

## **Description of Four New Species of *Zygomyia* Winnertz from Ethiopia and Uganda (Diptera: Mycetophilidae)**

Author: Kurina, Olavi

Source: African Invertebrates, 53(1) : 205-220

Published By: KwaZulu-Natal Museum

URL: <https://doi.org/10.5733/afin.053.0113>

---

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at [www.bioone.org/terms-of-use](http://www.bioone.org/terms-of-use).

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

---

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

## Description of four new species of *Zygomyia* Winnertz from Ethiopia and Uganda (Diptera: Mycetophilidae)

Olavi Kurina

Institute of Agricultural and Environmental Sciences, Estonian University of Life Sciences, Riia Str. 181, Tartu, 51014 Estonia; olavi.kurina@emu.ee

### ABSTRACT

Four new Mycetophilidae, representing the first records of the genus *Zygomyia* Winnertz, 1863 from the Afrotropical Region, are described, photographed and their terminalia illustrated. *Zygomyia siminensis* sp. n. and *Z. yllae* sp. n. are described from the Simien Mountains, Ethiopia and *Z. mollemanii* sp. n. and *Z. toro* sp. n., from Kibale National Park, Uganda. Data on Mycetophilidae in Ethiopia are presented for the first time.

KEY WORDS: Diptera, Mycetophilidae, *Zygomyia*, Afrotropical, Ethiopia, Uganda, new species.

### INTRODUCTION

The Mycetophilidae, or fungus gnats, are small- to medium-sized, humpbacked nematocerous flies, which are typical inhabitants of forest ecosystems around the world, often form one of the major Diptera components in samples from Afrotropical forests. Currently placed in the superfamily Sciaroidea (Chandler 2010), the family is poorly studied in the Afrotropical Region. Kirk-Spriggs and Stuckenberg (2009), for example, noted the family as one of the least known in the Afrotropical Diptera, with only about 11 % of the estimated number of species described to date. Studies of fungus gnats in the Afrotropics were dominated by the late Loïc Matile (1938–2000). Of the 253 species described from the Region, 148 (59 %) were described by Matile (1977, 1979a, b, 1980 and subsequent papers). In the past decade very few publications devoted exclusively to the study of this group in the Afrotropical Region have appeared, notably Gammelmo (2004), Jaschhof (2006) and Jaschhof and Mostovski (2006), but further studies can be expected in the near future, as an offshoot of the *Manual of Afrotropical Diptera* project, launched in 2010 (Kirk-Spriggs & Mostovski 2010).

*Zygomyia* Winnertz, 1863, belongs to the tribe Mycetophilini (Bechev 2000). Within the tribal limits, the simple cubital fork is present in four genera: *Aspidionia* Colless, 1966, *Platyprosthogyne* Enderlein, 1910, *Sceptonia* Winnertz, 1863, and *Zygomyia*, which were keyed by Matile (1975). *Zygomyia* differs from the other three genera in having ventral bristles on the mid tibia (absent in others), and veins  $M_1$  and  $CuA_1$  divergent rather than convergent. The genus *Zygomyia* is cosmopolitan with more than 80 described species (Bechev 2000; Pape & Thompson 2010), the biology of which is poorly understood. The larvae are believed to be saprophagous (Edwards 1925) and three Palearctic species are associated with the mycelium of wood-growing fungi (Jakovlev 2011). The richest *Zygomyia* fauna, with 39 known species, is found in New Zealand (Tonnoir & Edwards 1927; Zaitzev 2002; Pape & Thompson 2010). There are no *Zygomyia* species described from the Afrotropics, although unidentified specimens are known from Cameroon, the Central African Republic and the Comoro archipelago (Matile 1979b, 1980). Matile (1979b) noted two female specimens each with distinct colouration from the Comoros, but these were left undescribed because of the absence of male material.

This study was prompted by the discovery of four new *Zygomyia* species recently sampled in Ethiopia and Uganda. The mycetophilid fauna of these two countries is rather superficially known, even by Afrotropical standards, and there are no published records for Ethiopia, and only eight are known from Uganda (Matile 1977, 1980; Söli 1997a; Hippa 2008).

This paper is dedicated to the late Brian Roy Stuckenberg in recognition of his contribution to the study of Afrotropical Diptera including Sciarioidea (*e.g.* Stuckenberg 1961).

#### MATERIAL AND METHODS

Material on which this study was based was collected by the writer during a brief visit to the Simien Mountains in Ethiopia and as a result of Malaise trapping conducted at Kibale National Park, Uganda. The locality in the Simien Mountains is close to Chenek Campground at an altitude 3617 m. The material including six male specimens of two new *Zygomyia* species was sweep-netted in October of 2010 along a stream bank (Fig. 1). In Uganda, the material was collected in the Kibale National Park, close to Kanyawara Biological Station in the evergreen primeval forest (Fig. 2) at an altitude of 1513 m. Collecting with five Townes-type Malaise traps from March to October 2010 yielded only five male specimens of *Zygomyia* belonging to two undescribed species.

All material was initially collected and preserved in 70% ethanol. After study, the specimens were mounted from alcohol, using the chemical method described by Vockeroth (1966), and double-pinned. For detailed study and illustration of terminalia, they were detached and macerated in a heated solution of KOH, neutralised in acetic acid and washed in distilled water before being placed in glycerine (see also Kurina 2008).



Fig. 1. Simien Mountains in Ethiopia, one of collecting localities of *Zygomyia* species.



After examination, the terminalia were stored in glycerine in a polyethylene micro vial attached to the same pin as the mounted specimen.

Illustrations of the terminalia were prepared using a U-DA drawing tube attached to an Olympus CX31 compound microscope. Illustrations of aedeagal complexes were combined using Helicon Focus 4.7 software, from several partly focused images taken with a Leica DFC295 camera attached to the same microscope. Habitus photos were taken of specimens in alcohol, using a Canon 7D camera with Canon MP-E65 (F2.8 1–5×) lens. Male terminalia are figured in three different positions: lateral, dorsal and ventral. The detailed structure of the gonostylus was observed after detaching it from



Fig. 2. Malaise trapping at Kibale National Park in Uganda.

the gonocoxite and then figured separately viewed laterally from the median line. The morphological terminology follows Söli (1997b). All measurements are provided as the range followed by the mean. The measurements derived from each holotype are given in square brackets. The ratios of the three apical palpal segments are given as 3<sup>rd</sup>:4<sup>th</sup>:5<sup>th</sup>. The following abbreviations are used for tibial setation: d – dorsal bristles, a – anterior bristles, v – ventral bristles, p – posterior bristles.



Figs 3–6. New Afrotropical *Zygomyia* species, males, habitus: (3) *Z. mollemanii* sp. n.; (4) *Z. simiensis* sp. n. (terminalia removed); (5) *Z. toro* sp. n.; (6) *Z. yllae* sp. n. Scale bar = 1 mm.

Abbreviations used on the figures: *aed* – aedeagus, *cerc* – cercus, *gc* – gonocoxite, *gst dl* – dorsal lobe of gonostylus, *gst vl* – ventral lobe of gonostylus, *par* – parameres, *par ap* – parameral apodemes, *tg IX* – tergite IX.

All material is deposited at the Institute of Agricultural and Environmental Sciences, Estonian Agricultural University, Tartu, Estonia (formerly Institute of Zoology and Botany).

#### TAXONOMY

Genus *Zygomyia* Winnertz, 1863

***Zygomyia molleman* sp. n.**

Figs 3, 7–10, 25

**Etymology:** This species is named in honour of Dr Freerk Molleman (Tartu, Estonia), who organised a collecting trip to Uganda in February 2010 and curated subsequent Malaise trap samples from Kibale National Park.

**Differential diagnosis:** Distinguishable from other known Afrotropical *Zygomyia* species by the following characteristics: mesonotum and scape yellow; wing lacking dark markings; anepimeron with 1 prominent and 1 normal seta (other African species have 3 or 4 setae of equal size); male gonocoxite with ventroapical margin convex medially and laterally protruding (with a medial indentation and without lateral protrusions in other species). Gonostylus distinctly separated into 2 lobes; ventral lobe with glabrous apical outgrowth (Fig. 10), but lacking strong setae.

#### Description:

##### *Male.*

**Head:** Light brown with numerous dark setae. Two ocelli close to eye margins. Clypeus dark yellow, lighter than head. Mouthparts yellow. Palpus with first segment yellow, segments II–IV light brown, segment V yellow and apically brownish. Ratios of three apical segments 1.0:1.3:2.1. Scape and pedicel yellow, flagellar segments light brown. Flagellomeres cylindrical, median flagellomere as long as broad, apical flagellomere conical, 1.8× as long as broad basally. Scape with setae including 2 dorsoapical bristles extending to middle of pedicel. Pedicel with apical crown of setae and a dorsoapical bristle extending to apex of first flagellomere. Flagellomeres with short whitish setae.

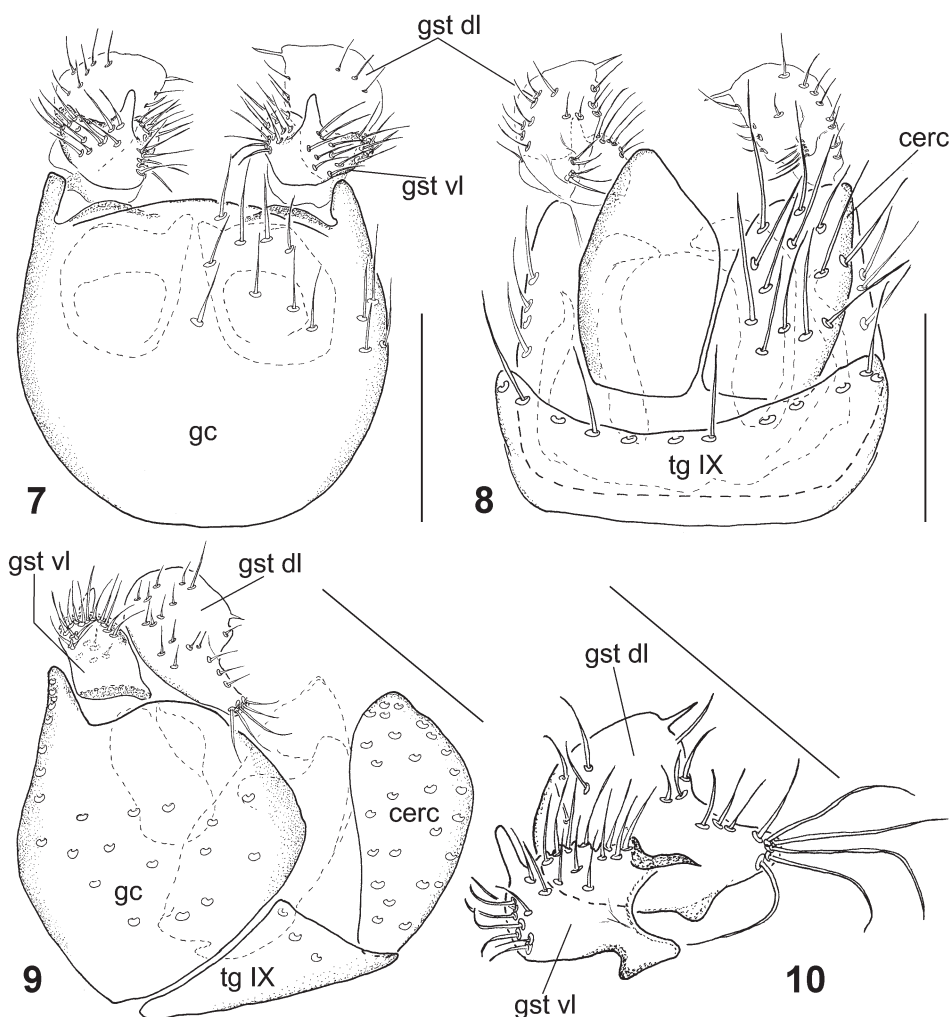
**Thorax:** Mesonotum dark yellow. Pleural parts yellow, except anepisternum darker at dorsal margin and laterotergite darker at ventral margin. All bristles and setae on thorax brown. Scutellum with 4 strong and several weaker marginal bristles. Antepronotum with setae including 1 bristle. Proepisternum with setae including 3 strong bristles. Anepisternum with several setae including 4 bristles on dorsal part. Anepimeron with setae, including 2 bristles, one of them remarkably long. Laterotergite with dorsally-directed setae. Metepisternum yellow with brown hind margin and dark setae on posterior part. Haltere pale yellow.

**Legs:** Coxae yellow, except apical brown markings on mid and hind coxae. Femora yellow, except hind femur brown on apical fourth and dorsal margins of mid and hind femora narrowly brown. Tibiae yellow. Tarsi appear brownish due to dense setae. All bristles and setae brown. Fore coxa anteriorly, mid coxa anteroapically and all femora clothed in setae. Mid femur with 2 apicoventral bristles progressively shorter towards apex, hind femur with 4 apicoventral bristles. Mid tibia with 4a, 5d (progressively

longer towards apex), 3p and 3v (one of them distinctly shorter). Hind tibia with 8a and 5d (progressively longer towards apex). Proportions of femur to tibia for fore, mid and hind legs: 1.23, 1.09, 0.88. Proportions of tibia to basitarsus for fore, mid and hind legs: 1.25, 1.39, 1.62.

**Wing:** Wing length 1.90 mm. Membrane with brownish tinge, but without distinct markings. Veins brown.  $R_1$ ,  $R_3$  and  $rm$  with strong setae on both sides.  $M_1$  and  $M_2$  very faint apically, with setae on dorsal surface.  $bM-Cu$  and  $CuA_1$  glabrous. Crossvein  $rm$  as long as  $m$ -stem.

**Abdomen:** Light brown with segments II–IV somewhat lighter laterally. Terminalia (Figs 7–10, 25) yellow. Ventroapical margin of gonocoxite slightly convex medially and protruding laterally. Gonostylus distinctly divided into ventral and dorsal lobes.



Figs 7–10. *Zygomyia mollemanii* sp. n., male terminalia: (7) ventral view; (8) dorsal view; (9) lateral view; (10) internal view of gonostylus. Scale bars = 0.1 mm.



Ventral lobe of gonostylus with protruding glabrous outgrowth apically. Dorsal lobe of gonostylus with apical spine-like process on medial margin. Basal part of dorsal lobe of gonostylus elongated medially and bearing cluster of strong bristles. Aedeagus distally heart-shaped; parameres broad, slightly tapering with apical part smoothly curved mesad.

*Female.* Unknown.

Holotype: ♂ UGANDA: Kibale NP, Kanyawara Biol. St., 00°33'54.2"N 30°21'31.3"E, 1513 m, 8–15.viii.2010, O. Kurina & co, Malaise trap (No 4).

*Biology.* Unknown.

### ***Zygomysia simiensis* sp. n.**

Figs 4, 11–14, 26

*Etymology:* From the type location, the Simien Mountains.

*Differential diagnosis:* Distinguished from all known Afrotropical *Zygomysia* species by the unique gonostylus (Fig. 14). Most similar to *Z. yllae* sp. n., but can be distinguished by the following characteristics: scape and coxae entirely yellow (entirely and basally brownish in *Z. yllae* sp. n., respectively); wing membrane lacking dark markings; ventroapical indentation of gonocoxite slopes gradually (Fig. 11).

*Description:*

*Male.*

*Head:* Dark brown with numerous dark setae. Two ocelli close to eye margins. Clypeus brown, lighter than head. Mouthparts yellow. Palpus with all segments yellow, apical segment slightly paler, ratios of three apical segments 1.0:1.25:2.63. Scape and pedicel yellow, first flagellar segment yellow on basal half, other flagellomeres brown. Flagellomeres cylindrical, median flagellomere 1.9× as long as broad, apical flagellomere conical, 3.0× as long as broad basally. Scape with setae, including 2 dorsoapical bristles, extending to middle of pedicel. Pedicel with apical crown of setae and dorsoapical bristle extending to apex of first flagellomere. Flagellomeres with short whitish setae.

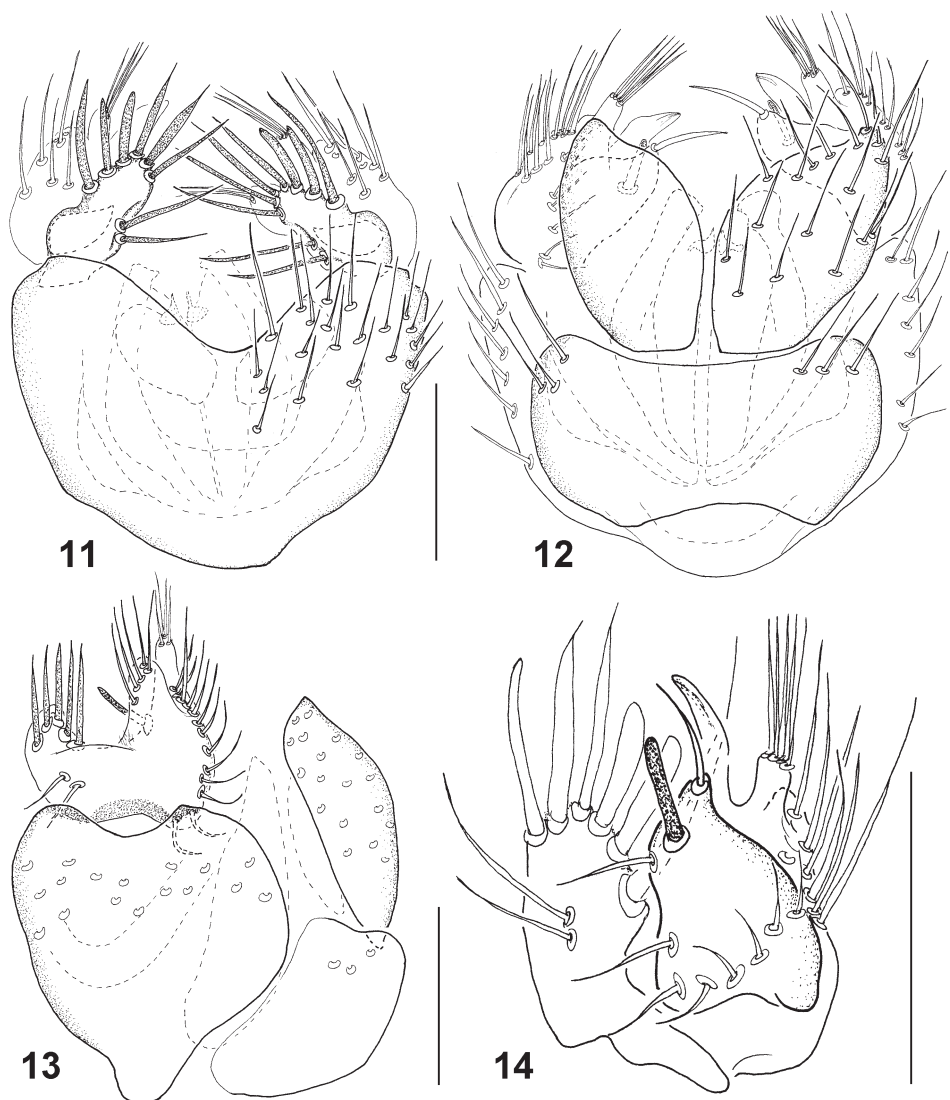
*Thorax:* Mesonotum brown. Pleural parts light brown, except anepisternum darker on dorsal part, laterotergite darker on hind margin and anepimeron lighter on lower part. All bristles and setae on thorax brown. Scutellum with 4 strong marginal bristles. Anteprepectum with setae, including 6 bristles of different lengths. Proepisternum with setae including 3 strong bristles. Anepisternum with several posteriorly-directed short setae and 6 bristles of different lengths on dorsal part. Anepimeron with 3 bristles on dorsal part. Laterotergite with dorsally-directed weak setae. Metepisternum with setae on posterior part. Haltere pale yellow.

*Legs:* All coxae entirely yellow. Hind femur brown in apical fifth, dorsal margins of all femora narrowly brown. Tibiae and tarsi appear darker, due to dense brown setation. Whole anterior side of fore coxa, apical fourth of anterior side of mid coxa and all femora clothed in dark setae. Hind coxa with sparse setae on posterior side. Mid femur with 2 apicoventral bristles, hind femur with 3 apicoventral bristles progressively shorter towards apex. Mid tibia with 3a, 4d (progressively longer towards apex), 3p and 1v. Hind tibia with 6a and 4d. Proportions of femur to tibia for fore, mid and hind legs: 1.04, 0.96, 0.85. Proportions of tibia to basitarsus for fore, mid and hind legs: 1.02, 1.25, 1.33.



*Wing*: Wing length 3.20 mm. Membrane with brownish tinge but without distinct markings. Veins light brown.  $R_1$  and  $R_5$  with strong setae on both sides. Crossvein  $rm$  and  $bM-Cu$  glabrous.  $M_1$  with 19,  $M_2$  with 12 and  $CuA_1$  with 7 apical setae on dorsal surface. Crossvein  $rm$   $0.7\times$  as long as  $m$ -stem.

*Abdomen*: Dark brown with first two segments somewhat lighter. Terminalia (Figs 11–14, 26) yellow. Ventrroapical margin of gonocoxite with medial wide indentation, about one fourth of gonocoxite height. Ventral part of gonostylus with well sclerotised spine-like bristles along apical margin and 2 sub-basal bristles medially-directed. Me-



Figs 11–14. *Zygomyia simiensis* sp. n., male terminalia: (11) ventral view; (12) dorsal view; (13) lateral view; (14) internal view of gonostylus. Scale bars = 0.1 mm.

dial part of gonostylus somewhat tapering with an apical bristle and subapical blunt spine, both exposed in internal or posterior view. Dorsal parts of gonostylus apically bifurcate: medial branch glabrous, tapering and somewhat medially-directed; lateral branch bearing a group of apical bristles. Aedeagus with apical broadening, bearing two pointed apicomedial outgrowths; parameres narrow with angular apices.

*Female*. Unknown.

Holotype: ♂ ETHIOPIA: Simien Mts, Camping Chenek, 13°15'38.2"N 38°11'36.7"E, 3617 m, 26.x.2010, O. Kurina & Ü. Jäe, sweep netting.

*Biology*: Unknown.

### ***Zygomyia toro* sp. n.**

Figs 5, 15–18, 23, 27

*Etymology*: The specific name is a noun in apposition, derived from the Toro Kingdom, one of the traditional Kingdoms of Uganda, in which the type material was collected.

*Differential diagnosis*: Distinguished from all other known Afrotropical *Zygomyia* species by the unique male terminalia (Figs 15–18). Most similar to *Z. yllae* sp. n., sharing a similar outline of the male terminalia: gonocoxite with a narrow and sharp medial indentation ventroapically; ventral part of gonostylus bearing an internal macroseta and a twisted internal process; and dorsal part of gonostylus apically protruding. It differs in its smaller size, lighter colouration and details of the male terminalia: gonostylus with geniculate, irregularly tapering blunt macroseta ventrobasally (geniculate and evenly tapering in *Z. yllae* sp. n.) and in the tapering dorsoapical protruding process (apically widening in *Z. yllae* sp. n.).

*Description*:

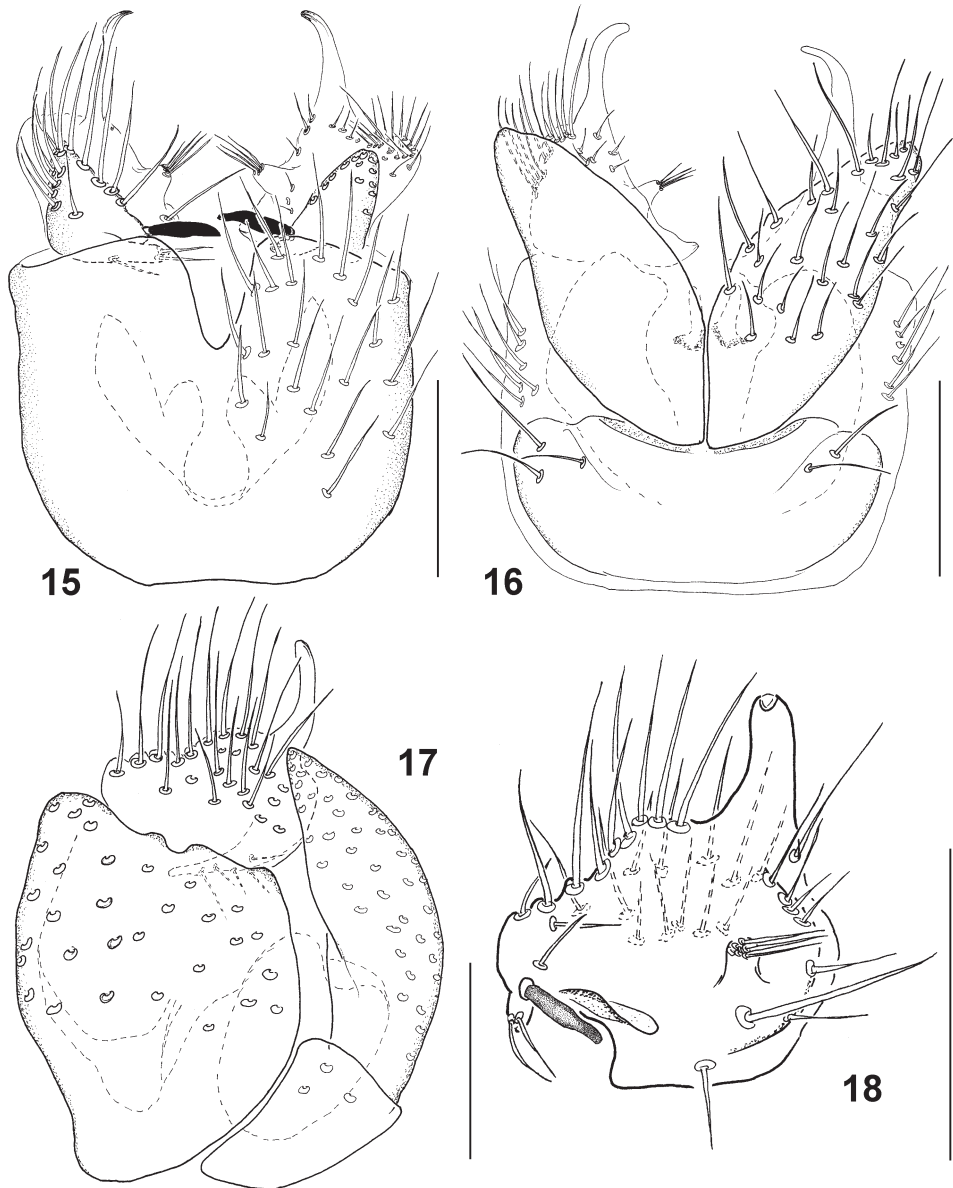
*Male*.

*Head*: Brown with numerous dark setae. Two ocelli close to eye margins. Clypeus brown, lighter than head. Mouthparts yellow. Palpus with all segments yellow, two apical segments slightly paler, ratios of three apical segments 1.0:1.3–1.4:2.9–3.2. Scape brownish, pedicel yellow, first flagellar segment yellow on basal half to two-thirds, other flagellomeres brown. Flagellomeres cylindrical, median flagellomere 1.5–1.7× as long as broad, apical flagellomere conical, 2.8–3× as long as broad basally. Scape with setae, including 2 dorsoapical bristles, extending to middle of pedicel. Pedicel with apical crown of setae and a dorsoapical bristle extending beyond apex of first flagellomere. Flagellomeres with short whitish setae.

*Thorax*: Mesonotum dark brown, shoulders somewhat lighter. Pleural parts light brown. All bristles and setae on thorax dark brown. Scutellum with 4 strong marginal bristles and several weaker bristles along margin. Antepronotum with setae, including 6–8 bristles, of different lengths. Proepisternum with setae including 3 strong bristles. Anepisternum with 5–7 bristles of different lengths on dorsal part and with posteriorly-directed short setae. Anepimeron with 4 bristles on dorsal part and 2 or 3 short setae. Laterotergite with dorsally-directed setae. Metepisternum with setae on posterior part. Haltere pale yellow.

*Legs*: Coxae yellow. Femora yellow, except hind femur brown on apical fifth and narrowly along dorsal margin. Tibiae yellow. Tarsi appear brownish due to dark setae.

Whole anterior side of fore coxa, apical fifth of anterior side of mid coxa and all femora clothed in dark setae. Hind coxa with dense light setae on posterior side. Mid femur with 1–3 apicoventral bristles, hind femur with 3–5 apicoventral bristles progressively shorter towards apex. Mid tibia with 3–4a, 6d (progressively longer towards apex), 4–5p (progressively longer towards apex) and 2v. Hind tibia with 7a and 6d. Proportions of femur to tibia for fore, mid and hind legs: 1.11–1.27, 1.19 [1.27]; 0.97–1.03, 1.01 [1.03];



Figs 15–18. *Zygomyia toro* sp. n., male terminalia: (15) ventral view; (16) dorsal view; (17) lateral view; (18) internal view of gonostylus. Scale bars = 0.1 mm.

0.78–0.85, 0.81 [0.85]. Proportions of tibia to basitarsus for fore, mid and hind legs: 1.05–1.23, 1.14 [1.05]; 1.40–1.42, 1.41 [1.41]; 1.67–1.71, 1.69 [1.71].

*Wing*: Wing length 2.35–2.77, 2.53 [2.46] mm. Membrane with yellowish tinge, veins dark yellow to brownish. A vague brown macula above *Rs* and *rm*; very faint preapical macula from tip of *R*<sub>1</sub> towards *M*<sub>1</sub>, but not including tip of *R*<sub>5</sub>. *R*<sub>1</sub> and *R*<sub>5</sub> with strong setae, crossvein *rm* and *bM*–*Cu* with weaker setae on both sides. *M*<sub>1</sub> with 9–13 and *M*<sub>2</sub> with 3–10 apical setae. *CuA* glabrous. Crossvein *rm* 0.7× as long as *m*-stem.

*Abdomen*: Brown with first four segments lighter. Terminalia (Figs 15–18, 23, 27) yellow. Ventroapical margin of gonocoxite with abrupt medial indentation of ca ½ gonocoxite height. Gonostylus undivided into appendages. Ventroapical margin of gonostylus with row of fine setae. A short ventrobasal medially-directed process bearing 2 apical and 1 basal setae. A geniculate, irregularly tapering blunt macroseta situated above the process and a twisted membranous short lobe posterior to macroseta. The latter exposed only in lateral or posterior view. Dorsal part of gonostylus with protruding apical process somewhat bent mesad and a sub-basal short internal hump-like lobe bearing apical setae. Aedeagus with two pointed apical outgrowths slightly bent mesad; parameres broad, curved with angular apices.

*Female*. Unknown.

Holotype: ♂ UGANDA: Kibale NP, Kanyawara Biol. St., 00°33'54.2"N 30°21'31.3"E, 1513 m, 29.viii–5.ix.2010, O. Kurina & co, Malaise trap (No 4).

Paratypes: ♂ same as holotype, except 13–20.vi.2010; ♂ same as holotype, except 00°33'54.1"N 30°21'28.1"E, 1504 m, 28.iii–4.iv.2010, O. Kurina & co, Malaise trap (No 1).

*Biology*: Unknown.

### ***Zygomylia yllae* sp. n.**

Figs 6, 19–22, 24, 28

*Etymology*: This species is named after my wife, Mrs Ülle Jäe, who has tolerated my lengthy collecting trips and absences from home. She accompanied me on the trip to Ethiopia in 2010 and assisted with the collection of the type material.

*Differential diagnosis*: Most similar to *Z. toro* sp. n., sharing an analogous outline of the male terminalia (see diagnosis under *Z. toro* sp. n.). It differs in its larger size, much darker colouration and details of the male terminalia: gonostylus with geniculate, evenly tapering blunt macroseta ventrobasally (geniculate, irregularly tapering in *Z. toro* sp. n.), apically widening dorsoapical protruding process (tapering in *Z. toro*) and strong setae along apical margin (setae of average size in *Z. toro* sp. n., cf. Figs 18, 22).

*Description*:

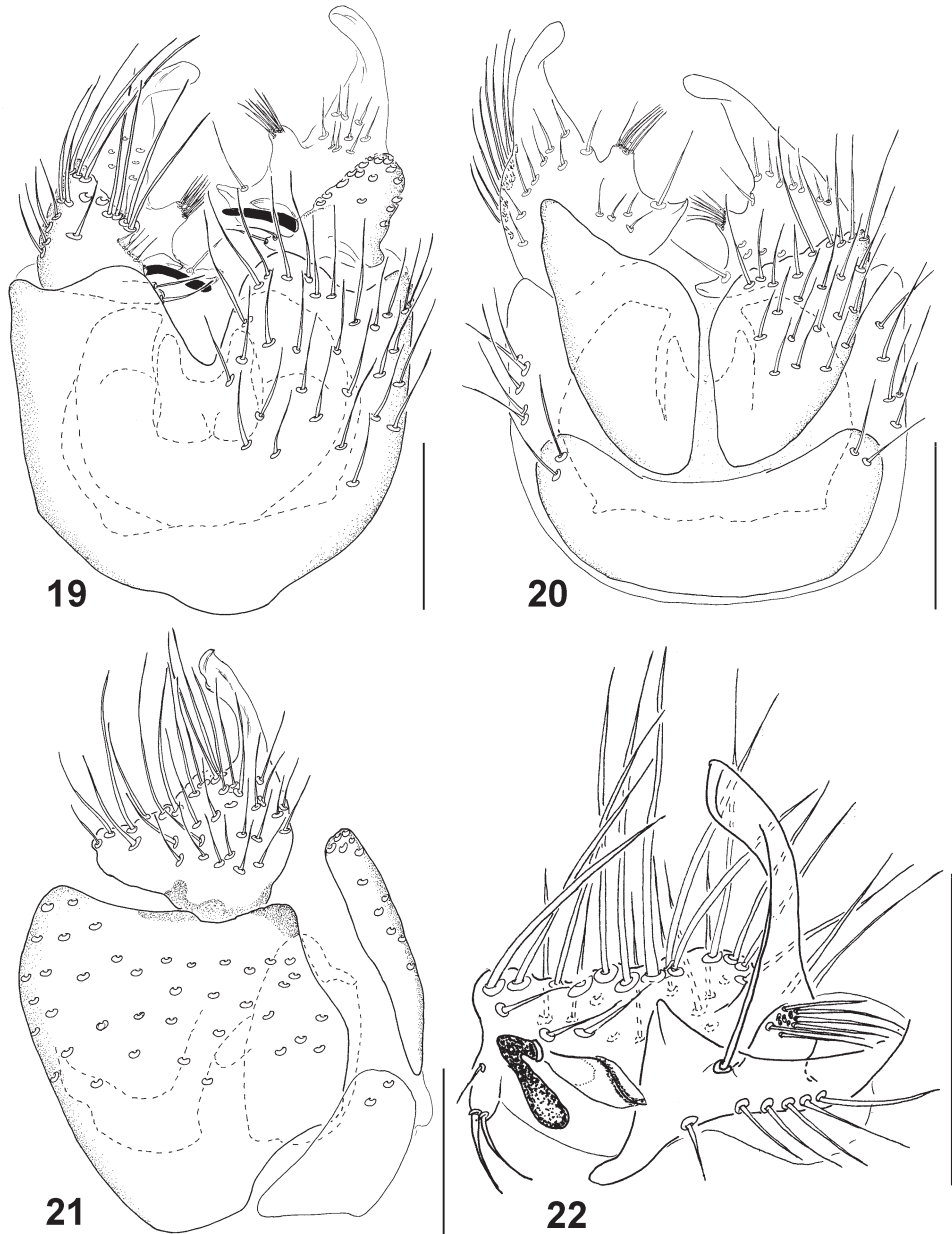
*Male*.

*Head*: Blackish brown with numerous dark setae. Two ocelli close to eye margins. Clypeus brown, lighter than head. Mouthparts yellow. Palpus with all segments dark yellow to brownish, apical segment slightly paler, ratios of three apical segments 1.0:1.12–1.40:2.67–3.30. Scape brown, pedicel dark yellow, first flagellomere yellow in basal half, other flagellomeres brown. Flagellomeres cylindrical, median flagellomere 2.0–2.4× as long as broad, apical flagellomere conical, 3.0–3.3× as long as broad basally. Scape with setae, including dorsoapical bristle, extending to apex of pedicel.



Pedicle with apical crown of setae and a dorsoapical bristle extending to apex of first flagellomere. Flagellomeres with short whitish setae.

*Thorax*: Mesonotum blackish brown. Pleural parts brown to dark brown. All setae on mesonotum and scutellum yellowish brown, on pleural parts of thorax dark brown.



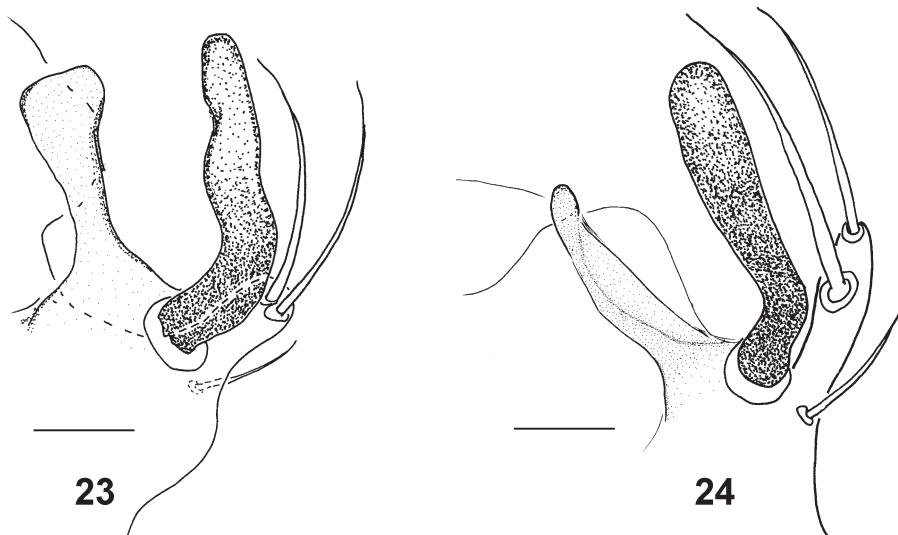
Figs 19–22. *Zygomyia yllae* sp. n., male terminalia: (19) ventral view; (20) dorsal view; (21) lateral view; (22) internal view of gonostylus. Scale bars = 0.1 mm.

Scutellum with 4 strong marginal bristles and several weaker bristles along margin. Antepronotum with setae including 4–6 bristles of different lengths. Proepisternum with setae including 3 strong bristles. Anepisternum with several posteriorly-directed short setae and with 5–7 bristles of different lengths on dorsal part. Anepimeron with 3 or 4 bristles on dorsal part. Laterotergite with dorsally-directed weak setae. Metepisternum with setae on posterior part. Haltere pale yellow.

**Legs:** Mid and hind coxae somewhat brownish basally. Fore and mid femora brownish along dorsal and ventral margins, sometimes very faintly. Hind femur brown at apical fifth, narrowly along dorsal margin. Tibiae and tarsi appear darker due to dense brown setae. Whole anterior side of fore coxa, apical fifth of anterior side of mid coxa and all femora clothed in dark setae. Hind coxa with short dense setae on posterior side. Mid femur with 2 or 3 apicoventral bristles, hind femur with 4 apicoventral bristles progressively shorter towards apex. Mid tibia with 3–4a, 5d, 2–3p and 1v, sometimes with an additional weaker ventral seta. Hind tibia with 5–6a and 6d. Proportions of femur to tibia for fore, mid and hind legs: 1.04–1.20, 1.12 [1.20]; 0.94–1.03, 0.99 [0.94]; 0.77–0.86, 0.81 [0.86]. Proportions of tibia to basitarsus for fore, mid and hind legs: 1.02–1.09, 1.05 [1.06]; 1.18–1.22, 1.20 [1.21]; 1.41–1.46, 1.44 [1.46].

**Wing:** Wing length: 2.73–3.35, 3.06 [3.35] mm. Membrane hyaline, veins light brown. A brown macula above  $R_s$  and  $rm$ ; a large preapical brown macula including tip of  $R_1$  extending to tip of  $R_5$ , but ending before or after reaching  $M_1$ .  $R_1$  and  $R_5$  with strong setae on both sides, crossvein  $rm$  and  $bM-Cu$  with weaker setae on both sides.  $M_1$  with 9–12 and  $M_2$  with 4–9 weak apical setae on dorsal surface. Crossvein  $rm$  0.75–1.00× as long as  $m$ -stem.

**Abdomen:** Dark brown with first two or three segments somewhat lighter. Terminalia (Figs 19–22, 24, 28) yellow. Ventroapical margin of gonocoxite with medial indentation of ca 0.25× gonocoxite height. Gonostylus not divided into distinct appendages. Ventro-



Figs 23, 24. Ventrobasal macroseta on gonostylus, posterior view: (23) *Zygomyia toro* sp. n.; (24) *Z. yllae* sp. n. Scale bars = 0.01 mm.

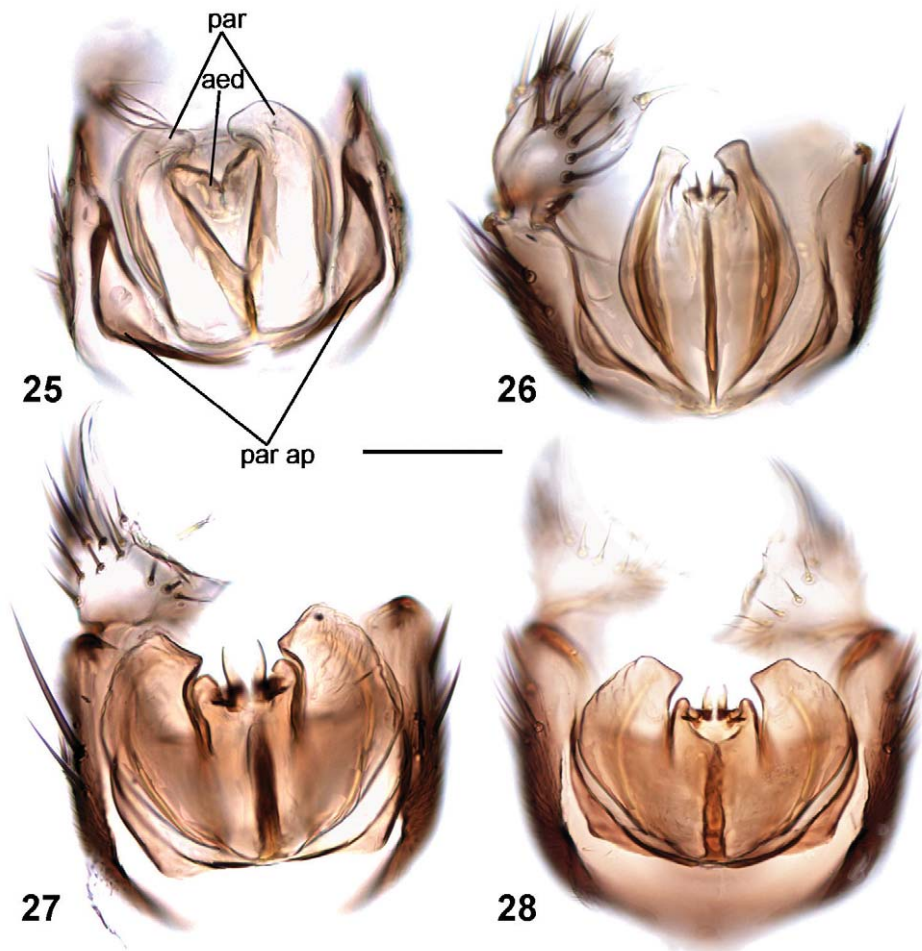
apical margin of gonostylus with row of strong apical setae. A short ventrobasal medially-directed process bearing 2 apical and 1 basal seta. A geniculate blunt macroseta situated above lobe and twisted membranous short process posterior to macroseta. The latter exposed only in lateral or posterior view. Dorsal part of gonostylus with protruding glabrous apical process, widening apically and somewhat bent mesad and sub-basal short internal hump (less lobe-like than in *Z. toro*), bearing apical setae. Aedeagus with two pointed apical outgrowths (shorter than in *Z. toro*), which are slightly bent mesad; parameres broad, somewhat tapering, curved and with angular apices.

*Female.* Unknown.

Holotype: ♂ ETHIOPIA: Simien Mts, Camping Chenek, 13°15'38.2"N 38°11'36.7"E, 3617 m, 26.x.2010, O. Kurina & Ü. Jäe, sweep netting.

Paratypes: 4♂ same data as holotype.

Biology: Unknown.



Figs 25–28. Aedeagal complex, dorsal view: (25) *Zygomyia mollemani* sp. n.; (26) *Z. simiensis* sp. n.; (27) *Z. toro* sp. n.; (28) *Z. yllae* sp. n. Scale bar = 0.1 mm.

## DISCUSSION

The species described herein clearly belong in the genus *Zygomysia*, based on the presence of the simple cubital fork,  $M_2$  and  $CuA_1$  divergent, the presence of ventral setae on the mid tibia and details of the thoracic pleura (Matile 1975). The arrangement of wing markings and the number of ventral setae on the mid tibia have been widely applied in previous keys for distinguishing species-groups and species (e.g., Tonnoir & Edwards 1927; Fisher 1937; Zaitzev 2003). For the identification of species, however, the best set of characters is found in the male terminalia, which have been figured for almost three-quarters of the world *Zygomysia* species. There is no study summarising the diversity of this cosmopolitan genus, although it has been well-studied in Europe and New Zealand, although these regions still lack identification keys for all species.

The general habitus of the male terminalia of the described species, particularly the gonostylus and aedeagal complex, somewhat resembles those of Holarctic species of the genus. The detailed structure of the terminalia differs, however, from that of any described species. In a study of the male terminalia of Nearctic *Zygomysia* species, Fisher (1937) noted that the gonostylus is not always distinctly subdivided into lobes. Among Afrotropical species, the gonostylus is divided into ventral and dorsal lobes in *Z. mollemanii* (well exposed in lateral view of terminalia, Fig. 9), but not in other species. In addition, *Z. mollemanii* is different from the other three species in the shape of the aedeagus (Fig. 25). The aedeagal complexes of *Z. simiensis*, *Z. toro* and *Z. yllae* are similar to those of the Palearctic *Z. valida* Winnertz, 1863 (Zaitzev 2003, fig. 111.8) having two pointed apicomedial outgrowths. The outlines of the dorsal part of the gonostylus of *Z. toro* and *Z. yllae* are also similar to *Z. valida*, but the ventral part of the gonostylus and the shapes of the parameres are unique.

The currently known distribution of *Zygomysia* species in the Afrotropics only reflects limited sampling and study of the regional fauna. Over the course of more exhaustive investigations, including collecting activities in other areas of the Afrotropical Region, the number of *Zygomysia* species will undoubtedly increase substantially.

## ACKNOWLEDGEMENTS

The study was financed by the Estonian Science Foundation grants 7558 and 9174 and targeted financing project SF0170160s08. The collecting trip to Uganda in February 2010 was supported by the European Union through the European Regional Development Fund (Centre of Excellence FIBIR). I am very grateful to Christopher Borkent (Quebec, Canada) for critical perusal of the manuscript with many helpful comments. Mathias Jaschhof (Greifswald, Germany) and an anonymous referee are thanked for their comments and suggestions. I express sincere thanks to Ashley H. Kirk-Spriggs for his invaluable help along the editorial process.

## REFERENCES

- BECHEV, D. 2000. World distribution of the genera of fungus gnats (Diptera: Sciaroidea, excluding Sciaridae). *Studia dipterologica* 7: 543–552.
- CHANDLER, P. 2010. The classification of Diptera. In: Chandler, P., ed., *A dipterist's handbook*. The Amateur Entomologist Series, Vol. 15. London: The Amateur Entomologists' Society, pp. 1–16.
- COLLESS, D.H. 1966. Diptera: Mycetophilidae. *Insects of Micronesia* 12: 637–667.
- EDWARDS, F.W. 1925. British fungus-gnats (Diptera, Mycetophilidae) with a revised generic classification of the family. *Transactions of the Entomological Society of London* 73: 505–670.
- ENDERLEIN, G. 1910. The Percy Sladen Trust Expedition to the Indian Ocean in 1905. V. Diptera, Mycetophilidae. *Transactions of the Linnean Society of London, Ser. 2* 14: 59–81.
- FISHER, E.G. 1937. *A comparative study of the male genitalia of the Mycetophilidae of Nearctic America*. Unpublished PhD thesis. New York: Cornell University.



- GAMMELMO, O. 2004. A review of the Afrotropical genus *Mycomyiella* Matile, 1973 (Diptera, Mycetophilidae, Mycomyini), with the description of six new species. *Zootaxa* **625**: 1–30.
- HIPPA, H. 2008. Notes on Afrotropical *Manota* Williston (Diptera: Mycetophilidae), with the description of seven new species. *Zootaxa* **1741**: 1–23.
- JAKOVLEV, J. 2011. Fungus gnats (Diptera, Mycetophiloidea) associated with dead wood growing fungi: new rearing data from Finland and Russian Karelia and general analysis of known larval microhabitats. *Entomologica Fennica* **22**: 157–189.
- JASCHHOF, M. 2006. Even more paradoxical: *Paradoxa paradoxa* sp. n. (Diptera: Mycetophilidae) from South Africa, closest relative of the New Zealand *Paradoxa fusca* Marshall. *African Invertebrates* **47**: 229–235.
- JASCHHOF, M. & MOSTOVSKI, M. 2006. First record of *Manota* (Diptera: Mycetophilidae: Manotinae) from southern Africa, with the description of two new species. *African Invertebrates* **47**: 237–242.
- KIRK-SPRIGGS, A.H. & STUCKENBERG, B.R. 2009. Afrotropical Diptera – rich savannas, poor rainforests. In: Pape, T., Bickel, D. & Meier, R., eds, *Diptera diversity: status, challenges and tools*. Leiden: Brill, pp. 155–196.
- KIRK-SPRIGGS, A.H. & MOSTOVSKI, M. 2010. Official launch of *Manual of Afrotropical Diptera* project. In: *Abstracts volume. 7<sup>th</sup> International Congress of Dipterology, San José, Costa Rica, 8–13 August 2010*, p. 125.
- KURINA, O. 2008. *Cluzobra matilei* sp. n. from French Guyana, with notes on congeners (Diptera: Mycetophilidae). *Zootaxa* **1874**: 63–68.
- MATILE, L. 1975 (1974). Note sur les genres *Aspidionia* et *Platyprosthogyne* en région éthiopienne. *Annales de la Société entomologique de France (n.s.)* **10** (3): 589–592.
- 1977 (1976). Notes sur le genre *Leptomorphus* et description de taxa nouveaux de la région éthiopienne (Diptera, Mycetophilidae). *Bulletin de l'Institut fondamental d'Afrique Noire, Sér. A* **38** (1): 141–155.
- 1979a. Un nouveau genre Afrotropical de Mycomyini (Diptera, Mycetophilidae). *Revue française d'Entomologie (n.s.)* **1** (3): 104–116.
- 1979b (1978). Diptères Mycetophilidae de l'Archipel des Comores. *Mémoires du Muséum national d'histoire naturelle, Sér. A, Zool.* **109**: 247–306.
- 1980. Superfamily Mycetophiloidea 15. Family Mycetophilidae. In: Crosskey, R.W., ed., *Catalogue of the Diptera of the Afrotropical Region*. London: British Museum (Natural History), pp. 216–230.
- PAPE, TH. & THOMPSON, F.CH., eds. 2010. *Systema Dipteriorum*. Version 1.0. <http://www.diptera.org/> (accessed 28 December 2010).
- SØLI, G.E.E. 1997a. Afrotropical species of *Sciophila* Meigen (Diptera, Mycetophilidae). *Journal of African Zoology* **111**: 149–190.
- 1997b. On the morphology and phylogeny of Mycetophilidae, with a revision of *Coelosia* Winnertz (Diptera, Sciaroidea). *Entomologica Scandinavica Supplement* **50**: 1–139.
- STUCKENBERG, B.R. 1961 (1960). Records and descriptions of Diptera from Madagascar Part I. Anisopodidae, and Mycetophilidae genus *Allactoneura* de Meijere. *Le Naturaliste malgache* **12**: 123–132.
- TONNOIR, A.L. & EDWARDS, F.W. 1927. New Zealand fungus gnats (Diptera, Mycetophilidae). *Transactions and Proceedings of the New Zealand Institute* **57**: 747–874.
- VOCKEROTH, J.R. 1966. A method of mounting insects from alcohol. *The Canadian Entomologist* **98**: 69–70.
- WINNERTZ, J. 1863. Beitrag zu einer Monographie der Pilzmücken. *Verhandlungen der zoologisch-botanischen Gesellschaft in Wien* **13**: 637–964.
- ZAITZEV, A.I. 2002. The Sciaroidea (Diptera) (excluding Sciaridae) of New Zealand. III. New and little known species of the genus *Zygomyia* Winn. *International Journal of Dipterological Research* **13**: 109–119.
- 2003. Fungus gnats (Diptera, Sciaroidea) of the fauna of Russia and adjacent regions (Part II). *International Journal of Dipterological Research* **14**: 77–386.