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A revision of the afrotropical genus *Afromelittodes* Oldroyd & Van Bruggen, 1963 (Diptera: Asilidae: Laphriinae) and discussion of its possible mimetic resemblance to bees of the genus *Megachile*

by

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ABSTRACT

Afromelittodes, a rarely encountered and unusual genus, appears to be restricted to the southern and south-western limits of the savanna biome where it has been collected only in late summer. *Afromelittodes mimos* is described from South Africa and Namibia (Type locality – Olifantshoek) and compared with the only other species in the genus, *A. solis* Oldroyd & Van Bruggen, 1963 known only from the type locality near Brits in South Africa. The male terminalia of both species are illustrated, as are the female terminalia of *A. mimos* (females of *A. solis* being unknown). Both species mimic megachilid bees. *A. solis* mimics *Megachile (Chalicodoma) felina* Gerstaecker, 1857, while *A. mimos* mimics *M. (Pseudomegachile) sinuata* Friese, 1903, a species which appears to serve as a model for at least two other Diptera belonging to two families, Syrphidae and Stratiomyidae. Brief comments on the strong resemblance to the monotypic, nearctic species *Dasylechia atrox* (Williston, 1883) are provided.

INTRODUCTION

This paper was prompted by the discovery of a second species belonging to the remarkable monotypic genus *Afromelittodes* Oldroyd & Van Bruggen, 1963, previously known from only two recorded specimens. The following brief history of published work on the genus serves as background.

Oldroyd & Van Bruggen (1963) – Described *Afromelittodes* and type-species, *solis*, on a unique male specimen collected by Dr Georges van Son in 1944. In describing the genus the authors noted its close resemblance to the megachilid bee *Megachile felina* Gerstaecker, 1857, and to other asilid genera that may mimic bees (*Dasyllis* Loew, 1851, *Hyperechia* Schiner, 1866, *Mallophora* Macquart, 1834 being mentioned).

Oldroyd (1974) – Keyed the genus in his general review of southern African Asilidae, commenting on its higher classification. He recorded a female specimen from Okahandja (Namibia) which, although demonstrating sexual dimorphism, he believed to be *solis*.

Oldroyd (1980) – Catalogued the genus and species, noting its distribution in both South Africa and Namibia.

In this paper I record three more specimens, two males and a female, bringing the total known number to five. These three specimens are all similar to the darkly coloured Namibian female recorded by Oldroyd (1974), and are now known to represent a species distinct from *A. solis*. The description of this new species is provided along with general remarks on the distribution and phenology of the genus. *Afromelittodes* strongly resembles *Dasylechia* Williston, 1907, a monotypic nearctic genus that apparently mimics carpenter bees, and so a few comments on the possible relationship between these genera are provided.

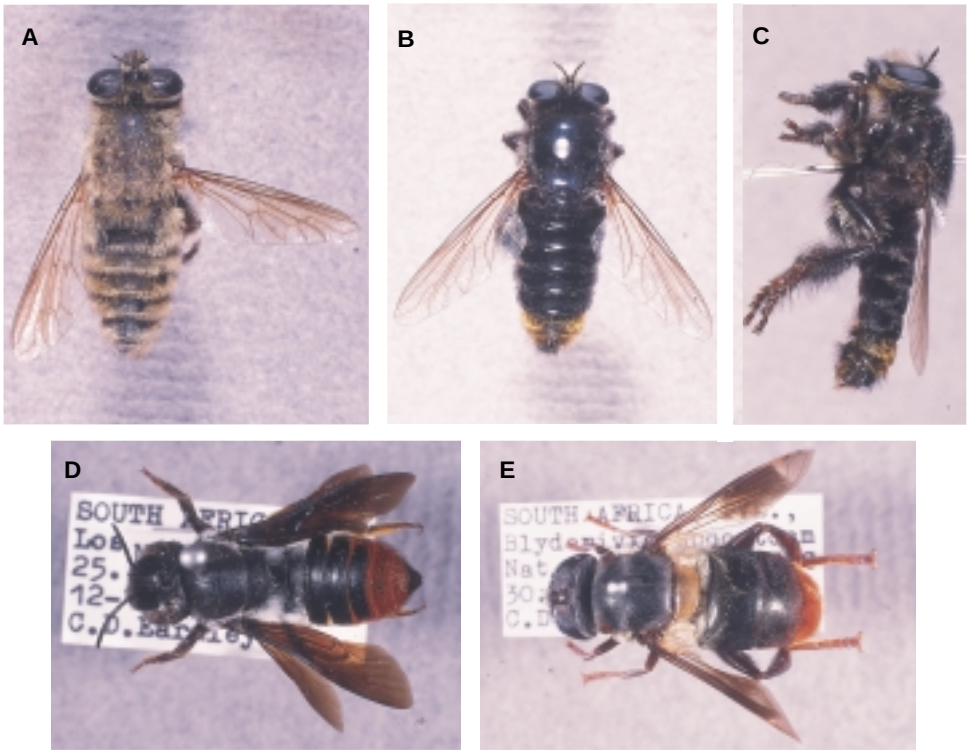


Plate 1. A–C. *Afromelittodes* species. A. *A. solis* Oldroyd & Van Bruggen, 1963 (Britz holotype) dorsal. B–C. *A. mimos* sp. n. (Olifantshoek holotype). B. Dorsal. C. Lateral. D. *Megachile sinuata* Friese, 1903 – possible model for mimicry by *Afromelittodes mimos* sp. n. E. *Senapsis haemorrhoa* (Gerstaecker, 1871) – a syrphid thought to mimic *M. sinuata.*

MATERIALS AND METHODS

The material studied is housed in the Natal Museum (NMSA), except for one specimen belonging to the National Museum of Namibia, Windhoek, Namibia (NMNW).

In recording label data for studied material, a standard format is used, where information contained on each label is demarcated by the use of single inverted commas, each line of data being separated by a slash (/). Square brackets are used to indicate useful additional information not found on labels. In all instances, specimens were dry-mounted on pins. Drawings were executed with the aid of a drawing tube, terminalia being first removed and macerated in warm potassium hydroxide. Genitalia were stored temporarily in glass vials containing 70% ethanol until the completion of the study, when they were sealed in polyethylene genitalia vials containing a mixture of ethanol and glycerine and attached to the specimen pins. While terminology and abbreviations used generally follow McAlpine (1981), antennal terminology follows Stuckenberg (1999) and genital terminology follows Theodor (1976).

Final illustrations were prepared from pencil drawings. For bilaterally symmetrical structures, setal distribution is usually shown on one side only. While setae may be fairly abundant in places, there was no need to remove setae in order to appreciate the

shape of sclerites. The study of certain morphological details associated with terminalia required a degree of dismemberment, dissection being kept to a minimum in order to preserve the integrity of structures, so as not to overly compromise future studies. Under no circumstances were organs placed on microscope slides and compressed under coverslips as this practice may greatly distort actual shapes.

Genus *Afromelittodes* Oldroyd & Van Bruggen

Afromelittodes Oldroyd & Van Bruggen, 1963: 190. Type-species: *Afromelittodes solis* Oldroyd & Van Bruggen, 1963, by original designation.

Afromelittodes solis Oldroyd & Van Bruggen, 1963

(Plate 1 A, Figs 6–7, 8–16, 30)

Afromelittodes solis Oldroyd & Van Bruggen, 1963: 191

Redescription: Based on the unique holotype which is in excellent condition except that the entire left hind tarsus is gummed to the type label and the last 3 tarsomeres of the right tarsus are gummed to the locality label.

Head: Antenna dark red-brown to black, junctions between first three elements orange-brown; sockets narrowly separated by sclerotised strip no wider than width of two large mystacal macrosetae; scape somewhat swollen (about 1.5 times as long as broad), medial surface flat and asetose, setae mixed black and white (predominantly black ventrally and white dorsally, black setae much better developed than white ones); pedicel about twice as long as maximum breadth, setae mixed black and white (black setae better developed and encircle segment distally); postpedicel about three times as long as broad (in lateral view), asetose, red-gold pruinose except for proximal quarter which is silver pruinose; stylus comprises two elements, a short cylindrical basal element, slightly broader than long, and a distal spine-like element approximately the same length as basal element. Face moderately gibbous in lower half, entirely covered with black and pale yellowish setae, those situated on gibbosity all of similar size; setae bordering eyes yellowish and lying almost parallel to facial surface. Vertex deeply sunken such that cone-like ocellar tubercle lies well below an imaginary line drawn between upper surfaces of eyes. Frons and anterior parts of vertex with many black setae (a few white ones adjacent to eye margins). Occipital area and posterior part of vertex silver pruinose and covered extensively with pale yellow-white setae (setae closer to occipital foramen are black); lower occipital setae shortish, bright yellow. Palpus two-segmented, basal segment small and covered with bright yellow setae, terminal segment greatly swollen (length less than twice breadth) and covered with long black setae except basally where setae are bright yellow and on a somewhat flattened medial surface adjacent to clypeus, which appears completely asetose. Proboscis dark red-brown (tip red-orange, with red-orange setae), short and broad (a little longer than twice breadth) with labella rounded distally, and with dorsal ridge-like flange; basal parts covered with bright yellow setae.

Thorax: Mesonotum dark red-brown to black, posterior part of postpronotal lobe bright orange and postalar callus red-brown; major macrosetae not evident, but surface entirely covered with pale yellow setae, a few similarly developed black setae are hidden amongst these (positioned where one normally expects to find the usual well-developed macrosetae). Scutellum similar in coloration and setation to mesonotum, no obvious macrosetae. Pleura dark red-brown to black (somewhat obscured by legs) covered with

yellow setae except for hypopleuron and central part of anepisternum which have black setae. Katatergal setae long, spread out and 'fan-like' such that orange-brown halteres are somewhat obscured. Postmetacoxal area entirely sclerotised. Legs: Femora, tibiae and tarsi robust, tarsomeres generally short (those of pro- and mesothoracic legs twice as broad as long); claws black; pulvilli brown, slightly shorter than claws; empodium dark brown, half as long as claws. Femora and tibiae with long, pale yellow and black setae; anterior surfaces mainly pale yellow setose, posterior surfaces mainly black setose. Tarsi, especially those of meso- and metathoracic segments, almost entirely black setose; dorsal surfaces of metathoracic tarsomeres with long pale yellow setae among more numerous, shorter, black ones. Wing: Length (from humeral cross-vein to tip) – 11.4 mm, greatest breadth – 5.0 mm. Membrane more or less transparent, but slightly brown-yellow stained adjacent to veins, especially in the subcostal area beyond mid-length. Costa extends around wing margin ending where A_1 reaches wing margin (i.e. anal lobe and alula not bordered by extension of C). Cells r_1, r_5, m_3 and cup closed and stalked; r-m cross-vein situated very near proximal end of discal cell. Vein R_4 has tiny 'spur vein' basally (Fig. 7). Both wings essentially similar (i.e. no notable variation exists).

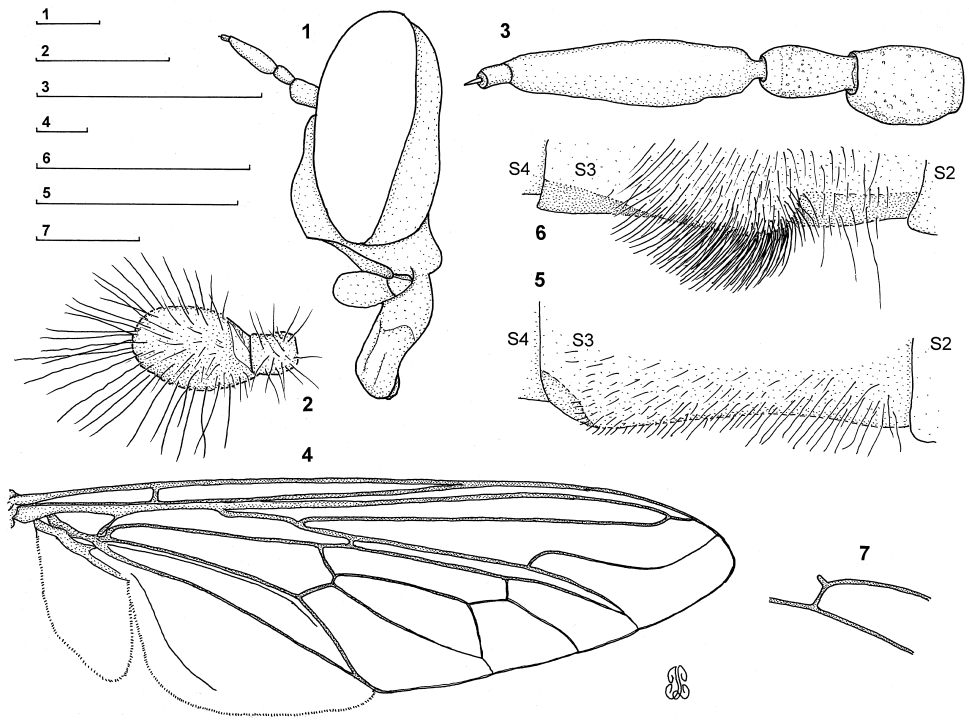
Abdomen: Dark red-brown to black. Tergites mainly pale yellow setose (some black setae laterally); T8 greatly reduced to narrow sclerotised ring bordered by extensive areas of membrane. Sternites mainly black setose (tufts of longish yellow setae present laterally on S4 and more distal sternites); S3 uniquely equipped with well-developed median protrusion covered with many tightly-packed black setae (Fig. 6).

Male terminalia (Figs 8–16): S8 enlarged, positioned adjacent to fused gonocoxites (i.e. indicating no or very little rotation of the terminalia relative to more anterior parts of abdomen); epandrium (T9) almost circular in dorsal view (i.e. not modified in any way to assist in clasping female during copulation), only distal part setose. Proctiger composed of elongate, setose ventral lamellae (S10) and short, setose dorsal lamellae (T10) not extending beyond anus; dorsal lamellae divided into two sets of lobes, a median lobe lying adjacent to anus and a lateral, cercus-like lobe jutting out at almost right-angles to body. Gonocoxites with two distally directed lobes fused basally with apparent remains of hypandrium, such that they form a rather flat U-shaped structure (viewed ventrally); outer lobe of gonocoxite with central tuft of setae and acute distal apex; medial lobe relatively asetose and with well-sclerotised, somewhat club-shaped distal region bearing a strong down-turned process. Gonostylus fairly broad at mid-length, with somewhat truncated distal end. Aedeagus with large proximal apodeme (whose length exceeds length of sheath and prongs combined); sheath somewhat longitudinally compressed, strongly sclerotised and lobed anteriorly (two lateral lobes and a central lobe projecting over prongs); prongs short, three in number, of similar length and not projecting beyond central lobe of sheath.

Female: Unknown.

Note: The holotype has a number of lepidopteran scales trapped amongst its setae – suggesting that the species may feed on lepidoptera. However, as Van Son was an active lepidopterist it seems far more likely that the specimen was collected in a trap designed for lepidoptera or perhaps stored amongst lepidopteran specimens prior to being pinned.

Material examined: SOUTH AFRICA: 1♂ **holotype**, 'Fernwood / Brits [25˚38'S:27˚47'E] Distr. / 6 Febr. 1944 / G. van Son', 'Holotype ♂ / *Afromelittodes / solis* / Oldroyd & v



Figs 1–7. *Afromelittodes* species. 1–5. *A. mimos* sp. n. (Olifantshoek holotype). 1. Head, lateral (no setae shown). 2. Palpus (left). 3. Antenna (left lateral, no setae shown). 4. Wing (right). 5. S3, lateral, showing medial setose tubercle. 6–7. *A. solis* Oldroyd & Van Bruggen, 1963. 6. S3, lateral, showing medial tubercle near hind margin. 7. Detail of venation showing 'spur vein' at base of R4. Scale lines 1 mm (figure numbers given). Abbreviations: S = sternite.

Bruggen / 1963', 'Afromelittodes / solis / Oldroyd & v Bruggen / Holotype No. 958' (NMSA). *Note:* The *solis* holotype was originally housed in the Transvaal Museum (Pretoria), but was subsequently transferred to the Natal Museum when the Transvaal Museum's entire Diptera collection was exchanged for a collection of Lepidoptera.

Distribution: Known only from the type-locality near Brits.

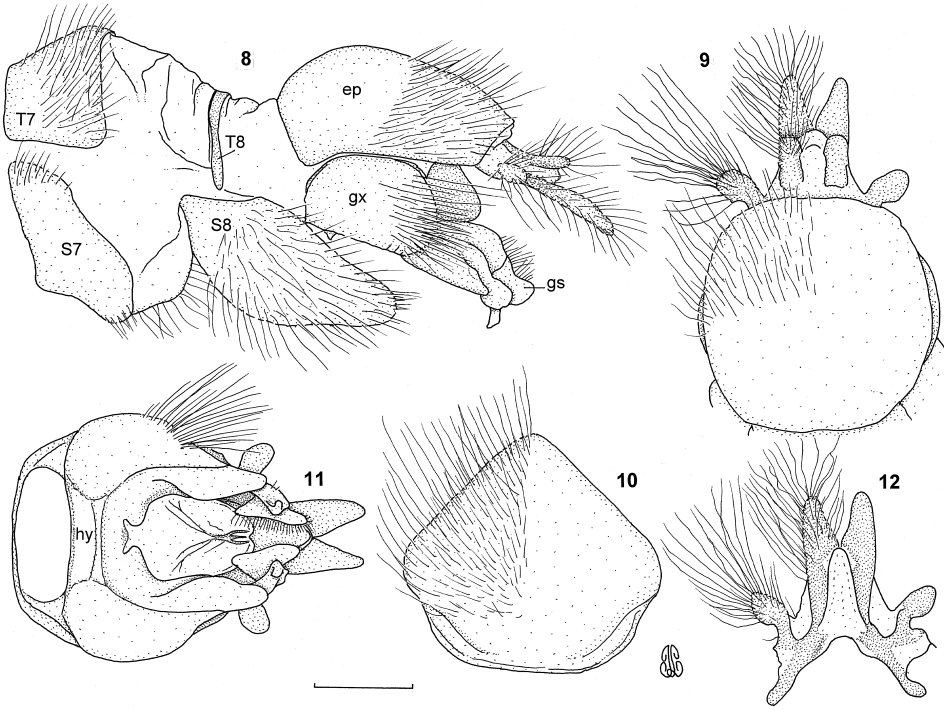
Afromelittodes mimos sp. n.

(Plate 1 B–C, Figs 1–5, 17–21, 22–29, 30)

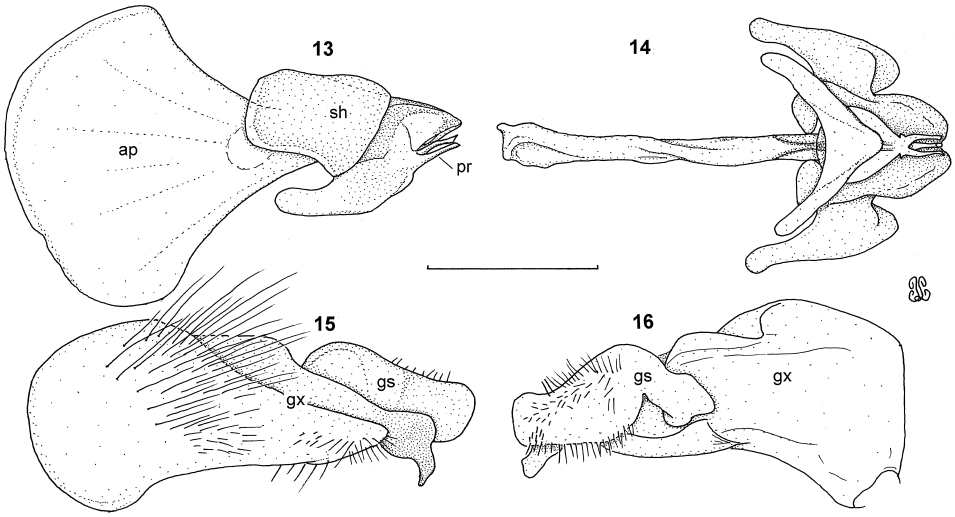
Etymology: Gr. *mimos* = actor. Refers to the mimicry displayed by this species.

Description: Based primarily on the completely intact holotype, in excellent condition. Descriptions of male and female genitalia are based on dissected paratypes. All features as in *solis* except as described below.

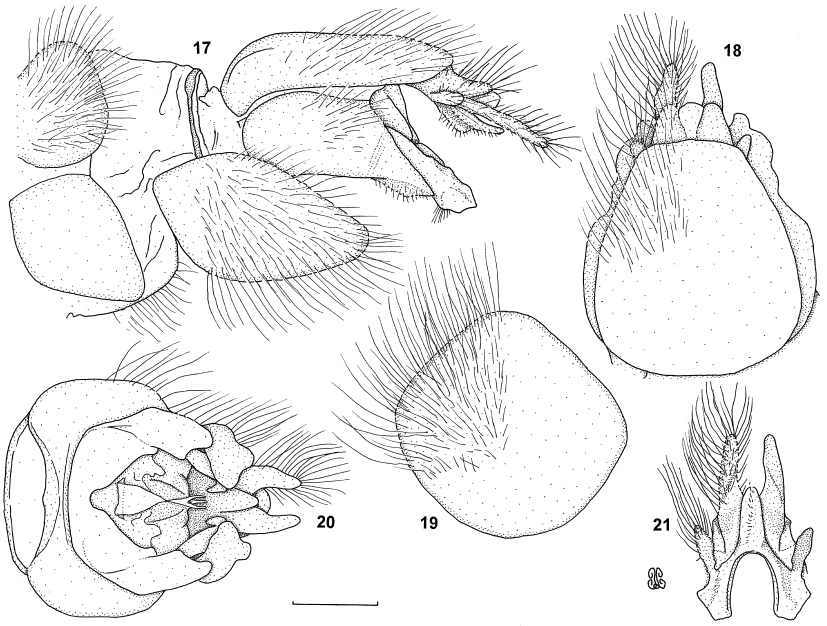
Head (Fig. 1): Antenna with postpedicel uniform dull silver pruinose; basal element of stylus slightly longer than broad (Fig. 3). Face with mystacal setae entirely white, except for some black ones ventrolaterally; area below antennal sockets shiny and almost completely asetose. Frons and anterior parts of vertex white setose (some black ones adjacent to eye margins). Occipital area almost entirely black setose (a few white ones



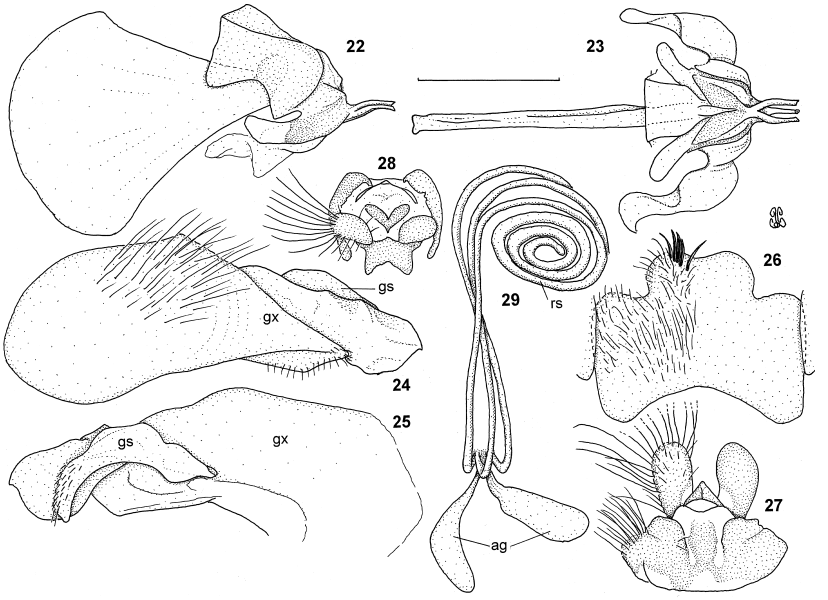
Figs 8–12. *Afromelittodes solis* Oldroyd & Van Bruggen, 1963. Male terminalia (Brits holotype): 8. Lateral. 9. Epandrium and proctiger, dorsal. 10. S8, ventral. 11. Genital bulb, ventral. 12. Proctiger, ventral. Scale line 1 mm (for all figures). Abbreviations: ep = epandrium, gs = gonostylus, gx = gonocoxite, hy = hypandrium, S = sternite, T = tergite.



Figs 13–16. *Afromelittodes solis* Oldroyd & Van Bruggen, 1963. Male terminalia (Brits holotype): 13–14. Aedeagus. 13. Lateral. 14. Ventral. 15–16. Gonopodite (left). 15. Lateral. 16. Medial. Scale line 1 mm (for all figures). Abbreviations: ap = apodeme, gs = gonostylus, gx = gonocoxite, pr = prongs, sh = sheath.



Figs 17–21. *Afromelittodes mimos* sp. n. Male terminalia (Olifantshoek holotype): 17. Lateral. 18. Epandrium and proctiger, dorsal. 19. S8, ventral. 20. Genital bulb, ventral. 21. Proctiger, ventral. Scale line 1 mm (for all figures).



Figs 22–29. *Afromelittodes mimos* sp. n. 22–25. Male terminalia (Olifantshoek holotype): 22–23. Aedeagus. 22. Lateral. 23. Ventral. 24–25. Gonopodite (left). 24. Lateral. 25. Medial. 26–29. Female terminalia (Okahandja paratype). 26. S8, ventral. 27–28. Proctiger. 27. Dorsal. 28. Ventral. 29. Spermathecae and associated organs, dorsal. Scale line 1 mm (for all figures). Abbreviations: ag = accessory glands, gs = gonostylus, gx = gonocoxite, reservoir.

adjacent to eyes); lower occipital setae shortish, those adjacent to eyes mostly whitish, those behind these black. Palpus (Fig. 2) with basal segment covered with both black and pale yellow setae, terminal segment entirely covered with black setae. Proboscis with basal parts covered with white setae.

Thorax: Mesonotum with surface almost entirely black setose except for a group of white setae situated anteriorly between postpronotal lobes. Scutellum covered with fine black setae. Pleura covered almost entirely with black setae (a few white ones may be mixed in amongst black). Legs: Femora and tibiae with setae predominantly black (those posterodorsally on femora mostly white). Metathoracic tarsi (and tips of tibiae) have bright orange setae ventrally. Wing (Fig. 4): Length (humeral cross-vein to tip) – 11.2 mm, greatest breadth – 5.0 mm (similar to *solis*, but wings flatter). Membrane entirely transparent. Vein R_4 without 'spur vein' basally.

Abdomen: Tergites 1–5 covered mainly with black setae (few shiny whitish ones laterally on T2–4), T6–7 with shiny bright orange setae (a few black ones interspersed). Sternites covered mainly by short black setae (tufts of longish white setae present laterally on S4–6, those on S7 orange); S3 with medial process situated on posterior margin and with tiny black setae only (Fig. 5).

Male terminalia (Figs 17–25) (Windhoek paratype illustrated): Epandrium (T9) slightly tapered distally in dorsal view. Proctiger similar to *solis*, but lateral cercus-like lobe of dorsal lamellae not jutting out quite as prominently. Gonocoxites fused basally as in *solis*, but remnants of hypandrium not clearly discerned. Outer lobe of gonocoxite with acute apex of different form to *solis*, medial lobe somewhat longer, gently undulating in shape and with a small terminal process. Gonostylus down-turned, narrowly sickle-shaped and with somewhat pointed distal end. Aedeagus similar to *solis*, but central lobe of sheath not projecting hood-like over prongs.

Female terminalia (Figs 26–29) (Okahandja paratype illustrated): S8 bilobed anteromedially, a group of well-developed black setae situated anteriorly on each lobe. Proctiger with poorly discernible, lateral, setose dorsal lamellae; ventral lamellae with large, swollen, setose, lateral lobes. Spermathecae, three in number, all of similar development (central one slightly more darkly coloured). Coiled reservoirs lie one on top of the other almost flush with inner surface of S6. Spermathecae each with three and a half coils, each only slightly thicker than long straight ducts leading to vagina. Straight ducts apparently with a right-angled bend just before they unite near vagina (unfortunately details in this area were not particularly easy to see). Two thin-walled accessory glands, each three times as long as broad, discharge into genital chamber.

Variation: A species showing very little intraspecific variation. Paratypes demonstrate variation in the degree of sclerotisation, the Windhoek ♂ being the least sclerotised and possessing orange-brown (scape) or red-brown (legs) coloration instead of the darker conditions seen in the holotype. There is also some variation in pleural setal colour, the Mirabeb ♀ has about equal numbers of white and black setae on katatergite and anepisternum. Specimens are remarkably similar in size, paratype wing measurements ranging from 11.7–12.7 mm (length), 5.0–5.4 mm (breadth).

Material: NAMIBIA: 1♂ **paratype**, 'Otjiseva 45 [farm] / Windhoek, S.W.A. / SE 2216BD / 12 Mar. 1971.', 'H 1890' [Collected by C. G. Coetzee & M-L. Penrith] (NMNW); 1♀ **paratype**, 'Okahandja / S.W.A. 2116DD / 13–14 Mar. 1969 / B. Lamoral + / R. Day', '*Afromelittodes* / *solis* Oldroyd & van Bruggen / det. H. Oldroyd 1972' [recorded by Oldroyd, 1974] (NMSA); 1♀ **paratype**, 'South West Africa / Namib/Naukluft Park / Mirabeb 23 27'S / 15 21'E 16.iii.1983 / C.D. Eardley', 'Visiting flowers / of *Euphorbia* sp.' (NMSA). SOUTH AFRICA: 1♂ **holotype**, 'S Africa: N Cape #16 / 5km W Olifantshoek / 27 57'S:22 42'E 1350m / Date: 15.iii.1991 / Londt & Whittington / *Acacia–Ziziphus* veld', 'Prey Identification / Ord: Hymenoptera / Fam: Tiphiidae / *Anthobosca* sp. / Det: D. Brothers', 'Prey Catalogue / No. 001476' (NMSA).

Distribution: Known from the type-locality of Olifantshoek in the Northern Cape Province of South Africa and three localities in central Namibia.

Key for the identification of *Afromelittodes* species

1. Mesonotal and scutellar setae predominantly yellow; T6–7 with mainly whitish setae; vein R_4 with 'spur vein' basally (Fig. 7) ..... **solis** Oldroyd & van Bruggen.
– Mesonotal and scutellar setae predominantly black; T6–7 with mainly ginger setae; vein R_4 without trace of a 'spur vein' basally (Fig. 4) ..... **mimos** sp. n.

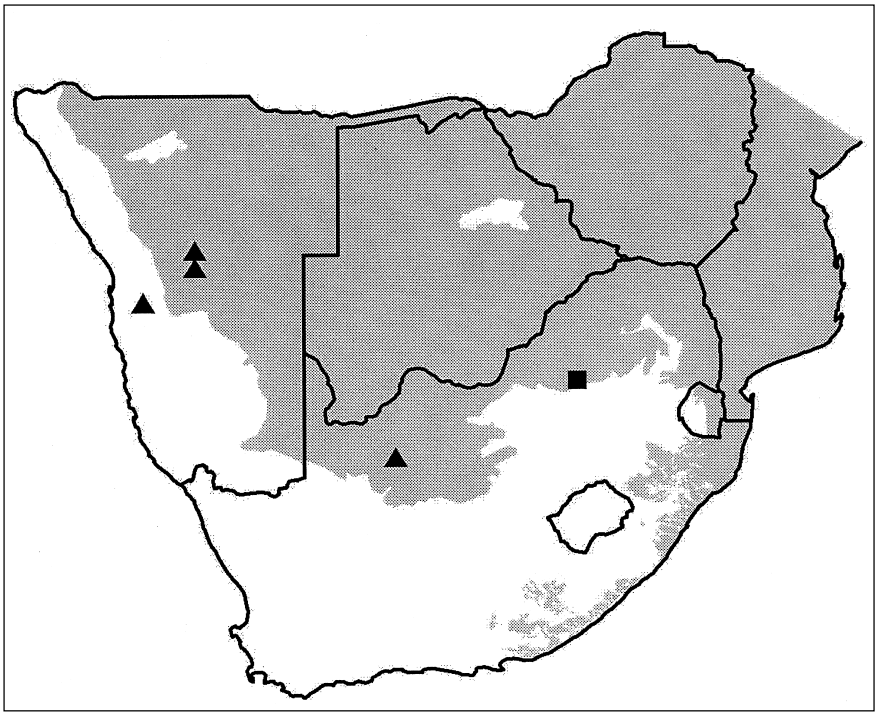


Fig. 30. Distribution of *Afromelittodes* species. *A. solis* (square), *A. mimos* (triangles). Distribution of savanna biome indicated as shaded region.

DISCUSSION

Distribution and phenology

All known localities appear to be situated within, or closely adjacent to, the Savanna Biome (Fig. 30) (Mirabeb is in the adjacent Nama-Karoo Biome, while Brits is on the edge of the Grassland Biome). While Olifantshoek falls within Van Wyk & Smith's Griqualand West Centre of Endemism (Van Wyk & Smith 2001) this probably is of no real significance.

All four specimens of *mimos* were collected in March while the unique *solis* holotype was collected in February. This may indicate that species are active in the adult stage for a short period during late summer. Late summer has been shown to be a particularly important time of year for grassveld asilids (Londt 2002).

Biology

Very little is known about the biology of *Afromelittodes* species. There is one hymenopteran prey record (Tiphiidae–*Anthobosca* sp.), which may suggest that these asilids feed mainly on Hymenoptera. It is interesting to note that other asilids that resemble Hymenoptera tend to feed primarily on Hymenoptera (Table 1). Although the data presented in Table 1 have limitations, it is noteworthy that of the seven genera listed as resembling Hymenoptera (and there may be a few others) for which there is some prey information, five are Laphriinae. There are a few other genera (e.g. *Damalis* Fabricius, 1805 and *Rhabdogaster* Loew, 1858) which are known to predate heavily upon alate ants, but these have been excluded from the table as they are clearly opportunistic feeders utilising flying Formicidae when these are locally abundant.

The strong resemblance that *Afromelittodes* has to certain Megachilidae is likely to be biologically and behaviourally significant. Oldroyd & Van Bruggen (1963) state that *A. solis* closely resembles *Megachile* (*Chalicodoma*) *felina* Gerstaecker, 1857, a bee I

TABLE 1

Data supporting the suggestion that Asilidae that appear to mimic Hymenoptera feed mainly on Hymenoptera.

Genus	Prey	Reference
Hyperechia Schiner, 1866	Hymenoptera (100% – 1 record)	NMSA Prey database
Lamyra Loew, 1851	Hymenoptera (100% – 10 records)	Dikow & Londt 2000 & NMSA Prey database
Proagonistes Loew, 1858	Hymenoptera (83% – 5 records) Lepidoptera (17% – 1 record)	NMSA Prey database
Stiphrolamyra Engel, 1928	Hymenoptera (77% – 20 records) Coleoptera (12% – 3 records) Diptera (8% – 2 records) Hemiptera (4% – 1 record)	NMSA Prey database
Laxenecera Macquart, 1838	Hymenoptera (42% – 13 records) Diptera (26% – 8 records) Hemiptera (13% – 4 records) Orthoptera (13% – 4 records) Coleoptera (6% – 2 records)	NMSA Prey database
Trichardis Hermann, 1906	Hymenoptera (100% – 4 records)	NMSA Prey database
Bana Londt, 1992	Hymenoptera (100% – 9 records)	Londt 1992 & NMSA Prey database

am not familiar with. There is no doubt however that *A. mimos* strongly resembles *Megachile* (*Pseudomegachile*) *sinuata* Friese, 1903 (Plate 1 D) which probably also serves as a model for the Batesian mimicry displayed by the syrphid *Senapsis haemorrhoa* (Gerstaecker, 1871) (Plate 1 E), as well as the stratiomyid *Nyassamyia andreniformis* (Lindner, 1935). The complex relationships existing between all these species requires elucidation. Stuckenberg (*pers. comm*.) collected both the bee and the syrphid at the edge of a waterhole in the Limpopo Valley; the bee was apparently collecting mud for nest-making, while the syrphids were ovipositing in the water/mud. It is possible that the syrphid gains protection during oviposition from the presence of the bee. According to Stuckenberg (*pers. comm*.) the stratiomyid was reared from larvae taken from a rothole in a baobab tree, so it may be possible that the bee also collects water from this type of situation, thus conferring protection on the ovipositing stratiomyids.

It is likely that *Afromelittodes* has a similar relationship to *Megachile* as the asilid genus *Hyperechia* Schiner, 1866 has to carpenter bees of the genus *Xylocopa* Latreille, 1802. *Hyperechia* is clearly an exponent of parasitic mimicry, as females oviposit near the burrows of carpenter bees. The larvae migrate into the open *Xylocopa* brood cells as they are being provisioned with pollen prior to the bee laying its egg and sealing the cell. The asilid larva then preys on the bee larva (Watmough 1974). Although Skaife (1979) states that *Hyperechia* imagoes 'lurk' near the bees' entrance holes and 'pounce' on the bees before 'overpowering them and devouring them'– this unlikely behaviour needs confirmation. Could it be that *Afromelittodes* imagoes parasitise the larvae of *Megachile* bees? These bees make quite large nests using mud. Perhaps future searches for the rare asilids need to be focussed on the nesting sites of these *Megachile* bees. As parasitic mimicry can only work when the parasite exists in low numbers, this may explain the rarity of *Afromelittodes* in collections.

Of particular interest is that one *A. mimos* paratype was recorded as having been collected 'visiting flowers of *Euphorbia* sp.', and has what appear to be some pollen grains adhering to the mesonotum and to other parts of its body. As asilids are not known to be pollinators, the significance of this observation is difficult to interpret. The fly may merely have been resting on the plant or may have been feeding on prey covered with pollen. However, as the megachilid bee may have been foraging on the *Euphorbia*, there may be far more to the observation than is presently appreciated.

Taxonomic relationships

When describing *Afromelittoides*, Oldroyd & Van Bruggen (1963) briefly discussed its placement in the Laphriinae and possible confusion with taxa then assigned to the subfamily Dasypogoninae. Since the redefinition of subfamilies by Papavero (1973) and Artigas & Papavero (1988) this confusion has been eliminated. *Afromelittodes* is correctly placed in the Laphriinae and although it is fairly unusual in having a post-metacoxal bridge, this character state is shared with *Katharma* Oldroyd, 1960.

Some years ago it was brought to my attention by Drs Steve Bullington and Eric Fisher (*pers. comm*.) that *Afromellitodes* very closely resembles the monotypic nearctic genus *Dasylechia*; a fact that had not been appreciated by either Oldroyd

or Van Bruggen. This astonishing similarity is easily confirmed by an examination of Hull's (1962) redescription of *Dasylechia*, and his excellent illustrations. While I am aware that Bullington and Fisher are preparing to publish new information on, and a detailed description of, *Dasylechia atrox* (Williston, 1884) that is likely to include details of both the male and female genitalia, it is clear that they will need the results of my study before finalising a decision on possible synonymy of *Afromelittodes* with *Dasylechia*. With this in mind, I acquired and examined a few specimens of *D. atrox* (listed below) in order to make my own assessment of the relationship between these genera and to draw attention to some of the features that might need to be taken into consideration when making a decision on the status of *Afromelittodes*. Among the character states that would need careful consideration are the following:

1. *Size*: Specimens of *Afromelittodes* are generally smaller (wing length *ca* 11–12 mm) than *Dasylechia* (wing length *ca* 14–16 mm).
2. *Antenna*: The shape and relative lengths of scape and pedicel differ. *Afromelittodes* has a relatively 'deeper' (more inflated) appearance, while the pedicel is shorter than the scape. Note: Hull's (1962) figure 279 shows *Dasylechia* with a style composed of three elements, two equally sized 'segments' and a terminal 'spine'. Specimens at my disposal have only one basal 'segment'.
3. *Spur vein at base of* R_4: While *D. atrox* and *A. solis* have spur veins, all four known *A. mimos* specimens lack spur veins.
4. *Tubercle on S3 of male*: Both species of *Afromelittodes* have a medially placed tubercle (although far better developed in *A. solis*). *D. atrox* lacks such a tubercle.
5. *Genital rotation*: The male 'genital bulb' of *Afromelittodes* is hardly if at all rotated (the enlarged S8 lying ventrally and immediately below the fused gonocoxites). *D. atrox* apparently demonstrates some rotation.
6. *Male genitalia*: *Afromelittodes* has much smaller aedeagal prongs than in *Dasylechia*. Other differences are relatively minor and may be regarded as specific rather than generic.
7. *Female genitalia*: *Afromelittodes* has spermathecae which coil three and a half times in the region of the reservoir. *Dasylechia* has fewer coils (two and a half). Other differences are relatively minor and may be regarded as specific rather than generic.
8. *Mimicry model*: *Afromelittodes* mimics *Megachile* (Megachilidae) while *D. atrox* mimics *Xylocopa* (Anthophoridae) in a similar way to afrotropical *Hyperechia*. Note: *D. atrox* was originally placed in *Hyperechia*.

It is obvious that *Afromelittodes* is morphologically very similar to *Dasylechia*. However, as convergence cannot be discounted, I suggest that any decision to synonymise *Afromelittodes* should be delayed until the results of a phylogenetic study of these and other laphriine genera are available. Should a synonymy be contemplated, it may be necessary to support the suggestion with an explanation of the disjunct distribution displayed by the species. In this regard, it may be useful to mention here that the bombyliid genus *Dicranoclista* Bezzi, 1924 presently has a similar distribution, although the afrotropical species are not found in southern Africa (Greathead & Evenhuis 2001: 190). Of additional interest is that specimens of *Dasylechia* are almost as rare as those of *Afromelittodes* (see Bullington 1978). While this may suggest antiquity, the particular parasitic lifestyle that is almost certain to involve mimicry in both genera should be considered.

Dasylechia material studied

1♀ 'Washtenaw Co. Mich. [Michigan] / Ann Arbor / ix–3–1937 / F.M. Gaige / In back of Museum', '*Dasylechia* / *atrox* Will. / Det. by A. L. Olson 1938', 'SW Bromley / Collection / 1955', 'USNM Ent. 00033106 / [barcoded]'. Donated to NMSA by Smithsonian Institution. *Note*: Pinned with a honey bee prey item.

1♀ 'Ithaca, N. Y. [New York State] / 27 Aug. '96 [1896]', 'Cornell U. / Lot. 482 / Sub. 14', '*Dasylechia* / *atrox* / Will.' (Cornell University Insect Collection).

1♂ 'Clinton Co., / O [Ohio] vii–20.62', 'F.J. Moore / Collector', '*Dasylechia* / *atrox* Will. / det. W. Wilcox 1967' (Ohio State University).

1♀ 'Columbus, / vii–24 O. [Ohio]', 'C. venmard', '*Dasylechia* / *atrox* / Williston / Det. / S.W. Bromley 1934' (Ohio State University).

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REFERENCES

ARTIGAS, J. N. & PAPAVERO, N. 1988. The American genera of Asilidae (Diptera): keys for identification with an atlas of female spermathecae and other morphological details. 1. Key to subfamilies and subfamily Leptogastrinae. *Gayana, Zoologia* **52** (1–2): 95–114.

BULLINGTON, S. W. 1978. Two new records for Dasylechia atrox (Williston) (Diptera: Asilidae), with a review of all previous records. *Entomological News* **89** (7&8): 195–196.

DIKOW, T. & LONDT, J. G. H. 2000. A review of *Lamyra* Loew, 1851 (Diptera, Asilidae, Laphriinae). African Entomology **8** (2): 189–200.

GREATHEAD, D. J. & EVENHUIS, N. L. 2001. Annotated keys to the genera of African Bombylioidea (Diptera: Bombyliidae; Mythicomyiidae). *African Invertebrates* **42**: 105–224.

HULL, F. M. 1962. Robber flies of the world. The genera of the family Asilidae. *Bulletin of the United States National Museum* **224** (1): 1–430, (2): 431–907.

LONDT, J. G. H. 1992. *Bana*, a new genus of bee-mimicking assassin flies from southern Namibia (Diptera: Asilidae: Stenopogoninae). *Cimbebasia* **13** (1991): 91–97.

——— 2002. A survey of grassland Asilidae (Diptera) at Queen Elizabeth Park, Pietermaritzburg, South Africa. *African Invertebrates* **43**: 93–108.

MCALPINE, J. F. 1981. Morphology and terminology – adults. *In*: McAlpine, J. F. [*et. al.*], *Manual of Nearctic Diptera*. Volume 1. Hull (Quebec): Agriculture Canada, Research Branch (Monograph; No. 27) pp. 9–63.

OLDROYD, H. 1974. An introduction to the Robber Flies (Diptera: Asilidae) of Southern Africa. *Annals of the Natal Museum* **22** (1): 1–171.

——— 1980. Family Asilidae. *In*: Crosskey, R. W., ed., *Catalogue of the Diptera of the Afrotropical Region*. London: British Museum (Natural History) pp. 334–373.

OLDROYD, H. & VAN BRUGGEN, A. C. 1963. A new South African bee mimic (Diptera: Asilidae). *Journal of the Entomological Society of South Africa* **26** (1): 190–193.

PAPAVERO, N. 1973. Studies of Asilidae (Diptera): systematics and evolution. I. A preliminary classification in subfamilies. *Arquivos de Zoologia, Sao Paulo* **23** (3): 217–274.

SKAIFE, S. H. 1979. *African Insect Life*. Cape Town: C. Struik.

STUCKENBERG, B. R. 1999. Antennal evolution in the Brachycera (Diptera), with a reassessment of terminology relating to the flagellum. *Studia Dipterologica* **6** (1): 33–48.

THEODOR, O. 1976. *On the structure of the spermathecae and aedeagus in the Asilidae and their importance in the systematics of the family.* Jerusalem: The Israel Academy of Sciences and Humanities. p. 175.

VAN WYK, A. & SMITH, G. F. 2001. *Regions of floristic endemism in southern Africa*. Pretoria: Umdaus Press.

WATMOUGH, R. H. 1974. Biology and behaviour of carpenter bees in southern Africa. *Journal of the Entomological Society of southern Africa* **37** (2): 261–281.