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NEW SPECIES OF *TOXORHYNCHITES* (DIPTERA: CULICIDAE) FROM MACAU (CHINA)

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ABSTRACT. The male holotype and female allotype of *Toxorhynchites (Toxorhynchites) macaensis* Ribeiro, a new mosquito species from Macau, southern China, are described on the basis of the examination of a type series of 6 males and 7 females. Similarities of the new species with the other species of the *Splendens* group, to which the new taxon belongs, are discussed and keys to identification of males and females of all the species of the group are provided.

INTRODUCTION

During a mosquito survey carried out in 1994–95 in Macau, a small territory under Portuguese administration in the Pearls' River estuary, southern China, several male and female specimens of a toxorhynchitine mosquito belonging to a new and undescribed species were collected.

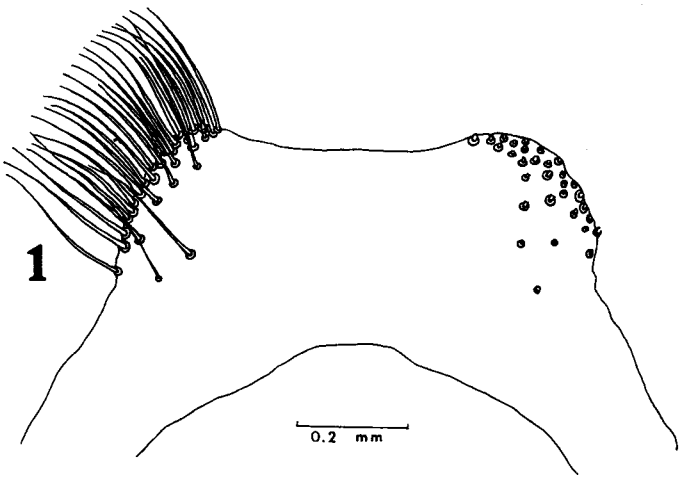
In the descriptions that follow, the terminology used is that of Harbach and Knight (1980), while the format is essentially that of Steffan and Evenhuis (1982).

TAXONOMIC TREATMENT

Toxorhynchites (Toxorhynchites) macaensis Ribeiro, new species

(Figs. 1–5)

Male. Wing length 6.5–8.4 mm. *Head:* Vertex mainly with purplish spatulate scales with pink, bluish green and bronze reflexions; dark forked scales; ocular line of pale scales very narrow, indistinct; usually 2 or 3 pairs of dark brown interocular setae (ISe). Probocis purplish, with some lighter scales at bend. Maxillary palpus (MPlp) mainly dark purple; second palpomere (Plp_2) with silvery scales on outer aspect for about distal ⅓–⅚, Plp_3 with a well-developed patch of silvery scales in middle, often also with small patches at base and apex, this one usually with violet-pink reflexions, Plp_4 with 3–5 pairs of semierect, moderately developed setae. *Antenna:* Pedicel (Pe) dark, without scales; first flagellomere (Flm_1) with well-developed tuft of purplish and silvery white translucent scales with bluish and bronze reflections, flagellar whorls (FW) with about 30 setae. Clypeus (Clp) tomentous. *Thorax:* Integument dark brown. Scutum (Scu) mainly with brownish fusiform scales with blue and bronze reflections, a small area of white scales also in front; supra-alar area with blue-green spatulate scales usually extending into postpronotum and prescutellar area. Scutellum (Stm) mainly with brownish and blue-green spatulate scales, lateral lobes externally with a small patch of silvery white scales; these scales are also present along lower edge of median lobe. Bristles dark brown. Antepronotum (Ap) mainly with blue-green spatulate scales and silvery white scales below and along ventral edge. Postpronotum (Ppn) largely covered with short silvery white spatulate scales; some blue-green scales also present along the upper border. Proepisternum (Ps), mesoka tepisternum (Mks), and mesanepimeron (Mam) with dense patches of silvery white spatulate scales, without brown scales. Pleural setae white and numerous, about a dozen weak ones on Mks, and 1–3 lower mesepimerals (MeSL). A small patch of white narrow fusiform scales below halteres. *Legs:* All coxae (Cx) and trochanters with well-developed patches of silvery white spatulate scales and white hairs; Cx I–III with a few strong, brown lateral setae, a row of strong yellowish mesal setae also present on Cx III. Fore- and midfemura (Fe I, Fe II) mainly purplish. Fe III pale beneath, without row of long hairs. Tibiae mainly dark scaled. Foretarsus (Ta I) dark purple, sometimes with indistinct basal or subbasal stripes of bluish white scales on first and second tarsomeres ($Ta\ I_1$, $Ta\ I_2$); midtarsus (Ta II) with first tarsomere ($Ta\ II_1$) white on about basal ½ or more, $Ta\ II_2$ white on basal ⅔ B ⅘, $Ta\ II_3$ and $Ta\ II_4$ either all dark or with more or less evident bluish white scaling; first hindtarsomere ($Ta\ III_1$) either all dark or with somewhat indistinct subbasal patch of bluish white scales, without brush of long hairs, $Ta\ III_2$ extensively white, dark-ringed at tip, sometimes also with very narrow dark ring at base; remainder of tarsomeres dark. Ungues of fore and midtarsi (U I, U II) unequal, one of them stronger and toothed; U III, smaller, equal, and simple. *Wing:* Costa and radius R_1 purple scaled with some bluish green scaling mainly at base, other wing scales brownish; rm index from about 2 to 3; medial veins 3 and 4 (M_{3+4}) strongly oblique, ondulate, reaching M_{1+2} at or slightly distad of rm; wing membrane slightly darker anteriorly. *Halter:* Pedicellum yellowish, bare, capitellum with brownish scales becoming yellowish golden at apex. *Abdomen:* Laterotergite with dense patch of silvery white spatulate scales and a few white hairs. First tergum (Te I) greenish blue in middle with lateral large patches of silvery white, yellowish or golden spatulate scales and many white hairs. Second and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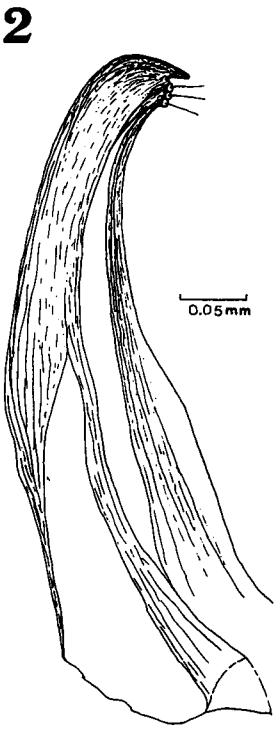
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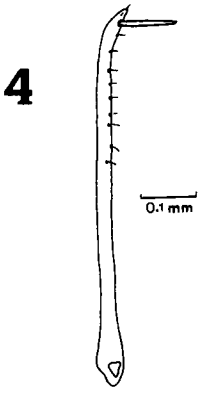
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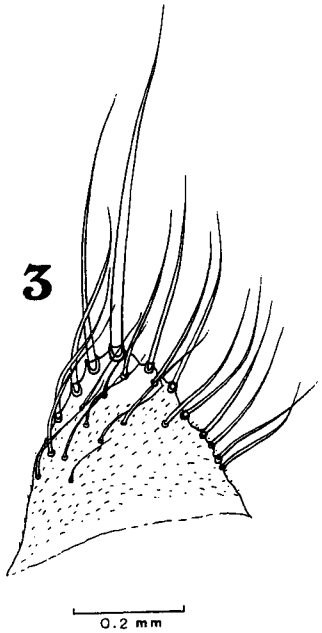
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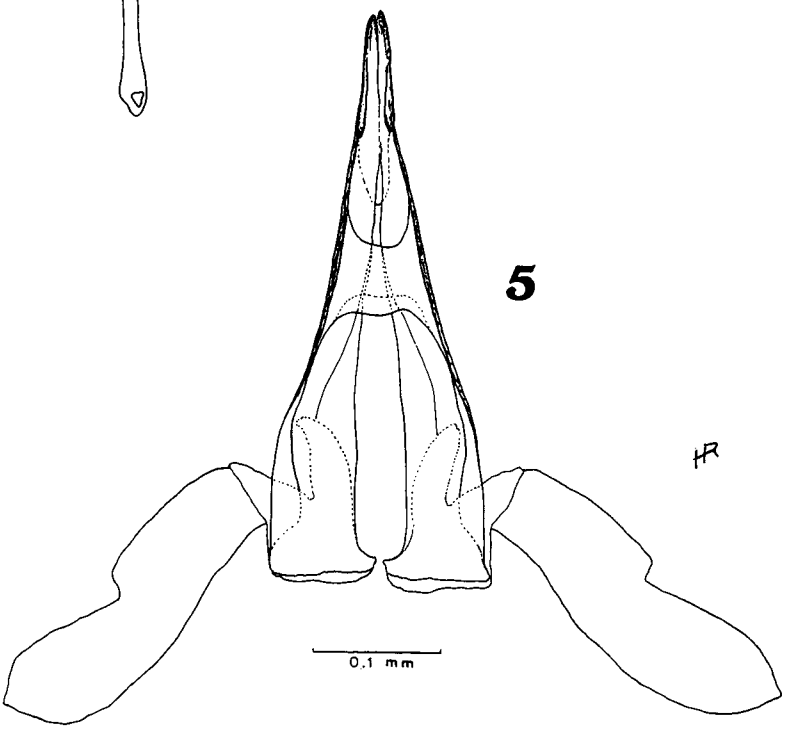
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third terga (Te II, Te III) usually with predominant dark blue scaling, though there is variable admixture of purple scales, namely on Te III. Te IV–VIII from purple- to dark blue-scaled, some bright blue scales usually also present along lateral margins, above, on Te VI–VIII. Lateral pale scale patches on terga from white to golden, often visible from above on terga I, V, III, and (II, VI), decreasing order of usual patches' magnitude; Te IV always dark above. Lateral aspect of abdominal terga from yellowish white to golden on Te II, III, and V, purple on Te IV. Caudolateral tufts well developed, that of Te VI black distally, at times almost all black, though usually pale on basal ⅓–⅔; sometimes white on about basal ⅓, yellowish in middle and black at distal ⅓; tuft of Te VII black; that of Te VIII orange or orange-yellow, sometimes also with a few black hairs at base. Sterna (S) II–IV with median stripe of purple scales, yellowish laterally; S V–VII usually more extensively yellow-scaled, SVIII often so. *Genitalia* (Figs. 1–5): Gonocoxite (Gc) length 0.63–0.71 mm; gonostylus (Gs) length also 0.63–0.71 mm; gonostylar claw (GC) length 0.095–0.103 mm, only 0.14–0.16 the length of gonostylus. Te IX: distal margin slightly concave, interlobar space wide, lobes (TL IX) with 24 ± 5.9 (14–37; n = 46) setae each (mean, standard deviation, variation interval, and number of observations). Gc without extraordinary strong setae on inner aspect. Gs with moderately long hairs, all or almost all inserted along distal ½, with 1 or 2 small setulae at apex. GC subapical, blunt-tipped. Basal mesal lobe (BML) with 1 strong apical seta reaching to about ⅔ or more of Gc. Paraproct with well-sclerotized apex, without unsclerotized transverse band, bearing 3 cercal setae. Aedeagus with distinct, moderately wide dorsal bidge (DAB), apex with a pair of moderately sclerotized spurs. Basal piece and paramere as illustrated.

Female. Wing length 5.5–7.5 mm. General morphology much as in the male, unless otherwise stated. *Head:* MPlp mainly purplish, with metallic blue and violet reflections toward tips of the segments; ratio MPlp/proboscis about 0.3. *Antenna:* Pe dorsally and medially clothed with white scales. Flm_1 with small tuft of purplish brown scales, FW with 4 or 5 small setae. *Legs:* All tibiae with some yellow scaling behind, mid- and hindtibia (Ti II and Ti III) usually extensively yellowish in front. Foretarsus: Ta I_1 almost all white, dark on about basal ⅕; Ta I_2 also mainly white-scaled, dark only at about distal ⅙–⅓; Ta I_3 often with extensive white scaling on outer aspect; Ta I_4 and Ta I_5 always dark; midtarsus: Ta II_1 white on basal ½–¾, sometimes white almost to tip, in front; Ta II_{2-4} all white or only narrowly dark at tip; Ta II_5 also often white-scaled basally; hindtarsus: Ta III_1 with more or less distinct subbasal patch of pale scales, sometimes making a complete ring; Ta III_2 all white or only narrowly dark at tip; Ta III_3 usually with some white scaling at base; Ta III_4 and Ta III_5 dark. All ungues small, equal, and untoothed. *Abdomen:* Caudolateral tufts of Te VI–VIII about as well developed as in the male, similarly colored. S IV almost all dark, with only a lateral line of golden scales; S VII purplish on about median ⅓, golden-scaled at sides.

Type data. *Holotype:* Male labeled *Toxorynchites (Tox.) macaensis* sp. nov. ♂ Holótipo. Macau. Ilha de Coloane, Parque Siac Pai Van, 1995. 09.25.No. E 39492." Genitalia mounted on slide. *Allotype:* Female similarly labeled, same data, but No. E 39493. *Paratypes:* Five males and 6 females, same data, Nos. E 39494 to E 39504.

All type material was laboratory-reared from larvae collected in a well-shaded body of turbid water with many fallen leaves in the bottom of an abandoned boat, at the Park Siac Pai Van, Coloane Island, 22°07′N 113°34′E, at an altitude of about 5 m near the sea coast.

Material examined. In addition to the type material, 22 males and 18 females from several other biotopes in the Coloane and Taipa Islands were also examined, making a total of 28 males and 25 females.

Etymology. The new species is named for Macau, the area of origin of the type series.

DISCUSSION

Toxorhynchites macaensis sp. nov. obviously belongs to subgenus *Toxorhynchites* s. stricto, mainly owing to the following: absence of golden scales on pleurae and coxae, densely scaled laterotergite, female with very short maxillary palpus, male with toothed midungues and, in the male genitalia, short gonostylar claw and absence of an unsclerotized transverse band on paraproct (Edwards 1932, Belkin 1962, Ribeiro 1991).

Within subgenus *Toxorhynchites, Tx. macaensis* sp. nov. also apparently belongs to the *Splendens* Group, as defined by Steffan and Evenhuis (1985), mainly because of the following characters: antennal pedicel scaled at least in female, absence of lateral stripe of pale greenish scales on scutum, rm index > 2, caudolateral tufts well developed, sternites medially dark-scaled, and a GC/Gs ratio of less than 0.12.

The *Splendens* group, widely distributed in the Oriental and Australasian regions, includes the following previously described taxa: *amboinensis* (Doleschall), *inornatus inornatus* (Walker), *inornatus albitarsis* (Brug), *pendleburyi* (Edwards), *ne-*

←

Figs. 1–5. *Toxorhynchites macaensis* sp. nov., male genitalia. (1) Tergum IX, paratype. (2) Paraproct, paratype. (3) Basal mesal lobe, holotype. (4) Gonostylus, paratype. (5) Aedeagus, parameres and basal pieces, holotype.

penthicola (Steffan and Evenhuis), *speciosus* (Skuse) and *splendens* (Wiedmann). Within this group, *Tx. macaensis* sp. nov. seems to be nearer to *amboinensis* and *splendens,* from which it can be easily separated, however, by the paler tarsi of the new species in both sexes and, in the male, by some genitalic characters and by the color of the caudolateral tuft of Te VIII, which is black in *amboinensis* (Steffan 1986, Steffan et al. 1982). *Toxorhynchites macaensis* sp. nov. can also be easily separated, in the male sex, from *nepenthicola* by the bare Pe and the absence of brush in the Ta III_1, in the former (Steffan and Evenhuis 1982), from *speciosus* by the ornamentation of Ta I_1 (Cooledge 1911), from *inornatus inornatus* by the color of the scales on Ppn, largely bluish green in the latter (Belkin 1962, Steffan 1986), and from *inornatus albitarsis* by the absence of a patch of scales on Flm_1, the green scaled Ap and the black tuft on Te VI of this one (Brug 1939). The scaling of Ppn and Ta I_2 also separates the females of the new species from those of *inornatus inornatus,* while the white scaling of Ta I_2 and Ta III_1 in *Tx. macaensts* sp. nov. easily separates its females from those of *nepenthicola.* Lastly, the females of the new species can also be distinguished from those of *pendleburyi* mainly by the largely bicolored Ppn of the latter (Edwards 1930).

The described males and females of all known species of the *Splendens* group, including the new taxon, can be identified by means of the keys that follow.

Keys to Species of the *Splendens* Group of Genus *Toxorhynchites*

Males

The male of *Tx. pendleburyi* is not known. The undescribed genitalia of *Tx. inornatus albitarsis* is assumed to be typical.

1. Caudolateral tuft of Te VIII black ..... *amboinensis*
1. Tuft of Te VIII whitish to orange yellow 2
2. Pe with dorsal white scales; Ap mainly with brownish scales, with bluish reflections, and silvery white scales along the lower edge; Ta III_1 with moderately developed though well-defined brush on basal ⅕; DAB quite distinct and very narrow ..... *nepenthicola*
2. Pe without scales; Ap with light bluish green and/or creamy white scales; Ta III_1 without ventral brush; DAB either moderately wide or with indistinct distal edge 3
3. Ta I_1 and Ta II_1 mainly white, dark at base only ..... *speciosus*
3. Ta I_1 and Ta II_1 all dark or with basal or subbasal pale scaling 4
4. Scales on Ppn mainly bluish green ..... *inornatus inornatus*
4. Ppn mainly with creamy, white or silvery white scales 5
5. First antennal flagellomere (Flm_1) without scales; Ap green-scaled; caudolateral tuft on Te VI black ..... *inornatus albitarsis*
5. Flm_1 with well-developed patch of scales; scales on Ap mainly white or distinctly bluish, not green; tuft on Te VI at least narrowly white at base, not entirely dark 6
6. Ta II_1 and Ta II_2 white on about basal ½ or more; Ta III_2 extensively white, at most narrowly dark at base and apex; lateral lobes of Te IX (TL IX) with 24 ± 5.9 setae each (mean and standard deviation); DAB quite distinct, moderately wide ..... *macaensis* sp. nov.
6. Tarsi usually all dark, sometimes with basal or subbasal very indistinct light scaling; TL IX each with about 12–20 setae; DAB without a distinct distal edge ..... *splendens*

Females

The females of *Tx. speciosus* and *Tx. inornatus albitarsis* are not known.

1. Ta I_2 dark 2
1. Ta I_2 not all dark, from white at base to almost all white 3
2. Scales on Ppn mainly bluish green, some white scales only at lower edge; Ta II_2 largely white, often with dark apical ring; Ta III_1 with a broad white basal ring; sternum S IV almost completely dark-scaled ..... *inornatus*
2. Scales on Ppn mainly silvery white; Ta II_2 white at basal ⅓ only; Ta III_1 dark; S IV dark along median ⅓, golden-scaled laterally ..... *nepenthicola*
3. Scales on Ppn blue on upper ½, creamy below; caudolateral tuft of Te VI orange ..... *pendleburyi*
3. Ppn not bicolored, scales mainly white, silvery or creamy; tuft of Te VI distally black or dark brown 4
4. Ta I_2 all white or white on at least the basal ⅔; Ta III_2 all white or with only a narrow apical dark ring; S VII mainly golden-scaled; caudolateral tuft of Te VI white basally and black distally, often also yellowish at middle ..... *macaensis* sp. nov.
4. Ta I_2 white only on basal ½; T III_2 dark on about distal ¼–½; S VII mainly dark; tuft of Te VI bicolored 5
5. Ta III_1 usually all dark; caudolateral tuft on Te VI largely orange yellow, dark brown distally ..... *splendens*
5. Ta III_1 pale to golden-scaled on about subbasal ⅕; tuft on Te V I white on about basal ½, black distally ..... *amboinensis*

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