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ON *COQUILLETTIDIA CRASSIPES,* A NEW RECORD FOR MACAU, WITH A KEY TO ADULTS OF THE SUBGENERA AND SPECIES GROUPS OF THE GENUS

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ABSTRACT. *Coquillettidia* (*Coquillettidia*) *crassipes* is recorded for the 1st time in the Territory of Macau, southern China. The systematics of the genus is examined, new species groups are proposed, and a key to subgenera and species groups of *Coquillettidia* is provided.

KEY WORDS *Coquillettidia crassipes*, new record, Macau, systematics

INTRODUCTION

Several *Coquillettidia* (*Coquillettidia*) *crassipes* (Van der Wulp) males and females were captured in the Territory of Macau, southern China, during September and October 1997. This is the 1st record of this genus and species from the territory, which was not listed in the last revision of the local mosquito fauna (Ramos et al. 1997), although the species was already known from Hong Kong (Chau 1982).

In the present account, we follow the taxonomic treatment of the tribe Mansoniini adopted by Knight and Stone (1977), recognizing the generic status of *Coquillettidia* Dyar, with subgenera *Austromansonia* Belkin, *Coquillettidia* s.s., and *Rhynchotaenia* Brèthes. New species groups within the subgenus *Coquillettidia* are proposed and a key to all subgenera and species groups of the genus is provided. The morphologic terminology used follows that of Harbach and Knight (1980).

COQUILLETTIDIA (COQUILLETTIDIA) CRASSIPES (VAN DER WULP, 1881)

Collection data. Municipal Sanitary Services, Coloane Island: 7 females, September 18, 1997; Parque Siac Pai Van, Coloane Island: 67 females and 9 males, September 18–24, 1997; Taoist Cemetery, Taipa Island: 1 male, September 18, 1997. All specimens were captured by light trap with CO_2, except 1 male and 1 female landing on human bait.

Distribution. *Coquillettidia crassipes* is known from Pakistan, India, Sri Lanka, Burma, Thailand, southern China, including Hong Kong and Macau, Malaysia, Philippines, Indonesia, Ryukyu-Retto Islands, Mariana Islands, New Guinea, Australia, and Bismark Archipelago. Figure 1 shows the approximate distribution of the species.

Notes on morphology. The following notes are intended to complete the short known descriptions, namely those of Barraud (1934) and Delfinado (1966), because more precise and complete descriptions of different local *Cq. crassipes* populations may contribute to clarifing the taxonomy of the various forms reported as "*crassipes*" from numerous localities in the Oriental, Indomalayan, and Australasian regions (Belkin 1962).

FEMALE. *Head:* With 6 well-developed ocular setae on each side; vertex with narrow, yellow upright forked scales behind and yellow decumbent scales anteriorly. Ocular line with broad whitish scales. Antenna, maxillary palpus, clypeus, and proboscis brown with violet sheen. Pedicel yellow, with a few light brown scales. Palpus 0.2–0.25 length of proboscis. *Thorax:* Scutum yellowish, with sparse covering of narrow golden scales; acrostical, dorsocentral, and dorsolateral setae brownish; antepronotum with a row of well-developed setae on the upper part; postpronotum with about 6 well-developed setae curved over anterior spiracle. Mesepimeron with a strong seta at about 0.6 of mesomeron. No postspiracular setae. A patch of silvery flat scales on upper part of mesepimeron, another on mesokatepisternum near mesopleural suture. Without scales on the prealar knob. Integument of pleura yellowish brown, with some well-defined darker areas. Scutellum without scales, with the usual 3 groups of strong setae. *Wing:* Scales narrow and dark, with pronounced purple reflections, without setae at base of subcosta ventrally. Alula and calypter fringed. *Legs:* Femora yellowish at base, purplish on apical 0.5–0.6; hindfemur with a median stripe of silvery scales at middle of outer surface. Tibiae long and slender, with dark, smooth scaling. Tarsi all dark, with purple sheen. *Abdomen:* Terga I–IV dark, mainly covered with purple scales, with basolateral yellow patches; terga V–VIII

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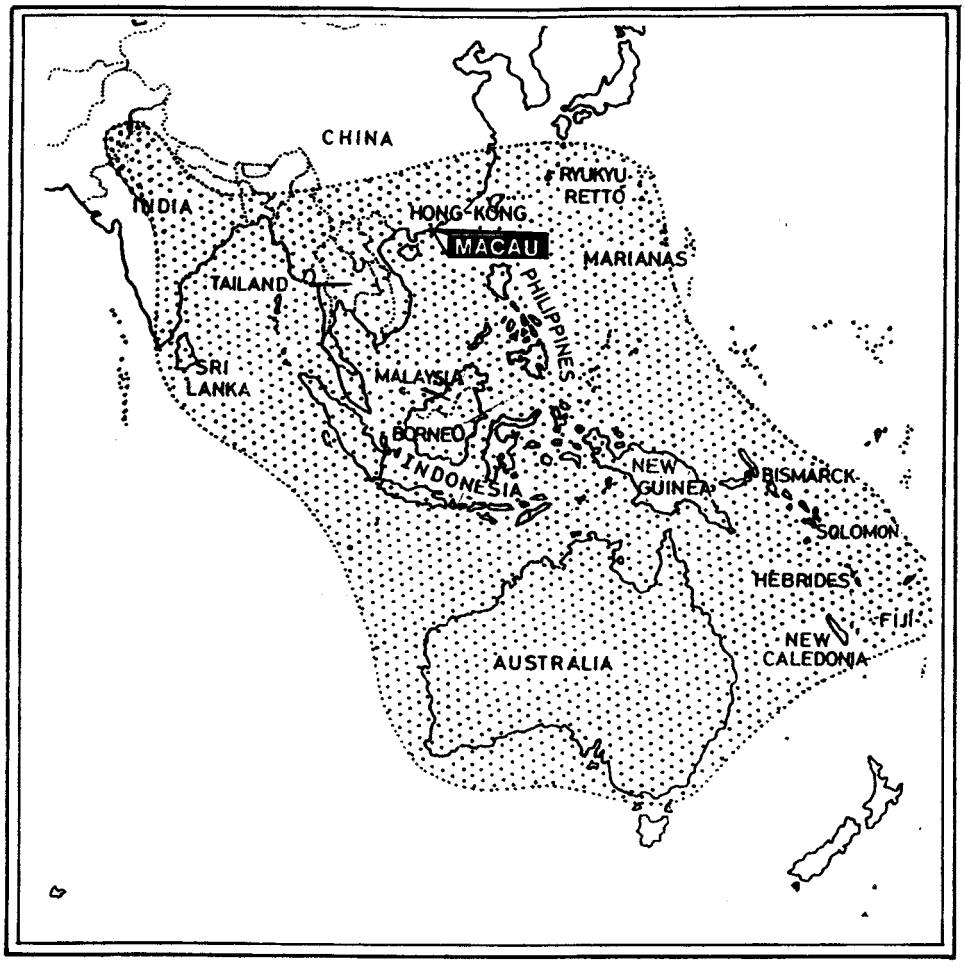

Fig. 1. *Coquillettidia* (*Coquillettidia*) *crassipes*. Approximate area of distribution.

mainly yellow scaled. Sterna II–VI yellow scaled at bases, VII and VIII mainly purple.

MALE. General morphology as in female. *Maxillary palpus:* Maxillary palpus longer than proboscis by slightly less than length of last palpomere, which is about 0.5 length of penultimate palpomere and turned downward, both moderately setose. *Genitalia* (Fig. 2): Tergum VIII rounded distally, with many setae; sternum VIII with a distinct median lobe at the posterior margin bearing about 12 strong appressed setae; tergum IX with wide interlobar space, lobes prominent, with a few weak setae. Gonocoxite with numerous long, strong setae on outer aspect and a dense setose area of fine, moderately long setae on inner aspect at apex. Basal mesal lobe with a long, strongly sclerotized, blunt-tipped rodlike basal mesal seta reaching near apex of gonocoxite. Gonostylus rather narrow basally, strongly curved, moderately enlarged distally, with a spiniform seta on inner margin, at about 0.33, and 2 moderately long, slender setae near base of gonostylar claw. Gonostylar claw short, pointed, well sclerotized. Aedeagus as figured, strongly sclerotized, rounded distally, constricted at about 0.33. Paramere and basal piece well developed. Paraproct with 2 strong teeth and a few small denticles at apex, with 5 or 6 cercal setae.

Systematics. The genus *Coquillettidia* was treated by Edwards (1932) as a subgenus of *Mansonia* Blanchard, a decision adopted by most subsequent authors. Belkin (1962) recognized 2 strikingly different sections within the tribe Mansoniini (*Mansonia* and *Mansonioides,* on one side, and *Coquillettidia* and *Rhynchotaenia,* on the other), considering that "it may be advisable to recognize a separate genus for each." In 1963, Ronderos and Bachmann elevated *Coquillettidia* to generic status. This was the taxonomic arrangement adopted in the catalog of Knight and Stone (1977), with 2 genera within the tribe Mansoniini: *Mansonia,* with subgenera *Mansonia* s.s. and *Mansonioides* Theobald, and *Coquillettidia,* with *Coquillettidia* s.s., *Rhynchotaenia* Brèthes, and *Austromansonia,* a monotypic subgenus described by Belkin (1968) for his

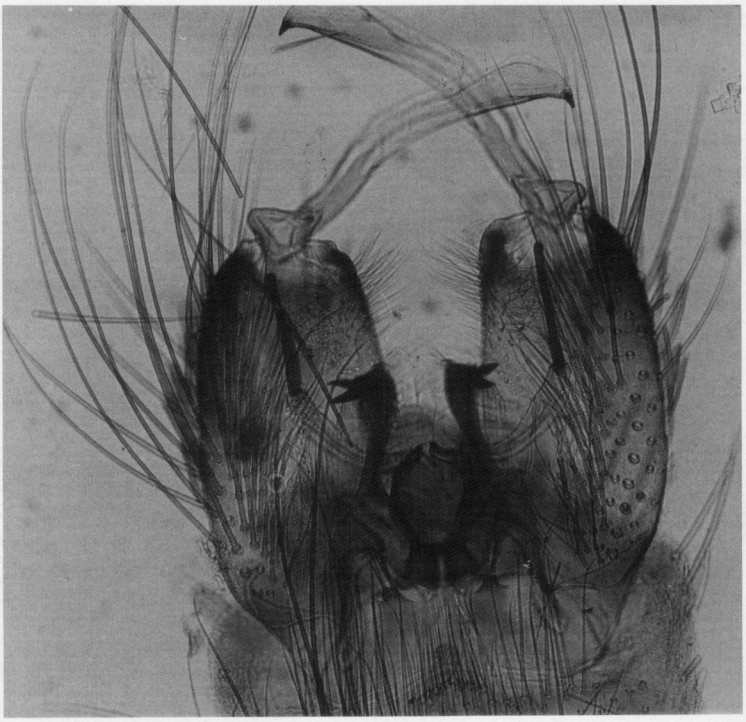

Fig. 2. *Coquillettidia* (*Coquillettidia*) *crassipes,* from Macau. Male genitalia (125×) .

Tenuipalpis Group. This also represents our view, although some earlier authors disagree with it, namely Mattingly (1971), Chau (1982), Danilov (1983), and Service (1990).

The subgenus *Coquillettidia* differs markedly from the other 2 subgenera and is, in turn, highly heterogenous, as shown by the recognition of 2 species groups of *Coquillettidia* s.s. by Belkin (1962) in the South Pacific: the endemic Australasian Iracunda Group and the Oriental and Australasian Crassipes Group. As defined by Belkin, the Crassipes Group may be characterized, in the adult stage, as follows: upright forked scales on vertex long and narrow; absence of postspiracular scales; mesokatepisternal scales largely restricted to lower area; presence of mesepimeral scales; wing with plume scales narrow, without a setal patch at base of subcosta ventrally (sometimes with 1 or 2 small setae); hindtibia long and slender, with smooth scaling, as usual; maxillary palpus of male slightly longer than proboscis and moderately curved downward, 5th palpomere shorter than 4th.

Coquillettidia specimens from Macau exhibit all the characters of the Crassipes Group. Within the group, the shape of the gonostylus and other male genitalic characters (Fig. 2) permitted a definite identification of the specimens as *Cq. crassipes.*

Another contribution to the systematics of subgenus *Coquillettidia* was given by Marks (1974), who distinguished 2 species groups in the Oriental Region, both lacking postspiracular and subcostal patch of setae but differing in pleural scaling and length and scaling of hindtibia. Six of these species were included by her in the Crassipes Group of Belkin. Marks (1974) formed a new group, the Ochracea Group, with other 4 species, which is mainly characterized by the absence of mesepimeral scales and the rather short and stout hindtibia with roughened scaling.

In Africa south of the Sahara, as pointed out by Marks (1974), *Cq. metallica* is also strikingly different from any other species of *Coquillettidia* in the region, having dark legs and wings, and lacking setae at the base of the subcosta ventrally (Edwards 1941, Gillett 1946, Ramos and Ribeiro 1975, Danilov 1983, Service 1990, Ribeiro and Ramos 1995). Thus, it seems advisable to consider this species as belonging to a new monotypical Metallica Group, endemic to the Afrotropical Region. As to the remaining Afrotropical species, they seem to belong to a widely distributed group apparently also including the Nearctic *Cq. perturbans* (Walker), and the Palaearctic *Cq. richiardii* (Ficalbi) and *Cq. buxtoni* (Edwards), here named the Pertubans Group, after the 1st described species of the group.

According to the preceding notes, our view is that the following 5 species groups are to be recognized within the subgenus *Coquillettidia*: the Crassipes Group of Belkin, Oriental and Australasian; the monotypical Iracunda Group of Belkin, endemic to New Zealand; the Ochracea Group of Marks, also with an Oriental and Australasian dis-

tribution; the monotypical Metallica Group, endemic to Africa south of the Sahara; and the Perturbans Group, mainly Afrotropical but apparently also including 3 species in the great Holarctic Region.

The monotypical Metallica Group may be characterized, in the adult stage, as follows: postspiracular setae absent; mesokatepisternum with 2 distinct groups of scales, those of the upper group not extending to the prealar knob; mesepimeron without scales; wings dark; wing plume scales narrow; without setae at the base of the subcosta ventrally; hindtibia long and slender, with smooth scaling; tibiae and tarsi entirely dark; maxillary palpus of male slightly curved downward, 5th palpomere distinctly shorter than 4th; posterior margin of sternum VIII of male not produced in middle.

The Perturbans Group also may be characterized, in the adult stage, as follows: postspiracular setae absent; mesokatepisternal scales present, not extending to the prealar knob; with a patch of mesepimeral scales; wings with more or less abundant pale scaling (except in *Cq. buxtoni* and *Cq. nigritarsis*); wing plume scales broadish; a few setae usually present at base of subcosta ventrally; hindtibia long and slender, often more or less shaggy; tibiae never entirely dark; tarsi ringed or with other pale markings (but dark in *Cq. buxtoni*); maxillary palpus of male curved downward; ratio 5th to 4th palpomeres about 1; posterior margin of male sternum VIII not produced in middle.

As defined, the Perturbans Group includes the Nearctic type species *perturbans* (Walker, 1856), the Palaearctic *buxtoni* (Edwards, 1923) and *richiardii* (Ficalbi, 1889), and all the Afrotropical species except *metallica*: *annettii* (Theobald, 1901), *aurea* (Edwards, 1915), *aurites* (Theobald, 1901), *chrysosoma* (Edwards, 1915), *cristata* (Theobald, 1904), *flavocincta* (Edwards, 1936), *fraseri* (Theobald, 1911), *fuscopennata* (Theobald, 1903), *grandidieri* (Blanchard, 1905), *karandalaensis* (Wolfs, 1951), *maculipennis* (Theobald, 1911), *microannulata* (Theobald, 1911), *nigritarsis* (Wolfs, 1952), *nigrithorax* (Theobald, 1910), *pseudoconopas* (Theobald, 1910), *rochei* (Doucet, 1951), *schoutedeni* (Wolfs, 1948), *vanoeyi* (Wolfs, 1948), *versicolor* (Edwards, 1913), *voltaensis* (Danilov, 1982), and *wahlbergi* (Edwards, 1936).

The following key will separate the 3 subgenera and 5 species groups here recognized in the genus *Coquillettidia*, including the new Metallica and Perturbans Groups.

KEY TO SUBGENERA AND SPECIES GROUPS OF GENUS *COQUILLETTIDIA* DYAR (ADULTS)

1 With postspiracular setae (Neotropical) . . . . . Subgenus *Rhynchotaenia*

– Without postspiracular setae 2

2(1) Mesepimeron with scales 3

– Mesepimeron without scales Subgenus *Coquillettidia*, in part 6

3(2) Scales of mesokatepisternum largely confined to lower area Subgenus *Coquillettidia*, in part 4

– Scales of mesokatepisternum extending to prealar area 5

4(3) Wing plume scales narrow; at most 1 or 2 small setae present at base of subcosta ventrally; hindtibia smoothly scaled; ♂: sternum VIII with a distinct median lobe at the posterior margin (Oriental and Australasian) . . . . . Crassipes Group

– Plume scales broader; usually, with at least a few setae at base of subcosta ventrally; hindtibia often more or less shaggy; ♂: sternum VIII not produced posteriorly (mainly Afrotropical, with a few Holarctic species) . . . . . Perturbans Group

5(3) Ventral side of subcosta with a large patch of setae at base; ♂: 2 last palpomeres slightly upturned; 5th palpomere slightly longer than 4th (Australasian) . . . . . Subgenus *Austromansonia*

– Base of subcosta without ventral setae; ♂: maxillary palpus turned downward; 5th palpomere about as long as 4th (Australasian) Subgenus *Coquillettidia*, in part. . Iracunda Group

6(2) Wing entirely dark; plume scales narrow; tibiae and tarsi dark; hindtibia long and slender, smoothly scaled, as usual (Afrotropical) . . . . . Metallica Group

– Wing, tibiae, and tarsi not entirely dark; plume scales broadish; hindtibia rather short and stout, with roughened scaling (Oriental and Australasian) . . . . . Ochracea Group

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