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Cover photo: *Metasesarma aubryi*, Ujung Kulon National Park, West Jawa, Indonesia Photo by: Gerald Cubitt

**THE TERRESTRIAL SESARMINE CRABS OF
THE GENERA *Metasesarma* AND *Geosesarma*
(CRUSTACEA: DECAPODA: BRACHYURA: GRAPSIDAE)
OF UJUNG KULON, WEST JAWA, INDONESIA**

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ABSTRACT

Three species of terrestrial grapsid crabs of the genera *Metasesarma* and *Geosesarma* are recorded from Ujung Kulon National Park at the southwestern tip of Jawa, Indonesia. Two species of *Metasesarma*—*M. rousseauxi* H. Milne Edwards, 1853, and *M. aubryi* (A. Milne Edwards, 1869)—are present in the more coastal parts of the park, while a new species of *Geosesarma*, *G. bicolor* sp. nov., occurs further inland. The present paper elaborates on the taxonomy of *M. rousseauxi* and *M. aubryi* and describes *G. bicolor*.

Key Words: Brachyura, Decapoda, *Geosesarma*, Grapsidae, Indonesia, *Metasesarma*, Ujung Kulon.

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INTRODUCTION

In 1991, Tony Whitten sent the first author a photograph of a strikingly-colored terrestrial sesarmine crab from Ujung Kulon National Park at the southwestern tip of Jawa, Indonesia. The crab appeared to be a species of *Metasesarma* or *Geosesarma*, but its precise identity could not be determined as no specimens were collected. Whitten and Whitten (1992) subsequently published the photograph of the crab (identifying it as a species of *Neosarmatium*) in a book on Indonesian wildlife. Between July and August, 1993, Christopher Stewart carried out a study of the ecology of the mangrove and terrestrial crabs in the national park. He subsequently sent specimens of the terrestrial sesarmines (including the distinctively-colored crab) to the first author for identification.

Studies of the collected specimens show the presence of three species of terrestrial sesarmine crabs in Ujung Kulon National Park. One is a new species of *Geosesarma* (*G. bicolor* sp. nov.), and two belong to *Metasesarma* (*M. rousseauxi* H. Milne Edwards,

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1853, and *M. aubryi* (A. Milne Edwards, 1869)). The distinctively-colored crab proved to belong to *M. aubryi*. The present paper provides diagnoses and taxonomic notes for all three species.

Measurements given are of the carapace width and length respectively. The abbreviations G1 and G2 are used for the male first and second pleopods, respectively. Specimens are deposited in the Zoological Reference Collection (ZRC), Department of Zoology, National University of Singapore; and the Queensland Museum (QM), Brisbane, Australia. Voucher specimens have also been deposited by Christopher Stewart in the Museum Zoologicum Bogoriense, Bogor, Indonesia.

TAXONOMY

Geosesarma de Man, 1892

Sesarma (*Geosesarma*) de Man, 1892: 341. Serène, 1968: 1084.

Geosesarma: Serène and Soh, 1970: 403, 407. Ng, 1988: 118.

Type species

Sesarma (*Geosesarma*) *nodulifera* de Man, 1892, by subsequent designation by Serène and Soh (1970).

Diagnosis

There is no clear definition of *Geosesarma*, but according to Serène and Soh (1970), the genus can be separated from most other sesarmine genera in having a swollen, globular basal antennular segment, with the antennal peduncle almost longitudinal in position. All members are freshwater and/or terrestrial species, and the one common character seems to be the few (*ca.* 50) large eggs (*ca.* 1.0–1.5 mm diameter) laid by the females, which hatch into very advanced larvae or young crabs (see Ng and Tan, 1995). *Geosesarma* is clearly polyphyletic, with at least three distinct groups, but until all the members can be re-examined, any division of the genus is premature (see also Ng, 1988).

Remarks

Crabs of the genus *Geosesarma* de Man, 1892, are terrestrial crabs common in tropical rainforest habitats in Southeast Asia, eastern Indonesia, Papua New Guinea, and some islands of the West Pacific; about 40 species are known at present (see Ng, 1988). Sixteen species are known from Indonesia: *G. amphinome* (de Man, 1899) [Kapas], *G. aranea* (Nobili, 1899) [Nias Islands], *G. celebense* (Schenkel, 1902) [Sulawesi], *G. clavicrura* (Schenkel, 1902) [Sulawesi], *G. insulare* Ng, 1986 [Anambas Islands], *G. leprosum* (Schenkel, 1902) [Sulawesi], *G. maculatum* (de Man, 1892) [Halmahera], *G. nannophyes* (de Man, 1887) [Sumatera], *G. noduliferum* (de Man, 1892) [Jawa], *G. ocyropa* (Nobili, 1899) [Sumatera], *G. rouxi* (Serène, 1968) [Jawa], *G. sumateraense* Ng, 1986 [Sumatera], *G. sylvicola* (de Man, 1892) [Sumatera], *G. ternatense* (Serène, 1968) [Ternate Islands], *G. teschi* Ng, 1986 [Natuna Islands], and *G. notophorum* (Ng and Tan, 1995) [Lingga Islands].

Geosesarma bicolor sp. nov.

Material Examined

Holotype: male, 11.0 x 10.5 mm (ZRC), Citerjun, in creeks, under stones, Ujung Kulon, West Jawa; coll. C. Stewart, July 1993. Paratypes: one male, 10.5 x 9.9 mm; two non-ovigerous females, 10.0 x 9.7 mm and 13.9 x 12.7 mm (both mature) (ZRC), same data as holotype.

Description of Male Holotype

Carapace squarish, slightly broader than long, dorsal surfaces smooth; regions relatively distinct, grooves shallow (Fig. 1, 2C). Frontal margin strongly deflexed, distinctly sinuous, forming two rounded lobes; postfrontal cristae distinct, sharp, each crista bi-lobed; surface of frontal region gently concave (Fig. 2A, B).

Lateral margin almost straight, exorbital angle acutely triangular, directed obliquely outwards; separated from first epibranchial tooth by deep V-shaped cleft; first epibranchial tooth low but distinct, rounded; second epibranchial tooth small but distinct, separated from first epibranchial tooth by small cleft. Posterolateral margin slightly diverging, regions covered with fine oblique striae (Fig. 2A). Merus of third maxilliped very broad, oval; exopod slender, with well developed flagellum (Fig. 2C).

Male chelipeds sub-equal; inner margin of carpus serrated; merus with sharp subdistal tooth on ventral and dorsal margins; outer surfaces of palm slightly rugose to almost smooth, upper and lower margins covered with low, sharp granules (Fig. 2D); proximal part of upper margin of dactylus lined with 10 small, low granules (Fig. 2E); fingers slightly shorter than palm, cutting edges lined with well developed teeth (Fig. 2D).

Ambulatory legs long, second pair longest, meri of all legs broad, each with a sharp subdistal dorsal spine; ventral margin of first ambulatory propodus and dactylus with dense brush-like setae (Fig. 1a-b).

Male abdomen broadly triangular, segment 7 rounded, sub-equal in length to segment 6; lateral margins of segments 6 and 7 distinctly convex; segments 4 and 5 trapezoidal; segment 3 rectangular, lateral margins convex; segments 1 and 2 narrow (Fig. 2F).

G1 relatively slender (Fig. 2G); distal part pectinate, long, spade-like, dorso-ventrally flattened, directed obliquely outwards (Fig. 2 I-M). G2 short, without distal segment (Fig. 2H).

Paratypes

The paratype male agrees with the holotype in all major characters except that it is smaller. Both female paratypes are mature and agree with the holotype male in most non-sexual characters. The number of granules on the dactylus of the chela varies somewhat in the paratypes, from seven to 10.

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Figure 1a. *Geosesarma bicolor* sp. nov., holotype male (ZRC), 11.0 x 10.5 mm.



Fig. 1b. *Geosesarma bicolor* sp. nov., paratype female (ZRC), 13.9 x 12.7 mm.

Color

In the holotype male and larger female, the anterior one-third of the carapace is bright purple, the posterior two-thirds being bluish-grey. In the smaller paratypes, the anterior one-third is also clearly defined, but the purple color is paler. The corneas of all four specimens are bright yellow.

Etymology

The species is named after its distinctive color pattern.

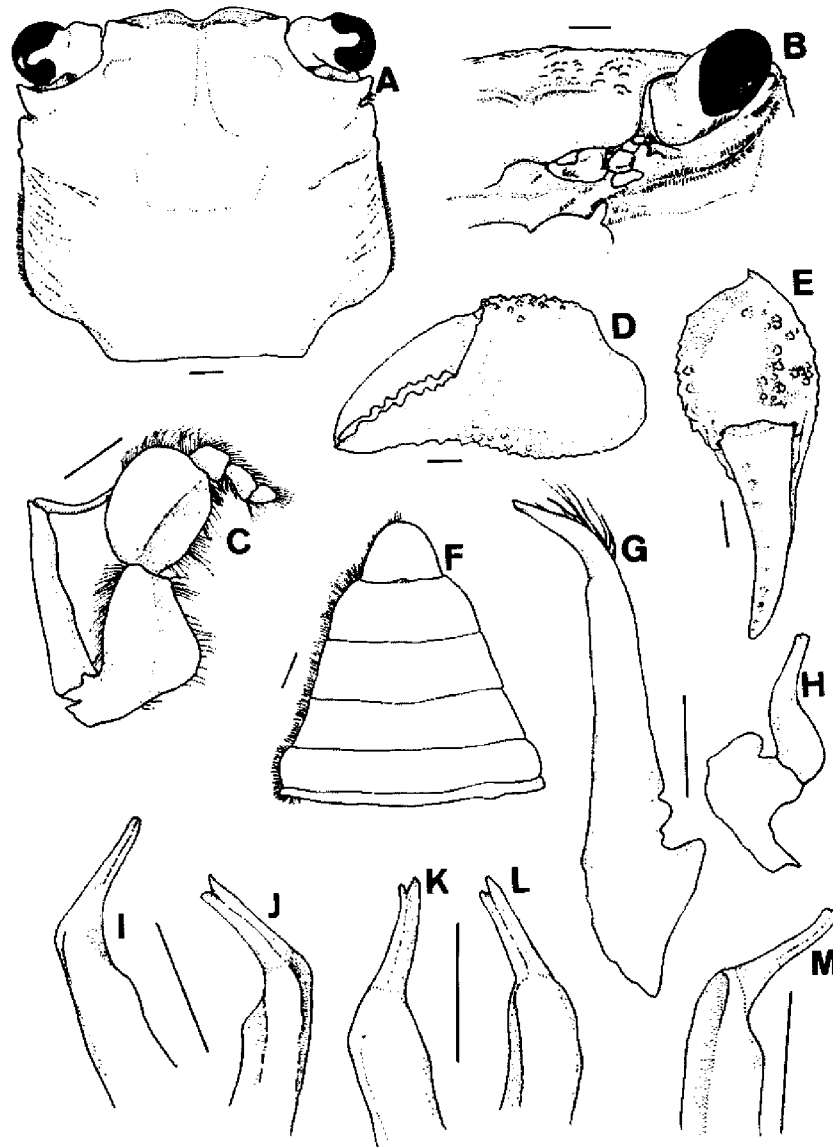


Fig. 2. *Geosesarma bicolor* sp. nov. Holotype male (ZRC), 11.0 x 10.5 mm. a) dorsal view of carapace; b) frontal view; c) right third maxilliped (setae partially denuded); d) left chela (frontal view); e) left chela (dorsal view); f) abdomen (setae on right side denuded); g) left G1 (dorsal view); h) left G2; i-m) distal part of left G1 drawn from different angles. Scale=1.0 mm.

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Remarks

Two species of *Geosesarma* are already known from Jawa: *G. noduliferum* (de Man, 1892) (West Jawa, type species of the genus) and *G. rouxi* (Serène, 1968) (Central Jawa). The new species, *G. bicolor*, differs from both these species most notably in the form of its G1. In *G. noduliferum* and *G. rouxi*, G1 is very stout, with the distal chitinous part short and rounded or short and cylindrical (Serène, 1968). In *G. bicolor*, however, the G1 is slender and the distal part is spatuliform.

The G1 of *G. bicolor* bears a striking resemblance to that of *G. peraccae* (Nobili, 1903) (Singapore and southern Peninsular Malaysia) but is relatively stouter, and the outer margin has a distinct indentation just before the distal part (this indentation is indistinct in *G. peraccae*) (Ng, 1988). Another difference is that *G. peraccae*'s carapace is distinctly trapezoidal, whereas that of *G. bicolor* is squarish. Also, in *G. peraccae* the distal part of the merus of the third maxilliped is distinctly broader than the proximal part, and the cutting edges of the fingers in adult males have a large subdistal tooth (absent in *G. bicolor*) (Ng, 1988).

The G1 of *G. bicolor* is also very close to that of *G. serenei* from Perak, Malaysia, but the exopod of the third maxilliped of *G. serenei* lacks a flagellum, and its ambulatory meri are also proportionately much more slender (broad in *G. bicolor*). The G1 of *G. bicolor* is also similar to that of *G. krathing* Ng and Naiyanetr, 1992, from eastern Thailand, but *G. krathing* has a smoother carapace and slender ambulatory meri.

Metasesarma H. Milne Edwards, 1853

Metasesarma H. Milne Edwards, 1853: 188. Alcock, 1900: 427. Tesch, 1917: 211, 257; 1918: 109. Sakai, 1939: 648, 699; 1976: 674. Crosnier, 1965: 73. Dai *et al.*, 1986: 510. Dai and Yang, 1991: 558.

Type Species

Metasesarma rousseauxi H. Milne Edwards, 1853, by monotypy.

Diagnosis

Metasesarma can be separated from most other genera allied to *Sesarma sensu lato* by having the antenna excluded from the orbit. This is a character it shares with *Clistocoeloma*, but it differs most conspicuously by having a smooth glabrous carapace, no anterolateral teeth behind the exorbital angle, and no (or only a vestigial) flagellum on the exopod of the third maxilliped.

Remarks

Currently only two species of *Metasesarma* are unequivocally recognized: *M. aubryi* (A. Milne Edwards, 1869) and *M. rousseauxi* H. Milne Edwards, 1853. A third taxon, *M. granularis* Heller, 1862, described from Tahiti, has been in the synonymy of *M. rousseauxi* or treated as a subspecies, but needs further research to prove its validity (see Forest and Guinot, 1961; Crosnier, 1965). The synonymies given here are abbreviated, and Tweedie (1947) should be consulted for the early references.

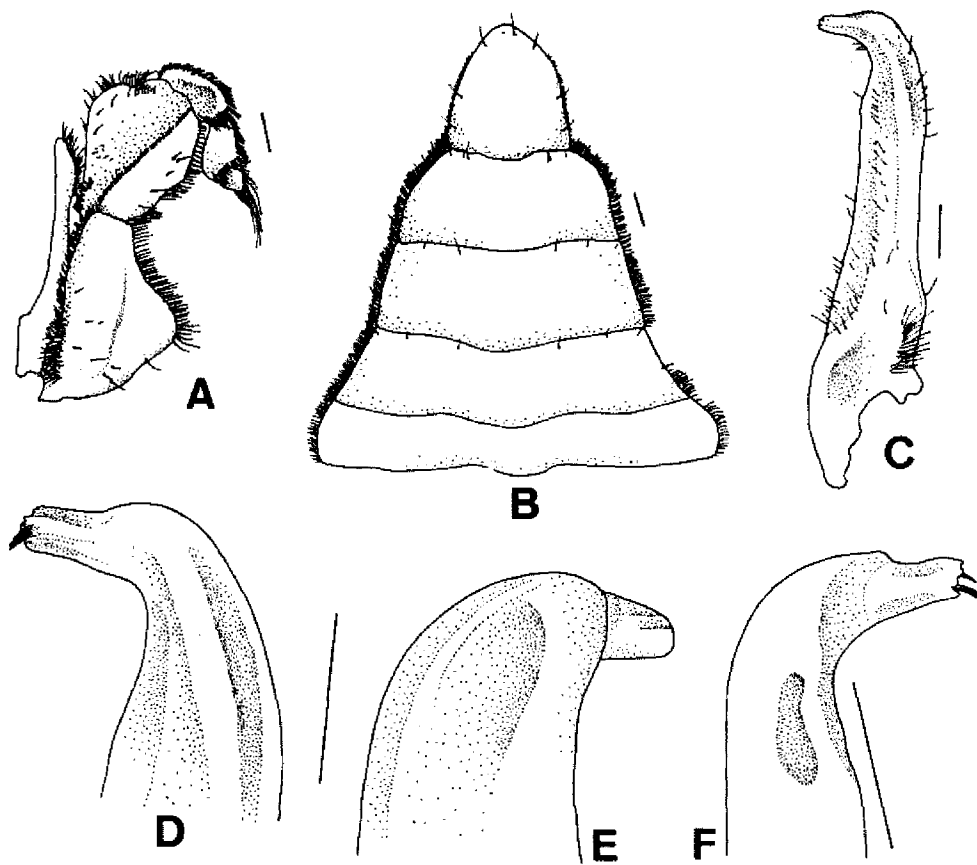


Fig. 3. *Metasesarma aubryi*, male, 23.9 x 20.5 mm (ZRC). a) left third maxilliped; b) abdomen; c) left G1 (dorsal view); d) distal part of left G1 (dorsal view); e, f) distal part of left G1 (ventral view, different angles). Scale=1.0 mm.

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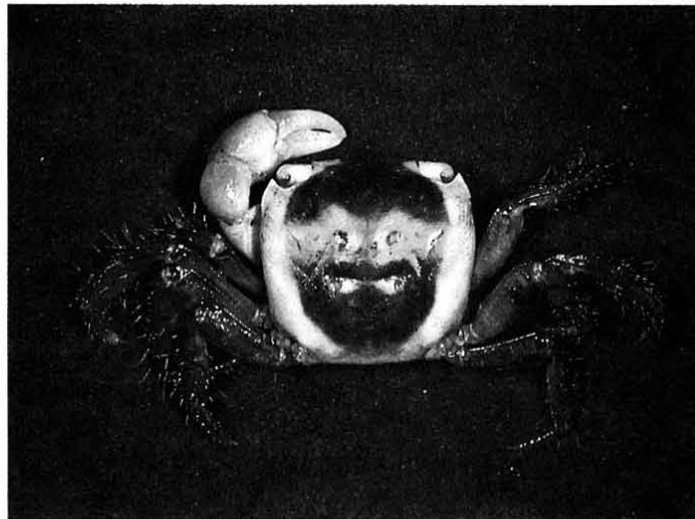


Fig. 4a. *Metasesarma aubryi* male, 23.9 x 20.5 mm (ZRC).



Fig. 4b. *Metasesarma aubryi* male, 22.7 x 19.4 mm (QM).

***Metasesarma aubryi* (A. Milne Edwards, 1869)**

Sesarma (*Holometopus*) *aubryi* A. Milne Edwards, 1869: 25; 1873: 307, Pl. 16, Fig. 3. Rathbun, 1910a: 329. *Sesarma aubryi*: de Man, 1887: 661 (part). *Sesarma* (*Metasesarma*) *aubryi*: de Man, 1895: 130, Pl. 29, Fig. 27. *Metasesarma aubryi*: Rathbun, 1910b: 308. Tesch, 1917: 211-212; 1918: 109. Maki and Tsuchiya, 1923: 183, Pl. 21,

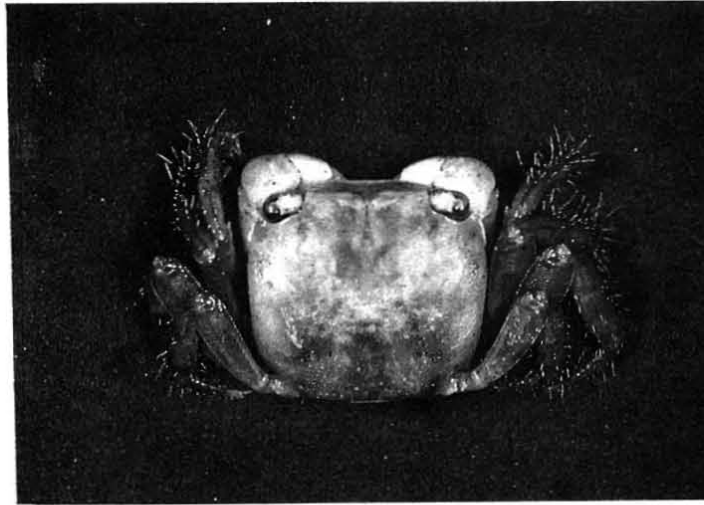


Fig. 4c. *Metasesarma aubryi* female, 14.6 x 12.8 mm (ZRC).

Fig. 3. Balss, 1938: 79. Sakai, 1939: 699-700, Pl. 110, Fig. 3; 1976: 674, text-fig. 372. Forest and Guinot, 1961: 158, Fig. 172, 173. Dai *et al.*, 1986: 510, Pl. 73(1), text Fig. 290. Dai and Yang, 1991: 558-59, Fig. 290, Pl. 73(1).

Material examined

One male (23.9 x 20.5 mm), one ovigerous female (14.6 x 12.8 mm), one non-ovigerous female (19.7 x 17.3 mm) (ZRC); one male (22.7 x 19.4 mm), one ovigerous female (19.1 x 16.0 mm) (QM), in leaf litter and under rotting logs, 50 m from the shore, Citerjun, Ujung Kulon, West Jawa; coll. C. Stewart, 20 July 1993.

Diagnosis

Size: carapace *ca.* < 24 mm width. Frontal breadth approximately half the greatest breadth of carapace; outer margin of exorbital angle is slightly divergent backward. Third maxilliped with broad subdistal lobe on outer edge of merus; merus widest across anterior third; no flagellum on exopod.

Color

Variable. Largest male of present series has central portion of carapace liver-colored, encircled by a broad band of orange-yellow which also covers the lateral walls and pterygostome. Legs also liver-colored dorsally; cheliped with merus, carpus, and proximal part of palm orange, fading to creamy-white on the fingers. Smaller male similar but carapace almost completely liver, with yellow margin much reduced; legs paler. Females with carapaces varying from dark to creamy-yellow and mottled with chocolate; legs varying from creamy-yellow to brown-grey. A. Milne Edwards (1873: 307) recorded the color of New Caledonian specimens as "... est violacee, avec des marbrures ou des taches jaunâtres sur les pattes, et quelquefois sur la carapace;" this seems to fall within the range of our present series. A photograph of a large male appears in Whitten and Whitten (1992).

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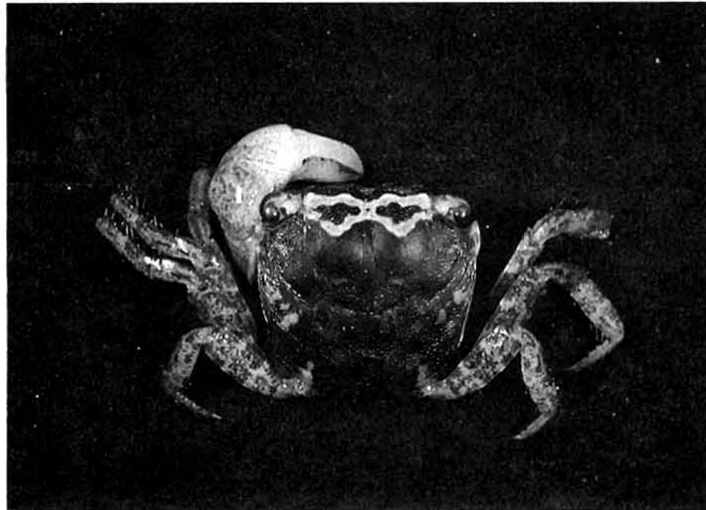


Fig. 5a. *Metasesarma rousseauxi* male, 15.2 x 13.3 mm (ZRC).

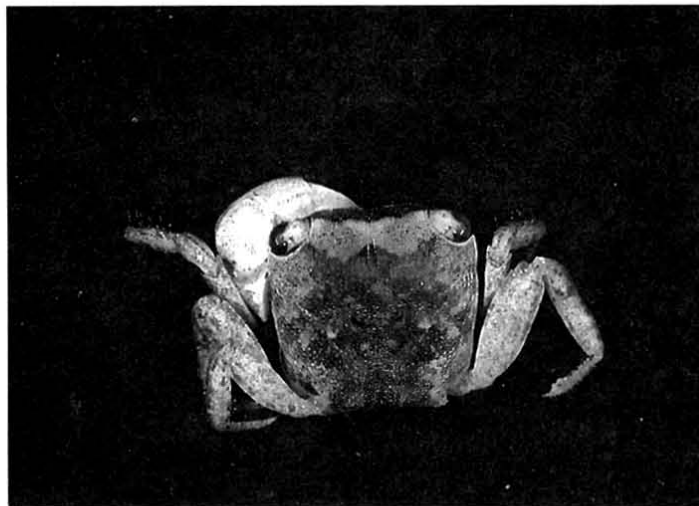


Fig. 5b. *Metasesarma rousseauxi* male, 14.3 x 12.9 mm (QM).

Habitat/biology

In Ujung Kulon, these crabs are common in shoreline woodlands, preferring dense shade. They make shallow burrows (<40 cm deep) into the soil ending in a small chamber; the burrows do not reach ground water. The crabs also shelter in holes in rotting logs and in crevices under rocks. They are nocturnally active and are herbivores and opportunistic carnivores (C. Stewart, unpubl.).

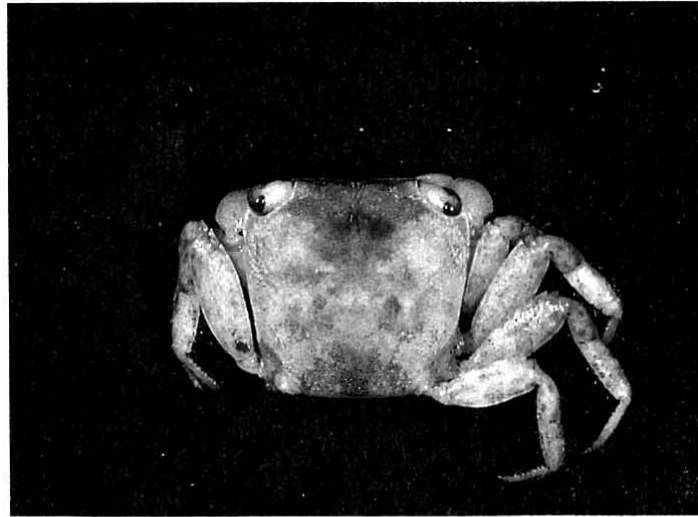


Fig. 5c. *Metasesarma rousseauxi* female, 15.3 x 13.4 mm (ZRC).

Distribution

New Caledonia (type locality), Taiwan, Gulf of Siam, Sumatera, Jawa, Flores, Aceh, New Guinea, Amboina, Nias, Ternate, Halmahera, Rotuma, Morotai Islands, Mergui Archipelago.

Metasesarma rousseauxi H. Milne Edwards, 1853

Metasesarma rousseauxi H. Milne Edwards, 1853: 188; 1855: 158, Pl. 10, Fig. 1. Tesch, 1917: 212-213. Gordon, 1934: 8. Ward, 1942: 107. Tweedie, 1947: 34. Forest and Guinot, 1961: 158, Fig. 170-171. Crosnier, 1965: 73-74. *Sesarma aubryi*: de Man, 1888a: 168; 1888b: 372.

Sesarma (Metasesarma) rousseauxi: de Man, 1895: 138, Pl. 29, Fig. 28. Pillai, 1951: 37-38. *Metasesarma aubryi*: Serène and Moosa, 1971: 15, Pl. 6, Fig. D.

Material examined

One male (15.2 x 13.3 mm), one non-ovigerous female (15.3 x 13.4 mm) (ZRC), one male (14.3 x 12.9 mm), one female (14.0 x 12.6 mm) (QM), in leaf litter, 5 m from the shore, Citerjun, Ujung Kulon, West Jawa; coll. C. Stewart, 30 July 1993.

Diagnosis

Size: ca. 16 mm or less. Frontal breadth clearly more than half the greatest carapace breadth. Outer margin of exorbital angle subparallel, more-or-less convex. Third maxilliped with outer border of merus regularly convex; vestigial flagellum on exopod.

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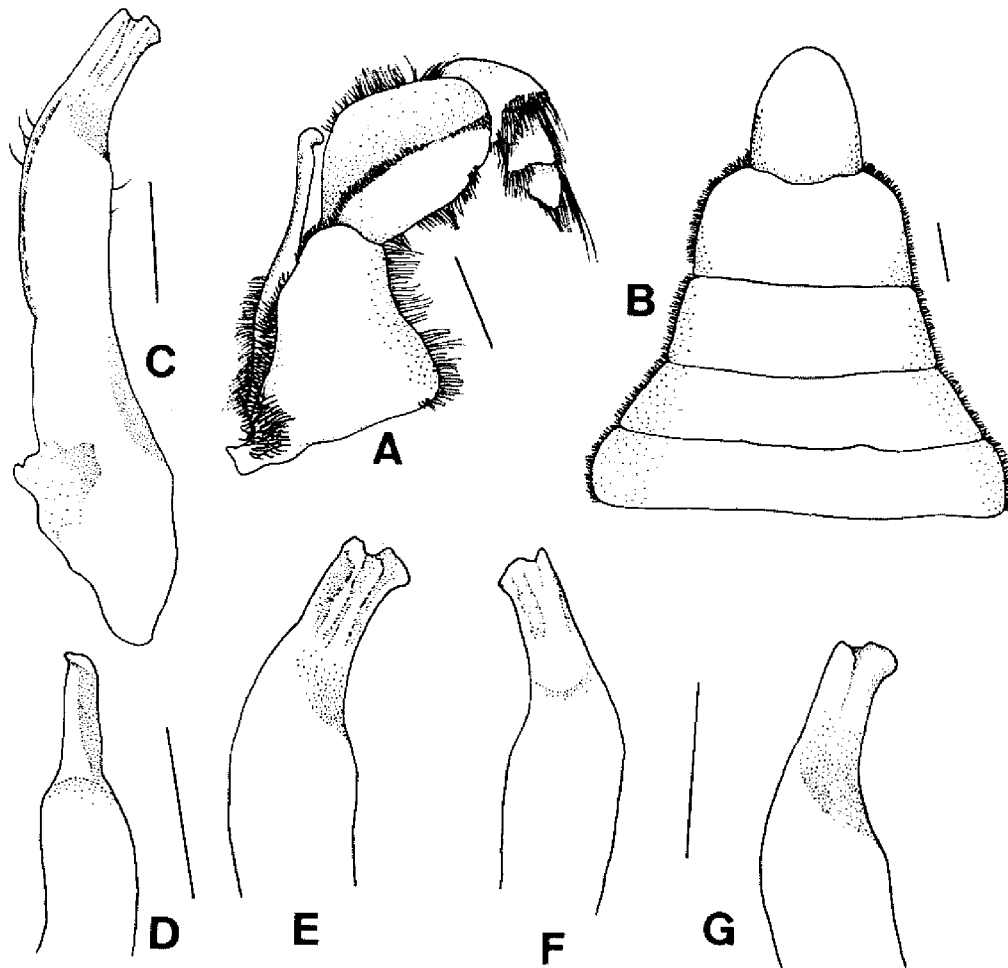


Fig. 6. *Metasesarma rousseauxi*, male, 15.2 x 13.3 mm (ZRC). a) left third maxilliped; b) abdomen; c) left G1s (ventral view); d-g) distal part of left G1 (various views). Scale=1.0 mm.

Color

Varying from predominantly pale yellow with reddish-brown marbling on carapace and legs, to carapace being predominantly reddish-brown. Most specimens with a conspicuous broad pale band across the post-frontal lobes, shaped as a flattened 'W' posteriorly; on one specimen this band has a dark triangular patch on each side so as to resemble a mask. The chelipeds are pale yellow, with largest male having reddish speckling on merus, dorsal surface of carpus and proximally on palm. Small specimens are white and tend to darken as they grow.

Distribution

Zanzibar (type locality), Eastern Africa and Madagascar, Sri Lanka, Laccadives, Mergui Archipelago, Jawa, Amboina, Flores, Aceh, Penang, the Philippines, New Guinea. The records from Tahiti, Tuamotu and Samoa are in doubt and may belong to *M. granularis* (see Forest and Guinot, 1961).

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The authors are grateful to Tony Whitten and Christopher Stewart for their kind help in this study. Christopher Stewart kindly furnished the specimens and his most informative unpublished report on the species was very helpful. Cheryl Tan kindly prepared the figures. Gerald Cubitt generously passed the slide of *Metasesarma aubryi* to us to use as we saw fit. The study has been partially supported by grant RP 900360 to the first author from the National University of Singapore.

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