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A review of the Afrotropical genus *Hermannomyia* Oldroyd, 1980, with the description of a new species from East Africa (Diptera: Asilidae: Stenopogoninae)

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ABSTRACT

The Afrotropical robber fly genus *Hermannomyia* Oldroyd, 1980 is reviewed. A new species, *H. ukasi* sp. n., is described from the biologically interesting Ukasi region of the Eastern Province of Kenya, while all known locality records are provided for previously described species, *H. engeli* (Hull, 1962) and *H. oldroydi* Londt, 1981. An identification key and distribution map are provided.

KEY WORDS: Asilidae, Stenopogoninae, *Hermannomyia*, Afrotropical, Kenya, robber flies, new species, taxonomy, identification key.

INTRODUCTION

Hermannomyia Oldroyd, 1980 is a small (two described species) genus of Afrotropical robber flies that has until now been recorded only from southern Africa (Londt 1981). It was therefore both surprising and exciting to discover an undescribed species from the Eastern Province of Kenya. This paper is dedicated to a description of this Kenyan species, new records of the two known species and a key for the separation of these taxa.

The taxonomic history of *Hermannomyia* is short and uncomplicated and may be summarized as follows:

Hull (1962) – Described the genus *Hermanella* based on a unique male from Rhodesia (= Zimbabwe), which had been labelled with a manuscript name ‘*Myielaphus* (*sic*, should be *Myelaphus*) *pardalinus*’ by Engel. The type species was accordingly given the name *engeli*. In the absence of a female the genus was grouped with his tribe Dioctrini, Hull stating that should females have spiny acanthophorites it would fall within his Dasypogonini.

Papavero (1973) – In redefining subfamilies put *Hermanella* in the Stenopogoninae.

Oldroyd (1974) – Discussed the history of the genus (including it in his tribe Saropogonini) providing notes on the morphology of *engeli* and listing additional material from Zimbabwe, South Africa and Lesotho, suggesting that the Lesotho specimen could represent a second species.

Oldroyd (1980) – In cataloguing the genus, placed it in the tribe Dasypogonini (subfamily Dasypogoninae) and indicated that the name was a junior homonym. A new name, *Hermannomyia*, was provided, and only the type species (*engeli*) was listed.

Londt (1981) – Revised the genus, confirming the presence of female acanthophorites, describing a second species, *oldroydi*, from Lesotho (the material Oldroyd had sus-

pected could be a second species) and South Africa, and listing a number of new records for *engeli*. A key to species was also provided.

Londt (1999) – Included *Hermannomyia* in a key to the genera of Afrotropical Stenopogoninae.

Geller-Grimm (2004) – Listed the genus in his world list of Asilidae genera.

Londt (2013) – Published an updated key to the genera of Afrotropical Stenopogoninae, including *Hermannomyia*.

MATERIAL AND METHODS

Terminology follows mainly that proposed by McAlpine (1981) and Stuckenberg (1999), and that used by the senior author in more recent publications. Institutional abbreviations used are as follows (names of curators who assisted us are given in brackets): BMNH – The Natural History Museum, London, UK (Erica McAlister); NMBZ – National Museum of Zimbabwe, Bulawayo, Zimbabwe; NMKE – National Museums of Kenya, Nairobi, Kenya (Mary Gikungu); NMSA – KwaZulu-Natal Museum, Pietermaritzburg, South Africa (Burgert Muller); SAMC – South African Museum, Cape Town, South Africa (Dawn Larsen); SANC – National Collection of Insects, Pretoria, South Africa (Ros Urban).

The material listed for *H. engeli* and *H. oldroydi* (alphabetically according to country and in order of latitude) relates both to specimens previously recorded in the literature (as indicated at the end of those records) and specimens recorded for the first time.



Fig. 1. *Hermannomyia engeli* (Hull, 1962), entire male.

TAXONOMY

Genus *Hermannomyia* Oldroyd, 1980

Hermannella Hull, 1962: 34. Type species: *Hermannella engeli* Hull, 1962, by original designation. Junior homonym, preoccupied by *Hermannella* Canu, 1891.

Hermannomyia: Oldroyd 1980: 372 [replacement name for *Hermanella* Hull, 1962].

Diagnosis: Stenopogonine asilids (Fig. 1) with the following combination of characters: *Head:* Antenna with compressed, strap-like postpedicel and terminal two-‘segmented’ style of similar form; head clearly wider than high in anterior view; face plane, not projecting ventrally; mystax extends down entire facial profile, from antennal bases to epistomal margin; palpi two-segmented; proboscis straight, not downcurved. *Thorax:* Anatergites asetose, wing with costal vein extending around entire margin (bordering anal lobe and alula). *Abdomen:* Usually constricted between segments 2 and 3; acanthophorites well-developed.

***Hermannomyia ukasi* sp. n.**

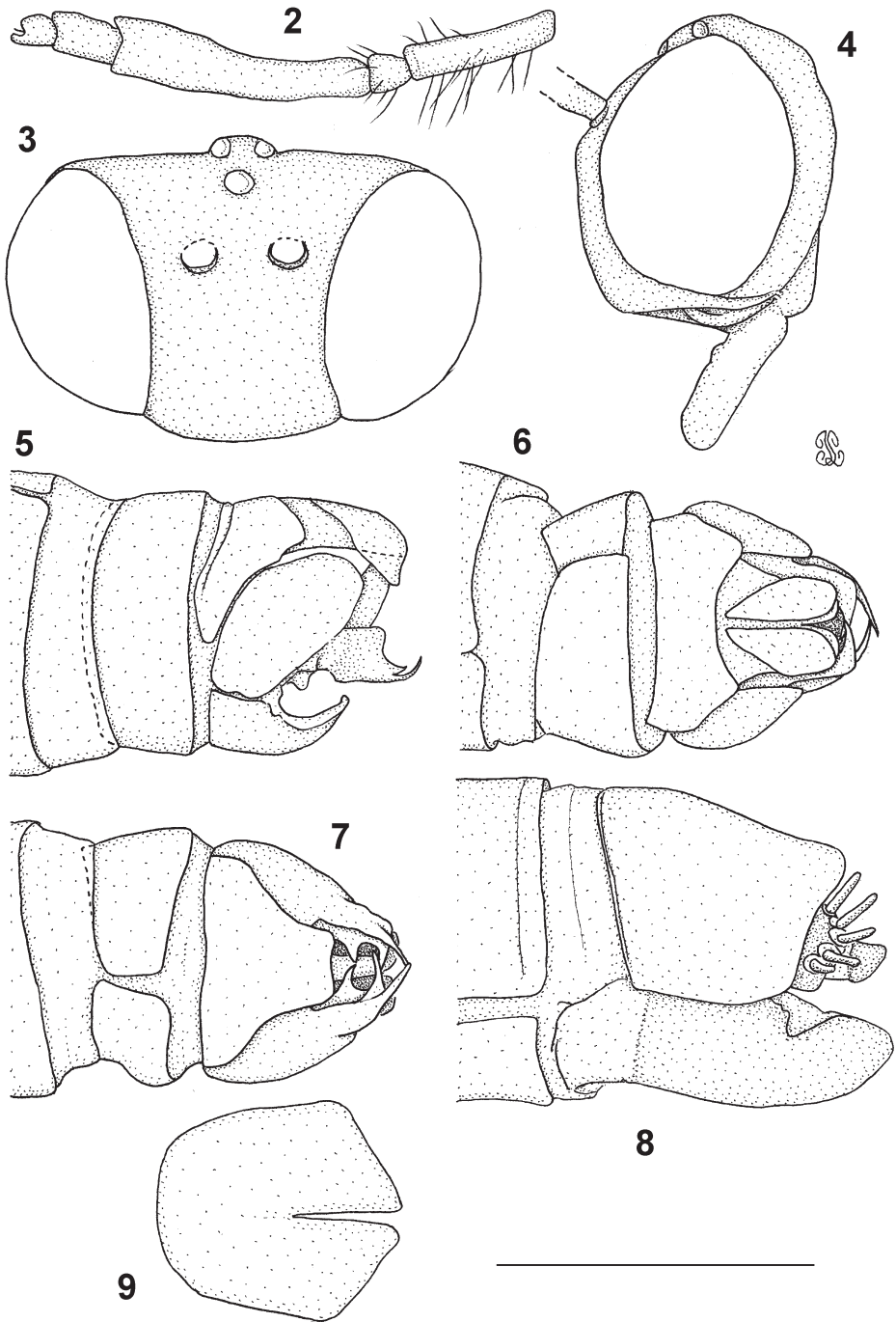
Figs 2–10

Etymology: Named after the type-locality of Ukasi Hill in Kenya; noun in apposition.

Description:

Head (Figs 2–4): Blackish, silver pruinose, white to pale yellow-white setose, clearly broader than high in anterior view. Antenna (Fig. 2) black, scape and pedicel fine white setose. Segmental ratios: 1:0.25:1.67:(0.42:0.33); scape elongate, cylindrical (almost 5× longer than deep), 4× longer than pedicel; pedicel fractionally longer than deep in lateral view; postpedicel more than 1.5× longer than scape, laterally compressed (somewhat leaf-like); style composed of three elements (two well-developed, laterally compressed segment-like elements and a small subapical spine-like sensory element). Face (Fig. 3) wider than one eye in anterior view (eye: face ratio 1:1.25); blackish, but colour masked by strong silver pruinescence, profile (Fig. 4) plane (no obvious gibbosity), mystacial setae white, cover entire face. Frons and vertex blackish, partly silver pruinose (anteriorly and along eye margins), partly dull red-brown pruinose (either side of ocellar tubercle), centrally (anterior of ocellar tubercle) shiny apruinose. Vertex slightly tumid (i.e. not depressed between eyes as in many asilids), ocellar tubercle only slightly raised. Postocular area dark red-brown to black, moderately silver pruinose, dorsal setae moderately developed, pale yellow-white, other setae fine white. Palpi dark red-brown to black, 2-segmented, white setose, largely hidden within stomal area. Proboscis dark red-brown, somewhat short (hardly projecting beyond epistomal margin), slightly dorsoventrally flattened.

Thorax: Blackish, silver and brownish pruinose, white and orange setose. Prothorax blackish, silver pruinose, white setose. Mesonotum blackish, silver pruinose except for large lateral areas and medial band which are somewhat brownish pruinose, all fine setae white; macrosetae weakly developed, orange (2 notopleurals, 1 supra-alar, 1 postalar), acrostichals not evident, dorsocentrals weakly developed posterior of transverse suture only. Scutellum blackish, dull silver pruinose, 4 weakly developed apical setae. Pleura blackish, strongly silver pruinose, weakly white setose (setae confined to dorsal region of anepisternum and katatergite; there being a single anepimeral macroseta). Anatergites asetose. Postmetacoxal area membranous.



Figs 2–9. *Hermannomyia ukasi* sp. n.: (2) antenna of holotype; (3, 4) head of holotype, anterior (3) and lateral (4); (5–7) male terminalia of paratype, lateral, dorsal, and ventral views; (8, 9) female terminalia of paratype: (8) general appearance, lateral view; (9) S8, ventral view. Scale bar = 1 mm.



Fig. 10. *Hermannomyia ukasi* sp. n., left wing of paratype male.

Legs: Coxae blackish, strongly silver pruinose, white setose. Trochanters brown-yellow. Femora brown-yellow, darker brown dorsodistally. Tibiae and tarsi dark red-brown to blackish. Claws, pulvilli and empodia well-developed (metathoracic empodia border on being inflated and laterally compressed as seen in *Empodiodes* Oldroyd, 1972).

Wing (Fig. 10): 4.6×1.8 mm (paratype ♂ measured – length from humeral crossvein to tip, width at widest level. (The wing was removed, soaked in alcohol and spread for photography. Due to having been mounted from alcohol, all specimens have twisted wings, difficult to measure. The ♀ paratype has slightly longer wings, approx. 4.8 mm.) Veins dark brown to black, membrane hyaline, transparent, but gray tinged due to dark microtrichia which cover almost entire surface (absent only from proximal parts of basal radial cell, all but distal tip of basal medial cell and anteroproximal parts of posterior cubital cell). Costa extends around entire wing margin, including anal cell and alula. Posterior cubital cell closed just before wing margin.

Abdomen: Black, mostly silver pruinose, entirely white setose. Constricted between segments 2 and 3. T1–5 silver pruinose posteriorly and laterally leaving anteromedial area shiny black. ♂ T6–8 (and ♂ epandrium plus cerci) entirely silver pruinose, ♀ (although somewhat ‘greasy’) similar to ♂ but T7 largely apruinose except for mediodistal region and T8 entirely apruinose. Sterna uniformly dull silver pruinose. All setae white, fine (except for a few poorly developed macrosetae posterolaterally on T1).

♂ terminalia (Figs 5–7): Rotated clockwise through 180°. Epandrium short (less than half as long as broad in dorsal view), hardly separated into two lobes distally; proctiger well-developed, jutting out far beyond epandrium; gonocoxites well-developed, oval in shape (lateral view), distomedial lobe well-developed, with three sharp medially directed claw-like processes (ventral view); gonostyli well-developed, elongate, straight; hypandrium slightly shorter than wide (ventral view), broad proximally, tapering to somewhat truncate, slightly bilobed distal end; aedeagus largely hidden from view, straight, weakly sclerotized.

♀ terminalia (Figs 8, 9): Ovipositor tubular, only slightly laterally compressed. T8 well-developed; S8 (subgenital plate) well-developed, weakly sclerotized proximally, widening distally before tapering quickly to cleft apex (ventral view); T9 with well-developed acanthophorites, each bearing 5 strong macrosetae; proctiger short, moderately well sclerotized.



Fig. 11. The Malaise trap set at the foot of Ukasi Hill, where the type series of *Hermannomyia ukasi* sp. n. was collected. (Photo: R. Copeland)

Holotype: ♂ 'KENYA, Eastern Prov. / base of Ukasi Hill / 613 m. 0.82103°S. / 38.54443°E [0°49'S 38°33'E]', 'Malaise trap. *Acacia* / *Commiphora* savanna / 21 NOV-5 DEC 2011 / R. Copeland' (NMKE).

Paratypes: 1♂ same data as holotype (NMSA); 2♀ 'KENYA, Eastern Prov. / base of Ukasi Hill / 613 m. 0.82103°S. / 38.54443°E', 'Malaise trap. *Acacia* / *Commiphora* savanna / 7-21 NOV 2011 / R. Copeland' (NMSA, NMKE).

Note: The females were trapped during a fortnight's exposure preceding another fortnight when the males were trapped.

Distribution, phenology, and biology: The species is known only from the type locality and has been collected during November and December. Nothing is known about its biology, but the fact that material was collected in a Malaise trap suggests that the species displays a degree of sustained flight (unlike many other robber flies) similar to many Hymenoptera. The habitat (Fig. 11), described as *Acacia/Commiphora* savanna, appears to be similar to that occupied by other species in the genus. The possession of acanthophorites means that the species probably spends much of its adult life resting on the ground (Londt 1994).

Hermannomyia engeli (Hull, 1962)

Records: BOTSWANA: 1♀ Farmers Brigade, Serowe [22°22'S 26°40'E], 2226BD, iv.1990, Forschhammer, Malaise (NMSA); 3♂ 1♀ Farmers Brigade, c. 6 km SE Serowe, 2226BD, 11.iv.1983 (♂), 20.iv.1983 (♂), 27.iv.1984 (♀), 20.v.1984 (♂), Forschhammer, Malaise trap (NMSA); 1♂ Farmers Brigade, c. 6 km SE Serowe, 2226BD, 20.v.1984, Forschhammer, forestry nursery (NMSA); 2♂ 2♀

Farmers Brigade, 5 km SE Serowe, 2226BD, 8.iii.1984 (♂), 19.iii.1984 (♂), iii.1986 (♀), 3.iv.1986 (♀), Forschhammer, Malaise trap (NMSA); 1♂ 1♀ Farmers Brigade, 5 km SE Serowe, 2226BD, 10.ii.1984 (♀), 18.ii.1984 (♂), Forschhammer, Hillside N slope, Malaise trap (NMSA); 1♂ 2♀ Farmers Brigade, 5 km SE Serowe, 2226BD, 30.iii.1985 (♀), xi.1985 (♂), Forschhammer, Malaise trap (NMSA). MOZAMBIQUE: 1♂ Motola [25°58'S 32°28'E], 10.iv.1982, Feijen (NMSA). SOUTH AFRICA: 1♂ 14–29 km W Alldays, 22°44'00"S 28°58'57"E, 14.iii.1990, Eardley (SANC); 1♀ Crystal Springs Mountain Resort, 24°49'36"S 30°37'26"E, 1304 m, 19.ix.2006, Londt, dry *Faurea–Acacia* bushveld (NMSA); 1♂ Pilanesberg National Park, Manyane Trail, 25°14'46"S 27°13'43"E, 1073 m, 19.ix.2011, Londt, dry open savanna (NMSA); 1♂ Pilanesberg National Park, Bakubung, 25°20'25"S 27°03'51"E, 1100 m, 12–19.xi.1999, Londt (NMSA); 3♂ 1♀ Pretoria [25°44'S 28°13'E], 21.xi.1915 (♀), 10.iii.1916 (3♂), Swierstra (NMSA – Londt 1981); 1♂ Pretoria, 15.x.[19]50, Munro (SANC); 1♀ Ndumu Game Reserve, 2632CC, 26.x.1972, Irwin (NMSA – Londt 1981); 1♀ Ndumu Game Reserve, 2632DC, 4–9.x.1982, Londt, riverine bush (NMSA); 1♀ Ndumu Game Reserve, 2632CD, Rest Camp [26°55'S 32°19'E], 95 m, 23–9.xi.1977, Brothers & Jacot Guillarmod, Malaise trap (NMSA); 2♂ Spioenkop Nature Reserve [28°42'S 29°31'E], 2829CB, 3–6.x.1981, Londt (NMSA); 1♂ Weenen [28°51'S 30°04'E], ii.1925, Thomasset (BMNH – Oldroyd 1974); 1♂ Weenen, 2840 ft, iii.1924, Thomasset (BMNH – Oldroyd 1974); 2♂ 2♀ 8 km SE Muden, Mhlopheni Nature Reserve, 2930AB, 8.iv.1983, Londt, Barraclough & Seymour, thornveld (NMSA); 1♀ Cumberland Nature Reserve, 29°30'16"S 30°30'12"E, 570 m, 3.ii.2002, Londt, mixed wooded grassland (NMSA); 1♂ Karoo National Park, Beaufort West, 32°20'S 22°30'E, 13.ii.1991, Eardley (SANC); 1♂ Rooinek Pass S of Laingsburg [33°20'S 20°55'E], x.1952, S.A. Mus. Expd. (SAMC – Londt 1981). ZAMBIA: 1♂ 'Kafue [River, 15°56'S 28°55'E], N.W.R. [? North West Rhodesia], 29/8/ [19]13, 3100 [? altitude], R.C.W., mid-day on sandy path' (BMNH). ZIMBABWE: 1♂ Umtali [= Mutare, 18°58'S 32°39'E], 9.x.1926, Rhodesia Museum (NMBZ – Londt 1981); 1♂ Bazely [Bazeley] Bridge [19°15'S 32°29'E], 20.iv.1965, Cookson (NMSA – Oldroyd 1974; Londt 1981); 1♂ Sawmills [19°35'S 28°01'E], 12.iv.1920, Rhodesia Museum (BMNH); 1♀ Sawmills Road, Nyamandhlovu [19°52'S 28°16'E], 26.iii.1961, Nat. Mus. S. Rhod. (NMBZ – Londt 1981); ♂ holotype, 'Bulawayo [20°10'S 28°35'E] / S. Rhodesia / 5.4.1920 / Rhodesia / Museum', 'Pres. By / Imp. Inst. Ent. / Brit. Mus. / 1931–33', 'Myielaphus / pardalinus / sp. n. / Dr. E.O. Engel det', '*Hermanella* / *engeli* Hull / Holotype', 'Holo- / type [circular red edged label]' (BMNH – Hull 1962; Oldroyd 1974. *Note:* Dr Erica McAlister kindly sent us a series of excellent photographs of the holotype for reference purposes. These substantiate earlier identifications).

Hermannomyia oldroydi Londt, 1981

Records: LESOTHO: ♂ holotype 'Mamathes [Mamathe, 29°08'S 27°50'E] / Basutoland / 15-xi-1947 / C. Jacot / Guillarmod' (NMSA – Oldroyd 1974; Londt 1981). SOUTH AFRICA: 4♂ paratypes 'Spitzkop / Meirings Poort [Meiringspoort, 33°24'S 22°33'E] ~ 'Museum Staff / Jan 1935' (3♂ SAMC 1♂ NMSA – Londt 1981).

Key to *Hermannomyia* species

- 1 Extensively blackish including postpronotal lobes and all abdominal segments; wing membrane transparent except for gray tinge caused by black microtrichia. (East Africa) **ukasi** sp. n.
- Orange and dark red-brown to black species; postpronotal lobes and abdominal tergites extensively orange (may be masked by silver pruinescence); wing membrane pale orange to brownish stained even if only along major veins distally. (Southern Africa) 2
- 2 Abdomen laterally constricted between segments 2 and 3; tarsomeres orange to pale brownish; wing membrane pale orange to brownish stained along major veins distally, centres of cells unstained **engeli** (Hull, 1962)
- Abdomen not constricted between segments 2 and 3; tarsomeres dark red-brown to black; wing membrane fairly uniformly pale brown stained **oldroydi** Londt, 1981

DISCUSSION

The distribution of *Hermannomyia* is confined to the eastern parts of the African continent, south of the equator (Fig. 12). Records suggest that it is a matter of time before the genus is reported from countries such as Tanzania and Malawi, as suitable habitat almost certainly exists in these countries. Records also clearly indicate that the genus is associated with the savanna biome. *H. ukasi* was collected during a period of heavy rainfall that occurred during the ‘short rains’, one of two periods of seasonally heavy rainfall (October–December, April–June) experienced annually in Kenya. The Ukasi region is of great biological interest as it is also home to other rarely collected taxa including the ‘terrible hairy fly’ *Mormotomyia hirsuta* Austen, 1936 (Diptera: Mormotomyiidae) (Copeland *et al.* 2011), the mellitid bee genera *Meganomia* Cockerell, 1909 and *Pseudophilanthus* Alfken, 1939 (Hymenoptera: Melittidae: Meganomiinae) (Michener 1981, 1992), the proctotrupid wasp genus *Afroserphus* Masner, 1961 (Hymenoptera: Proctotrupidae), not previously recorded from Kenya (Kolyada & Mostovski

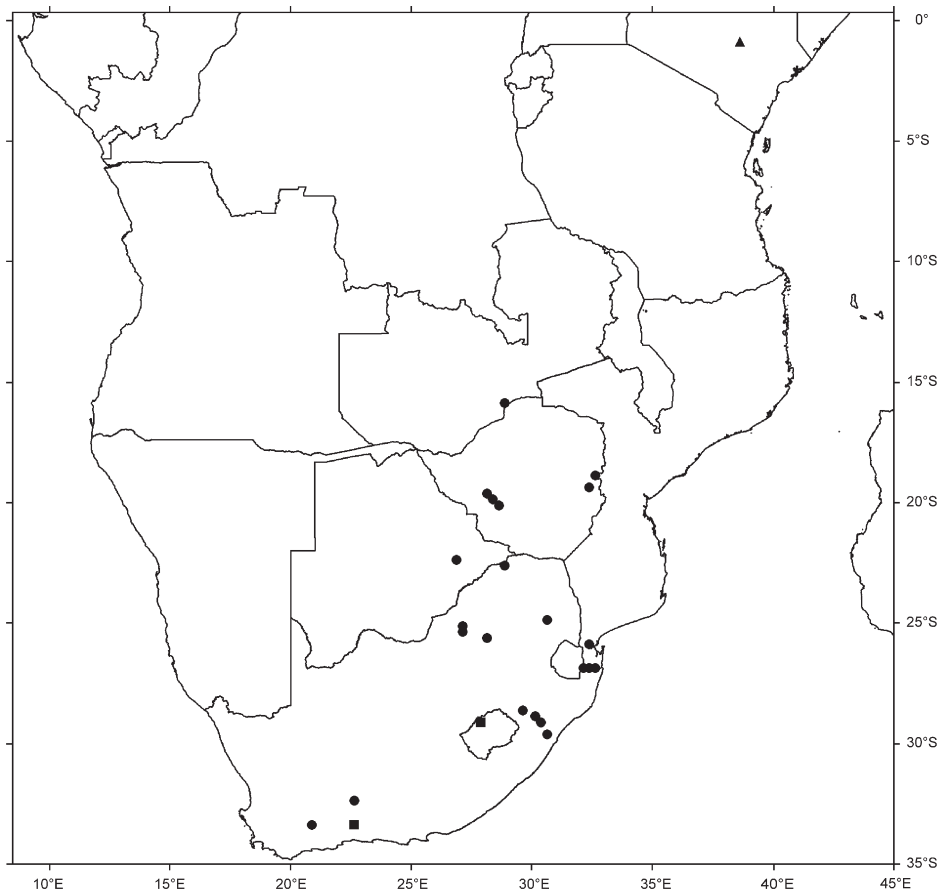


Fig. 12. The distribution of *Hermannomyia* species in Africa: *H. engeli* (circles), *H. oldroydi* (squares), *H. ukasi* (triangle).

TABLE 1
The phenology of *Hermannomyia* species.

Species	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
<i>engeli</i>	–	–	●	●	●	–	–	●	●	●	●	–
<i>oldroydi</i>	–	–	–	–	●	–	●	–	–	–	–	–
<i>ukasi</i>	–	–	–	–	●	●	–	–	–	–	–	–

2007), and an undescribed species of the jewel wasp genus *Anachrysis* Krombein, 1986 (Hymenoptera: Chrysididae: Amiseginae), previously known only from southern Africa (Krombein 1986, 1994).

Finding an endemic species of *Hermannomyia*, previously known only from southern Africa, at Ukasi will further strengthen efforts to make the Ukasi Hill area a protected site.

Although data are limited, the two southern African species appear to be summer active in the adult phase (Table 1) while *H. ukasi* was active during periods of heavy rainfall. The more abundant data for *engeli* suggest that species may have extended flight periods.

Of interest is the sexual ratio of specimens studied. Of the 53 specimens recorded above, no fewer than 36 (68%) are male, while 17 (32%) are female. While it may be possible that the usual one to one ratio expected of most species does not pertain to this group of flies, a more likely explanation for the imbalance is collecting bias. It is probable that males are more active than females and therefore more frequently observed and collected. It is also the senior authors experience that Malaise-trapped asilids often show a similar sexual bias and it has been put down to males having sustained, hymenopteran-like flight that results in them rising high enough in the trap to get caught. Females may more frequently fly into a trap and then out again.

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REFERENCES

- COPELAND, R.S., KIRK-SPRIGGS, A.H., MUTETI, S., BOOTH, W. & WIEGMANN, B.M. 2011. Rediscovery of the “terrible hairy fly”, *Mormotomyia hirsuta* Austen (Diptera: Mormotomyiidae), in eastern Kenya, with notes on biology, natural history, and genetic variation of the Ukasi Hill population. *African Invertebrates* **52** (2): 363–390.
- GELLER-GRIMM, F. 2004 (2003). A world catalogue of the genera of the family Asilidae (Diptera). *Studia dipterologica* **10** (2): 473–526.
- 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.

- KOLYADA, V.A. & MOSTOVSKI, M.B. 2007. On a putative Gondwanan relic *Afroserphus bicornis* Masner (Hymenoptera: Proctotrupidae), with a description of the hitherto unknown female. *African Invertebrates* **48** (2): 261–265.
- KROMBEIN, K.V. 1986. A remarkable new African amesegine wasp (Hymenoptera: Chrysididae: Amiseginae). *Proceedings of the Entomological Society of Washington* **88**: 509–514.
- 1994. A new *Anachrysis* from South Africa (Hymenoptera: Chrysididae: Amiseginae). *Proceedings of the Entomological Society of Washington* **96**: 339–341.
- LONDT, J.G.H. 1981. The genera *Habropogon* Loew and *Hermannomyia* Oldroyd in southern Africa (Diptera: Asilidae: Dasypogoninae). *Journal of the Entomological Society of Southern Africa* **44** (1): 69–78.
- 1994. Afrotropical Asilidae (Diptera) 26. Ethological observations, and a possible ecological classification based on habitats. *Annals of the Natal Museum* **35**: 97–122.
- 1999. Afrotropical Asilidae (Diptera) 31. A review of the genera *Stenopogon* Loew, 1847 and *Rhacholaemus* Hermann, 1907 with the description of new genera and species (Stenopogoninae). *Annals of the Natal Museum* **40**: 47–82.
- 2013. A remarkable new genus of robber flies, *Akatiomyia* gen. n., from the Western Cape Province of South Africa, and a new key to the genera of Afrotropical Stenopogoninae (Diptera: Asilidae). *African Invertebrates* **54** (1): 57–68.
- MCALPINE, J.F. 1981. Morphology and terminology — Adults. In: McAlpine, J.F. et. al., eds, *Manual of Nearctic Diptera*. Vol. 1. Hull, Quebec: Agriculture Canada, Research Branch (Monograph No. 27), pp. 9–63.
- MICHENER, C.D. 1981. Classification of the bee family Melittidae with a review of species of Meganomiinae. *Contributions of the American Entomological Institute* **18**: 1–135.
- 1992. Nomenclatural problems in the Meganomiinae and a review of the genus *Pseudophilanthus* (Hymenoptera, Melittidae). *Journal of the Kansas Entomological Society* **65**: 146–150.
- 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, 1218, 1226, 1229.
- PAPAVERO, N. 1973. Studies of Asilidae (Diptera): systematics and evolution. I. A preliminary classification in subfamilies. *Arquivos de Zoologia, São Paulo* **23** (3): 217–274.
- 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.