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First record of *Manota* (Diptera: Mycetophilidae: Manotinae) from southern Africa, with the description of two new species

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ABSTRACT

The first finds of *Manota* in South Africa are documented, and two new species of this genus, *natalensis* sp. n. and *whiteleyi* sp. n., are described. The two species are not closely related, while *whiteleyi*—lowland coastal in distribution—shows affinities to an East African (Tanzanian) species. Our results indicate much lower species diversity of *Manota* in South Africa compared with the rainforest fauna of tropical Africa.

KEY WORDS: Diptera, Mycetophilidae, *Manota*, fungus gnats, new species, South Africa.

INTRODUCTION

The cosmopolitan genus *Manota* includes numerous morphologically uniform species that are typical forest-dwellers. Eighteen Afrotropical species have become known from the tropical rainforests stretching along a belt from West to East Africa and further to the archipelagos of Seychelles and Comores (Matile 1972, 1978, 1980; Søli 1993). In addition, we know of several unnamed *Manota* species in Madagascar. Occurrence of *Manota* in continental southern Africa, where not much work has been done on Sciaroidea including Mycetophilidae (Barraclough & Londt 1985), was hitherto unknown. Here we describe the first two *Manota* species from KwaZulu-Natal, South Africa, and discuss their relationships.

Compared with tropical Africa, *Manota* in South Africa seems to be much less speciose. This might reflect the general pattern in which the great abundance in individuals and species in the tropics is in contrast with the paucity of *Manota* in more temperate regions. Such a pattern is not yet documented for the southern continents. It is however most obvious in the northern hemisphere, where more work has been done on Mycetophilidae. Three *Manota* species are known from the entire Palaearctic region, while the Oriental tropics appear to be very rich in species (Hippa 2006; Jaschhof, pers. observ.), and one unidentified species in the Nearctic compares with 27 species described from the small territory of Costa Rica (Jaschhof & Hippa 2005). The biology of *Manota* species is practically unknown (but see Zaitzev 1990), so that observed patterns cannot yet be explained.

MATERIAL AND METHODS

Most specimens studied here were collected by the authors using Malaise traps in different types of indigenous forest in various parts of KwaZulu-Natal; a few specimens were collected by hand. Type specimens were macerated in cold 10% KOH, stepwise dehydrated in ethanol, treated briefly with an ethanol/formaldehyde mixture, transferred

into beechwood creosote, and eventually mounted on microscope slides in Canada balsam. Other specimens were kept in 70% ethanol. All types are deposited in the Natal Museum, Pietermaritzburg, South Africa. For light microscope study and the preparation of drawings we used an Olympus BX50 microscope in combination with the U-DA drawing unit. Usage of morphological terminology follows Søli (1997) and Jaschhof & Hippa (2005).

TAXONOMY

Genus *Manota* Williston, 1896

Manota natalensis sp. n.

Figs 1–3

Etymology: From the distribution area, KwaZulu-Natal.

Diagnosis: Distinguished from *Manota whiteleyi*, the only other *Manota* species known from South Africa (see below), by the shorter antennae and maxillary palpi, non-setose preepisternum 2, and in features of both male and female terminalia. Male gonocoxites are conspicuous, even in low magnification, by the dorsal row of numerous black megasetae.

Description:

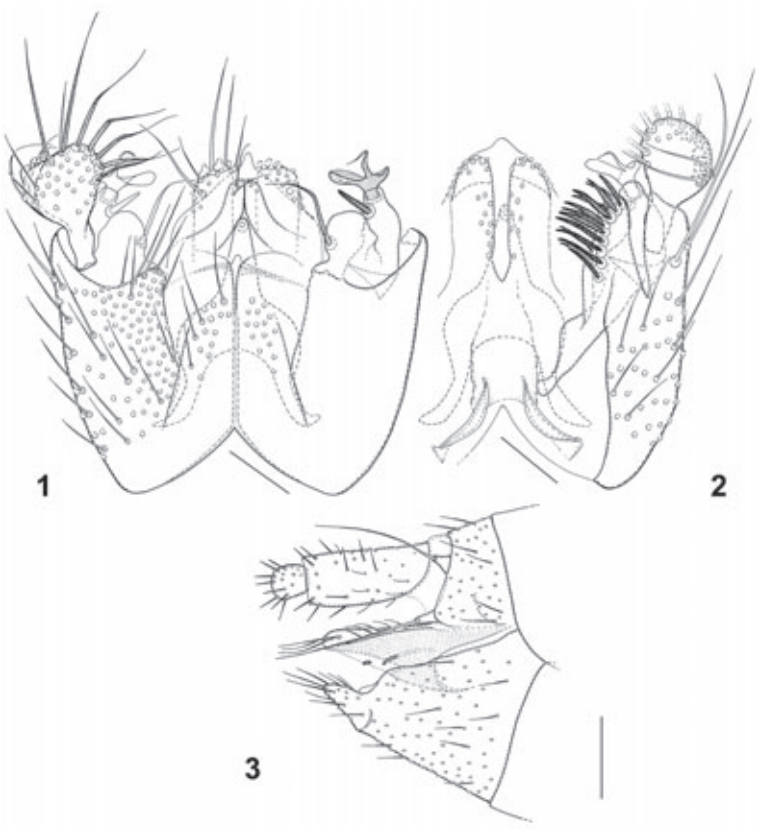
Male.

Body size 2.6–3.0 mm.

Head: Antenna with node of fourth flagellomere 0.9 times as long as wide; nodes of more distal flagellomeres longer than wide. Maxillary palpus short, 1.5 times the height of head; third palpal segment with short apical process without curved sensilla; fourth segment with short apical process.

Thorax: Anepisternum fully setose. Anepisternal cleft completely separating anepisternum and anterior basalare. Anterior basalare, preepisternum 2 and laterotergite non-setose. Episternum 3 setose. *Wing*: Membrane with a few setae along posterior margin. Portion of Sc basally of h setose dorsally, portion distally of h non-setose. CuA-fork complete. CuA-stem setose. A1 discernible as long line of setae. A2 faint but long, setose.

Abdomen: Tergite 8 with broadly rounded distal margin; densely setose, including 5–7 very large setae apically. *Terminalia*: Sternite 9 large, almost as long as gonocoxites, very weak distally, with deeply incised distal margin, with large setae on central portion (Fig. 1). Tergite 9 not traceable. Gonocoxites with setae very dense ventro-mesially, and very large disto-laterally; dorso-mesially, in position I+II, with some 15 short, pointed megasetae on elongate lobe; disto-mesially, in position III+IV, with weak, elongate lobe bearing apically one short, pointed megaseta and one large, flat megaseta tapering to tip (Figs 1, 2). Gonostylus with basolateral apophysis long, handle-like; two-lobed which becomes apparent in lateral view; ventral lobe roundish, with 7–8 very large setae apically; dorsal lobe with some 5 large setae outside and innumerable finer setae inside (Figs 1, 2). Parastylar lobe large but weak, with 1 or 2 large setae (Fig. 1). Tegmen long, medially bulbous (Figs 1, 2). In between tegmen and apex of sternite 9 with large, sclerotised V-shaped rib. Hypoproct with numerous setae apically including 2 or 3 pairs of large setae; with pair of lobe-like extensions ventrally, forming hood above tegmen



Figs 1–3. *Manota natalensis* sp. n.: (1) male terminalia, ventral view; (2) male terminalia, dorsal view; (3) female terminalia, lateral view. Scale bars = 0.05 mm (Figs 1 and 2) and 0.1 mm (Fig. 3).

apex, with setae pointing ventrally (Fig. 1). Tergite 10 present as weak, bare lobe. Lobes of cerci elongate, dorso-medially fused, baso-laterally with elongate, curved apodemes; dorsally and apically setose (Fig. 2).

Female.

Body size 3.0 mm.

Head: Antennal flagellomeres with nodes 0.8 times as long as wide.

Terminalia (Fig. 3): Segment 7 very short. Tergites 8 and 9 largely fused, only laterally separated, densely setose. Sternite and gonocoxite 8 merged, large, densely setose; apical lobe with dense, large setae. Gonapophysis 8 discernible, bare. Gonapophysis 9 extending far caudally, interconnected with ventro-lateral portions of sternite 10. Tergite 10 largely covered by preceding tergite, very short; on either side with 2 very large setae on large protuberances. Sternite 10 extending far caudally, with row of small lateral and large apical setae. Cercus two-segmented; proximal segment 4 times as long as distal segment; both segments with strong, stiff setae; distal segment inside with some 8–10 bud-like sensilla. Mouth of spermathecal ducts sclerotised.

Holotype: ♂ (on slide). SOUTH AFRICA: *KwaZulu-Natal*: Karkloof Nat. Res. (29°19.1'S:30°15.5'E), alt. 1325 m, mistbelt forest, 24.xi–18.xii.2005, Malaise trap, M. Mostovski, M. & C. Jaschhof.

Paratypes: 3♂ 1♀ (all on slides), same data as the holotype; 2♂ 1♀ (all on slides), *KwaZulu-Natal*: Northern Drakensberg, Royal Natal Nat. Park, Gudu Forest (28°40.9'S:28°55.8'E), alt. 1680–1730 m, old-growth indigenous forest, 28.xi–13.xii.2005, Malaise trap, M. Mostovski, M. & C. Jaschhof; 2♂ (on slides), Central Drakensberg, Cathedral Peak Nat. Res., Rainbow Gorge (28°57.6'S:29°13.6'E), alt. 1500 m, old-growth indigenous forest, 3–15.xii.2005, Malaise trap, M. Mostovski, M. & C. Jaschhof.

Other material examined: SOUTH AFRICA: *KwaZulu-Natal*: 1♂ (in ethanol), same locality as holotype but 24.iv–27.v.2005; 1♂ (in ethanol), same locality but 26.vii–28.ix.2005; 1♂ (in ethanol), Northern Drakensberg, Royal Natal Nat. Park, Devil's Hoek valley (28°42.7'S:28°55.3'E), alt. 1650 m, old-growth indigenous forest, 11.xii.2005, sweepnet and aspirator, M. Jaschhof; 1♂ (in ethanol), Central Drakensberg, Cathedral Peak Nat. Res., Rainbow Gorge (28°57.6'S:29°13.6'E), alt. 1500 m, old-growth indigenous forest, 4.xii.2005, sweepnet, M. Jaschhof; 1♂ (in ethanol), Pietermaritzburg, Hilton (29°32'30.7"S:30°18'18.4"E), suburban garden with compost pile, 17–29.ii.2004, Malaise trap, M. Mostovski; 1♂ (in ethanol), Queen Elizabeth Park Nat. Res. (29°34.157'S:30°19.299'E), alt. 860 m, forest patch, 1–5.xii.2003, Malaise trap, J.G.H. Londt & M. Mostovski.

Remarks: Among Afrotropical species of *Manota*, presence in the male gonocoxites of a dorsal row of megasetae is not unusual (see Søli 1993), but if other characters are taken into account, none of these species are really close to *natalensis*. Relatively short maxillary palpus and lack of curved sensilla on the third palpal segment are characters giving *natalensis* a rather isolated position among its congeners.

This new species was collected predominantly in various indigenous forests of both the mountains and lowland of KwaZulu-Natal, with one specimen being found in a suburban garden. Preimaginal stages and the habitat of larvae are unknown.

Manota whiteleyi sp. n.

Figs 4, 5

Etymology: To honour the lepidopterist Earle Whiteley for his efforts in protecting and exploring the biodiversity of the native bush of Ramsgate Butterfly Sanctuary.

Diagnosis: Distinguished from *natalensis* by the longer antennae and maxillary palpi, and setose preepisternum 2. Male terminalia of *natalensis* and *whiteleyi* differ greatly. The female of *whiteleyi* lacks lateral setae on sternite 10 which are present in *natalensis*. Differs from *M. joerni* Søli from Tanzania in details of the male terminalia: (1) the gonocoxites with an elongate and setose lobe dorso-apically (this lobe is absent in *joerni*), ordinary setae in position I+II (megasetae), and a slender lobe in position III+IV bearing apically one seta and one large, blunt megaseta (each one megaseta on two separate lobes); (2) the gonostylus bearing 3 spine-like setae dorso-mesially (without such setae).

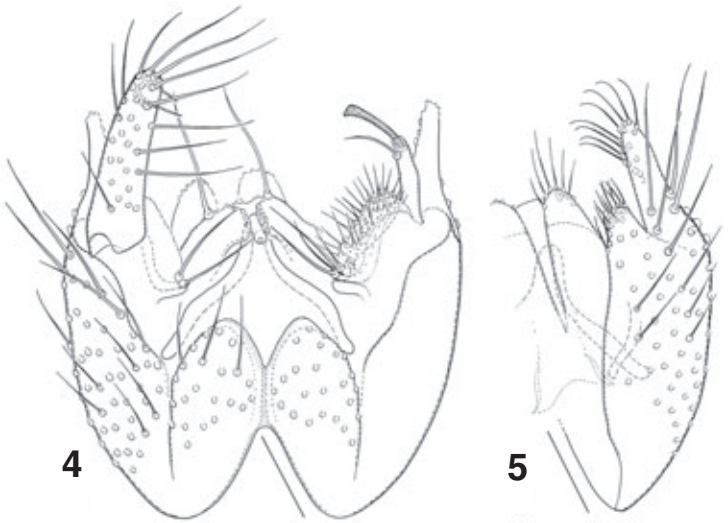
Description:

Male.

Body size 3.0–3.2 mm.

Head: Antenna with node of fourth flagellomere 1.1 times as long as wide. Maxillary palpus long, 2.7 times the height of head; third palpal segment on apical process with 4 or 5 large curved sensilla; fourth segment subapically with small parasegment.

Thorax: Anepisternum fully setose. Anepisternal cleft completely separating anepisternum and anterior basalare. Anterior basalare and laterotergite non-setose. Preepisternum 2 and episternum 3 setose. *Wing*: Membrane with a few setae along posterior margin. Portion of Sc basally of h setose dorsally, portion distally of h non-setose. CuA-fork complete. CuA-stem setose. A1 discernible as long line of setae. A2 long, setose.



Figs 4–5. *Manota whiteleyi* sp. n.: (4) male terminalia, ventral view; (5) male terminalia, dorsal view. Scale bars = 0.05 mm.

Abdomen: Tergite 8 with broadly rounded distal margin; densely setose, including 5 or 6 very large setae apically. *Terminalia*: Sternite 9 much shorter than gonocoxites, bilobed distally, with large setae (Fig. 4). Tergite 9 not traceable. Gonocoxites with setae of various lengths including very large setae along ventro-mesial margin and disto-laterally; dorso-apically with elongate, setose lobe; dorso-distally, in position I+II, with 10–15 dense, short setae on small lobe; disto-mesially, in position III+IV, with slender lobe bearing apically one seta and one large, blunt megaseta (Figs 4, 5). Gonostylus elongate; with setae of various lengths including some 8 very large setae along mesial and distal margins; dorso-mesially with 3 subapical spine-like setae (Fig. 4). Parastylar lobe large but weak, with 5 or 6 large setae apico-mesially and dense cover of large trichia (Fig. 4). Tegmen short, with apical process pointing ventrally. (Fig. 4). Hypoproct with 2 large setae on apical margin; with pair of lobe-like extensions pointing ventrally on either side of tegmen apex, with setae pointing ventrally (Fig. 4). Tergite 10 present as weak, bare lobe with rounded distal margin. Lobes of cerci elongate, dorso-medially fused, baso-laterally with small, weak apodemes; apically setose (Fig. 5).

Female.

Body size 3.0 mm.

Head: Antennal flagellomeres with nodes 0.8 times as long as wide.

Terminalia: As in previous species, except for sternite 10 lacking lateral row of setae.

Holotype: ♂ (on slide). SOUTH AFRICA: *KwaZulu-Natal*: Ramsgate, Butterfly Sanctuary (30°53.3'S:30°20.4'E), alt. 45 m, patch of indigenous forest near small stream, 3–26.ii.2005, Malaise trap, M. Mostovski.

Paratypes: 3♂ 1♀ (all on slides), same data as holotype; 1♂ (on slide), same locality but 3.xii.2004–8.i.2005; 1♂ (on slide), same locality but 9.i–2.ii.2005.

Other material examined: 2♂ (in ethanol), same locality, 3.xii.2004–8.i.2005.

Remarks: Judged from features of the male terminalia, *M. joerni* is closest to *whiteleyi*, a view supported by the presence in both species of a setose preepisternum 2 and non-setose laterotergite.

This species is known from one patch of coastal lowland forest close to the southern border of KwaZulu-Natal. All individuals were captured in summer between December and February. Preimaginal stages and the habitat of larvae are unknown.

REMARKS ON SPECIES IDENTIFICATION

As late as the 1970s, species richness in *Manota* had been greatly underestimated (e.g. Matile 1978). Species diagnoses from that period lack the degree of accuracy that later was realised to be indispensable for distinguishing closely related species (Søli 1993). Most recent study strongly suggest that the male terminalia provide the only useful characters for separating sister species (Jaschhof & Hippa 2005), a fact rendering species descriptions based only on females very problematic, if not useless. Of the 20 Afrotropical *Manota* species now named, three are known from the female only (Matile 1972), and six from the male only. Male terminalia were illustrated for the 17 species where the male is known, but with varying accuracy and being only partially supplemented by sufficiently detailed descriptions. Consequently, creating a well-functioning key to the Afrotropical species is impossible on the basis of the available literature, and for identification we must refer to the primary sources (Matile 1972, 1978; Søli 1993). A considerable increase in the number of Afrotropical *Manota* species, that may result from future study, will inevitably necessitate re-examination of types and redescription of species.

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