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THE CALAPPIDAE (CRUSTACEA:BRACHYURA) OF CHINESE WATERS

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ABSTRACT

The taxonomy and geographical distribution of the Calappidae in Chinese waters are examined. Of twenty species identified belonging to six genera and three subfamilies, two species, *C. calappa* and *C. capellonis*, are recorded for the first time from Chinese waters, and one species, *Calappa undulata*, is new. *C. undulata* is characterized by front border thin, with four small teeth; hepatic region slightly depressed; carapace covered with coarse tubercles; posteriorly with reddish wave-like mottles. Keys to subfamilies and species of most genera are given.

INTRODUCTION

The present study is based upon a large collection made by the Institute of Oceanology, Academia Sinica, between 1953 and 1990 in Chinese waters. The Calappidae Dana 1852, includes thirty three species from the Indo-West Pacific. Twenty species are found in Chinese waters (about 2/3 that of the Indo-West Pacific region). With the exception of *Paracyclois milneedwardsii* and *Mursia curtispina* which were obtained from deeper water. All the other species are from shallow waters.

Calappid fauna and distribution

The Chinese calappids have a tropical and subtropical distribution. Of the twenty species recorded from the South China Sea, thirteen species are found in the East China Sea; only two species occur in the Yellow Sea and Bohai Sea; and eighteen species are widely distributed in the Indo-West Pacific. Of these, sixteen species are common to Chinese and Japanese waters. Thus, it is obvious that the Chinese calappid fauna is related to that of Japan. Only one species, *Orithyia sinica* is known from Chinese and Korean waters. *Calappa terraereginae* also is not known to occur in Japanese waters. *Paracyclois milneedwardsii*, *Mursia armata*, *M. trispinosa*, *M. curtispina* and *Matuta curtispina* are found in the western Pacific but are not present in the Indian Ocean. The only circumtropical species is *Calappa gallus*.

SYSTEMATIC ACCOUNT

Calappidae Dana, 1852

Calappidae and Matutidae Dana 1852: 393–394. —Miers 1886: 282.

Calappidae Alcock 1896: 137. —Ihle 1918: 161–179. —Sakai 1937: 83, 1976:127. —Chen 1975: 158. —Dai and Yang 1991:100.

Key to the subfamilies of Calappidae

1. Exopodite of third maxillipeds with flagellum 2
—Exopodite of third maxillipeds without flagellum Orithyinae
2. Posterolateral borders of carapace with clypeiform expansion.
Ambulatory legs not natatorial Calappinae
—Posterolateral borders of carapace without any clypeiform expansion.
Ambulatory legs natatorial Matutinae

Calappinae Alcock, 1896

Calappinae Alcock 1896: 138. —Ihle 1918: 161–179. —Rathbun 1937: 197. —Sakai 1937:83; 1965:50; 1976: 127. —Dai and Yang 1991:101.

Key to the genera of Calappinae

1. Carapace relatively broad; clypeiform expansion well-developed *Calappa*
—Carapace subcircular; clypeiform expansion small or absent 2
2. Clypeiform expansion with 3 or 4 teeth, basal joint of antenna swollen
..... *Paracyclois*
—Clypeiform expansion absent, basal joint of antenna slender 3
3. Carapace transversely oval, with strong spine at junction of anterolateral and posterolateral borders *Mursia*
—Carapace subcircular, with small denticle at junction of anterolateral and posterolateral borders *Cycloes*

***Calappa* Weber, 1795**

Calappa Weber, 1795: 92 (not seen). —Miers 1886: 283. —Alcock 1896:139.

—Ihle 1918: 181. —Rathbun 1937: 179. —Barnard 1950:346.

—Sakai 1937: 83; 1976:127. —Chen 1975: 158. —Dai and Yang 1991:101.

Key to the species of *Calappa*

1. Carapace with typically well-developed clypeiform expansion 2
—Carapace with weakly developed clypeiform expansion. Carapace subcircular ..
..... *C. pustulosa*

2. Carapace very broad 3
—Carapace moderately broad 4
3. Carapace distinctly tuberculate. Clypeiform expansions with broad teeth *C. hepatica*
—Carapace with some indistinct tubercles. Clypeiform expansion entire and smooth *C. calappa*
4. Posterior border of carapace distinctly produced *C. terraereginae*
—Posterior border of carapace not produced 5
5. Posterior border of carapace with 3 strong teeth, an incomplete reddish loop on each orbital region *C. philargius*
—Posterior border of carapace with 3 broad lobes 6
6. Transverse reddish mottles between teeth of clypeiform expansion *C. lophos*
—Without transverse reddish mottles between teeth of clypeiform expansion 7
7. Frontal border thick; hepatic region strongly depressed *C. gallus*
—Frontal border thin; hepatic region slightly depressed 8
8. Carapace covered with large wart-like tubercles *C. capellonis*
—Carapace covered with coarse tubercles; posteriorly with reddish wave-like mottles *C. undulata* sp. nov.

***Calappa hepatica* (Linnaeus, 1758)**

Cancer hepatica Linnaeus, 1758: 1048 (not seen).

Calappa hepatica: De Haan 1837:70. —Miers 1884:257, 550; 1886:285. —Haswell 1882: 136. —Ortmann 1892: 568. —Henderson: 1893:395. —Nobili 1906: 148. —Alcock 1896: 142. —De Man 1902: 687. —Borradaile 1903: 436, plate 22, figs. 6–6a. —Rathbun 1906:887. —Parisi 1914: 285. —Ihle 1918: 183. —Balss 1922: 123. —Sakai 1934: 284; 1937: 89, 101, 12 fig. 2. —Buitendijk 1939: 230. —Stephensen 1945: 65. —Barnard 1950: 348, 350, figs. 66a–d. —Tyndale-Biscoe and George 1962: 69–70, fig. 2(6). —Shen and Dai 1964: 10. —Chen 1975: 158, plate I(1). —Sakai 1976: 128, plate 38, figs. 1–3. —Dai and Yang 1991:102, plate 11(3), fig. 49(1).

Cancer tuberculata: Herbst 1785: 204, plate 3, fig. 78.

Material. Dongdao, Xisha Islands, 1 carapace (60.0 x 84.0 mm), 12. VI. 1975. —Yongxingdao, Xisha Islands, 1 ♂, 1 ♀, 15. IV. 1957. —Yongxingdao, Xisha Islands, 1 ♂ 17.II. 1977. —Shidao, Xisha Islands, 3 ♀, 10. V. 1975. —Xincun, Hainan Island, 1 ♂ (47.0 x 67.0 mm), 1 ♂ (36.0 x 64.0 mm), 13. VII. 1975. —Sanya, Hainan Island, 1 ♂ 13.VII. 1957. —Hainan Island, 1 ♂ (43.0 x 62.0 mm), 8.IV.1955. —Yulin, Hainan Island, 1 ♀, 3.IV. 1957. —Xincun, Hainan Island, 1 ♀, 21. IV. 1955.

Habitat. Found on coral reefs; broken shells and rock bottoms; littoral to 59 m depths.

Type locality. Unknown.

Distribution. China (Xisha Islands, Hainan Island and Taiwan), Japan, Hawaii, Tonga, East Australia, New Zealand, Indonesia, India, Maldives, Laccadives, Sri Lanka, Seychelles, Mozambique, Mali, South Africa, Persian Gulf and Red Sea. Very common.

***Calappa calappa* (Linnaeus, 1758). Fig. 1.**

Cancer calappa Linnaeus 1758: 1048 (not seen). —Herbst 1758: 196, plate 12, figs. 73–74.

Calappa calappa Rathbun 1906: 887; 1911: 197. —Parisi 1914: 286. —Ihle 1918: 184. —Bals 1922: 123. —Sakai, 1934: 90, plate 17, fig. 1. —Tyndale-Biscoe and George 1962: 69, fig. 2(5). —Sakai 1976: 129, plate 39, figs. 1, 3.

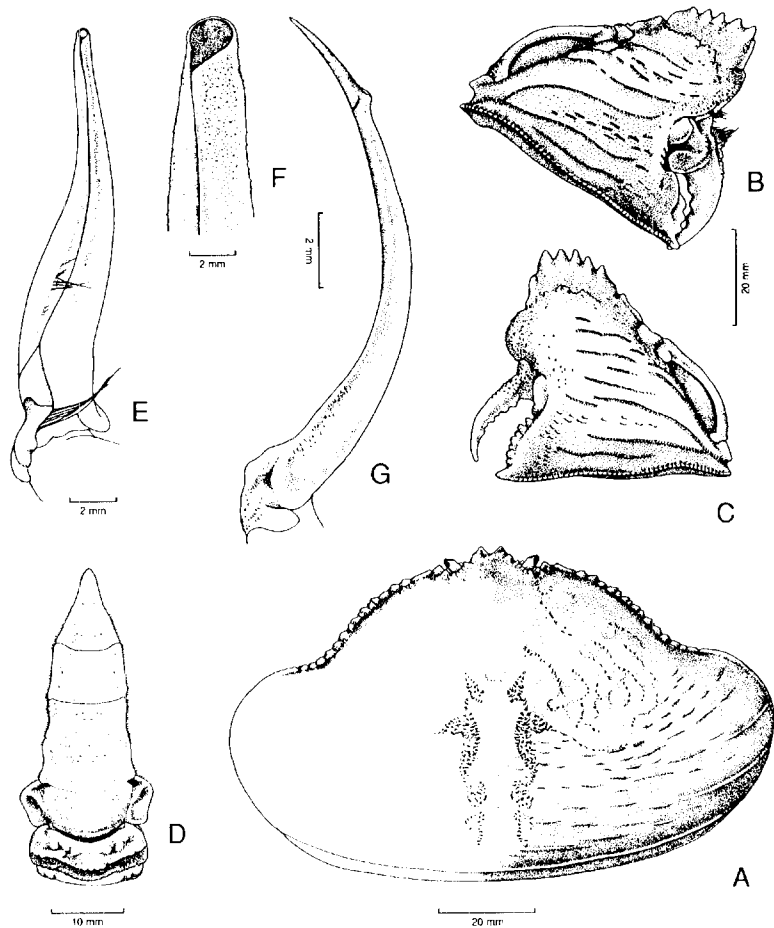


Fig. 1. *Calappa calappa* (Linnaeus, 1758). A, Carapace; B, major chela; C, minor chela; D, male abdomen; E–F, first male pleopod and enlarged tip; G, second male pleopod.

Calappa fornicata Herklots 1861: 25 (not seen). —Ortmann 1892: 569. —Alcock 1896: 142.

Material. Sanya, Hainan Island, 1 ♂ (74.0 x 125.0 mm), coll. by Chen Canzhong.

Habitat. Found on broken shell bottoms, 9–46 m depth.

Type locality. Unknown.

Remarks. Body shiny. Anterior carapace with some indistinct, smooth tubercles; posteriorly with smooth transversely wavy beaded lines of various length. Clypeiform expansion very large and entire, without teeth. Only one male collected. This species is recorded for the first time from Chinese waters.

Distribution. China, Japan, Hawaii, New Caledonia, Australia, Indonesia, India, Mauritius and Zanzibar.

Calappa philargius (Linnaeus, 1758). Fig. 2.

Cancer philargius Linnaeus 1758: 1042 (not seen).

Calappa philargius De Haan 1837: 71, plate 19, fig. 1. —Alcock 1896: 145. —Balss 1922: 122. —Shen 1931: 104, plate 8, text-figs. 10–11. —Sakai 1937: 93, plate 12, fig. 3. —Shen and Dai 1964: 11. —Tyndale-Biscoe and George 1962: 69. —Sakai 1965: 56, plate 22, fig. 1; 1976: 130–131, plate 37, fig. 2. —Dai and Yang 1991: 104, plate 11(6), fig. 50(2)

Calappa cristata Whitelegge 1899: 231 (not seen). —Stimpson 1907: 165.

Material. Yingchai, Hainan Island, 1 ♂ (42.4 x 61.2 mm), 5. VII. 1955. —Xinying, Hainan Island, 1 ♂ (56.4 x 86.0 mm), 1 juv. ♀, 25. V. 1955. —Sanya, Hainan Island, 1 ♀ (64.5 x 100.0 mm), 14. IV. 1955. —Haimen, Guangdong, 1 ♂, 18. III. 1954; 1 ♂, 1 ♀, 14. III. 1956; 1 ♀, 7. V. 1957. —Baoan, Guangdong, 1 ♂ (57.0 x 95.0 mm), 1957. —Xuwen, Guangdong, 1 ♂ (22.1 x 29.5 mm), 1955. —Weizhoudao, Guangxi, 2 ♂, 28. XI. 1954. —Xiongdiaodao, Fujian, 1 ♀, 18. IV. 1957. —Dongshan, Fujian, 1 ♀, 27. V. 1975. —Zhangpu, Fujian, 1 ♂, 31. V. 1975. —Shenhu, Fujian, 3 ♂, 24. VI. 1975. —Weitou, Fujian, 4 ♂, 27. VI. 1975. —East China Sea, 1 ♂, 2 ♀, depth: 64 m, Bottom: muddy sand, 11. VII. 1959. —East China Sea, 1 ♀, depth: 57 m, bottom, silt, 23. X. 1959. —South China Sea, 12 ♂, 9 ♀, depth: 13–50 m, bottom: sandy mud, and muddy sand, IV–X. 1959. —Beibu Gulf, 7 ♂, 3 ♀, depth: 24–51 m, bottom: fine sand, ooze and muddy sand, I–VII. 1960.

Habitat. Found on muddy sand, sandy mud or broken shell, sand bottoms, 24–100 m depths.

Type locality. Unknown.

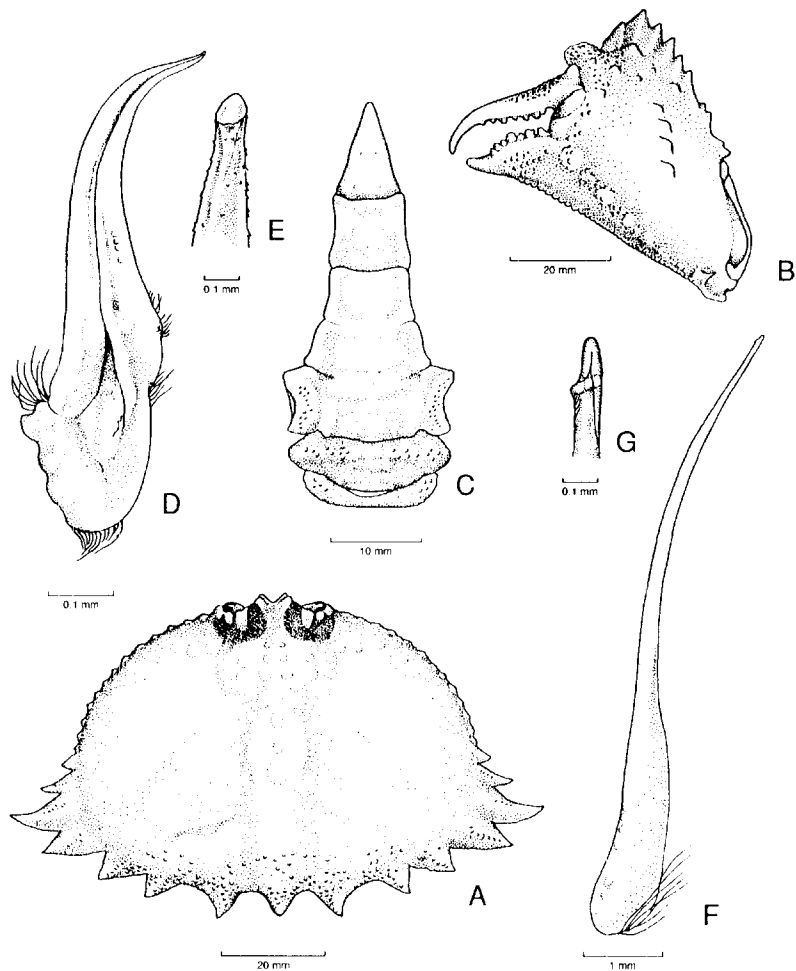


Fig. 2. *Calappa philargius* (Linnaeus, 1758). A, Carapace; B, minor chela; C, male abdomen, D–E, first male pleopod and enlarged tip; F–G, second male pleopod and enlarged tip.

Remarks. This present species is easily distinguished by having 3 triangular teeth at its posterior border and an incomplete reddish loop on each orbital region; carpus and palm of cheliped each have a large spot of the same colour.

Distribution. South China Sea and East China Sea, Japan, Korea, Vietnam, Indonesia, Singapore, Burma, India, Persian Gulf and Red Sea.

***Calappa lophos* (Herbst, 1782). Fig. 3.**

Cancer lophos Herbst 1782: 201, plate 13, fig. 17.

Calappa lophos De Haan 1837: 72, plate 20, fig. 1. —De Man 1887: 389. —Henderson 1893: 395. —Alcock 1896: 144. —Parisi 1914: 283. —Ihle 1918: 182. —Balss

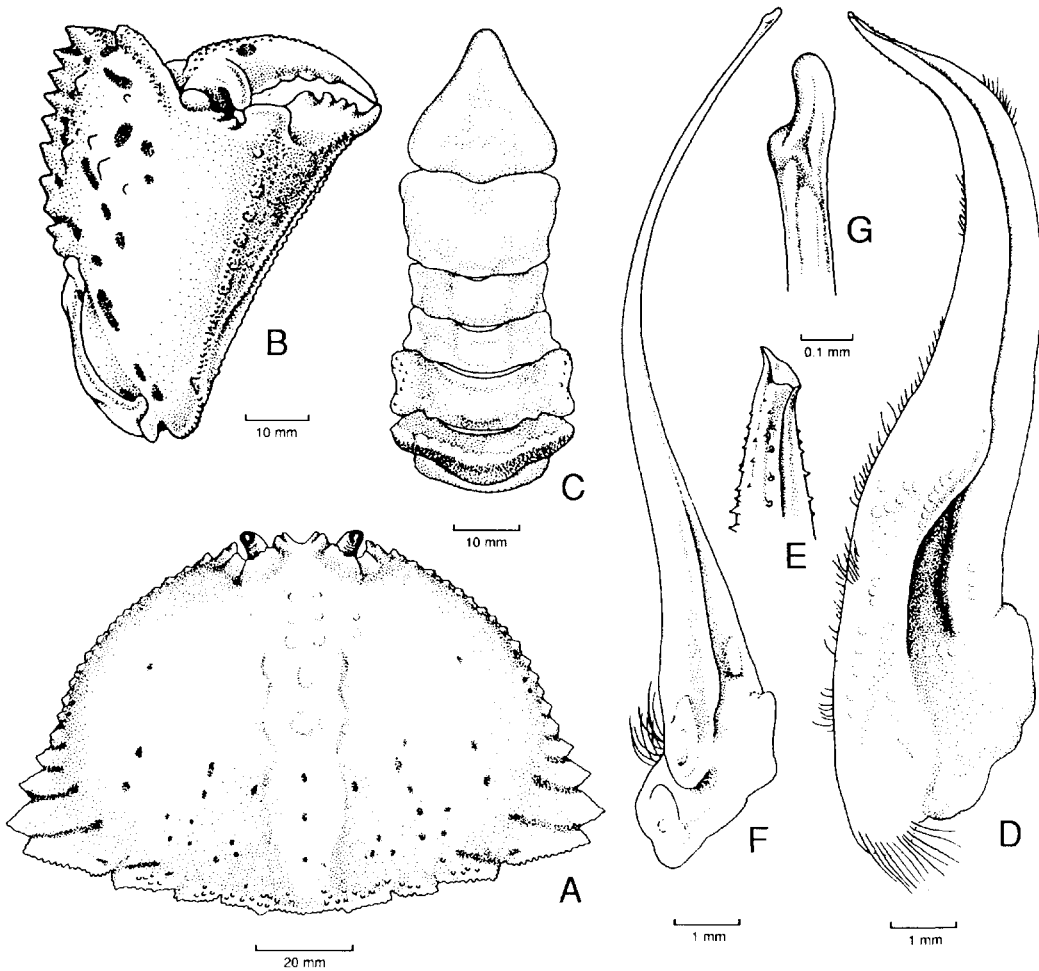


Fig. 3. *Calappa lophos* (Herbst, 1782). A, Carapace; B, major chela; C, female; D-E, first male pleopod and enlarged tip; F-G, second male pleopod and enlarged tip.

1922:123. —Rathbun 1923: 137. —Shen 1936: 64. —Sakai 1937: 90–91, plate 12, fig. 1. —Stephensen 1945: 65, figs. 5a–b. —Barnard 1950: 351, figs. 66 j–m. —Tyndale-Biscoe and George 1962: 70. —Shen and Dai 1964: 11. —Sakai 1976: 129–130, plate 37, fig. 1, plate 38, fig. 2. —Dai and Yang 1991: 103, plate 11(4), fig. 49(2).

Material. Shanwei, Guangdong, 2 ♀ (33.0 x 44.5; 44.5 x 67.0 mm), 15.I.1955. —1 ♂, 2 ♀, 10.I.1955. —1 ♀ (32.5 x 44.4 mm.), IV.1953. —Zhapo, Guangdong, 2 ♀ (88.5 x 129.0; 32.0 x 45.0 mm), 1956. —East China Sea: 1 ♂ (79.0 x 120.2 mm), depth: 98 m, bottom, broken shells, 23.X.1959. —1 ♂, depth: 44 m, bottom, ooze, 10.X.1959. —South China Sea: 9 ♂, 7 ♀, depth: 38–122 m, bottoms, muddy sand or fine sand, I–XII.1959. —5 ♂, 1 ♀, depth: 30–124 m, bottoms muddy sand or fine sand, II–IV.1960.

Habitat. Found on muddy sand, fine sand and broken shell bottoms, 30–150 m depth.
Type locality. Unknown.

Remarks. Juvenile specimens agree with Sakai's description and figure. The carapace has reddish brown stripes and a pair of large ocelli, one on each epibranchial region but these disappear in adults.

Distribution. South China and East China Sea, Japan, Indonesia, Thailand, Sri Lanka, India, Dar-es-Salaam and Persian Gulf.

***Calappa terraereginae* Ward, 1936. Fig. 4A.**

Calappa terraereginae Ward 1936: 11, plate 3, figs. 9–11. —Sakai 1937: 92, plate 18, fig. 1, text-figs. 6b, 7. —Tyndale-Biscoe and George 1962: 70, plate 1, fig. 2, plate 2, fig. 2. —Sakai 1976: 130, text-figs. 72a–b. —Dai and Yang 1991: 103, plate 11(5), fig. 50(1).

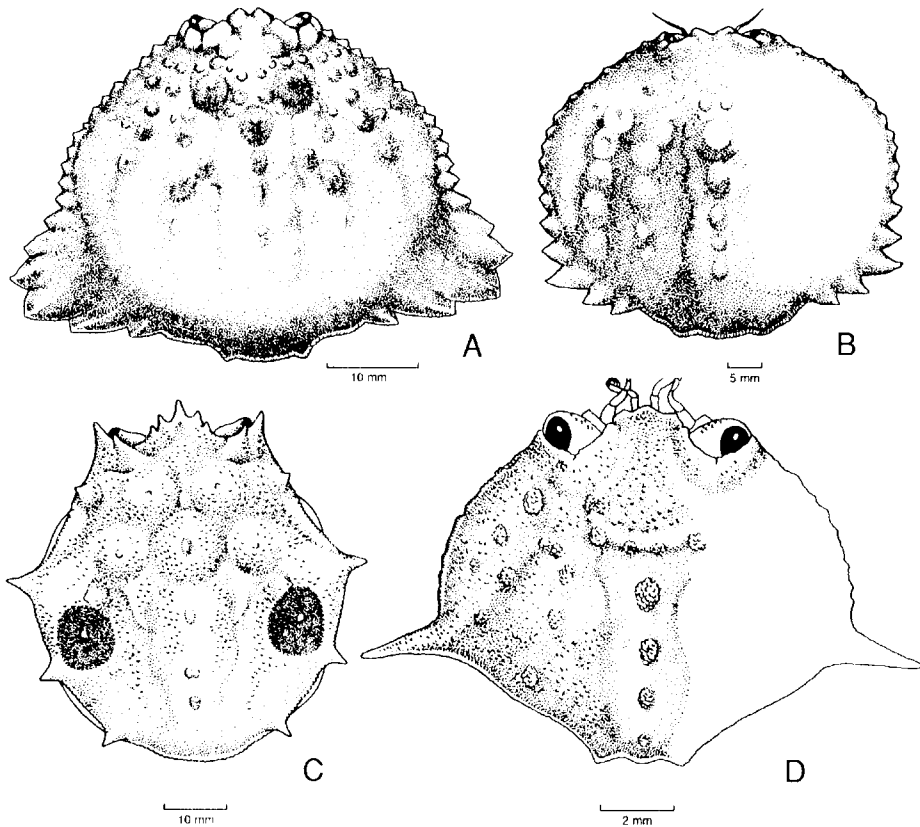


Fig. 4. A. *Calappa terraereginae* Ward, 1936.
 B. *Calappa pustulosa* Alcock, 1896.
 C. *Orithya sinica* (Linnaeus, 1771).
 D. *Mursia curtispina* Miers, 1886.

Material. Wezhoudao, Guangdong, 1 ♂ (33.0 x 46.5 mm), 26.XII.1954. —Zhuxi, Guangdong, 1 ♀ (35.0 x 47.0 mm), 31.III.1956. —Beihai, Guangxi, 1 ♂ (35.5 x 56.0 mm), 10.IV.1956. —South China Sea: 18♂, 13♀, depth: 30–67 m, bottom, muddy sand or sandy mud, I–XII.1959;— 8♂, 5♀, depth: 30–104 m, bottom, muddy sand or sandy mud, I–V.1960. —Beibu Gulf: 26♂, 19♀, depth: 30–122 m, bottom, muddy sand or sand, XII.1959; 96♂, 90♀, depth: 18–79 m, bottom, muddy sand or sandy mud. II–XI.1961; 16♂, 12♀, 9 juv., depth: 15–68 m, bottom, muddy or sandy mud.

Habitat. Found on muddy sand or sandy mud bottoms, 15–122 m depths.

Type locality. Lindeman Island, Queensland.

Remarks. The posterior border of the carapace is produced backwards. This feature is constant from the juvenile to the full-grown specimens.

Distribution. China, Vietnam, Australia and Korean Channel.

***Calappa gallus* (Herbst, 1803). Fig. 5.**

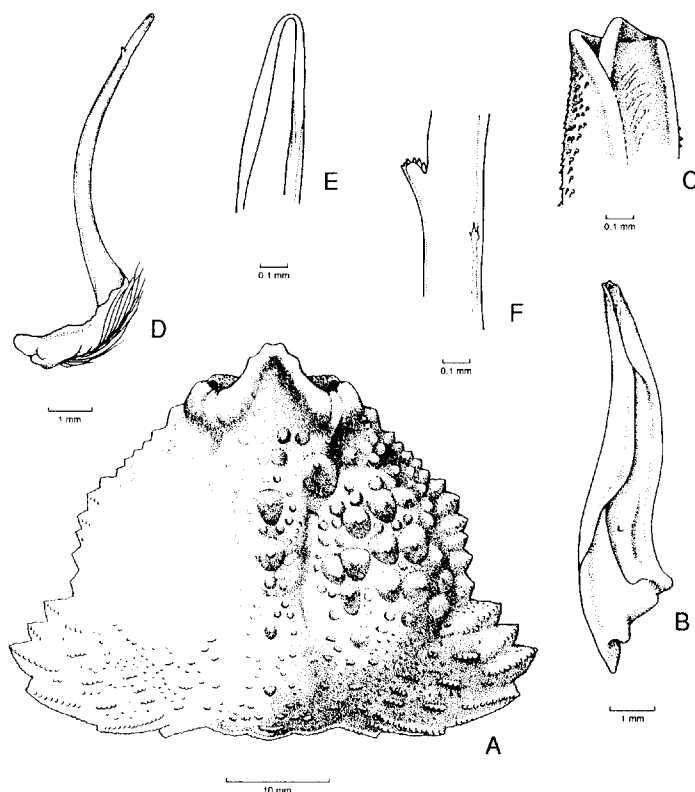


Fig. 5. *Calappa gallus* (Herbst, 1803). A, Carapace; B–C, first male pleopod and enlarged tip; D–F, second male pleopod and enlarged parts.

Cancer gallus Herbst 1803:46, plate 58, fig. 1.

Calappa gallus H. Milne-Edwards 1837: 105. —De Haan 1837: 70. —Klunzinger 1906: 61, plate 2, fig. 14. —Henderson 1893: 395. —Rathbun 1937: 214, plate 65, figs. 2–3. —Sakai 1937: 94, plate 17, fig. 2. —Barnard 1950: 350, figs. 66, e–i. —Monod 1956: 100, figs. 115–116. —Shen and Dai 1964: 10. —Sakai 1976: 131, plate 39, fig. 2. —Dai and Yang 1991: 105, fig. 51.

Material. Xizhoudao, Hainan Island, 1 ♂ (36.5 x 46.2 mm), 1 ♀ (36.0 x 48.0 mm), 8.IV.1955.

Habitat. Found on coral reefs, muddy sand and broken shell bottoms, littoral to 220 m depth.

Type locality. Unknown.

Distribution. This is a circumtropical species. China (Nansha Islands, Xisha Islands and Taiwan), Japan, Hawaii, Philippines, Indonesia, India, Burma, Sri Lanka, Mascarene Islands, Suvadiva Atoll, East and South Africa, Persian Gulf, Red Sea and tropical Atlantic coasts.

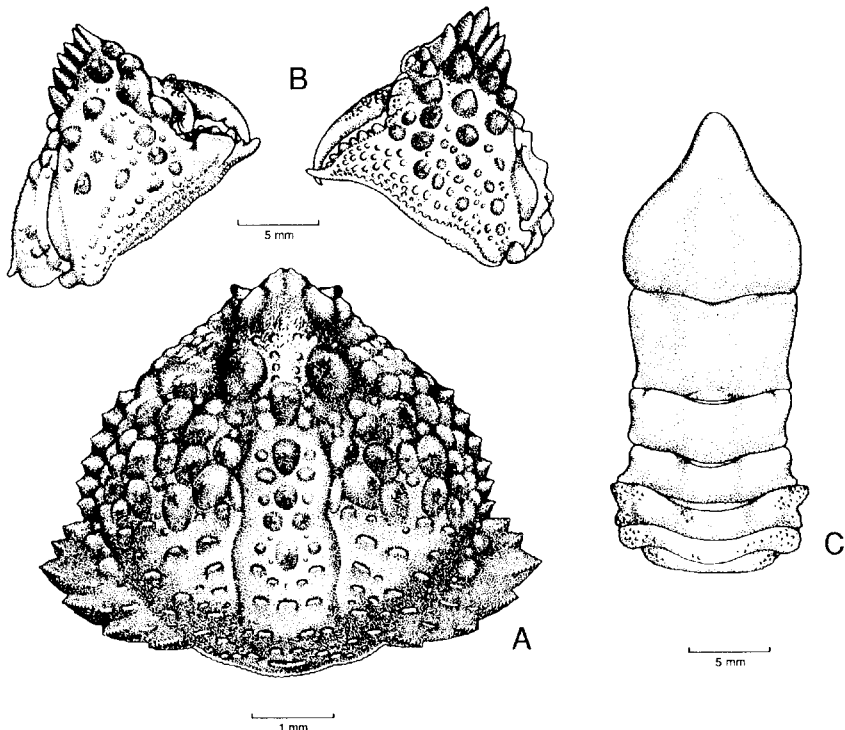


Fig. 6. *Calappa capellonis* Laurie, 1906. A, Carapace; B, chelae; C, female abdomen.

Calappa capellonis Laurie, 1906. Fig. 6.

Calappa gallus var. *capellonis* Laurie 1906: 355, —Sakai 1934:284: 1937: 95, plate 17, fig. 3; 1976:131, text-fig. 73. —Rathbun 1937:214.

Material. Xincun, Hainan Island, 1 ♀ (47.8 x 71.0 mm), 2.IV.1960. —South China Sea, 1 juv. ♀ (19.0 x 23.0 mm), depth: 23 m, bottom, coarse sand, 14.V.1960.

Habitat. Found on coarse sand, pebbles or rock bottoms, 15–30m. depths,

Type locality. Sri Lanka.

Distribution. South China Sea, Japan and Sri Lanka.

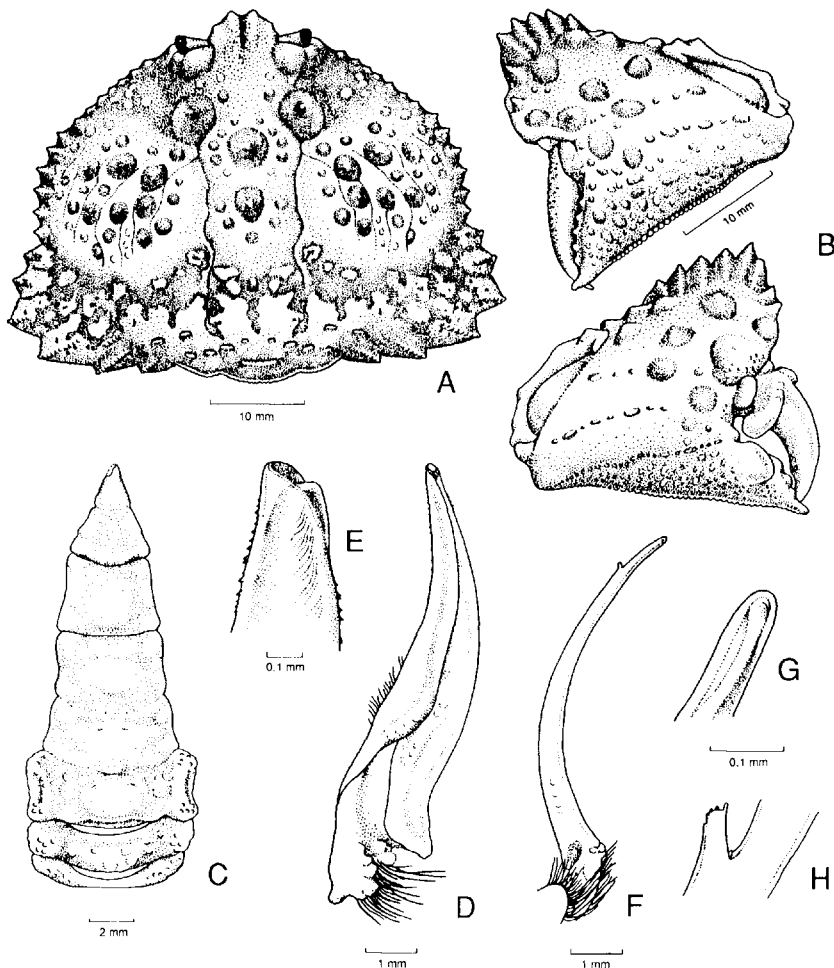


Fig. 7. *Calappa undulata* sp. nov. A, Carapace; B, chelae; C, male abdomen; D–E, first male pleopod and enlarged tip; F–H, second male pleopod and parts.

***Calappa undulata* sp. nov. Fig. 7.**

Material. Holotype ♀ (38.6 x 48.5 mm), K16B-7, South China Sea (21°30'N, 113°30'E), muddy sand bottom, 39 m depth, 10.IV.1960. Allotype ♂ (38.0 x 52.0 mm), SSDI12-8, Nansha Islands, depth: 66 m, 10.IV.1990.

The holotype is deposited in the Institute of Oceanology, Academia Sinica, the allotype is kept in the South China Sea Institute of Oceanology, Academia Sinica.

Description. Carapace broader than long, covered with low, smooth tubercles. Frontal border thin, divided into 4 small teeth, the medial pair more distinct than the lateral pair. A pair of broad, shallow, longitudinal grooves situated between gastric-cardiac-intestinal region and the branchial region. Hepatic region slightly depressed. Anterior 1/2 of anterolateral border with indistinct teeth and posterior 1/2 with 6 small teeth. Posterolateral border cut into 6 lobes. Posterior border with 3 lobes, each edge of which has beady granules.

Chelipeds asymmetrical. Merus widening distally; with transverse hairy ridge cut into 4 broad lobes. Carpus small; outer surface with a few small tubercles. The larger palm high and thick, upper portion of outer surface covered with some wart-like tubercles of varying sizes; anterior border crested, divided into 7 triangular teeth; middle portion of palm with three rows of granules of varying sizes; posterior border of palm with 3 rows of fine, close-set granules. Proximal 1/2 of dorsal border of movable finger with a median tooth and some indistinct teeth; basal part of its outer surface with a finger-like tooth. Basal portion of immovable finger with a molar and 3 blunt teeth. First two ambulatory legs longer than posterior two. Surface of ambulatory legs smooth.

Male. Abdomen consists of five segments (3rd to 6th fused); first segment shortest, second longer than the first, its middle part produced, 6th segment square. Telson triangular. First male pleopod stout, distal part curved outwards, distal end thin, denticulate. Second male pleopod slender, its distal part with a small tooth.

Etymology. The name is from the Latin 'undulata' wavy, alluding to the wavy reddish mottles of the posterior part of the carapace.

Remarks. Carapace (in spirit) yellowish, and with reddish tubercles. Posterior 1/3 of carapace with reddish wavy mottles. This new species closely resembles *Calappa gallus* and *Calappa capellonis* but differences between the three species are summarized in Table 1.

***Calappa pustulosa* Alcock, 1896. Fig. 4B.**

Calappa pustulosa Alcock 1896: 147, plate 6, fig. 1. —Borradaile 1903: 436. —Ihle 1918: 306, —Chopra 1933: 29. —Sakai 1937: 97, plate 18, figs. 2-3. —Shen and Dai 1964: 12. —Sakai 1965: 57, plate 23; 1976: 134, plate 41, fig. 1. —Dai and Yang 1991: 106, plate 12(1), fig. 12.

Material. Zhapo, Guangdong, 1 ♀ (44.5 x 50.0 mm), 1956. —South China Sea, 1 ♀ (48.0 x 52.0 mm), depth: 125 m, muddy sand bottom, 20.XI.1959.

Table 1
 Characters separating *Calappa undulata* sp. nov. from its nearest relatives.

Character	<i>Calappa gallus</i>	<i>Calappa capellonis</i>	<i>Calappa undulata</i> sp. nov.
Frontal border	thick and obtusely triangular in adult; with 4 blunt teeth in juvenile	thin and with 4 distinct teeth	thin and with 4 indistinct teeth
Surface of carapace	rough; without hairs	smooth; with short hairs on gastric region	smooth; without hairs
Size of tubercles on anterior 2/3 of carapace	medium	large	medium
Size and number of squamiform tubercles of posterior 1/3 of carapace	small and numerous	small and few	large and few
Depth of longitudinal grooves of carapace	deep	shallow	shallow
Depth of hepatic region	deep	shallow	shallow
Distribution	Indian, Pacific and Atlantic	South China Sea, Japan and Sri Lanka	South China Sea

Habitat. Found on sand, broken shells and muddy sand bottoms, 50–150 m depth.

Type locality. India.

Remarks. The subcircular carapace and the weakly developed clypeiform expansion easily distinguish this species from its congeners.

***Paracyclois* Miers, 1886**

Paracyclois Miers 1886: 288. —Sakai 1976: 134.

***Paracyclois milneedwardsii* Miers, 1886. Fig. 8.**

Paracyclois milneedwardsii Miers 1886: 289, plate 24, fig. 1. —Sakai 1976: 134, plate 41, fig. 2.

Material. South China Sea, 1 ♂ (26.4 x 27.0 mm), depth: 300 m, bottom, coarse sand, 23.X.1959.

Habitat. Found on soft sand, coarse sand, and sandy mud bottoms, 80–300 m depths.

Remarks. Anterior 2/3 of carapace subcircular, posterior 1/3 narrow. The middle portion of posterolateral border with some small teeth. Posterior border produced backwards; with 3 strong teeth. Male abdomen of 5 segments with 3rd to 5th fused, and first segment short and small; second segment with three tubercles; 6th segment square. Telson elongate, triangular. First male pleopod long and stout; second male pleopod long, slender, and inwardly curved.

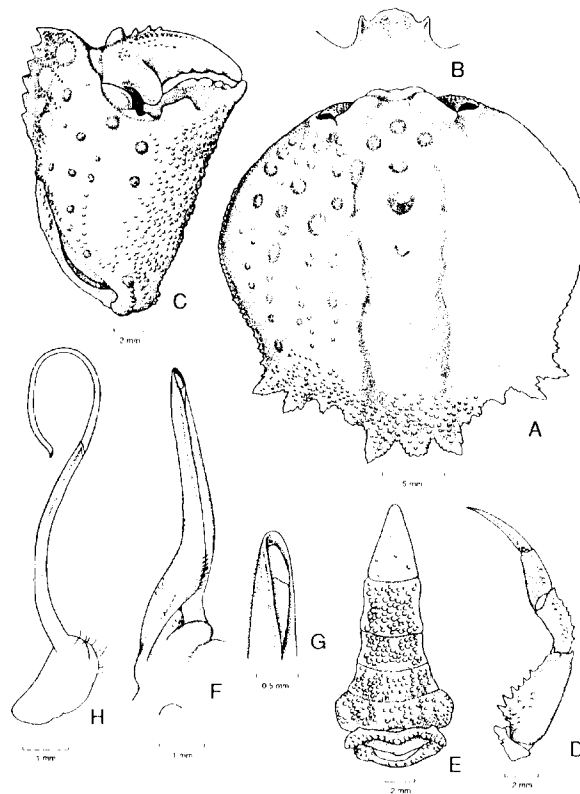


Fig. 8. *Paracyclois milneedwardsii* Miers, 1886. A, Carapace; B, front; C, major chela; D, 4th ambulatory leg; E, male abdomen; F–G, first male pleopod and enlarged tip; H, second male pleopod.

Mursia Leach, 1823

Mursia Leach 1823 in Desmarest: 231 (not seen). —Alcock 1896:148. —Doflein 1904:36. —Ihle 1918: 300, 307. —Rathbun 1937: 215. —Barnard 1950: 353. —Sakai 1937: 85; 1976: 134. —Dai and Yang 1991: 106.

Key to the Chinese species of *Mursia*

1. Lateral processes of carapace long 2
 —Lateral processes of carapace short *Mursia curtispina*

2. Palm of chelipeds with three strong teeth along the outer inferior border; lateral processes of carapace bent *M. trispinosa*
 —Palm of chelipeds with flat tubercles of nearly equal size; lateral processes of carapace straight *M. armata*

***Mursia armata* De Haan, 1837. Fig. 9.**

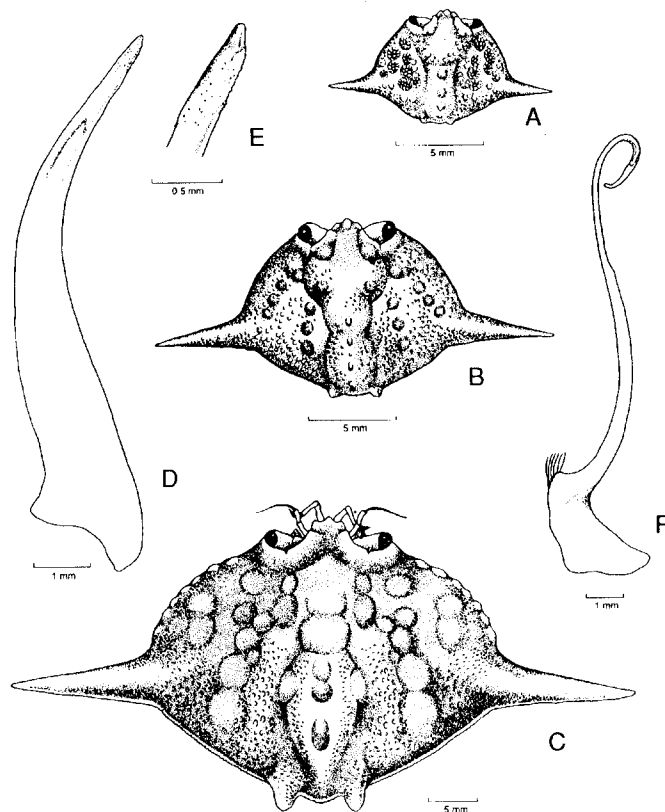


Fig. 9. *Mursia armata* De Haan, 1837. A–C, Carapaces; D–E, first male pleopod and enlarged tip; F, second male pleopod.

Mursia armata De Haan 1837: 73, plate 19, fig. 2. —Ortmann 1892: 564. —Doflein 1902: 653. —Parisi 1914: 290. —Ihle 1918: 179. —Balss 1922: 124. —Yokoya 1933: 114. —Sakai 1937: 85, plate 11, fig. 3. —Shen 1940a: 214. —Shen and Dai 1964: 12. —Sakai 1965: 51, plate 20, fig. 4; 1976: 135–136, plate 43, fig. 2. —Dai and Yang 1991: 107, plate 12(2), fig. 53.

Material. Shanwei, Guangdong, 1 ♀ (24.7 x 30.0 mm), IX.1953. —Jieshi, Guangdong, 1 ♂ (20.0 x 20.5 mm), 28.IV.1954. —Shangchuan dao, Guangdong, 1 ♂ (26.5 x 33.0 mm), 1 ♀ (37.0 x 40.0 mm), 8.VII.1959. —Zhapo, Guangdong, 2 ♀ (27.0 x 36.0; 25.0 x 32.5 mm), 9.IV.1956; —1 ♂, 6 ♀, 16.XI.1956. —Beibu Gulf, 1 ♂ (24.0 x 37.0 mm), 8.IV.1956. —South China Sea, 62 ♂, 64 ♀, depth: 47–195 m, bottom, muddy sand, ooze, and sand mud. II–XII.1959. —East China Sea, 1 ♂, depth: 126 m, bottom, fine sand, 21.IX.1976.

Habitat. Found on muddy sand, ooze, sandy mud and sand bottoms, 47–195 m depth.

Remarks. The lateral process is very long (about 18 mm), probably longer than any of its congeners; thick, and straight. The posterior border of the cheliped palm has 3 blunt teeth.

Distribution. South China Sea, East China Sea and Japan.

***Mursia trispinosa* Parisi, 1914. Fig. 10.**

Mursia trispinosa Parisi 1914: 290, plate 12.

Mursia armata curtispina: Balss 1922: 124 (part). —Sakai 1937: 87, plate 11, fig. 4.

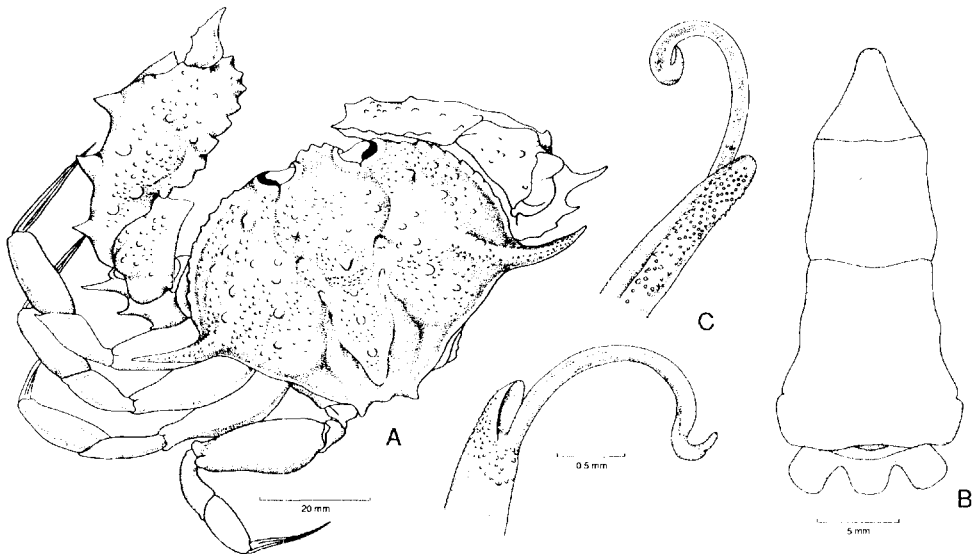


Fig. 10. *Mursia trispinosa* Parisi, 1914. A, Carapace and legs; B, male abdomen; C, tips of first and second male pleopods.

Mursia curtispina trispinosa: Sakai 1965: 53, plate 21, fig. 1, text fig. 8 b-b'.

Mursia trispinosa Campbell 1971:35. —Sakai 1976: 137, plate 43, fig. 4, text-figs. 74 b-b'.

Material. East China Sea, 1 ♂ (50.0 x 64.2 mm).

Habitat. Found on muddy sand, fine sand bottoms, 65–184 m depths.

Type locality. Japan.

Remarks. The lateral process is long and curved at base. Posterior border of cheliped palm has 3 triangular teeth. First male pleopod stout and has small spines at tip; second male pleopod very long and slender but tip differs from that shown in text-fig. 74 of Sakai (1976, p. 138).

Distribution. Nansha Islands, East China Sea and Japan.

***Mursia curtispina* Miers, 1886. Fig. 4D.**

Mursia curtispina Miers 1886: 291–292, plate 24, fig. 2. —Sakai 1965: 52, plate 21, fig. 2, text-figs. 8 a-a': 1976: 136, plate 43, fig. 1, text-figs. 74 a-a'.

Mursia armata curtispina: Doflein 1902: 40; 1904: plate 17, fig. 2. plate 18, fig. 3. —Ihle 1918: 179 (part). —Balss 1922: 124 (part). —Yokoya 1933: 115 (part).

(Nec *Mursia curtispina*: Sakai 1937:87, plate 11, fig. 4 (= *M. trispinosa* Parisi, 1914)

Material. South China Sea, 1 ovig. ♀ (15.0 x 17.2 mm), depth: 260 m, bottom, sand, 19.IV.1959; 6♂, 2♀ (7.5 x 9.0–15.5 x 19.0 mm), depth: 194–195 m, bottom, fine sand, muddy sand, IV–VII.1959. —East China Sea, 4♂, 1♀, depth: 107–162 m, bottom, fine sand, 10.X.1975; 2♂, 2♀, depth: 107–126 m, bottom, fine and coarse sand, VI–VII. 1976.

Habitat. Found on muddy sand and sand bottoms, 40–576 m depths.

Type locality. Fiji Islands.

Remarks. Lateral processes of carapace shorter than those of the former two species.

Distribution. South China Sea, East China Sea, Japan Indonesia and Fiji Islands.

***Cycloes* De Haan, 1837**

Cycloes De Haan 1837: 67–68. Rathbun 1937: 225. —Chace 1968: 610. —Sakai, 1976: 139. —Dai and Yang 1991: 108.

Cryptosoma Brulle 1840 (not seen). —H. Milne-Edwards 1837: 110. —Miers 1886:292. —Alcock 1896: 151. —Sakai 1937: 84; 1965: 50.

***Cycloes granulosa* De Haan, 1837. Fig. 11.**

Cycloes granulosa De Haan 1837: 71, plate 19, fig. 3. —Rathbun 1906: 888; 1937: 225. —Chace 1968: 610.

Cryptosoma granulatum Miers 1886: 293. —Alcock 1896: 152. —Laurie 1906: 356. Ihle 1918: 179. —Sakai 1937: 84, plate 13, fig. 1; 1965: 50, plate 20, fig. 3; 1976: 139, plate 43, fig. 3. —Dai and Yang 1991: 108, plate 12(3), fig. 54.

Material. South China Sea, 4♂, 13♀ (8.5 x 8.1–18.3 x 18.0 mm), depth: 29–43 m, bottom, fine sand or silt, IV.1959; 4♂, 3♀ (6.0 x 5.7–8.4 x 7.9 mm), depth: 32–44 m, bottom, fine sand, coarse sand and muddy sand; III–IV.1960. —Beibu Gulf, 4♂, 1♀, depth: 25–49 m, bottom, fine sand, muddy sand, IV–VII.1960.

Habitat. Found on sand, muddy sand and silt bottoms, 25–100 m depths.

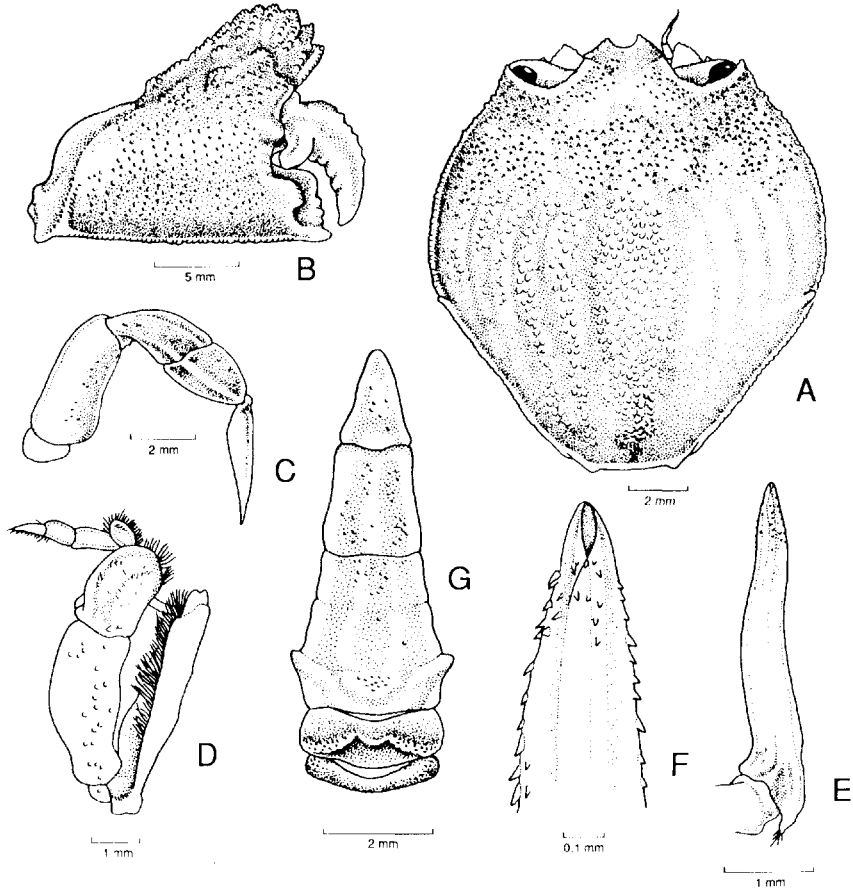


Fig. 11. *Cycloes granulosa* De Haan, 1837. A, Carapace; B, major chela; C, 4th ambulatory leg; D, third maxilliped; E–F, first male pleopod and enlarged tip. G, male abdomen.

Type locality. Japan.

Remarks. This is a relatively small species. The carapace is slightly longer than broad and has its surface covered with granules of various sizes. Between the anterolateral and posterolateral borders there is a small tooth. The posterior border has two small tubercles on each side. The chelipeds are of a similar shape to those of *Calappa*.

Matutinae Alcock, 1896

Matutinae Alcock 1896: 139. —Ihle 1918: 178. —Rathbun 1937: 234. —Sakai 1937: 84, 98; 1965: 59; 1976: 139. —Dai and Yang 1991: 109

Matuta Weber, 1795

Matuta Weber 1795: 92 (not seen). —H. Milne-Edwards 1837: 113. —Miers 1877: 178; 1886: 294. —Alcock 1896: 153. —Klunzinger 1906: 230. —Stebbing 1910: 335. —Chopra 1933: 31. —Barnard 1950: 357. —Tyndale-Biscoe and George 1962: 70. —Sakai 1937: 98; 1976: 139. —Dai and Yang 1991: 109

Key to the Chinese species of *Matuta*

1. Lateral processes long 2
—Lateral processes short, body small *M. curtispina*
2. Carapace with 6 distinct tubercles and posterolateral border with a small tubercle *M. banksii*
—Carapace with 6 indistinct tubercles and posterolateral border with or without an indistinct tubercle 3
3. Carapace smooth 4
—Carapace covered with coarse granules and 6 relatively distinct tubercles *M. granulosa*
4. Carapace after spirit preservation with closely set red dots *M. lunaris*
—Carapace after spirit preservation with red dots forming rings and loops *M. planipes*

***Matuta planipes* Fabricius, 1798. Fig. 12.**

Matuta planipes Fabricius 1798: 369 (not seen). —Laurie 1906: 356. —Ihle 1918: 308. —Balss 1922: 125. —Shen 1932: 35, text-figs. 20–21, plate 3, fig. 2. —Sakai 1937: 101, plate 13, fig. 4; 1965: 60, plate 24, fig. 3; 1976: 141, plate 44, fig. 2. —Buitendijk 1939: 232. —Stephensen 1945: 67, figs. 5c–d. —Barnard 1950: 357. —Tyndale-Biscoe and George 1962: 71. —Shen and Dai 1964: 13. —Romimohtarto 1972: 11–13, figs. 6–9; 21–26, plates Ib–b', IIIb–b'. Dai and Yang 1991: 109, plate 12(4), fig. 55(1).
Matuta lunaris Herbst 1799: 43, plate 48, fig. 6. —Alcock 1896: 161. —Stimpson 1907: 166.

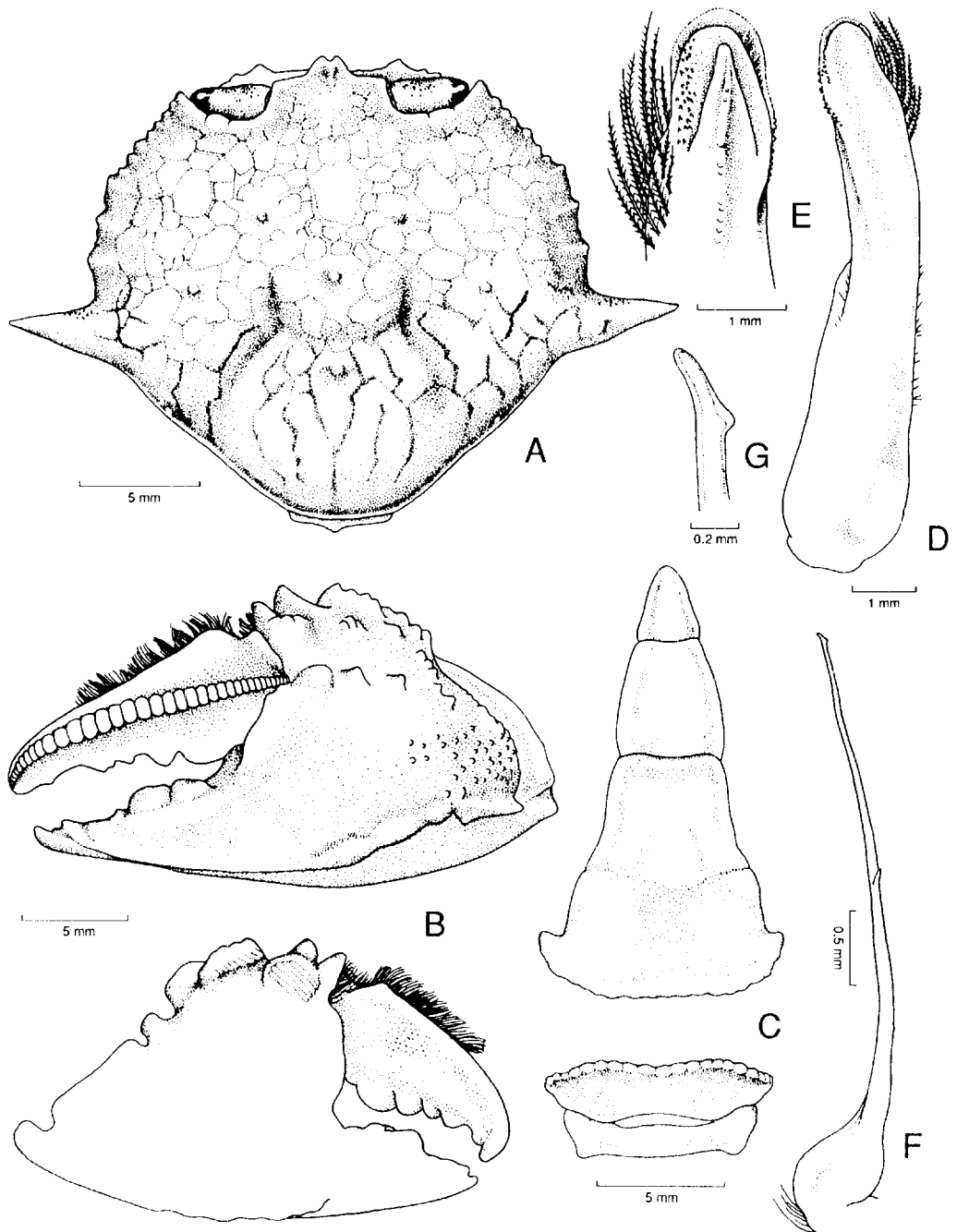


Fig. 12. *Matuta planipes* Fabricius, 1798. A, Carapace; B, chelae; C, male abdomen; D–E, first male pleopod and enlarged tip; F–G, second male pleopod and enlarged tip.

Matuta flagra Shen 1936: 64–66, text-fig. 1.

Material. Huangdao, Qingdao, 7 ♂ (29.2 x 30.2–39.5 x 40.5 mm), 9.IX.1957. —Qingdao, 6 ♂ (17.5 x 18.0–25.0 x 26.0 mm), 4 ♀ (19.3 x 19.8–24.0 x 25.0 mm), 3.VI.1956. —Rudong, Jiangsu, 4 ♀ (25.4 x 26.0–30.5 x 30.7 mm), 3.VI.1956. —Changle, Fujian, 1 ♂, 1 ♀, 22.V.1963. —Dongshan, Fujian, 3 ♂, 24.V.1975. —Xuwen, Guangdong, 2 ♂, 13 ♀ (11 ovig.), 18.VI.1955. —Weizhoudao, Guangxi, 1 ♂, 20.XI.1954. —Beibu Gulf 1 ♀, 8.VI.1956. —Qinglan, Hainan Island, 1 ♂, 24.III.1955. —Sanya, Hainan Island, 1 ♂, 4.XII.1955. —Haitangtou, Hainan Island, 1 ♀, 30.VI.1957. —Yinggehai, Hainan Island, 1 ♂, 7.V.1955. —Bohai and Yellow Sea, 26 ♂, 7 ♀ (3 ovig), depth: 21–40 m, IV–XII.1959, bottom, fine, coarse sand, and muddy sand, IV–XII.1959. —South China Sea, 1 ♂, 1 ♀, depth: 22–64 m, bottom, sand or broken shells. East China Sea, 1 ♂, depth: 31 m, bottom, fine sand and broken shells —17.IX.1976. —Beibu Gulf, 1 ♀, 4.VI.1956.

Habitat. Found on sand, broken shell or muddy sand bottoms, depth littoral to 15 m.

Type locality. 'Oceano Indico'.

Remarks. The carapace is yellowish in spirit and has dotted red lines and loops. These characters are, however, variable.

Distribution. The entire China coast, Korea, Japan, Australia, Indonesia, Singapore, Vietnam, Thailand, India, Persian Gulf and South Africa.

***Matuta lunaris* (Forskål, 1775). Fig. 13.**

Cancer lunaris Forskål 1775: 91 (not seen).

Matuta lunaris Rathbun 1902: 30; 1910: 315. —Laurie 1906: 356. —Balss 1922: 124. —Sakai 1937: 100, plate 13. —Buitendijk 1939: 231. —Shen 1940b: 77; 1940a: 214. —Shen and Dai 1964: 14. —Barnard 1950: 358, fig. 67L. —Tyndale-Biscoe and George 1962: 71. —Romimohtarto 1972: 11–13, figs. 1–3, 5, 8, 15–20, plates Ia, a', IIIa–a'. —Sakai 1967: 140, plate 44, fig. 1. —Dai and Yang 1991: 110, plate 12(5), fig. 55(2)

Material. Xiongdidai, Fujian, 1 ♂ (45.2 x 47.0 mm), 18.IV.1957. —Changle, Fujian, 2 ♂ (41.0 x 43.0; 39.0 x 40.3 mm), 21.V.1963. —Pingtan, Fujian, 1 ♂ (45.0 x 49.0 mm), 14.III.1957. —Jinjiang, Fujian, 2 ♂ (16.0 x 16.0–20.0 x 20.0 mm). —Qiongtou, Tongan, Fujian, 6 ♂, 5.IV.1957. —Baoan, Guangdong, 1 ♂ (44.5 x 47.1 mm). —Zhapo, Guangdong, 2 ♂, 2 ♀ 18.XI.1954. —Naozhoudao, Guangdong, 1 ♂, 20.XI.1954. —Weizhoudao, Guangxi, 2 ♂, 20.XI.1954. —Yinggehai, Hainan Island, 1 ♂, 28. VII.1957. —Haikou, Hainan Island, 1 ♂, 18.XI.1954. —Sanya, Hainan Island, 2 ♂, 1 ♀, 14.IV.1954. —Xingying, Hainan Island, 1 ♂, 7.V.1955.

Habitat. Found on muddy sand, sand or broken shells bottoms, littoral to 15 m depth.

Type locality. Red Sea.



Fig. 13. *Matuta lunaris* (Forskål, 1775). A, Carapace; B, chela; C, fingers; D, male abdomen; E–F, first male pleopod and enlarged tip; G–H, second male pleopod and enlarged parts.

Remarks. The carapace is yellow in spirit and has many reddish dots.

Distribution. China (Hainan Island, Guangdong, Guangxi, Fujian and Taiwan), Korea, Japan, Australia, Indonesia, Thailand, India and Red Sea.

***Matuta banksii* Leach, 1817. Fig. 14.**

Matuta banksii Leach 1817: 14 (not seen). —Alcock 1896: 158. —Nobili 1906: 149. —Ihle 1918: 185. —Bals 1922: 125. —Sakai 1937: 98–100, plate 3, fig. 2. —Buitendijk 1939: 231. —Barnard 1950: 359. —Tyndale-Biscoe and George, 1962: 71. —Shen and Dai 1964: 14. —Romimohtarto 1972: 13–16, figs. 7, 10, 27–32, plates Ic, IIIc, c'. —Dai and Yang 1991: 110, plate 12(6), fig. 56(1)

Material. Xinying, Hainan Island, 2♂, 4♀ (20.5 x 22.3–39.0 x 39.5 mm), 28.VII.1957. —Xincun, Hainan Island, 1♂, 2♀, 21.IV.1955. —Xinying, Hainan Island, 1♀ (30.5 x 30.5 mm), 22.V.1955. —Weizhoudao, Guangxi, 1♂ (32.3 x 34.0 mm), 26.XII.1954.

Habitat. Found on shallow sand beach below low tidal mark.

Type locality. Unknown.

Remarks. This species is easily distinguished from the former two species in having six distinct tubercles on the carapace, one tubercle at the middle of the posterolateral border and an obsolete stridulating ridge on the outer surface of the movable finger, which consists of very fine or indistinct striae.

Distribution. China (Guangdong, Guangxi, Hainan Island, and Taiwan), Japan, Polynesia, Australia, Indonesia, India, South Africa, Persian Gulf and Red Sea.

***Matuta granulosa* Miers, 1877**

Matuta granulosa Miers 1877: 245, plate 59, figs. 8–9. —De Man 1881: 114. —Haswell 1882: 134. —Ortmann 1892: 572–573. —Tyndale-Biscoe and George 1962: 71–72. —Dai and Yang 1991: 113, plate 12(8), fig. 57.

Habitat. Dredged at 30 fathoms.

Type locality. Eastern Seas.

Remarks. This species was recorded by Dai and Yang (1991) from Hainan Island but as yet I have not collected this species.

Distribution. China, Australia and Indian Ocean.

***Matuta curtispina* Sakai, 1961. Fig. 15.**

Matuta curtispina Sakai 1961: 139, plate 3, fig. 7; 1965: 60, 61, plate 24, fig. 2; 1976: 14, plate 45, fig. 2.

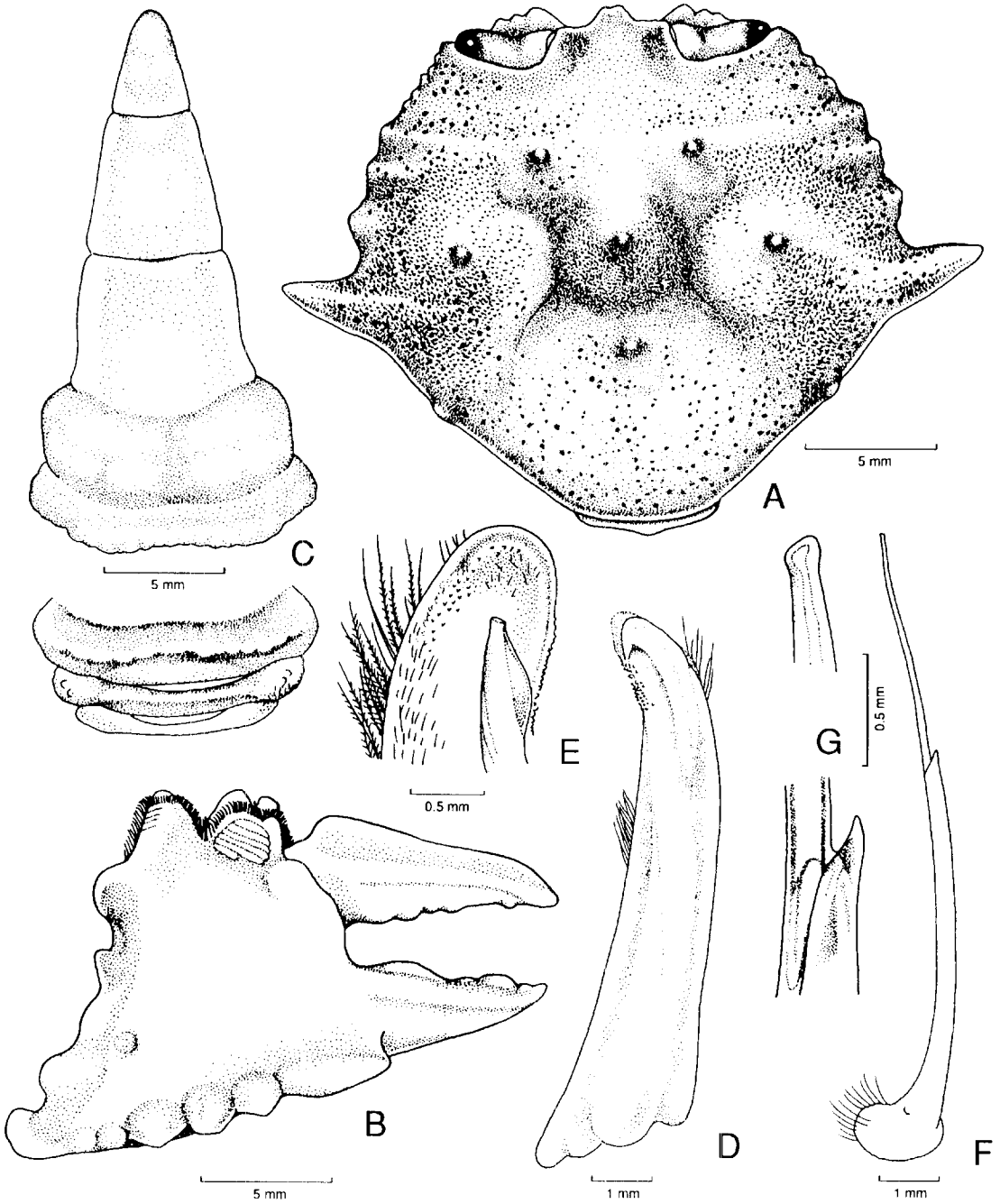


Fig. 14. *Matuta banksii* Leach, 1817. A, Carapace; B, chela; C, male abdomen; D-E, first male pleopod and enlarged tip; F-G, second male pleopod and enlarged parts.

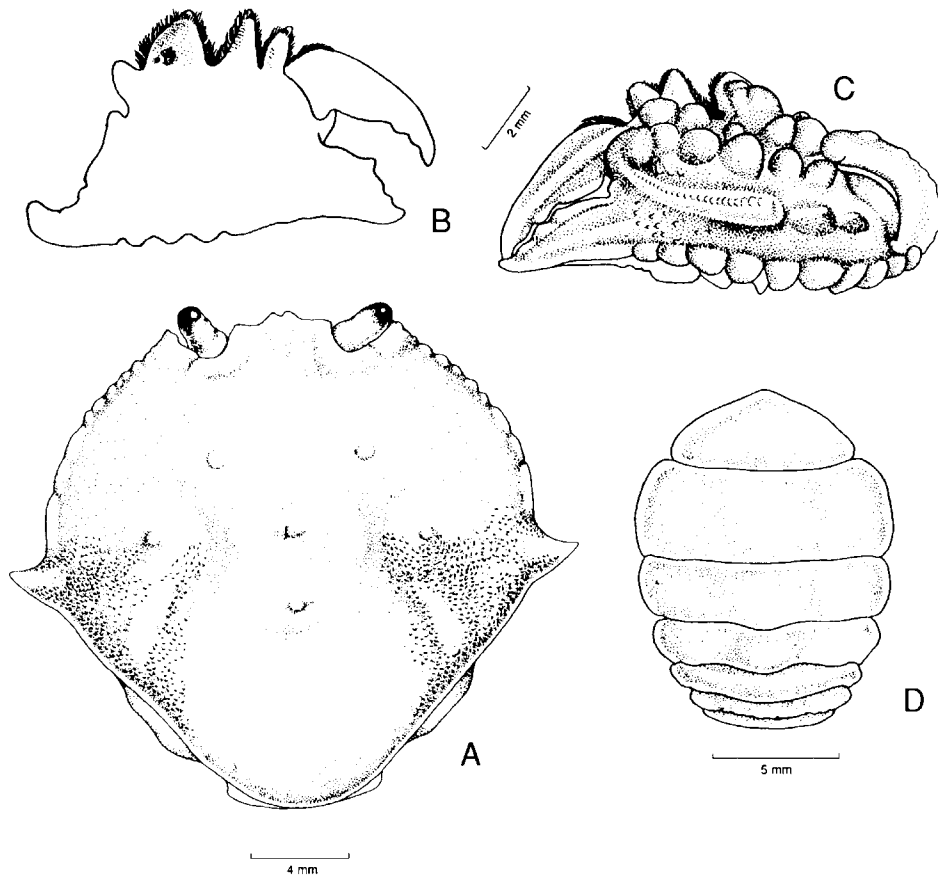


Fig. 15. *Matuta curtispina* Saiki, 1961. A, Carapace; B–C, chelae; D, female abdomen.

Material. South China Sea, 1 ♀ (16.5 x 16.7 mm), depth: 217 m, bottom, sand, 26.II.1959. —East China Sea, 1 ♀ (18.0 x 18.2 mm), depth: 100 m, bottom, fine sand, 29.VIII.1976; 1 ♀ (14.0 x 14.1 mm), depth: 104 m, bottom, fine sand, 27.VIII.1976; 1 ♂ (19.0 x 19.0 mm), depth: 105 m, bottom, fine or broken shells, 11.VI.1978.

Habitat. Found on fine sand or broken shell bottoms, 35–105 m depths.

Type locality. Japan.

Distribution. South China Sea, East China Sea and Japan.

Orithyinae Dana, 1852

Orithyinae Dana 1852: 391. —Miers 1886: 283. —Ihle 1918: 178. —Sakai 1937: 84, 101; 1976: 143. Dai and Yang 1991: 113.

Orithyoida Alcock 1896***Orithyia* Fabricius, 1798**

Orithyia Fabricius, 1798: 363 (not seen). —Ortmann 1892; 569. —Alcock 1896: 138.
—Ihle 1918: 178. —Sakai 1937:84, 101; 1976:143. Dai and Yang 1991: 113.

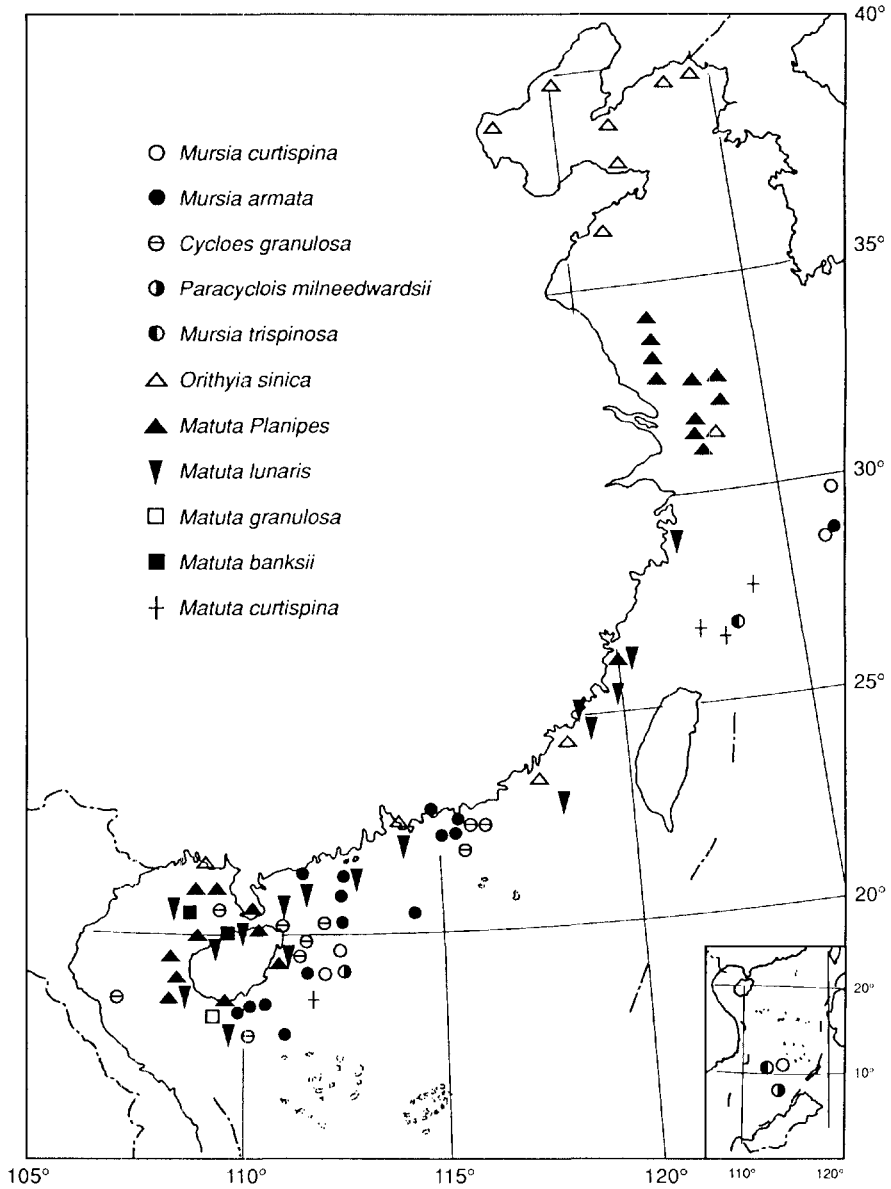


Fig. 16. The distribution of *Calappa* spp. recorded from Chinese waters.

***Orithya sinica* (Linnaeus, 1771). Fig. 4C.**

Cancer sinica Linnaeus 1771: 541 (not seen).

Cancer bimaculatus Herbst 1790: 248, plate 18, fig. 101.

Orithya mammillaris Fabricius 1798: 363 (not seen). —H. Milne-Edwards 1837: 112.
—Ortmann 1892: 569. —Shen 1931: 106–107, plate 9, figs. 1–3; 1932: 30, text-figs.

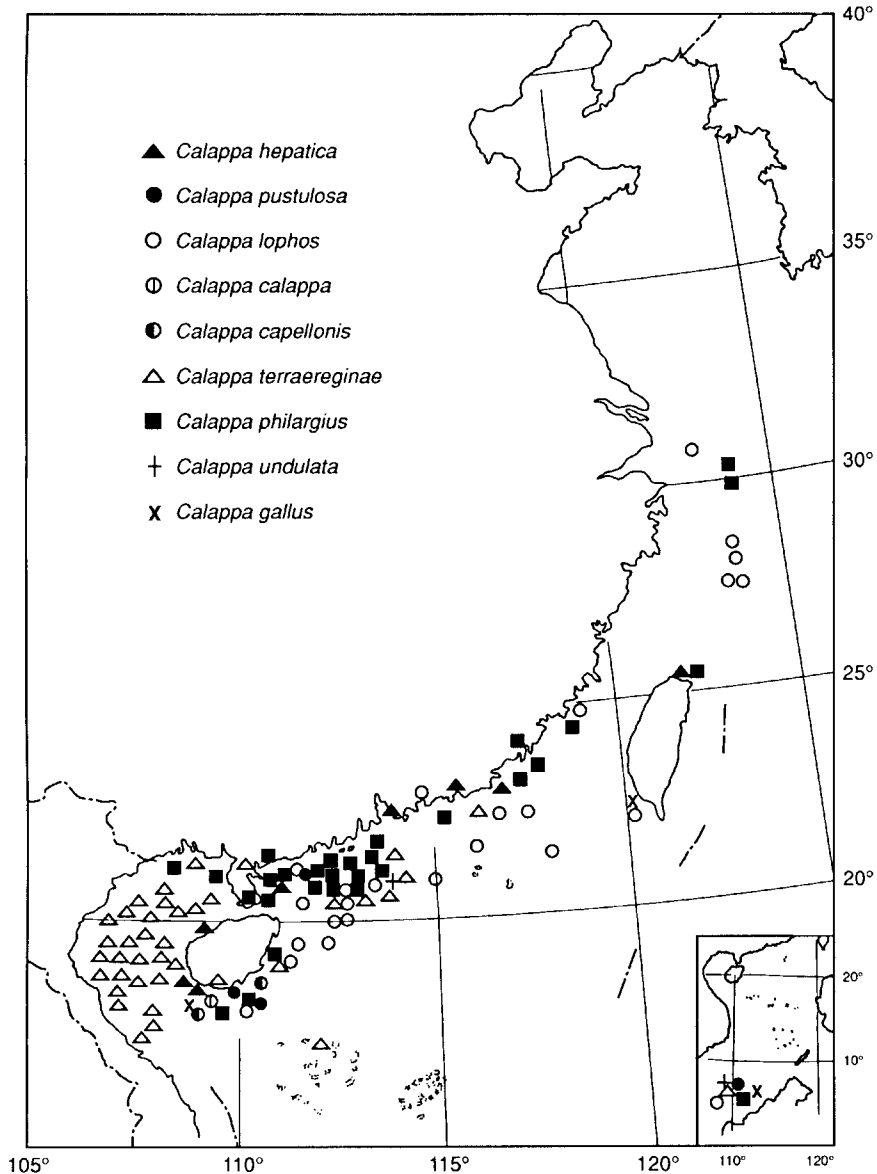


Fig. 17. The distribution of some species of Calappidae from Chinese waters.

18–19, plate 3, fig. 1. —Shen and Dai 1964: 13. —Dai and Yang 1991: 113, plate 12(8), fig. 57.

Material. Qingdao, 1 ♀ (57.5 x 50.2 mm), 19.VI.1957. —1 ♀ (67.0 x 60.0 mm), 24.X.1982. —Xiamen, 1 ♀ (58.0 x 51.0 mm), 3.III.1984.

Habitat. Found on sand or mud bottoms.

Type locality. China.

Remarks. This is the only species of the subfamily Orithyinae. It is recorded from the Bohai Sea, Yellow Sea, East China Sea, and South China Sea. It has not yet been reported from Japanese waters.

Distribution. The entire China coasts and Korea.

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