

Taxonomic revision of the assassin-fly genus *Microphontes* Londt, 1994

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Introduction

Asilidae, or assassin flies, are the 3rd most speciose family of flies and the most diverse family in the Afrotropical Region with >7,500 species world-wide and 1,684 species in sub-Saharan Africa, which represents about 8% of the entire Diptera fauna in Africa¹. They are unique behaviorally in that they are predatory flies catching prey in mid-flight and have evolved special morphological features for this life history. The genus *Microphontes* Londt, 1994 is a small genus of assassin flies with currently three known species occurring in desert and semi-desert environments of western Namibia and South Africa.

The purpose of this revision is to re-describe the three existing species, and to describe one species as new to science. We add for the first time behavioral observations of the unusual flight pattern in male flies of the new species when searching for females near sparse vegetation on a Namib Sand Sea dune.

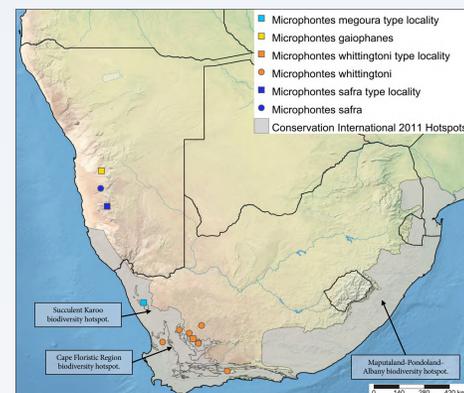


Figure 1. Species distribution for all known *Microphontes*.



Figure 2. Male *Microphontes* sp. nov. lateral and dorsal view, scale = 5mm.

Materials and Methods

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43 specimens examined for this study were loaned from the following institutions: National Museum of Natural History (USNM), Iziko South African Museum (SAMC), Illinois Natural History Survey (INHS), and KwaZulu-Natal Museum (NMSA).

Metadata for the 43 specimens were input and analyzed in the File Maker Pro local database. Coordinate data of specimen occurrence in File Maker Pro was input into SimpleMappr to create a comprehensive distribution map (Figure 1). Morphological features were examined using a Leica MZ8 and a Zeiss SteREO Discovery.V12 stereo microscope. Detailed character matrix was created using Lucid Builder V3.5, and exported into natural language for species description manuscript. Photographs were taken using GIGAmacro imaging system, a Canon D-7 full-frame DSLR, a Canon MP-E 65 mm f2.8 macro-lens, and illuminated by a twin-flash. Raw images were stacked using HeliconFocus Pro V6.7. Photographs and metadata were then uploaded to online data repositories such as ZooBank, Morphbank, and GBIF.

Cybertaxonomy and Data Resources

In our manuscript of this taxonomic revision we will submit the primary biodiversity data and images to openly accessible depositories using unique identifiers so as to allow future researchers to re-use, re-purpose, and test our data and hypotheses easily.

- **Global Biodiversity Information Facility (GBIF)**: specimen occurrence data
- **Lucid Builder**: matrix-based identification key, matrix-based species characterization
- **Morphbank**: biological image repository of specimens for comparative anatomy
- **SimpleMappr**: creates distribution maps of species occurrence data
- **Zenodo**: natural language species descriptions in XML-format
- **ZooBank**: for registering new nomenclature acts

Currently Known *Microphontes* Species



M. safra
Loaned from NMSA

- Wings length 4.1–5mm
- Abdomen regular, wings not reaching tip
- Anepisternum dorsally with short macrosetae
- Discal scutellar setae absent
- Cross vein r-m situated in proximal part of discal cell
- Distributed in the eastern Namib desert in February



Figure 3a. Male *M. safra* in lateral view and dorsal view, scale = 5mm.



M. megoura
Loaned from SAMC

- Wing length 3.2–4.1mm
- Abdominal segments shortened. Wing almost reaching tip
- Anepisternum dorsally with setae only
- Discal scutellar setae present
- Male terminalia with hypandrium shorter than epandrium
- Distributed in Namaqualand in November



Figure 3b. Male *M. megoura* in lateral view and dorsal view, scale = 5mm.



M. whittingtoni
Loaned from NMSA

- Wing length 3.1–3.7
- Abdominal segments shortened. Wing almost reaching tip
- Anepisternum dorsally with setae only
- Discal scutellar setae present
- Male terminalia with hypandrium longer than epandrium
- Distributed in south western South Africa in September–December



Figure 3c. Female *M. whittingtoni* in lateral view and dorsal view, scale = 5mm.

Newly Discovered Species



Figure 3. *Microphontes* sp. nov. ♀ in situ. Perched on dried vegetation potentially to avoid high temperatures of sand

Microphontes sp. nov.

- Wing length 4.2–5.5mm
- Abdomen regular, wings not reaching tip
- Anepisternum dorsally with short macrosetae
- Discal scutellar setae absent
- Cross vein r-m situated in distal part of discal cell
- Distributed in the eastern Namib desert in September

Field Behavior

- Males flew in a very unusual flight pattern not known from other assassin flies in an up-and-down flight, similar to a roller coaster, around vegetation
- Males would land on the sand in open spaces between the grass boulders and perch or rest with their pro- and mesothoracic legs held sideways and up
- Females observed less active and perched on dried vegetation

Discussion

Characters

- *M. safra* and *Microphontes* sp. nov. with abdomen regular, anepisternum dorsally with short macrosetae, and discal scutellar setae absent. Both distributed in the eastern Namib desert
- *M. whittingtoni* and *M. megoura* with abdominal segments shortened, anepisternum dorsally with setae.
- Male terminalia in *M. megoura* with hypandrium shorter than epandrium. Male terminalia in *M. whittingtoni* with hypandrium longer than epandrium
- *Microphontes* sp. nov. with cross vein r-m situated in distal part of discal cell. *M. safra*, *M. megoura*, and *M. whittingtoni* with cross vein r-m situated in proximal half of discal cell

Specimen Occurrence and Seasonality

- Species of *Microphontes* have been collected in the Southern Hemisphere spring to summer
- *Microphontes* sp. nov. is restricted in flight activity to the spring (September), *M. megoura* to early summer (November), and *M. safra* to summer (February)
- *M. whittingtoni* has been collected from spring (September) to summer (December). Specimen occurrence data for *M. whittingtoni* suggests greatest flight activity occurs in November where 10 specimens were collected amongst seven collecting events
- *M. safra* and *Microphontes* sp. nov. were collected in similar habitats and close in locality (Figure 4–5)

Microphontes sp. nov.

- We confidently present one new species as new to science with a published morphological taxonomic revision and accessible dichotomous key, photographs, and occurrence data
- Cross vein r-m situated in distal part of discal cell
- Seasonality of *Microphontes* sp. nov. distinct from similar species *M. safra* which only flies in February

Namib Desert Sites

Two red sand dune collection habitats 100km apart from each other, with similar vegetation, and similar species characteristics.



Figure 4. Sparsely vegetated sand dune on the eastern edge of the Namib Sand Sea N of Solitaire, Namibia where *Microphontes* sp. nov. was collected



Figure 5. Slope of Elim Dune with *Stipagrostis* sp. (Poaceae) on the eastern edge of the Namib Sand Sea near Sesriem, Namibia where *M. safra* was collected

Acknowledgements and References

This project would not have been possible without the contribution of specimens by natural history collections internationally. For this reason, we thank the collections managers and curators for providing access to specimens in their care. We'd like to also like to graciously acknowledge the National Science Foundation, as well as the Smithsonian Institution for making this research possible. Particularly, we'd like to thank Gene Hunt, Virginia Power, and Elizabeth Cottrell for their constant support during their administration of the NHE. We also acknowledge field work support through a Field Dreams award from the Field Museum of Natural History, Chicago, Illinois, under a project entitled, "Exploring enigmatic flies in the Namib desert", the NMNH for a project entitled, "Novel morphological data to decipher the character and life history evolution and diversification of Asiloidea and Nemestrinoidea flies", and the Global Genome Initiative for a project entitled, "Asiloid flies in the Nama Karoo and comparative phylogenomics." Furthermore, we thank the Namibian Ministry of Environment and Tourism and CapeNature (Western Cape, South Africa) for providing collecting and export permits in support of the field work in Namibia and South Africa.

¹ Londt, J.G.H. and Dikow, T., 2017. 48. Asilidae (assassin flies or robber flies). In: A.H. Kirk-Spriggs and B.J. Sinclair (eds.), *Manual of Afrotropical Diptera*, vol. 2. Nematoceros Diptera and lower Brachycera, pp. 1097–1182. Suricata 5, SANBI, Pretoria.

² Londt, J.G.H. 1994. Afrotropical Asilidae (Diptera) 25. A key to the genera of the subfamily Stenopogoninae with new synonymy and descriptions of seven new genera. *Annals of the Natal Museum* 35(1): 79–96. <http://hdl.handle.net/10499/AJ214>