

## Research article

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*Mallota* Meigen (Diptera: Syrphidae)**Marc DE MEYER <sup>1,\*</sup>, Georg GOERGEN <sup>2</sup>, John MIDGLEY <sup>3</sup> & Kurt JORDAENS <sup>4</sup><sup>1,4</sup>Royal Museum for Central Africa, Invertebrates Section, Leuvensesteenweg 13,  
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**Abstract.** The Afrotropical hoverflies belonging to the genus *Mallota* Meigen, 1822 (Diptera: Syrphidae) are revised. Ten species are recognized, of which four are new to science: *Mallota glabra* sp. nov., *M. hircus* sp. nov., *M. wyatti* sp. nov. and *M. stipulata* sp. nov. *Merodon edentulus* Macquart, 1855 is considered a junior synonym of *Eristalis dasyops* Wiedemann, 1819. Lectotypes are designated for *Eristalis dasyops*, *Merodon edentulus*, *Mallota pachymera* Bezzi, 1915 and *Helophilus extremus* Loew, 1858. The taxonomic history of the placement and identity of the different species of *Mallota* is presented. Their relationships, as well as affiliations with Afrotropical representatives of the genera *Eristalis* Latreille, 1804 and *Myathropa* Rondani, 1845, is briefly discussed based on morphological and DNA barcode data.

**Keywords.** Eristalinae, Africa, DNA barcoding, flower fly, hoverfly.

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**Introduction**

Hoverflies or flower flies (Diptera: Syrphidae) belong to one of the most diverse families of true flies with over 6300 species described worldwide (Skevington *et al.* 2019). The Afrotropical fauna,

however, comprises only slightly over 600 species (Kirk-Spriggs & Sinclair 2017) and this is considered an underestimation as a result of limited faunistic work and studies conducted in the region (Ssymank *et al.* 2021). Because of the varied larval life history (Ssymank *et al.* 2021), the group is a useful indicator of biodiversity for several ecosystems (Sommaggio 1999). In addition, they play an economic and ecological role as pollinators, biocontrol agents and decomposers (Inouye *et al.* 2015). A proper identification is required in order to understand the particular role of specific taxa. Despite the fact that the need for a more thorough taxonomic revision has been expressed about 20 years ago (Whittington 2003), up till recently there were no such revisions or identification keys for the vast majority of genera (Ssymank *et al.* 2021). It is only in the last years that taxonomic monographs have been published for a number of genera with representatives in the Afrotropical region (Jordaens *et al.* 2021), in addition to a key for all genera found in Africa (Ssymank *et al.* 2021). This paper is part of a series of revisions of Afrotropical representatives of crystalline genera (De Meyer *et al.* 2020a, 2020b; Jordaens *et al.* 2021).

The genus *Mallota* Meigen, 1822 was established by Meigen (1822) for three Palearctic species: *M. vittata* Meigen, 1822, *M. megilliformis* (Fallén, 1817), and *M. fuciformis* (Fabricius, 1794). Afterwards a number of taxa were added and currently, there are more than 60 species included in this genus (Morales 2011), the majority from the Holarctic Region but also with representatives in the Afrotropical, Neotropical, and Oriental Regions (Ssymank *et al.* 2021).

The rat-tailed larvae of *Mallota* are considered saprophagous and are found in stagnant water, often in cavities in trees (van Veen 2010). Adults, on the other hand, may exhibit necrophilous behavior, as evidenced by some species that were successfully attracted to carrion.

Within the genus, there is a large interspecific morphological diversity and their interrelationships, both within a particular zoogeographical region as well as between zoogeographical regions remain unclear. *Mallota* are usually densely pilose, resembling honeybees or bumblebees (Stubbs & Falk 2002; van Veen 2010) with a thickened metafemur. However, this generic description does not apply to all species. Hull (1949) recognized several groups (some described as distinct subgenera, mainly by Shiraki 1930) based on pilosity of the eyes, thickness of the metafemur, the position of cross-vein r-m, and the male eyes holoptic or dichoptic.

For the Afrotropical Region, six valid species of *Mallota* are listed in the Afrotropical catalogue (Smith & Vockeroth 1980), namely *M. aenigma* Bezzi, 1912, *M. aperta* (Bezzi, 1912), *M. dasyops* (Wiedemann, 1819) (senior synonym of *M. pachymera* Bezzi, 1915), *M. extrema* (Loew, 1858), *M. hirsuta* Hull, 1941, and *M. meromacrimima* Hull, 1941. These species show a remarkable heterogeneity in morphology; reason why the genus keys out at three different places in the recent key to the genera of Afrotropical Syrphidae Latreille, 1802 by Ssymank *et al.* (2021). In addition, the species recognition is ambiguous, making difficult the taxonomic identification. For several taxa the identified material available in collections is very limited or only known from the type series, and the original descriptions lack sufficient detail to allow a clear identification and species diagnosis. Recent identification keys for Afrotropical species of *Mallota* are lacking; the only ones available are Bezzi (1915) for three species and Curran (1939b) for two species (but also see below under taxonomic history for placement of species in different genera).

Recent expeditions by different research groups have expanded the material available, including specimens suitable for molecular analysis. The main objectives of this manuscript are, therefore, to establish the identity of all representatives of the genus *Mallota* found in the Afrotropical Region, to present an identification key and to discuss their interspecific relationships based on morphological and molecular data.

## Material and methods

This section largely follows the same outlines and methodologies as described in previous recent taxonomic revisions published by us (De Meyer *et al.* 2020a, 2020b; Jordaens *et al.* 2021).

### Material examined

Specimens from the following institutional collections were studied:

AMGS	=	Albany Museum, Makhanda [formerly Grahamstown], South Africa
AMNH	=	American Museum of Natural History, New York, USA
ANHRT	=	African Natural History Research Trust, Leominster, UK
ANSP	=	Academy of Natural Sciences of Philadelphia, Philadelphia, USA
CAS	=	California Academy of Sciences, San Francisco, USA
IITA	=	International Institute of Tropical Agriculture, Cotonou, Benin
MCSNG	=	Museo Civico di Storia Naturale “Giacomo Doria”, Genoa, Italy
NHMUK	=	The Natural History Museum, London, UK
NHMW	=	Naturhistorisches Museum, Wien, Austria
NMSA	=	KwaZulu-Natal Museum, Pietermaritzburg, South Africa
NRMS	=	Naturhistoriska Riksmuseet, Stockholm, Sweden
RBINS	=	Royal Belgian Institute of Natural Sciences, Brussels, Belgium
RMCA	=	Royal Museum for Central Africa, Tervuren, Belgium
ZMUC	=	Zoological Museum Copenhagen, Denmark

Part of the material was collected by the authors between 1994–2023. Hoverflies were collected from agricultural land and adjacent environment (no private grounds without prior consent by the owners were accessed). Collecting in Togo was done in collaboration with IITA, which is a non-profit international organization and a member of the Consultative Group on International Agricultural Research (CGIAR) Consortium. In Togo, IITA has a close partnership with the National Plant Protection Service and the University of Lomé through which material was obtained and no specific permissions were required. Permits for collecting in Malawi were obtained from the Forestry Research Institute of Malawi (FRIM). Permits for collecting in South Africa were obtained from Cape Nature (CN44-87-27032), the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (permits not numbered) and Ezemvelo KZN Wildlife (OP29-2020, OP2823-2020, OP2920-2021). None of the collected species occur on red lists or are considered to be endangered/threatened, neither is any ranked in IUCN lists nor protected by CITES.

### Morphology

Morphological observations were made with a Leica MZ8 stereo microscope and morphological terminology largely followed Thompson (1999). All species recognized as valid are redescribed. Body length and wing length ranges given are minimum and maximum values observed in the studied material. Body measurements were taken between the frons and the posterior end of tergum 4, while wing measurements were taken between the tegula and the apex of the wing. Stacking pictures were made using the set-up as outlined in Brecko *et al.* (2014) and stacking was done with the Zerene Stacker software (<https://zerenesystems.com/cms/home>). Literature references are given for original taxon descriptions under each species.

### DNA barcoding

Procedures for DNA barcoding (DNA extraction, PCR and DNA sequencing) followed Jordaens *et al.* (2015). Sequences were assembled in Geneious R10 (<https://www.geneious.com>). A Neighbour-Joining (NJ) tree (Saitou & Nei 1987) was constructed using uncorrected p-distances in MEGA ver. 11 (Tamura

*et al.* 2021) (see Fig. 57) and pairwise p-distances within and among species were calculated (Table 2). We obtained 25 DNA barcodes of *Mallota* which were submitted to GenBank. An undescribed species of *Syrittosyrphus* Hull, 1944 was used to root the tree. In addition, we included two DNA barcodes of each of the following species: *Eristalis apis* Curran, 1939, *E. plumipes* Bezzi, 1912, *E. tenax* (Linnaeus, 1758), and *Myathropa florea* (Linnaeus, 1758). Table 1 summarizes the material, with GenBank accession numbers, included in the NJ tree.

## Results

### *Taxonomic history*

As mentioned earlier, the genus *Mallota* was established by Meigen (1822) for three Palaearctic species. The only species from the Afrotropical Region described prior to the erection of *Mallota*, and currently included in the present work, is *Eristalis dasyops* Wiedemann, 1819. This species was considered a true *Eristalis* Latreille, 1804 by subsequent authors (Kertész 1910; Bezzi 1912). The first mention of Afrotropical species under the name *Mallota* was by Bezzi (1912) who described *Mallota aenigma*. Bezzi (1912) pointed out that a number of species originally classified under *Eristalis* (including *E. dasyops*) show characteristics typical of *Protylocera* Bezzi, 1912 (currently *Senaspis* Macquart, 1850, see De Meyer *et al.* 2020b). He preferred to place *aenigma* under *Mallota*, based on the non-appendiculate wing vein  $R_{4+5}$ , the long pilosity of the eyes and the body shape in general. In addition, he mentioned that *Helophilus extremus* Loew, 1858 may also belong to this aberrant group. He did not include *Mallota* in his *Eristalis* s. lat. key (Bezzi 1912: 414), where he listed groupings recognized under *Eristalis* as subgenera or related genera.

Bezzi (1915) formalized the above-mentioned grouping by recognizing a separate group of Afrotropical species as belonging to the genus *Mallota*. He included here *M. aenigma*, *M. extrema*, and a newly described species *M. pachymera*. These are separated from other eristaline genera in his key (Bezzi 1915: 7–11) by the combination of the following characters: wing vein  $R_{4+5}$  sinuate; wing cell  $r_1$  open (differentiating it from *Protylocera*, *Phytomia* Guérin-Méneville, 1833, *Simoides* Loew, 1858, *Lathyrophthalmus* Mik, 1897, *Eristalodes* Mik, 1897, and *Eristalis*); metafemur without tooth-like protuberance (differentiating it from *Merodon* Meigen, 1803); and eyes pilose (differentiating it from *Helophilus* Meigen, 1803). Curran (1927) used the same or similar differentiating characters in his key (Curran 1927: 45–47).

Curran (1939b) questioned the position of above mentioned Afrotropical species under *Mallota* and considered the placement here “only in the widest sense” (Curran 1939b: 1). He suggested that *M. extrema* could be placed under or confused with *Eristalis*, while other species may have to be grouped under *Simoides*. While he initially considered *Eristalis dasyops* as belonging to *Senaspis* (Curran 1927), he later reassigned it to *Mallota* and identified *M. pachymera* as its junior synonym.

Hull (1941) did not discuss the generic concept of *Mallota* although he acknowledged it as one of the “typically Ethiopian genera” (Hull 1941: 309) and described two new species from Madagascar: *M. hirsuta* and *M. meromacrimima*. In his review of the morphology and inter-relationship of syrphid genera, Hull (1949) provided a general diagnostic description of the genus including character states such as densely long pilose eyes, eyes widely dichoptic, and metafemur slender and only little thickened. However, Hull noted considerable variation within the genus. He recognized several subgenera characterized by variations such as bare or pilose eyes, holoptic or dichoptic eyes, and metafemur moderately to strongly thickened.

The Afrotropical catalogue (Smith & Vockeroth 1980) largely followed the previous publications in placing the species *aenigma*, *dasyops* (with its junior synonym *pachymera* as recognized by Curran

**Table 1** (continued on next page). List of specimens of *Mallota* Meigen, 1822, *Myathropa* Rondani, 1845, *Eristalis* Latreille, 1804 and *Syrittosyrphus* Hull, 1944 used in NJ tree.

DNA voucher code	genus	species	country	voucher number	GenBank accession number
RMCA994B04	<i>Mallota</i>	<i>aenigma</i>	Malawi	RMCA AB59313805	PP823970
RMCA1381A06	<i>Mallota</i>	<i>dasyops</i>	South Africa	uncatalogued	PP823969
RMCA1306B01	<i>Mallota</i>	<i>dasyops</i>	South Africa	RMCA ENT0000040720	PP823961
RMCA1306B03	<i>Mallota</i>	<i>dasyops</i>	South Africa	RMCA ENT0000040715	PP823963
RMCA1381A01	<i>Mallota</i>	<i>dasyops</i>	South Africa	NMSA-DIP 175980	PP823967
RMCA1306B02	<i>Mallota</i>	<i>dasyops</i>	South Africa	RMCA ENT0000040719	PP823962
RMCA1306B04	<i>Mallota</i>	<i>dasyops</i>	South Africa	RMCA ENT0000040716	PP823964
RMCA1306B05	<i>Mallota</i>	<i>dasyops</i>	South Africa	RMCA ENT0000040707	PP823965
RMCA1023A05	<i>Mallota</i>	<i>extrema</i>	Togo	RMCA AB49104653	PP823978
RMCA1381A07	<i>Mallota</i>	<i>extrema</i>	South Africa	NMSA-DIP 193462	PP823974
RMCA1381B02	<i>Mallota</i>	<i>extrema</i>	South Africa	NMSA-DIP 211699	PP823976
RMCA1381B04	<i>Mallota</i>	<i>extrema</i>	South Africa	NMSA-DIP 211609	PP823977
RMCA1381A03	<i>Mallota</i>	<i>extrema</i>	South Africa	NMSA-DIP 208712	PP823973
RMCA1381B01	<i>Mallota</i>	<i>extrema</i>	South Africa	NMSA-DIP 211677	PP823975
RMCA1587E05	<i>Mallota</i>	<i>extrema</i>	Congo	ANHRTUK00278678	PP823951
RMCA1179D01	<i>Mallota</i>	<i>glabra sp. nov.</i>	South Africa	RMCA AB59880787	PP823972
RMCA1179B01	<i>Mallota</i>	<i>glabra sp. nov.</i>	South Africa	RMCA AB59880785	PP823971

**Table 1** (continued). List of specimens of *Mallota* Meigen, 1822, *Myathropa* Rondani, 1845, *Eristalis* Latreille, 1804 and *Syrittosyrphus* Hull, 1944 used in NJ tree.

DNA voucher code	genus	species	country	voucher number	GenBank accession number
RMCA1283F03	<i>Mallota</i>	<i>glabra</i> sp. nov.	South Africa	NMSA-DIP 206104	PP823966
RMCA1381A04	<i>Mallota</i>	<i>glabra</i> sp. nov.	South Africa	NMSA-DIP 205936	PP823968
RMCA1587E07	<i>Mallota</i>	<i>stipulata</i> sp. nov.	South Africa	NMSA-DIP 208439	PP823952
RMCA1587E08	<i>Mallota</i>	<i>stipulata</i> sp. nov.	South Africa	NMSA-DIP 211776	PP823953
RMCA711A06	<i>Mallota</i>	<i>wyatti</i> sp. nov.	Togo	uncatalogued	PP823979
RMCA1587E04	<i>Mallota</i>	<i>wyatti</i> sp. nov.	Congo	ANHRTUK00282323	PP823948
RMCA1587F06	<i>Mallota</i>	<i>wyatti</i> sp. nov.	Togo	RMCA AB72067305	PP823949
RMCA1587F07	<i>Mallota</i>	<i>wyatti</i> sp. nov.	Togo	RMCA AB72067310	PP823950
MK308394	<i>Myathropa</i>	<i>florea</i>	Germany	ZFMK-TIS-2520074	MK308394
MN622015	<i>Myathropa</i>	<i>florea</i>	Georgia	ZFMK-TIS-8005738	MN622015
RMCA107E06	<i>Eristalis</i>	<i>apis</i>	Benin	RMCA AB42886423	PP823955
RMCA113F02	<i>Eristalis</i>	<i>apis</i>	South Africa	NMSA-DIP 75204	PP823956
RMCA522D04	<i>Eristalis</i>	<i>tenax</i>	La Reunion	RMCA ENT00029813	PP823959
RMCA111C07	<i>Eristalis</i>	<i>tenax</i>	South Africa	BMSA(D)01813	PP823960
RMCA1002B05	<i>Eristalis</i>	<i>plumipes</i>	Malawi	RMCA AB59850614	PP823957
RMCA113F03	<i>Eristalis</i>	<i>plumipes</i>	South Africa	NMSA-DIP 75205	PP823958
RMCA SYR36	<i>Syrittosyrphus</i>	sp.	Burundi	Uncatalogued	PP823954

(1939b)), *extrema*, *hirsuta* and *meromacrimima* all under *Mallota*. The authors also included *Protylocera aperta* in this genus although this placement is not indicated explicitly as a new combination.

Dirickx (1998) in his catalogue and Whittington (2003) in his assessment of the Afrotropical Syrphidae both followed Smith & Vockeroth (1980) and included *aenigma*, *aperta*, *dasyops*, *extrema*, *hirsuta* and *meromacrimima* under *Mallota*.

The recent review by Ssymank *et al.* (2021) included the six species as listed in Smith & Vockeroth (1980) but points out that it is a paraphyletic group in need of revision. In their key (Ssymank *et al.* 2021: 1453–1459), *Mallota* appears in three different sections. A first differentiation refers to the shape of the apical margin of the scutellum (margin with flattened rim, to accommodate *M. aperta*). Further split up is based on either bare or pilose eyes. This dual character state has also been included in keys for other biogeographical regions such as that of the Neotropical Region (Thompson 1999). Further differentiation of these species with bare eyes (restricted to the two species recorded from Madagascar) from other related genera is based on the bare katepimeron, the strongly sinuate wing vein  $R_{4+5}$ , the face tuberculate and the setulose dorsomedial triangular part of the anepimeron (all other Afrotropical species under *Mallota* have this part bare). As such a proper and unambiguous generic diagnosis, even just for the Afrotropical species, cannot be given.

The taxonomic history of a number of individual taxa has also been confusing at times. These cases are discussed under the comments' section of each species where relevant.

### ***Taxonomic treatment***

Class Insecta Linnaeus, 1758  
Order Diptera Linnaeus, 1758  
Family Syrphidae Latreille, 1802  
Genus *Mallota* Meigen, 1822

### **Key to Afrotropical species of *Mallota* Meigen, 1822**

1. Head: eyes bare (Figs 11–13) ..... 2  
– Head: eyes long to medium long, dense pilose (Figs 14–17) or short and more dispersed pilose (Figs 18–20) ..... 4
2. Wing with distinct medial dark brown macula (Fig. 39); head: face brown to black (Fig. 13); thorax: scutum with short rufous pile (Fig. 3); pleura: posterior anepisternum with long rufous pile; scutellum marginated along posterior margin (Fig. 23) ..... *M. aperta* (Bezzi, 1912)  
– Wing slightly fumose, more densely coloured along anterior half, without distinct medial macula (Figs 37–38); head: face yellow to dark orange (Figs 11–12); thorax: scutum with yellow to yellow-orange pile intermixed with black pile (Figs 1–2); pleura: posterior anepisternum with long pale yellow to yellow-orange pile; scutellum not marginated, rounded along posterior margin (as in Fig. 24) ..... 3
3. Head: face dark orange (Fig. 11); thorax: posterior anepisternum with yellow-orange pile; scutellum orange; abdomen subshining black to dark brown, without white pollinose fasciate vittae along anterior margin of terga 3 and 4 (Fig. 47) ..... *M. hirsuta* Hull, 1941  
– Head: face yellow (Fig. 12); thorax: posterior anepisternum with pale yellow pile; scutellum yellow; abdomen reddish, with distinct narrow fasciate vittae of white pollinosity along anterior margin of terga 3 and 4 (Fig. 48) ..... *M. meromacrimima* Hull, 1914

4. Head: eyes long pilose, especially in lower third (Figs 14–17); male eyes dichoptic (the male of *M. aenigma* is unknown); legs: metatibia ventrally with dispersed short pilosity, pile at most one third of width of tibia (Figs 28–31) ..... 5  
 – Head: eyes short pilose throughout (Figs 18–20), male eyes holoptic; legs: metatibia ventrally with dense long pilosity in at least apical half, pile at least half as long as width of tibia (Figs 32–34) .. 8
5. Face: clypeus without tuft of hairs (Fig. 22); legs: metafemur strongly swollen, in anterior view medial part at least three times as broad as the apex (Figs 28–29) ..... 6  
 – Face: clypeus with tuft of hairs (Fig. 21); legs: metafemur moderately to strongly swollen, in anterior view medial part 2.5–3 times as broad as the apex (Figs 30–31) ..... 7
6. Legs: metatibia with apex pointed (Fig. 28); metafemur medioventrally with short black pile (Fig. 35); pro- and mesotibia largely orange-red ..... *M. dasyops* (Wiedemann, 1819)  
 – Legs: metatibia apically blunt (Fig. 29); metafemur medioventrally bare in distal half (Fig. 36); pro- and mesotibia largely black ..... *M. glabra* sp. nov.
7. Head female: frons long pilose, with pile as long as length of postpedicel (Fig. 17); legs: metafemur moderately swollen, more than three times as long as high, dorsal margin moderately convex (Fig. 31) ..... *M. aenigma* Bezzi, 1912 (the male is unknown)  
 – Head female: frons short pilose, with pile less than length of postpedicel (Fig. 16); legs: metafemur strongly swollen, less than three times as long as high, dorsal margin strongly convex (Fig. 30) .....  
 ..... *M. hircus* sp. nov.
8. Head: face flattened and not protruding; facial tubercle hardly visible; ocellar pile short, in lateral view about equal to ocellar triangle (Fig. 20) ..... *M. stipulata* sp. nov.  
 – Head: face distinctly protruding; facial tubercle distinctly pronounced; ocellar pile longer, in lateral view at least twice as long as ocellar triangle (Figs 18–19) ..... 9
9. Abdomen: tergum 2 black with orange maculae restricted to anterolateral margins, not extending beyond half of the width of the tergum along margin (Fig. 55); sterna 1–3 completely black-brown to black ..... *M. wyatti* sp. nov.  
 – Abdomen: tergum 2 black with orange maculae more extensive, along lateral margins reaching almost till posterior margin, sometimes extending medially till halfway (Fig. 54); sterna 1–3 partially yellow-orange ..... *M. extrema* (Loew, 1858)

### *hirsuta* group

Representatives of the *hirsuta* group can be differentiated by the following character states: eyes bare, postpedicel roundish, dorsomedial (triangular) part of the anepimeron setulose. It comprises two species, both confined to Madagascar: *M. hirsuta* and *M. meromacrimima*.

*Mallota hirsuta* Hull, 1941  
Figs 1, 11, 25, 37, 47

*Mallota hirsuta* Hull, 1941: 327.

### Differential diagnosis

One of the two Madagascan species. It can be differentiated from the other Madagascan species (*M. meromacrimima*) by the orange face (more yellow in *meromacrimima*), the posterior anepisternum with yellow-orange pile (pale yellow in *meromacrimima*), the darker abdomen, and the absence of white pollinose fasciae on abdominal terga (present in *meromacrimima*) but see comments under





**Figs 1–2.** Species of *Mallota* Bezzi, 1822. Habitus, lateral view. 1. *M. hirsuta* Hull, 1941, holotype, ♀ (ANSP ENT 142915 (6591)). 2. *M. meromacrimima* Hull, 1941, holotype, ♂ (ANSP ENT 142916 (6592)).

*meromacrimima*. Both can be differentiated from the only other Afrotropical species with bare eyes (*M. aperta*) by the absence of a distinct medial dark brown macula in the wing (present in *aperta*), and the unmarginated, rounded apical margin of the scutellum (distinctly marginated in *aperta*).

### Type material

#### Holotype

MADAGASCAR • ♀; Tananarive Dist., Moramanga, Oriental Forest; May–Sep. 1938; C. Lamberton leg.; ANSP, ANSP ENT 142915 (6591).

### Description

Body length: 15.0 mm. Wing length: 11.5 mm.

#### Female

HEAD (Fig. 11). Eye bare; dichoptic, ommatidia equal in size. Frons strongly protruding, in lateral view slightly beyond facial tubercle; ground colour dark orange, in upper third black; with medium long, yellow pile, along lateral margins and in dorsal third pile more yellow-orange. Ocellar triangle medium long black pilose. Face ground colour orange to dark orange, genae black; with whitish pollinosity, facial tubercle non-pollinose; with dispersed long yellow pile along dorsolateral margins, otherwise bare; facial tubercle distinctly pronounced. Antennal segments orange; arista bare, orange at base, darker distally; postpedicel wider than long.

THORAX (Fig. 1). Scutum subshining black; anterior third with medium long yellow to yellow-orange pile intermixed with shorter black pile, posterior two-thirds with short black pile (probably large part rubbed off in holotype); postalar callus with longer yellow-orange pile. Scutellum dark orange, anterior margin narrowly darker; with long pale yellow pile (probably large part rubbed off in holotype); unmarginated. Pleura ground colour black; posterior anepisternum with long and dense yellow-orange pile, katepisternum with dispersed long pale yellow-orange pile, anterior and dorsomedial parts of anepimeron with dispersed long black pile; otherwise pleura bare.

LEGS. Femora black; with short dense black pile; profemur posteriorly at base with longer pale yellow pile; mesofemur posteriorly along basal two-thirds with longer pale yellow pile continued distally by longer black pile; metafemur (Fig. 25) thickened, anterodorsally along basal two-thirds with row of longer pale yellow pile continued anteriorly as shorter pile; ventrally with few dispersed longer black pile. Tibia and tarsal segments dark orange; with short pale yellow pile; metatibia curved (Fig. 25).

WING (Fig. 37). Slightly fumose; most areas microtrichose, slightly more densely microtrichose at anterior half of cell *sc* and adjacent area of cell *r*<sub>1</sub>. Stigmal cross-vein present between distal end of vein *Sc* and middle of vein *R*<sub>1</sub>. Vein *R*<sub>4+5</sub> sinuate, without appendix.

ABDOMEN (Fig. 47). Subshining black to dark brown; with short black pile (large parts rubbed off in holotype) except tergum 1 with longer yellow-orange pilosity; tergum 2 anterolaterally with short whitish pile; anterior margin of tergum 3 with whitish pile; other terga laterally with longer whitish pile. Sterna black to red-brown; sterna 1–3 with very long, dispersed whitish pile intermixed with few shorter black pile, sterna 4–5 with dispersed black pile.

#### Male

Unknown.

### Distribution

Madagascar.

## Comments

See under *M. meromacrimima*. No DNA barcodes were obtained.

*Mallota meromacrimima* Hull, 1941  
Figs 2, 12, 26, 38, 48

*Mallota meromacrimima* Hull, 1941: 328.

## Differential diagnosis

One of the two Madagascan species. It can be differentiated from the other Madagascan species (*M. hirsuta*) by the yellow face (darker orange in *hirsuta*), the posterior anepisternum with pale yellow pile (yellow-orange in *hirsuta*), the more reddish abdominal terga, and the presence of narrow interrupted fasciae of white pollinosity along the anterior margin of terga 3 and 4 (absent in *hirsuta*) but see comments below. Both can be differentiated from the only other Afrotropical species with bare eyes (*M. aperta*) by the absence of a distinct medial dark brown macula in the wing (present in *aperta*), and the unmarginated rounded scutellum (distinctly marginated in *aperta*).

## Type material

### Holotype

MADAGASCAR • ♂; Fianarantsoa Dist., Fanovana, Oriental Forest; Jan.–May 1937; C. Lamberton leg.; ANSP, ANSP ENT 142916 (6592).

### Allotype

MADAGASCAR • ♀; same data as for holotype; ANSP, ANSP ENT 142917.

## Description

Body length: 10.5–17.0 mm. Wing length: 10.5–12.5 mm.

### Male

HEAD (Fig. 12). Eye bare; holoptic, eye contiguity for distance equal to ocellar triangle, ommatidia equal in size. Frons strongly protruding, in lateral view beyond facial tubercle; ground colour yellow; with medium long to long pale yellow pile; anterior of ocellar triangle black medium long pile. Ocellar triangle black; medium long black pilose. Face ground colour yellow, genae black; with whitish pollinosity, facial tubercle and medial part ventral of tubercle non-pollinose; with dispersed long yellow pile along dorsolateral margins, otherwise bare; facial tubercle distinctly pronounced. Antennal segments orange; arista bare, orange at base, darker distally; postpedicel wider than long.

THORAX (Fig. 2). Scutum subshining black; anteriorly, posteriorly and along transverse suture with grey pollinosity; anterior third with medium long to short yellow pile intermixed with shorter black pile, black pile predominant in central part; posterior two-thirds with short black pile, along posterior margin with few pale yellow hairs, postalar callus with longer yellow pile. Scutellum yellow to dark yellow, anterior margin narrowly darker; with long pale yellow pile; unmarginated. Pleura ground colour black; posterior anepisternum with long and dense pale yellow pile, katepisternum with dispersed long pale yellow pile, anterior and dorsomedial parts anepimeron with dispersed long black pile; otherwise pleura bare.

LEGS. Femora all thickened, black; with short dense black pile except ventrally where long black pile, sometimes intermixed with few pale yellow hairs; profemur posteriorly at base with longer pale yellow pile; mesofemur posteriorly along basal two-thirds with longer pale yellow pile continued distally by

longer black pile; metafemur (Fig. 26) anterodorsally along basal two-thirds with row of longer pale yellow pile. Tibia and tarsal segments orange to red-brown; with short whitish pile.

WING (Fig. 38). Slightly fumose, more so along anterior margin, widening distally; most areas microtrichose. Stigmal cross-vein present between distal end of vein Sc and middle of vein R<sub>1</sub>. Vein R<sub>4+5</sub> sinuate, without appendix.

ABDOMEN (Fig. 48). Mainly dark reddish brown, along anterior margin of tergum 2 black; with short black pile except tergum 1 with longer yellow-orange pilosity and white pollinosity; tergum 2 along anterolateral margins with longer yellow-orange pile; anterior margin of terga 3 and 4 with narrow fascia of white pollinosity, interrupted medially, and short whitish pile, anterolateral slightly widening; other terga laterally with longer whitish pile. Sterna black to red-brown; sterna 1–3 with very long, dispersed whitish pile intermixed with few shorter black pile, sterna 4–5 with dispersed black pile.

### Female

As male except eyes dichoptic, frons yellow, in dorsal half medially slightly darker; with medium long to long pale yellow pile. Thorax, along posterior margin of scutum with pale yellow pile. Femora ventrally without long dense pilosity; only metafemur with dispersed black pile. Metafemur only thickened. Wing, fumose area along anterior margin less pronounced. Abdominal terga more orange-red.

### Distribution

Madagascar.

### Comments

Both species (*M. hirsuta* and *M. meromacrimima*) are similar in most respects especially when comparing the female holotype of *M. hirsuta* with the female allotype of *M. meromacrimima*. The main difference is the colouration of abdominal terga, the presence of distinct narrow fasciae of white pollinosity along the anterior margin of terga 3 and 4 in *meromacrimima* (see Fig. 48) and the pilosity on the scutum. However, abdominal tergal colouration has been shown to be very variable in some crystalline genera; for example, see revisions of *Senaspis* (De Meyer *et al.* 2020b) and *Mesembrius* Rondani, 1857 (Jordaens *et al.* 2021). The poor condition of the sole specimen of *M. hirsuta* makes comparison between both with regard to scutal and abdominal character states difficult. One paratype (not studied) of *M. meromacrimima* is collected at the same spot as the holotype of *M. hirsuta*. The type locality for *M. meromacrimima* is about 30 km east of the one for *M. hirsuta*. It is likely that both are actually varied representatives of the same species and the late F.C. Thompson already indicated this as such in the *Systema Dipteriorum* website (<http://www.diptera.org/>), but the proposed synonymy was not officially published. However, because of the limited material available which does not allow a detailed investigation of the intra-specific variability and lacking molecular data, we do not propose a synonymy here. No DNA barcodes were obtained.

### *aperta* group

The *aperta* group has a single representative, *M. aperta*, differentiated by the character states given below for the differential diagnosis of the species: presence of a distinct macula on the wing and the marginated scutellum.

### *Mallota aperta* (Bezzi, 1912)

Figs 3, 13, 23, 27, 39, 49

*Protylocera aperta* Bezzi, 1912: 417.



**Figs 3–4.** Species of *Mallota* Bezzi, 1822. Habitus, lateral view. **3.** *M. aperta* (Bezzi, 1912), holotype, ♂ (MCSNG). **4.** *M. dasyops* (Wiedemann, 1819), ♂ (NMSA DIP 211695).

**Differential diagnosis**

Belongs to the species of *Mallota* with bare eyes. It can be readily differentiated from any other Afrotropical *Mallota* by the presence of a large and distinct medial macula on the wing extending over the entire width of the wing (absent in other *Mallota*), and the apical margin of the marginated scutellum (rounded in other *Mallota*).

**Type material****Holotype**

GABON [as Congo Francese] • ♂; Fernand-Vaz; Sep.–Oct. 1902; L. Fea leg.; MCSNG.

**Other material examined**

CAMEROON • 1 ♂; 36 mi W of Bertoua; 5 Oct. 1966; E.S. Ross and K. Lorenzen leg.; CAS.

DEMOCRATIC REPUBLIC CONGO • 1 ♂; Equateur, Bokuma; Mar. 1952; R.P. Lootens leg.; RMCA, RMCA ENT 000039659 • 1 ♀; Tshuapa, Bokuma; Jan.–Mar. 1954; R.P. Lootens leg.; RMCA • 1 ♂, 1 ♀; Bolingo, rives Busira; 23 Jun. 1936; J. Ghesquière leg.; RBINS • 1 ♂; same data as for preceding; 24 Jun. 1936; RBINS • 1 ♀; Eala, 10–20 Mar. 1914; R. Mayné leg.; RMCA • 2 ♂♂; Eala; Aug. 1935; J. Ghesquière leg.; RBINS • 1 ♀; same data as for preceding; 22 Aug. 1935; RBINS • 1 ♂, 3 ♀♀; same data as for preceding; Mar. 1936; RBINS • 1 ♀; same data as for preceding; 5 Oct. 1936; RBINS • 1 ♀; Eala, Boyeka; 30 Nov. 1929; H.J. Brédo leg.; RMCA, RMCA ENT 000039657 • 1 ♀; Eala-Bokatola-Bikoro; Sep.–Oct. 1930; P. Staner leg.; RMCA • 2 ♀♀; Haut-Lopori; May–Jun. 1927; J. Ghesquière leg.; RMCA, RMCA ENT 000039660, RMCA ENT 000039662 • 1 ♀; Malela; 1 Jul. 1915; Lang and Chapin leg.; AMNH • 1 ♀; Salonga, Simba; May 1927; J. Ghesquière leg.; RMCA, RMCA ENT 000039661 • 1 ♀; Ubangi, Nzali; 3–4 Feb. 1932; H.J. Brédo leg.; RMCA, RMCA ENT 000039658.

**Description**

Body length: 10.5–13.5 mm. Wing length: 7.5–9.5 mm.

**Male**

HEAD (Fig. 13). Eye bare; holoptic, eye contiguity for distance slightly longer than length of ocellar triangle, ommatidia equal in size; sometimes trace of maculae. Frons distinctly protruding, in lateral view equal to or slightly beyond facial tubercle; with medial protuberance, ground colour brown (holotype) to almost black; largely shining, dark brown pollinosity in dorsal third; with medium long dispersed black pile, dorsally somewhat longer. Ocellar triangle with short black pile. Face ground colour brown, along gena slightly darker (holotype) to almost black; shining except ventral of antennae where slight greyish pollinosity; along dorsolateral margins with dispersed long pale orange pile, otherwise bare; facial tubercle distinctly pronounced. Antennal segments brown (holotype) to black, postpedicel orange (holotype) to brown; arista missing in holotype, bare, dark orange in non-type material; postpedicel slightly longer than wide.

THORAX (Fig. 3). Scutum subshining black; rufous pollinosity; with short rufous pile, postalar callus with longer pile. Scutellum as scutum, anterior margin pile somewhat longer; marginated along posterior margin (Fig. 23). Pleura ground colour black, posterior anepisternum with dispersed long rufous pile, katepisternum more pale rufous pile, anterior anepimeron dorsally predominantly black, ventrally predominantly pale rufous; otherwise pleura bare. Non-type material pollinosity and pilosity sometimes darker golden brown.

LEGS. All femora dark brown (holotype) to almost black, with short dense rufous (holotype) to dark brown pile; pro- and mesofemur posteriorly and metafemur anterodorsally with longer black pile. Metafemur (Fig. 27) thickened. Tibiae and tarsal segments orange-brown (holotype) to dark brown;

with short dense rufous (holotype) to black pile; metatibia curved, along anterior and posterior margins with row of dense medium long pile.

WING (Fig. 39). Largely dark black-brown coloured; in medial part, distally, along posterior margin less so, sometimes some central parts of cells also with less dark brown colouration; microtrichose, more densely so along anterior margin; in distal half with darker fascia from anterior to posterior margin. Stigmal cross-vein absent. Vein  $R_{4+5}$  sinuate, with short appendix.

ABDOMEN (Fig. 49). Mainly dark brown subshining, with brownish pollinosity, holotype tergum 2 with pair of orange-red triangular shaped lateral maculae, and tergum 3 with pair of orange-red more square shaped lateral maculae; these absent in non-type material. Tergum 4 along anterior two-thirds with more conspicuous grey-brown pollinosity. All terga with short rufous pile (darker in non-type specimens), lateral margins longer pile, posterior margins with short black pile. Sterna black-brown to black, sterna 1–3 with very long dispersed pale yellow pile; sterna 4–5 with dispersed black pile.

### Female

As male except for the following character states. Head with eyes dichoptic. Frons subshining black to black-brown; in dorsal half with pale brown pollinosity; with short rufous pile. Legs, paler brown; predominantly rufous pile. Wing less dark brown, with more hyaline maculae. Abdomen, abdominal terga sometimes paler brown, with rufous maculae; subshining maculae sometimes more extensive and more pronounced.

### Distribution

Cameroon, Democratic Republic Congo, Gabon. Also reported from Kenya (De Meyer 2001).

### Comments

This species was initially placed in *Protylocera*, which is considered an unnecessary replacement name for *Senaspis* (see De Meyer *et al.* 2020b). It is unclear who transferred it to *Mallota* but it is listed as such by Smith & Vockeroth (1980). It shares some characteristics with species of *Senaspis* like the wing pattern, similar to what is observed in e.g., *S. haemorrhoea* (Gerstaecker, 1871), and the marginated apical margin of the scutellum. Some specimens also have slightly maculated eyes, although the maculae are hardly discernible. It differs mainly from species of *Senaspis* by the distinctly open wing cell  $r_1$  (closed and petiolate in *Senaspis*, rarely shortly open). No recent material could be obtained in order to include it in the molecular analysis. We propose to leave it in the genus *Mallota* pending availability of additional material. In addition to the type, there is a long series from D.R. Congo some of which have a much darker appearance, but otherwise they appear to correspond with the type. No DNA barcodes were obtained.

### *dasyops* group

The *dasyops* group can be differentiated by the following character states: eyes dichoptic in both sexes and covered by long pile. It comprises four species: *M. dasyops*, *M. glabra* sp. nov., *M. hircus* sp. nov., and *M. aenigma*.

### *Mallota dasyops* (Wiedemann, 1819)

Figs 4, 14, 28, 35, 40, 50

*Eristalis dasyops* Wiedemann, 1819: 18.

*Merodon edentulus* Macquart, 1855: 110 (90). **Syn. nov.**

*Mallota pachymera* Bezzi, 1915: 99. **Syn. by Curran (1929).**

**Differential diagnosis**

This species belongs to a group differentiated from other Afrotropical species of *Mallota* by the distinctly long pilose eyes and dichoptic eyes in both sexes. It can be differentiated from *M. aenigma* and *M. hircus* sp. nov. by the bare clypeus (with a tuft of long pile in *M. aenigma* and *M. hircus*). It resembles most closely *M. glabra* sp. nov. but can be differentiated from this by the sharply pointed apex of the metatibia (with blunt apex in *M. glabra*) and the distal half of the metafemur which ventrally is densely short black pilose (bare in *M. glabra*).

**Type material****Lectotype of *Eristalis dasyops***

SOUTH AFRICA • ♀; “Cap”; Winthem leg.; NHMW. This specimen is hereby designated as lectotype.

**Paralectotypes of *Eristalis dasyops***

SOUTH AFRICA • 2 ♂♂ (examination of images only); Cape Good Hope; Dec. 1816; Westermann leg.; ZMUC, ZMUC 00024913, ZMUC 00024914.

**Comments**

The original publication by Wiedemann (1819) indicates that the description is based on a female and gives no indication of male specimens. Yet, one of the ZMUC specimens bears a label with a date corresponding with the month (December) as indicated in the original description and another label with reference to Westermann (“Mus Westerm.”). It is, therefore, unclear whether the male specimens should be considered as part of the syntype series but we have included them here. The female specimen of the Winthem collection in NHMW is hereby designated as lectotype. For further discussion on the origin of this specimen see Denner (2017).

**Lectotype of *Merodon edentulus***

SOUTH AFRICA • ♀; Cape of Good Hope; ex Bigot Collection; NHMUK, NHMUK 013933222. This specimen is hereby designated as lectotype.

**Lectotype of *Mallota pachymera***

SOUTH AFRICA • ♂; Cape of Good Hope; ex coll. Saunders 54.13; NHMUK. This specimen is hereby designated as lectotype.

**Paralectotype of *Mallota pachymera***

SOUTH AFRICA • 1 ♀; Cape of Good Hope; ex coll. Saunders 54.13; NHMUK, BMNH(E) #914365.

**Other material examined**

ETHIOPIA • 1 ♂; Holeta, Holeta Station; Oct. 2012; A. Zewdu and A. Pauly leg.; RMCA.

KENYA • 1 ♀; Coast Province, Kasigau Mt; 5–19 Oct. 2011; R. Copeland leg.; ICIPE, ICIPE 9528.

RWANDA • 1 ♂; Nyansa; May 1946; A. Lestrade leg.; RMCA, RMCA ENT 000039630.

SOUTH AFRICA – **Eastern Cape** • 1 ♂, 1 ♀; Bidstone Cottages Garden; 8–11 Oct. 2019; J. Midgley leg.; NMSA, NMSA DIP 175980, NMSA DIP 175981 • 4 ♂♂, 1 ♀; same data as for preceding; 9–10 Oct. 2019; K. Jordaens leg.; RMCA, RMCA ENT 000040707, RMCA ENT 000040716, RMCA ENT 000040719, RMCA ENT 000040720, RMCA ENT 000040715 • 2 ♂♂, 1 ♀; Fennel at Junction of DR03217 and DR03220; 8 Feb. 2022; Bellingan, Jordaens and Midgley leg.; NMSA, NMSA DIP 212418 to 212420 • 1 ♀; Katberg; Dec. 1932; R.E. Turner leg.; NHMUK • 1 ♂; Maclear, Fairbairn; 11 Feb. 2022; Bellingan, Jordaens and Midgley leg.; NMSA, NMSA DIP 212559. – **Gauteng** • 1 ♀; Pretoria; 21 Jan.



1920; H.K. Munro leg.; NMSA, NMSA DIP 14087. – **KwaZulu-Natal** • 1 ♀; Empangeni; 18 Dec. 1992; P.E. Reavell leg.; NMSA, NMSA DIP 49017 • 1 ♀; iSimangaliso wetland park; 11 Oct. 2021; Bellingan, Jordaens and Midgley leg.; AMGS, AMGS 101657 • 1 ♂; same data as for preceding; 14 Oct. 2021; NMSA, NMSA DIP 211695 • 1 ♀; Karkloof Falls; 3 Dec. 1961; T. Schofield leg.; NMSA, NMSA DIP 48512 • 1 ♀; Mtunzini; 8 Oct. 2021; Bellingan, Jordaens and Midgley leg.; AMGS, AMGS 101658 • 1 ♀; Saint Lucia, Ingwenya Lodge; 10 Oct. 2021; Bellingan, Jordaens and Midgley leg.; RMCA, RMCA ENT 000044379 • 1 ♂; Kloof; Sep. 1926; R.E. Turner leg.; NHMUK, BMNH 914237 (labeled as holotype of *Mallota pygmaea* Hull. Unavailable name, cf. below under comments). – **Western Cape** • 1 ♂; Cape Town; J.C. Bridwell leg.; AMNH • 2 ♀♀; Cape, Ceres; Feb. 1932; J. Ogilvie leg.; NHMUK • 1 ♂; Grootvadersbosch Nature Reserve; 3 Dec. 2023; J.M. Midgley and G.L. Theron leg.; NMSA, NMSA DIP 222553. – **Unknown locality** • 2 ♀♀; ex coll. Bigot, presented by G.H. Verrall, B.M. 1901-14; NHMUK.

### Description

Body length: 9.5–14.5 mm. Wing length: 8.0–10.5 mm.

#### Male

**HEAD** (Fig. 14). Eye with medium long to long whitish pile; dichoptic, separated for distance at least equal to ocellus of ocellar triangle, ommatidia equal in size. Frons protruding, in lateral view at most equal to facial tubercle; ground colour black, narrowly yellow along ventral margin; dorsal of antennae shining, otherwise dark grey pollinosity, along eye margins denser silvery pollinosity; with long intermixed black and pale brown pile. Ocellar triangle black, anterior of ocellar triangle area with macula of grey pollinosity; long black pilose. Face ground colour black, sometimes sublateral band from eye margin to oral margin more yellow-brown; with dense whitish pollinosity, facial tubercle and medial part ventral of tubercle less dense pollinose; with dispersed long yellow pile along dorsolateral margins, otherwise bare; facial tubercle weakly pronounced. Antennal segments black-brown, postpedicel black; arista bare, black-brown; postpedicel longer than wide.

**THORAX** (Fig. 4). Scutum subshining black; with grey pollinosity, with long pale brown pile; anteriorly and medially fasciae with more brownish pollinosity and pile intermixed with black hairs. Scutellum yellow-brown, paler than scutum; with long pale yellow pile; anteromedially rarely with slightly darker yellow pile. Pleura ground colour black; posterior anepisternum, katapisternum and anterior anepimeron with long pale brown pile, otherwise bare.

**LEGS**. Femora mainly yellow-orange with black maculae; with short to long dense pale yellow pile except ventrally where short black pile. Metafemur (Fig. 28) greatly thickened, in anterior view medial part at least three times as broad as apex; ventrally dense black pilose in distal half (Fig. 35). Pro- and mesotibia predominantly orange-red with few black maculae; with short pale yellow pile; metatibia curved, with apex distinctly pointed (Fig. 28); entirely dark brown to black; with short black pile especially along dorsal margin, anteriorly more dispersed pale yellow pile. Tarsal segments orange-red; with short black pile.

**WING** (Fig. 40). Largely hyaline; most areas microtrichose. Stigmal cross-vein present between distal end of vein Sc and middle of vein R<sub>1</sub>. Vein R<sub>4+5</sub> sinuate, without appendix.

**ABDOMEN** (Fig. 50). Mainly shining black; tergum 1 orange ground colour; white pollinose; with long white pile. Tergum 2 with pair of orange maculae touching broadly along medial line; predominantly short whitish pile, along lateral margins longer, especially anteriorly; posterior margin with black pile; tergum 3 anterior margin narrowly yellow-orange and with grey pollinosity, with medial interruption; with short pale whitish except in posterior fourth where black and slightly longer; tergum 4 anterior

margin with grey pollinosity; with short whitish pile in anterior half, posteriorly slightly longer black pile; posterior margin sometimes distinctly yellow-orange. Sterna black to red-brown; sterna 1–3 with very long, dispersed whitish pile.

### Female

As male except eyes wide dichoptic, frons subshining black; grey pollinose except dorsal third where brown. Pilosity scutum less dark brown. Femora ventrally with less long dense pilosity, only metafemur with dispersed black pile. Abdominal terga orange-red maculae and fasciae more extensive.

### Distribution

Ethiopia, Kenya, Rwanda, South Africa. Also reported from Tanzania (De Meyer *et al.* 1995) and Zimbabwe (Curran 1939b). Records from Equatorial Guinea (Bezzi 1912) and Ghana (Bezzi 1915) are based on misidentifications (see Comments below). A record from the Democratic Republic of Congo (in Curran 1927) could not be confirmed.

### Comments

Bezzi (1912, 1915) followed Wiedemann in placing *dasyops* under *Eristalis*. He based this on material identified by him from Bioko Island (as Fernando Poo), Equatorial Guinea (Bezzi 1912; one female from Bahia de S. Carlos, Mar. 1902, in MCSNG) and from Ghana (Bezzi 1915; one female from Obuasi, Ashanti, 31 Jul. 1907, W.M. Graham, in NHMUK), but both specimens were studied and belong to *Eristalis apis* Curran, 1939. Bezzi (1915) differentiated the genus *Eristalis* from *Mallota* by the long and petiolate wing cell  $r_1$  in the former, and described a new species with open wing cell  $r_1$  based on material from South Africa as *Mallota pachymera*. Curran (1939b) recognized the synonymy with *dasyops*, and examination by the authors of the type material of *pachymera* and comparison with images of the types of *dasyops* confirmed this synonymy. Curran (1939a) also questioned the position of *edentulus* under *Merodon* because of the absence of a “spur” (= dens or lamina sensu Vujić *et al.* 2021) on the metafemur. Contrary to what is stated in Vujić *et al.* (2021), the type is not lost but present in the NHMUK collections and could be examined. Although it is in a poor condition and missing the metalegs, other characteristics correspond to those of *M. dasyops* and are unlike any of the other species recognized in this group, or under *Mallota*. Additionally, it does not fit the generic concept of *Merodon*. We, therefore, propose to also place *Merodon edentulus* as a junior synonym of *Eristalis dasyops*. Furthermore, in the collections of the NHMUK, there is a specimen labelled as the type of *Mallota pygmaea* Hull. We did not find any trace of a publication of this name and consider it unavailable. This specimen also corresponds to *dasyops*. *Mallota dasyops* is morphologically most similar to *M. glabra* sp. nov. but apart from the morphological differences, both species show a strong interspecific differentiation in their DNA barcodes (mean interspecific p-distance of 7%; range of interspecific p-distances: 6.8–7.3% (Fig. 57; Table 2). The range of intraspecific p-distances in both species is much narrower (0–0.3%).

### *Mallota glabra* sp. nov.

[urn:lsid:zoobank.org:act:6B74F8B8-4710-479B-AB48-59B32F4CDE04](https://zoobank.org/act:6B74F8B8-4710-479B-AB48-59B32F4CDE04)

Figs 5, 15, 22, 29, 36, 41, 51

### Differential diagnosis

This species belongs to a group differentiated from other Afrotropical species of *Mallota* by the distinctly long pilose eyes and dichoptic eyes in both sexes. It can be differentiated from *M. aenigma* and *M. hircus* sp. nov. by the bare clypeus (with a tuft of long pile in *M. aenigma* and *M. hircus*). It is most closely related to *M. dasyops* but can be differentiated by the blunt apex of the metatibia, rather than pointed as in *M. dasyops*, and the bare medioventral part of the metafemur (with short black pilosity in *M. dasyops*). Specimens of *M. glabra* sp. nov. are in general larger and have more extensive black pilosity on scutum and scutellum, but these characters are not exclusive.



**Figs 5–6.** Species of *Mallota* Bezzi, 1822. Habitus, lateral view. **5.** *M. glabra* sp. nov., paratype, ♂ (NMSA DIP 65015). **6.** *M. hircus* sp. nov., paratype, ♂ (RMCA ENT 000037959).

**Etymology**

After the Latin ‘*glabrum*’ for ‘bald’, referring to the absence of pile in the medioventral part of the metafemur. The specific epithet should be treated as an adjective (nominative singular feminine).

**Type material****Holotype**

SOUTH AFRICA • ♂; KwaZulu-Natal, Dlinza Forest N.R.; 3 Nov. 2020; Midgley and Bellingan leg.; NMSA, NMSA DIP 206104.

**Paratypes**

SOUTH AFRICA – **Eastern Cape** • 1 ♀; Ciskei, 23 km N of King William’s Town; 26–27 Jan. 1984; D. and C. Barraclough leg.; NMSA, NMSA DIP 50179. – **KwaZulu-Natal** • 1 ♀; Karkloof; 13 Nov. 2018; K. Jordaens leg.; RMCA, RMCA AB59880787 • 1 ♂; oNgoye (Ngoye) Forest; 22–23 Apr. 2006; G.B.P. Davies leg.; NMSA, NMSA DIP 65015 • 1 ♀; oNgoye Forest N.R.; 6 Nov. 2020; Midgley and Bellingan leg.; NMSA, NMSA DIP 205936. – **Limpopo** • 1 ♂, 1 ♀; N Transvaal, Zoutpansberg Range, Entabeni For. Station; Jan. 1975; Stuckenberg leg.; NMSA, NMSA DIP 48401, NMSA DIP 63846. – **Western Cape** • 1 ♂; Cape, Outeniqua State For. near Knysna; 23 Jan. 1984; D. and C. Barraclough leg.; NMSA, NMSA DIP 49398 • 1 ♂; Cape, Storm’s River State Forest; 24 Jan. 1984; D. and C. Barraclough leg.; NMSA, NMSA DIP 49880 • 1 ♀; Grootvadersbosch Nature Reserve; 3 Dec. 2023; J.M. Midgley and G.L. Theron leg.; NMSA, NMSA DIP 222552 • 1 ♂; Groenkop Forest; 18 Dec. 2021; R.C. Swart leg.; RMCA • 1 ♀; same data as for preceding; 29 Jan. 2022; RMCA.

**Description**

Body length: 12.5–14.5 mm. Wing length: 9.0–11.0 mm.

**Male**

**HEAD** (Fig. 15). Eye with medium long to long whitish pile; dichoptic, separated for distance at most equal to ocellus of ocellar triangle, ommatidia equal in size. Frons protruding, in lateral view equal to or slightly beyond facial tubercle; ground colour black, narrowly yellow along ventral margin; predominantly shining, dorsally light grey pollinosity, along eye margins more densely grey to grey-brown pollinosity; with long pale brown pile. Ocellar triangle black; long black pilose. Face (Fig. 22) ground colour black, sometimes sublateral band from eye margin to oral margin more yellow-brown; with whitish pollinosity, facial tubercle and medial part ventral of tubercle non-pollinose; with dispersed long yellow pile along dorsolateral margins, otherwise bare; facial tubercle weakly pronounced. Antennal segments black-brown, postpedicel sometimes black; arista bare, brown; postpedicel longer than wide.

**THORAX** (Fig. 5). Scutum subshining black; with grey pollinosity, with long pale brown pile; anteriorly and medially fasciae with more brownish pollinosity and dark brown pile. Scutellum yellow-brown, paler than scutum; with long pale yellow pile; anteromedially with distinct black pile. Pleura ground colour black; posterior anepisternum, katapisternum and anterior anepimeron with long pale brown pile, otherwise bare.

**LEGS**. Femora mainly black, with orange-red maculae in basal third, metafemur more extensively yellow to orange-red; with short to long dense pale yellow pile except ventrally where short black pile. Metafemur (Fig. 29) greatly thickened, in anterior view medial part about three times as broad as apex; medioventral part bare (Fig. 36). Pro- and mesotibia predominantly black; with short pale yellow pile; metatibia curved with apex bluntly pointed and covered with short blunt spines (Fig. 29), entirely dark brown; with short predominantly black pile, few pale yellow hairs. Tarsal segments orange-red; with short black pile.

**Table 2.** Mean inter- (below diagonal) and intra- (on diagonal) p-distances among DNA barcodes of six Afrotropical species of *Mallota*. The range of p-distances is given in parenthesis. For *M. aenigma* Bezzi, 1912 only a single barcode was obtained.

	<i>M. aenigma</i>	<i>M. dasyops</i>	<i>M. extrema</i>	<i>M. glabra</i> sp. nov.	<i>M. stipulata</i> sp. nov.	<i>M. wyatti</i> sp. nov.
<i>M. aenigma</i>	–					
<i>M. dasyops</i>	0.073 (0.072–0.075)	0.001 (0–0.003)				
<i>M. extrema</i>	0.082 (0.081–0.085)	0.113 (0.110–0.117)	0.002 (0–0.005)			
<i>M. glabra</i> sp. nov.	0.052 (0.051–0.053)	0.070 (0.068–0.071)	0.087 (0.085–0.090)	0.001 (0–0.002)		
<i>M. stipulata</i> sp. nov.	0.100 (0.099–0.101)	0.126 (0.124–0.129)	0.039 (0.037–0.041)	0.107 (0.106–0.109)	0.005 (0.005)	
<i>M. wyatti</i> sp. nov.	0.082 (0.081–0.084)	0.108 (0.104–0.112)	0.036 (0.032–0.039)	0.087 (0.085–0.090)	0.049 (0.048–0.053)	0.005 (0.003–0.008)

WING (Fig. 41). Largely hyaline; most areas microtrichose. Stigmal cross-vein present between distal end of vein Sc and middle of vein R<sub>1</sub>. Vein R<sub>4+5</sub> sinuate, without appendix.

ABDOMEN (Fig. 51). Mainly shining black; tergum 1 pale orange ground colour; white pollinose; with long white pile. Tergum 2 with pair of yellow-orange maculae narrowly separated along medial line, posteriorly with narrow yellowish margin; predominantly short whitish pile except along posterior black part where black; tergum 3 along anterior margin with yellow-orange maculae; grey pollinose narrowly along anterior margin, with medial interruption; with short whitish pile except in posterior fourth where black and slightly longer; tergum 4 predominantly black, posteriorly with narrow yellowish margin; with mixed black and whitish pile. Sterna pale yellow to red-brown, posteriorly sometimes darker; with very long, dispersed whitish pile.

### Female

As male except frons intermixed pale yellow and black pile, dorsally predominantly black. Apex metatibia not bluntly pointed.

### Distribution

South Africa.

### Comments

Although very similar to *M. dasyops*, it is clearly a distinct species and can be differentiated mainly by character states of the metafemur and metatibia, as outlined in the diagnosis and the key. It has a much more restricted distribution with material available from South Africa only. *Mallota glabra* sp. nov. is morphologically most similar to *M. dasyops* but apart from the morphological differences, DNA barcodes also show substantial differentiation between both species (mean interspecific p-distance of 7%; range of interspecific p-distances: 6.8–7.3%) (Fig. 57; Table 2). The range of intraspecific p-distances in both species is much narrower (0–0.3%).

*Mallota hircus* sp. nov.

[urn:lsid:zoobank.org:act:C649A2B0-F563-4815-8091-74EE8319B848](https://zoobank.org/urn:lsid:zoobank.org:act:C649A2B0-F563-4815-8091-74EE8319B848)

Figs 6, 16, 30, 42, 52

### Differential diagnosis

This species belongs to a group differentiated from other Afrotropical species of *Mallota* by the distinctly long pilose eyes, and dichoptic eyes in both sexes. It can be differentiated from all three other species in this group by the shorter black pilosity of the ocellar triangle. It differs furthermore from *M. dasyops* and *M. glabra* sp. nov. by the presence of a tuft of long pile on the clypeus. It can be differentiated from *M. aenigma* by the strongly thickened metafemur (only moderately in *M. aenigma*). In the female the frontal pilosity is distinctly shorter in *M. hircus* compared to *M. aenigma*. It is the only species in *Mallota* with wing cell r<sub>1</sub> sometimes closed. If the latter, then a petiole is either absent, or very short and unlike what is seen in *Eristalis*.

### Etymology

The Latin word ‘*hircus*’ stands for a ‘billy-goat’ and is a reference to the hair or tuft of hairs sticking out from the clypeus (allusion to a goatee). The specific epithet should be treated as a noun in apposition.

### Type material

#### Holotype

DEMOCRATIC REPUBLIC CONGO • ♂; Stanleyville [= Kisangani]; Mar. 1915; Lang and Chapin leg.; RMCA, RMCA ENT 000037958.

### Paratypes

DEMOCRATIC REPUBLIC CONGO • 1 ♂; same data as for holotype; RMCA, RMCA ENT 000037959 • 1 ♀; same data as for holotype; Apr. 1915; RMCA, RMCA ENT 000037957 • 1 ♂; same data as for holotype; AMNH • 1 ♂, 1 ♀; same data as for holotype; 10 Apr. 1915; (one with ID label *M. pallidibasis*); AMNH.

### Description

Body length: 13.0–15.5 mm. Wing length: 10.2–11.0 mm.

#### Male

**HEAD** (Fig. 23). Eye with short to medium long whitish pile; narrowly dichoptic, separated by distance of at most equal to half the width of ocellus of ocellar triangle, ommatidia equal in size. Frons weakly protruding, in lateral view at most equal to facial tubercle, ground colour black, narrowly yellow along ventral margin; predominantly shining, only along eye margins more weakly pale brown pollinosity; with medium long pale brown pile. Ocellar triangle black; short to medium long black pilose. Face ground colour black, sometimes sublateral band from eye margin to oral margin more pale brown; with whitish pollinosity, facial tubercle and medial part ventral of tubercle non-pollinose; with dispersed medium long yellow pile along dorsolateral margins, otherwise bare; facial tubercle weakly pronounced. Clypeus with small tuft of long whitish pile or single long hair. Antennal segments black-brown; arista bare, brown; postpedicel longer than wide.

**THORAX** (Fig. 6). Scutum subshining black; with brown pollinosity, with medium long pale brown pile; along anterior and posterior margin with more greyish pollinosity and pale yellow pile. Scutellum yellow-brown, paler than scutum; with long pale yellow pile; anteromedially with distinct black pile. Pleura ground colour black; posterior anepisternum, katapisternum and anterior anepimeron with long pale brown pile, otherwise bare.

**LEGS**. Femora mainly black-brown, anteriorly more orange-brown; with short to long dense pale yellow pile except ventrally where short black pile. Metafemur (Fig. 30) greatly thickened, in anterior view medial part about three times as broad as apex; medioventral part with very short pile. Pro- and mesotibia predominantly black; with short pale yellow pile; metatibia curved with apex not pointed, entirely dark brown; with short predominantly black pile, few pale yellow hairs. Tarsal segments orange-red; with short black pile.

**WING** (Fig. 42). Largely hyaline; most areas microtrichose. Stigmal cross-vein present between distal end of vein Sc and middle of vein R<sub>1</sub>. Sometimes cell r<sub>1</sub> closed. Vein R<sub>4+5</sub> sinuate, without appendix.

**ABDOMEN** (Fig. 52). Mainly shining black; tergum 1 pale orange ground colour; white pollinose; with long white pile. Tergum 2 yellow-orange, anteromedially with triangular black macula, posterior fourth black-brown coloured, sometimes dark parts more extensive and yellow-orange fascia interrupted in middle; predominantly short whitish pile except along posterior part where black; tergum 3 along anterior margin broadly and posteriorly narrowly orange-brown; grey pollinose narrowly along anterior margin; with short whitish pile except in posterior fourth where black; tergum 4 predominantly black, posteriorly with narrow yellowish margin; with mixed black and whitish pile. Sterna pale yellow to red-brown, posteriorly sometimes darker; with very long, dispersed whitish pile.

#### Female

As male except frons subshining black dorsally of antennae, along eye margins with distinct whitish pollinosity, brown-black anterior of ocellar triangle over entire width; with intermixed short whitish and black pile (Fig. 16), dorsally predominantly black; ocellar triangle short black pilose.

**Distribution**

Democratic Republic of Congo.

**Comments**

A series of specimens, collected during the Lang-Chapin Expedition to the Democratic Republic of Congo, was initially identified by Curran (1927) as *Mallota pallidibasis* (Bigot, 1891), and later on as *Mallota extrema* (Curran 1939b). However, comparison with the holotype of *M. extrema* has shown that they do not belong to this species. The whereabouts of the type of *M. pallidibasis* are unknown but this species is considered to belong to *Eristalis* currently. Although Bigot (1891) makes reference to a swollen metafemur in *pallidibasis*, he also indicates that the eyes are barely villose or tomentose (“oculi sparce tomentosis” and “les yeux à peine villosules”), which seems to refer to the dense short pilosity one observes in some *Eristalis* species and does not seem to correspond with the long dispersed pile observed in the type series of specimens. No DNA barcodes were obtained.

*Mallota aenigma* Bezzi, 1912

Figs 7, 17, 21, 31, 43, 53

*Mallota aenigma* Bezzi, 1912: 434.

**Differential diagnosis**

This species belongs to a group differentiated from other Afrotropical species of *Mallota* by the distinctly long pilose eyes and dichoptic eyes in both sexes (not confirmed for *M. aenigma* as the male of this species is unknown). It can be differentiated from *M. dasyops* and *M. glabra* sp. nov. by the presence of a tuft of long pile on the clypeus. It is the only species in this group with the metafemur only slightly thickened (medial part at most 2.5 times as broad as apex; in others of this group three times or more). The lower part of the face is also more drawn out compared to the others.

**Type material****Holotype**

EQUATORIAL GUINEA • ♀; Is. Fernando Poo [= Bioko Island], Moka; Feb. 1902; L. Fea leg.; MCSNG.

**Other material examined**

KENYA • 1 ♀; Eastern Province, Nyambene Hills, Itieni Forest; 15–27 Nov. 2011; R. Copeland leg.; ICIPE, NMK/ICIPE 210.

MALAWI • 1 ♀; Zomba Plateau, Kuchawe trout farm; 8–11 Nov. 2016; K. Jordaens leg.; RMCA, RMCA AB59313805.

ZIMBABWE • 1 ♀; Chirinda Forest; Oct. 1905; G.A.K. Marshall leg.; NHMUK • 1 ♀; Mt Selinda, Chirinda Forest; 6–8 Feb. 1959; A.C. van Bruggen leg.; SANC.

**Description**

Body length: 12.0–13.0 mm. Wing length: 8.5–9.3 mm.

**Female**

HEAD (Fig. 17). Eye with dense medium long whitish pile; dichoptic, ommatidia equal in size. Frons weakly protruding, in lateral view subequal to facial tubercle; ground colour black, dorsally of antennae narrowly yellow; light greyish brown pollinosity, along eye margins more greyish, dorsally of antennae without pollinosity; with long intermixed black and pale brown pile, in ventral and dorsal





**Figs 7–8.** Species of *Mallota* Bezzi, 1822. Habitus, lateral view. 7. *M. aenigma* Bezzi, 1912, holotype, ♀ (MCSNG). 8. *M. extrema* (Loew, 1858), ♂ (NMSA DIP 211609).

part predominantly brownish. Face ground colour black, sublateral band from eye margin to oral margin more yellow-brown; with whitish pollinosity, along lateral margins more densely so, facial tubercle and medial part ventral of tubercle non-pollinose; with dispersed long yellow pile along sublateral paler areas, otherwise bare; facial tubercle weakly pronounced. Clypeus with small tuft of long whitish pile (Fig. 21). Antennal segments black-brown, postpedicel black; arista missing in holotype, bare, yellow-brown to dark brown in non-type material; postpedicel longer than wide.

**THORAX** (Fig. 7). Scutum subshining black; with grey pollinosity; with long pale brown pile, sometimes darker brown pile in parts of posterior third. Scutellum yellow-brown, paler than scutum; with long pale brown pile; anteromedially with pale reddish (holotype) to black pile. Pleura ground colour black; posterior anepisternum, katepisternum and anterior anepimeron with long pale brown pile, otherwise bare.

**LEGS.** Femora largely black, basally orange-brown, metafemur more extensively orange-brown ventrally and distally; with short to long dense pale yellow pile, metafemur ventrodistally with short black pile. Metafemur (Fig. 31) moderately thickened, in anterior view medial part at most 2.5 times as broad as apex. Pro- and mesotibia predominantly black-brown to orange-brown; with short pale yellow pile; metatibia curved, along anterior and posterior margins with dispersed short black pile. Tarsal segments orange-brown; with short black pile.

**WING** (Fig. 43). Largely hyaline; most areas microtrichose. Stigmal cross-vein present between distal end of vein Sc and middle of vein R<sub>1</sub>. Vein R<sub>4+5</sub> sinuate, without appendix.

**ABDOMEN** (Fig. 53). Mainly shining black with orange fasciae; tergum 1 pale orange, white pollinose; with long white pile. Tergum 2 with large orange fascia medially occupying about half of entire length, sometimes weakly interrupted in the middle; predominantly short whitish pile except along posterior margin where black; tergum 3 orange fascia occupying anterior third to half, sometimes reduced to pair of narrow maculae along anterior margin; posterior margin narrowly orange; with short whitish pile except in posterior fourth where black; tergum 4 black except along anterior margin and more narrowly posterior margin where orange; with short whitish pile except along posterior margin where black, other terga with short black pile. Sterna dark brown to black; with very long, dispersed whitish pile.

### Male

Unknown.

### Distribution

Equatorial Guinea, Kenya, Malawi, Zimbabwe. Probably also Cameroon (see Comments).

### Comments

Limited material (all female specimens) is available for this species. While the type originates from Equatorial Guinea, the other specimens we have studied are from eastern Africa. They correspond in general characters used for this group with the type; the latter is distinctly larger. Curran (1939b) suspected that the specimen by Bezzi (1915) listed under *M. aenigma* from southern Rhodesia (Zimbabwe) belongs to *extrema* but study of this specimen has shown that it most likely belongs to *M. aenigma*. Recently, we received images of a specimen of *Mallota* collected in Cameroon by A. Hlavacek (Prague, Czech Republic). From the images provided, it corresponds with specimens of *M. aenigma*. The single DNA barcode of *M. aenigma* showed high interspecific p-distances to other species of *Mallota* (range p-distances = 5.2–10%) (Fig. 57; Table 2).

### ***extrema* group**

The *extrema* group can be differentiated by the following character states: eyes short pilose and holoptic in males. It has three representatives: *M. extrema*, *M. wyatti* sp. nov. and *M. stipulata* sp. nov.

#### ***Mallota extrema* (Loew, 1858)**

Figs 8, 18, 32, 44, 54

*Helophilus extremus* Loew, 1858: 380.

*Helophilus extremus* – Loew 1860: 387.

### **Differential diagnosis**

This species belongs to a group of three species that are characterized by the combination of the following character states: dispersed short pile on the eyes, holoptic eyes in the male, the metafemur only moderately thickened (as in *M. aenigma*), and ventral pile of metatibia longer (at least half as long as width). *Mallota extrema* can be differentiated from *M. stipulata* sp. nov. by the more pronounced facial tubercle (hardly present in *M. stipulata*), and the long frontal and ocellar pile (short in *M. stipulata*). It is almost identical to *M. wyatti* sp. nov. The main diagnostic character to differentiate it from *M. wyatti* is the colouration of abdominal tergum 2: with lateral triangular maculae in *M. extrema*, the posterior margin (almost) reaching the posterodorsal corner of the tergum; occasionally the triangular maculae are extended, touching medially and forming a complete fascia occupying more than half of the entire length of the tergum (in *M. wyatti* the colouration is limited to the anterodorsal corner, posteriorly never reaching beyond half of the length of the tergum). In addition, the metafemur in *M. extrema* is more distinctly coloured orange in the basal third (more obscured in *M. wyatti*) and the abdominal sterna 1–3 are partially yellow-orange coloured in *M. extrema* (completely black-brown to black in *M. wyatti*).

### **Type material**

#### **Lectotype**

SOUTH AFRICA • ♀; “Caffraria” [unknown locality]; Wahlberg leg.; NRMS, NHRS-GULI 000102664. This specimen is hereby designated as lectotype.

### **Other material examined**

MOZAMBIQUE • 1 ♀; Manica-Sofala, Villa Paiva d’Andrada; Sep. 1957; Stuckenberg leg.; NMSA, NMSA DIP 14086.

REPUBLIC OF THE CONGO (Congo-Brazzaville) • 1 ♀; Nouabale-Ndoki National Park, Mbeli Camp; 3–10 Oct. 2022; V. Dérozier, B. Fouka, A.H. Kirk-Spriggs and H. Takano leg.; carrion bait; ANHRT, ANHRTUK00278678 • 1 ♀; same data as for preceding; 14–20 Feb. 2023; N. Bakala, V. Dérozier, A. Kirk-Spriggs and G. Laszlo leg.; carrion bait; ANHRT, ANHRTUK00282318.

SOUTH AFRICA – **KwaZulu-Natal** • 1 ♀; ‘Stella B’ [= Stella Bush]; Jan. 1916; Marley leg.; NMSA, NMSA DIP 54536 • 1 ♂; Greater St Lucia Wetland Park; 9 Mar. 2004; J.G.H. Londt leg.; NMSA, NMSA DIP 65199 • 1 ♂; iSimangaliso wetland park; 12 Oct. 2021; Bellingan, Jordaens and Midgley leg.; NMSA, NMSA DIP 211609 • 2 ♂♂, 1 ♀; same data as for preceding; 14 Oct. 2021; NMSA, NMSA DIP 211699, NMSA DIP 211675, NMSA DIP 211677 • 2 ♂♂; same data as for preceding; 16 Oct. 2021; RMCA, RMCA ENT 000043830, RMCA ENT 000043831 • 1 ♀; Mtunzini; 27 Feb. 2021; T. Bellingan leg.; NMSA, NMSA DIP 208712 • 1 ♂, 1 ♀; same data as for preceding; 8 Oct. 2021; Bellingan, Jordaens and Midgley leg.; NMSA, NMSA DIP 193462, NMSA DIP 193456 • 1 ♂; same data as for preceding; RMCA, RMCA ENT 000044357 • 1 ♂; Saint Lucia, below Ingwenya Lodge; 12 Oct. 2021; Bellingan, Jordaens and Midgley leg.; RMCA, RMCA ENT 000044384 • 1 ♀; Umlalazi Nature

Reserve; 2–10 Oct. 1982; J.G.H. Londt leg.; NMSA, NMSA DIP 43001. – **Limpopo** • 1 ♀; Transvaal, Zoutpansberg Range, Entabeni For. Station, Vera Kop Forest; 15 Jan. 1974; NMSA, NMSA DIP 63679.

TOGO • 1 ♂; Kloto; G. Goergen leg.; Feb. 2018; RMCA, RMCA AB72067308 • 1 ♂; same data as for preceding; Dec. 2021; RMCA, RMCA AB72067309.

### Description

Body length: 11.5–15.0 mm. Wing length: 9.0–10.5 mm.

#### Male

**HEAD** (Fig. 18). Eye with short and dispersed silvery pile; holoptic, eye contiguity for distance at least equal to length of ocellar triangle, ommatidia equal in size. Frons protruding, in lateral view equal or beyond facial tubercle; ground colour black, dorsal of antennae shining, otherwise light brown pollinosity, along eye margins more greyish; with long intermixed black and whitish pile, along lateral margins paler coloured, medially darker. Ocellar triangle black; short to medium long black pilose. Face ground colour black, sometimes more yellow laterally; with grey pollinosity, more densely so along eye margins, facial tubercle and ventrally of antennae non-pollinose; with dispersed long pale yellow pile along dorsolateral margins, otherwise bare; facial tubercle weakly pronounced. Clypeus smooth, without tuft of pile. Antennal segments black-brown to black; arista bare, black-brown; postpedicel longer than wide.

**THORAX** (Fig. 8). Scutum subshining black; with grey to brown pollinosity, with long pale yellow pile; medially fascia with darker brown pile. Scutellum yellow-brown, paler than scutum; with long pale yellow pile along apical margin; anteromedially darker brown pile. Pleura ground colour black; posterior anepisternum, katepisternum and anterior anepimeron with long pale brown pile, otherwise bare.

**LEGS**. Mainly black, anterior third to fourth of femora distinctly orange and apex narrowly pale orange, protibia at base pale orange, mesotibia pale area extending beyond middle of tibia. Proleg with intermixed black and pale yellow short pile, femur posteriorly long dense pile. Mesoleg predominantly short pale yellow pile, femur posteriorly long dense pile. Metaleg (Fig. 32), femur moderately thickened, with long dense pale yellow pile, except ventrally where predominantly shorter black pile; tibia curved, with conspicuous short black pile, ventrally longer pile, basally sometimes more pale yellow.

**WING** (Fig. 44). Largely hyaline; weak microtrichose, absent in parts. Distal end of vein Sc and middle of vein R<sub>1</sub> without distinct stigmal cross-vein but with darker brown macula between the veins. Vein R<sub>4+5</sub> sinuate, without appendix.

**ABDOMEN** (Fig. 54). Mainly shining black; tergum 1 orange and white pollinose; with long white pile. Tergum 2 with pair of orange-red triangular shaped maculae separated along medial line, maculae reaching along lateral margin till posterodorsal corner of tergum or almost so, occasionally maculae joined forming a full fascia that is occupying more than half of the entire length of the tergum; medial vitta of dense grey pollinosity along entire length except for anterior third, along posterior margin fascia of weaker pollinosity; predominantly short to medium long pale pile except along posterior margin where black; terga 3 and 4 distinctly grey pollinose along anterior margin, continued posteriorly along medial line, posterior margin fascia of weaker pollinosity; tergum 3 with short whitish pile except in posterior half to fourth where black; tergum 4 predominantly black pile. Sometimes orange maculae on abdominal terga more extensive, tergum 2 black areas restricted to anterior margin medially and posterior third, tergum 3 anterior fourth orange-red. Sterna black, sterna 1–3 partially yellow-orange; sterna 1–3 with very long, dispersed whitish pile; sterna 4–5 with dispersed black pile.

### Female

As male except eyes dichoptic; frons subshining black dorsally of antennae, medially and along eye margins with distinct pollinosity, ventrally whitish and gradually darkening dorsally till brown-black anterior of ocellar triangle; pilosity black anterior of ocellar triangle. Scutum, maculae with black pilosity sometimes less distinct. Proleg predominantly pale yellow pilosity, tibiae basally usually more pale yellow pilosity.

### Distribution

Congo (Brazzaville), Mozambique, South Africa, Togo. Records from Congo (D.R.) are based on misidentification (cf. Comments).

### Comments

Johan August Wahlberg collected in South Africa and kept travel diaries, but the details in those diaries are not sufficient to assign a precise locality to the holotype. The type locality is likely to be in the KwaZulu-Natal province, but it could also be in the Free State, Gauteng, Mpumalanga or Northwest provinces.

Loew (1858) described *Helophilus extremus* based on material from South Africa. Curran (1927) places a single Afrotropical species under *Mallota*, i.e., *M. pallidibasis*, based on a series of specimens collected at Stanleyville [= Kisangani] in 1915. However, later on, Curran (1939b) considered those specimens to belong to *M. extrema*. As stated above, part of this material was re-examined and compared with the type of *extrema*, but they belong to *M. hircus* sp. nov. Curran (1939b) also considered as *M. extrema* the material listed by Bezzi (1915) as *M. aenigma* from Zimbabwe. However, our examination of the material at NHMUK confirmed the identification by Bezzi as *M. aenigma*.

Apart from the morphological differences, DNA barcodes also show substantial differentiation from *M. wyatti* (mean interspecific p-distance = 3.6%; range interspecific p-distances: 3.2–3.9%) and *M. stipulata* sp. nov. (mean interspecific p-distance: 3.9%; range interspecific p-distances: 3.6–4.1%) (Fig. 57; Table 2). The range of intraspecific p-distances in both species is much narrower (0–0.5%).

*Mallota wyatti* sp. nov.

[urn:lsid:zoobank.org:act:1D4C04B8-6555-4E39-A269-16F6A290418D](https://zoobank.org/act:1D4C04B8-6555-4E39-A269-16F6A290418D)

Figs 9, 19, 24, 33, 45, 55

### Differential diagnosis

This species belongs to a group of three species which are characterized by the combination of the following character states: eyes short pilose, holoptic eyes in the male, the metafemur only moderately thickened and ventral pile of metatibia longer (at least half as long as width). *Mallota wyatti* sp. nov. can be differentiated from *M. stipulata* sp. nov. by the more pronounced facial tubercle (hardly present in *M. stipulata*) and the long frontal and ocellar pile (shorter in *M. stipulata*). Our new species is almost identical to *M. extrema* and the main diagnostic character to differentiate them is the colouration of abdominal tergum 2: predominantly dark black-brown to black with paler colouration that is limited to the anterodorsal corner of the tergum, posteriorly never reaching beyond half of the length (in *M. extrema* paler colouration as a lateral triangular macula, the posterior margin (almost) reaching the posterodorsal corner of the tergum; occasionally the triangular maculae are extended, touching medially and forming a complete fascia occupying more than half of the entire length of the tergum). In addition, the metafemur is largely black-brown coloured, at most with restricted dark orange macula in basal fourth (more distinctly coloured orange in the basal third in *M. extrema*), and the abdominal sterna 1–3 are completely dark black-brown (partially yellow-orange in *M. extrema*).



**Figs 9–10.** Species of *Mallota* Bezzi, 1822. Habitus, lateral view. **9.** *M. wyatti* sp. nov., holotype, ♂ (RMCA AB72067310). **10.** *M. stipulata* sp. nov., holotype, ♂ (NMSA DIP 208439).

### **Etymology**

Named in honour of Mr Nigel Wyatt, who was the curator of the Diptera collection at NHMUK, for his kind assistance and diligent curation of this collection over the last four decades. The specific epithet should be treated as a noun in the genitive case.

### **Type material**

#### **Holotype**

TOGO • ♂; Kloto; Dec. 2021; G. Goergen leg.; RMCA, RMCA AB72067310.

#### **Paratypes**

TOGO • 1 ♀; Kloto; Jan. 2021; G. Goergen leg.; IITA, IITA AB72067305 • 1 ♀; same data as for preceding; Feb. 2022; RMCA, RMCA AB72094771.

REPUBLIC OF THE CONGO (Congo-Brazzaville) • 1 ♀; Nouabale-Ndoki National Park, Mbeli Camp; 3–10 Oct. 2022; V. Dérozier, B. Fouka, A. Kirk-Spriggs and H. Takano leg.; carrion bait; ANHRT, ANHRTUK00278668 • 1 ♀; same data as for preceding; 14–20 Feb. 2023; N. Bakala, V. Dérozier, A. Kirk-Spriggs and G. Laszlo leg.; carrion bait; ANHRT, ANHR TUK00282323.

### **Description**

Body length: 11.0–13.5 mm. Wing length: 9.0–10.0 mm.

#### **Male**

**HEAD** (Fig. 19). Eye with short silvery pile; holoptic, eye contiguity for distance at least equal to 1.5 times length of ocellar triangle, ommatidia equal in size. Frons protruding, in lateral view equal or slightly beyond facial tubercle; ground colour black, dorsal of antennae shining, otherwise light dark brown pollinosity, along eye margins more greyish; with long intermixed black and whitish pile, along lateral margins paler coloured, medially darker. Ocellar triangle black; short to medium long black pilose. Face ground colour black medially, sometimes more yellow laterally; with grey pollinosity, more densely so along eye margins, facial tubercle and ventrally of antennae non-pollinose; with dispersed long pale yellow pile along dorsolateral margins, otherwise bare; facial tubercle weakly pronounced. Clypeus smooth, without tuft of pile. Antennal segments black-brown to black; arista bare, black-brown; postpedicel longer than wide.

**THORAX** (Fig. 9). Scutum subshining black; with grey to brown pollinosity, with long mixed pale yellow and black pile. Scutellum (Fig. 24) yellow-brown, paler than scutum; with long pale yellow pile; anteromedially few black pile. Pleura ground colour black; posterior anepisternum, katepisternum and anterior anepimeron with long pale brown pile, otherwise bare.

**LEGS**. Mainly black, sometimes base of femora; protibia at base pale orange, mesotibia orange area extending beyond middle of tibia. Proleg with intermixed black and pale yellow short pile, in distal half femur anteriorly with short dense black pile, posteriorly long dense predominantly black pile. Mesoleg predominantly short pale yellow pile, femur posteriorly long dense pale yellow pile. Metaleg (Fig. 33), femur moderately thickened, with long dense pale yellow pile, except ventrally and at apex where predominantly black; tibia curved, with conspicuous short black pile, ventrally longer pile, basally sometimes more pale yellow.

**WING** (Fig. 45). Largely hyaline; weak microtrichose, absent in parts. Distal end of vein Sc and middle of vein R<sub>1</sub> without distinct stigmal cross-vein but with darker brown macula between the veins. Vein R<sub>4+5</sub> sinuate, without appendix.



**Figs 11–16.** Species of *Mallota* Bezzi, 1822. Head, lateral view. **11.** *M. hirsuta* Hull, 1941, holotype, ♀ (ANSP ENT 142915 (6591)). **12.** *M. meromacrimima* Hull, 1941, holotype, ♂ (ANSP ENT 142916 (6592)). **13.** *M. aperta* (Bezzi, 1912), ♀ (RBINS, Eala, Aug. 1935, J. Ghesquière). **14.** *M. dasyops* (Wiedemann, 1819), ♂ (NMSA DIP 211695). **15.** *M. glabra* sp. nov., paratype, ♂ (NMSA DIP 65015). **16.** *M. hircus* sp. nov., paratype, ♀ (RMCA ENT 000037957).



ABDOMEN (Fig. 55). Mainly shining black; tergum 1 completely or predominantly black, white pollinose; with long white pile. Tergum 2 with pair of orange-red maculae restricted to anterodorsal corners of tergum; medial vitta of dense grey pollinosity along entire length except for anterior third, along posterior margin fascia of weaker pollinosity; predominantly short to medium long whitish pile except along posterior margin where black; terga 3 and 4 distinctly grey pollinose along anterior margin, continued posteriorly along medial line, posterior margin fascia of weaker pollinosity; tergum 3 with short whitish pile except in posterior half to fourth where black; tergum 4 predominantly black pile. Sterna black; sterna 1–3 with very long, dispersed whitish pile; sterna 4–5 with dispersed black pile.

### Female

As male except eyes dichoptic; frons shining black dorsally of antennae, medially and along eye margins with distinct pollinosity, ventrally whitish and gradually darkening dorsally till brown-black anterior of ocellar triangle; pilosity black anterior of ocellar triangle. Scutum, pilosity predominantly pale yellow.



**Figs 17–20.** Species of *Mallota* Bezzi, 1822. Head, lateral view. **17.** *M. aenigma* Bezzi, 1912, holotype, ♀ (MCSNG). **18.** *M. extrema*, ♂ (Loew, 1858) (NMSA DIP 211609). **19.** *M. wyatti* sp. nov., holotype, ♂ (RMCA AB72067310). **20.** *M. stipulata* sp. nov., holotype, ♂ (NMSA DIP 208439).

**Distribution**

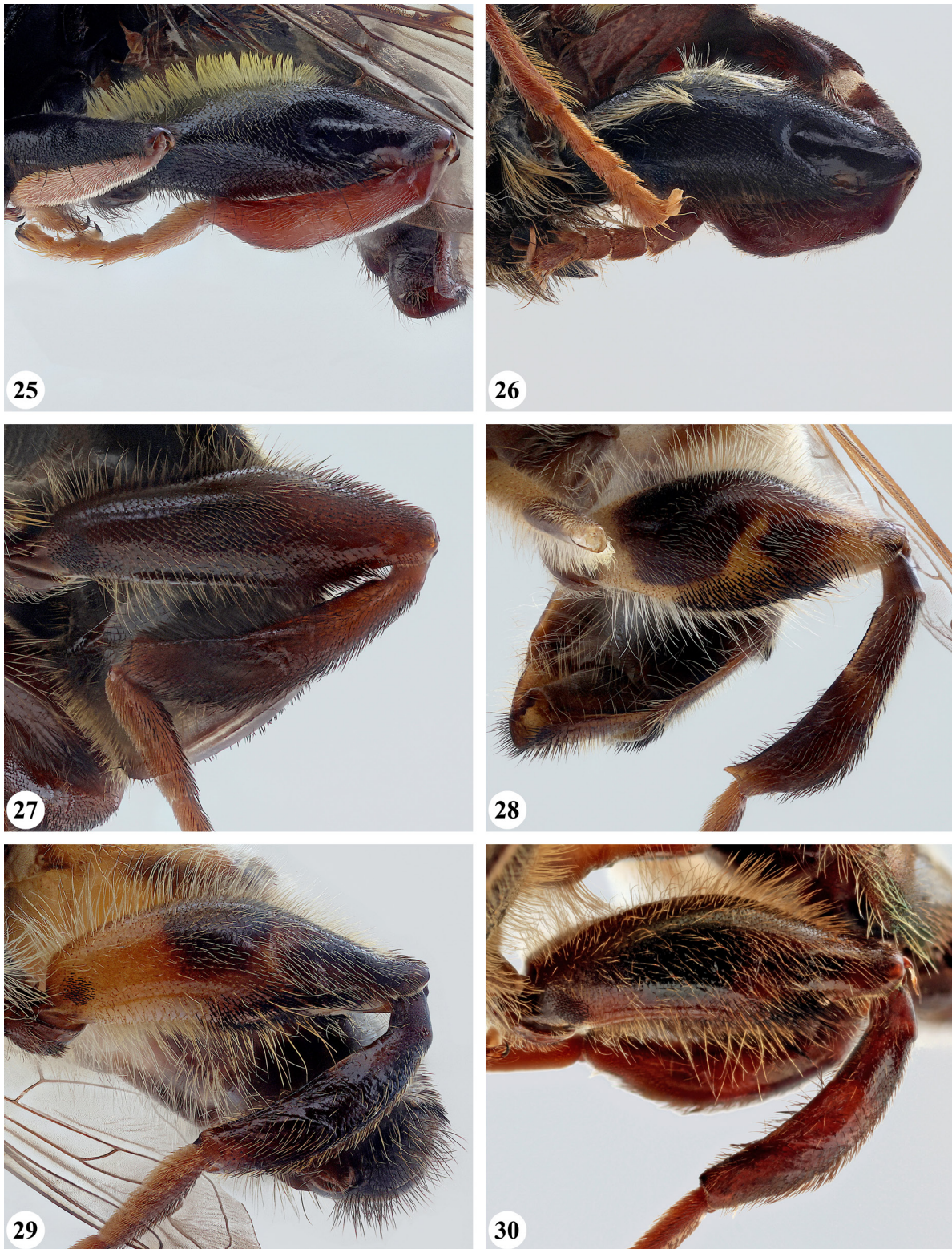
Republic of the Congo (Congo-Brazzaville), Togo.

**Comments**

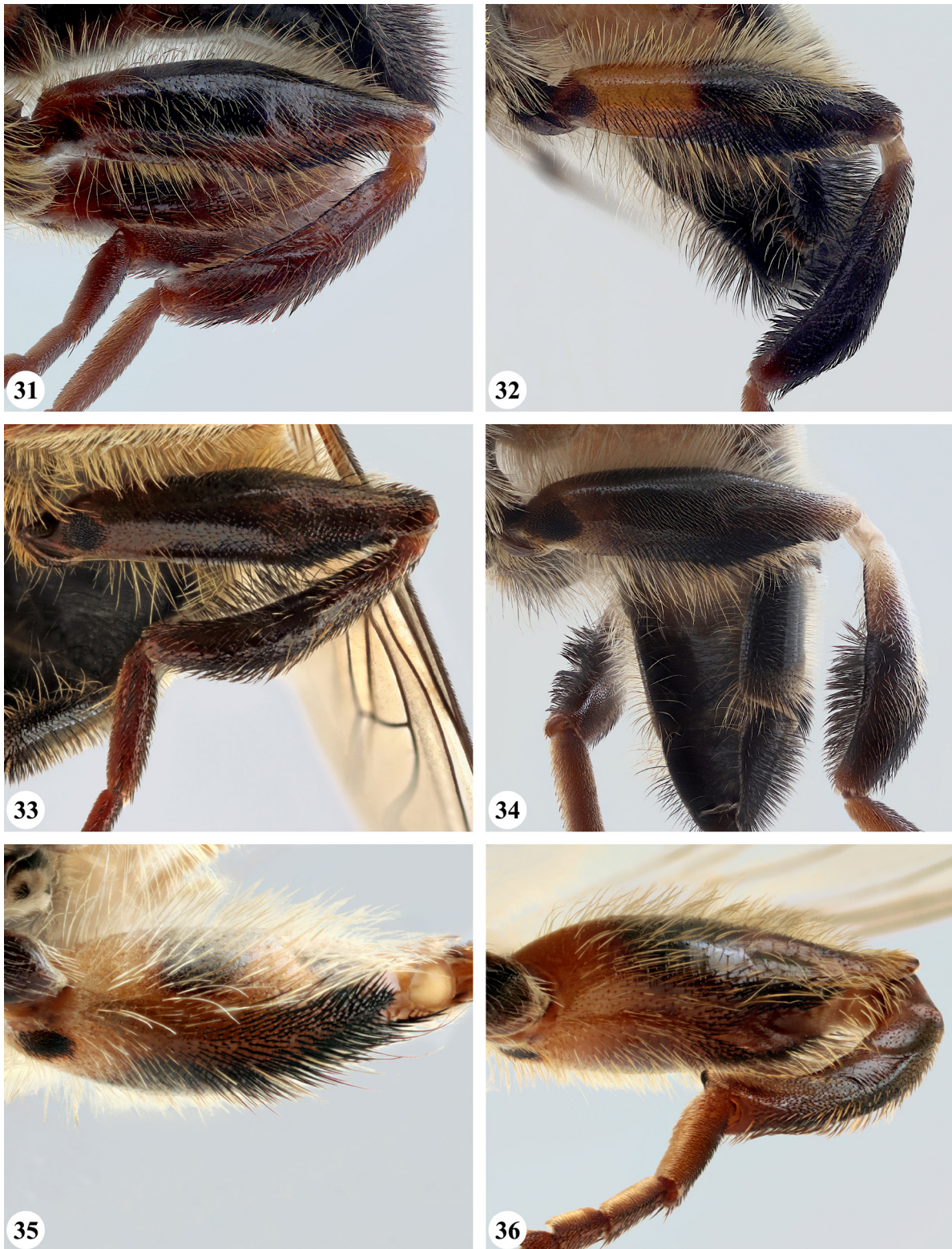
This species resembles *M. extrema* very closely. However, DNA analysis places representatives in a separate cluster from *M. extrema*. There are a few morphological characters that appear to be consistently different between the two species, as outlined in the diagnostic descriptions. Material of both entities were found in sympatry in the Republic of the Congo and in Togo. Apart from the morphological differences, DNA barcodes also show substantial differentiation from *M. extrema* (mean interspecific p-distance = 3.6%; range interspecific p-distances: 3.2–3.9%) and *M. stipulata* sp. nov. (mean interspecific p-distance = 4.9%; range interspecific p-distances: 4.8–5.3%) (Fig. 57; Table 2). The range of intraspecific p-distances in both species is much narrower (0–0.5%).



**Figs 21–24.** Species of *Mallota* Bezzi, 1822. **21–22.** Detail face, anterolateral view. **21.** *M. aenigma* Bezzi, 1912, ♀ (NMK/ICIPE 210). **22.** *M. glabra* sp. nov., paratype, ♀ (NMSA DIP 48401). **23–24.** Scutellum, dorsolateral view. **23.** *M. aperta* (Bezzi, 1912), ♂ (RBINS, Bolingo (rives Busira), 23 Jun. 1936, J. Ghesquière). **24.** *M. wyatti* sp. nov., paratype, ♀ (ANHRTUK 282323).



**Figs 25–30.** Species of *Mallota* Bezzi, 1822. Metaleg, anterior view. **25.** *M. hirsuta* Hull, 1941, holotype, ♀ (ANSP ENT 142915 (6591)). **26.** *M. meromacrimima* Hull, 1941, holotype, ♂ (ANSP ENT 142916 (6592)). **27.** *M. aperta* (Bezzi, 1912), ♀ (RBINS, Eala, 5 Oct. 1936, J. Ghesquière). **28.** *M. dasyops* (Wiedemann, 1819), ♀ (NMSA DIP 175981). **29.** *M. glabra* sp. nov., paratype, ♂ (NMSA DIP 65015). **30.** *M. hircus* sp. nov., paratype, ♂ (RMCA ENT 000037959).



**Figs 31–36.** Species of *Mallota* Bezzi, 1822. **31–34.** Metaleg, anterior view. **31.** *M. aenigma* Bezzi, 1912, holotype, ♀ (MCSNG). **32.** *M. extrema* (Loew, 1858), ♂ (RMCA ENT 000044357). **33.** *M. wyatti* sp. nov., paratype, ♀ (ANHRTUK 00282323). **34.** *M. stipulata* sp. nov., paratype, ♀ (NMSA DIP 211776). **35–36.** Metafemur, ventral view. **35.** *M. dasyops* (Wiedemann, 1819), ♂ (RMCA ENT 000040720). **36.** *M. glabra* sp. nov., paratype, ♀ (NMSA DIP 48401).



**Figs 37–39.** Species of *Mallota* Bezzi, 1822. Right wing. **37.** *M. hirsuta* Hull, 1941, holotype, ♀ (ANSP ENT 142915 (6591)). **38.** *M. meromacrimima* Hull, 1941, holotype, ♂ (ANSP ENT 142916 (6592)). **39.** *M. aperta* (Bezzi, 1912), holotype, ♂ (MCSNG).



**Figs 40–42.** Species of *Mallota* Bezzi, 1822. Right wing. **40.** *M. dasyops* (Wiedemann, 1819), ♀ (RMCA ENT 000044379). **41.** *M. glabra* sp. nov., paratype, ♂ (NMSA DIP 65015). **42.** *M. hircus* sp. nov., paratype, ♀ (RMCA ENT 000037957).

*Mallota stipulata* sp. nov.

[urn:lsid:zoobank.org:act:6524C068-F37E-4665-AD6B-233047FE00CF](https://zoobank.org/urn:lsid:zoobank.org:act:6524C068-F37E-4665-AD6B-233047FE00CF)

Figs 10, 20, 34, 46, 56

**Differential diagnosis**

This species belongs to a group of three which are characterized by the combination of the following character states: eyes short pilose, holoptic eyes in the male, the metafemur only moderately thickened and ventral pile of metatibia longer (at least half as long as width). It can be differentiated from *Mallota extrema* and *M. wyatti* sp. nov. by the face much receded compared to frons and very weak facial tubercle (more pronounced in the other two species). In both sexes the ocellar pile is distinctly shorter than in the other two species. The same applies to the frontal pile in the female especially in the upper half of the frons.



**Figs 43–44.** Species of *Mallota* Bezzi, 1822. Right wing. **43.** *M. aenigma* Bezzi, 1912, holotype, ♀ (MCSNG). **44.** *M. extrema* (Loew, 1858), ♂ (NMSA DIP 211609).

### Etymology

After the Latin ‘*stipula*’ for ‘stalk’ or ‘stubble’ and it refers to the shorter pilosity on the head compared to the other species. The specific epithet should be treated as an adjective (nominative singular feminine).

### Type material

#### Holotype

SOUTH AFRICA • ♂; KwaZulu-Natal, iSimangaliso wetland park; 20 Jan. 2022; Midgley and Bellingan leg.; NMSA, NMSA DIP 208439.

#### Paratypes

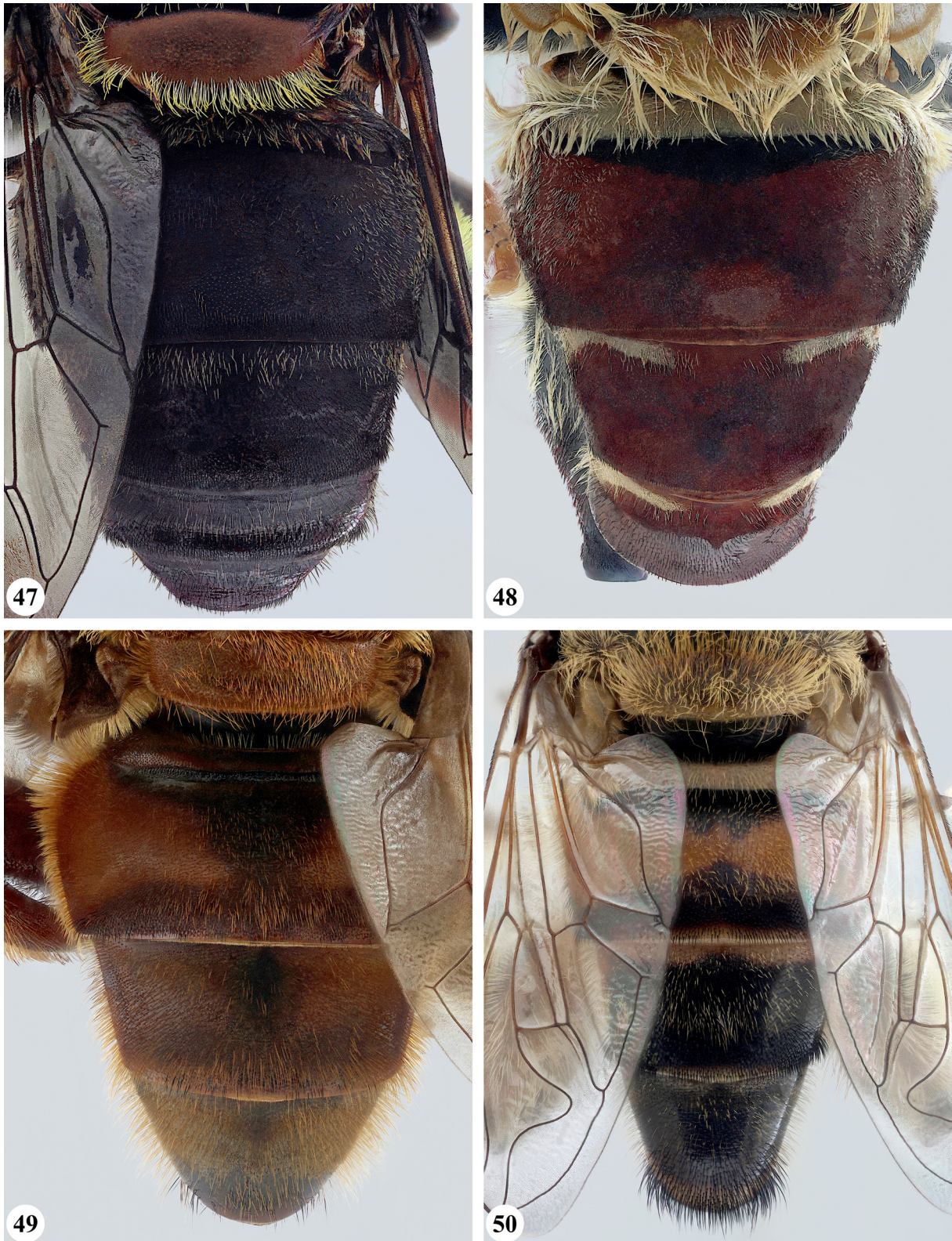
MOZAMBIQUE • 1 ♀; Manica-Sofala, Villa Paiva d’Andrada; Sep. 1957; Stuckenberg leg.; NMSA, NMSA DIP 54236 (ID label as *Mallota extrema* by v. Doesburg).

SOUTH AFRICA – **KwaZulu-Natal** • 2 ♀♀; iSimangaliso wetland park; 9 Oct. 2021; Bellingan, Jordaens and Midgley leg.; NMSA, NMSA DIP 211775, NMSA DIP 211776 • 1 ♀; same data as for

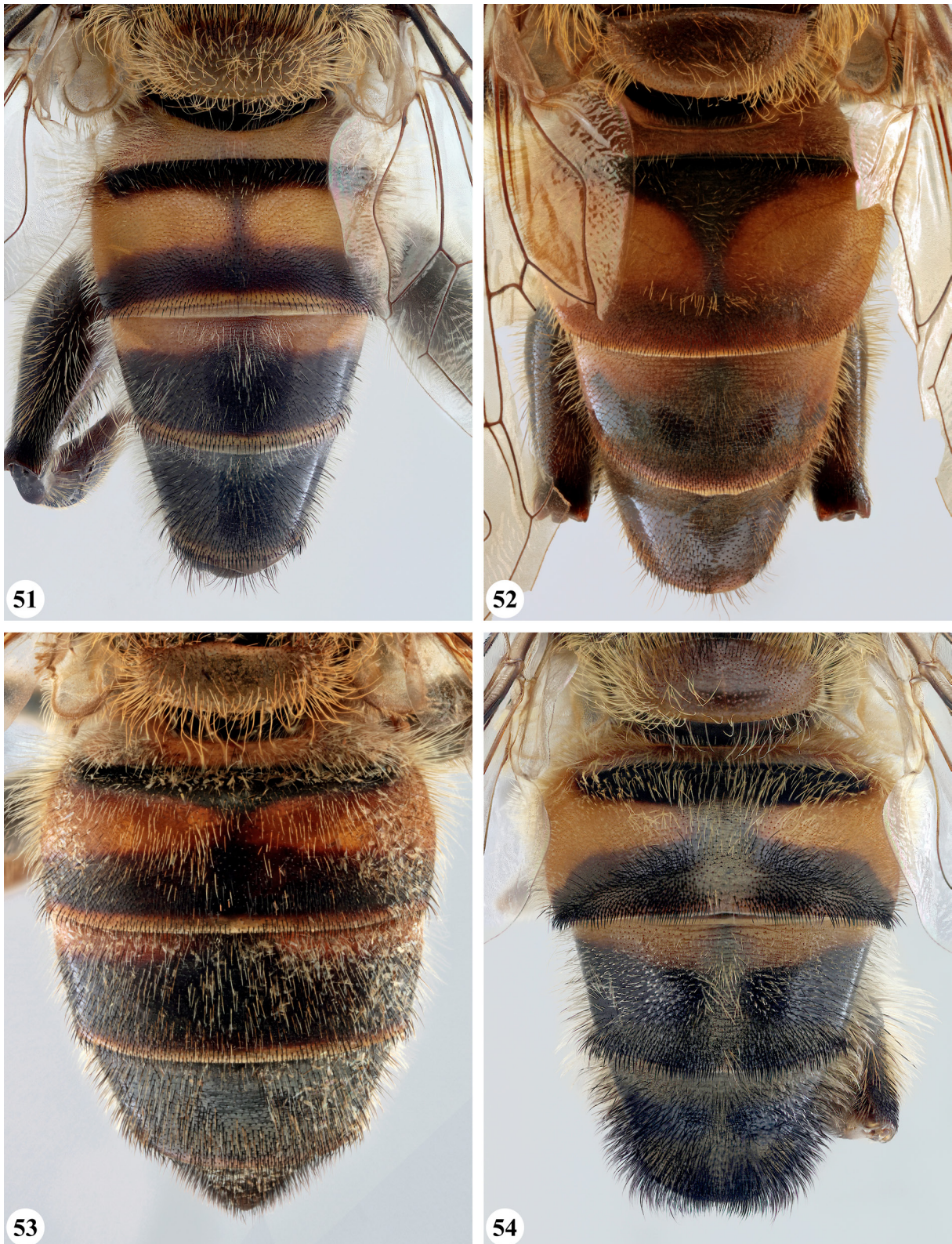


**Figs 45–46.** Species of *Mallota* Bezzi, 1822. Right wing. **45.** *M. wyatti* sp. nov., paratype, ♀ (ANHRTUK 00282323). **46.** *M. stipulata* sp. nov., paratype, ♀ (NMSA DIP 54236).





**Figs 47–50.** Species of *Mallota* Bezzi, 1822. Abdomen, dorsal view. **47.** *M. hirsuta* Hull, 1941, holotype, ♀ (ANSP ENT 142915 (6591)). **48.** *M. meromacrimima* Hull, 1941, holotype, ♂ (ANSP ENT 142916 (6592)). **49.** *M. aperta* (Bezzi, 1912), holotype, ♂ (MCSNG). **50.** *M. dasyops* (Wiedemann, 1819), ♂ (NMSA DIP 211695).



**Figs 51–54.** Species of *Mallota* Bezzi, 1822. Abdomen, dorsal view. **51.** *M. glabra* sp. nov., paratype, ♂ (NMSA DIP 65015). **52.** *M. hircus* sp. nov., holotype, ♂ (RMCA ENT 000037958). **53.** *M. aenigma* Bezzi, 1912, ♀ (NMK/ICIPE 210). **54.** *M. extrema* (Loew, 1858), ♂ (NMSA DIP 211609).

preceding; RMCA, NMSA DIP 211777 • 1 ♀; same data as for preceding; 20 Jan. 2022; Midgley and Bellingan leg.; NMSA, NMSA DIP 208356 • 1 ♂; same data as for preceding; 20 Jan. 2022; Midgley and Bellingan leg.; rothole at iGwalagwala trail; RMCA, NMSA DIP 208457.

TOGO • 1 ♀; Kloto; Feb. 2022; G. Goergen leg.; RMCA, RMCA AB72094770.

ZIMBABWE • 1 ♀; Hillside; 8 Feb. 1923; Swinburne and Stevenson leg.; NMSA, NMSA DIP 45152.

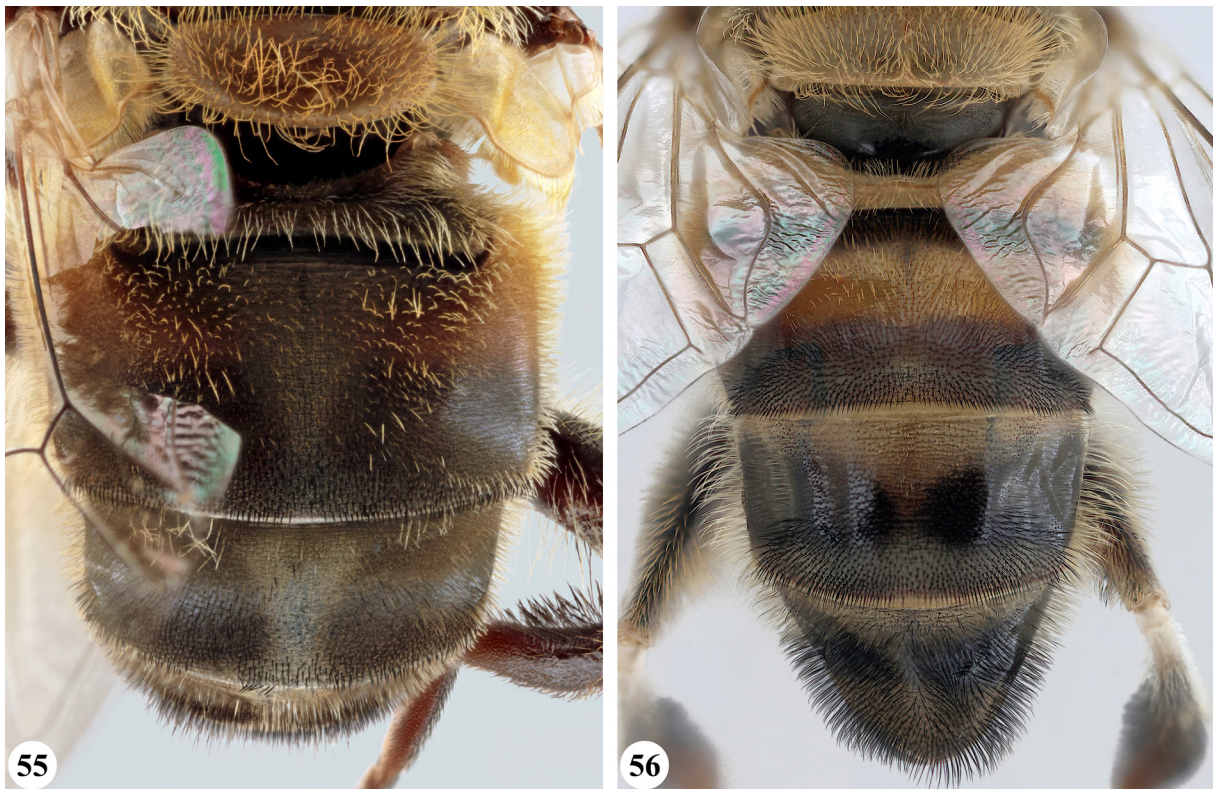
### Description

Body length: 13.5–17.0 mm. Wing length: 9.5–11.0 mm.

#### Male

HEAD (Fig. 20). Eye with short silvery pile; holoptic, eye contiguity for distance at least equal to length of ocellar triangle, ommatidia equal in size. Frons protruding, ground colour black, dorsal of antennae shining, otherwise light dark brown pollinosity, along eye margins more densely greyish; with medium long intermixed black and whitish pile, along lateral margins more pale coloured. Ocellar triangle black; short black pilose. Face distinctly receding below frontal protuberance; ground colour black; with grey pollinosity, weakly so along medial line, more densely towards eye margins; with dispersed medium long whitish pile along dorsolateral margins, otherwise bare; facial tubercle hardly present. Antennal segments dark brown, postpedicel black; arista bare, black-brown; postpedicel longer than wide.

THORAX (Fig. 10). Scutum subshining black; with grey to brown pollinosity, with long pale brown pile; medially fascia with darker brown pile. Scutellum yellow-brown, paler than scutum; with long pale



**Figs 55–56.** Species of *Mallota* Bezzi, 1822. Abdomen, dorsal view. **55.** *M. wyatti* sp. nov., paratype, ♀ (ANHRTUK 00282323). **56.** *M. stipulata* sp. nov., holotype, ♂ (NMSA DIP 208439).

yellow pile. Pleura ground colour black; posterior anepisternum, katepisternum and anterior anepimeron with long pale brown pile, otherwise bare.

LEGS. Femora mainly brown to black, pro- and mesofemur anterior third to fourth distinctly orange, tibiae at base pale orange, mesotibia pale area extending beyond middle of tibia. Pro- and midleg with predominantly short pale yellow pile, femur posteriorly long dense pale yellow pile, few black hairs posteroventrally in distal part. Metaleg (Fig. 34), femur moderately thickened, with long pale yellow pile, except ventrally where mixed with shorter black pile; tibia with short pale yellow and black pile, ventrally with conspicuous dense longer black pile.

WING (Fig. 46). Largely hyaline; largely devoid of microtrichosity. Distal end of vein Sc and middle of vein R<sub>1</sub> without distinct stigmal cross-vein but with darker brown macula between the veins. Vein R<sub>4+5</sub> sinuate, without appendix or with a very short one.

ABDOMEN (Fig. 56). Mainly shining black; tergum 1 yellow-orange, and white pollinose; with long white pile. Tergum 2 with yellow-orange fascia, broadened along lateral margins; predominantly short whitish pile except along posterior fourth where black; along posterior margin with weak grey pollinosity, extended shortly anteriorly along medial line; terga 3 and 4 distinctly grey pollinose along anterior margin, continued posteriorly along medial line, posterior margin weaker pollinosity; with short whitish pile except in posterior fourth where black, pile longer along lateral margin; tergum 4 predominantly black pile. Sterna black to yellow-orange; sterna 1–3 with very long, dispersed whitish pile intermixed with few shorter and black pile; sterna 4–5 with dispersed black pile.

### Female

As male except eyes dichoptic, frons weakly subshining black dorsally of antennae, distinct grey pollinose except in dorsal fourth to fifth and narrowly along eye-margins where brown to black; pilosity medium long whitish in lower part, short whitish in upper part except anterior of ocellar triangle where black.

### Distribution

Mozambique, South Africa, Togo and Zimbabwe.

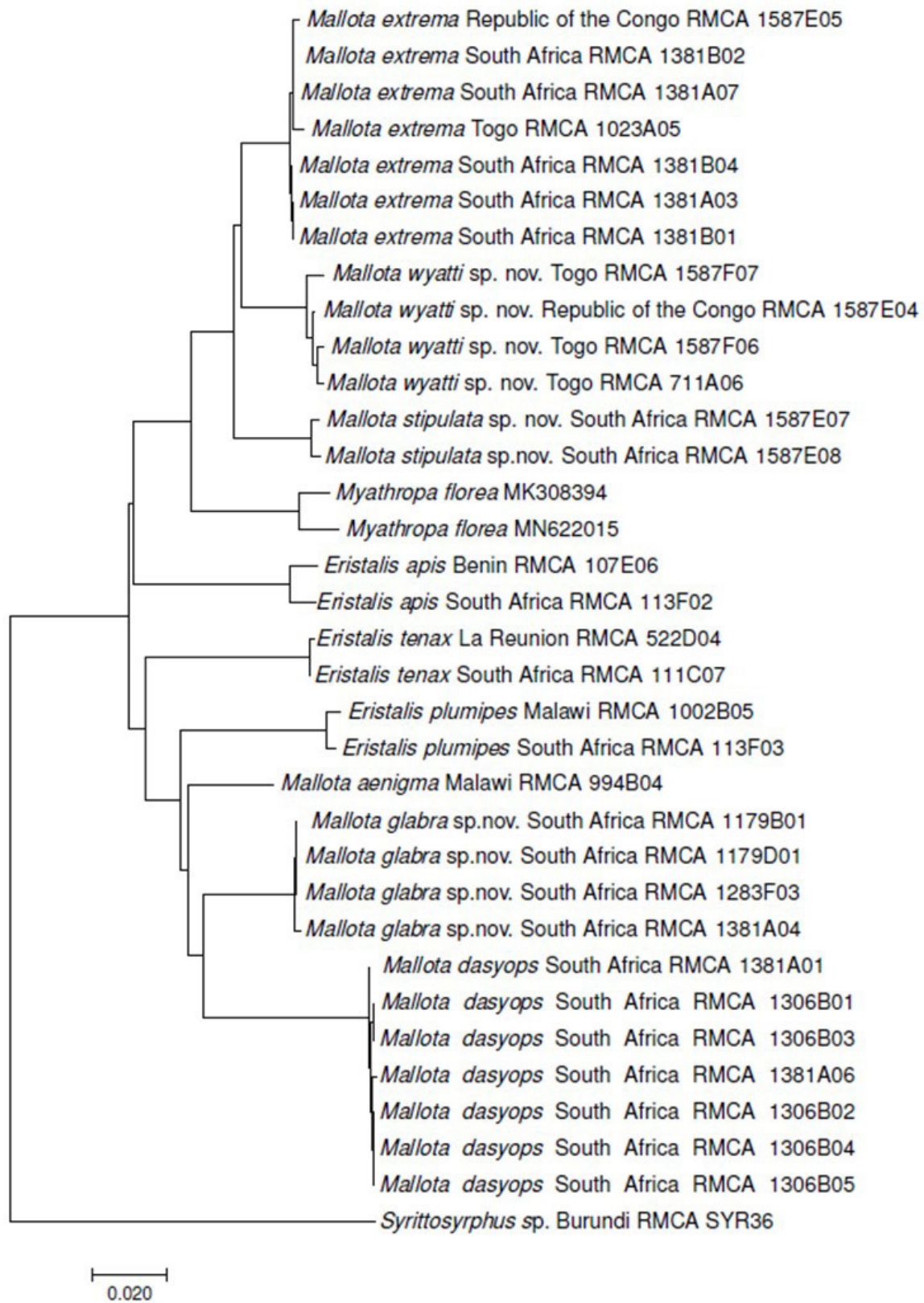
### Comments

Apart from the morphological differences, DNA barcodes also show a substantial differentiation from *M. extrema* (mean interspecific p-distance = 3.9%; range interspecific p-distances: 3.6–4.1%) and *M. wyatti* sp. nov. (mean interspecific p-distance = 4.9%; range interspecific p-distances: 4.8–5.3%) (Fig. 57; Table 2). The range of intraspecific p-distances in both species is much narrower (0–0.5%).

### Discussion

The Afrotropical species currently placed in the genus *Mallota* constitute a very heterogeneous morphological group. This is also corroborated by high mean interspecific p-distances that vary between 3.6 and 12.6% (8% overall; range: 3.6–12.9%; Table 2) and much lower mean intraspecific p-distances (0.001–0.05%; range: 0–0.8%) (Fig. 57). Based on these results, we recognize four distinct groups.

The *hirsuta* group has two representatives, both from Madagascar: *M. hirsuta* and *M. meromacrimima*. These differ clearly from any of the other Afrotropical species placed under *Mallota* by the combination of the following character states: eyes bare, postpedicel roundish, and the dorsomedial (triangular) part of the anepimeron setulose. No recent material could be obtained for these species and hence no representative could be included in the NJ tree analysis.



**Figs 57.** Neighbour-Joining tree for representatives of *Myathropa florea* (Linnaeus, 1758) as well as Afrotropical *Mallota* Bezzi, 1822 and *Eristalis* Latreille, 1804.

The *aperta* group has a single representative, *Mallota aperta*. As indicated in the Comments, this species shares a number of character states that are also observed in representatives of the genus *Senaspis* (see De Meyer *et al.* 2020b), such as the marginated scutellum and the medial macula on the wing. In addition, some specimens also have slightly maculated eyes. It lacks, however, some other characteristics of the latter genus such as the closed wing cell  $r_1$  (but see De Meyer *et al.* (2020b) on variability of this characteristic in some *Senaspis*). As such it seems to occupy an intermediate position between both genera, similar to the case of *Senaspis pennata* (Hervé-Bazin, 1914). No recent material could be obtained and therefore it also was not included in the NJ tree analysis.

The *dasyops* group comprises four Afrotropical species: *M. dasyops*, *M. glabra* sp. nov., *M. hircus* sp. nov., and *M. aenigma*. All representatives are distinct bee mimics, differentiated from other Afrotropical species of *Mallota* by the long pilose and dichoptic eyes in both sexes (for those species for which both sexes are known). The NJ tree places representatives of three species within this group (*M. hircus* excluded as no fresh material could be obtained) in a distinct cluster related to Afrotropical species of *Eristalis* (*E. plumipes* and *E. apis*) as well as Afrotropical specimens of *E. tenax*. They differ morphologically from these Afrotropical species of *Eristalis* by the open wing cell  $r_1$  (long petiolate in *Eristalis*), and the much longer pilosity of the eyes. In most species of this group (except *M. aenigma*) the metafemur is also distinctly swollen (only moderately so in *E. plumipes* and *E. apis*, very slender in *E. tenax*).

The *extrema* group has three representatives: *M. extrema*, *M. wyatti* sp. nov. and *M. stipulata* sp. nov. Representatives of this group are characterized by the short pile of the eyes and holoptic eyes in males. The ventral pile of the metatibia is much longer than observed in other Afrotropical species of *Mallota*. In the NJ-tree the three representatives form distinct clusters that group together with representatives of *Myathropa florea*. They resemble (in particular *M. stipulata*) *M. florea* in having the short pile of the eyes, the stubble like frontal pilosity and weakly developed facial tubercle. These characteristics are also observed in Asian species of *Mallota* such as *M. orientalis* (Wiedemann, 1824) and *M. sufficiens* Curran, 1928.

We refrain from proposing new generic concepts and combinations till a more comprehensive molecular phylogeny of the different *Mallota* groups and other Afrotropical eristaline genera is available.

## Acknowledgements

We would like to thank the various curators and researchers who made material and/or digital images available to us for study or who provided input on particular queries: N. Apelqvist (NRMS), T. Bellingan (AMGS), A. Camargo (NHMW), R.S. Copeland (ICIPE), W. Deconinck (RBINS), N. Evenhuis (B.P. Bishop Museum, Honolulu, USA), M. Hauser (California Department of Food & Agriculture, Sacramento, USA), A.H. Kirk-Spriggs (ANHRT), M. Ndlovu (NMSA), T. Pape (ZMUC), C. Richenbacher and D. Grimaldi (AMNH), M. Tavano (MCSNG), B. Virgilio (Italy), N. Wyatt (NHMUK) and J. Weintraub (ANSP). We thank J. Brecko for his assistance in the digital imaging. We also thanks X. Mengual and an anonymous reviewer for their valuable comments on a previous version of the manuscript. This work was funded through DIPoDIP (Diversity of Pollinating Diptera in South African biodiversity hotspots) and DIPoDIP2 (Diversity of Pollinating Diptera in African biodiversity hotspots) which are financed by the Directorate-general Development Cooperation and Humanitarian Aid through the Framework agreement with KMMA.

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