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A revision of *Cryptosoma* Brullé, 1837 and *Cycloes* de Haan, 1837 (Crustacea: Brachyura: Calappidae)

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The nomenclature of the calappid genera *Cryptosoma* Brullé, 1837 and *Cycloes* de Haan, 1837 is reviewed. *Cryptosoma* Brullé, 1837 is recognized as an available genus name of decapod Crustacea and not a junior homonym of *Cryptosoma* Berthold, 1827 (Insecta, Coleoptera). The Eastern Pacific and Atlantic species are assigned to *Cryptosoma* and Indo-Pacific species to *Cycloes*. The revision of these genera includes descriptions of two new species, one assigned to *Cryptosoma* and the other to *Cycloes*, descriptions of all species, distributional data, synonymies, figures of first and second pleopods, photographs and a key.

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ADDITIONAL KEY WORDS: —Decapoda – Oxystomata – nomenclature – taxonomy – new species.

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INTRODUCTION

In 1837, two closely allied Oxystomata genera, *Cryptosoma* Brullé and *Cycloes* de Haan, were established. Brullé published his genus in Webb & Berthelot (1835–1850) and de Haan in Siebold (1835–1850). The dates of these two major works have long been in doubt and, as a consequence, the nomenclatural priority of these two names was rather uncertain. For example, Stimpson (1907:166), Rathbun (1902:85, 1937:225), Balss (1957a:1611) and Guinot-Dumortier and Dumortier (1961:561) considered *Cryptosoma* to be a subjective junior synonym of *Cycloes*, whereas Miers (1886:292), Alcock and Anderson (1895:198, 203), Alcock (1896:151), Borradaile (1903:436), Ihle (1918:179), Balss (1922:124), Sakai (1937:84, 1960:33, 1965:50), Lin (1949:13), Uchida (1949:723), Monod (1956:114) and Takeda (1973:82, 1982:109) believe that *Cycloes* was the subjective junior synonym. Monod (1933:495[40]), uncertain about which name took priority, further suggested that *Cryptosoma* Brullé could be preoccupied by *Cryptosoma* Berthold 1827. Recently, Chace (1968:610), followed by Sakai (1976:139) and Manning and Holthuis (1981:56) declared *Cryptosoma* Brullé, 1837 to be a junior homonym of *Cryptosoma* Berthold, 1827 (Insecta, Coleoptera).

This study offers a fresh appraisal of the status of *Cryptosoma* Brullé, 1837, ascertains the publication dates of the genera described by Brullé and de Haan, and presents a generic revision.

NOMENCLATURAL REVIEW

Chace (1968:610) proposed that *Cryptosoma* Brullé, 1837, was a junior homonym of *Cryptosoma* Berthold, 1827 (Coleoptera) and was therefore unavailable as a crustacean genus name. This is here shown to be incorrect.

Dejean (1821:34) established the coleopteran genus *Cryptostoma* and indicated, by original monotypy, that the type species of this taxon was *Elater spinicornis* Fabricius, 1801. Although Neave (1939:891) considered *Cryptostoma* Dejean, 1821, to be a *nomen nudum* the name is available (see ICZN 1985:35, Art. 12b(5)).

The work of Berthold (1827) was a direct German translation of Latreille (1825) except that the French vernacular names were Latinized. The original copy of Latreille contains two references to *Cryptostoma* (as *Cryptostome*): page 199 (Mollusca) and page 248[348] (Insectes). Pages 339–352 in Latreille (1825) have been incorrectly given the numbers 239–252. The molluscan genus was described by de Blainville (1818) and the coleopteran genus established by Dejean (1821). In his German translation, Berthold transcribed the molluscan genus to *Cryptostoma* (p. 192) but the coleopteran taxon to *Cryptosoma* (p. 335). Berthold may have altered the coleopteran spelling deliberately, realizing that *Cryptosoma* de Blainville, 1818, was the senior homonym, but neglected to state this was an intentional replacement for *Cryptostoma* of Dejean; or it was simply misspelled. *Cryptosoma* Berthold, 1827, was recognized as a possible typographical error by Sherborn (1925:1665), [? err. pro *Cryptostoma*] and Neave (1939:891), (?err. pro -stoma Dejean 1821). Consequently, *Cryptosoma* Berthold, 1827, is a *nomen nudum*, as noted previously by Silfverberg (1984:58) and Muona (1987:82). As there is no way of ascertaining whether Berthold's name change was intentional or accidental, the present study concludes (subjectively) that *Cryptosoma* of Berthold, 1827, was an incorrect subsequent spelling

for *Cryptostoma* Dejean, 1921 and is therefore an unavailable name. The first valid use of the name is *Cryptosoma* Brullé, 1837. There is one further reference to the coleopteran genus *Cryptosoma*, that of Schenkling (1928:84). This too is a *nomem nudum*, not of Berthold as stated, but of Schenkling's own making because his use of the name is already preoccupied by that of Brullé (1837). Neave (1939:891) recorded another use of the name *Cryptosoma*, that of Theobald (1857). Cokerell (1912:70) suggested that this molluscan genus should take the name *Megaustenia*; type *Megaustenia praestans* (Gould, 1843). Acknowledging that this molluscan genus was a junior homonym, Cokerell stated that he had not found the date of Brullé's genus, but considered it to be not later than 1848.

A century of confusion over the date of publication of the crustacean plate of Webb & Berthelot ended with Stearn's (1937:55) finding that the Crustacea plate (unique) was bound in livraison 15 with a distribution date of February 1837, though the wrapper is dated 1836. The text written by Brullé to accompany the plate was not published until livraison 40, June 1839 (Stearn, 1937:55), though the wrapper is dated 1838. As the caption to figure 2 of the "Crustacées plate unique" reads *Cryptosoma cristata* Br., the genus and species are available (ICZN 1985, Art. 12b(7)).

Sherborn (1925:1665) and Neave (1939:891) suggested that the citation of *Cryptosoma* Brullé by H. Milne Edwards (1837) was a *nomem nudum*. The point of confusion over the use of *Cryptosoma* by H. Milne Edwards concerns his statement that Brullé proposed to name *Cryptosoma cristata*, and figured the specimen, in the work of Webb and Berthelot. The month of distribution of volume II of *Histoire Naturelle des Crustacés* by H. Milne Edwards was obscure because three announcements relating to this tome were made by three French journals throughout 1837. Holthuis (1979:290–291) established that it was published in July of that year. As the figure of Brullé was published in February 1837 and the work of H. Milne Edwards was published in July 1837, the reference to *Cryptosoma* by H. Milne Edwards was in fact valid. The description of *Cycloes* by de Haan appears in the third Decas of the Crustacea volume in Siebold's *Fauna Japonica* (1833–50). Recently, it was established that the date of distribution of Decas III was the 14th August 1837 (Yamaguchi, 1993:30; Holthuis, 1993:606).

MATERIAL AND METHODS

The extensive collections of the National Museum of Natural History, Smithsonian Institution, Washington (USNM), have been studied together with material sent on loan by the American Museum of Natural History (AMNH), Instituut voor Systematiek en Populatiebiologie, Amsterdam (ISP), Natural History Museum of Los Angeles County (LACM), Museum national d'Histoire naturelle, Paris (MNHN), The Natural History Museum, London (NHM), Nationaal Natuurhistorisch Museum, Leiden (NNM), Senckenberg, Frankfurt (SM), the Zoologisk Museum, Copenhagen (ZMC), and Zoological Reference Collection of National University, Singapore, (ZRC).

Left first and second pleopods were removed and mounted in polyvinyl lactophenol. Drawings were made using an Olympus BH-2 microscope with Nomarski interference contrast and a *camera lucida*. Abbreviations used in the text:

coll. = collected by; id. = identified by; juv. = juvenile; sta. = station. Measurements refer to the carapace length (mm) and were taken using Tesa dial calipers.

TAXONOMIC REVISION

Cryptosoma Brullé, 1837

Cryptosoma Brullé 1837(February)[1836]: pl. unique, fig. 2; H. Milne Edwards, 1837(July):110; Brullé, 1839(June)[1838]:16; Erichson, 1841:251; Lucas, 1844a:437–438, 495; Agassiz, 1848:307; Scudder, 1882:84; Miers, 1886:292(part); Alcock 1896:151(part); Doflein, 1904:38; Balss, 1922:124(part); Sherborn, 1925:1665; Neave, 1939:891; Monod, 1956:114; Sakai, 1965:50(part); Takeda, 1973:82(part).

Cycloes. de Haan, 1841:124–125(part); Finnegan, 1931:613; Fausto-Filho, 1967:41(list), 54; 1968:44; Williams *et al.*, 1968:49; Fausto-Filho & Sampaio Neto, 1976:68; Powers, 1977:32; Manning & Holthuis, 1981:56(part); Williams, 1984:277; Dai *et al.*, 1986:96(part); Williams & Child, 1989:106 (key); Dai & Yang, 1991:108(part); Hendrickx, 1993a(list). **non de Haan, 1837.**

Cycloës. Studer, 1882:15; Stimpson, 1907:166; Rathbun, 1902:85(part), 1933:101; 1937:225(part); Garth, 1946a:362; Balss, 1957a:1611(part); Ribeiro, 1964:4; Rodriguez da Costa, 1968:29; Hendrickx, 1994:572. **non de Haan, 1837.**

Mursia. White, 1847:45. **non Desmarest, 1823.**

non *Cryptosoma* Borradaile, 1903:436; Ihle, 1918:179; Sakai, 1936:42–43 = *Cycloes* de Haan, 1837.

non *Cryptosoma* [Insects, Coleoptera] Berthold, 1827 (an incorrect subsequent spelling of *Cryptostoma* Dejean, 1921 from Latreille, 1825:248[348]); Sherborn, 1925:1665; Neave, 1939:891 = *Ceratogonys* Perty, 1830 (Lacordaire, 1857:125).

non *Cryptosoma* [Mollusca, Sigmurethra] Theobald, 1857 (a junior homonym of *Cryptosoma* Brullé, 1837); Cockerell, 1912:70; Neave, 1939:891 = *Megaustenia* Cockerell, 1912.

non *Cryptosoma* [Insects, Coleoptera] Schenkling, 1928 *nec* Berthold, 1827 (a junior homonym of *Cryptosoma* Brullé, 1837) = *Ceratogonys* Perty, 1830.

Type-species. *Cryptosoma cristatum* Brullé, 1837, by monotypy; gender: neuter.

Diagnosis. Carapace pentagonal, convex, granulate, regions undefined. Carapace wider than long. Front, as wide as orbit, bidentate, slightly projecting. Anterolateral margin arcuate, coarsely granulate. Lateral spine small, two-thirds down lateral margin. Posterolateral margin convergent, concave, granulate. Branchial regions with three ridges subparallel to anterolateral margin, furrows bordering cardiac region most pronounced. Eyes filling orbits, eyestalk short, smooth, cornea large. Orbital margins with long plumose setae. Supraorbital margin swollen medially, unisutured. Inner orbital tooth separated from outer orbital margin by fissure opening into oblique subhepatic canal. Subhepatic regions and outer maxillipeds densely setose. Antero-internal angle of merus of third maxilliped produced, lobate. Chelipeds massive, subequal. Merus with transverse setose, dentate crest externally, distal-most tooth largest, keel-like. Carpus trigonal, anterior angle produced

interiorly. External surface of chela swollen, granulose, upper margin crested, with nine foliate lobes, their interior surface smooth; keel-like laminar tooth proximally near lower margin, lower margin with two subparallel files of tubercles, converging distally, external file with smaller, closely-set tubercles; internal surface densely setose along inner and lower margins. Larger dactylus proximally with molariform tooth fitting into shallow depression, its inner surface granulose, with milled ridge occupying distal two thirds of upper margin. Inner surface of smaller dactylus with line of coarse granules. Upper margins of cheliped fringed with long setae. Pereiopods smooth, laterally compressed, dactyli styliform, meral upper margin setose. Male abdomen five-segmented. Trilobate, granulate carina on second segment, median lobule small. Transverse granulate crest on anterior thoracic sternite. First male pleopod stout, tapering, slightly sinuous, distally spinulose. Second male pleopod filamentose, elongate, distally crook-shaped, tip spinulose.

Remarks. *Cryptosoma* is distinguished from the closely allied genus *Cycloes* by its wider carapace, distinct branchial spine, smooth upper margin of cheliped carpus, smooth interior surface of palmar crest, milled ridge on palmar dactylus occupying two thirds of anterior margin, transverse granulate crest on anterior thoracic sternite and distally sinuous first pleopod.

Several authors considered *Cycloes* de Haan, 1837, to be a junior synonym of *Cryptosoma* Brullé, 1837 (see Introduction).

This genus includes four recognized species, *C. bairdii* (Stimpson, 1860), *C. balguerii* (Desbonne, 1867), *C. cristatum* Brullé, 1837, and one new species. *Cryptosoma orientis* Adams & White, 1849, is a junior synonym of *Mursia cristata* H. Milne Edwards, 1837 (see Galil, 1993).

In her recent revision Galil (1993:348) confirmed the authority of *Mursia* as Desmarest (1823). It seems probable that Desmarest had used a name proposed by Leach. This nomenclatural decision is uncontested, though a number of subsequent authors followed Desmarest's authorship and attributed *Mursia* to Leach (Guérin, 1827; Latreille, 1829; H. Milne Edwards, 1837; Lucas, 1844a and Takeda, 1973). Although Agassiz (1848) and Scudder (1882) cited *Mursia* Leach, 1817, Sherborn (1928:4208) referred the Agassiz's citation to *Nursia* Leach, 1817. In fact, H. Milne Edwards (1837) and Latreille (1829) commented that *Mursia* Leach must not be confused with *Nursia* of Leach (1817:18), which is a valid genus of Leucosiidae.

White (1847:45) also referred *Mursia* Leach and even assigned an extant NHM specimen "*Mursia cristata*, Leach MSS" to the genus. Miers (1886:293) considered this specimen to have type status (see footnote p. 293) and attributed it to *Cryptosoma cristatum* (Leach). In his synonymy, Miers indicated that *Cryptosoma cristatum* Brullé is a junior synonym of this Leach species. However, a search of Leach's publications failed to find a description of *Mursia* or a mention of *M. cristata*, thus the name "Murcie" Leach (1818:74) is unavailable as a genus name. The list of Leach's specimens in the Samouelle Register, Entomological Memorandums, does not include this specimen either, and it has not been afforded type status within the NHM dry reference collection. It is concluded that the genera of Desmarest, 1823, and Brullé, 1837, are valid and *Mursia* Leach, 1818 is a *nomen nudum*.

Cryptosoma bairdii (Stimpson, 1860)
(Figs 1A-C, 2A,B, 3A)

Cyclois bairdii Stimpson, 1860:237; Evans, 1967:404.

Cryptosoma bairdii: Miers, 1886:293.

Cycloes bairdii: Crane, 1937:100; Garth, 1960:121 tab. V; 1966:13; Hendrickx, 1993a:9 tab. 11; 1993b:311 (list).

Cycloës Bairdii: Verrill, 1908:pl. 27, fig. 2.

Cycloës bairdii: Rathbun, 1937:225(part), 299(part), tab. 74(part) 230, pl. 69, figs 3,4; Garth, 1946b:620 tab.(part); 1948:19(part); Guinot-Dumortier & Dumortier, 1961:561; Garth, 1966:1(part list).

Cycloes bairdi: Hendrickx, 1993a:8(list).

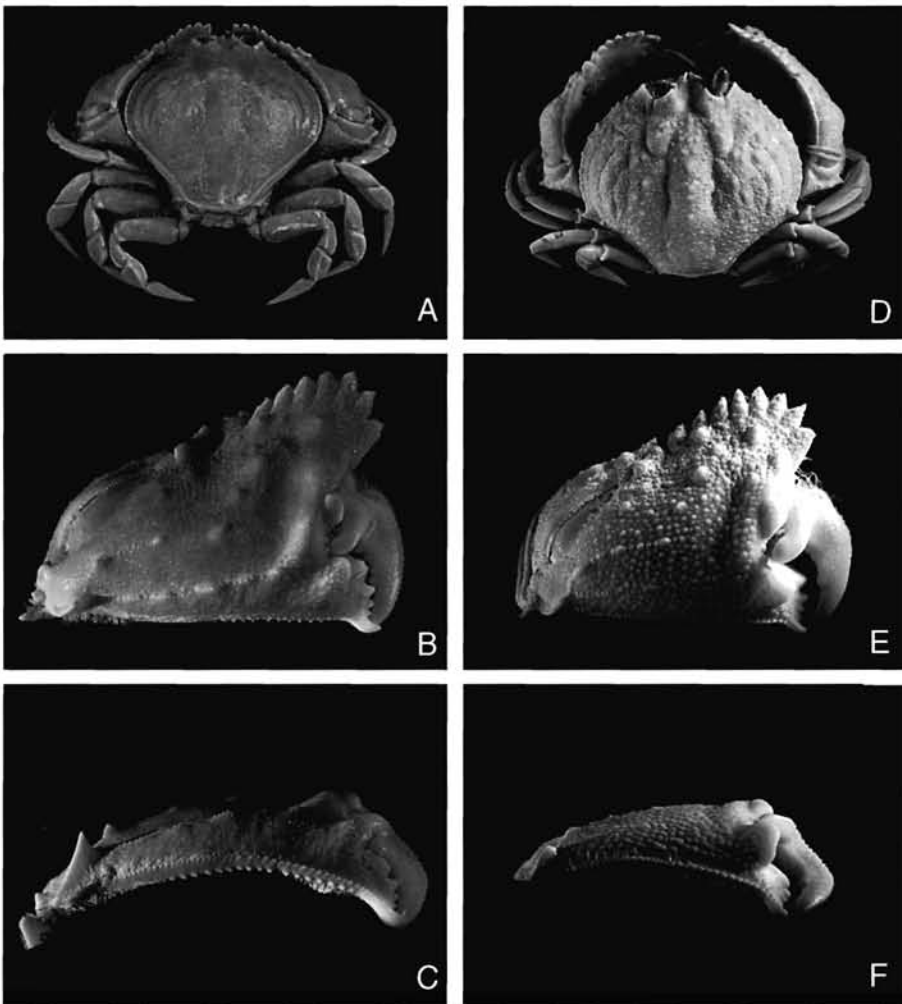


Figure 1. *Cryptosoma bairdii* (Stimpson, 1860) [USNM 2001]; A, dorsal view; B, cheliped, external view, C, cheliped, ventral view. *Cryptosoma balquerii* (Desbonne, 1867) [USNM 68810]; D, dorsal view; E, cheliped, external view, F, cheliped, ventral view.

non *Cycloes bairdii*; Rathbun, 1898b:290; 1921:67; Fausto-Filho, 1967:41(list), 54, fig. 7, pl. 4, figs 16, 17; Chace, 1968:609; Williams *et al.*, 1968:49, fig. 6; Fausto-Filho, 1968:44; Coelho, 1971a:234 tab. 1; Coelho & de Alves Ramos, 1972:181; Fausto-Filho & Sampaio Neto, 1976:68; Powers, 1977:32; Williams, 1984:278, fig. 210; Garth, 1992:3 tab. 1(part). = *C. balguerii* (Desbonne, 1867).

non *Cyclois Bairdii*: Verrill, 1901:18, pl. 2, figs 1, 2 = *C. balguerii* (Desbonne, 1867).

non *Cycloës bairdii*: Rathbun, 1902:85–86; 1933:101–102, fig. 98; 1937:229(part), 232–233 tab. 74(part); Garth, 1946b:620 tab.(part); Rodrigues da Costa 1968:29–30, fig. 1; Coelho, 1971b:243 = *Cryptosoma balguerii* (Desbonne, 1867).

non *Cycloes Bairdii* var. *atlantica* Verrill, 1908:423–425, figs 46, 47 = *C. balguerii* (Desbonne, 1867).

non *Cycloës Bairdii* var. *atlantica* Verrill, 1908:419, fig 44a = *C. balguerii* (Desbonne, 1867).

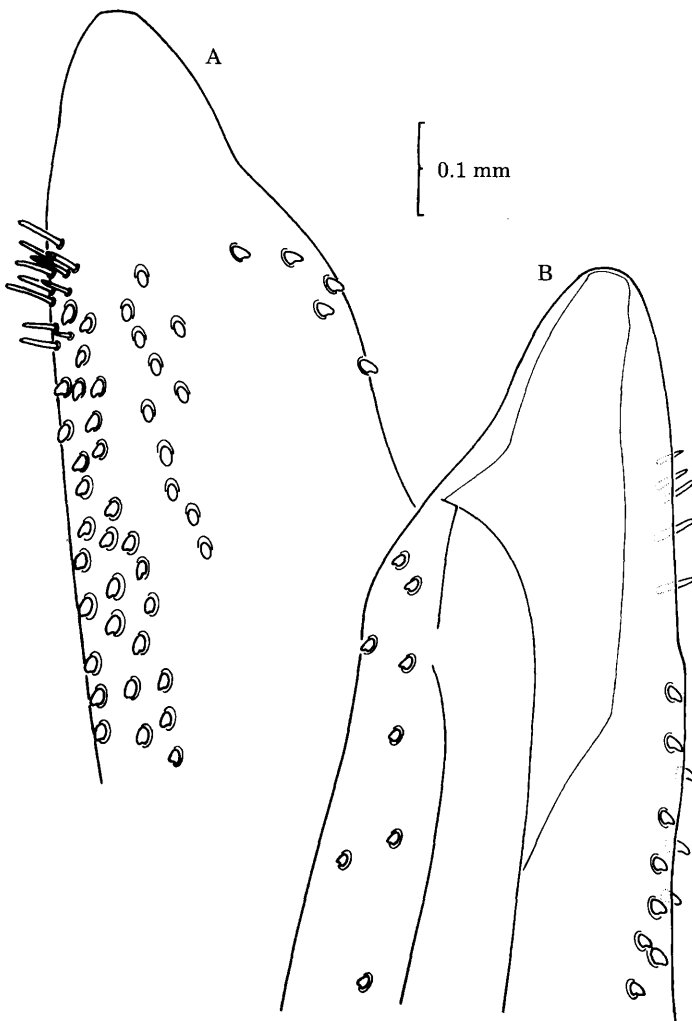


Figure 2. *Cryptosoma bairdii* (Stimpson, 1860) [MNHN MP B.16256], paralectotype; left tip of first pleopod; A, dorsal aspect; B, ventral aspect.

non *Cycloës bairdii*: Rathbun, 1898a:610; Finnegan, 1931:613; Von Prael & Sanchez, 1986:24, fig. 2a, b, c; Garth, 1992:3 tab. 1 (part), 5; Lemaitre & Alvarez, 1992:51 tab.; Hendrickx, 1994:575 (list) = *C. garthi* sp.nov.

non *Cycloës bairdii*: Rathbun, 1937:229(part), 231 tab. 74(part); Garth, 1946a:362, pl. 62, figs 7, 8; 1946b:620 tab.(part); 1948:19(part); 1966:1(part list), 13(part) = *C. garthi* sp.nov.

non *Cycloës bairdii*: Hendrickx, 1994:573, fig. 1 [erroneous spelling] = *C. garthi* sp.nov.

Material examined. MEXICO. Lower California, Cape St Lucas, coll. J. Xantus, id.

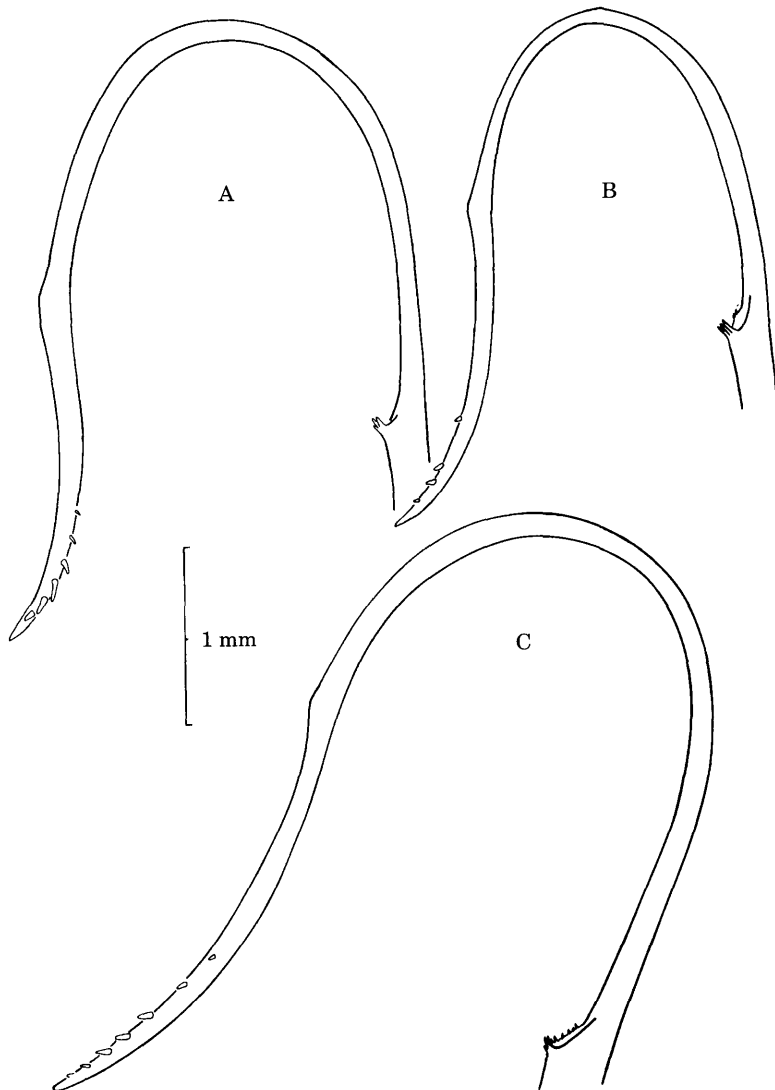


Figure 3. Tip of left second pleopod; A, *Cryptosoma bairdii* (Stimpson, 1860) [MNHM MP B.16256], paralectotype; B, *Cryptosoma balguerii* (Desbonne, 1867) **comb. nov.** [USNM 324716]; C. *Cryptosoma cristatum* Brullé, 1837 [ZM CRU 1155].

W.M. Stimpson, 1 m 40.5, cotype now lectotype, 3 m 23.7–32.3, 4 f 27.0–35.7, cotypes now paralectotypes (USNM 2001); 1 m 27.1, cotype now paralectotype (MNHN B.16256). Lower California, Salinas Bay, 6 fms, 11.ii.1935, coll. W. Schmitt, id. M.J. Rathbun, 1 m 20.6, 1 f 24.0 (USNM 77204); Arena Pt., 10–18 fms, 21.iv.1939, 3 m 22.5–22.7, 2 f 24.3, 25.6 (USNM 207834); Santa Maria Bay, *Velero*, sta. 1031–40, 18–25 fms, 19.i.1940, 1 m 26.7 (LACM 40–3.38 = AHF 1031–40); Bay of Dolce, 16°35'N 99°54'W, 20 fms, 5.iv.1937, 4 f 22.8–33.5, 2 juv. (USNM 207834); Santiago Bay, 10–13 fms, 24.iii.1939, coll. E. Lewis, 3 m 17.8–27.8, 7 f 16.3–35.9, 4 juv (USNM 207834); Bandarus Bay, 25–40 fms, 13.ii.1938, coll. S.A. Glassell, 1 m 20.2, 5 f 20.0–30.1 (USNM 207834); Tenacatita Bay, 5–7 fms 11.iv.1937, 1 f 32.3 6 juv. (USNM 207834); Guerrero, Zihuatanejo, 18–26 fms, 30.i.1939, 3 m 25.5–40.4, 3 f 26.3–31.8 (USNM 171465); Petatlan Bay, 25 fms, 3 Mar. 1934, coll. W.L. Schmitt, id. M.J. Rathbun, 1 f 34.1 (USNM 69223); *Velero*, sta. 267–34, 25 fms, 3.iii.1934, 1 f 28.0 (LACM 39–66.1 = AHF 963–39); White Friars Rocks, 20–25 fms, 7.v.1939, *Velero*, sta. 963–39, 1 m 28.4, 4 f 24.2–37.2 (LACM 39–66.1 = AHF 963–39); Acapulco, iv.1930, id. M.J. Rathbun, 1 m 35.5, 2 f 22.7, 23.1, 1 juv. (USNM 66444); Oaxaca, Santa Cruz Bay, 30–60 fms, 6.iii.1938, coll. S.A. Glassell, 1 m 27.0 (USNM 207834); Santa Cruz Bay, 6 fms, 7 Mar. 1938, Coll. S.A. Glassell, 1 m (USNM 207834).
 COSTA RICA. Palaya Blancas, 8.ii.1935, coll. W.L. Schmitt, id. M.J. Rathbun, 8 juv. (USNM 77169); Puerto Culebra, 25.ii.1934, coll. W.L. Schmitt, id. M.J. Rathbun, 1 m 26.0 (USNM 69174).

Description. carapace 1.1 wide as long, surface minutely granulate; frontal and epigastric regions more finely and densely granulate. Branchial ridges, minutely granulate, lacking tuberculate warts. Anterolateral margin unevenly granulate anteriorly, closely and uniformly granulate posteriorly. Lateral spine small, upturned. Posterolateral and posterior margins beaded. Merus of cheliped bidentate, distal tooth lamellar, keel-like, proximal tooth triangular, acute. Three proximal-most lobes on upper margin of chela bicuspidate. External surface of chela minutely granulate. Unevenly granulate ridge running parallel to lower margin from proximal ram-like, acuminate tooth of base of fixed; shallow L-shaped groove separating ridge from three median granulate tubercles, proximal-most tubercle triangular, prominent. Dactylar stridulating band with 30 transverse ridges.

Colour. “General color light chestnut; carpus, manus and dactylus of ambulatories of larger specimen violet. Inner side of carpus, manus, and dactylus of cheliped streaked with orange and white in larger specimen; white with single large orange spot on inside of distal end of manus in smaller” (Chamela Bay, Mexico; Crane in Garth, 1966).

Remarks. Stimpson (1860) described *Cyclois bairdii* [sic] from Cape St. Lucas, California. However, many authors including Balss, 1957b:1687; Chace 1968:611; Coelho, 1971b:243; Coelho and de Alves Ramos, 1972:181; Crane, 1937:100; Fausto-Filho and Sampaio Neto, 1976:69; Finnegan, 1931:613; Garth, 1946b:620; 1948:19; 1966:13; 1992:3 tab. 1; Guinot-Dumortier and Dumortier, 1961:561; Powers, 1977:32; Rathbun, 1898b:290; 1902:86; 1921:67; 1933:102; 1937:299, 230–233 tab. 74; Rodrigues da Costa, 1968:30; Verrill, 1901:18; 1908:426; Williams 1984:278; Williams *et al.*, 1968:49, considered that the distribution of this species was from the Pacific coast of Mexico to Ecuador and the Atlantic coast of America from

North Carolina to Espirito Santo, Brazil. Records of *C. bairdii* from Costa Rica to Ecuador, including Revillagigedo Is., Cocos Id., Galapagos Is., are assigned to a new *Cryptosoma* species and those from the Atlantic coast of America to Brazil pertain to *C. balguerii* (Desbonne, 1867).

Distribution. Eastern Pacific from Baja California to Costa Rica, on sand, gravel and rocky bottoms, crushed shells, dead coral. 2–70 fms.

Cryptosoma balguerii (Desbonne, 1867) **comb. nov**
(Figs 1D–F, 4A,B, 3B)

Mursia balguerii Desbonne, 1867:52, pl. IV, fig. 20; 1914[1867]:52, pl. IV, fig. 20.

Cyclois Balguerii: Stimpson, 1871:152.

Cycloes bairdii: Rathbun, 1898b:290; 1921:67; Fausto-Filho, 1967:41(list), 54, pl. 4, figs 16, 17; Chace, 1968:609; Williams *et al.*, 1968:49, fig. 6; Fausto-Filho, 1968:44;

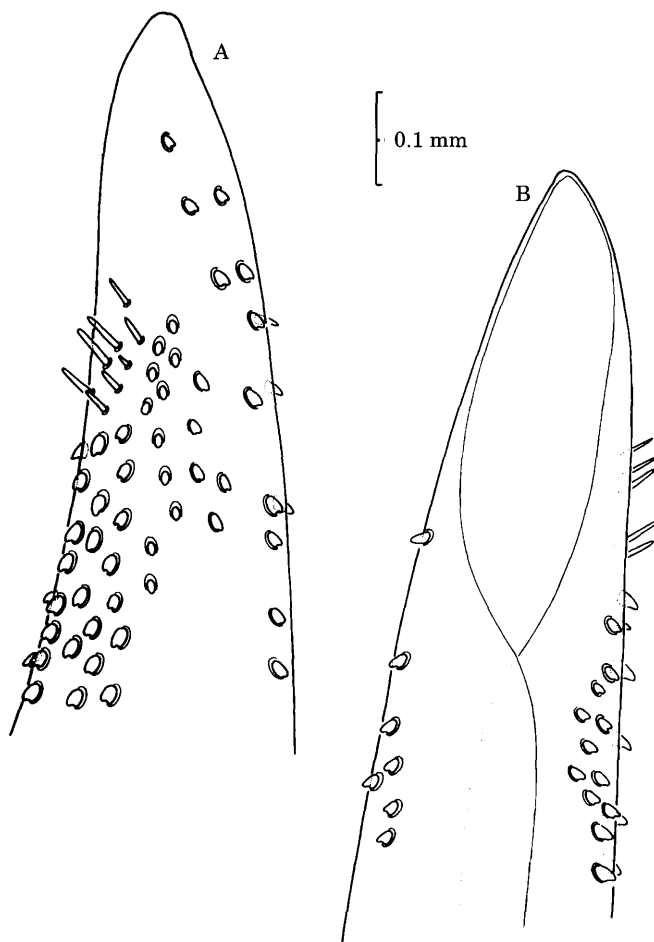


Figure 4. *Cryptosoma balguerii* (Desbonne, 1867) **comb. nov.** [USNM 324716]; left tip of first pleopod; A, dorsal aspect; B, ventral aspect.

Coelho, 1971a:234 (tab. 1); Coelho and Ramos, 1972:181; Fausto-Filho & Sampaio Neto, 1976:68; Powers, 1977:32; Williams, 1984:278, fig. 210; Garth, 1992:3 tab. 1 part.

Cyclois Bairdii: Verrill, 1901:18(part), pl. 2, figs 1,2.

Cycloës bairdii: Rathbun, 1902:85; 1933:101, fig. 98; 1937:225(part), 229(part), 232–233 tab. 74(part); Balss, 1957b:1687(part); Rodrigues da Costa 1968:29, fig. 1; Coelho, 1971b:243.

Cycloes Bairdii var. *atlantica* Verrill, 1908:423, figs 46,47.

Cycloës Bairdii, *atlantica* Verrill, 1908:419, fig. 44a.

Material examined. U. S. A. Off N. Carolina 33°49'N 76°34'W, 62 m, 11.viii.1981, 1 m 29.6 (USNM 202755); 33°48'N 76°34'W, 77 m, 3. iii. 1981, 1 f 25.8 (USNM 220965); Off S. Carolina, 32°45'N 78°56'W, 27 m, 18.viii.1977, coll. K. Shaw, 1 juv. 19.6 (USNM 174085); Florida, Off Tampa, 26°21'N 80°02'W, 17.ix.1975, coll. Miller & Bowers, 1 m 27.8 (USNM 169929); Off Charlotte Harbour, 2. iv. 1901, 28 fms, 1 m 21.2 (USNM 25603); Off Miami, 75 fms, xi.1915, coll. J.B. Henderson, id. M.J. Rathbun, 1 m 21.6 (USNM 68503); Government Cut, 40 m, 4.ii.1965, coll. L.B. Holthuis, 2 juv. (NNM D 23624); Triumph Reef, 25°29'N 80°07'W, 6–30 fms, 26x.1970, coll. D. Opreko, 1 f 13.0, 1 juv. (NNM D 27632); Key West, 1934, coll. H. Dardy, id. M.J. Rathbun, 1 f 16.0 (USNM 71065); 30°08'N 80°18'W, 59 m, 19.viii.1974, R/V *Dolphin* 1 f 21.5 (USNM 188675); Tortugas Is., 1924, coll. W.L. Schmitt, id. M.J. Rathbun, 1 m (USNM 66428); Straits of Florida, 200–204 fms, 22.ii.1965, R/V *Oregon*, 1 m 24.8, 1 f 24.8 (USNM 233618).

BAHAMAS. Bimini, v.1956, coll. W.K. Emerson, 1 m 21.3 (AMNH 15877); Eleuthera Id., Spanish Wells, 6 fms, 12.vii.1903, id. M.J. Rathbun, 1 f 33.7 (USNM 68810). BERMUDA. viii. 1929, 1 f 24.2 (AMNH 10412). PUERTO RICO. Ponce, 30. i. 1899, R/V *Fish Hawk*, id. M.J. Rathbun, 1 m 15.9, 1 f 21.2 (USNM 24078). NICARAGUA. Laguna de Perlas, 12°42'N 82°47'W, 25–27 fms, 29. i. 1971, *Pillsbury*, sta. 1336, 1 f 18.7 (NNM D 27631). COLOMBIA. 9°45'N 76°12'W, 82–101 m 13–14.vii.1966, *Pillsbury*, sta. 372, 1 m 22.6 (NNM D 27630). LESSER ANTILLES. Curacao, Piscadera Bay, v.1956, coll. A.C.J. Burgess, 1 f 35.8 (NNM D 12137); St. Michiels Bay, 4 m, 18.i.1957, coll. M. Thiebau, 1 f 16.5 (NNM D 14964). BRAZIL. 1°40'N 47°55'W, 34 fms, 12. v. 1975, R/V *Oregon II* 2 m 22.8, 26.1 (USNM 324716); E. of Sao Luis, 2°2'S 43°17'W, 28 fms, 10.iii.1968, 1 m 22.9 (USNM 123339).

Description. Carapace 1.1 wide as long, surface coarsely granulate; branchial ridges bearing prominent tuberculate warts diminishing in size posteriorly. Anterolateral margin slightly scalloped, irregularly granulate, denticular. Lateral spine distinct, slightly curved. Posterolateral and posterior margins beaded. Merus of cheliped bidentate, distal tooth keel-like, proximal tooth bluntly triangular. Two proximal-most lobes on upper margin of chela bicupsidate. External surface of chela coarsely granulate, irregular row of granules running parallel to lower margin from proximal blunt tooth halfway to base of fixed finger; medially a granulate line, proximal-most granule most prominent. Dactylar stridulating band with 27 transverse ridges.

Colour. "The carapace is pale yellow or whitish with lemon-yellow spots in irregular rows, and many small bright red or crimson spots, especially laterally. Chelipeds and legs bright yellow, spotted and banded with bright scarlet red; chelae with a crescent of red at the articulation of the dactylus on the inside; tips of digits and teeth of the

dorsal crest of manus red; carpus with two red spots. Legs bright yellow, with bands of red and purple, and purplish red margins on the merus; eye stalks orange" (Verrill, 1908). "Upper surface of carapace cream-buff, spines and tubercles white with hinder two-thirds of larger tubercles margined with purple. Eyestalks cream-buff with tinge of maze yellow, corneas gray with tinge of salmon buff. Chelipeds white outside with some purple spots; inside white with large maroon spot at distal end of manus; hazel spot on carpus at middle of outside near upper margin. Dactyli and propodi of ambulatories citron yellow, carpal joint with auricula purple in a line on line on each side united across upper margin proximally; first leg has a little spot on hind side of propodus, merus with large splotch of purple on same side" (Schmitt in Rathbun, 1937).

Remarks. *Mursia balguerii* was well described and illustrated by Desbonne (1867), and assigned to *Cyclois* [*sic*] by Stimpson (1871). However, Rathbun, familiar with the closely related eastern Pacific species, believed *C. balguerii* was a junior synonym of *C. bairdii* (see above).

Verrill (1908), comparing Atlantic specimens with material from Stimpson's type locality, wrote that the former had "carapace more strongly areolated and appears rougher, owing to the relatively larger granules and more elevated tubercles. The two frontal teeth are more acute and have a small lobe or shoulder on the outer edge... The carapace has the posterior lateral spines sharper, longer and farther back... and the sides are more rapidly contracted behind the spines... The outer surface of the chelae has fewer but larger tubercles... The large tooth, near the lower proximal end, is... broadly rounded and obtuse". Though Verrill found "various other minor differences" he was uncertain "whether they are constant or not... on account of the small number of Atlantic specimens available for comparison", and so concluded that "Our form is so very similar to *C. Bairdii* of the Pacific coast that it can hardly be separated as a species" and described it as var. *atlantica*. Chace (1968) too doubted that "the Atlantic form" of *C. bairdii* is specifically distinct", yet acknowledged that were it "a separate taxon, the oldest name available for it is *Mursia balguerii*". *C. balguerii* differs from *C. bairdii* in its colour pattern, in having sharply converging posterolateral margins, rougher carapace and lacking the unevenly granulate ridge parallel to lower margin of chela. *C. balguerii* is herein reinstated as a distinct species.

Distribution. Western Atlantic from North Carolina and Bermuda to Espirito Santo, Brazil. Found in shallow waters and up to depth of 125 fms, on sand, fine coral fragments, Lithothamnium reef, and rocky bottom.

Cryptosoma cristatum Brullé, 1837
(Figs 5A-C, 6A, 7A,B 3C)

Cryptosoma cristata Brullé, 1837(February)[1836], pl. unique, fig. 2; H. Milne Edwards, 1837(July):110; de Haan, 1841:124; Türkay, 1976:61(list).

Cryptosoma dentatum Brullé, 1839(June)[1838]:17; Erichson, 1841:251.

Cryptosoma cristatum: Erichson, 1841:251; Lucas, 1844a:437; 1882:CXV; Miers, 1886:293; Monod, 1933:494(39); 1956:114, fig. 133.

Mursia cristata: White, 1847:45. non H. Milne Edwards, 1837.

Cycloes cristata: Stimpson, 1859:162; Chace, 1968:610(key); Guinot, 1968, fig. 13;

Manning & Holthuis, 1981:56; Garcia-Raso, 1989:15, fig. 1; Manning & Chace, 1990:75 (tab. 2), 77.

Cycloës cristata: Studer, 1882:15; Stimpson, 1907:166, pl. 19, fig. 7; Guinot-Dumortier & Dumortier, 1961:561, figs 1–4; Guinot & Ribeiro, 1962:12 (list), 27, figs 3, 4; Ribeiro, 1964:4.

Cycloës cristatum: Balss, 1957b:1705

Cyloes deweti Chace, 1968:605.

Cryptosoma cristatum: Turkay, 1976:62 [erroneous spelling].

Material examined. ST. HELENA ID., 10–15 fms, 17.i.1968, coll. A. Loveridge, 1 m 70.7 (USNM 122769). Holotype of *Cycloes deweti*.

MADEIRA. pres. Rev. B. Watson, 1 juv. 12.6 (NHM 1876.2); Pta. do Garajau, 30m,

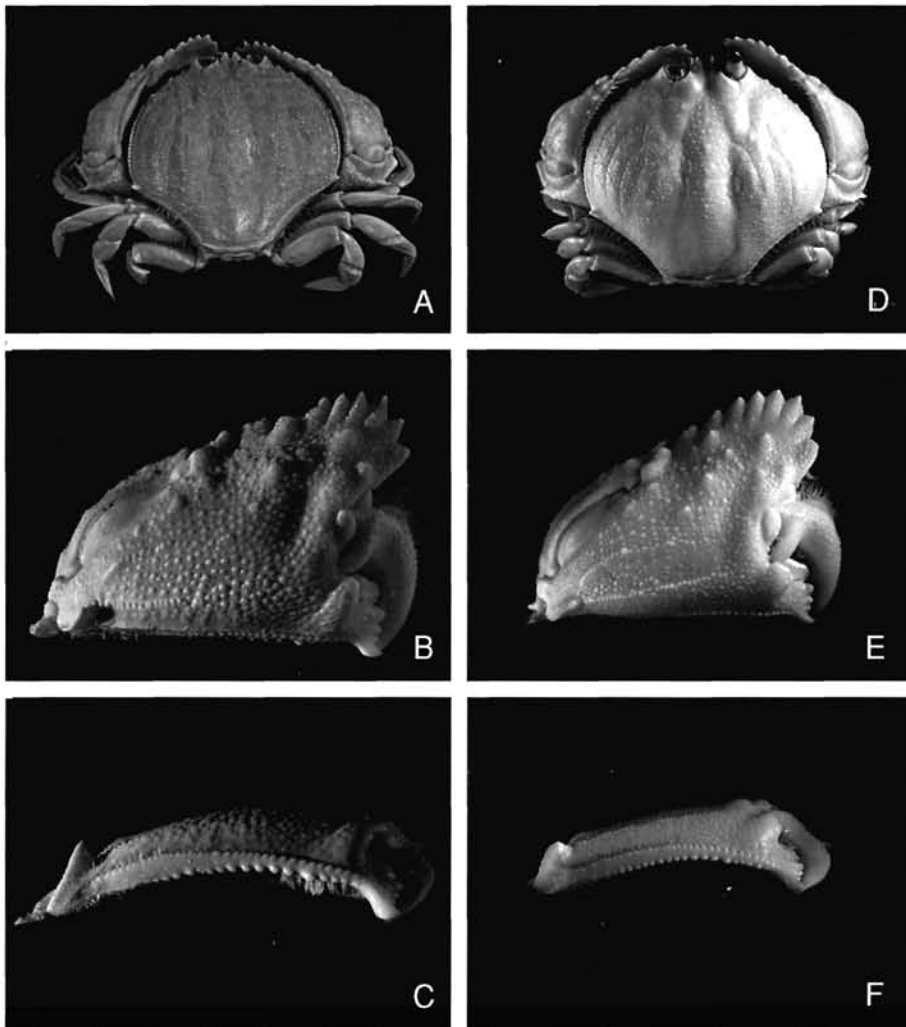


Figure 5. *Cryptosoma cristatum* Brullé, 1837 [NHM 1868.35]; A, dorsal view; B, cheliped, external view; C, cheliped, ventral view. ***Cryptosoma garthi* sp. nov.** [USNM 125795]; D, dorsal view; E, cheliped, external view; F, cheliped, ventral view.

22.viii.1956, 1 f 22.9 (SM 6837); Porto Santo Id., 3m, 15-30.ix.1956, coll. Fiugeira, det. R. Manning, 1 f 22.9 (ZM 16/1063). CANARY IS. Gran Canaria Id., Pto. de La Luz, 15-20 fms, 24.iii.1930, coll. T. Mortensen, det. R. Manning, 1 m 25.5, 1 f 20.0 (USNM 173077); 1 m 15.3, 1 f 25.4 (ZMC CRU-1158); Las Palmas, 2.x.1930, coll. De Jong, det. R. Manning, 1 m 36.4, 1 f 36.6 (ZMC CRU-1155); pres. R. McAndrew, 1 m 16.0, 2 f 20.0, 28.0 (NHM 1853.11). CAPE VERDE IS. det. Guinot and Ribeiro, 1 m 31.7, (MNHN B.16259); Fogo Id., 21.v.1959, det. Guinot and Ribeiro, 1 f 33.5 (MNHN B.16258); Vicente Id., vii.1873, 2 m 25.5, 51.9, 1 f 48.1 (NHM 1884.31). ST. HELENA. Prosperous Bay, 50m, 22.ii.1930, coll. T. Mortensen, det. R. Manning, 1 m 28.0 (ZMC CRU-1156); Sea Cow Cove, 9m. 11.

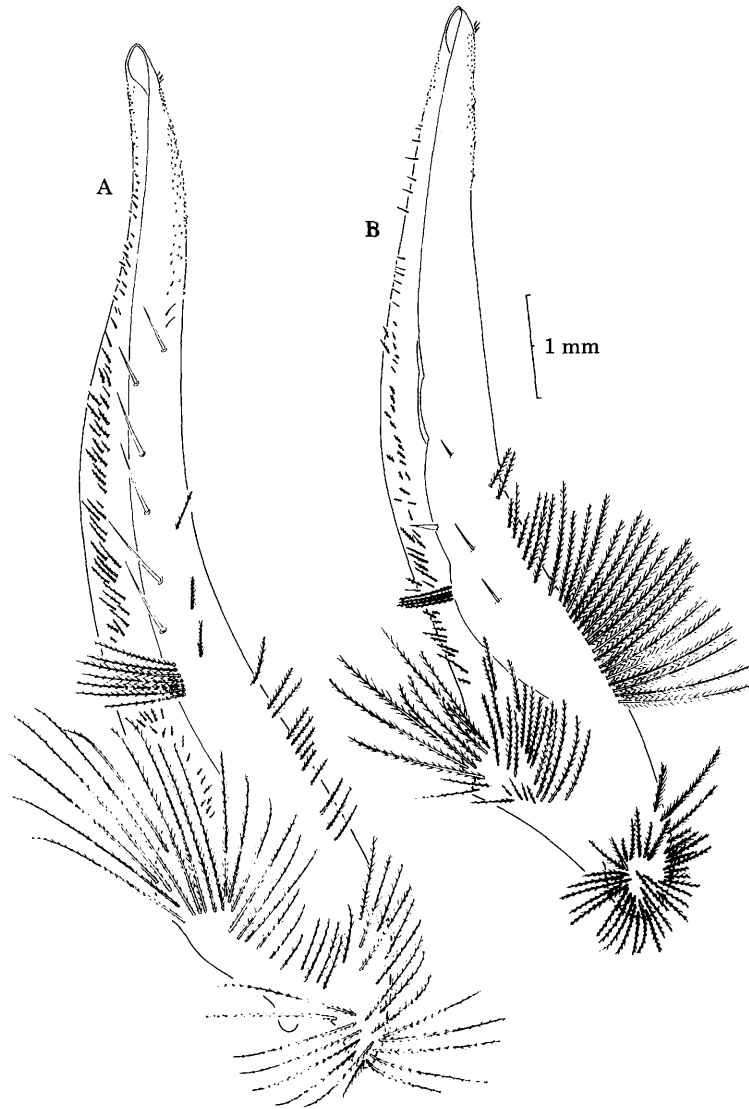


Figure 6. Whole ventral aspect of first left pleopod; A, *Cryptosoma cristatum* Brullé, 1837 [ZM CRU-1155]; B, *Cycloes marisrubri* sp. nov. [MNHN MP B. 22847], paratype.

ii. 1930, coll. T. Mortensen, det. R. Manning, 2 m 39.3, 48.3, 5 juvs 15.8–22.4 (ZMC CRU-1157); 1 m 59.0 (NHM 1868.35); 1 m 18.9, 1 f 18.3 (MNHN B.17822); Egg Id., 0–20 fms, 5. iii. 1930, coll. T. Mortensen, 1 m 20.2, 1 f 43.5 (USNM 173076). Africa [not Indian Ocean], 1 m 45 (NHM 469).

Description. Carapace 1.1 wide as long, surface coarsely granulate; branchial ridges bearing prominent tuberculate warts diminishing in size posteriorly. Anterolateral margin unevenly granulate anteriorly, closely and uniformly granulate posteriorly. Lateral spine distinct, upcurved. Posterolateral and posterior margins beaded. Merus of cheliped bispinose, distal tooth keel-like, proximal tooth triangular, curved. Three proximal-most lobes on upper margin of chela bicupsidate. External surface of chela coarsely granulate. Short, closely beaded line of pearliform granules running parallel

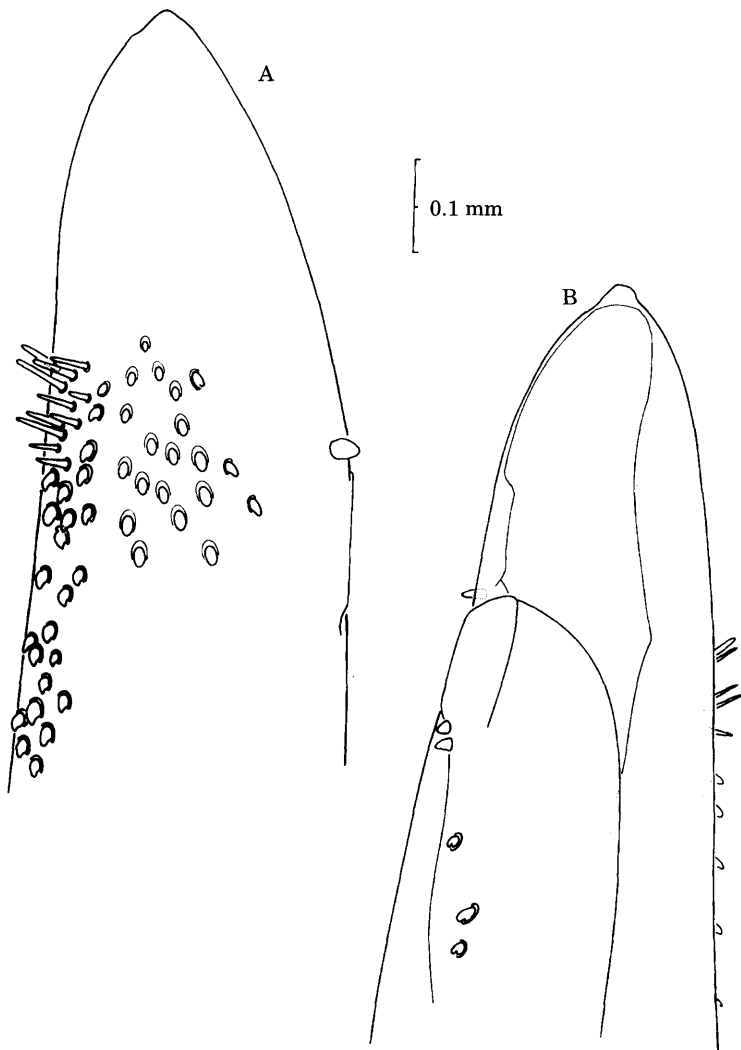


Figure 7. *Cryptosoma cristatum* Brullé, 1837 [ZM CRU-1155]; left tip of first pleopod; A, dorsal aspect; B, ventral aspect.

to lower margin from proximal acute tooth; medially, a short granulate line. Dactylar stridulating band with 33–35 transverse ridges.

Colour. “The colour ... is a pale yellow. The carapace ... is covered with small spots rounded with bright pink. The first pair of legs is sprinkled on the external surface with small pink dots assuming a rounded shape; on the internal side they are yellow and strongly marbled and spotted with purplish-blue pink. The walking legs are brownish yellow, with their various joints strongly spotted purplish-blue pink on their outer and inner sides, whilst the last joint is pale yellow with the claw reddish-brown” (translated from Lucas, 1882).

Remarks. Brullé’s figure of *Cryptosoma cristatum* was published in February 1837 [1836], however, when his text was published in June 1839 [1838] the species was referred to as *Cryptosoma dentatum* and this name is regarded as a junior synonym. Stimpson (1859) assigned *C. cristatum* to *Cycloes*. Chace (1968) established *Cycloes deweti* for a single large specimen collected off St. Helena Is., yet wrote “It is possible that the characters here used to distinguish *C. deweti* are directly related to size and that the Saint Helena specimen will eventually be found to represent only an unusually large *C. bairdii*”. Manning and Chace (1990) redetermined it as *C. cristata*. White’s *Murcia cristata* (1847:45) (NHM 469), identified as *C. cristata*, was originally cited in White’s catalogue, the NHM register and the specimen’s label as coming from The Indian Ocean. This was later substituted by “Africa” as noted by Miers (1886:293, footnote) “for what reason I know not”. *C. cristatum* s. str. has never been recorded from the Indian Ocean.

C. cristatum though closely allied to *C. balguerii*, differs from the latter in its colour pattern, in having anterolateral margins uniformly granulate posteriorly, acuminate teeth on merus of cheliped, acuminate tooth proximally on chela and more than 33 carina on dactylar stridulating band.

Distribution. Eastern Atlantic, Madeira, Canary Is., Cape Verde Is., St. Helena Is., and a single record from Malaga, Spain (Garcia-Raso, 1989). Found on sand or coraligenous bottom, 4–55 m.

***Cryptosoma garthi* sp. nov.**

(Figs 5D–F, 8A,B, 9A)

Cycloes bairdii: Rathbun, 1898a:610; Finnegan, 1931:613; Garth, 1992:3 tab. 1 (part), 5; Lemaitre & Alvarez, 1992:51 (tab.); Hendrickx, 1994:575 (list).

Cycloes bairdii: Rathbun, 1937:229(part), 231 tab. 74(part); Garth, 1946a:362, pl. 62, figs 7, 8; 1946b:620; 1948; 19(part); 1966:1(part list), 13(part).

Cycloes bandii: Hendrickx, 1994:573, fig.1 [erroneous spelling].

Material examined. COSTA RICA. Puerto Culebra, 25. ii. 1934, *Velero III*, sta. 257, coll. W.L. Schmitt, id. M.J. Rathbun, 1 m 29.1 (USNH 69174), holotype; 6 juv. (USNM 69174), paratypes. COCOS ID. Chatham Bay, 5 m, 3. ix. 1967, coll. P.F. Major, 1 f 38.8 (USNM 125795), paratype. PANAMA. Panama Bay, 33 fms, 5.v.1888, *Albatross*, Sta. 2796, 1 f 45.3 (USNM 22125). ECUADOR. La Plata Is., 7–10 fms, 10. ii. 1934, *Velero III*, sta. 213, coll. W.L. Schmitt, id. M.J. Rathbun, 1 f 14.7 (USNM 69167). Revillagigedo Is. Socorro Id., Braithwaite Bay, 20 fms, 4. i. 1934, *Velero III*, sta. 133–34, 1 m, 28.3, 3 juv. (LACM 34–6.5 = AHF 133–34). Galapagos Is. Albemarle Id., 12. i. 1934, coll. W.L. Schmitt, id. M.J. Rathbun, 5 juv.

(USNM 69165); 2. i. 1934, 2 m 23.0, 16.4 (USNM 69172); Hood Id., Gardner Bay, 30 fms, 31. i. 1934, *Velero III*, sta. 204-34, 1 f 23.7, 2 juv. (LAM 34-78.9 = AHF 204-34).

Description. (holotype male). Carapace 1.1 wide as long, surface finely granulate, frontal and epigastric regions more minutely and densely granulate. Branchial ridges nearly indistinct, bearing blunt tuberculate warts. Anterolateral margin with five tubercles anteriorly, irregularly beaded posteriorly. Lateral spine slightly curved. Posterolateral and posterior margins beaded. Merus of cheliped bidentate, distal tooth ram-like, proximal tooth triangular. Two proximal-most lobes on upper margin of chela bicuspidate. External surface of chela minutely granulate, irregular row of granules parallel to lower margin, from proximal ram-like to base of fixed finger; medially a faint line of small granules, running to mid-palm. Dactylar stridulating band with 30 transverse ridges.

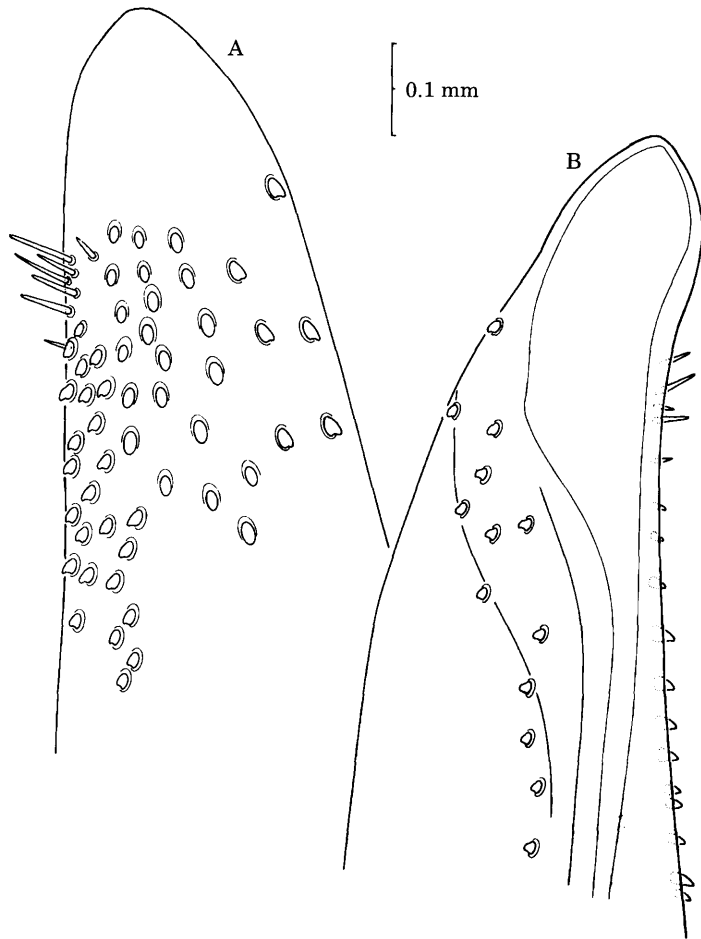


Figure 8. *Cryptosoma garthi* sp. nov. [USNM 69174]; left tip of first pleopod; A, dorsal aspect; B, ventral aspect.

Colour. "Coral sand white with faint brownish markings, cinnamon or pale hazel; markings sometimes inconspicuous". (Hood Id., Rathbun, 1937). "Ground colour of carapace light olive gray with numerous deep purplish vinaceous spots. Ambulatory legs French gray with stripes of purplish lilac, salmon colour at distal end of merus. Dactyl light amber yellow. Eyestalks French gray; eyes light green (Petersen in Garth, 1946a).

Remarks. *C. garthi* bears close resemblance to *C. bairdii*; however, it is distinguished from the latter in its colour pattern, having sharply converging posterolateral margins, somewhat rougher carapace, obtuse rather than acuminate tooth proximally on chela, and a beaded line rather than an unevenly granulate ridge parallel to lower margin of chela. Many authors, Balss, 1957b:1687; Chace

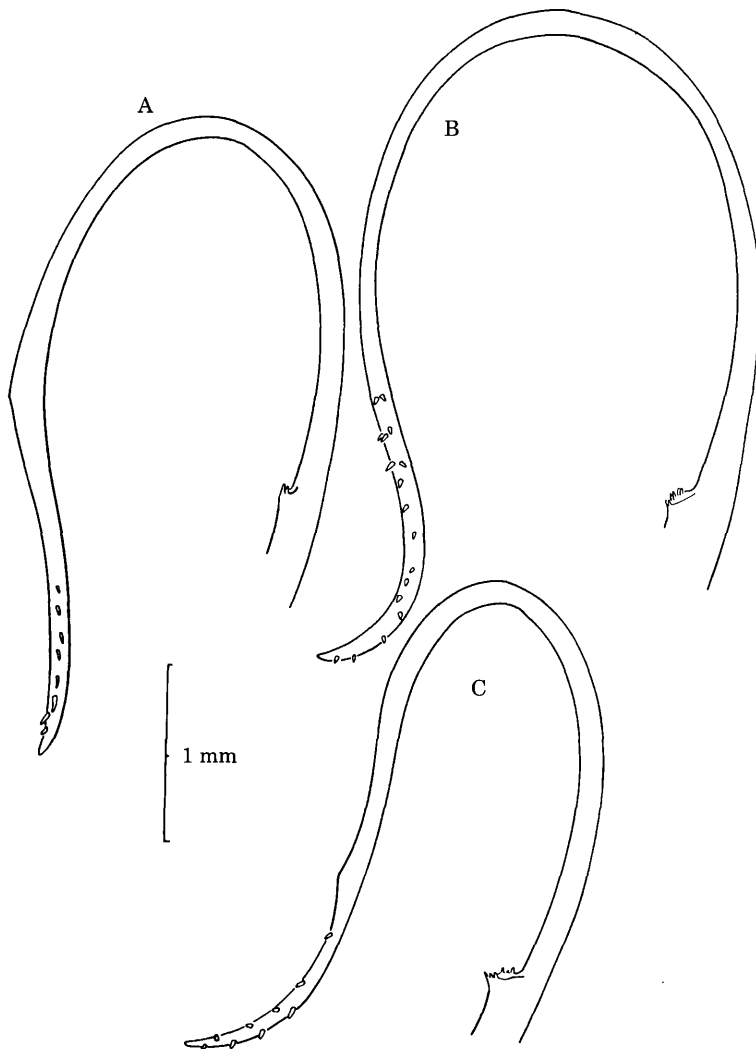


Figure 9. Tip of left second pleopod; A, *Cryptosoma garthi* sp. nov. [USNM 69174]; B, *Cycloes granulosa* de Haan, 1837 [ZRC 1971.9.17.1]; C, *Cycloes marisrubri* sp. nov. [MNHN MP B.22847].

1968:611; Coelho, 1971b:243; Coelho & de Alves Ramos, 1972:181; Crane, 1937:100, Fausto-Filho & Sampaio Neto, 1976:69; Finnegan, 1931:613; Garth 1946b:620; 1948:19; 1966:13; 1992:3 tab. 1; Guinot-Dumortier & Dumortier, 1961:561; Powers, 1977:32; Rathburn, 1898b:290; 1902:86; 1921:67; 1933:102; 1937:299, 231 tab. 74(part); Rodrigues da Costa, 1968:30; Verrill, 1901:18; 1908:426; Williams 1984:278; Williams *et al.*, 1968:49, referred specimens from Costa Rica to Ecuador, including Revillagigedo Is., Cocos Id. and Galapagos to *C. bairdii* Stimpson, 1860. The present study has assigned them to *C. garthi* sp. nov. instead.

Distribution. Costa Rica, Panama, Ecuador, Revillagigedo Is., Cocos Id., Galapagos Is.

Etymology. In honour of the late Prof. J.S. Garth.

Cycloes de Haan, 1837

Cycloës de Haan, 1837(August):67,68,69; Sherborn, 1925:1737; Rathbun, 1937:225(part); Neave, 1939:917; Balss, 1957a:1611(part); Holthuis & Sakai, 1970:90.

Cyclois: Agassiz, 1848:317; Scudder, 1882:86; Sherborn, 1925:1738; Neave, 1939:918.

Cycloës: Miers, 1886:292,293 [erroneous spelling].

Cycloes: de Haan, 1841:124–125(part); Lucas, 1844b:495; Agassiz, 1848:317; Herklots, 1861:25; Scudder, 1882:86; Guinot, 1967:245; Serène, 1968:41; Sakai, 1976:139; Dai *et al.*, 1986:96(part); Dai & Yang, 1991:108(part).

Cycloës Holthuis & Sakai, 1970:288 [erroneous spelling].

Cryptosoma: Miers, 1886:292(part); Alcock, 1896:151(part); Borradaile, 1903:436; Ihle, 1918:179; Balss, 1922:124(part); Sakai, 1936:42–43; 1937:84, 1965:50; Takeda, 1973:82(part). non Brullé, 1837.

non *Cycloes:* Fausto-Filho, 1967:41, 54; 1968:44; Williams *et al.*, 1968:49; Fausto-Filho & Sampaio Neto, 1976:68; Powers, 1977:32; Manning & Holthuis, 1981:56(part); Williams, 1984:277; Williams & Child, 1989:106(key) = *Cryptosoma* Brullé, 1837.

non *Cycloës:* Studer, 1882:15; Stimpson, 1907:166; Rathbun, 1902:85(part), 1933:101; 1937:225(part); Garth, 1946a:362; Balss, 1957a:1611(part); Ribeiro, 1964:4 = *Cryptosoma* Brullé, 1837.

Type-species. *Cycloes granulosa* de Haan, 1837, by monotypy.

Gender. feminine.

Diagnosis. Carapace subcircular, convex, granulate, regions undefined. Carapace widest midlength. Front, as wide as orbit, bidentate, barely projecting. Anterolateral margin arcuate, granulate. Lateral spine minute, nearly indistinct, midlength. Posterolateral margin convergent, oblique, granulate. Branchial regions with three ridges subparallel to anterolateral margin, furrows bordering cardiac region most pronounced. Eyes filling orbits, eyestalk short, smooth, cornea large, orbital margins with long plumose setae. Supraorbital margin swollen medially, unisutured. Inner orbital tooth separated from outer orbital margin by fissure opening into oblique

subhepatic canal. Subhepatic regions and outer maxillipeds densely setose. Antero-internal angle of merus of third maxilliped produced. Chelipeds massive, subequal. Merus with transverse bidentate crest externally, distal tooth largest, keel-like. Carpus triangular, upper margin distally dentate, anterior angle produced, granulate interiorly. Chela swollen, granulose, upper margin crested, with nine lobes, proximal-most lobe broad, bicuspidate, second and third lobes granulate interiorly; proximally near lower margin keel-like laminar tooth. Lower margin with two parallel rows of tubercles, external row with smaller, closely-set tubercles. Internal surface of chela densely setose along inner and lower margins. Larger dactylus proximally with molariform tooth fitting into shallow depression. Inner surface of larger dactylus granulose, milled ridge occupying distal half of upper margin. Inner surface of smaller dactylus medially with line of coarse granules. Upper margin of cheliped fringed with long setae. Pereiopods smooth, laterally compressed, dactyli styliform, meral upper margin setose. Male abdomen five-segmented. Trilobate, granulate carina on second segment, medial lobule small. Anterior thoracic sternite lacks transverse granulate crest. First male pleopod stout, tapering straight, distally spinulose. Second male pleopod filamentose, elongate, distally crook-shaped, tip spinulose, outcurved.

Remarks. Agassiz, 1848:317 emended *Cycloes* de Haan, 1837 to *Cyclois* without comment or justification. Later, Stimpson (1860) adopted this emendation for *Cyclois bairdii*.

Cycloes granulosa de Haan, 1837
(Figs 10A–C, 11A,B, 9B)

Cycloës granulosa de Haan, 1837(August):71, pl. 19, fig.3; Rathbun, 1937:225, Nakazawa, 1927:1064, fig. 2047.

Cycloe granulosa: de Haan, 1841:124 [erroneous spelling].

Cycloes granulosa: Lucas, 1844a:438; Herklots, 1861:25; Guinot, 1967:245; Chace, 1968:610(part); Serène, 1968:41(list); Sakai, 1976:139, pl. 43, fig. 3; Takeda, 1979:153(list); Miyake, 1985:199, Dai *et al.*, 1986:96, fig. 54, pl. 12 fig. 3; Dai & Yang, 1911:108, pl. 12, Fig. 3, text-fig. 54; Yamaguchi & Baba, 1993:313–314, fig. 97a,b.

Cryptosoma granulorum: Lucas, 1844a:438; Miers, 1886:293; Doflein, 1900:137; Balss, 1922:124; Sakai, 1936:49, pl. 7, fig. 2; 1937:84, pl. 13, fig. 1; Lin, 1949:13(list); Nakazawa & Sakai, 1947:723, fig. 2092; Sakai, 1956:7; 1960:33, pl.16(8); 1965:50–51, pl.20, fig. 3; Takeda, 1973:82; 1982:109, fig. 319.

non *Cryptosoma granulorum*: Alcock & Anderson, 1895:198(list), 203; Alcock, 1896:152; Borradaile, 1903:436; Laurie, 1906:356; Ihle, 1918:176 = *C. marisrubri* sp. nov.

non *Cycloës granulosa*: Rathbun, 1906:888; = *C. marisrubri* sp. nov.

Material examined. TAIWAN. vi. 1993, 100 m, coll. P. Ng, 1 m 30.7 (ZRC 1994.4449). VIETNAM. Nha Trang Bay, 1956, coll. R. Serène, 1 m 16.1 (ZRC 1970.1.22.7); 1958, coll. R. Serène, 1 m 17.2 (ZRC 1970.8.4.17). Singapore. Changi, ix. 1971, coll. R. Serène, 1 m 38.2 (ZRC 1971.9.17.1).

Description Carapace as wide as long. Surface granulate, frontal and epigastric regions more minutely and densely granulate. Branchial ridges indistinct. Anterolateral

margin beaded. Lateral spine indistinct. Posterolateral and posterior margins beaded. Merus of cheliped with distal tooth lanceolate. Upper margin of carpus tridentate, its external surface coarsely granulate. External surface of palm closely covered with granules, increasing in size and prominence distally, near base of serrate upper crest. Proximally on lower margin an acuminate, keel-like projection, continuing obliquely in granulate row. Lower margin prominently tuberculate, tubercles smaller proximally. External surface of dactylus closely granulose, its upper margin with acuminate tubercles. Inner surface of dactylus granulose, milled stridulating band with 13 transverse ridges. Second male pleopod distally spinose.

Colour. Carapace tan with reddish spots. Inner side of chela, near dactylus, with

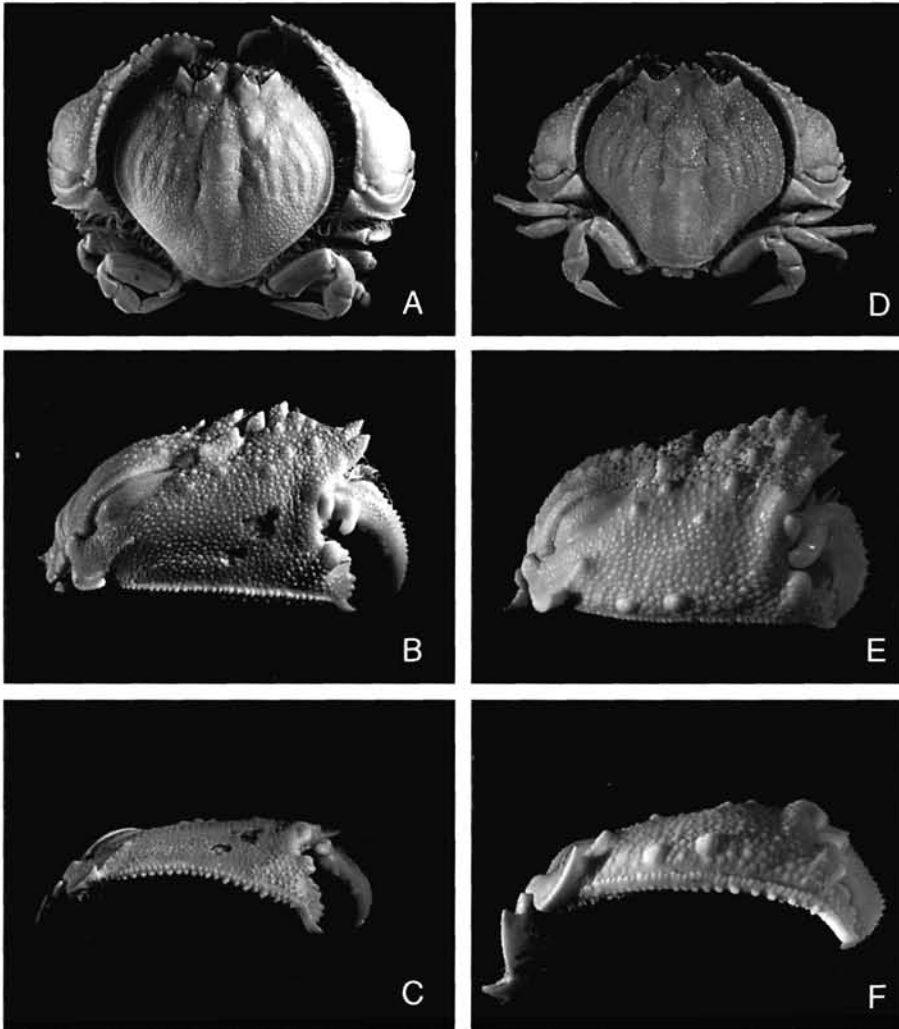


Figure 10. *Cycloes granulosa* de Haan, 1837 [ZRC: 1971.9.17.1]: A, dorsal view; B, cheliped, external view; C, cheliped, ventral view. *Cycloes marisrubri* sp. nov. [MNHN MP B. 22847]: dorsal view: E, cheliped, external view; F, cheliped, ventral view.

brown marks (Sakai, 1976, pl. 43, fig. 3). Carapace yellowish brown with faint reddish-brown spots (Ng, pers. comm.).

Remarks. The holotype is deposited in NMM and was illustrated by Yamaguchi & Baba, (1993, fig. 97a, b). *C. granulosa* is distinguished from its congener, *C. marisubri*, by its indistinct radial ridges on carapace, tridentate upper margin and granulate external surface of cheliped carpus and external surface of chela lacking knob-like tubercles.

Indian Ocean and Hawaiian references to *C. granulosa* by Balss, 1922:124; Sakai, 1936:49; 1937:84; 1965:50–51; 1976:139; Dai *et al.*, 1986:96; Dai & Yang, 1991:108 are assigned to *C. marisubri* sp. nov. instead.

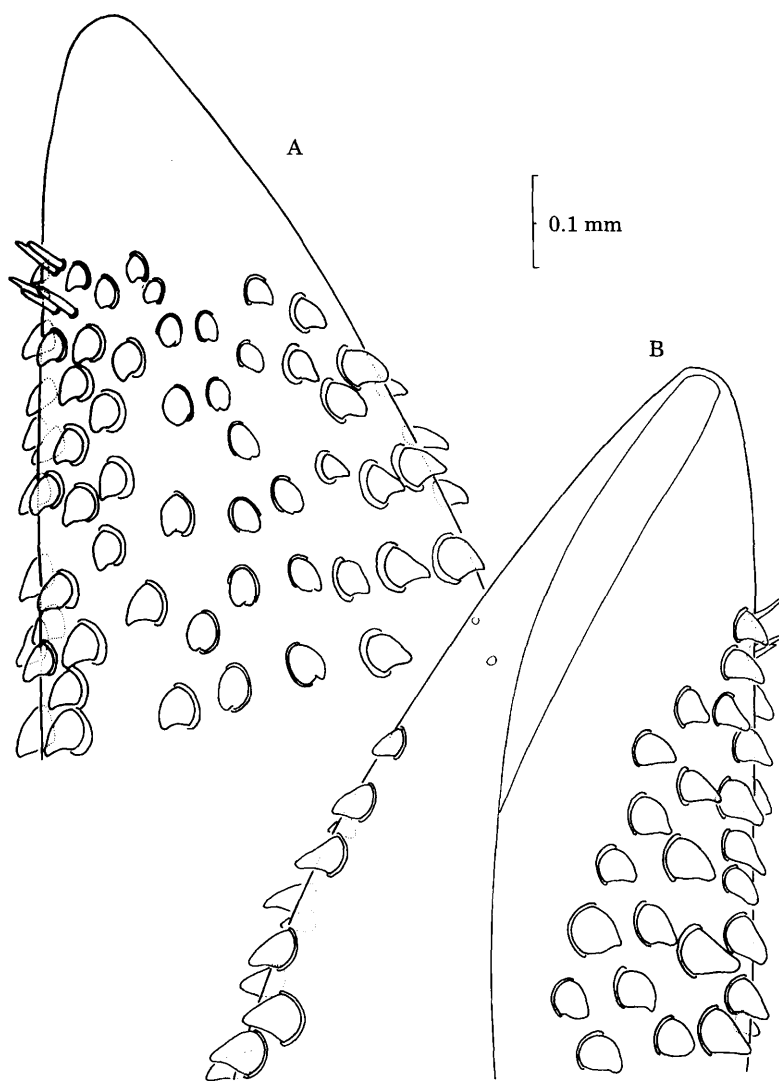


Figure 11. *Cycloes granulosa* de Haan, 1837 [ZRC 1971.9.17.1]; left tip of first pleopod; A, dorsal aspect; B, ventral aspect.

Distribution. Japan, China, Taiwan, Vietnam, Singapore. On sand, 15– 100 m.

***Cycloes marisrubri* sp. nov.**

(Figs 6B, 9C, 10D–F, 12A,B)

Cryptosoma granulosum: Alcock & Anderson, 1895:198(list), 203(list); Alcock, 1896:152; Borradaile, 1903:436; Laurie, 1906:356; Ihle, 1918:179, Balss 1922:124.

Cycloes granulosa: Rathbun, 1906:888.

Material examined. JORDAN. Red Sea. Aqaba, 35 m, 26.iv.1987, coll. N. Hulings, 1 m 34.1 (MNHN B 22847) holotype; 40 m, 1.ii.1987, 1 m 33.3, 2 f 37.8, 34.6 (MNHN B 22849), paratypes; 19.xii.1982, 1 f 35.0 (MNHN B 22848), paratype. CEYLON.

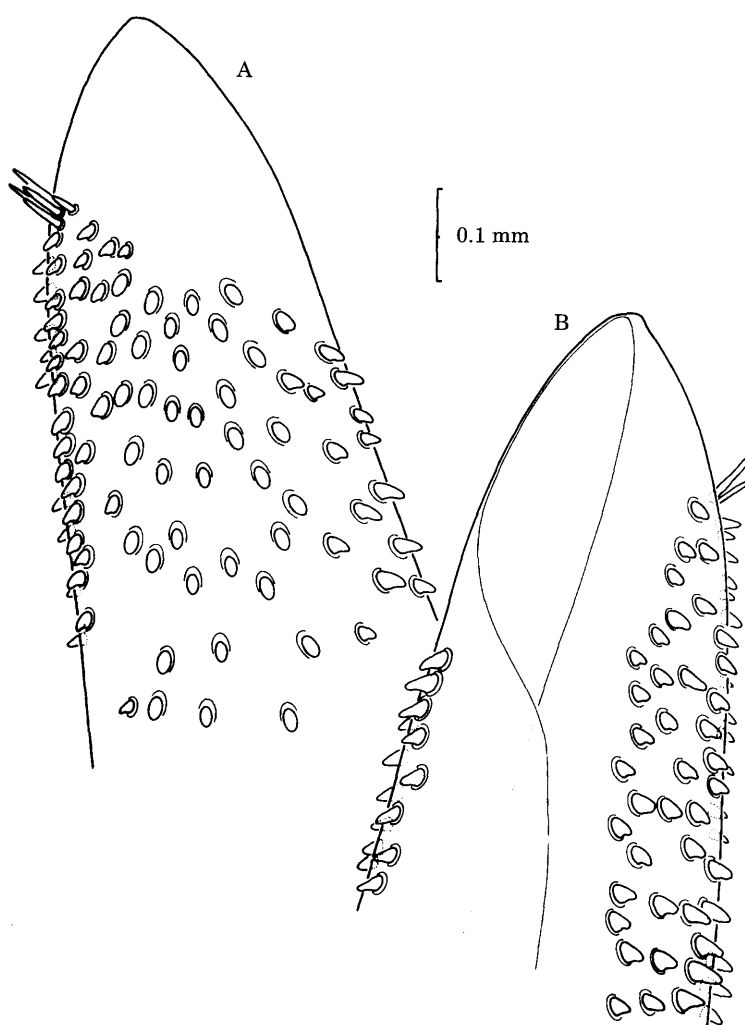


Figure 12. *Cycloes marisrubri* sp. nov. [MNHN MP B. 22847] left tip of first peopod; A, dorsal aspect; B, ventral aspect

Gulf of Manaar, coll. Herdman, 1 m 19.7 (NHM 1907.5.22.19) paratype; 1 broken (NHM 1934.1.16.24). INDONESIA. Amboina, 1891, coll. A. Strubell, 1 f 29.7 (SM 4584); Tiger Is., S. of Pulau Tarupa Kecil, 06°32.1'S 121°09'E, 59 m, 16.iv.1984, *Snellius II*, sta. 4.232, 2 m 15.3, 11.3, 1 f 15 (NNM D 38520); Banda Id., *Siboga*, sta. 240, 19–45 m, 1 f 16.3 (ISP 201.005); Roma Id., *Siboga*, sta. 279, 36 m 1 f (broken) (ISP 201.006). HAWAIIAN Is. Ohau Id., Honolulu Harbour, 12–25 fms, 9.ix.1939, coll. F.E. Lewis, 1 f 38.2 (USNM 182767); Ohau, 20 fms, 10.ix.1939, coll. F.E. Lewis, 1 m 20.6, 4 f 20.7–33.4 (USNM 207834); Off Keehai Lagoon, 50–70 fms, 26. v. 1959, 2 m 13.8, 10.7 (MNH B.16257); Kauai Id., *Albatross*, 1 m 48.6 (USNM 29927); Molokai Id., *Albatross*, 1 m 39.4 (USNM 29926); 1 f 34.0 (USNM 29925); 1 juv. (USNM 29924).

Description (holotype male). Carapace as wide as long. Surface granulate, frontal and epigastric regions more minutely and densely granulate. Radial ridges distinct, irregularly set with granular warts. Anterolateral margin with closely spaced pearliform granules. Lateral spine indistinct. Posterolateral and posterior margins beaded. Merus of cheliped with distal tooth lanceolate, subdistal tooth triangular, acuminate, upcurved. Upper margin of carpus bidentate, its external surface of palm closely covered with granules, larger tubercles in two oblique rows near serrate upper crest and two medially above lower margin. Proximally on lower margin an acuminate, keel-like projection, continuing obliquely in triangulate tooth. Lower margin prominently tuberculate, tubercles smaller proximally. External surface of dactylus closely granulate, its upper margin tuberculate. Inner surface of dactylus granulate, milled stridulating band with 13 transverse ridges. Second male pleopod distally spinose.

Remarks. *C. marisrubri* sp. nov. is distinguished from *C. granulosa* by its carapace bearing distinct radial ridges set with wart-like tubercles, cheliped carpus with bidentate upper margin and tuberculate external surface and two knob-like tubercles medially near lower margin of chela. Describing *C. granulosa*, De Haan (1837) wrote “Thorax... granulosus, granulis totam superficiem tegentibus aequalibus”, “carpus latere exteriore granulosus, margine superiore tridentatus” and the chela drawn (tab. 19, fig. 3) lacks the two knobby tubercles medially above lower margin. Alcock (1896), describing specimens collected in the Andaman and Maldive Is., “Carapace ... in its anterior half there are also some small tubercles, most of which fall into seven nearly longitudinal rows”, “the upper surface of the wrist has several small tubercles”. Yet, he did not find these characters significant enough and identified the specimens the specimens as *Cryptosoma granulosum*.

Distribution. Red Sea, Ceylon, Maldive and Andaman Is., Indonesia, Hawaiian Is. 20–73 fms.

Etymology. After the type location: Red Sea.

KEY TO THE SPECIES *CRYPTOSOMA* AND *CYCLOES*

1. Carapace as wide as long; lateral tooth nearly indistinct; milled band on inner surface of palmar dactylus with less than 15 ridges; anterior thoracic sternite uncrested; upper margin of cheliped carpus dentate, anterior angle interiorly

- granulate; 2nd and 3rd proximal teeth on upper margin of palm interiorly granulate; 1st male pleopod straight *Cycloes* (2)
- Carapace wider than long, lateral tooth small but distinct; milled band on inner surface of palmar dactylus with more than 25 ridges; anterior thoracic sternite bearing transverse granulate crest; upper margin of cheliped carpus not dentate, anterior angle interiorly smooth; 2nd and 3rd proximal teeth on upper margin of palm interiorly smooth; 1st male pleopod sinuous *Cryptosoma* (3)
2. Radial ridges on carapace distinct, set with wart-like tubercles; upper margin of cheliped carpus bidentate, its external surface tuberculate; medially near lower margin of chela two knob-like tubercles ***Cycloes marisrubri* sp. nov.**
- Radial ridges on carapace indistinct, granulose; upper margin of cheliped carpus tridentate; its external surface granulate; external surface of chela lacking knob-like tubercles *Cycloes granulosa* de Haan, 1837
3. Atlantic (4)
- Eastern Pacific (5)
4. Anterolateral margins uniformly granulate posteriorly; acuminate teeth on merus of cheliped; acuminate tooth proximally on chela; more 33 ridges on dactylar stridulating band *Cryptosoma cristatum* Brullé, 1837
- Anterolateral margins irregularly granulate; bluntly triangular tooth on merus of cheliped; blunt tooth proximally on chela; 27 ridges on dactylar stridulating band *Cryptosoma balguerii* (Desbonne, 1867)
5. Posterolateral margins somewhat concave, sharply converging; obtuse tooth proximally on chela; a granulate file parallel with lower margin of chela ***Cryptosoma garthi* sp. nov.**
- Posterolateral margins oblique; acuminate tooth proximally on chela; an irregular row of granules parallel with lower margin of chela*
..... *Cryptosoma bairdii* (Stimpson, 1860)

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