

Research on the Mosquitoes of Angola (*Diptera: Culicidae*)

XVIII - Description of *Uranotaenia (Uranotaenia) machadoi* sp. nov.

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ABSTRACT. The adults of both sexes, male terminalia, pupa and fourth instar larva of *Uranotaenia machadoi*, a new species, are described and illustrated. Differential diagnoses of the female, male, larva and pupa of the new taxon to the closest allied species are given.

INTRODUCTION

The present paper is based on the examination of a population of *Uranotaenia* from Angola. Although closely allied to *Uranotaenia caeruleocephala* Theobald, 1901, this population is thought to represent a distinct, underscribed species, mainly on account of the presence of a continuous row of dark, strong and numerous hairs along the anterior margin of the mesepisternum simultaneously with the presence of specialized groups of setae on legs of the adult male.

The terminology adopted for description is based on the system of setal nomenclature developed by (Belkin 1962, Ribeiro et al 1979 and Harbach & Knight 1980).

With this new description 16 species of the subgenus *Uranotaenia* become known in the Afrotropical Region, 13 of which are also known from Angola (Gândara 1956, Ramos & Ribeiro 1975, Machado, Ramos & Ribeiro 1981, Ramos in press). In all the world, 103 species of the nominal subgenus are now known (Knight & Stone 1977, Knight 1978, White in Crosskey 1980, and Ward 1984).

Uranotaenia (Uranotaenia) machadoi sp. nov.

TYPE-DATA. Type series consisting of 2♀, 2♂, 1 pupal exuvia and 1 fourth instar larva. *Holotype* male nr. E28915 from Dundo, Angola, about 7° 22'S, 20° 50'W and 730 meters altitude, 1.01.1961; *allotype* female nr. E 28916 from the same locality, 15.07.1961; one male *paratype*, nr. E28920, same locality, 2.XII.1961; one female *paratype* nr. E28917 and the associated pupal exuvia *paratype* nr. E28921, from Cuango (Cafunfo, Cambamba river), at about 8° 41'S, 18° 03'W and 750 meters altitude, 2.10.69; 1 fourth instar larva *paratype* nr. E28922, mounted with two third instar larvae on the same slide, from the same breeding place as the pupa. All type-material is deposited in Instituto de Higiene e Medicina Tropical, Universidade Nova de Lisboa, Lisboa.

One female *ex pupa* and the remaining adults collected with a New Jersey trap located either within the town of Dundo or in the Luachimo gallery forest of the Carrisso Park, near Dundo.

Immature specimens bred in small ground pools in the gallery forest along the Luachimo river associated with *Uranotaenia mashonaensis* Theobald, 1901 and *U. alboabdominalis* Theobald, 1910.

The new taxon is named in honor of the collector of the type-series, Dr. A. de Barros Machado, who during his long term program of zoological surveying of northeastern Angola made this area one of the best known in Africa.

FEMALE. Head clothed with appressed broad flat decumbent bluish-white scales, without a patch of darker scales in the middle. A few erect dark scales on vertex and occiput. Frontal tuft not developed. Clypeus triangular, short and dark. Proboscis dark, swollen at tip, 1.82 mm long, a little shorter than fore femur (1.83 mm). Palpus with a single segment (0.15 mm), 0.082 of proboscis, dark. Antenna distinctly longer than proboscis, 2.05 mm; first flagellar segment markedly longer than second; the two last segments nearly the same length, 0.35 mm and 0.31 mm. Thorax: Mesonotum arched, with integument uniformly dark brown dorsally. *apn* clothed with a large patch of broad flat white-bluish scales. *ppn* clothed with appressed broad flat decumbent brownish scales. Postnotum bare and dark. Scutum with two short, but distinct, supra-alar lines of white scales. Mesepisternum with a large patch of flat silvery-white scales in middle which extends up to the uppermost bristles and with a patch of brown scales on lower 1/3. Meskatepisternal (= sternopleural) setae dark, strong and numerous, forming a continuous row along the anterior as well as the upper and posterior margins of the sternopleura. Legs uniformly dark, except the anterior face, at base, of middle and posterior femora and the underside of middle femur, which are paler; femora, tibiae and tarsi normal; no obvious knee spots; at tip of hind tibia two curved short and thin spines; first tarsal segment of hind leg with, close to base, a small stripe of scales obliquely set on the inner side; the last tarsal segments (III, IV and V) indefinitely paler. Wings mainly dark, base of vein Cu pale-brown, not silvery as in *caeruleocephala*, and base of R with brown scales in addition to some silvery ones. Other veins dark to base. Haltere with a thick yellow base (scabellum), a slender stemlike part (pedicel) also yellow and an expanded distal part (capitellum) very dark. Abdomen without scales above but pale beneath.

MALE. Essentially as in female except for the specialized setae on the legs. Head: labium very swollen apically, mainly dark-scaled, with a conspicuous ventral light patch on swollen part. Antenna: flagellum plumose. Flagellar segment 12 moderately elongated, 0.35 mm, and segment 13 0.31 mm. Both segments much longer than segment 11 (only 0.15 mm). Front leg: femora 1.84 mm in length, with a row of short bristles on its under surface and a few longer and stout bristles on the inner and outer sides in addition to two or three very stout and long spines. Tibiae 1.97 mm in length, with a row of 6-8 spines on the outer side, their thickened tips bearing a very long bristle and a pecten of several delicate spines ending by a larger and stouter spine in the inner side. Tarsi

with first segment (Fig. 1A) remarkably short, 0.61 mm, about one-fourth of tibia, with a distinct, long and moderately stout bristle at apex. Second segment (Fig. 1A) sinuous, 1.15 mm, several short bristles on its anterior surface and a row of bristles along the inner side; third, fourth and fifth tarsal segments 0.88, 0.47 and 0.19 mm respectively. Middle leg: femora 2 mm; tibiae 2.63 mm. Tarsi with the fourth segment 0.17 mm in length, with a remarkable projection beneath, ending in a curved claw-like bristle (Fig. 1B); fifth segment 0.20 mm, bearing modified claws, anterior enlarged and posterior strongly reduced (Fig. 1B). Hind leg unmodified. Femora 1.83 mm long with a small tuft of hairs near base below and a strong stout spine at apex in addition to 3 or 4 smaller stout bristles. Tibiae (Fig. 1C) 2.01 mm in length. On its under surface, close to base, a tuft of 20 - 30 long hairs along with a small patch of smaller ones; at about one-third a tuft of 8-10 rigid modified setae, the longest of which are distinctly fork-shaped; a strong bristle on the inner side at middle; apically, a tuft of about 20 small modified bristles ending by another long, stout and curved bristle, together with 3 or 4 smaller ones ventrally. Hind tarsi unmodified; first segment 1.97 mm long with a compact patch of flattened setae close to base and two strong spines at apex; second segment 1.29 mm; third segment 1.02 mm long, with various setae on its under surface and inner and outer sides; fourth segment 0.5 mm long, with a strong bristle distally; fifth segment 0.19 mm long, with 4 or 6 bristles distally; claws subequal.

Male terminalia, as illustrated (Fig. 1D). Coxite (basimere) short and broad, its surface entirely and finely spiculated, with some setae. Style (distimere) short, distal half broadened and with several small setae, ending in a small sharp point and a well developed subterminal spine. Basal mesal lobe poorly developed but distinct, with a group of two moderately strong and 2 or 3 weaker bristles. Lateral plates of aedeagus with 2 lateral teeth, without terminal tooth. Tenth tergite fairly sclerotized, with two strong hooks bent in a right angle so that they point directly inward, separated by a wide and shallow sinus. Male genitalia of *U. machadoi* are very similar to those of *U. caeruleocephala* Theobald 1901, *U. pallidocephala* Theobald 1908, *U. philonuxia* Philip 1931 and *U. angolensis* Ramos 1985 from which it can be separated, however, by the more strongly bent hooks of tenth tergite. It can be easily separated from *U. caliginosa* Philip 1931 by the rounded, not beak-like, lobes of the tenth tergite in this species (Ramos, in press).

LARVAE. Described from a whole fourth instar larva from Cuango. Head (Fig. 1E) wider than long, cephalic index about 1.40. Antenna slightly spiculate, mainly to middle, and infuscated throughout. Seta 4-C with 8 delicately plumose branches; setae 5-C and 6-C almost smooth stout spines (smooth in basal half and with very slight serration distally, not visible under low powers); seta 7-C with 8 branches; seta 8-C with 7 branches and seta 9-C with 5 branches. Mentum with about 12 teeth each side the median tooth with apex forming an acute angle as in *pallidocephala* (fide Peters 1955). Comb-plate of segment VIII (Fig. 1F) well sclerotized, bearing 7 and 9 spines, which are very delicately fringed at the extreme base and markedly unequal, those in the center being much larger; siphon index (mounted specimen) about 3.6; pecten (Fig 1F) with 13 very delicately fringed spines, the fringe extending from the

extreme base to about three-fourths; last pecten spine inserted beyond the subventral tuft; tuft at two-fifths, with about 20 simple branches which arise independently from a large flattened base. Anal segment (Fig. 1F) with complete saddle, longer than broad (ratio 1.87), the posterior margin with minute spicules; lateral seta at about midway between dorsal and ventral margins of segment, with 6 and 8 simple branches; upper caudal seta missing; lower caudal seta double. Ventral brush composed of five pairs of multiple tufts of which the anterior three are single and the posterior 2-branched; anal papillae narrow, about the length of the segment in the only remaining papilla.

PUPA. Trumpet and paddle as illustrated in Fig 1G, H. Chaetotaxy and measurements based on the only, damaged, pelt associated with a female paratype from Cuango. On the cephalotorax, seta 2CT with 6 and 5 branches; 3CT both 5-branched; 4CT with 5 branches; 5CT with 11 branches; 6CT single; 7CT 4-branched; 8CT with 4 and 6 branches; 9CT both with 9 branches; the remaining setae missing.

Trumpet slightly expanded on apical half, tracheoid on basal half with deep meatal cleft and distinct slit; trumpet index 9.1; pinna ratio 0.25 and 0.28; meatus ratio 0.75 and 0.73. On the metathorax, setae 10MT both 4-branched; 11MT both bifid and seta 12MT 5-branched.

Abdomen seta 1I dendritic (about with 18 branches); 4I both 4-branched; 6 and 7I bifid; 1II with 11 or 13 branches; 2II single; 3II both 4-branched, 4II both trifid; 5II both 6-branched; 6II bifid; 1III with 11 or 9 branches; 3III both 4-branched; 4III with 2 or 3 branches; 5III with 9 or 11 branches; 6III with 4 or 5 branches; 7III single; 8III bifid; 10III both 4-branched; 11IV trifid; 2IV single; 3IV with 4 or 5 branches; 4IV single or bifid; 5IV 7-branched; 6IV both 6-branched; 7IV both bifid; 8IV with 3 or 4 branches; 10IV both bifid; 11IV both single; 1V both trifid; 2V both single; 3V with 4 or 6 branches; 4V both 5-branched; 5V with 7 or 8 branches; 6V both 4-branched; 9V single; 10V both single; 11V single; 1VI with 5 or 6 branches; 2VI and 3VI both single; 4VI with 5 or 6 branches; 5VI with 6 or 7 branches; 6VI both 4-branched; 7VI and 8VI both bifid; 10VI single; 1VII both 5-branched; 2VII both single; 3VII with 4 or 5 branches; 4VII both bifid; 5VII with 7 branches; 6VII with 4 branches; 7VII single; 8VII with 4 branches; 9VII bifid; 10VII and 11VII both single; 4 VIII with 4 long branches which arise from a long stem; 9VIII missing; 1IX single and minute.

Paddle (Fig 1H) light brown at base; midrib light brown from base to apex; inner part obviously wider than the outer; outer margin serrate on apical half; inner margin with a few serrations on the distal half; apex very deeply emarginate; seta 1-P absent. Paddle index 1.4. Paddle index (ratio of length of paddle to width), pinna ratio (ratio of length of pinna to total length of trumpet) and meatus ratio (ratio of length of meatus to total trumpet length), as well as the usual trumpet index, measured as in (Belkin 1962) and (Ribeiro *et al* 1979).

DIFFERENTIAL DIAGNOSIS

Larvae of *U. machadoi* can be easily separated from all known larvae of related species (larvae of *U. angolensis*, *U. caeruleocephala* and *U. caliginosa* are unknown), following the key below:

1. Head setae 5C (or C) and 6C (or B) obviously serrated stout spines; lateral seta of saddle 1X with about 10 branches 2
 Head setae 5C (or C) and 6C (or B) stout spines appearing smooth under low powers; seta of saddle (1X) with 5-8 branches 3
2. Head seta 4C (or d) 9-branched * *pallidocephala*
 Head seta 4C (or d) 3-branched *philomuxia*
3. Lateral seta of saddle (1X) 5 branched; siphon index about 2.5 ** *benoiti*
 Lateral seta of saddle (1X) 6 to 8 branched; siphon index about 3.5 *machadoi*

Adults of *U. machadoi* can be easily separated from all known adults of the related african species (*U. benoiti* Wolfs, 1964 is only known in the larval stage). It can be separated from *U. angolensis*, *U. caliginosa*, *U. pallidocephala* and *U. philomuxia* by the presence in the new species of a continuous row of dark bristly hairs along the anterior as well as the upper and posterior margins of the sternopleura. It can also be distinguished from *U. caeruleocephala* by the characters used in the following couplet:

- ♂ Hind tibiae without specialized setae; tarsi unmodified;
- ♂♀ Scales on sternopleuron either all brownish or, sometimes, with a lighter median stripe of whitish scales. Wing with white scales extending for some distance along base of vein Cu; remigium white scaled.....*caeruleocephala*
- ♂ Hind tibiae with groups of specialized setae on its under surface, in the basal half; tarsi modified;
- ♂♀ Upper two-thirds of sternopleuron covered with silvery-white scales, the lower third with dark brown scales. Base of vein Cu pale brown, not white; remigium with brown scales in addition to some white ones*machadoi*

* According to (Peters 1955)

** According to the examination of the larval holotype by the writer.

Pupae of *U. machadoi* are immediately separated from the only two known pupae of related species, *U. pallidocephala* and *U. philomuxia*, by the absence of the terminal seta of the paddle (seta 1P) in the new taxon.

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LEGEND

Fig. 1. *Uranotaenia (Uranotaenia) machadoi* sp. nov.

- A. Front leg of male. Photomicrograph of first and second segments of tarsus.
- B. Middle leg of male. Fourth and fifth segments of tarsus.
- C. Hind leg of male. Photomicrograph of tibia showing groups of specialized bristles.
- D. Male terminalia. Photomicrograph of whole organ in tergal view showing the hook-like tergotateral lobes of tenth tergite and teeth of lateral plate of aedeagus.
- E. Larva, head. Photomicrograph showing setae 5C and 6C.
- F. Larva, abdominal segments VIII, X and siphon.
- G. Pupa, Trumpet.
- H. Pupa, pupal paddle (photomicrograph).

Fig. 1

