; integument of all legs orange to blackish-orange; metasoma black (never orange); face with vertex raised a little above upper extreme of eye (intermediate between that in Fig. 1 and Fig. 10); densely punctate and shiny between punctures; malar area long (malar area:eye = 1.0:6.8); galea weakly pointed; antennal scape reaching to upper extreme of lateral ocellus; flagellar segment 1 less than one-third scape length; labrum convex, glabrous; propodeal triangle with fine granular sculpture, and weakly shiny. Male unknown.

*Remarks.* It is recorded visiting flowers of *Lebeckia multiflora* (Fabaceae).

*Distribution* (Fig. 9). This species is known only from the southwestern part of Namibia, which is winter rainfall desert.

*Etymology.* This species is named for Barbara Gemmill to acknowledge her tireless contribution to pollinator biodiversity conservation

*Type material.* Namibia, between Oranjemund and check point, 28.34S 16.28E, 26.ix.1997, F.W. & S.K. Gess, On *Lebeckia multiflora* (female holotype, 5♀ paratypes AMGC, 2♀ paratypes NCSA).

### ***Melitta whiteheadi* Eardley sp. n., Fig. 9**

#### *Description*

*Female.* Size: head 4.0 mm; scutum 3.2 mm; forewing 10.5 mm; body 14.2 mm. Vestiture: mesosoma mostly dark brown with a little orange on anterior region of scutum; legs mostly blackish-orange, ventral surface of middle tarsus reddish-orange and scopa bright orange; metasomal dorsum with T1 whitish, T2–T4 black anteriorly and white posteriorly, T5–T6 black; lateral and ventral regions white anteriorly and blackish-orange posteriorly. Integument black. Face with vertex above upper extreme of eye (*cf.* Fig. 2); densely punctate with very small punctures and glabrous; clypeus similar to rest of face (punctures bigger); malar

area long (malar area:eye = 1.5:8.5); galea weakly pointed, with reticulate sculpture; glossa protrudes a little beyond galea and slightly longer than labial palpus; antennal scape shorter than clypeus (1:0.9), and reaching to lower edge of lateral ocellus; flagellar segment 1 one-fourth scape length; labrum convex, glabrous; propodeal triangle with fine granular sculpture, and mat appearance. Male unknown.

*Remarks.* It is here recorded on flowers of *Watsonia* sp. (Iridaceae)

*Distribution* (Fig. 9). This species is known only from the type locality, which is coastal Cape fynbos.

*Etymology.* This species is named for V. B. Whitehead, collector of the type material.

*Type material.* South Africa, Betty's Bay, 3418BD (34.22S 18.56E), 4.xi.1998, V.B. Whitehead, On pink *Watsonia* sp. (♀ holotype SAMC, 1♀ paratype NCSA, 3♀ paratypes SAMC).

### ***Melitta danae* Eardley sp. n., Figs 10–15, 20**

#### **Description**

*Female.* Size: head 2.4–3.2 mm; scutum 2.1–2.6 mm; forewing 7.4–9.3 mm; body 10.0–11.3 mm. Vestiture: mesosoma frequently with orange covering entire dorsum; fore tibia pallid, tarsus blackish above and orange below; middle tibia and tarsus pallid dorsally, with orange or black tinge, and ventral surface of tarsus orange; hind tibia and basitarsus mostly orange, black near basitibial plate and pencillius; remainder of hind tarsus blackish; metasomal dorsum with T1 whitish to orange, distal margin with dense fringes; T2–T3 orange with dense distal fringes; T4 black anteriorly and white to orange posteriorly; T5–T6 black; lateral region and venter white. Integument: legs black, except hind tibia and basitarsus mostly orange, basitibial plate black; metasoma black. Face (Fig. 10) with vertex above upper extreme of eye; very densely punctate (little space between punctures), clypeus less densely punctate than rest of face, especially ventrally, and weakly glabrous; malar area short (malar area:eye = 0.5:6.5); galea acutely pointed, with reticulate sculpture; glossa protrudes a little beyond galea and slightly longer than labial palpus; antennal scape equal to clypeus length, and reaching to upper extreme of lateral ocellus; flagellar segment 1 less than one-third scape length; labrum convex, mat appearance; propodeal triangle with coarse

granular sculpture.

*Male.* Size: head 3.0–3.2 mm; scutum 2.0–2.4 mm; forewing 8.3–9.4 mm; body 9.4–11.2 mm. Vestiture on face white with a narrow, black, lateral fringe and pale yellow or orange vertex; mesosomal venter white, upper region of pleuron and dorsum pale yellow or orange; legs concolorous with mesosomal venter dorsally, orange ventrally; metasomal dorsum with T1–T2 pale yellow or orange, with paler, denser, distal fringe; T3 with a mixture of black and pallid vestiture; distal region of metasomal dorsum (T4–T6) black; vestiture sparse on hind tibia (more densely pubescent than *M. arrogans* but difficult to quantify). Integument of antennal flagellum black; legs blackish, except distal end of hind tibia and hind tarsus orangish. Face with vertex gently convex, above upper extreme of eye (Fig. 11); densely punctate (less finely than in *M. arrogans*) and shiny between punctures; malar area short (malar area:eye = 0.3:6.7); galea acutely pointed, with reticulate sculpture; glossa protrudes a little beyond galea and slightly longer than labial palpus; antennal scape subequal to clypeus length; flagellar segment 1 0.4 times scape length; flagellum a little less than twice eye length; propodeal triangle with fine granular sculpture, and with mat appearance; S6–S8 and genital capsule as illustrated (Figs 12–15).

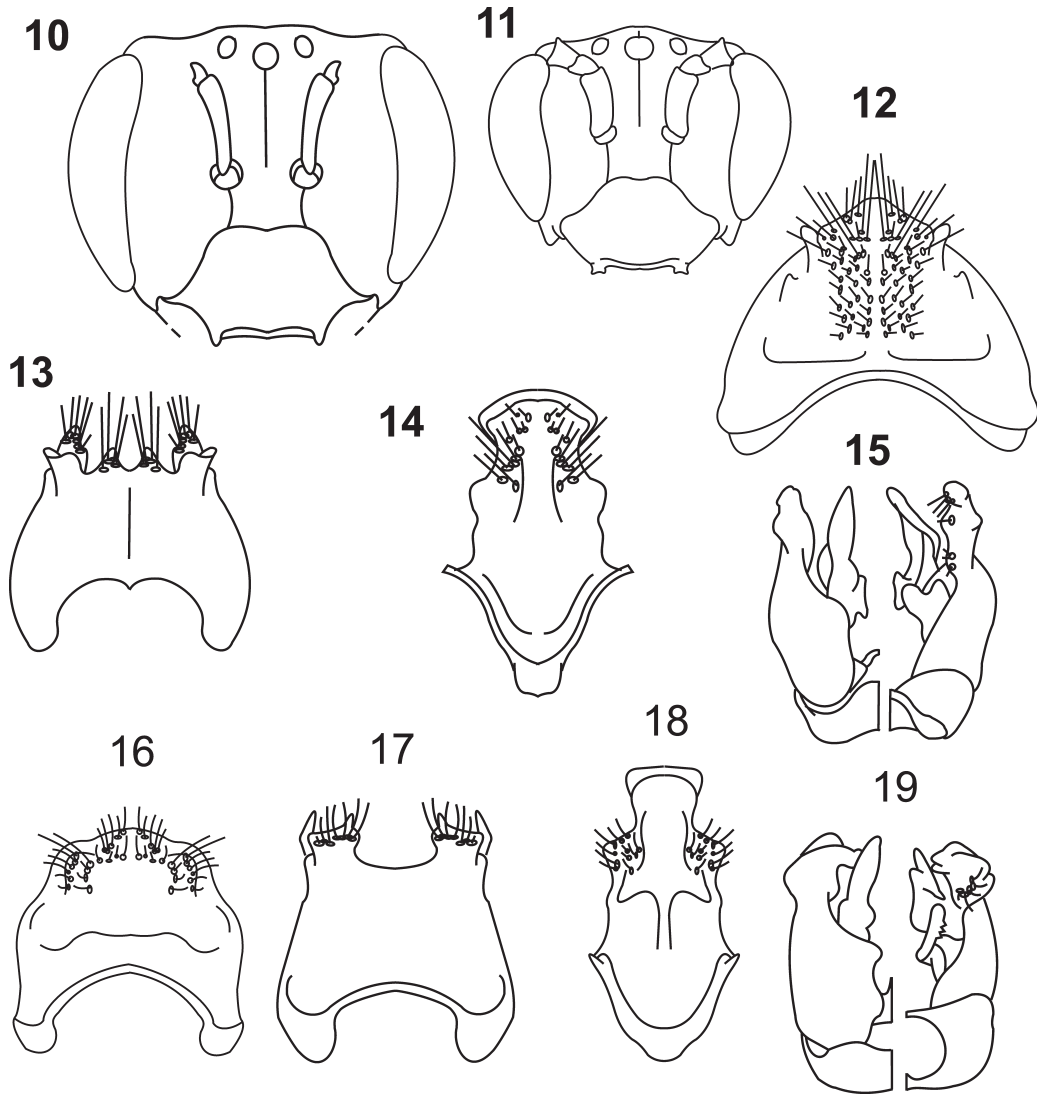
*Remarks.* It is here recorded on flowers of *Berkheya purpurea* (Asteraceae).

*Distribution* (Fig. 20). This species appears to be widely distributed in montane areas from Beaufort West to the Wolkberg, with most material collected between these two sites.

*Etymology.* This species is named for Dana Roth to acknowledge her contribution to pollinator biodiversity conservation.

*Type material.* LESOTHO: Mamathes (29.06S 27.48E), 10.iii.1952, 2.i.1953 (x3), 10.i.1952, 17.xi.1946, 4.xi.1951, 21.xi.1948, 8.i.1950, 22.xi.1959, 12.i.1952, 2.i.1950, 12.xi.1954, 19.i.1952 (x2), i.1961, C. Jacot Guillarmod (1♀ AMGC). SOUTH AFRICA: Wolkberg, 21 km SW Tzaneen (23.59S 30.02E), 8.iii.1976, R.H. Watmough (1♀ NCSA); Drakensberg Botanic Gardens, Harrismith, 28.17S 29.09E, 26.xii.1989, C.D. Eardley (1♂ NCSA); Harrismith, 28.17S 29.09E, i.1982, C. Eardley (male holotype NCSA); Hensley's Dam, Leribe (29.38S 30.15E), 29.ii.1948, C. Jacot Guillarmod (1♀ AMGC); Chicago, Lindley (27.24AC), 1.xii.1965, D.J. Brothers (1♀, AMGC); Naudesnek Pass, 30.28CA





**Figs 10–19.** *Melitta* spp. **10–15,** *Melitta danae*: **10,** female, face, frontal view; **11–15,** male: **11,** face, frontal view; **12–14,** sterna 6–8, respectively, ventral views; **15,** gonocoxa, left dorsal view, right ventral view. **16–19,** *Melitta albida*: **16–18,** sterna 6–8, respectively, ventral views; **19,** gonocoxa, left dorsal view, right ventral view.

(30.44S 28.08E), 30.i.2000, K. Steiner On *Berkheya purpurea* (2♂ SAMC); Reibeek East (31.40S 25.55E), 7.xi.1992, F.W & S.K. Gess (2♂ AMGC); Garden Castle State Forest (29.54S 29.15E), 2050 m, V.B. Whitehead, 7.ii.1986 (1♀ SAMC); Sani Pass, 3.2 km SE border post, 2929CB (29.42S 29.19E), V.B. Whitehead (4♀ 2♂ (SAMC)); Cathedral Peak area above Mike's Pass, 28.59S 29.14E, 1973m, 28–29.iii.1985, C.D. Eardley (1♀ NCSA); Royal Natal National Park, between The Nek and Witsieshoek, 2828DB (28.45S 28.53E), V.B. Whitehead (1♀ SAMC); Beau-

fort West, Molteno Pass, 3222BA (32.13S 22.33E), 1480 m, 30.iii.1988, V.B. Whitehead (1♀ SAMC).

***Melitta albida* Cockerell, Figs 16–20**

*Melitta albida* Cockerell, 1935: 76–77, male holotype (TMSA) Botswana; Cockerell 1934: 449, 451–452; Michener 1981: 40.

**Description**

*Female.* Size: head 2.5–2.9 mm; scutum 2.1–2.3 mm; forewing 7.3–8.1 mm; body 10.0–10.1 mm.

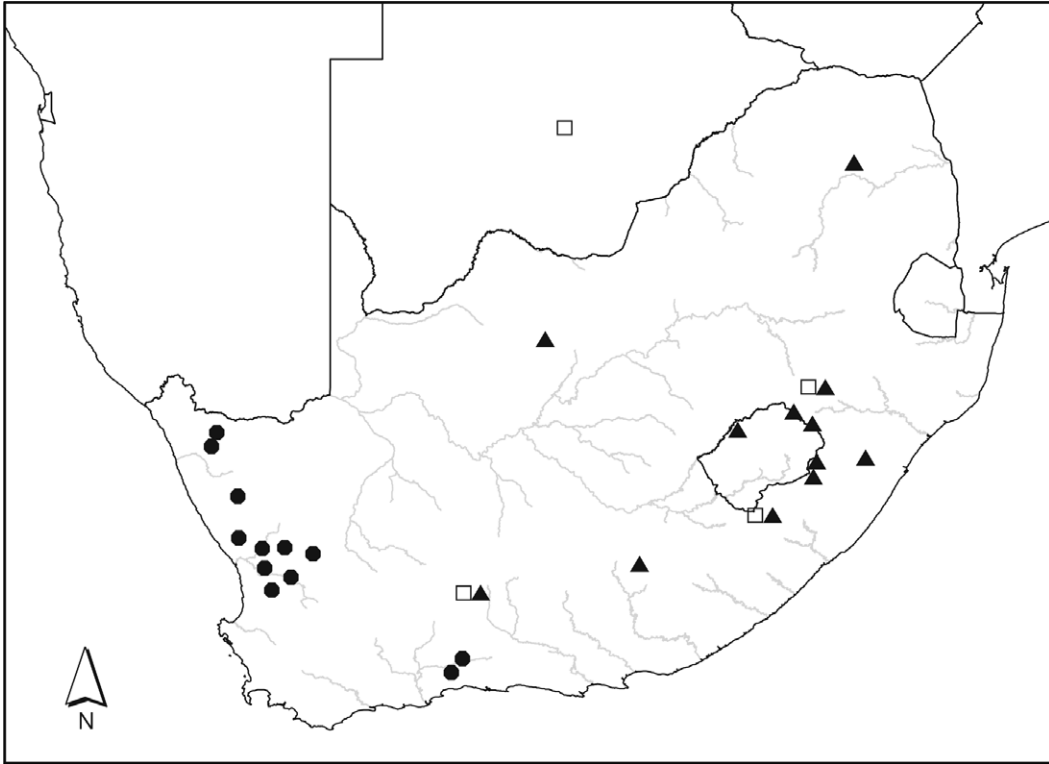


Fig. 20. Known distribution of *Melitta danae*, ▲, *M. albida*, □, and *M. schultzei*, ●.

Vestiture: mesosoma with orange tinge; fore and middle tibiae pallid, with black or orange tinge; fore and middle tarsi black above and orange below; scopa blackish-orange, with areas near basitibial plate and pencillius black, remainder of hind tarsus blackish; metasomal dorsum with T1 pallid, T2–T4 black with distinct white posterior fringes; T5–T6 black; lateral region and venter white. Integument, including legs black (hind tibia and tarsus orangish-blackish). Face with vertex slightly about upper extreme of eye (cf. Fig. 10); densely punctate and sculptured between punctures, except clypeus more sparsely punctate and shiny between punctures; malar area short (malar area:eye = 0.5:12.5); galea acutely pointed, with reticulate sculpture; glossa protrudes a little beyond galea and slightly longer than labial palpus; antennal scape equal to clypeus length, and reaching to lower extreme of lateral ocellus; flagellar segment 1 less than one-third scape length; labrum convex, glabrous; propodeal triangle with fine granular sculpture, and mat appearance.

*Male*. Similar to *M. danae* except as follows: smaller, size: head 2.4–2.6 mm; scutum 1.6–2.1 mm;

forewing 6.3–8.1 mm; body 9.2–9.4 mm; vestiture generally paler; T3 black anteriorly with a white distal fringe (not a mixture of pale and black hairs), as is T4; S6–S8 and genital capsule as illustrated (Figs 16–19).

*Distribution* (Fig. 20). This species is widely distributed between desert and high rainfall, montane areas, but all with summer rainfall.

*Type material*. TYPE *Melitta albida*, 'V.-L. Kal. Exp. Kuke Pan, 21–30/3/1930, *Melitta albida* Ckll. Type male mouth parts on slide'.

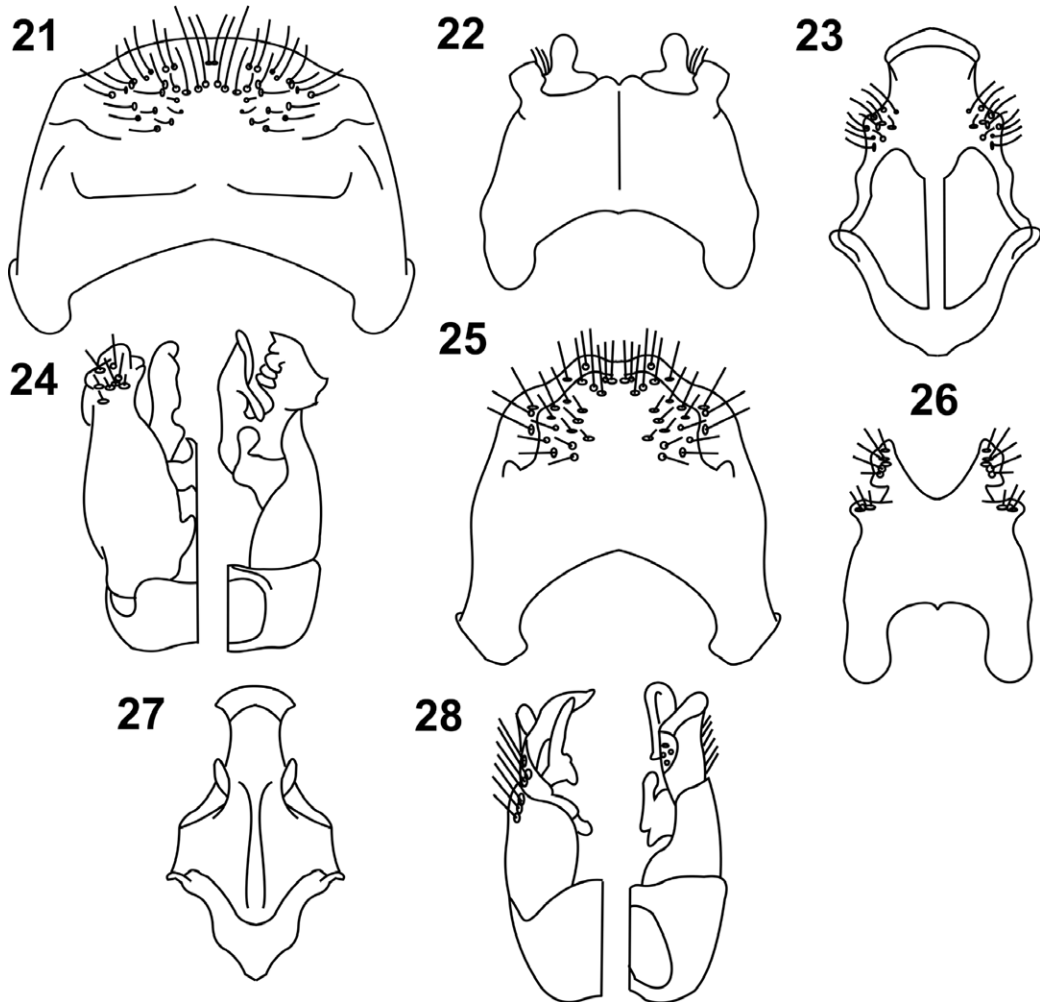
*Additional material*. SOUTH AFRICA: Drakensberg Botanical Gardens, 28.17S 29.09E, 26.xii.1989, C.D. Eardley (1♀ NCSA); Beaufort West, Molteno Pass, 32.22BA (32.13S 22.33E), 1480 m, 30.iii.1988, V.B. Whitehead (1♀ SAMC); Naudesnek (30.44S 28.08E), 2500 m, 12.i.1985, K. Steiner, V.B. Whitehead (1♀ SAMC).

***Melitta katherinae* Eardley sp. n., Figs 21–24**

*Description*

*Female*. Unknown.

*Male*. Size: head 2.6 mm; scutum 2.4 mm; fore-



**Figs 21–28.** *Melitta* spp. **21–24**, *Melitta katherinae*, male: **21–23**, sterna 6–8, respectively, ventral views; **24**, gonocoxa, left dorsal view, right ventral view. **25–28**, *Melitta schultzei*: **25–27**, sterna 6–8, respectively, ventral views; **28**, gonocoxa, left dorsal view, right ventral view.

wing damaged; body 9.4 mm. Similar to *M. danae* except as follows: Vestiture on face white to pale yellow, without narrow, lateral, black fringe; mesosomal venter white, upper region of pleuron and dorum pale yellow, intermixed with a few black hairs; legs white above, orange below; metasomal dorsum with T1–T3 pale yellow, with white distal fringes; T4–T5 black with white distal fringes; T6–T7 black; metasomal venter white; vestiture dense on hind tibia. Integument black to blackish. Face with vertex gently convex above upper extreme of eye; densely punctate (less finely than in *M. arrogans*) and shiny between punctures; malar area short (malar area:eye =

0.2:6.4); galea rounded apically and glabrous; glossa protrudes a long way beyond galea and much longer than labial palpus; antennal scape shorter than clypeus (1:08); flagellar segment 1 0.5 times scape length; flagellum a little less than twice eye length; propodeal triangle with fine granular sculpture, and with mat appearance; S6–S8 and genital capsule as illustrated (Figs 21–24).

*Remarks.* It is here recorded on flowers of *Acacia gerrardii* (Fabaceae).

*Distribution.* This species is known only from the type locality, which is in central Kenya, and is East African savanna.

*Etymology.* This species is named for Katherine

Baldock, the collector of the type material.

*Type material.* Kenya, Mpala Res. Centre, Laikipia, 00.19.30N 36.52.86E, Junction site, K. Baldock, 3.vi.2003, On *Acacia gerrardii* (white), Ref. 8/N1 ( $\delta$  holotype NMK, 1 $\delta$  paratype NCSA).

***Melitta schultzei*** Friese, Figs 20, 25–28

*Melitta schultzei* Friese, 1909: 183, male holotype (ZMHB) South Africa; Cockerell 1935: 76; Strand 1912: 132.

*Melitta flavipes* Friese, 1925: 506, male holotype (ZMHB) South Africa; Cockerell 1935: 76.

**Syn. nov.**

The holotypes of both these species were studied. They represent the variation between black and orange antennal flagellum and legs, which following the study of several specimens and the male genitalia of the different varieties are here synonymized.

**Description**

*Female.* Size: head 2.8–2.9 mm; scutum 2.2–2.3 mm; forewing 8.3–8.5 mm; body 10.6–11.0 mm. Vestiture: mesosomal pale brownish, occasionally pale orange posteriorly; fore and middle tibiae and tarsi black above and orange below; scopa yellowish anteriorly and orange posteriorly, with proximal and distal regions blackish; remainder of tarsus orange; metasomal dorsum with T1 pallid, T2–T4 black with narrow white distal fringes; T5–T6 usually orange, sometimes black; lateral and ventral regions pallid, except S5–S6 orange, or occasionally black. Integument: antennal flagellum more orange than other species, but difficult to quantify; legs black, with hind tibia and tarsus sometimes blackish-orange; metasoma black. Face with vertex a little above upper extreme of eye (cf. Fig. 2); densely punctate and shiny, including clypeus; malar area short (malar area:eye = 0.2:6.5); galea rounded apically, with reticulate sculpture yet shiny; glossa protrudes well beyond galea and labial palpus reaches almost to end of glossa; antennal scape equal to clypeus length, and reaching to upper extreme of lateral ocellus; flagellar segment 1 less than one-third scape length; labrum convex, glabrous; propodeal triangle with fine sculpture, and shiny.

*Male.* Size: head 2.2–2.5 mm; scutum 1.5–2.0 mm; forewing 7.0–7.5 mm; body 8.4–9.2 mm. Vestiture on face white with a narrow, black, lateral fringe; mesosomal venter white, dorsum brown (pale brown and black hairs intermixed); legs dorsally

concolorous with mesosomal venter, ventral surfaces orange; T1–T2 concolorous with mesosomal dorsum; T3–T4 black with white distal fringes; T5–T6 black; vestiture on hind tibia more dense than in *M. arrogans*. Integument of antennal flagellum orange or black; all tibia and tarsi orange or black. Face with vertex gently convex above upper extreme of eye; densely punctate and weakly shiny between punctures; malar area short (malar area:eye = 0.3:5.9); galea rounded apically, with reticulate sculpture yet shiny; glossa protrudes well beyond galea and labial palpus reaches almost to end of glossa; antennal scape subequal to clypeus length; flagellar segment 1 0.4 times scape length; flagellum more than twice eye length; outer surface of hind tibia not swollen; propodeal triangle with fine granular sculpture, and with matt appearance; S6–S8 and genital capsule as illustrated (Figs 21–24).

*Remarks.* It is here recorded on flowers of *Watsonia* sp. (Iridaceae) and *Oxalis* sp. (Oxalidaceae).

*Distribution* (Fig. 20). This species is known only from the southwestern and western regions of South Africa, except one from the Drakensberg. The Cape has winter rainfall and arid summers, and the Drakensberg has high, summer rain.

*Type material.* *Melitta schultzei*, holotype: 'Kl. Namaland, Steinkopf, L. Schultze S; *Melitta schultzei* male Friese. 1908 Friese det., Type', MHUB. *Melitta flavipes*, holotype: 'Capland; *Melitta flavipes* male Friese. 1921 Friese det., Type', MHUB.

*Additional material.* SOUTH AFRICA: Zebra, 27 km South Oudtshoorn (33.45S 22.19E), 3.viii.1987, V.B. Whitehead (1♀ 3♂ SAMC); Botterkloof Pass, 3119CD (31.55S 19.15E), 15.viii.1993, V.B. Whitehead (3♂ SAMC); Botterkloof Pass, 3119CD, 30.viii.1985, V.B. Whitehead, M. Macpherson (5♀ SAMC); Ramskop Camp, Clanwilliam, 3218BB (32.10S 18.53E), 21–22.viii.1984, V.B. Whitehead, M. Macpherson (4♀ SAMC); 6.7 km NE Klawer, 3118DA (31.45S 18.40E), 5.viii.1989, V.B. Whitehead (2♀ SAMC); Nuwerus, Meerhofkasteel, 3118AA (31.10S 18.15E), 21.viii.1981, V.B. Whitehead, On *Watsonia* sp. (1♀ SAMC); Calvinia, Witputs farm, 9 km Middelpoos road, 3119DB (31.28S 19.40E), 28.viii.1990, V.B. Whitehead, M. Macpherson (1♀ SAMC); Derust, 3322AD (33.29S 22.32E), 16.viii.1995, V.B. Whitehead (1♀ SAMC); Klipfontein, 10 km north west Steinkopf (29.09S 17.50E), 12.viii.1986, V.B. Whitehead (1♀ SAMC); 15 km south Vanrhynsdorp, 3218DA (31.45S 18.45E),

21.viii.1985, V.B. Whitehead, M. Macpherson (1♀ SAMC); Steinkopf (29.19S 17.44E), S. Schultze (1♂ TMSA); Leliefontein, 30.13S 18.01E, 23.ix.2003, C. Mayer (1♀, 1♂ MKMU); Leliefontein, 30.14S 18.09E, C. Mayer (1♂ MKMU); Knersvlakte, 30 km N Vanrhynsdorp, 31.22S 18.42E, 5.ix.2003, K. Timmermann (1♂ MKMU); Nieuwoudtville, Flower Reserve, 31.21S 19.08E, 735 m, on *Oxalis* sp., 4.ix.2003, M. Kuhlmann (1♂ MKMU); Nieuwoudtville, Flower Reserve, 31.21S 19.08E, 735 m, 10.viii.2004, M. Kuhlmann (1♂ MKMU); Nieuwoudtville, Flower Reserve, 31.21S 19.08E, 735 m, 13.viii.2004, M. Kuhlmann (3♂ MKMU).

*Melitta rufipes* Friese (1913b) was described from a male from Cradock, South Africa. The holotype, which is in ZMHB, was studied and was found to belong to *Rediviva*. Cradock is in the summer rainfall area of South Africa and this species is

therefore not included in Whitehead and Steiner (2001).

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