



Six new species of *Microdon* Meigen from Madagascar (Diptera: Syrphidae)

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Abstract

Six new species of the myrmecophilous hoverfly genus *Microdon* Meigen (Diptera: Syrphidae) are described from Madagascar. Redescriptions are given for the three other Madagascan species of this genus. Keys are presented to the Madagascan genera of the subfamily Microdontinae and to the Madagascan species of *Microdon*.

Key words: Microdontinae, Afrotropical region, species key

Introduction

Hoverflies of the subfamily Microdontinae (Diptera: Syrphidae) are associated with ants during their immature stages. The larvae are predators or parasitoids of the ant brood and highly specialized in their relationships with their preys or hosts (Reemer 2013; Pérez-Lachaud *et al.* 2014). In parallel with ant diversity, the greatest diversity of Microdontinae is found in the tropics: of approximately 480 described species, 400 occur in tropical regions (Reemer 2013; Reemer & Ståhls 2013a).

The Afrotropical region harbours 63 described species of Microdontinae, seven of which are presently included in the type genus *Microdon* Meigen. On Madagascar, 21 species of Microdontinae are known (excluding one species of the Comoros), three of which are included in *Microdon* (Cheng & Thompson 2008; Dirickx 1995; Keiser 1971; Reemer & Ståhls 2013a).

The present paper describes six new species of *Microdon* from Madagascar. The three formerly described species are redescribed. Keys to the Madagascan genera of Microdontinae and the Madagascan species of *Microdon* are given.

Material and methods

Dissected male genitalia have been macerated in lactic acid for 24 hours and were subsequently stored in glycerol. Drawings were made using a drawing tube attached to a Wild M20 microscope.

The following acronyms are used to indicate entomological collections:

CAS	California Academy of Sciences, San Francisco (USA)
CSCA	California State Collection of Arthropods, Sacramento (USA)
MNHN	Musée National d'Histoire Naturelle, Paris (France)
RMNH	Naturalis Biodiversity Center, Leiden (the Netherlands)

Morphological terminology follows Reemer & Ståhls (2013b), who derived their terminology mainly from McAlpine (1981), supplemented with a few terms with special relevance to Microdontinae from Speight (1987), Thompson (1999), Sinclair (2000), Hippa & Ståhls (2005) and Cheng & Thompson (2008).

Key to Madagascan genera of Microdontinae

A key to the genera of Microdontinae of the world can be found in Reemer & Ståhls (2013). In the Afrotropical region, the key below may be used to recognize the African genera.

- 1 Abdomen oval (may be short or elongate) (Figs 7, 12, 30) 2
- Abdomen petiolate (Fig. 1) 4
- 2 Vein R4+5 with posterior appendix extending into cell r4+5 (Figs 8, 18, 19) 3
- Vein R4+5 without posterior appendix (Fig. 2) *Afromicrodon* Thompson
- 3 Antennae shorter than distance between antennal fossa and anterior oral margin (as in Fig. 4). Male genitalia: hypandrium with basolateral bulges, phallus wide, apically furcate (Fig. 3) *Archimicrodon* Hull
- Antennae longer than or as long as distance between antennal fossa and anterior oral margin (Figs 8, 21). Male genitalia: hypandrium without basolateral bulges, phallus more slender, apically or basally furcate (e.g. Figs 10, 15, 29, 53) *Microdon* Meigen (see next key)
- 4 Occiput without crease (Figs 21, 57, 52). Metapleura connected, forming postmetacoxal bridge 5
- Occiput with deep dorsolateral crease (Fig. 4). Metapleura separate, not forming postmetacoxal bridge *Spheginobaccha* de Meijere
- 5 Mesonotum with transverse suture complete, uninterrupted medially. Tergites 3 and 4 separate, not fused. Male with long pilosity on basoflagellomere (Fig. 20 in Reemer & Ståhls 2013b) *Ceratrighomyia* Séguy
- Mesonotum with transverse suture incomplete, interrupted medially. Tergites 3 and 4 fused. Male without long pilosity on basoflagellomere *Paramixogaster* Brunetti

Key to Madagascan species of *Microdon*

Only males are known of *Microdon berobaka* Reemer **sp. n.**, *M. janne* Bot **sp. n.** and *M. tsara* Keiser, so whether this key also works for females of those species is unknown.

- 1 Occiput evenly narrow over entire length: dorsal eye margin parallel to hind margin of head (Figs 52, 59). Male hind basitarsomere dorsally with wide and deep longitudinal groove (Fig. 5). Male genitalia: phallus furcate far from apex, very slender (Figs 53, 61) *Microdon* (*Megodon*) 2
- Occiput dorsally widened (even if only slightly): dorsal eye margin diverging from hind margin of head (Figs 21, 47). Male hind basitarsomere dorsally without longitudinal groove (Fig. 6). Male genitalia: phallus furcate closer to apex, moderately slender (Figs 10, 15, 23, 29, 35, 40, 48) *Microdon* s.l. 3
- 2 Larger species: >10 mm. Scutellar calcars very large and conical, making angle of about 30° with mesoscutum in lateral view (Figs 57, 60) *M. stuckenbergi* (Keiser)
- Smaller species: <10 mm. Scutellar calcars more slender and more or less at same level as rest of scutellum (Figs 54, 55) *M. planitarsus* Keiser
- 3 Most of body with bronze sheen (Figs 30, 45). Scutellar calcars of 1/3 of scutellar length or longer 4
- Body largely without bronze sheen, at most mesonotum and tergites 3–4 faintly metallic (Figs 16, 18, 32, 36, 41, 44,). Scutellar calcars less than 1/3 of scutellar length 5
- 4 Tibiae orange (Fig. 45). Alula bare on basomedian 1/2 *M. tsara* Keiser
- Tibiae black, except apices somewhat paler (Fig. 27). Alula entirely microtrichose *M. irwini* Reemer **sp. n.**
- 5 Ventrolateral part of face black, contrasting with pale rest of face (Figs 13, 17) *M. harinhalai* Reemer **sp. n.**
- Face more or less unicolorous, without contrasting parts (Figs 9, 20, 25, 34, 38) 6
- 6 Pleuron and tergites black (Figs 32, 33) *M. janne* Bot **sp. n.**
- Pleuron at least partly pale brown, tergites partly brownish (Figs 7, 8, 18, 19, 24, 36, 37, 41, 42) 7
- 7 Tergite 3 with complete fascia of pale golden pile along posterior margin (Fig. 7) *M. berobaka* Reemer **sp. n.**
- Tergite 3 at most with medially widely interrupted, narrow fascia of pale pile posterolaterally 8
- 8 Smaller species (11 mm) with more compact abdomen (Fig. 18). Lateral margins of tergites 3 and 4 with long white pile (Fig. 22). Male genitalia as in Fig. 20 *M. ifanadiana* Reemer **sp. n.**
- Larger species (13–14 mm) with more elongate abdomen (Fig. 36). Lateral margins of tergites 3 and 4 with short yellowish pile (Fig. 39). Male genitalia as in Fig. 40 *M. sava* Reemer **sp. n.**

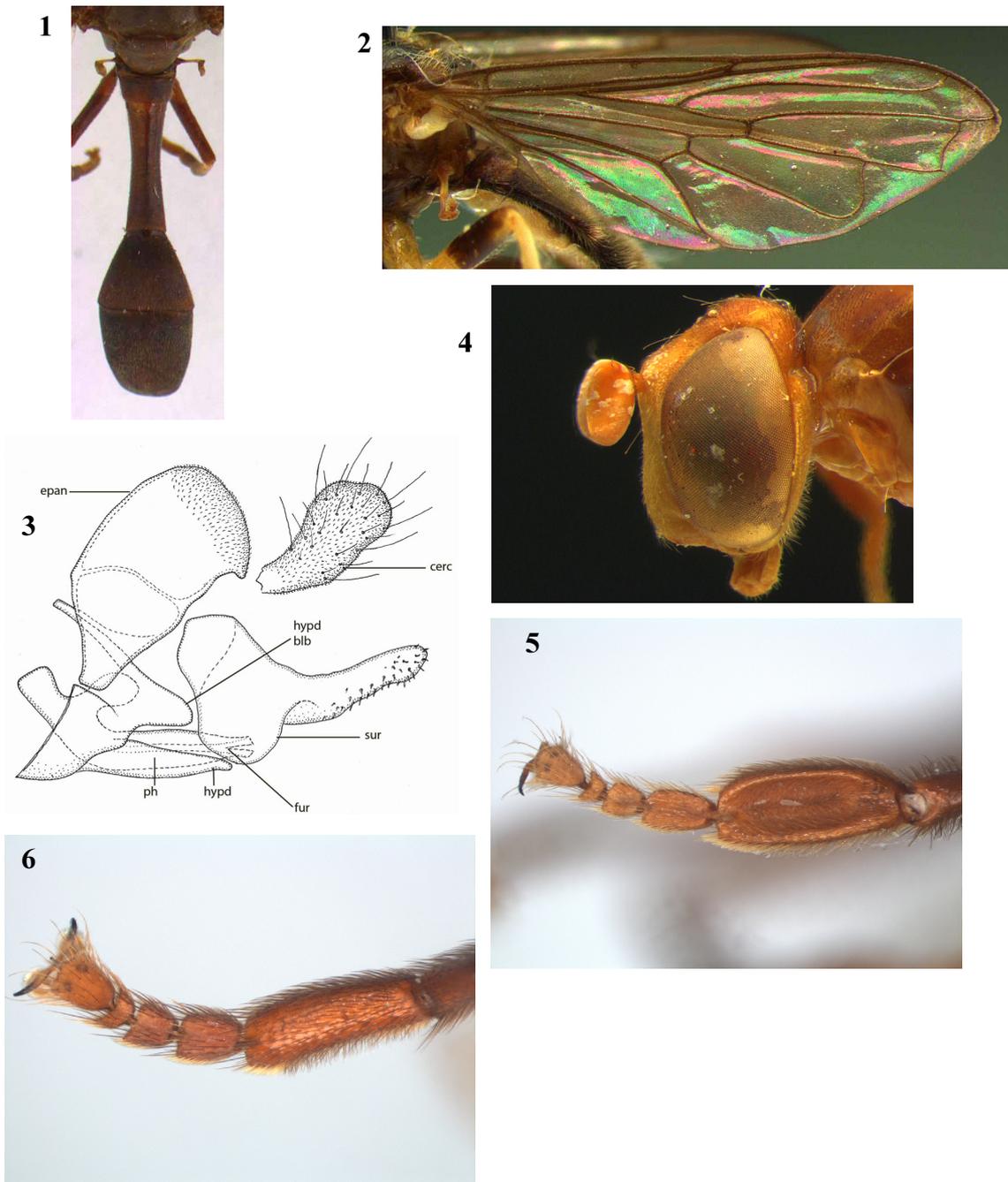


FIGURE 1. *Spheginobaccha ruginosa* Dirickx. Abdomen of male holotype.

FIGURE 2. *Afromicrodon madecassa* (Keiser). Left wing.

FIGURE 3. *Archimicrodon (Hovamicrodon) ampefyanus* (Keiser). Male genitala. Acronyms: ph, phallus; fur, furcation point of phallus; hypd, hypandrium; hypd blb, basolateral bulge of hypandrium; sur, surstylus; epan, epandrium; cerc, cercus.

FIGURE 4. *Spheginobaccha guttula* Dirickx. Head lateral.

FIGURE 5. *Microdon (Megodon) planitarsus* Keiser. Male, hind basitarsomere with longitudinal groove.

FIGURE 6. *Microdon harinhalai* Reemer **sp. n.** Male hind basitarsomere without longitudinal groove.

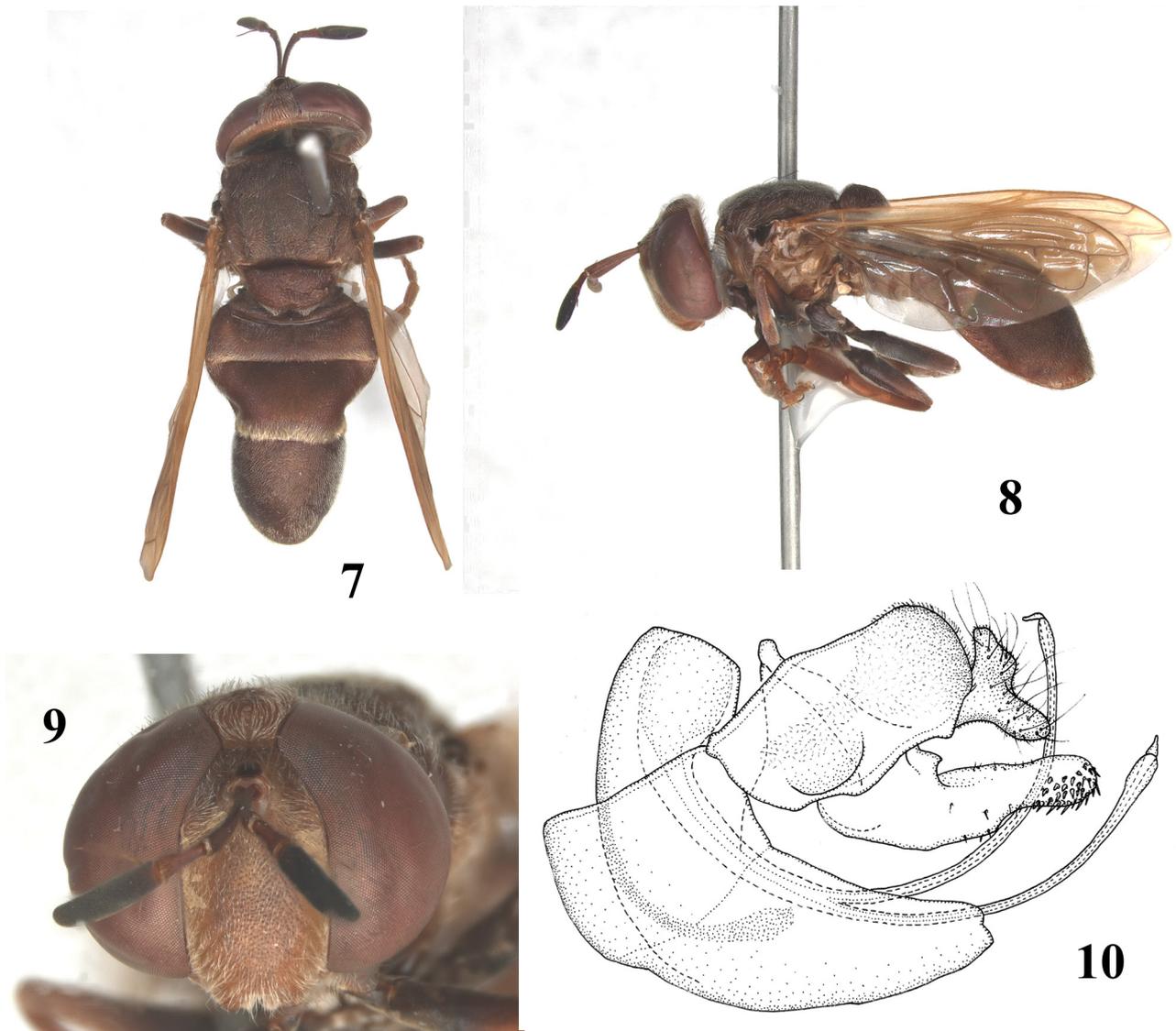
Systematics of Madagascan species of *Microdon*

Microdon berobaka Reemer sp. n.

(Figs 7–10)

Diagnosis. A dark reddish brown, elongate species with yellowish wings, which can be distinguished from other Madagascan species of *Microdon* by the combination of a yellow face and a fascia of golden pile along the posterior margin of tergite 3 (Fig. 7).

Type material. HOLOTYPE. Adult male. MADAGASCAR. Label: "MADAGASCAR: Menabe Region, / Dist. of Morondava, Beroboka / village, 45 km NE of Morondava, / 4-12.XII.2008, elev. 45 m, / 19°58'65 S, 44°39'.92 E, coll: M. / Irwin, R. Harin'Hala MG-45B-18". Coll. CAS.



FIGURES 7–10. *Microdon berobaka* Reemer sp. n. Male holotype. 7. Habitus dorsal. 8. Habitus lateral. 9. Head frontal. 10. Genitalia lateral.

Description of male holotype. Body size: 11 mm. **Head.** Face and gena yellow; white pilose, more yellowish laterally. Oral margin slightly produced. Frons and vertex yellow, except dark brown median macula on frons; yellowish white pilose. Occiput yellow; white pilose and pollinose. Eye bare. Antennal fossa about as wide as high.

Antenna with scape and pedicel reddish brown, basoflagellomere black. Arista dark brown, about 3/4 of length of basoflagellomere. **Thorax.** Mesoscutum dark reddish brown with faint metallic hues; short appressed white pilose. Postpronotum and postalar callus dark yellow; white pilose. Scutellum semicircular with pair of short apical calcars with mutual distance about 1/4 of width of scutellum at base, slightly concave between calcars. Pleuron yellow, with dorsal half of anepisternum and ventral part of katepisternum brown; all pile white. Propleuron bare. Anepisternum with deep sulcus separating anterior from posterior part; pilose anteriorly and posteriorly, with widely bare part in between. Anepimeron entirely pilose. Katepisternum pilose dorsally, bare ventrally. Katepimeron without pile, but with short white microtrichia. Katatergum and anatergum long and short microtrichose, respectively. Calypter pale grey and halter yellow. **Wing.** Yellowish in anterior and apical cells. Microtrichose, except bare on cell bc, posterobasal 1/3 of cell br, posterobasal 1/4 of cell bm, anterobasal 1/4 of cell cup, along A2 in anal lobe and on centre of alula. **Legs.** Femora dark brown at basal 2/3, yellowish brown apically; white pilose. Tibiae yellowish brown; white pilose. Tarsi dark yellowish brown; basitarsomeres white pilose, other tarsomeres mixed black and yellow or entirely black pilose. Coxae and trochanters dark brown; white pilose. **Abdomen.** Tergite 1 dark brown; white pilose. Tergite 2 dark reddish brown, slightly paler laterally; white pilose, except for narrow line of golden pile laterally along posterior margin. Tergite 3 dark reddish brown, paler along lateral margin; short black pilose, except longer white pilose along lateral margins and with broad band of golden pile along posterior margin. Tergite 4 dark reddish brown, paler along lateral and posterior margins; short white pilose, except longer golden pilose posteriorly. Sternites pale brown; white pilose (incl. sternite 1). Male genitalia as in Fig. 10.

Female. Unknown.

Etymology. This species is named after the village of Berobaka, in which the species was found. The epithet is a noun in apposition.

Microdon harinhalai Reemer sp. n.

(Figs 11–17)

Diagnosis. A compact, blackish brown species with a diagnostic facial colour pattern: yellow with sharply defined, broadly black ventrolateral parts (Figs 13, 17).

Type material. HOLOTYPE. Adult male. MADAGASCAR. Label 1: "MADAGASCAR: Fianarantsoa / Prov., Parc National Ranomafana, / radio tower, elev. 1130 m., 14- / 23.ii.2009, ex: Malaise trap, / 21°15.05'S, 47°24.43'E, coll: M. / Irwin & R. Harin'Hala, MG-09B-242". Coll. CAS. PARATYPES. Two males from same locality as holotype, with dates as follows: 18-28.IX.2003 (coll. CSCA) and 31.I-12.II.2004 (coll. RMNH). One female from Fitovavy, Fitovinany region, Ifanadiana district, 12 km W of Ranomafana, 14-21.XII.2007, leg. M. Irwin & R. Harin'Hala (coll. CAS).

Description of male holotype. Body size: 8 mm. **Head.** Face pale brown, except widely black ventrolaterally; white pilose. Gena black; white pilose. Oral margin not produced. Frons dark brown; black pilose. Vertex black; yellow pilose. Occiput black; yellow pilose, thin white pollinose. Eye bare. Antennal fossa about as wide as high. Antenna brown. Arista brown, about 5/6 of length of basoflagellomere. **Thorax.** Mesoscutum black, except brown along lateral margins; long erect yellow pilose. Postpronotum and postalar callus brown; yellow pilose. Scutellum black anteriorly, brown posteriorly; yellow pilose; semicircular with pair of long, pale brown, more or less parallel apical calcars with mutual distance about 1/4 of width of scutellum at base and length approximately equal to half length of scutellum. Pleuron shining dark brown to blackish. Propleuron bare. Anepisternum with slight sulcus separating anterior from posterior part; yellow pilose anteriorly, black and yellow pilose posteriorly, with widely bare part in between. Anepimeron black pilose dorsally, yellow pilose ventrally. Katepisternum yellowish pilose dorsally, bare ventrally. Katepimeron without pile, shining. Katatergum and anatergum long and short microtrichose, respectively. Calypter greyish yellow, halter yellowish white. **Wing.** Greyish infuscate, especially antero-apically. Microtrichose, except bare in cell br, which is microtrichose only along vena spuria, bare on posterobasal 1/2 of cell bm, anterobasal 1/6 of cell cup, and on centre of alula. **Legs.** Brown, except femora black at basal 1/4 to 1/2. Femora and tibiae black pilose, except femora yellow pilose basally. Tarsi mixed yellow and black pilose. Coxae and trochanters blackish; yellow and white pilose. **Abdomen.** Tergite 1 dull black; white pilose. Tergite 2 dull black, except reddish brown along lateral margins; white pilose, except short black pilose in posterolateral corners. Tergite 3 dull black, except reddish brown along lateral margins; black pilose, except white pilose in anterolateral corners. Tergite 4 dull black anteromedially, reddish brown on other parts; black pilose, except white pilose in anterolateral corners and along posterior margins. Pregenital segments yellowish brown. Sternites brown to yellowish brown, except narrowly yellowish white along posterior margins; white pilose (incl. sternite 1), except sternite 4 black pilose posteriorly. Male genitalia as in Fig. 15.



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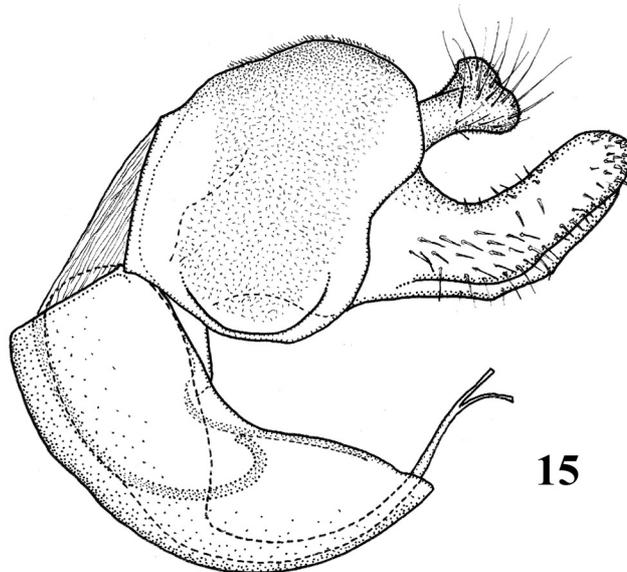
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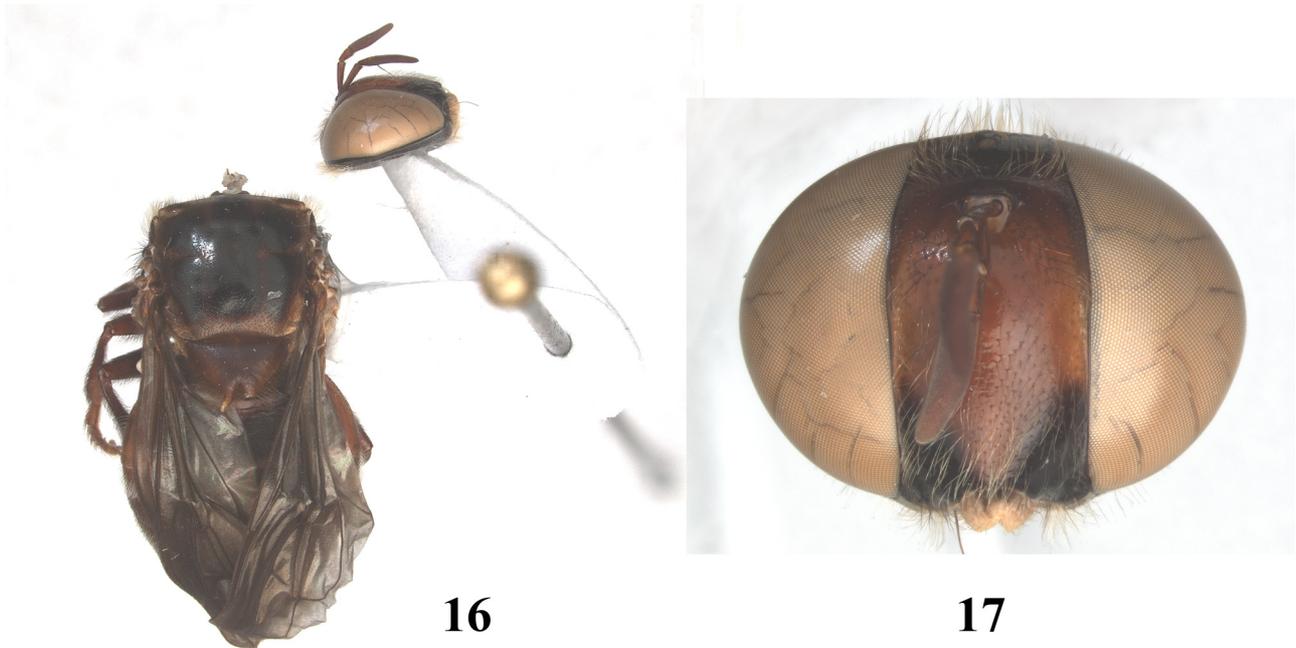


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FIGURES 11–15. *Microdon harinhalai* Reemer **sp. n.** Male holotype. 11. Habitus lateral. 12. Abdomen dorsal. 13. Head frontal. 14. Thorax dorsal. 15. Genitalia lateral (drawn from paratype).



FIGURES 16–17. *Microdon harinhalai* Reemer **sp. n.** Female paratype. 16. Habitus dorsal. 17. Head frontal.

Female. Body size: 10 mm. As male, except for usual sexual dimorphism and following differences. Mesoscutum narrowly yellowish brown along margins. Anepimeron entirely black pilose. Abdomen with widely pale brown margins. Tergite 3 white pilose, except black pilose along posterior margin. Tergite 4 narrowly black pilose along anterior margin and entirely black pilose on posterior half, with band of white pile in between. Tergite 5 white pilose, except for median patch of black pile.

Variation. Male body size 7–9 mm. Colours are paler in one presumably teneral female (not included in type series): posterior margin of mesoscutum widely pale yellow, scutellum yellowish brown, anepimeron entirely pale pilose, femora without black base, abdomen laterally and posteriorly widely yellowish brown.

Etymology. This species is named after R. Harin'Hala, one of the collectors of the specimens on which this description is based.

Microdon ifanadiana* Reemer **sp. n.*

(Figs 18–25)

Diagnosis. A moderately elongate species with yellow face, partly yellowish pleuron, and blackish abdomen without fasciae of golden pile. Smaller (11 mm) and more compactly built than the similarly coloured, larger (13–14 mm) and more elongate *M. sava*.

Type material. HOLOTYPE. Adult male. MADAGASCAR. Label 1: "MADAGASCAR: Fitovavy / Fitovinany Region, Ifanadiana / District, 12 km W of Ranomafana / 21°15.05'S , 47°24.43'E, alt. / 1127 m, 2-16.xii.2006. ex: Malaise / trap, coll: M. Irwin, R. Harin'Hala, / MG-09B-167". Coll. CAS. PARATYPE. Adult female. MADAGASCAR. Label 1: " MADAGASCAR: Fitovavy / Fitovinany Region, Ifanadiana / District, 12 km W of Ranomafana / 21°15.05'S , 47°24.43'E, alt. / 1127 m, 16-23.xii.2006. ex: malaise / trap, coll: M. Irwin, R. Harin'Hala, / MG-09B-167". Coll. CAS.



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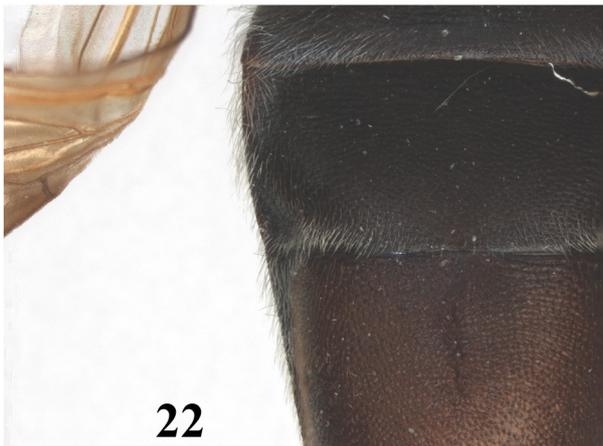
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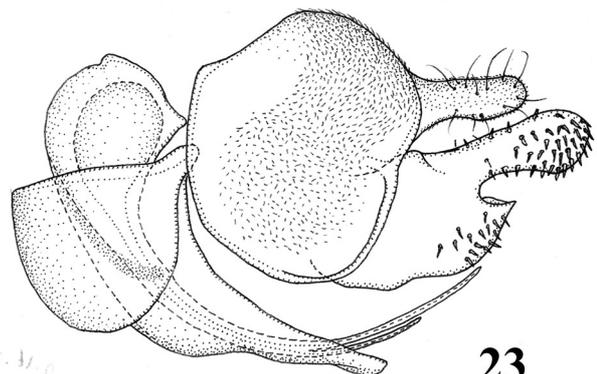
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FIGURES 18–23. *Microdon ifanadiana* Reemer **sp. n.** Male holotype. 18. Habitus dorsal. 19. Habitus lateral. 20. Head frontal. 21. Head lateral. 22. Tergites 3–4. 23. Genitalia lateral.



FIGURES 24–25. *Microdon ifanadiana* Reemer *sp. n.* Female paratype. 24. Habitus lateral. 25. Head frontal.

Description of male holotype. Body size: 11 mm. **Head.** Face and gena yellow; entirely white pilose; with narrow band of whitish pollinosity along eye margins. Oral margin slightly produced. Frons and vertex yellow, except black median spot on frons and brownish ocellar triangle; white pilose, except anterolateral parts of frons and ocellar triangle black pilose. Occiput yellow; white pilose and pollinose. Eye almost bare, very sparse and short pile only visible under high magnification. Antennal fossa about as wide as high. Antenna with scape and pedicel reddish, basoflagellomere black. Arista dark brown, about 4/5 of length of basoflagellomere. **Thorax.** Mesoscutum black, lateral margins dark yellow; with faint bronze and purple metallic hues; white pilose. Postpronotum and postalar callus dark yellow; white pilose. Scutellum semicircular with pair of apical calcars with mutual distance about 1/4 of width of scutellum at base, slightly concave between calcars; apices of calcars clearly converging; reddish brown with faint metallic hues; white pilose. Propleuron bare. Anepisternum with deep sulcus separating anterior from posterior part; white pilose anteriorly and posteriorly, with widely bare part in between; yellow, except dark brown anteroventrally. Anepimeron yellow dorsally; dark brown ventrally; entirely white pilose. Katepisternum yellow dorsally, dark brown ventrally; white pilose on yellow part, otherwise bare. Katepimeron dark brown, bare and shining. Katatergum and anatergum microtrichose. Calypter white and halter yellow. **Wing.** Yellowish in cells bc, c, sc and r1, vein R1 yellow; yellowish brown around veins at apical half. Microtrichose, except bare on cell bc, on cell br (only microtrichose along vena spuria and in apical part), posterobasal 1/2 of cell bm, anterobasal 1/3 of cell cup, along A2 in anal lobe and centre of alula. **Legs.** Femora black except narrowly dark red at apex; white pilose. Tibiae yellowish red; white pilose. Tarsi dark red to orange; white pilose. Coxae black; white pilose. Trochanters black with narrow dark red apex; white pilose. **Abdomen.** Tergite 1 black; white pilose. Tergite 2 black, except lateral margins narrowly yellowish red; white pilose. Tergite 3 dull black medially, shining black laterally, but lateral margin narrowly yellowish red; short black pilose, except longer white pilose along lateral and posterior margins. Tergite 4 mostly dark reddish brown, but blackish laterally except narrow part along lateral margin and posterior margin more widely yellowish red; short dark pilose, except long white pilose along lateral and posterior margins. Sternites blackish brown, except narrowly yellowish along posterior margins; white pilose (incl. sternite 1). Male genitalia as in Fig. 23.

Female. Body size: 11 mm. As male, except for usual sexual dimorphism and following differences. Tergite 4 with medially interrupted fascia of short golden pile along posterior margin. Tergite 5 dark reddish brown; dark pilose, except white pilose along lateral margins and with large posteromedian patch of golden pile.

Etymology. This species is named after the district Ifanadiana, in which the species was found. The epithet is a noun in apposition.

***Microdon irwini* Reemer sp. n.**

(Figs 26–31)

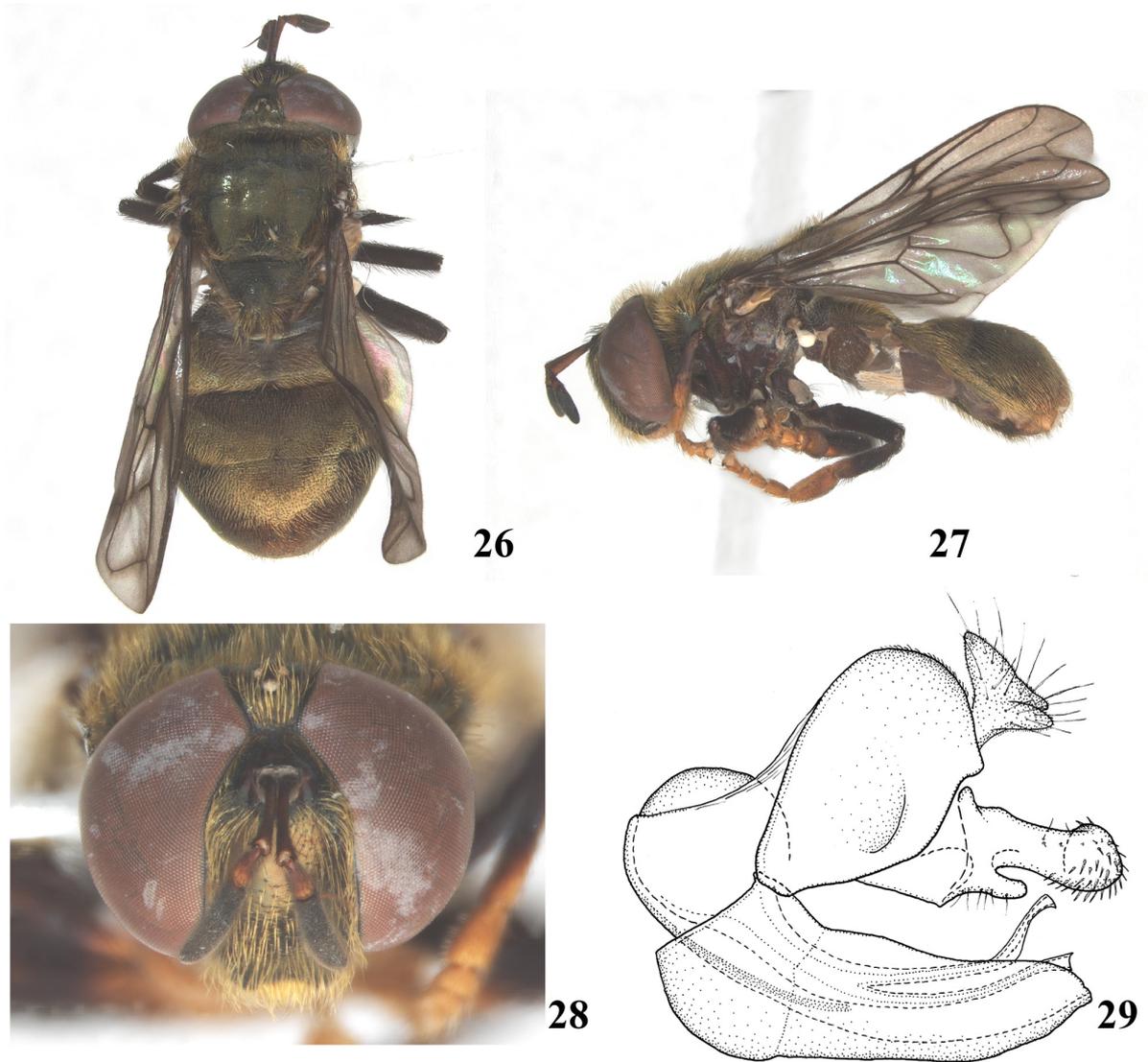
Diagnosis. One of the two known Madagascan *Microdon* species with bronze coloured abdomen. Distinguishable from *M. tsara* by its largely black tibiae and entirely microtrichose alula.

Type material. HOLOTYPE. Adult male. MADAGASCAR. Label 1: "MADAGASCAR: Fianarantsoa / Prov., Parc National Ranomafana, /radio tower at forest edge, elev. / 1127 m., 12-25.vii.2005, ex: malaise / trap, 21°15.05'S 47°24.43'E, coll: / M. Irwin & R. Harin'Hala, MG-09B-119". Coll. CAS. PARATYPES. One male of same locality as holotype, but date 26.ii-5.iii.2005 (coll. RMNH). One female of Madagascar, Fianarantsoa Prov., Belle Vue, 1.2 km S of Ranomafana National Park entrance, Malaise in rainforest, 28.i-4.ii.2002, 1095 m., 21°15.99'S 47°25.21'E, leg. R. Harin'Hala & M.E. Irwin (coll. CAS).

Description of male holotype. Body size: 7 mm. **Head.** Face and gena black with strong bronze sheen; golden yellow pilose. Oral margin not produced. Frons blackish brown; black pilose anteriorly, golden yellow pilose posteriorly. Vertex bronze black; golden yellow pilose. Occiput bronze black; golden yellow pilose, thin white pollinose. Eye bare. Antennal fossa about as wide as high. Antenna with scape and pedicel brown, basoflagellomere black. Arista brown, about 4/5 of length of basoflagellomere. **Thorax.** Mesoscutum, postpronotum and postalar callus bronze black; long erect golden yellow pilose. Scutellum trapezoid, almost triangular; bronze black; golden yellow pilose; with pair of apical calcaria approximately as long as half the length of the scutellum, with mutual distance about 1/4 of width of scutellum at base. Pleuron black. Propleuron bare. Anepisternum with slight sulcus separating anterior from posterior part; golden yellow pilose anteriorly and posterodorsally, with widely bare part in between. Anepimeron entirely golden yellow pilose. Katepisternum white pilose dorsally, bare ventrally. Katepimeron without pile, shining. Katatergum and anatergum long and short microtrichose, respectively. Calypter yellow, halter white. **Wing.** A little greyish antero-apically. Microtrichose, except bare on cell bc, basal 1/6 of c, basal 1/5 of r1, basal 3/4 of br, basal 4/5 of bm, and anterobasal 1/6 of cell cup. **Legs.** Femora blackish brown, somewhat paler posteriorly; black pilose, except white pilose posterobasally. Tibiae blackish brown, except yellow at apical 1/4 to 1/3; black pilose. Tarsi yellow; mixed yellow and black pilose. Coxae and trochanters blackish; white pilose, except fore coxa apically golden yellow pilose. **Abdomen.** Tergite 1 black; white pilose. Tergite 2 bronze black, except duller black anteromedially; golden yellow pilose. Tergite 3 bronze black, except duller black on anterior 1/3; golden yellow pilose. Tergite 4 bronze shining, black ground colour hardly visible, with ground colour posteriorly yellow; golden yellow pilose. Pregonital segments yellow; yellow pilose dorsally, black pilose ventrally. Sternites blackish brown. Sternite 1 bare. Sternite 2 yellow pilose. Sternites 3 and 4 mixed black and yellow pilose. Male genitalia as in Fig. 29.

Female. Body size: 8 mm. As male, except for usual sexual dimorphism.

Etymology. This species is named after Mike E. Irwin, one of the collectors of the specimens on which this description is based.



FIGURES 26–29. *Microdon irwini* Reemer **sp. n.** Male holotype. 26. Habitus dorsal. 27. Habitus lateral. 28. Head frontal. 29. Genitalia lateral.



FIGURES 30–31. *Microdon irwini* Reemer **sp. n.** Female paratype. 30. Abdomen dorsal. 31. Head frontal.

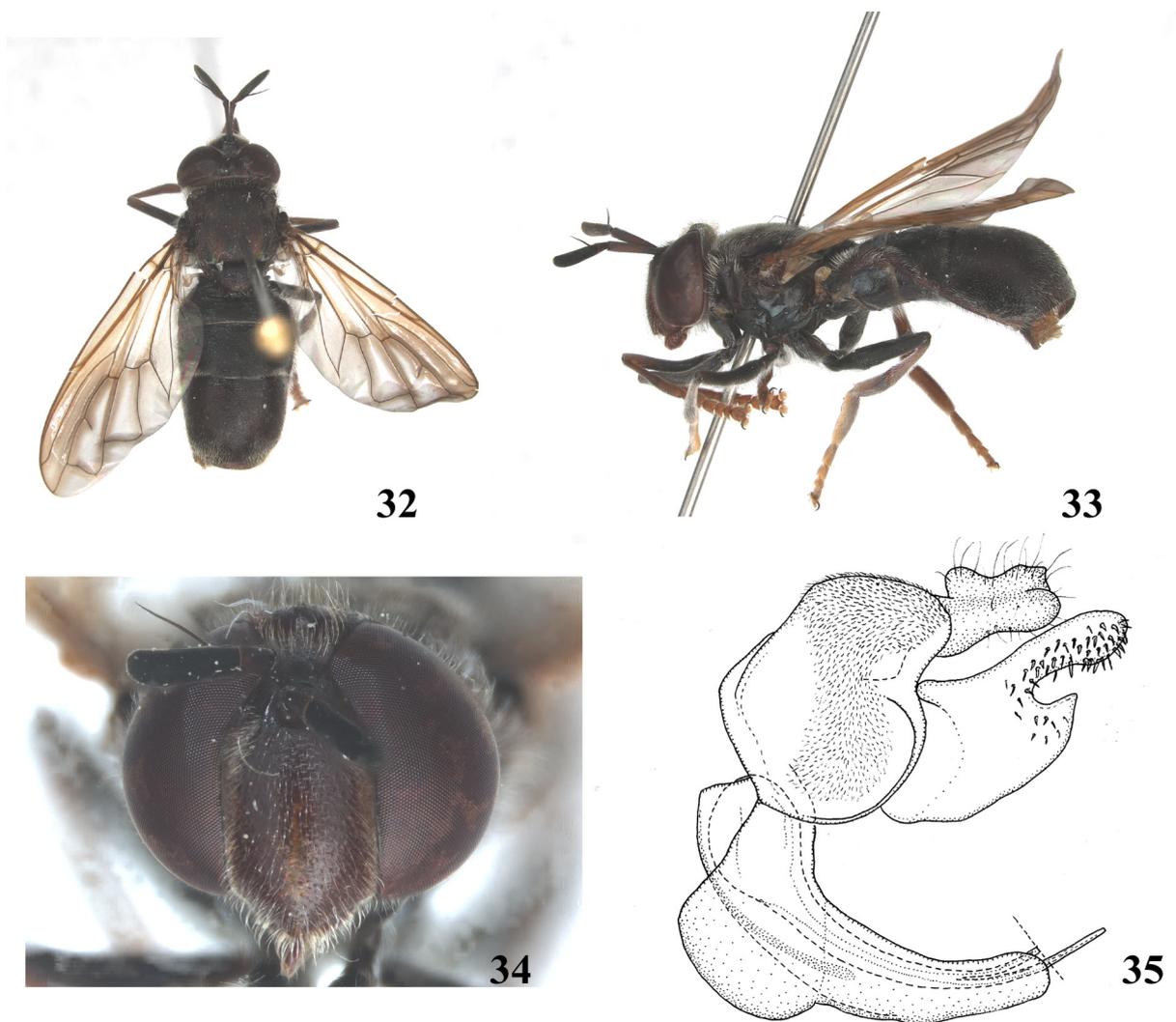
***Microdon janne* Bot sp. n.**

(Figs 31–35)

Diagnosis. A moderately elongate species with dark face, blackish pleuron and blackish abdomen.

Type material. HOLOTYPE. Adult male. MADAGASCAR. Label 1: "MADAGASCAR / Ranomafana NP / lat-21.235 lng 47.400 / 27 XI 2014 leg. S.Bot". Coll. RMNH.

Description of male holotype. Body size: 10 mm. **Head.** Face and gena dark reddish brown, almost black near the antennal fossa; entirely white pilose; with narrow band of whitish pollinosity along eye margins. Oral margin slightly produced. Frons and vertex dark reddish brown, turning black around antennal fossa, ocelli and occiput; yellowish white pilose, except anterior part of frons and ocellar triangle black pilose. Occiput black; white pilose and pollinose. Eye almost bare, very sparse and short pile only visible under high magnification. Antennal fossa about as wide as high. Antenna black. Arista black, about 4/5 of length of basoflagellomere. **Thorax.** Mesoscutum black, lateral margins dark reddish brown; with faint blue-green metallic hues three indistinct longitudinal purplish vittae; yellow-white pilose, except for central submedian pair of patches of black pile. Postpronotum and postalar callus dark reddish brown to black; yellow-white pilose. Scutellum semicircular with pair of apical calcars with mutual distance about 1/4 of width of scutellum at base, slightly concave between calcars; apices of calcars slightly diverging; blackish brown with faint metallic hues; yellow-white pilose. Pleuron



FIGURES 32–35. *Microdon janne* Bot sp. n. Male holotype. 32. Habitus dorsal. 33. Habitus lateral. 34. Head frontal. 35. Genitalia lateral.

blackish except anepisternum and katepisternum dorsally dark reddish brown; all pilosity white. Propleuron bare. Anepisternum with deep sulcus separating anterior from posterior part; pilose anteriorly and posteriorly, with widely bare part in between. Anepimeron entirely pilose. Katepisternum pilose dorsally; bare ventrally. Katepimeron bare and shining. Katatergum and anatergum microtrichose. Calypter white and halter yellow. **Wing.** Yellowish in cells bc, c, sc and r1, vein R1 yellow; infuscated greyish brown around veins at apical half. Microtrichose, except bare on cell bc, on cell br (only microtrichose along vena spuria and in apical part), posterobasal 1/2 of cell bm, anterobasal 1/3 of cell cup, along A2 in anal lobe and centre of alula. **Legs.** Femora black except narrowly dark red at apex; white pilose. Tibiae dark red with faint black ring 1/3 from apex, most conspicuous on hind leg; white pilose. Tarsi dark red to orange; white pilose. Coxae black; white pilose. Trochanters black with narrow dark red apex; white pilose. **Abdomen.** Tergite 1 black; white pilose. Tergite 2 black, except lateral margins narrowly reddish brown; white pilose. Tergite 3 black; short black pilose, except longer white pilose along lateral and posterior margins. Tergite 4 black; short black pilose on anterior half, with longer appressed golden pile on posterior half, lateral margins long white pilose. Sternites black, except narrowly yellowish along posterior margins; white pilose (incl. sternite 1). Male genitalia as in Fig. 35.

Female. Unknown.

Etymology. The species is named after Sander Bot's girlfriend, Janne Ouwehand, since for long Sander promised her to name after her the first new species for science he would describe. The epithet is a noun in apposition.

***Microdon sava* Reemer sp. n.**

(Figs 36–43)

Diagnosis. An elongate species with yellow face, partly yellowish pleuron, and blackish abdomen without fasciae of golden pile. Larger (13–14mm) and more slenderly built than the similarly coloured, smaller (13–14 mm) and more compact *M. ifanadiana*.

Type material. HOLOTYPE. Adult male. MADAGASCAR. Label 1: "MADAGASCAR: Sava Region, / Vohemar District, Andranotsimaty, / Dry forest, 9 km NE of Daraina, / 15°10'.17 S, 49°42'.04 E, alt. 90 m, / ex: sharkey, 28.iii-4.iv.2011, coll: / M. Irwin, R. Harin'Hala, MG-57-25". Coll. CAS. PARATYPES. Male and female from same locality, but dates respectively 21-28.iii.2011 and 3-10.vii.2012. Male in coll. RMNH, female in coll. CAS.

Description of male holotype. Body size: 13 mm. **Head.** Face and gena yellowish brown; white pilose. Oral margin slightly produced. Frons and vertex yellowish brown, except for black median spot on frons; black pilose. Occiput yellow; black pilose, white pollinose. Eye almost bare, very sparse and short pile only visible under high magnification. Antennal fossa about as wide as high. Antenna with scape and pedicel black, basoflagellomere partly very dark reddish, partly blackish. Arista brown, about 5/6 of length of basoflagellomere. **Thorax.** Mesoscutum black with dark reddish brown margins and a pair of submedian dark reddish brown vittae on posterior half; short black pilose, except longer white pilose along anterior margin. Postpronotum and postalar callus dark reddish brown; black pilose. Scutellum dark reddish brown, black pilose; semicircular with pair of short apical calcars with mutual distance about 1/3 of width of scutellum at base, slightly concave between calcars; calcars slightly converging. Pleuron yellowish to dark brown; all pile white. Propleuron bare. Anepisternum with deep sulcus separating anterior from posterior part; pilose anteriorly and posteriorly, with widely bare part in between. Anepimeron entirely pilose. Katepisternum pilose dorsally, bare ventrally. Katepimeron without pile, but with short pale microtrichia. Katatergum and anatergum long and short microtrichose, respectively. Calypter pale grey and halter yellow. **Wing.** Yellowish in anterior half. Microtrichose, except bare on posterobasal 1/4 of cell br, posterobasal 1/3 of cell bm, anterobasal 1/6 of cell cup, along A2 in anal lobe and on centre of alula. **Legs.** Femora black at basal 1/2 to 3/4, dark reddish brown apically; white pilose, except fore and mid femur black pilose on basal 1/2 and 1/4, respectively. Tibiae dark reddish brown; white pilose. Tarsi dark reddish brown; black pilose. Coxae and trochanters blackish; white pilose, except fore coxa and trochanter black pilose. **Abdomen.** Tergite 1 black; white pilose. Tergite 2 black, except reddish brown along lateral margins; short white pilose. Tergite 3 black anteromedially, with reddish brown lateral margins widening towards posterior margin to almost its entire width; short black pilose, except narrowly white pilose along lateral margin. Tergite 4 blackish brown, paler along lateral

and posterior margins; short black pilose, except narrowly white pilose along lateral and posterior margins. Sternites blackish brown; white pilose (incl. sternite 1). Male genitalia as in Fig. 40.

Female. Body size: 14 mm. As male, except for usual sexual dimorphism.

Etymology. This species is named after the Sava region, in which the species was found. The epithet is a noun in apposition.



36



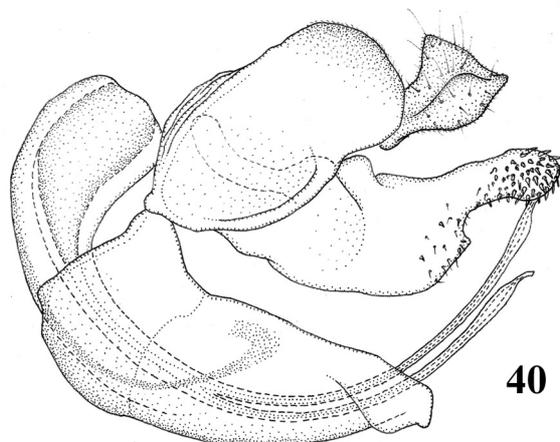
37



38



39



40

FIGURES 36–40. *Microdon sava* Reemer **sp. n.** Male holotype. 36. Habitus dorsal. 37. Habitus lateral. 38. Head frontal. 39. Tergites 3–4. 40. Genitalia lateral.



FIGURES 41–43. *Microdon sava* Reemer **sp. n.** Female paratype. 41. Habitus dorsal. 42. Habitus lateral. 43. Head frontal.

***Microdon tsara* Keiser**

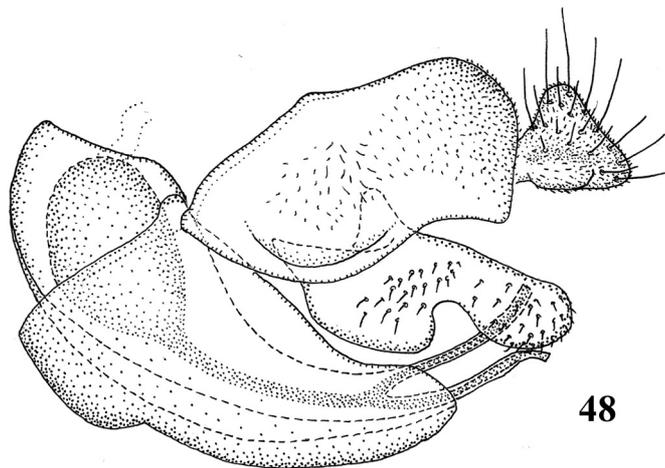
(Figs 44–48)

Microdon tsara Keiser, 1971: 247.

Diagnosis. One of the two known Madagascan *Microdon* species with bronze coloured abdomen. Distinguishable from *M. irwini* by its entirely orange tibiae and partly bare alula.

Type material studied. HOLOTYPE. Female. Label 1 (red): "TYPUS"; label 2: "Madagascar Sambirano, Lokobe, Nossi-Bé, 6 m, 9-23.XI.57. B. Stuckenberg"; label 3: "Microdon tsara Keiser"; label 4: "Muséum Paris, Microdon tsara Keiser 1971". Coll. MNHN.

Redescription of female holotype. Body size: 6 mm. **Head.** Face occupying about 1/4 of head width in frontal view; dark brown; entirely white pilose. Gena black; white pilose. Lateral oral margins produced. Frons and vertex



FIGURES 44–48. *Microdon tsara* Keiser. Male holotype. 44. Habitus dorsal. 45. Habitus lateral. 46. Head frontal. 47. Head lateral. 48. Genitalia lateral.

black; yellow to brown pilose. Occiput narrow over entire length; black; yellow pilose; whitish pollinose. Eye bare. Antennal fossa about as wide as high. Antenna brown, basoflagellomere darker than scape and pedicel; basoflagellomere elongate, parallel-sided with rounded apex, with sensory pit slightly apical of 1/2. Arista brown, almost as long as basoflagellomere. **Thorax.** Mesoscutum, postpronotum, postalar callus and scutellum bronze-coloured; yellow pilose. Scutellum with two apical calcars of about 1/3 the length of the scutellum. Anterior and posterior part of anepisternum not differentiated by sulcus; yellow pilose anteriorly and posteriorly, with bare area in between. Anepimeron entirely yellow pilose. Katepisternum yellow pilose dorsally, bare ventrally. Katatergum and anatergum long and short microtrichose, respectively. Other parts of pleuron bare. Calypter and halter yellow. **Wing.** Hyaline; microtrichose, except bare on first costal cell, basally on cell r1 along vein RS, on most of cell r, on posterobasal 2/3 of cell bm, basal 1/3 of cell cup, basomedian 1/2 of alula. **Legs.** Yellow, except femora brownish; yellow to brown pilose. Coxae and trochanters brown; pale pilose. **Abdomen.** Sternites brownish with bronze hues. Sternite 1 bare, other sternites yellow pilose. Genitalia as in Fig. 48.

Male. Unknown.

Microdon (Megodon) planitarsus Keiser

(Figs 49–55)

Microdon planitarsus Keiser, 1971: 245.

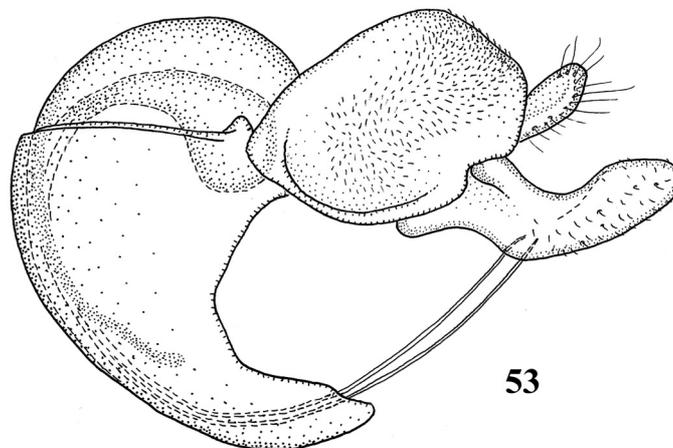
Diagnosis. One of the two known species of the subgenus *Megodon*, which differs from other species of *Microdon* in the occiput, which is narrow and evenly wide over its entire length, and also by the wide and deep longitudinal groove in the male hind basitarsomere. *Microdon planitarsus* differs from *M. stuckenbergi* by its smaller size (6–9 mm) and the much smaller scutellar calcars (Fig. 49).

Type material studied. HOLOTYPE. – Male. Label 1 (red): "Typus"; label 2: "Madagascar Centre, Anjavidilava 2020 m, Andriagitra Ambalavao, 17-21.I.58. B. Stuckenberg"; label 3: "Microdon planitarsus Keiser"; label 4: "Muséum Paris, *Microdon planitarsus* Keiser 1971". Coll. MNHN.

Additional material studied. Madagascar. Fianarantsoa Prov, Belle Vue, 1.2 km S Ranomafana National Park entrance, Malaise in rain forest, leg. R. Harin'Hala & M.E. Irwin: 28.I.–4.II.2002, 1 male & 1 female (coll. CAS); 16.–28.V.2003, 1 male & 1 female (coll. RMNH); 23.IV.–4.V.2003, 1 male (coll. CAS). Fianarantsoa Prov., 17 km W Ranomafana, Vohiparara, Ranomafana National Park, Malaise in rain forest, leg. R. Harin'Hala & M.E. Irwin: 24.XII.2001–2.I.2002 (coll. CAS), 1 female; 10.–14.I.2002 (coll. CAS), 1 female; 14.–21.I.2002, 1 male (coll. CAS), 1 female (coll. CSCA); 22.–29.IV.2002, 1 female (coll. CSCA). Fianarantsoa Prov., ANGAP Hqt., Ranomafana (town), Malaise nr stream, 6.–15.XII.2001, leg R. Harin'Hala & M.E. Irwin: 1 male (coll. RMNH). Fianarantsoa Prov., Ranomafana National Park, radio tower at forest edge, 2.–10.XII.2005 and 7.–16.XII.2005, leg. M. Irwin & R. Harin'Hala: 1 male, 2 females (coll. CSCA). Fitovavy, Fitovinany Region, Ifanadiana District, 12 km W of Ranomafana, 14.–21.XII.2007, leg. M. Irwin & R. Harin'Hala: 1 female (coll. CSCA).

Redescription of male holotype (except where stated otherwise). Body size: 9 mm (additionally studied males: 6–9 mm). **Head.** Face shining brownish black; entirely black pilose (yellow pilose in additionally studied specimens). Genae black, black pilose. Oral margin laterally not produced. Frons black; black and yellow pilose. Vertex black; yellow pilose. Occiput narrow over entire length; black; yellow pilose; greyish pollinose. Eye bare. Antennal fossa slightly higher than wide. Antenna yellowish brown; antennal ratio approximately as 3:1:3. Arista brown, about as long as basoflagellomere. **Thorax.** Mesoscutum black with brownish margins; yellow pilose. Postpronotum, postalar callus and scutellum brown; yellow pilose. Scutellum with two apical calcars of about 1/4 of length of scutellum. Pleurae blackish brown. Anepisternum with shallow sulcus separating anterior from posterior part; anterior part yellow pilose, posterior part black pilose, with widely bare part in between. Anepimeron entirely yellow pilose. Katepisternum yellowish pilose dorsally; bare ventrally. Katatergum long, black microtrichose, anatergum short microtrichose. Calypter and halter yellow. **Wing.** Hyaline, slightly brownish; entirely microtrichose, except bare on narrow basomedian part of alula. **Legs.** Yellowish brown. Femora black pilose. Tibiae black pilose anteriorly, yellow pilose posteriorly. Tarsae yellow pilose, except first tarsomere of hind leg dorsally black pilose. Coxae and trochanters brown; black pilose on front and middle leg, white pilose on hind leg. **Abdomen.** Tergites 2–3 yellowish with brown lateral margins and a narrow dark median line. Tergite 4 brown with faint yellowish maculae at

anterior margin and vaguely yellow along posterior margin. Tergite 2 yellow pilose with some black pile laterally. Tergite 3 black pilose. Tergite 4 black pilose with yellow pile posteriorly. Sternite 1 brown; bare. Other sternites yellow; yellow pilose. Genitalia as in Fig. 53.



FIGURES 49–53. *Microdon (Megodon) planitarsus* Keiser. Male holotype. 49. Habitus dorsal. 50. Habitus lateral. 51. Head frontal. 52. Head lateral. 53. Genitalia lateral.



FIGURE 54. *Microdon (Megodon) planitarsus* Keiser. Male (1.2 km S Ranomafana Park entrance, 16.–28.V.2000 (RMNH)). Abdomen dorsal.

FIGURE 55. *Microdon (Megodon) planitarsus* Keiser. Female (12 km W of Ranomafana, 14.–21.XII.2007 (RMNH)). Abdomen dorsal.

Female. Body size 7–9 mm. As male, except for usual sexual dimorphism and colouration of tergites: dark brown except for pale brown lateral margins, especially on tergite 2 (Fig. 55).

Variation. The additionally studied specimens differ from the holotype in the pale pilosity of the face and overall paler colouration (Fig. 54). Otherwise, they are very similar in morphology, also in the male genitalia. They were collected roughly 70 km from the type locality.

***Microdon (Megodon) stuckenbergi* (Keiser)**
(Figs 56–61)

Megodon stuckenbergi Keiser, 1971: 253

Diagnosis. One of the two known species of the subgenus *Megodon*, which differs from other species of *Microdon* in the occiput, which is narrow and evenly wide over its entire length, and also by the wide and deep longitudinal groove in the male hind basitarsomere. *Microdon stuckenbergi* differs from *M. planitarsus* by its larger size (12 mm) and the much larger scutellar calcars (Fig. 60).

Type material studied. HOLOTYPE. Male. Label 1 (red): "Typus"; label 2: "Megodon stuckenbergi Keiser"; label 3: "Madagascar Nord, Montagne d'Ambre 1700 m, det. Diégo-Suarez, 11-15.XII.58. B. Stuckenberg"; label 4: "Muséum Paris, *Megodon stuckenbergi* Keiser 1971". Coll. MNHN.

Redescription of male holotype. Body size: 12 mm. **Head.** Face dark brown laterally, pale brown medially, yellowish dorsally; yellow pilose, except bare medially and dorsally. Gena dark brown, yellow pilose. Oral margin laterally slightly produced. Frons and vertex brown; yellow pilose. Occiput narrow over entire length; blackish; white pilose; white pollinose. Eye bare. Antennal fossa slightly higher than wide. Antenna yellowish brown, basoflagellomere darker near apex; antennal ratio approximately as 3.5:1:2.5. Arista brown, slightly longer than basoflagellomere. **Thorax.** Mesoscutum dark brown, yellowish white pilose. Postpronotum pale brown; pale pilose. Postalar callus pale brown; pale pilose dorsally, black pilose ventrally. Scutellum pale brown; making angle of about 30° with mesoscutum in lateral view; posteriorly with a pair of large, conical calcars, of about 2/3 of length of scutellum; yellow pilose dorsally, black pilose ventrally. Pleurae brown. Anepisternum with shallow sulcus separating anterior from posterior part; anterior part yellow pilose, posterior part black pilose, with widely bare part in between. Anepimeron entirely black pilose. Katepisternum whitish pilose dorsally; bare ventrally. Katatergum long black microtrichose, anatergum short microtrichose. Calypter greyish white. Halter yellow. **Wing.** blackish infuscated; entirely microtrichose, except bare on basomedian part of alula (only margins microtrichose). **Legs.** Brown, with femora a shade darker than tibiae and tarsi; femora and tibiae black pilose anteriorly and dorsally, pale pilose posteriorly; tarsi black pilose dorsally and ventrally, except hind tarsus yellow pilose ventrally. Coxae and trochanters brown; pale pilose. **Abdomen.** Tergites brown, with faintly demarkated pairs of large yellowish brown maculae on tergites 2 and 3, leaving a narrow dark median line, narrow dark posterior margins

and wide dark lateral margins. Tergite 4 largely brown, with faint yellowish brown maculae at anterior margin. Pilosity of tergites mixed white and black. Sternite 1 dark brown; bare. Other sternites yellow; white pilose, except sternite 4 black pilose. Genitalia as in Fig. 61.

Female. Unknown.



FIGURES 56–61. *Microdon (Megodon) stuckenbergi* (Keiser). Male holotype. 56. Habitus dorsal. 57. Habitus lateral. 58. Head frontal. 59. Head lateral. 60. Thorax dorsal. 61. Genitalia lateral.

Final remark

The six new species described here are not placed in a subgenus, because they do not fit the diagnoses of the subgenera as given by Reemer & Ståhls (2013a). Together with several other species from Africa, as well as other regions, they are placed in *Microdon* s.l., until more extensive phylogenetic evidence allows for a new evaluation of the classification of this genus.

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