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

BELLA S. GALIL

Israel Oceanographic and Limnological Research, National Institute of Oceanography, POB 8030, Haifa, 31080, Israel

AND

PAUL F. CLARK

Department of Zoology, The Natural History Museum, Cromwell Road, London SW7 5BD

Received December 1994, accepted for publication May 1995

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.

©1996 The Linnean Society of London

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

CONTENTS

| Introduction | 176 |
| Nomenclatural review | 176 |
| Material and Methods | 177 |
| Taxonomic revision | 178 |
| *Cryptosoma* Brullé, 1837 | 178 |
| *C. haideri* (Stimpson, 1860) | 180 |
| *C. balguerii* (Desbonne, 1867) | 184 |
| *C. cristatum* Brullé, 1837 | 186 |
| *C. garthi* sp. nov. | 190 |
| *Cycloes* de Haan, 1837 | 193 |
| *C. granulosa* de Haan, 1837 | 194 |
| *C. mariscrubri* sp. nov. | 197 |

Key to the species of *Cryptosoma* and *Cycloes* | 198 |

Acknowledgements | 199 |

References | 199 |
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 (Insects, 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 Megastenia; type Megastenia praestans (Gould, 1843). Acknowledging that this molluscan genus was a junior homonym, Cockerell 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 Steam’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 Crustaces 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; Ericson, 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).


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


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.

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 tubercules, 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* Brulle, 1837 (see Introduction).

This genus includes four recognized species, *C. bairdii* (Stimpson, 1860), *C. balguerii* (Desbonne, 1867), *C. cristatum* Brulle, 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* Brulle 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 Brulle, 1837, are valid and *Mursia* Leach, 1818 is a *nomen nudum*.
Cryptosoma bairdii (Stimpson, 1860)  
(Figs 1A–C, 2A, B, 3A)

_Cryptosoma bairdii_ Miens, 1886:293.


_Cycloes Bairdii_ Verrill, 1908:pl. 27, fig. 2.

_Cycloes 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 bulgurii (Desboure, 1867) [USNM 68810]; D, dorsal view; E, cheliped, external view. F, cheliped, ventral view.](image)

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

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

---

Figure 2. *Cryptosoma bairdii* (Simpson, 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 Prahl & 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 bardii*: 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* Bredlé, 1837 [ZM CRU 1153].
W.M. Stimpson, 1 m 40.5, cotype now lectotype, 3 m 23.7–32.3, 4 f 27.0–35.7, cotypes now paratype (USNM 2001); 1 m 27.1, cotype now paratype (MNHN B.16256). Lower California, Salinas Bay, 6 fms, 11.vi.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); Bandarux 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); Guererro, 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).


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 tubercules, 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.

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

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

_Cycloes Bairdii var. atlantica_ Verrill, 1908:423, figs 46,47.

_Cycloes 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, 26.x.1970, coll. D. Opresko, 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).


**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 bicuspitate. 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 ambulatoories 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.

*Cycloes 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.

*Cycloes cristatula*: Balss, 1957b:1705

*Cycloes deweti* Chace, 1968:605.


**Material examined.**

ST. HELENA ID., 10–15 fins, 17.i.1968, coll. A. Loveridge, 1m 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 cristatulum* Brulle, 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, 9 m. 11.

Figure 6. Whole ventral aspect of first left pleopod; A, Cryptosoma cristaum 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 peariform 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) reetermined 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, acuminated teeth on merus of cheliped, acuminated 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 bairdii: Hendrickx, 1994:573, fig.1 [erroneous spelling].

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.

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

![Diagram of Cryptosoma garthi sp. nov., Cycloes granulata de Haan, 1837, and Cycloes marisrubri sp. nov.](image-url)
REVISION OF THE CALAPPID GENERA CRYPTOSOMA AND CYCLOES


**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.

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

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


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


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.** *Cycloës 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, unsutured. 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 triagonal, 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 tubercules, 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, 11AB, 9B)

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

Cycloes 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 granulosum: 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 granulosum: Alcock & Anderson, 1895:198(list); Alcock, 1896:152;
Borradaile, 1903:436; Laurie, 1906:356; Ihle, 1918:176 = 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,
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

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

Figure 10. Cycloes grandiosa 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. 23847]; 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. marisrubri*, 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. marisrubri* sp. nov. instead.
Distribution. Japan, China, Taiwan, Vietnam, Singapore. On sand, 15–100 m.

*Cycloes marisrubri* sp. nov.
(Figs 6B, 9C, 10D–F, 12A,B)


_Cycloès granulosa_: Rathbun, 1906:888.

*Materialexamined*. 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.

![Diagram](Figures/12.png)

Figure 12. *Cycloes marisrubri* sp. nov. [MNHN MP B. 22847] left tip of first pereopod; 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, *Snelius 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 Keahai Lagoon, 50–70 fms, 26. v. 1959, 2 m 13.8, 10.7 (MNHN 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 peariform 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 medi ally 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 granulose, its upper margin tuberculate. Inner surface of dactylus granulose, 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 tubercules medially near lower margin of chela. Describing *C. granulosa*, De Haan (1837) wrote “Thorax... granulosus, granulis totam superficiem tegentibus aequalibus”, “carpus latere exterio granulosus, margine superiore tridentatus” and the chela drawn (tab. 19, fig. 3) lacks the two knobby tubercules 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 tubercules, 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 tubercules ...... 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 Brüllé, 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)

ACKNOWLEDGEMENTS

Grateful thanks are due to Prof. Holthuis, NNM, and Anthea Gentry, ICZN, for helpful comments on the nomenclature. We are indebted to Drs Niel Bruce, Joseph Poupin, Charles Fransen, Daniele Guinot, Joel Martin, Peter Ng, and Michael Turkay for entrusting us with valuable material from their collections. Thanks go to Alain Crosnier for material and help in tracing a number of copies of Webb & Berthelot at the MNHN. Sharon Shute, Entomology, NHM, gave much help with coleopteran literature. The assistance of the staff at the library of American Museum of Natural History and the British Library is acknowledged. We are grateful to Mr Shooib whose photographs are reproduced in this paper. Keiji Baba gave valuable assistance with some Japanese references.

REFERENCES


