

The taxonomy of five species of *Episesarma* De Man, 1895, in Singapore (Crustacea: Decapoda: Brachyura: Sesarmidae)

Bee Yan, Lee^{1,2*}, Ngan Kee, Ng³ & Peter K. L. Ng^{1,4}

Abstract. Five species of *Episesarma* have been reported from Singapore mangroves — *E. chentongense* (Serène & Soh, 1967), *E. mederi* (H. Milne Edwards, 1853), *E. palawanense* (Rathbun, 1914), *E. singaporense* (Tweedie, 1936), and *E. versicolor* (Tweedie, 1940). All have diagnostic characters for the male chela and gonopod, which easily separate the species. Their colour in life, notably of the chela, is also distinct. However, the identities and colours of the chelae of *E. chentongense* and *E. palawanense* have been confused. The present study, which re-examined all the type material, provides a detailed taxonomic account for all five species found in Singapore.

Key words. mangrove crab, Sesarmidae, taxonomy, colouration, mangrove, Singapore

INTRODUCTION

There are currently 87 species of mangrove brachyuran crabs known from Singapore (Davie, 1992, 1994; CGS Tan & PKL Ng, 1994; Wee & PKL Ng, 1994; PKL Ng & Sivasothi, 1999; PKL Ng & Schubart, 2002; PKL Ng, Wang & Lim, 2008; Davie, 2012; Lee & NK Ng, 2012). Of these, 36 belong to the family Sesarmidae Dana, 1851 (CGS Tan & PKL Ng, 1994; Lee, unpublished data). The five species belonging to the genus *Episesarma* De Man, 1895, are among the largest and most common sesarmids in Peninsular Malaysia and Singapore (Serène & Soh, 1967a; CGS Tan & PKL Ng, 1994), and the five species are: *E. chentongense* (Serène & Soh, 1967), *E. mederi* (H. Milne Edwards, 1853), *E. palawanense* (Rathbun, 1914), *E. singaporense* (Tweedie, 1936), and *E. versicolor* (Tweedie, 1940).

Serène & Soh (1967a) discussed these five *Episesarma* species and presented a simplified key using characters of the adult male chelae, such as the number of tubercles on dorsal margin of the dactylus and the colouration of the chelae. However, the description of the chela coloration of the five *Episesarma* species was not accompanied with figures, causing subsequent interpretations of the colour of the chelae to be somewhat subjective. Following the key for

all five species of *Episesarma* published by Serène & Soh (1967a), subsequent authors also recorded these five species from Singapore and Peninsular Malaysia (e.g., Macnae, 1968; CGS Tan & PKL Ng, 1994; Chou, PKL Ng & Lim, 1994). Currently, at least four species have been recorded as still present in Singapore mangroves (PKL Ng, Wang & Lim, 2008), of which three are relatively common: *E. chentongense* (Serène & Soh, 1967) (pink-fingered vinegar crab), *E. singaporense* (Tweedie, 1936) (Singapore vinegar crab), and *E. versicolor* (Tweedie, 1940) (violet vinegar crab) (PKL Ng & Sivasothi, 1999; PKL Ng, Wang & Lim, 2008). As with earlier authors, the colour of the chelae was used as a key character to discriminate species. However, a review of all the related literature and an extensive collection of specimens show that the recent identifications of *E. chentongense* have been erroneous, although five species do occur in Singapore. In this paper, the types of all five *Episesarma* species were re-examined, fresh specimens obtained, live colours recorded, and the taxonomic characters reappraised. A revised key using morphological as well as colour characters is presented. The genus *Episesarma* currently contains eight valid species (PKL Ng, Guinot & Davie, 2008: 220), and its taxonomy is currently being revised by PJF Davie (Queensland Museum).

MATERIAL AND METHODS

Recent specimens examined for this paper include those collected by the Comprehensive Marine Biodiversity Survey (CMBS) in Singapore, a national project by the National Parks Board of Singapore (NParks) and the National University of Singapore (NUS) as well as the first author's final year project. Specimens examined are deposited in the Zoological Reference Collection (ZRC) of the Lee Kong Chian Natural History Museum (LKCNHM) (formerly the Raffles Museum of Biodiversity Research), National University of Singapore; Museum Zoologicum Bogoriense (MZB), Research Centre for Biology, Indonesian Institute of Sciences,

¹Systematics & Ecology Laboratory, Department of Biological Sciences, National University of Singapore, S3 Level 2, 14 Science Drive 4, Singapore 117543, Republic of Singapore; Email: beeyan06@gmail.com (*corresponding author)

²Tropical Marine Science Institute, National University of Singapore, 18 Kent Ridge Road, Singapore 119227, Republic of Singapore.

³Department of Biological Sciences, National University of Singapore, S2 level 4, 14 Science Drive 4, Singapore 117543, Republic of Singapore.

⁴Lee Kong Chian Natural History Museum, National University of Singapore, 2 Conservatory Drive, Singapore 117377, Republic of Singapore.

Bogor, Indonesia; The Natural History Museum, London, U.K. (NHM); U.S. National Museum of Natural History, Smithsonian Institution, Washington D.C., U.S.A. (USNM); and Muséum national d'Histoire naturelle (MNHN), Paris, France. Measurements, in millimetres, are of the carapace width and length, respectively. The following abbreviations are used: G1 = male first gonopod; coll. = collected by. The synonymy provided is only of the original description as well as literature relevant for Singapore and Malaysia. For citations, all authors' names are cited (for papers with more than three authors) in full rather than the conventional "et al.", when there is room for confusion. The reason for this cumbersome nomenclature is because family names like Tan and Ng are common in Singapore and many workers with these names have been active over the years.

The number of tubercles on the dorsal margin of the dactylus of the chela of each *Episesarma* species is an important species character. In adult male, it is a reliable character as the form, density, and number of dactylar tubercles is constant for each species. In female specimens, while these dactylar tubercles are present, they are generally fewer in number and/or less distinct. For juveniles, it is not a reliable character as the dactylar tubercles are not obvious. In some species like *E. chentongense*, there are a large number (65–75) of densely packed tubercles (Fig. 5A); while in *E. palawanense*, there are fewer tubercles (40–50) that are more widely separated (Fig. 5B).

TAXONOMY

Family Sesarmidae Dana, 1851

Genus *Episesarma* De Man, 1895

Sesarma (*Episesarma*) De Man, 1895: 128 (list), 165 (type species *Sesarma taeniolata* Miers, 1877, subsequent designation by Holthuis, 1978; gender neuter).

Neoepisesarma (*Neoepisesarma*) Serène & Soh, 1970: 390 (key), 396 (type species *Neoepisesarma* (*Neoepisesarma*) *mederi* (H. Milne Edwards, 1853); gender neuter).

Diagnosis. Carapace quadrate, lateral margins parallel to subparallel; with 1 lateral teeth behind external orbital tooth; frontal margin subequal or wider than half carapace width, with distinct median concavity; postfrontal lobe well developed; antennal peduncle not excluded from orbit. Dorsal surface of male palm with distinct single longitudinal pectinated ridge; dorsal margin of dactylar finger of male chela with over 30 tubercles; anterior border of merus of cheliped with subdistal triangular lobiform process with distinctly denticulated margin.

Key to the five *Episesarma* species found in mangroves of Singapore:

1. Carapace almost square (e.g., Fig. 1A); outer surface of palm of chela with granulation of similar colouration to palm (e.g., Fig. 2A)2
- Carapace slightly wider than long (e.g., Fig. 7A); outer surface of palm of chela with white granules (e.g., Fig. 8A)3

2. Dorsal margin of dactylar finger of adult male chela with between 65–75 densely packed tubercles on adult male (Fig. 5A); entire chela reddish (Fig. 2A); tip of G1 with chitinous crest truncate, broad (Fig. 6A–D); vulvae with operculum slightly elongated, protruding laterally; sternal vulvar cover with slightly raised lateral crested wall (Fig. 16A)
.....*Episesarma chentongense* (Serène & Soh, 1967)
- Dorsal margin of dactylar finger of adult male chela with between 40–50 less densely packed tubercles on adult male (Fig. 5B); palm of chela reddish in colour with white finger tips. (Fig. 2B); tip of G1 with chitinous crest semi-circular, rounded, broad (Fig. 6E–H); vulvae with central operculum, oval shaped, slightly protruded laterally; sternal vulvar cover slightly raised above operculum (Fig. 16B).....
..... *Episesarma palawanense* (Rathbun, 1914)
3. Chela evenly reddish (Fig. 8A); tip of G1 split into 3 peaks, highest peak median, with V-shaped chitinous tip, with other peaks rounded (Fig. 14A–D); vulvae with elongated central operculum, resembling short hook-, protruding; sternal vulvar cover slightly raised, shorter than operculum (Fig. 16C).....
..... *Episesarma singaporense* (Tweedie, 1936)
- Chela with white finger tips (e.g., Fig. 8B); tip of G1 with either single (Fig. 14B) or double peak (Fig. 14C); vulvae not as above (e.g., Fig. 16D)4
4. Palm of chela violet with white finger tips (Fig. 8B); dorsal margin of dactylar finger of adult male chela with 65–80 densely packed tubercles (fig. 13B); tip of male G1 with single peak (Fig. 14E–H); vulvae with flattened operculum, slightly protruded distally; sternal vulvar cover not obvious (Fig. 16D).....
..... *Episesarma versicolor* (Tweedie, 1940)
- Palm of chela with purple to violet colouration on top half, reddish colouration on bottom half; tips of chelae white (Fig. 8C); dorsal margin of dactylar finger of adult male chela with 40–60 less densely packed tubercles (fig. 13C); tip of male G1 with 2 peaks, both chitinous (Fig. 15); vulvae with round central operculum; thickened sternal vulvar cover above operculum, rounded (Fig. 16E).....
..... *Episesarma mederi* (H. Milne Edwards, 1853)

Episesarma chentongense (Serène & Soh, 1967)

(Figs. 1A, B, 2A, 3, 5A, 6A–D, 16A)

Sesarma (*Sesarma*) *chentongensis* Serène & Soh, 1967a: 27–29, pls. 3, 4 (type locality: Johore Straits, Singapore; see Remarks); Serène & Soh, 1967b: 107–110, fig. 1, table 1; Macnae, 1968: 171.

Sesarma (*Episesarma*) *chentongensis* – Soh, 1969: 9 (list), 20 (key), 43, 44, 92 (list), 94, 97, 100, figs. 7, 21, tables 4, 7, 10 [new combination].

Neoepisesarma (*Neoepisesarma*) *chentongensis* – Serène & Soh, 1970: 396, 405 (list) [new combination].

Episesarma chentongense – CGS Tan & PKL Ng, 1994: 82 (list); PKL Ng, 1998: 1140 (key), 1141 (list), figs. 10, 11; Sivasothi, 2000: 26 (list).

Episesarma chentongensis – Chou, PKL Ng & Lim, 1994: 82 (list). *Episesarma chentongense* – PKL Ng, Guinot & Davie, 2008: 220 (list).

Episesarma singaporense – Lee, 2012: 12 (list), fig. 4C [not *Sesarma* (*Sesarma*) *singaporensis* Tweedie, 1940].

Material examined. Lectotype (herein designated): 1 male (36.2 × 35.3 mm) (ZRC 1967.1.6.1), Johore Strait, Singapore, coll. CL Soh, 13 February 1966. Paralectotypes (herein designated): 2 females (34.3 × 31.8 mm, 35.1 × 32.4 mm) (ZRC 1967.1.6.3–4), Sungei Melayu, Singapore, coll. CL Soh, 26 September 1966; 1 male (39.6 × 37.7 mm) (ZRC



Fig. 1. A, B, *Episesarma chentongense* (Serène & Soh, 1967), Singapore, male (38.7 × 37.2 mm) (ZRC 2014.0018); A, dorsal view of carapace; B, ventral view; C, D, *E. palawanense* (Rathbun, 1914), Singapore, male (33.0 × 32.9 mm) (ZRC 2013.1611); C, dorsal view of carapace; D, ventral view. Scale bars = 2.0 mm.

1967.1.6.2) Sungei Melayu, Singapore, coll. CL Soh, 26 September 1966; 1 male (37.4 × 35.5 mm) (ZRC 1967.1.6.6) Sungei Berih, Singapore, coll. CL Soh, 13 February 1966; 1 male (damaged) (ZRC 1967.1.6.7) Simpang Mak Wai, Singapore, coll. CL Soh, 4 October 1966. Singapore: 2 males (38.7 × 37.2 mm, 36.3 × 34.4 mm) (ZRC 2014.0018), Pasir Ris mangrove, coll. BY Lee, 03 January 2014; 1 male (37.0 × 35.5 mm) (ZRC 2012.0314), Pasir Ris mangrove, coll. BY Lee & RRY Oh, 28 October 2011; 1 male (33.6 × 32.1 mm) (ZRC 2014.0231), station SW01 (JS-0153), Outward Bound School camp 1, Pulau Ubin (01°25'15.77"N, 103°55'57.00"E), coll. CMBS expedition 1, 15 October 2012; 1 male (33.9 × 33.4 mm) (ZRC 2014.0232), station SW13 (JS-0863), Chek Jawa, Pulau Ubin (01°24'25.65"N, 103°59'33.85"E), coll. CMBS Expedition 1, 16 October 2012; 1 male (33.3 × 32.3 mm) (ZRC 2014.0233), station SW50 (JS-0387), Pasir Ris mangrove (01°22'36.71"N, 103°57'9.57"E), coll. CMBS Expedition 1, 20 October 2012; 1 male (34.4 × 32.8 mm) (ZRC 2014.0234), station SW50 (JS-2202), Pasir Ris mangrove (01°22'36.71"N, 103°57'9.57"E), coll. CMBS Expedition 1, 20 October 2012; 1 male (36.1 × 35.3 mm) (ZRC 2014.0235), station SW50 (JS-0379), Pasir Ris mangrove (01°22'36.71"N, 103°57'9.57"E), coll. CMBS Expedition 1, 20 October 2012; 1 male (29.8 × 28.0 mm) (ZRC 2012.0206), Pulau Tekong, coll. MAH Chua, 10 June 2012; 1 male (28.8 × 27.1 mm) (ZRC 2013.1208), Pulau Ubin, coll. SY Chan, 26 December 2004; 1 male (35.7 × 34.1 mm) (ZRC 1965.7.27.204), coll. MWF Tweedie, February 1939; 1 male (36.4 × 34.9 mm) (ZRC 1971.9.24.3), River Melayu,

coll. CL Soh; 1 male (42.1 × 40.4 mm), 1 female (27.0 × 25.4 mm) (ZRC 1987.458–459), Loyang, coll. PKL Ng, 14 May 1984; 1 female (43.2 × 41.0 mm) (ZRC 1971.9.24.2), River Simpang Mak Wai, coll. CL Soh, 30 December 1966; 1 male (26.1 × 24.4 mm) (ZRC 1965.7.29.88), Pandan Forest Reserve, coll. MWF Tweedie, April 1934. Malaysia: 1 male (25.2 × 22.9 mm), 1 female (21.7 × 20.4 mm) (ZRC 1965.7.27.206–207), Labuan, Sabah, coll. August 1938; 1 male (33.5 × 31.7 mm) (ZRC 1999.1141), Sarawak, coll. PKL Ng, 22 June 1998. Indonesia: 4 male (40.0 × 38.8 mm, 37.4 × 35.8 mm, 35.1 × 33.5 mm, 29.4 × 27.4 mm), 1 female (33.8 × 31.7 mm) (ZRC 2013.0142), Bunguran Timur, Pulau Natuna, Riau Islands Province, coll. D Wowor et al., 3 November 2002.

Diagnosis. Carapace almost square, covered with tufts of setae, denser around post-frontal region (Figs. 1A, 3A). Anterolateral region with 2 anterolateral teeth, inclusive of external orbital angle; first tooth larger in size, tip rounded (Figs. 1A, 3A). Adult male cheliped with dorsal surface of palm granulated; dorsal margin of dactylar finger of chela with 65–75 tubercles, tubercles largest medially, decreasing in size distally and proximally (Figs. 2A, 3A, 3D, 5A); tubercles present in females and juveniles. Single longitudinal pectinated ridge with 70–80 fine granules on dorsal surface of adult male chela (Figs. 3D, 5A); similar ridge present in females and juveniles but less distinct. In life, palm and fingers red (Fig. 2A); females, and juveniles similar. Inner surface of chela with single vertical raised row of 10–16

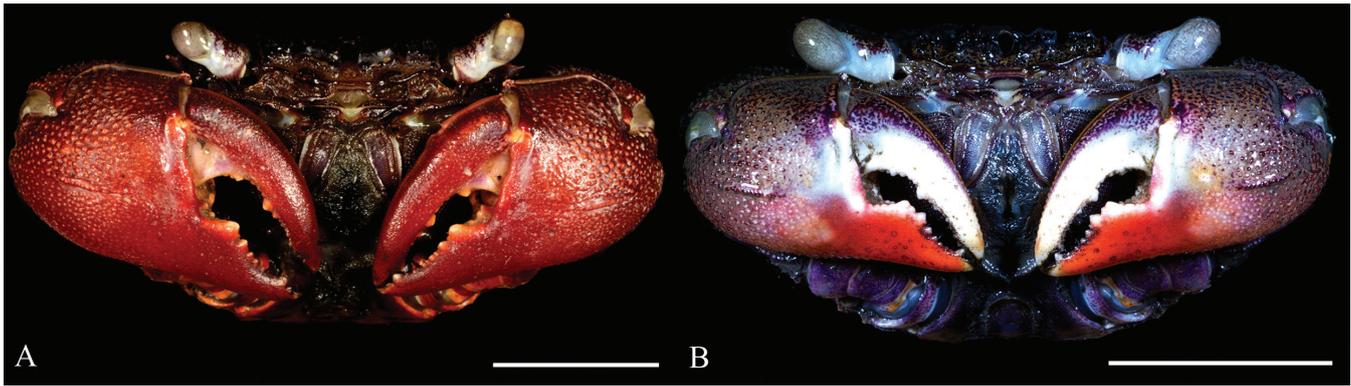


Fig. 2. Frontal views showing the colouration of chelae. A, *Episesarma chentongense* (Serène & Soh, 1967), Singapore, male (38.7 × 37.2 mm) (ZRC 2014.0018); B, *E. palawanense* (Rathbun, 1914), Singapore, male (33.0 × 32.9 mm) (ZRC 2013.1611). Scale bars = 2.0 cm.

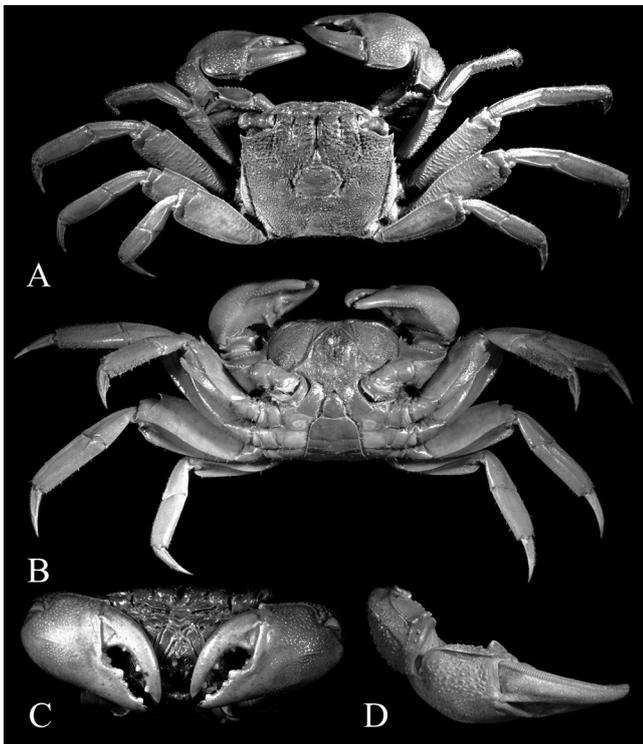


Fig. 3. Holotype of *Sesarma chentongensis* Serène & Soh, 1967, male (36.2 × 35.3 mm) (ZRC 1967.1.6.1). A, dorsal view; B, ventral view; C, frontal view of chela; D, top view of chela.

granules arrange closely together, more pronounced in adult males; granules present in lower numbers in adult females and relatively weaker in juveniles. Tip of male telson rounded; abdomen wide (Figs. 1B, 3B). Tip of G1 with dense tufts of setae, with single row of setae along exterior margin of G1; chitinous crest truncate, broad, covering most of tip (Fig. 6A–D). Vulvae with operculum slightly elongated, protruded laterally; sternal vulvar cover with slightly raised lateral crested wall (Fig. 16A).

Remarks. The authorship and year of publication of *Sesarma chentongensis* is usually cited as Serène & Soh (1967b). This paper appeared in issue number 16 of volume 33 of the ‘Bulletin of the National Museum’. However, an earlier paper (i.e., Serène & Soh, 1967a) appeared in the first double issue of volume 20 of the ‘Malayan Nature Journal’. The ‘Bulletin of the National Museum’ paper is dated “28 February 1967”

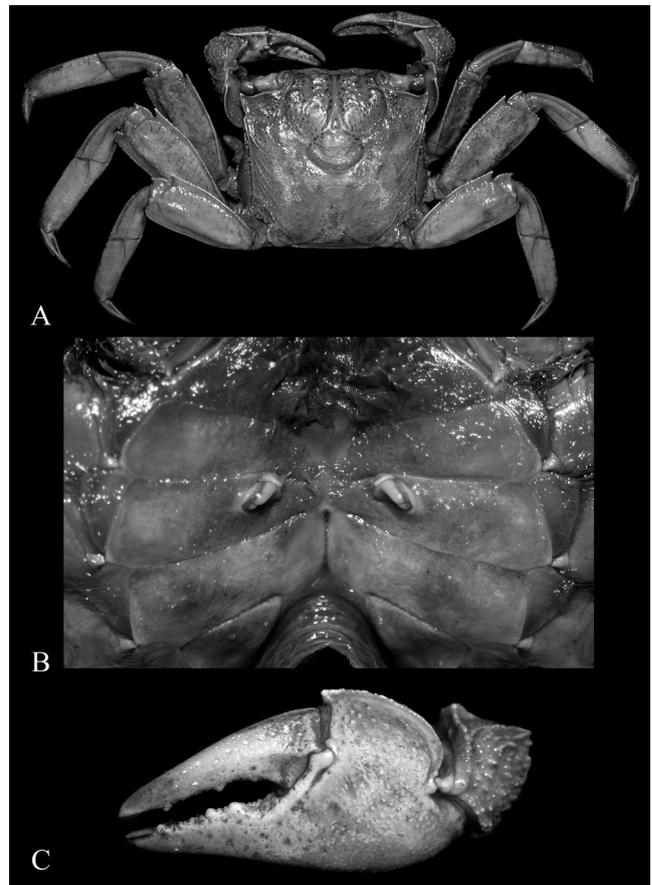


Fig. 4. Holotype of *Sesarma palawanense* Rathbun, 1914, female (41.6 × 40.1 mm) (USNM 45792). A, dorsal view; B, female sternum; C, frontal view of chela.

on the first page, while the ‘Malayan Nature Journal’ is dated as “March 1967”. However, Low & SH Tan (2009: 288) have ascertained that Serène & Soh (1967b) was only issued in May 1967. Hence the first available description of *Sesarma chentongensis* is Serène & Soh (1967a) with the latter’s date of publication 31 March 1967 (cf. Article 21.3 of the ‘International Code of Zoological Nomenclature’, and hereafter the Code, ICZN, 1999: 22).

The holotype and paratypes of *S. chentongensis* were designated by Serène & Soh (1967b), but this publication postdates Serène & Soh (1967a), which did not have

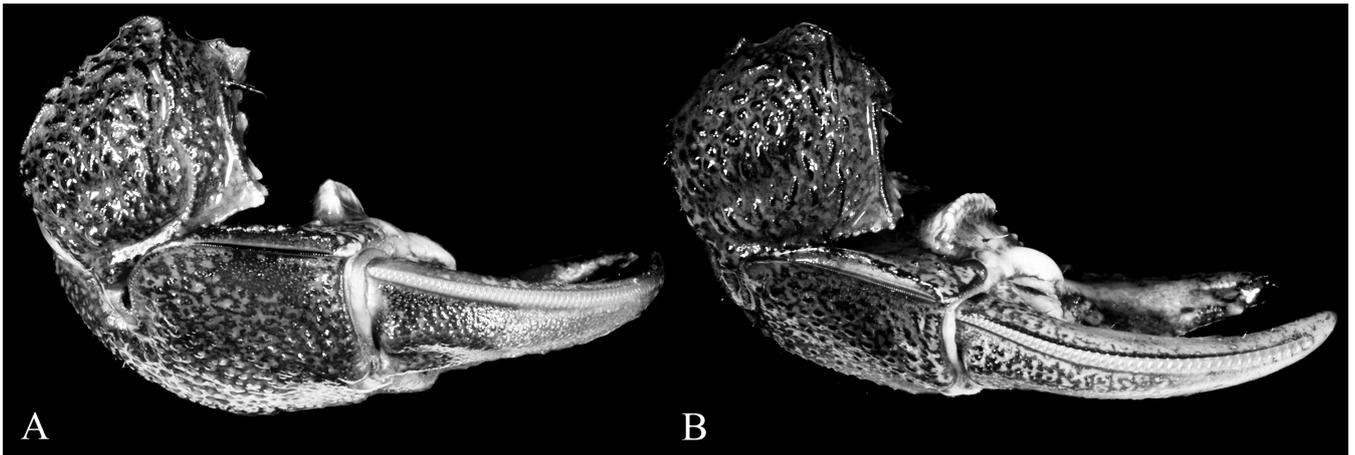


Fig. 5. Top views of chelae. A, *Episesarma chentongense* (Serène & Soh, 1967), Singapore, male (38.7 × 37.2 mm) (ZRC 2014.0018); B, *E. palawanense* (Rathbun, 1914), Singapore, male (33.0 × 32.9 mm) (ZRC 2013.1611).

any designation or clear indication of which specimens were examined. As such, the designation of holotype and paratype specimens listed by Serène & Soh (1967b) must now be regarded as lectotype and paralectotype designations respectively (cf. Article 74 of Code, ICZN, 1999: 82). Through this lectotype designation, the type locality of this species is therefore, the Johor Straits, Singapore (cf. Article 76.2 of the Code, ICZN, 1999: 87).

Another confusing aspect of this species is concerning the colouration of its chelae. In most recent books and popular guides on mangrove crabs, *Episesarma chentongense* is called the “pink-fingered tree-climbing crab” or “pink-fingered vinegar crab” (cf. PKL Ng, 1998; PKL Ng & Sivasothi, 1999; PKL Ng, Wang & Lim, 2008) as it was believed (incorrectly) that this species has a pink and white chela. In reality, the colour of the chela of the *E. chentongense* sensu stricto is actually very similar to that of *E. singaporense* being mostly red to reddish-brown, as originally observed by Serène & Soh (1967a, b). The major difference in the colour of the chela between these two species is that in *E. singaporense*, the numerous granules on the proximal half of the chela are white (Fig. 8A) whilst those of *E. chentongense* are red (Fig. 2A). These colour characters are consistent for the specimens examined. A pinkish-red and white chela is in fact, a distinguishing character of *E. palawanense* (Fig. 2B). The authors have rechecked museum specimens and fresh specimens of the above three species with these colour patterns, and the morphologies of the chela granulation and G1 are in agreement.

Episesarma palawanense (Rathbun, 1914)

(Figs. 1C, D, 2B, 4, 5B, 6E–H, 16B)

Sesarma (*Sesarma*) *palawanense* Rathbun, 1914: 72–74 (type locality Nakoda Bay, Palawan Island, Philippines). — Serène & Soh, 1967a: 27–29, pls. 3, 4.

Sesarma (*Sesarma*) *palawanensis* – Tesch, 1917: 183 (list), 184, 185, 202, 203, 204 (key); Tweedie, 1936: 54–57, 58 (key), 70, text fig. 1b, pl. 14 fig. 3, 4; Ow Yang, 1963: 244; Sasekumar, 1974: 60 (list).

Sesarma (*Sesarma*) *taeniolata* – Tweedie, 1936: 53 (see Tweedie, 1940: 94).

Sesarma palawanensis – Tweedie, 1940: 95–97, fig. 5; Tweedie, 1950: 343; Macnae, 1968: 171.

Sesarma (*Episesarma*) *palawanensis* – Soh, 1969: 11 (list), 21 (key), 58 (list), 65, 94, 96, 101, 110, 112, 123, 132, 134, 135, 149, figs. 10, 21, 25, tables 13, 25 [new combination].

Neopisesarma (*Neopisesarma*) *palawanensis* – Serène & Soh, 1970: 396, 405 (list) [new combination]; Jeffries, Voris & Yang, 1982: 563 (list).

Episesarma palawanense – CGS Tan & PKL Ng, 1994: 82 (list); PKL Ng, 1998: 1140 (key), 1141 (list), 1145, figs. 10, 11; PKL Ng, Guinot & Davie, 2008: 220 (list).

Episesarma palawanensis – Chou, PKL Ng & Lim, 1994: 82 (list).

Episesarma chentongense – PKL Ng, 1998: 1145; PKL Ng & Sivasothi, 1999: 68, 69, 71; PKL Ng, Wang & Lim, 2008: 109, 110; Lee, 2012: 12 (list), fig. 4A. [not *Sesarma* (*Sesarma*) *chentongensis* Serène & Soh, 1967a]

Episesarma chentongense – PKL Ng, Corlett & HTW Tan, 2011: 454 [not *Sesarma* (*Sesarma*) *chentongensis* Serène & Soh, 1967a]

Material examined. Holotype: 1 female (41.6 × 40.1 mm) (USNM 45792), River, Nakoda Bay, Palawan Island, coll. 31 December 1908. Singapore: 2 males (36.7 × 36.7 mm, 33.0 × 32.9 mm) (ZRC 2013.1611), Mandai mangrove, coll. BY Lee, 12 September 2013; 1 male (43.1 × 44.0 mm) (ZRC 2012.0262), Pasir Ris mangrove, coll. BY Lee & RRY Oh, 28 October 2011; 1 female (34.3 × 33.3 mm) (ZRC 2014.0314), station SW106, Lim Chu Kang mangrove (01°26.772’N, 103°42.509’E), coll. CMBS Expedition 1, 27 October 2012; 1 male (38.7 × 38.5 mm) (ZRC 1997.699), Lim Chu Kang mangrove, coll. N Sivasothi; 1 male (33.7 × 32.7 mm) (ZRC 1999.1033), Mandai mangrove, coll. SK Koh, 25 June 1999; 1 male (30.3 × 28.9 mm) (ZRC 1999.0912), Lim Chu Kang mangrove, coll. N Sivasothi; 1 male (38.5 × 37.0 mm) (ZRC 2012.0829), Sungei Buloh, coll. 11 December 2004; 1 male (43.2 × 42.5 mm) (ZRC 1967.7.15.3), River Simpang Mak Wai, coll. CL Soh, 21 December 1966; 1 female (38.0 × 37.0 mm) (ZRC 1965.7.27.203), Pandan Forest Reserve, coll. July 1934; 1 female (33.2 × 31.6 mm) (ZRC 2000.1940), Sungei Buloh mangrove, coll. N Sivasothi et al., 28 December 1999; 1 male (42.5 × 41.8 mm) (ZRC 1996.2048), no coll. data; 1 male (41.5 × 41.2 mm) (ZRC 1967.7.10.20), River Simpang Mak Wai, coll. CL Soh, 21 December 1966; 1 male (35.5 × 34.5 mm) (ZRC 1967.8.15.4), River Simpang Mak Wai, coll. CL Soh, 1 July

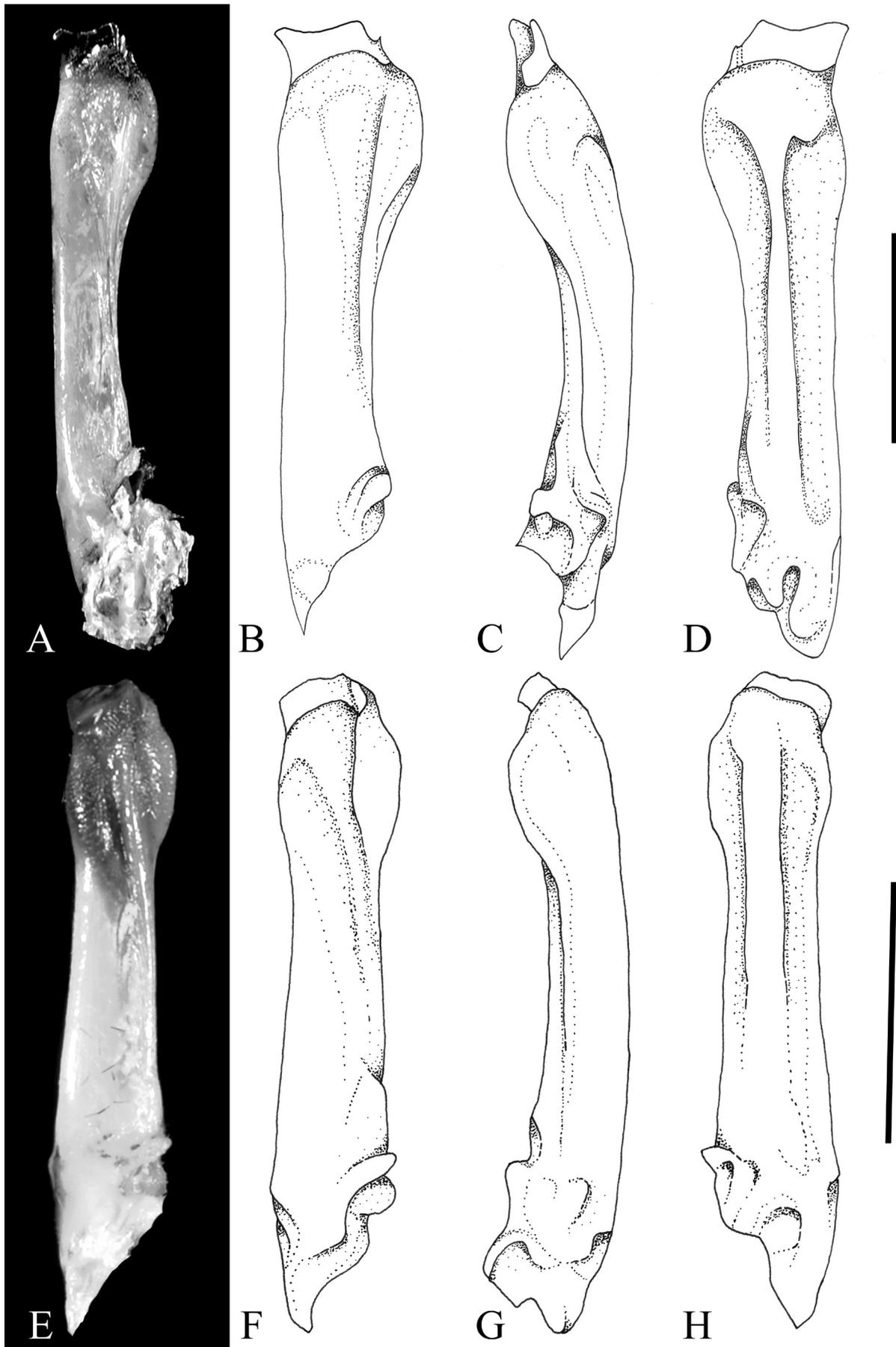


Fig. 6. G1 photographs and drawings. A–D, *Episesarma chentongense* (Serène & Soh, 1967), male (38.7 × 37.2 mm) (ZRC 2014.0018), Singapore; A, dorsal view photograph of G1; B, G1 dorsal view; C, G1 lateral view; D, G1 ventral view; E–H, *E. palawanense* (Rathbun, 1914), male (33.0 × 32.9 mm) (ZRC 2013.1611), Singapore; E, dorsal view photograph of G1; F, G1 dorsal view; G, G1 lateral view; H, G1 ventral view. Scale bar = 5.0 mm.



Fig. 7. A, B, *Episesarma singaporeense* (Tweedie, 1936), Singapore, male (34.4 × 33.1 mm) (ZRC 2013.1610). A, dorsal view of carapace; B, ventral view; C, D, *E. versicolor* (Tweedie, 1940), Singapore, male (35.2 × 33.1 mm) (ZRC 2013.1609); C, dorsal view of carapace; D, ventral view; E, F, *E. mederi* (H. Milne Edwards, 1853), Singapore, male (40.4 × 38.0 mm) (ZRC 2014.0016); E, dorsal view of carapace; F, ventral view. Scale bars = 2.0 cm.

1966; 1 female (36.8 × 35.7 mm) (ZRC 2014.0298), Lim Chu Kang mangrove, coll. KL Yeo et al., 20 June 2000; 1 female (34.3 × 33.2 mm) (ZRC 2000.2590), Sungei Buloh mangrove, off western Johore straits, coll. N Sivasothi et al., 8 June 1999. Malaysia: 1 female (33.0 × 32.2 mm) (ZRC 1965.7.27.205), Kuantan, Pahang, no coll. data.

Diagnosis. Carapace almost square, covered with tufts of setae, denser around post-frontal region (Figs. 1C, 4A). Anterolateral region with 2 anterolateral teeth, inclusive of external orbital angle; second tooth small and less distinct (Figs. 1C, 4A). Adult male cheliped with dorsal surface of palm sparsely granulated, with defined straight row of tubercles on middle of palm; dorsal margin of dactylar finger of chela with 40–50 tubercles, tubercles increasing in size towards distal end of dactylar finger (Figs. 2B, 4C, 5B); tubercles similar but not obvious in females, absent in juveniles. Single longitudinal pectinated ridge on dorsal

surface of adult male chela, with between 60–80 fine tubercles (Fig. 5B) ridge absent on females and juveniles. In life, palm is reddish with tip of fingers white (Fig. 2B); females, and juveniles similar. Inner surface of chela with single vertical raised row of 10–13 distinct granules arranged relatively close together, more pronounced in adult males (Fig. 5B); not obvious in females and absent in juveniles. Tip of male telson oval shaped; abdomen relatively narrow (Fig. 1D). Tip of G1 with dense tufts of setae, with single row of setae along exterior margin of G1; chitinous crest semi-circular, rounded, broad, covering most of tip (Fig. 6E–H). Vulvae with central operculum, ovate, slightly protruded; sternal vulvar cover slightly raised above operculum (Fig. 16B).

Remarks. Tweedie originally identified this species in 1936 as *Sesarma* (*Sesarma*) *taeniolata*. Tweedie (1940) later reappraised its identity after he managed to compare his specimens with the type of *S. taeniolata* and *S. palawanensis*;

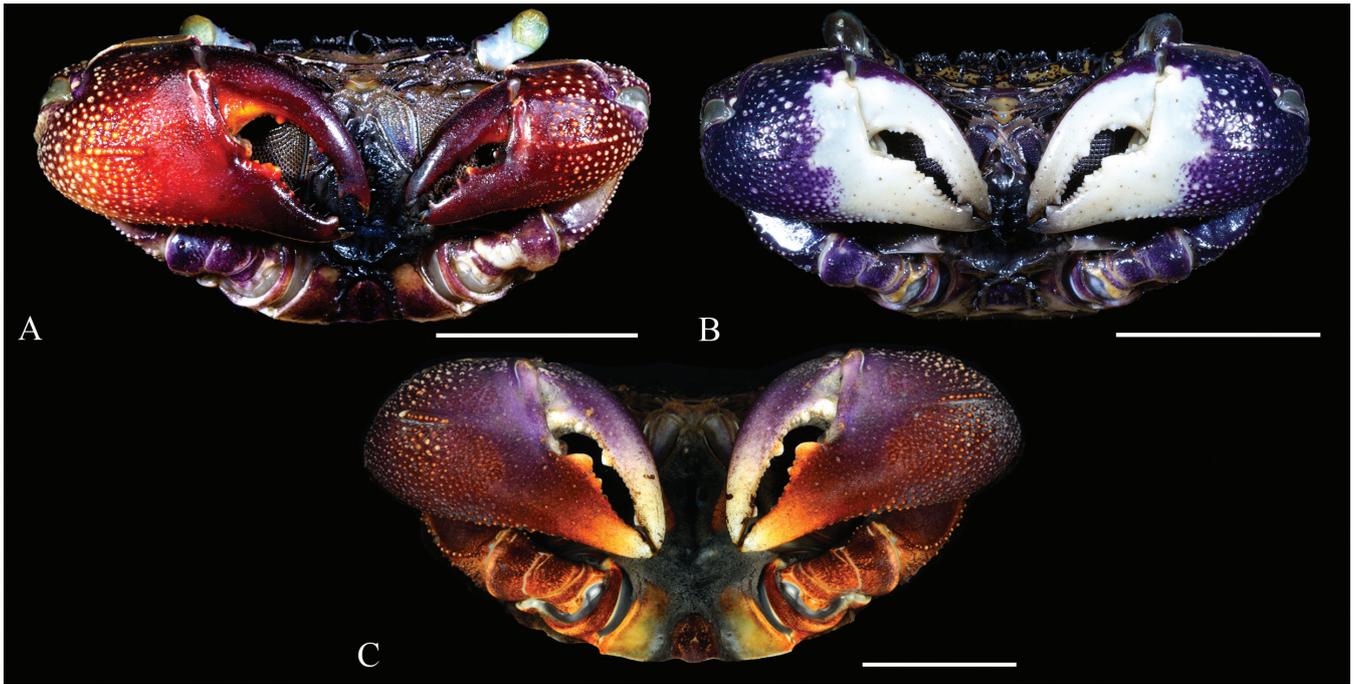


Fig. 8. Frontal views showing the colouration of chelae. A, *Episesarma singaporense* (Tweedie, 1936), Singapore, male (34.4 × 33.1 mm) (ZRC 2013.1610); B, *E. versicolor* (Tweedie, 1940), Singapore, male (35.2 × 33.1 mm) (ZRC 2013.1609); C, *E. mederi* (H. Milne Edwards, 1853), Singapore, male (40.4 × 38.0 mm) (ZRC 2014.0016). Scale bars = 2.0 cm.

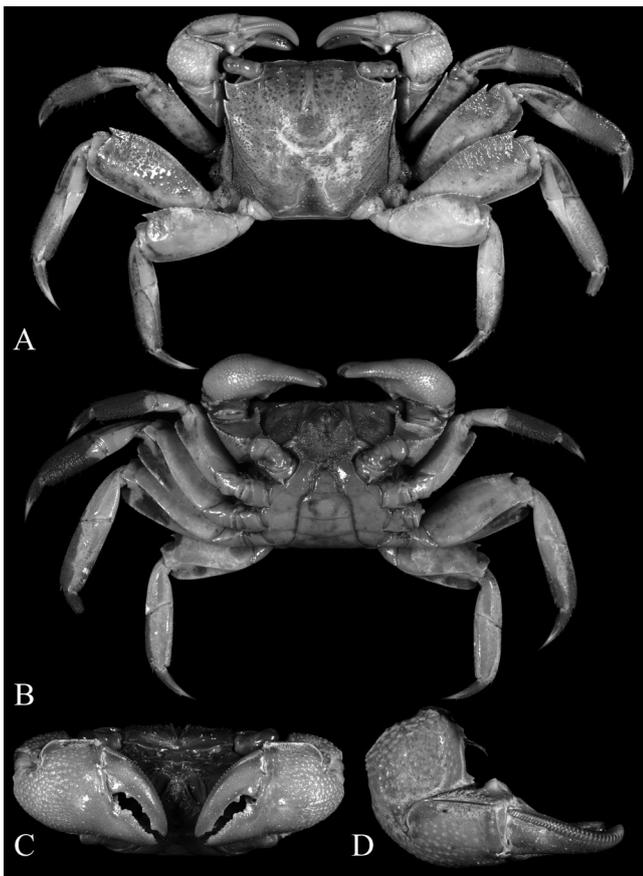


Fig. 9. Lectotype of *Sesarma singaporensis* Tweedie, 1936, male (32.4 × 29.6 mm) (NHM 1947.11.18.37). A, dorsal view; B, ventral view; C, frontal view of chela; D, top view of chela.

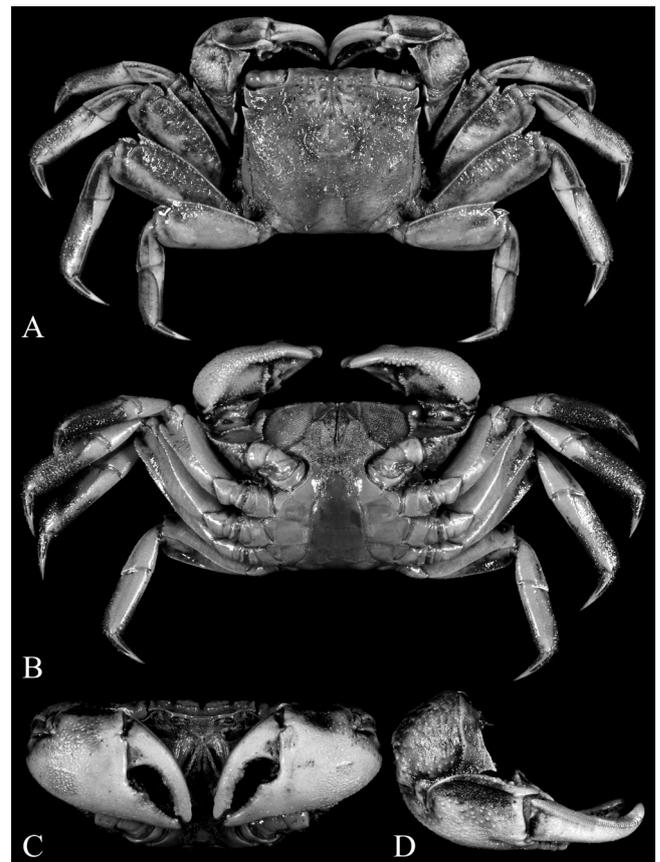


Fig. 10. Lectotype of *Sesarma versicolor* Tweedie, 1940, male (39.4 × 35.9 mm) (NHM 1947.8.9.3). A, dorsal view; B, ventral view; C, frontal view of chela; D, top view of chela.

as a result, specimens that Tweedie (1936) had referred to *S. taeniolata* were transferred to *S. mederi* and *S. palawanensis*. In doing so, Tweedie (1940: 94) effectively synonymised *S. taeniolata* Miers, 1877 (see account on *Episesarma mederi* below), with *S. mederi*, an action we agree with. Tweedie (1936) had earlier identified some specimens from Singapore as “*S. palawanensis*”, but in 1940, he noted that his material was also mixed; being composed of two species: *S. palawanensis* sensu stricto, as well as a new species, *S. versicolor*.

The holotype (Fig. 4) as well as other specimens examined by Rathbun (1914) of *E. palawanense* are female, and as such, the diagnostic male chelae and G1s are not available for comparison. However, we are reasonably certain it is conspecific with the Singapore and Malaysian material. The overall carapace shape of both male and female specimens fit that of the holotype female (Fig. 4), being almost square with two anterolateral teeth where the second tooth is small and less distinct. The various female specimens (Fig. 16B) examined also have the same gonopore structure to that seen in the holotype female (Fig. 4B). It is noteworthy that the structures of the gonopores (vulvae) are distinct for all five species of *Episesarma* examined (Fig. 16).

The colour of the chela of this species is diagnostic and as discussed earlier, has long been confused with “*E. chentongense*”. The species identified as *E. chentongense* by PKL Ng & Sivasothi (1999) and PKL Ng, Wang & Lim (2008) is actually *E. palawanense*.

***Episesarma singaporense* (Tweedie, 1936)**

(Figs. 7A, B, 8A, 9, 13A, 14A–D, 16C)

- Sesarma* (*Sesarma*) *singaporensis* Tweedie, 1936: 44 (list), 53, 54, 56, 58 (key) (type locality: Kranji River, Singapore).
Sesarma (*Sesarma*) *singaporensis* – Ow Yang, 1963: 244; Serène & Soh, 1967a: 27–29, pls. 3, 4; Sasekumar, 1974: 60 (list).
Sesarma singaporensis – Tweedie, 1940: 97, 98, fig. 6.; Macnae, 1968: 171.
Sesarma (*Episesarma*) *singaporensis* – Soh, 1969: 11 (list), 21 (key), 43, 44, 65 (list), 92 (list), 95, 97, 101 (list), 112 (list), 120, 134, 135, figs. 7, 8a, 9b, 21, 24, tables 4, 7, 10, 13, 24 [new combination].
Neopisesarma (*Neopisesarma*) *singaporensis* – Serène & Soh, 1970: 396, 405 (list) [new combination].
Episesarma singaporense – CGS Tan & PKL Ng, 1994: 82 (list).
 — PKL Ng, 1998: 1140 (key), 1141 (list), 1146, fig. 10, 11.
 — PKL Ng & Sivasothi, 1999: 68–69; Sivasothi, 2000: 26 (list); Chua, 2002: 41 (unnumbered fig.); PKL Ng, Guinot & Davie, 2008: 220 (list); PKL Ng, Wang & Lim, 2008: 100, 109–110, 3 figs.; MFC Ng, 2009: 54, 107 (list), 54 (fig. 3); PKL Ng, Corlett & HTW Tan, 2011: 454; MFC Ng, 2012: 61, 144 (list), 61 (unnumbered fig).
Episesarma singaporensis – Chou, PKL Ng & Lim, 1994: 82 (list).

Material examined. Lectotype (herein designated): 1 female (35.4 × 31.0 mm) (NHM 1947.11.18.38), same data as lectotype. Singapore: 1 male (19.8 × 18.0 mm), 1 female (28.5 × 25.9 mm) (ZRC 1965.7.29.84–85), Kranji River, coll. MWF Tweedie, January 1935; 1 female (29.2 × 26.5 mm) (ZRC 1965.7.29.86), Kranji River, coll. MWF Tweedie, June

1935; 1 male (34.3 × 33.1 mm) (ZRC 2013.1610), Mandai mangrove, coll. BY Lee, 12 September 2013; 3 males (32.8 × 31.5 mm, 32.4 × 31.1 mm, 31.3 × 29.8 mm), 1 female (27.4 × 25.0 mm) (ZRC 2011.0173), Sungei Mandai Kechil mangrove, coll. BY Lee et al., 7 October 2010; 1 male (25.9 × 23.0 mm) (ZRC 2014.0292), Ama Keng River, coll. CL Soh, 28 November 1965; 1 male (17.1 × 15.8 mm) (ZRC 2012.0257), Sungei Buloh, coll. March 2006; 1 male (17.3 × 15.2 mm), 1 juvenile (ZRC 2012.0334), Lim Chu Kang mangrove, coll. BY Lee & SK Tan, 4 March 2012; 1 male (33.1 × 30.1 mm) (ZRC 1965.7.29.87), Pandan Forest Reserve, coll. MWF Tweedie, April 1934; 1 male (36.7 × 33.3 mm) (ZRC 1971.9.22.2), River Simpang Mak Wai, coll. CL Soh, 3 February 1966; 1 female (32.0 × 27.5 mm) (ZRC 1999.0913), no specific locality data, coll. N Sivasothi; 2 males (29.2 × 26.3 mm, 33.6 × 30.5 mm), 1 female (28.1 × 25.1 mm) (ZRC 2011.0175), Sungei Mandai Kechil mangrove, coll. BY Lee et al., 7 October 2010; 1 male (32.0 × 29.5 mm) (ZRC 2000.1949), Mandai mangrove, coll. C.D. Schubart et al., 10 September 1999; 2 males (16.1 × 14.3 mm, 16.2 × 14.4 mm), 1 female (13.8 × 12.2 mm) (ZRC 2013.1540), Sungei Mandai Besar mangrove, coll. BY Lee et al., 21 October 2010; 3 females (28.2 × 25.1 mm, 21.2 × 19.2 mm, 28.9 × 26.0 mm) (ZRC 2012.0263), Sungei Buloh, coll. March 2006; 1 male (22.1 × 20.1 mm) (ZRC 2012.0366), Sarimbun mangrove, coll. BY Lee et al., 24 February 2012. Malaysia: 3 males (30.1 × 28.2 mm, 31.4 × 28.5 mm, 27.6 × 25.2 mm), 1 female (31.0 × 27.6 mm) (ZRC 1965.7.29.93–96), Prai, Province Wellesley, coll. December 1938. Indonesia: 1 male (37.1 × 33.6 mm) (MZB CRU-3983), Kumai District, West Kotawaringi, Central Kalimantan, coll. B Suyanto, 13 August 1983. Thailand: 2 males (33.0 × 30.0 mm, 17.6 × 15.6 mm), 2 females (29.5 × 27.5 mm, 16.8 × 14.8 mm) (ZRC 2000.1906), Ao Nam Bor, Phuket, coll. CD Schubart et al., 24 August 1999; 3 males (34.7 × 31.8 mm, 30.0 × 27.1 mm, 29.9 × 27.8 mm) (ZRC 2001.1079), Phuket, Phang-Nga Province, coll. locals, 17 February 2001.

Diagnosis. Carapace wider than long, covered with tufts of setae, denser around post-frontal region (Figs. 7A, 9A). Anterolateral region with 2 anterolateral teeth, inclusive of external orbital angle; first tooth larger in size with sharp angle (Figs. 7A, 9A). Adult male cheliped distinctly granulated on dorsal surface of palm, with distinct straight row of tubercles arranged on submedian part of palm; dorsal margin of dactylar finger of chela with 35–50 tubercles, tubercles increasing in size towards distal end of dactylus (Figs. 8A, 9C–D, 13A); ridge similar but with fewer tubercles, clustering near inner half of dorsal surface of dactylus on females, absent in juveniles. Single longitudinal pectinated ridge on dorsal surface of adult male chela, with between 65–75 fine tubercles (Fig. 9D, 13A); absent in females and juveniles. In life palm and fingers of chela red with fine white granulation (Fig. 8A); females, and juveniles similar. Inner surface of chela with single vertical row of 9–12 distinct granules, cluster of approximately 8 granules on inner surface of propodal finger; more pronounced in adult males (Fig. 13A); fewer granules present in females, absent in juveniles. Tip of male telson oval shaped, abdomen

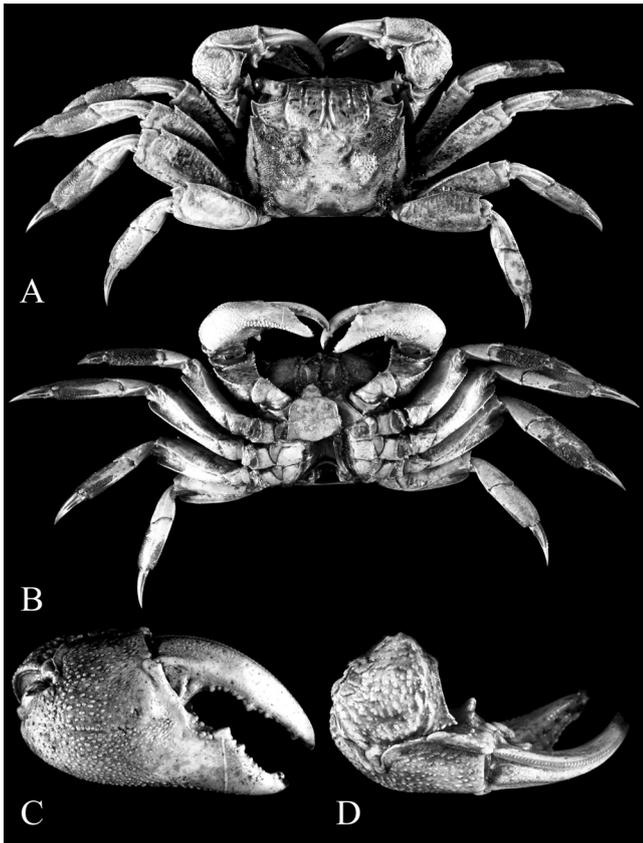


Fig. 11. Lectotype of *Sesarma mederi* H. Milne Edwards, 1853, male (39.0 × 36.1 mm) (MNHN B3666a). A, dorsal view; B, ventral view; C, frontal view of chela; D, top view of chela.

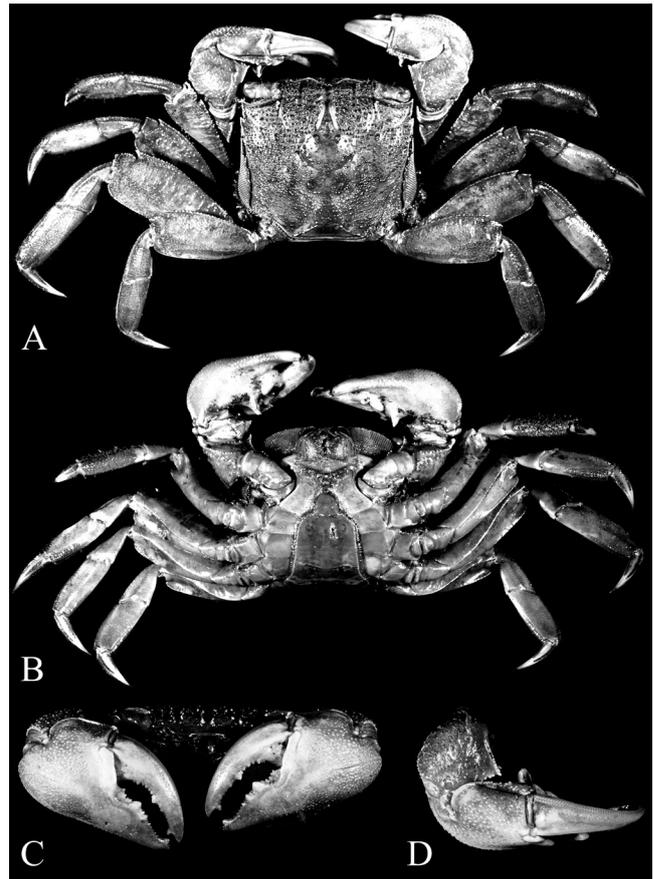


Fig. 12. *Episesarma mederi* (H. Milne Edwards, 1853), male (31.4 × 29.2 mm) (MZB CRU-3886), Indonesia. A, dorsal view; B, ventral view; C, frontal view of chela; D, top view of chela.

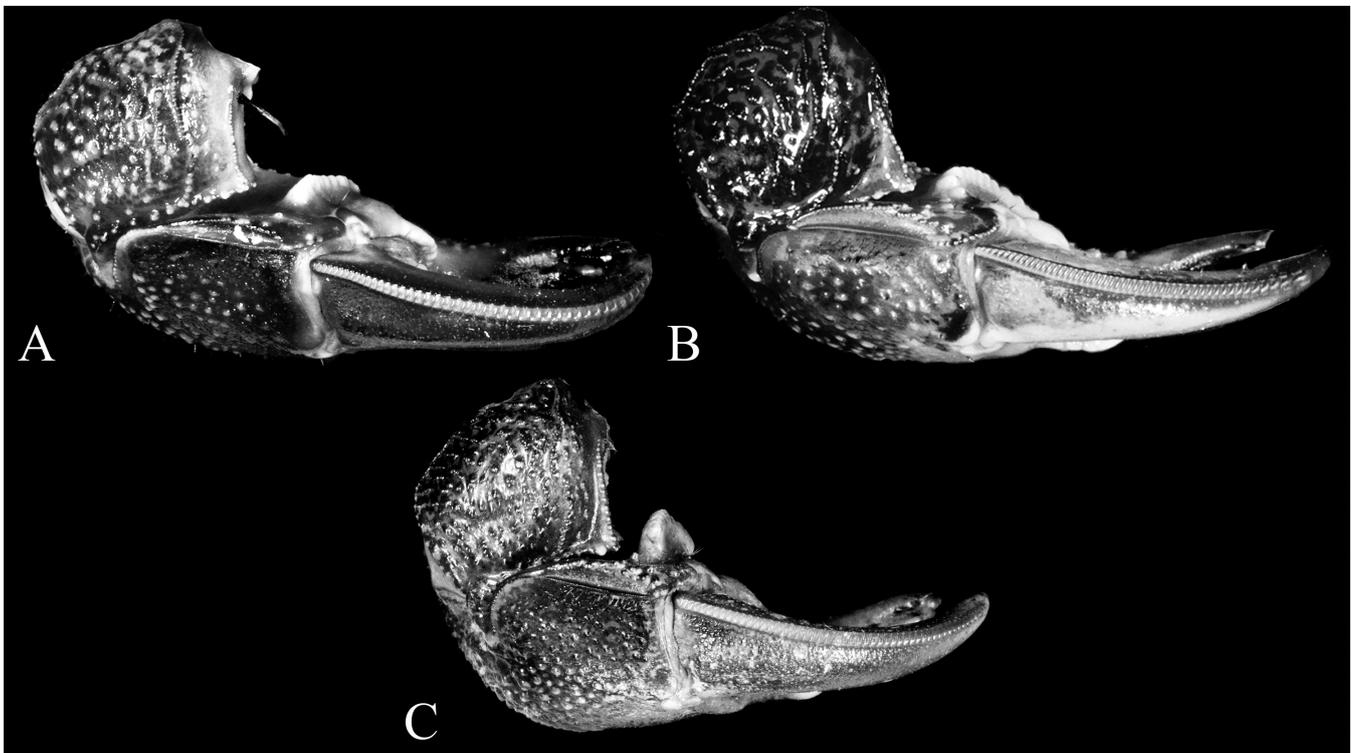


Fig. 13. Top views of chelae. A, *Episesarma singaporense* (Tweedie, 1936), male (34.4 × 33.1 mm) (ZRC 2013.1610); B, *E. versicolor* (Tweedie, 1940), male (35.2 × 33.1 mm) (ZRC 2013.1609); C, *E. mederi* (H. Milne Edwards, 1853), male (40.4 × 38.0 mm) (ZRC 2014.0016).

relatively wide (Figs. 7B, 9B). Tip of G1 with dense tufts of setae, with single row of setae along exterior margin of G1; tip of G1 split into 3 peaks, highest peak median, with V-shaped chitinous tip, other 2 peaks rounded (Fig. 14A–D). Vulvae with elongated central operculum, resembling small hook, protruding; sternal vulvar cover slightly raised, shorter than operculum (Fig. 16C).

Remarks. In describing this species, Tweedie (1936: 53) listed two co-types (one male and one female) that were deposited in the British Museum (now NHM), as well as specimens from Singapore and Johor Straits. Following Article 72.4.6 of the Code (ICZN, 1999), which regards a cotype designation as equivalent to the designation of syntypes; the other specimens from Singapore and Johor Straits cannot be regarded as part of the type series. At best, they are topotypes. Hence, the male and female cotype specimens are herein designated as the lectotype and paralectotype respectively (cf. Article 73.2 of the Code, ICZN, 1999: 81).

This species is one of the more common *Episesarma* species. The colour of its chela is very similar to *E. chentongense* sensu stricto, except that the granules on the proximal half of the palm of the chela are white (red in the *E. chentongense*). This close similarity in colour of the chela probably led to confusion between these two species.

***Episesarma versicolor* (Tweedie, 1940)**
(Figs. 7C, D; 8B; 10; 13B; 14E–H; 16D)

Sesarma (*Sesarma*) *palawanensis* – Tweedie, 1936: 53, 54–58, text fig. 1a, pl. 14 [not *Sesarma* (*Sesarma*) *palawanense* Rathbun, 1914; see synonymy list in Tweedie (1940: 89)].

Sesarma versicolor Tweedie 1940: 89 (list), 98–100, fig. 7 (type locality Singapore). — Tweedie, 1950: 342. — Ow Yang, 1963: 240. — Macnae, 1968: 171.

Sesarma (*Episesarma*) *versicolor* – Soh, 1969: 11 (list), 21 (key), 58, 92 (list), 94, 96, 97, 101 (list), figs. 10, 21, table 13 [new combination].

Sesarma (*Sesarma*) *versicolor* – Serène & Soh, 1967a: 27–29, pl. 3, 4. — Sasekumar, 1974: 60 (list).

Neopisesarma (*Neopisesarma*) *versicolor* – Serène & Soh, 1970: 396, 405 (list) [new combination]. — Dai et al., 1986: 17 (list), 495, text fig. 279 (2), pl. 70 fig. 1. — Dai & Yang, 1991: 542, text fig. 279 (2), pl. 70 fig. 1.

Episesarma versicolor – CGS Tan & PKL Ng, 1994: 82 (list). — Chou, PKL Ng & Lim, 1994: 82 (list). — PKL Ng, 1998: 1140 (key), 1141 (list), 1143, fig. 10, 11. — PKL Ng & Sivasothi, 1999: 68, 69. — Sivasothi, 2000: 26 (list). — Chou, HTW Tan & Yeo, 2007: 79, fig. 5.7 (left). — HTW Tan, Chou, Yeo & PKL Ng, 2007: 79, fig. 5.7 (left). — PKL Ng, Guinot & Davie, 2008: 220 (list). — PKL Ng, Wang & Lim, 2008: 109–110. — HTW Tan, Chou, Yeo & PKL Ng, 2010: 108, fig. 5.7a. — PKL Ng, Corlett & HTW Tan, 2011: 454. — Lee, 2012: 12 (list), fig. 4B.

Material examined. Lectotype (herein designated): 1 male (39.4 × 35.9 mm) (NHM 1947.8.9.3), Singapore, coll. MWF Tweedie, February 1939. Paralectotype (herein designated): 1 female (39.2 × 35.0 mm) (NHM 1947.8.9.4), same data as lectotype. Singapore: 1 male (34.8 × 33.5 mm), 4 females (31.3 × 30.0 mm, 37.1 × 35.6 mm, 36.2 × 34.7 mm, 36.2

× 34.5 mm) (ZRC 1965.7.29.141–145), Singapore, coll. MWF Tweedie, February 1939; 1 male (29.8 × 27.8 mm) (ZRC 1965.7.29.135), Serangoon River, Singapore, coll. MWF Tweedie, June 1935; 1 male (29.4 × 27.7 mm) (ZRC 1965.7.29.136), Jurong River, Singapore, coll. MWF Tweedie, April 1934; 1 male (37.4 × 34.9 mm) (ZRC 1973.11.2.269), Pandan Forest Reserve, Singapore, coll. MWF Tweedie, April 1934; 1 male (35.2 × 33.1 mm) (ZRC 2013.1609), Mandai mangrove, coll. BY Lee, 12 September 2013; 1 female (36.6 × 34.9 mm) (ZRC 2014.0017), station SW50 (JS-0384), Pasir Ris mangrove (01°22'36.71"N, 103°57'9.57"E), coll. CMBS expedition 1, 20 October 2012; 1 male (34.8 × 32.9 mm) (ZRC 2012.0277), Pasir Ris mangrove, coll. BY Lee & RRY Oh, 28 October 2011; 1 male (29.1 × 27.6 mm) (ZRC 2014.0237), station SW01 (JS-0152), Outward Bound School camp 1, Pulau Ubin (01°25'15.77"N, 103°55'57.00"E) coll. CMBS expedition 1, 15 October 2012; 1 male (20.3 × 19.6 mm), 1 female (24.4 × 23.5 mm) (ZRC 2000.1939), Lim Chu Kang mangrove, coll. CD Schubart et al., 21 April 2000; 1 male (32.5 × 29.2 mm) (ZRC 2014.0299), no coll. data; 1 male (35.4 × 32.0 mm), 2 females (25.9 × 23.8 mm, 26.4 × 23.8 mm) (ZRC 2014.0318), Lim Chu Kang, coll. 20 June 2000; 1 male (36.3 × 33.4 mm) (ZRC 2011.0172), Lim Chu Kang mangrove, coll. BY Lee et al., 9 October 2010; 1 male (35.4 × 32.5 mm), 1 female (28.9 × 26.2 mm) (ZRC 2012.0828), Sungei Buloh, 11 December 2004; 1 female (34.5 × 31.0 mm) (ZRC 2000.1943), Sungei Buloh mangrove, coll. N Sivasothi et al., 28 December 1999. Malaysia: 5 males (37.0 × 35.0 mm, 32.4 × 31.0 mm, 30.0 × 29.1 mm, 35.2 × 33.9 mm, 25.1 × 33.5 mm), 2 females (37.3 × 34.3 mm, 34.6 × 32.5 mm) (ZRC 1965.7.29.146–152), Prai, Province Wellesley, Malaysia, coll. MWF Tweedie, December 1938; 1 male (28.7 × 26.7 mm), 1 female (36.4 × 33.5 mm) (ZRC 1965.7.29.137–138), Kuantan, Pahang, Malaysia, coll. G Nunong, September 1935; 1 male (29.8 × 28.6 mm) (ZRC 2012.1212), Kuala Selangor nature park, Kuala Selangor, coll. L Ribero & G Polgar, 16 April 2011; 1 female (19.0 × 17.4 mm) (ZRC 1965.7.29.134), River below Kuching, Sarawak, coll. 24 December 1948. Thailand: 1 male (34.9 × 31.9 mm), 1 female (31.7 × 28.5 mm) (ZRC 2000.2624), main market in Phuket town, Phuket, coll. HH Tan, 18 January 2000.

Diagnosis. Carapace slightly wider than long, covered with tufts of setae on entire carapace (Figs. 7C, 10A). Anterolateral region with 2 anterolateral teeth, inclusive of external orbital angle; first tooth larger in size with sharp angle (Figs. 7C, 10A). Adult male cheliped with dorsal surface of palm sparsely granulated; dorsal margin of dactylar finger of chela with 40–50 tubercles, tubercles increasing in size towards distal end of dactylus, tubercles not continuous to tip of dactylus (Figs. 8B, 10C–D, 13B); tubercles less obvious in females and juveniles. Single longitudinal pectinated ridge on dorsal margin of chela, with 65–80 fine tubercles (Figs. 10D, 13B); ridge absent in females and juveniles. In life, palm of chela violet with fingers white (Fig. 8B); females, and juveniles similar. Inner surface of male chela with single vertical row of 10–13 distinct granules, cluster of granules on inner surface of propodal finger; relatively fewer

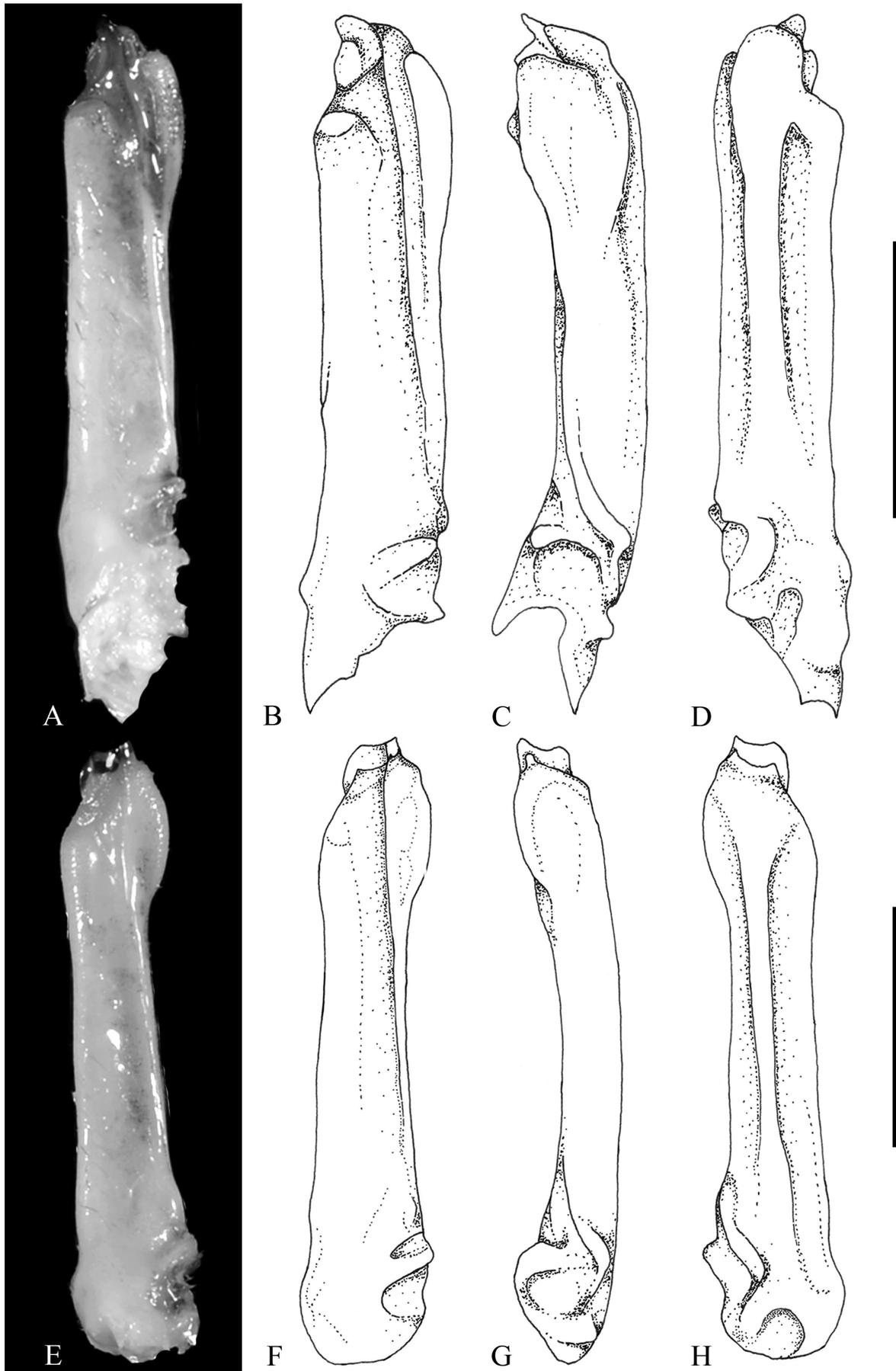


Fig. 14. G1 photographs and drawings. A–D, *Episesarma singaporensis* (Tweedie, 1936), male (34.4 × 33.1 mm) (ZRC 2013.1610), Singapore; A, dorsal view photograph of G1; B, G1 dorsal view; C, G1 lateral view; D, G1 ventral view. E–H, *E. versicolor* (Tweedie, 1940), male (35.2 × 33.1 mm) (ZRC 2013.1609), Singapore. E, dorsal view photograph of G1; F, G1 dorsal view; G, G1 lateral view; H, G1 ventral view. Scale bar = 5.0 mm.

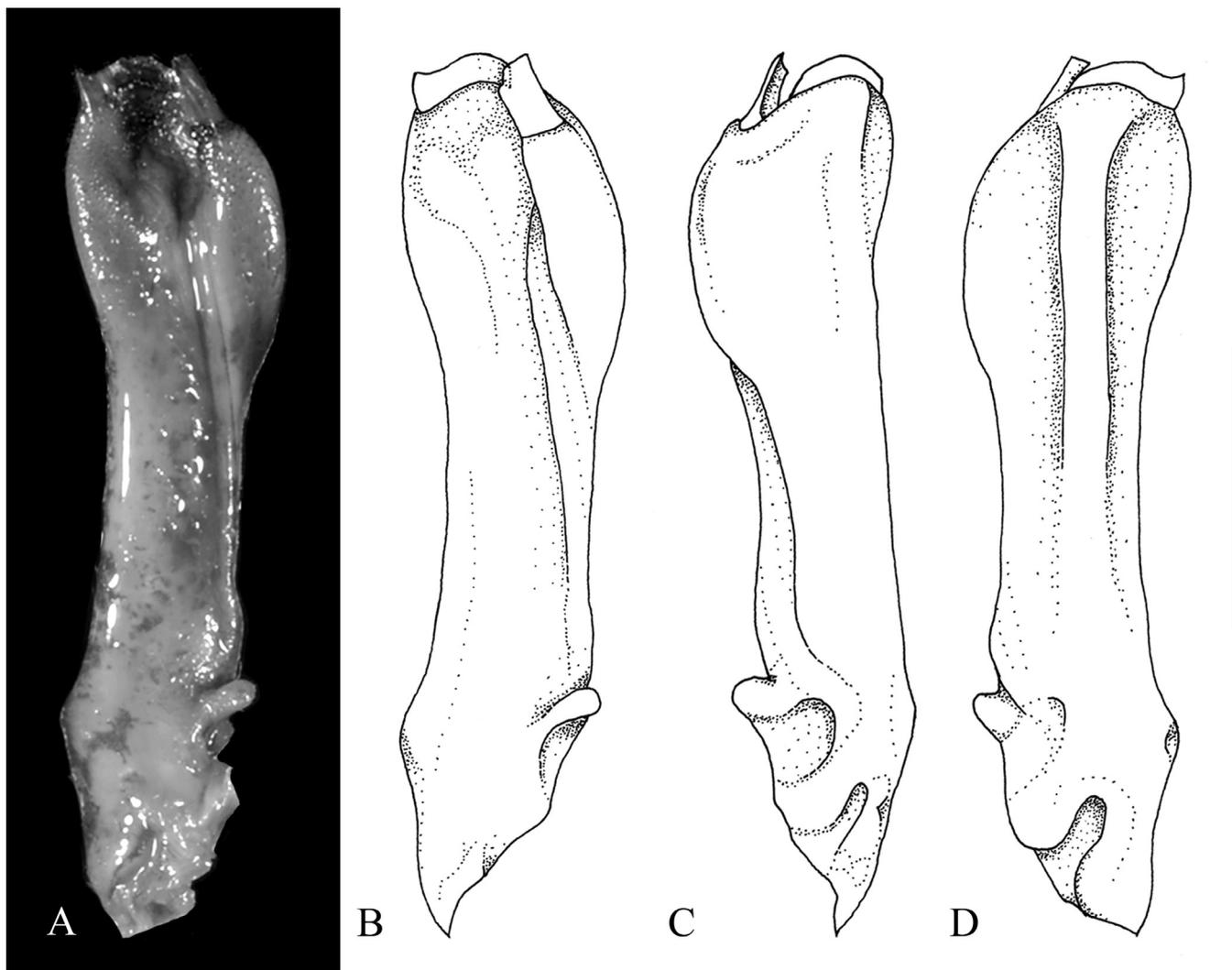


Fig. 15. G1 photographs and drawings of *Episesarma mederi* (H. Milne Edwards, 1853), male (40.4 × 38.0 mm) (ZRC 2014.0016), Singapore. A, dorsal view photograph of G1; B, G1 dorsal view; C, G1 lateral view; D, G1 ventral view. Scale bar = 5.0 mm.

granules in females, less obvious or absent in juveniles. Tip of male telson oval; abdomen narrow (Figs. 7D, 10B). Tip of G1 with dense tufts of setae, with single row of setae along exterior margin of G1; single peak with chitinous crest relatively narrow (Fig. 14E–H). Vulvae with flattened operculum, with slight protrusion distally; sternal vulvar cover not obvious (Fig. 16D).

Remarks. The type series is a pair of specimens in the British Museum (now NHM). The other specimens listed by Tweedie (1940) are only topotypes at best (see Remarks for *E. singaporense*). Hence, the male and female cotype specimens in NHM are herein designated as the lectotype and paralectotype, respectively (cf. Article 73.2 of the Code, ICZN, 1999: 81). As discussed earlier under *E. palawanense*, the material identified as this species by Tweedie (1936) was mixed; and Tweedie (1940) referred most of these specimens to *E. versicolor*.

This species is probably the most common *Episesarma* species in the mangroves of Singapore, and is easily recognised by its purple to violet chela, which is obvious even in small specimens of both sexes.

***Episesarma mederi* (H. Milne Edwards, 1853)**
(Figs. 7E, F, 8C, 11, 12, 13C, 15, 16E)

- Sesarma taeniolata* White, 1847: 38 [nomen nudum].
Sesarma mederi H. Milne Edwards, 1853: 185 (type locality “Batavia” (= Jakarta, Indonesia)).
Sesarma taeniolata Miers, 1877: 137, footnote (type locality the Philippines).
Sesarma Mederi – Targioni-Tozzetti, 1877: 136–141, pl. 9 fig. 1a–i.
Sesarma taeniolata – De Man, 1880: 26–27 [new combination].
 — Miers, 1880: 313. — De Man, 1887: 647, 666, 667. — De Man, 1888: 181, 182. — Bürger, 1893: 615–617. — Ortmann, 1894: 720. — Lanchester, 1900: 756–757. — Tesch, 1917: 165–167, 183–185, 201, 202, 204 (key).
Sesarma (Episesarma) taeniolata – De Man, 1895: 166. — Ow Yang, 1963: 241.
Sesarma (Sesarma) taeniolata – Tweedie, 1936: 53, 55, 56, 57 (key), text fig. 1a. — Ow Yang, 1963: 244.
Sesarma mederi – Tweedie, 1940: 94–95, fig. 4. — Macnae, 1968: 171, 213.
Sesarma (Sesarma) mederi – Ow Yang, 1963: 244. — Serène & Soh, 1967a: 27–29, pls. 3, 4.
Sesarma (Episesarma) mederi – Soh, 1969: 10 (list), 21 (key), 43, 44, 51, 58 (list), 92 (list), 94, 97, 98, 100, figs. 7, 8, 21, tables 4, 7, 10.

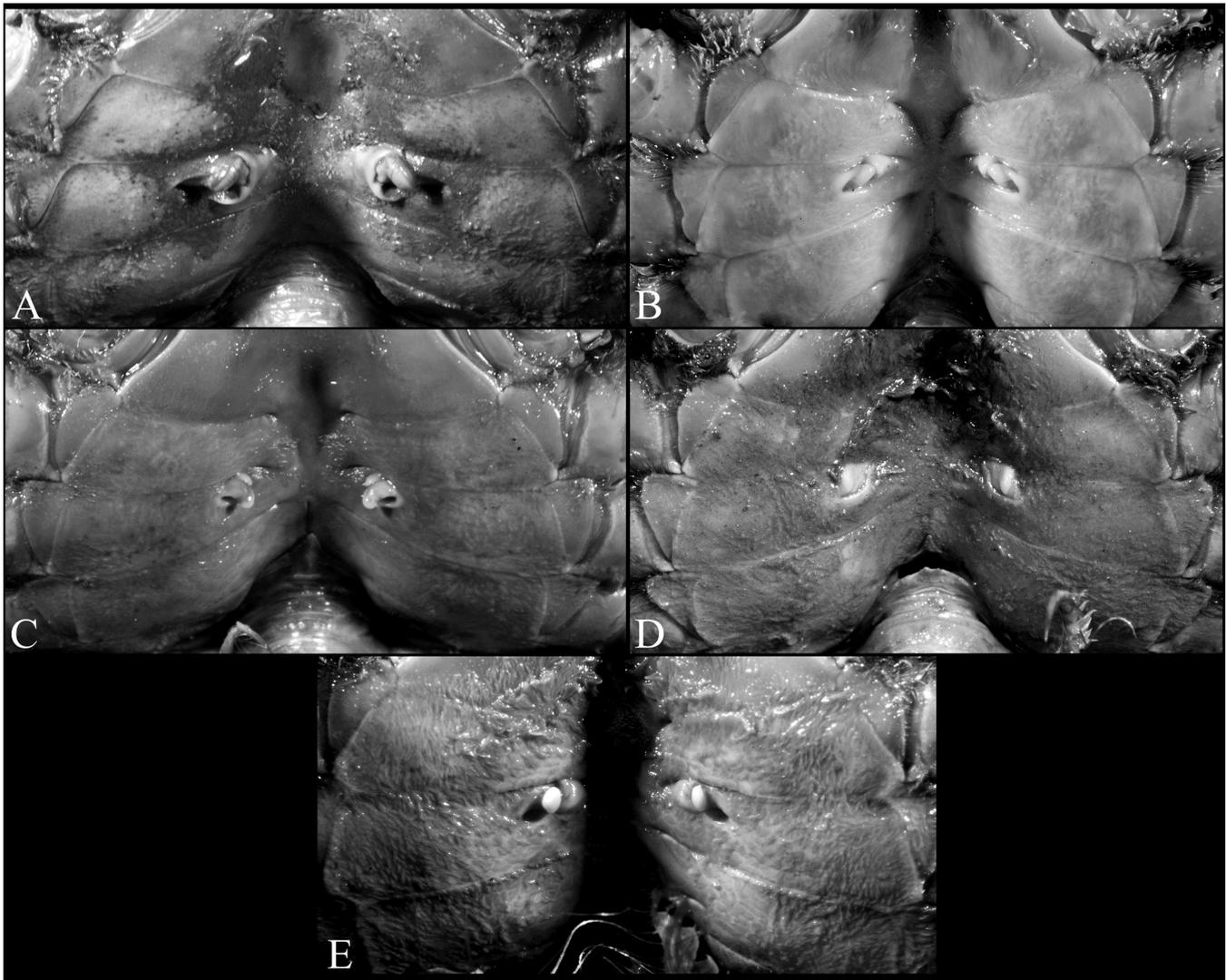


Fig. 16. Female thoracic sternums and vulvae. A, *Episesarma chentongensis* (Serène & Soh, 1967), paralectotype female (34.3 × 32.8 mm) (ZRC 1967.1.6.3–4); B, *E. palawanense* (Rathbun, 1914), female (34.3 × 33.2 mm) (ZRC 2000.2590); C, *E. singaporensis* (Tweedie, 1936), topotype female (28.5 × 25.9 mm) (ZRC 1965.7.29.84–85); D, *E. versicolor* (Tweedie, 1940), topotype female (36.0 × 33.0 mm) (ZRC 1965.7.29.141–145); E, *E. mederi* (H. Milne-Edwards, 1853), female (38.7 × 35.8 mm) (MZB CRU 2237).

Neoepisesarma (*Neoepisesarma*) *mederi* – Serène & Soh, 1970: 396, 405 (list), 408, pl. 2 fig. C, D, pl. 3 fig. A, B. [new combination]. — Dai et al., 1986: 17 (list), 494, text fig. 279 (1), pl. 69 fig. 8; Dai & Yang, 1991: 541–542, text fig. 279 (1), pl. 69 fig. 8.

Episesarma mederi – Tan & PKL Ng, 1994: 82 (list). — Chou, PKL Ng & Lim, 1994: 82 (list). — PKL Ng, 1998: 1140 (key), 1141 (list), 1145, fig. 10, 11; PKL Ng, Guinot & Davie, 2008: 220 (list). — PKL Ng, Wang & Lim, 2008: 109.

Episesarma taeniolata – Chou, PKL Ng & Lim, 1994: 82 (list).

Material examined. Lectotype (herein designated): 1 dried male (39.0 × 36.1 mm) (MNHN B3666a), Batavia (= Jakarta), Indonesia. Paralectotype (herein designated): 1 dried female (MNHN B3666b), same data as lectotype. Indonesia: 1 male (31.4 × 29.2 mm) (MZB CRU-3886), Desa Kelapa, Lembar Sekotong Timur, Lombok Barat, Nusa Tenggara Barat, coll. U. Nurhaman, 15 April 2013; 1 male (37.3 × 35.3 mm), 1 female (38.7 × 35.8 mm) (MZB CRU-2237), Kalibaru, Batavia (= Jakarta), coll. J Verwey, June 1929. Singapore: 1 male (40.4 × 38.0 mm) (ZRC 2014.0016), station SW50 (JS-0384), Pasir Ris mangrove

(01°22'36.71"N, 103°57'9.57"E), coll. CMBS Expedition 1, 20 October 2012; 1 male (35.5 × 34.1 mm) (ZRC 2014.0236), station SW113 (JS-2740), Outward Bound School Camp 1, Pulau Ubin (01°25'15.77"N, 103°55'57.00"E), coll. CMBS Expedition 1, 28 October 2012; 1 female (32.1 × 29.0 mm) (ZRC 2014.0316), station SW137, OBS camp 1, Pulau Ubin (01°25'15.77"N, 103°55'57.00"E), coll. CMBS Expedition 1, 30 October 2012; 1 female (46.5 × 44.6 mm) (ZRC 1967.7.10.2), River Simpang Mak Wai, coll. CL Soh, 21 June 1966; 1 male (40.8 × 38.5 mm) (ZRC 2000.1950), Mandai mangrove, coll. CD Schubart et al., 10 September 1999; 3 males (28.5 × 26.0 mm, 23.3 × 21.2 mm, 18.5 × 16.7 mm) (ZRC 1973.11.2.497–500), Ama Keng River, coll. CL Soh, 28 November 1965. Malaysia: 2 males (38.6 × 37.7 mm, 35.5 × 34.9 mm), 2 females (33.1 × 31.5 mm, 31.9 × 29.7 mm) (ZRC 1965.8.2.223–227), Sungei Batu Arang, Labuan, coll. G Nunong, August 1938; 2 male (26.2 × 24.0 mm, 38.9 × 37.1 mm) (ZRC 1965.8.2.229–230), Muar, Johore, coll. MWF Tweedie, February 1936; 1 female (21.8 × 20.3 mm) (ZRC 1965.8.2.218), Labuan, coll. MWF Tweedie, August 1938; 1 female (31.3 × 28.2 mm) (ZRC 1965.8.2.219), Kuala

Ibai, Trengganu, coll. MWF. Tweedie, August 1950; 1 male (38.3 × 36.9 mm), 2 females (38.8 × 36.7 mm, 32.5 × 30.3 mm), (ZRC 1965.8.2.220–222), Prai, Province Wellesley, coll. December 1948. Philippines: 1 male (40.1 × 38.1 mm), 1 female (38.4 × 35.8 mm) (ZRC 2003.0386), Loboc River, Bohol, coll. PKL Ng et al., 28–29 July 2003; 1 male (21.1 × 30.0 mm), 2 females (37.4 × 35.5 mm, 33.1 × 30.1 mm) (ZRC 2004.0469), mangrove, mouth of Loboc River, Bohol, Visayas, coll. PKL Ng et al., 2 March 2004. Thailand: 5 males (44.6 × 43.5 mm, 36.6 × 35.7 mm) (ZRC 1998.1182), Chonburi Province, coll. PKL Ng, 29 September 1998; 6 males (42.3 × 39.2 mm, 34.5 × 31.8 mm), 1 female (31.1 × 29.5 mm) (ZRC 1997.110), Trat wet market, Trat Province, coll. SH Tan et al., 15 January 1997.

Diagnosis. Carapace slightly wider than long, covered with tufts of setae, denser around post-frontal region (Figs. 7E, 11A, 12A). Anterolateral region with 2 anterolateral teeth, inclusive of external orbital angle; first tooth larger, tip with sharp angle (Figs. 7E, 11A, 12A). Adult male cheliped with dorsal surface of palm granulated, with distinct straight row of tubercles on middle of palm; dorsal margin of dactylar finger of chela with 40–60 tubercles, tubercles largest medially, decreasing in size towards both ends (Figs. 8C, 11C, D, 12C, D, 13C); similar ridge present in females and juveniles but relatively weaker. Single longitudinal pectinated ridge on dorsal surface of adult male chela, with 55–70 fine tubercles (Figs. 11D, 12D, 13C); present in both females and juveniles. In life, palm purple to violet on top half of, extending to dactylar finger, red on bottom half, extending to propodal finger; finger tips white (Fig. 8C); females, and juveniles similar. Inner surface of chela with single vertical raised row of 9 granules arranged close together, granules positioned close together, more pronounced in adult males (Figs. 11D, 12D, 13C); not obvious in females and juveniles. Tip of male telson rounded; abdomen relatively wide (Figs. 7F, 11B, 12B). Tip of G1 with dense tufts of setae, with single row of setae along exterior margin of G1; when denuded, tip of G1 with 2 peaks, both chitinous; shorter peak with long, slender chitinous tip, longer peak with relatively lower chitinous crest (Fig. 15). Vulvae with round central operculum; thickened round sternal vulvar cover above operculum (Fig. 16E).

Remarks. Henri Milne Edwards (1853: 185) described *Sesarma mederi* in brief, and noted he had material from “Batavia” (present day Jakarta). In MNHN are two dried specimens, one male and one female, and both should be regarded as syntypes. The male is herein selected as the lectotype of the species (Fig. 11). As it is a dried specimen, we were not able to examine its G1; but comparisons with fresh material from Java (Fig. 12) confirmed that the material from the type locality and Singapore are conspecific, with all the major morphological characters in agreement.

Of the five *Episesarma* species in Singapore mangroves (Serène & Soh, 1967a; Chou, PKL Ng & Lim, 1994; CGS Tan & PKL Ng, 1994), this species is the least common, and this is reflected in the relatively few specimens and records

in the LKCNHM. This species is currently known to be present in mangroves of Pasir Ris on mainland Singapore and Outward Bound School on Pulau Ubin based on the first CMBS expedition conducted on the northern shores of Singapore along the Johor Straits. Based on the museum records, it seems that this species can also be found in Mandai mangrove as well as two other rivers that is part of the Kranji Reservoir.

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