

Crustacea Decapoda: A revision of the Indo-Pacific species of the genus *Calappa* Weber, 1795 (Calappidae)

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ABSTRACT

The Indo-Pacific species of *Calappa* Weber, 1795 are revised. Specimens have been collected from the intertidal to depths over 380 m, with nine species from water depths greater than 100 m.

One new genus of calappid crab is established: *Calappula*, for *Calappa saussurei* Rathbun, 1898 and *C. tortugae* Rathbun, 1933 from each side of the Central American Isthmus. Five new species are described: *C. conifera*, *C. matsuzawa*, *C. monilicanthus*, *C. sebastieni*, and *C. torulosa*. All taxa are described and illustrated, detailed synonymies are listed, and a key is provided.

RÉSUMÉ

Crustacea Decapoda : Une révision des espèces indo-ouest pacifiques du genre *Calappa* Weber, 1795 (Calappidae).

Les espèces indo-ouest pacifiques du genre *Calappa* Weber, 1795 sont revues. Les récoltes ont été faites de la zone intertidale jusqu'à plus de 380 m de profondeur. Neuf espèces ont été récoltées à plus de 100 m de profondeur.

Un genre nouveau *Calappula* est établi pour *Calappa saussurei* Rathbun, 1898 et *C. tortugae* Rathbun, 1933, qui se trouvent de part et d'autre de l'isthme de l'Amérique centrale. Cinq espèces nouvelles sont décrites : *C. conifera*, *C. matsuzawa*, *C. monilicanthus*, *C. sebastieni*, and *C. torulosa*. Toutes les espèces sont décrites et figurées, des synonymies détaillées sont fournies et une clé d'identification est proposée.

INTRODUCTION

"Box crabs", or "shame-faced crabs", characteristically barricaded behind flexed massive chelae and with legs tucked under the eaves of their carapace, are among the most distinctive crabs in tropical and subtropical seas.

Because they are commonly found in shallow waters or hauled in from as deep as 380 m, owing to their size and brightly-colored carapace they were described early and often. However, this same seemingly distinctive and familiar shape was the cause of some taxonomic confusion. HERBST (1799: 22) already wrote in apparent pique: "Genauer lassen sich die Verschiedenheiten jetzt erwähnter Arten unmöglich durch eine blosser Beschreibung verständlich machen". HERBST's vexation finds an echo in MONOD (1928: 109): "Le genre *Calappa* est extrêmement homogène et comprend une vingtaine d'espèces souvent très voisines les unes des autres et que l'on pourrait ranger en une série linéaire.... Cette homogénéité si remarquable du genre *Calappa* rend parfois la distinction des espèces rien moins que facile, ce qui explique les incertitudes taxonomiques des carcinologistes à leur sujet".

A study of the extensive collections of the Muséum national d'Histoire naturelle, Paris (MNHN), Nationaal Natuurhistorische Museum, Leiden (formerly Rijksmuseum van Natuurlijke History (RMNH)), National Museum of Natural History, Smithsonian Institution, Washington (USNM), together with material made available by the American Museum of Natural History, New York (AMNH), The Natural History Museum and Institute, Chiba (CMB ZC), Institute of Oceanology, Chinese Academy of Sciences, Qingdao (IOCAS), Natural History Museum of Los Angeles (LAM), Museo Zoologico, Università degli studi di Firenze (MF), The Natural History Museum, London (NHM), Naturhistorisches Museum, Wien (NMW), Zoological Reference Collection, National University of Singapore (NUS); Queensland Museum, Brisbane (QM), South African Museum, Cape Town (SAM), Senckenberg Museum, Frankfurt (SMF), Tel Aviv University (TAU), and the Zoologisk Museum, Copenhagen (ZM) has enabled re-examination of most type specimens and much of the published material.

The present study divides the Indo-Pacific species between *Calappa* Weber, 1795 and a new genus, *Calappula*, and describes five new species. Descriptive and distributional information is presented as well as detailed references to literature. All taxa examined have been photographed and illustrated, and a key is presented for their identification. Measurements refer to carapace length and are given in mm.

In the lists of Material examined, the names of the cruises are in capital letters. The names of vessels are in italic letters and quoted. Station numbers of the MUSORSTOM cruises are often preceded by two capital letters, denoting the gear used: DW means Warren dredge, CP beam trawl.

SPECIES LIST

Genus *CALAPPA*

Calappa bicornis Miers, 1884
C. calappa (Linnaeus, 1758)
C. capellonis (Laurie, 1906)
C. clypeata (Borradaile, 1903)
C. conifera sp. nov.
C. convexa Saussure, 1853
C. depressa Miers, 1886
C. dumortieri Guinot, 1962
C. gallus (Herbst, 1803)
C. hepatica (Linnaeus, 1758)
C. japonica Ortmann, 1892

C. lophos (Herbst, 1782)
C. matsuzawa sp. nov.
C. monilicanthus sp. nov.
C. philargius (Linnaeus, 1758)
C. pustulosa Alcock, 1896
C. sebastieni sp. nov.
C. torulosa sp. nov.
C. undulata Dai, 1991
C. yamasitae Sakai, 1980

Genus *CALAPPULA*

Calappula saussurei comb. nov.

SYSTEMATIC ACCOUNT

CALAPPA Weber, 1795

Calappa Weber, 1795: 92.

Type species: *Cancer granulatus* Linnaeus, 1758, by subsequent designation LATREILLE, 1810: 422. Gender feminine. Name placed on the Official List of Generic Names in Zoology by the International Commission on Zoological Nomenclature in their Opinion 712 (1964, *Bull. zool. Nomencl.*, 21: 336-351).

Lophos De Haan, 1837: 69, pls E, 19 fig. 1, 20 fig. 1.

Type species: *Cancer lophos* Herbst, 1782, by absolute tautonymy. Gender masculine.

Camara De Haan, 1837: 69, pl. E.

Type species: *Cancer fornicatus* Fabricius, 1781: 502 (= *Cancer calappa* Linnaeus, 1758: 630), by monotypy. Gender feminine. Incorrectly cited as *Camera* by DE HAAN, 1850, *Fauna Japonica* (Crust.) (Index: 237).

Gallus De Haan, 1837: 70, pl. E.

Type species: *Cancer gallus* Herbst, 1803, by monotypy and absolute tautonymy. Gender masculine. This name is invalid as it is a junior homonym of *Gallus* Brisson, 1760, for a genus of Aves.

Pistor Gistel, 1848: viii. A new replacement name for *Gallus* De Haan, 1837. Type species thereby *Cancer gallus* Herbst, 1803. Gender masculine.

DIAGNOSIS. — Carapace typically convex, regions undefined, furrows bordering cardiac region most pronounced. Front, triangulate, as wide as orbit. Anterolateral margin arcuate, crenate, dentate or granulate. Posterolateral margin typically expanded, clypeiform, concealing flexed ambulatory legs underneath. Eye filling orbit, eyestalk short, cornea large. Supraorbital margin swollen medially, bifissured. Antennules folding nearly vertically. Basal article of antennae dilate, forming inner orbital margin. Buccal cavity elongate, anteriorly divided by median septum. Outer maxillipeds gaping, exposing mandibles, lamellar processes of first maxillipeds. Subhepatic regions and outer maxillipeds densely setose. Chelipeds massive, subequal, fitting closely. Merus with transverse dentate crest externally, distalmost tooth largest, keel-like. Carpus trigonal. External surface of chela swollen, upper margin crested, with foliate lobes; laminar tooth proximally near lower margin, lower margin with two subparallel files of tubercles, converging distally; internal surface densely setose along lower margin. Larger dactylus proximally with crochet tooth fitting into molariform depression, dactylus' upper margin setose, granulate. Pereiopods smooth, laterally compressed, dactyli styliiform. Male abdomen five-segmented, second segment trilobate, bearing transverse granulate carina. First male pleopod stout, tapering, distally spinulose. Second male pleopod filamentose.

ETYMOLOGY. — From *Kelapa*, coconut in Malay. "Maleits *Cattam Calappa*, naar de gedaante van een *Calappusdop*" (RUMPHIUS, 1741).

REMARKS. — All but one of the Indo-Pacific species treated here belong to *Calappa* Weber, 1795. These species are characterized by bifissured supraorbital border, buccal cavity with median septum anteriorly, and clypeiform expansion on posterolateral margin. Among the 20 species described here, some seem more clearly allied. The "*philargius*" group comprises four species - *C. philargius*, *C. lophos*, *C. dumortieri* and a new species - distinguished by nearly smooth carapace, external surface of chela with prominent ridge running subparallel to lower margin, first male pleopod markedly curved distad, and second pleopod with stubby digitate tip. The "*gallus*" group encompasses eight species - *C. gallus*, *C. capellonis*, *C. undulata*, *C. yamasitae* and four new species - characterized by depressed hepatic region, and having second male pleopod with subdistal denticulate flange and digitate tip. The "*hepatica*" group includes two species - *C. hepatica* and *C. depressa* - possessing anteriorly spatulate basal antennal article and second male pleopod with spatulate tip.

Most of the Indo-Pacific species of *Calappa*, excluding the recently described species, are widely distributed. One species, *C. convexa*, is confined to tropical west America, another, *C. dumortieri*, to the Red Sea. Two species cover nearly the entire range: *C. gallus* is found from the Red Sea to Hawaii and *C. hepatica* ranges from

the Red Sea to Clipperton Is. All but four species - *depressa*, *gallus*, *japonica*, *pustulosa* - are found in waters no deeper than 150 m (table 1).

Depth (m)	50	100	150	200	250	300
<i>C. bicornis</i>	-----					
<i>C. calappa</i>	-----					
<i>C. capellonis</i>	-----					
<i>C. clypeata</i>	-----					
<i>C. conifera</i> *	-----					
<i>C. convexa</i>	-----					
<i>C. depressa</i>	-----					350 →
<i>C. dumortieri</i>	-----					
<i>C. gallus</i>	-----					
<i>C. hepatica</i>	-----					
<i>C. japonica</i>	-----					380 →
<i>C. lophos</i>	-----					
<i>C. matsuzawa</i> *	?					
<i>C. monilicanthus</i> *	-----					
<i>C. philargius</i>	-----					
<i>C. pustulosa</i>	-----					
<i>C. sebastieni</i> *	-----					
<i>C. torulosa</i> *	-----					
<i>C. undulata</i> *	-----					
<i>C. yamasitae</i> *	?					
<i>Calappula saussurei</i>	-----					

TABLE 1. — Vertical distribution of the Indo-Pacific species of *Calappa* and *Calappula*.

* New species or species known from less than 5 specimens.

Key to the Indo-Pacific species of *Calappa* and *Calappula*

1. Supraorbital border unfissured; buccal cavity lacking median septum anteriorly; milled ridge vertically transversing interior surface of chela *Calappula saussurei* comb. nov.
- Supraorbital border bifissured; buccal cavity with median septum anteriorly, no milled ridge on interior surface of chela *Calappa* ...2

2. Carapace subcircular, with only moderate clypeiform expansions *C. pustulosa*
- Carapace not subcircular because of well-developed clypeiform expansions 3
3. Clypeiform expansions of carapace entire and smooth *C. calappa*
- Clypeiform expansions of carapace dentate or laciniate 4
4. External surface of chela nearly smooth, with ridge running subparallel to lower margin, first male pleopod markedly curved distad 5
- External surface of chela granulate, tuberculate, first male pleopod only slightly curved 8
5. Posterior margin of carapace bearing median tooth 6
- Posterior margin of carapace lacking median tooth 7
6. Median tooth on posterior margin of carapace rounded, shorter than adjacent teeth, carpus and chela each with large maroon spot, maroon crescents encircle eyes . *C. philargius*
- Median tooth on posterior margin of carapace conical, as long as adjacent teeth, carapace densely covered with minute maroon spots, posterolateral teeth pale yellow *C. dumortieri*
7. Posterolateral margins laciniate *C. lophos*
- Posterolateral margins lamellar, granulate *C. monilicanthus* sp. nov.
8. Second male pleopod with subdistal denticulate flange and digitate tip (figs 5d, 23d).... 9
- Second male pleopod otherwise 16
9. Carapace 1.6 wide as long 10
- Carapace 1.4 wide as long, or less 11
10. Carapace coarsely granulate, branchial regions with mammilate tubercles *C. yamasitae*
- Carapace minutely granulate, branchial regions with flattened lumps *C. sebastieni* sp. nov.
11. Hepatic region somewhat depressed 12
- Hepatic region markedly depressed 15
12. Tubercles on branchial regions contiguous, mammilate 13
- Tubercles on branchial regions otherwise 14
13. Front projecting, bidentate; large tubercles anteriorly on clypeiform process *C. capellonis*
- Front truncate, obtuse; no tubercles anteriorly on clypeiform process *C. torulosa* sp. nov.
14. Carapace posteriorly rugose, front quadridentate, keel-like tooth proximally on external surface of chela *C. matsuzawa* sp. nov.
- Carapace posteriorly nearly glabrous, front bidentate, no keel-like tooth proximally on external surface of chela *C. undulata*
15. Front bidentate, anterolateral margin arcuate, prominently dentate, conical tubercles anteriorly on external surface of chela *C. conifera* sp. nov.
- Front truncate, anterolateral margin sinuous, unevenly granulate, rounded tubercles anteriorly on external surface of chela *C. gallus*
16. Second male pleopod tip spatulate (figs 9d, 14d)..... 17
- Second male pleopod tip otherwise 19

- 17. Carapace granulate, tuberculate, clypeiform process with transverse granulate rows, basal antennal article anteriorly spatulate 18
- Carapace finely punctate, clypeiform process smooth, basal antennal article with anterior proximal angle produced *C. clypeata*
- 18. Carapace convex, 1.6-1.7 wide as long *C. hepatica*
- Carapace flattened, 1.4 wide as long *C. depressa*
- 19. Front projecting, with two triangular teeth separated by deep sulcus; anterolateral margin prominently dentate, anteriormost tooth largest; second male pleopod with subdistal denticulate flange and pod-like tip *C. bicornis*
- Front not projecting, with two rounded teeth separated by wide sulcus; anterolateral margin unevenly granulate; second male pleopod otherwise 20
- 20. Carapace lavender finely spotted with white; second male pleopod distally sickle-shaped *C. convexa*
- Carapace with yellow-tipped red tubercles; second male pleopod distally crook-like *C. japonica*

Calappa bicornis Miers 1884

Fig. 1 a, 2, 4 a, 29

Calappa gallus var. *bicornis* Miers, 1884: 550.

Calappa bicornis - RATHBUN, 1911: 197, pl. 17 fig. 8. — IHLE, 1918: 308 (list). — SAKAI, 1937: 95, pl. 17 fig. 4. — GUINOT, 1967: 245 (list). — SERÈNE, 1968: 41 (list). — TAKEDA & KOYAMA, 1974: 104, pl. 10 fig. a. — SAKAI, 1976: 132, pl. 40 fig. 1. — TAKEDA, 1982: 106, fig. 312. — MIYAKE, 1983: 23, pl. 8 fig. 1. — TAKEDA & SHIKATANI, 1990: 477.

Calappa gallus - RATHBUN, 1937: 214 (part).

Not *Calappa bicornis* Manning & Chace, 1990: 45 (= *C. galloides* Stimpson, 1859).

MATERIAL EXAMINED. — **Seychelles.** Providence I., 35 m, coll. H.M.S. "Alert": 1 ♀ holotype, 33.3 mm (NHM 1882.24). — 62 m, 20.10.1905, coll. "Sealark": 1 ♂ 40.3 mm (USNM 41056). — N. of Bird I., 3°42'S, 55°13'E, sandy bottom with calcareous algae, 50-52 m, 22.12.1992, coll. "Tyro": 1 ♀ 16.1 mm (RMNH).

REYES 2: stn 1, 5°24.8'S, 57°03.5'E, 55 m, 2.09.1980; 1 ♂ 19.4 mm (MNHN). — Stn 38, 5°03.5'S, 56°50.5'E, 44 m, 13.09.1980; 1 ♀ 15.5 mm (MNHN).

Madagascar: North-west coast, 13°05'S, 48°21'E, 50 m, 19.06.1967, coll. A. CROSNIER: 1 ♂ 39.4 mm, 1 ♀ 36.4 mm (MNHN).

Réunion I. 150 m, 1966, coll. M. GUÉZÉ: 2 ♂ 53.3, 60.6 mm (MNHN).

Indonesia. 5°48'S, 106°12'E, 38 m, sand, 27.07.1922, coll. Th. MORTENSEN: 1 ♀ 50.0 mm (ZM CRU1828).

South China Sea. Macclesfield Bank, 37-79 m: 1 ♂ 46.6 mm (NHM).

Philippines. "Albatross": stn 5151, Sirun I., 5°24.40'N, 120°28.15'E, 43 m, 18.02.1908: 1 ♂ 31.5 mm (USNM). — Stn 5165, Tawitawi grp., Observation I., 16 m, 24.02.1908: 1 ♂ 21.5 mm (USNM 122722).

Japan. 1 ♂ 62.3 mm, 1 ♀ 63.4 mm, coll. T. SAKAI (SMF 22940). — Shikoku I., Tosa Bay, coll. K. SAKAI: 1 ♀ 57.9 mm (USNM 286118). — Cape Muroto, 14.10.1986, coll. K. MATSUZAWA, det. K. SAKAI: 1 ♂ 55.9 mm (SMF). — Honshu I., Kii Peninsula, coll. T. SAKAI: 1 ♂ 49.0 mm (NHM 1961.6.5.26). — Minabe, 30 m, coll. T. SAKAI: 1 ♂ 37.7 mm (USNM 123312), 2 ♂ 49.4, 54.5 mm (USNM 268805).

DESCRIPTION. — Carapace moderately convex, 1.2-1.3 wide as long, deep longitudinal groove separating gastrocervical from branchial regions, hepatic region depressed. Surface prominently tuberculate, branchial tubercles largest, conical, intestinal region with granulate tubercles. Front projecting, with two triangular teeth separated by deep sulcus. Anterior margin of basal antennal article bidentate, peduncle emerging from distal angle, tubercle at base of peduncle. Afferent branchial canal ending below orbit in tridentate process. Endostomial septum visible with first maxillipeds closed, with straight anterior margin. First maxillipeds with triangular notch on anterointernal margin. Anterolateral margin setose, carinate, with granulate, triangular teeth, anteriormost tooth

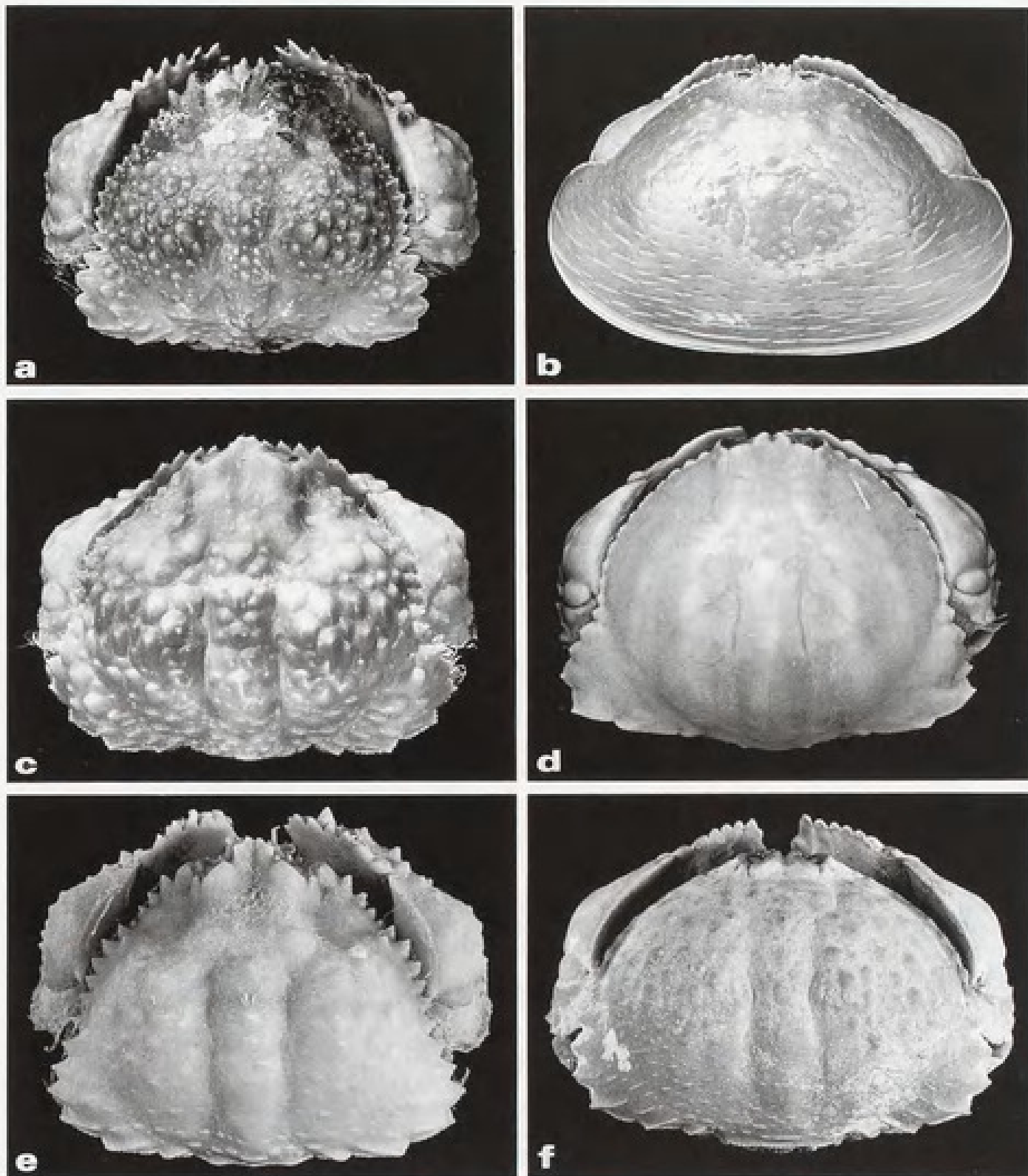


FIG. 1. — Whole crab, dorsal view: **a**, *Calappa bicornis* Miers, 1884, ♂ 39.4 mm, Madagascar, 13°05'S, 48°21'E, 50 m (MNHN). — **b**, *Calappa calappa* (Linnaeus, 1758), ♂ 55.4 mm, Madagascar, Nosy Be, 4 m (MNHN). — **c**, *Calappa capellonis* (Laurie, 1906), ♂ 36.6 mm, Seychelles, "REVES 2", stn 25, 4°54.6'S, 55°20.5'E, 60 m (MNHN). — **d**, *Calappa clypeata* (Borradaile, 1903), ♂ 36.0 mm, Madagascar, Majunja, "Vauban" stn 129, 15°25'S, 46°03.5'E, 57 m (MNHN). — **e**, *Calappa conifera* sp. nov., ♂ 18.6 mm, South Africa, holotype (SAM A43141). — **f**, *Calappa convexa* Saussure, 1853, ♂ 68.1 mm, Panama (USNM 144344).

large. Posterolateral margin setose, marginally beaded, four anterior teeth rounded, distalmost largest, two posterior teeth shallow, beaded median ridges setose. Posterior margin sinuous, beaded. Merus of cheliped distally with setose quadrilobate lamina. Carpus distally with four prominent tubercles. External surface of chela sparsely granulate, obliquely traversed by three rows of conical tubercles, median row most prominent. Crest of larger chela cut into seven conical teeth increasing in size distally. Unevenly granulate ridge running subparallel to beaded lower margin, from proximal tooth to base of fixed finger. Lower margin narrow, two beaded rows contiguous distally. Internal surface of chela inferiorly granulate, with beaded row parallel to lower margin. First male pleopod stout, slightly curved, tapering apically, distally spinulate; second pleopod slender, subdistal denticulate flange and podlike tip.

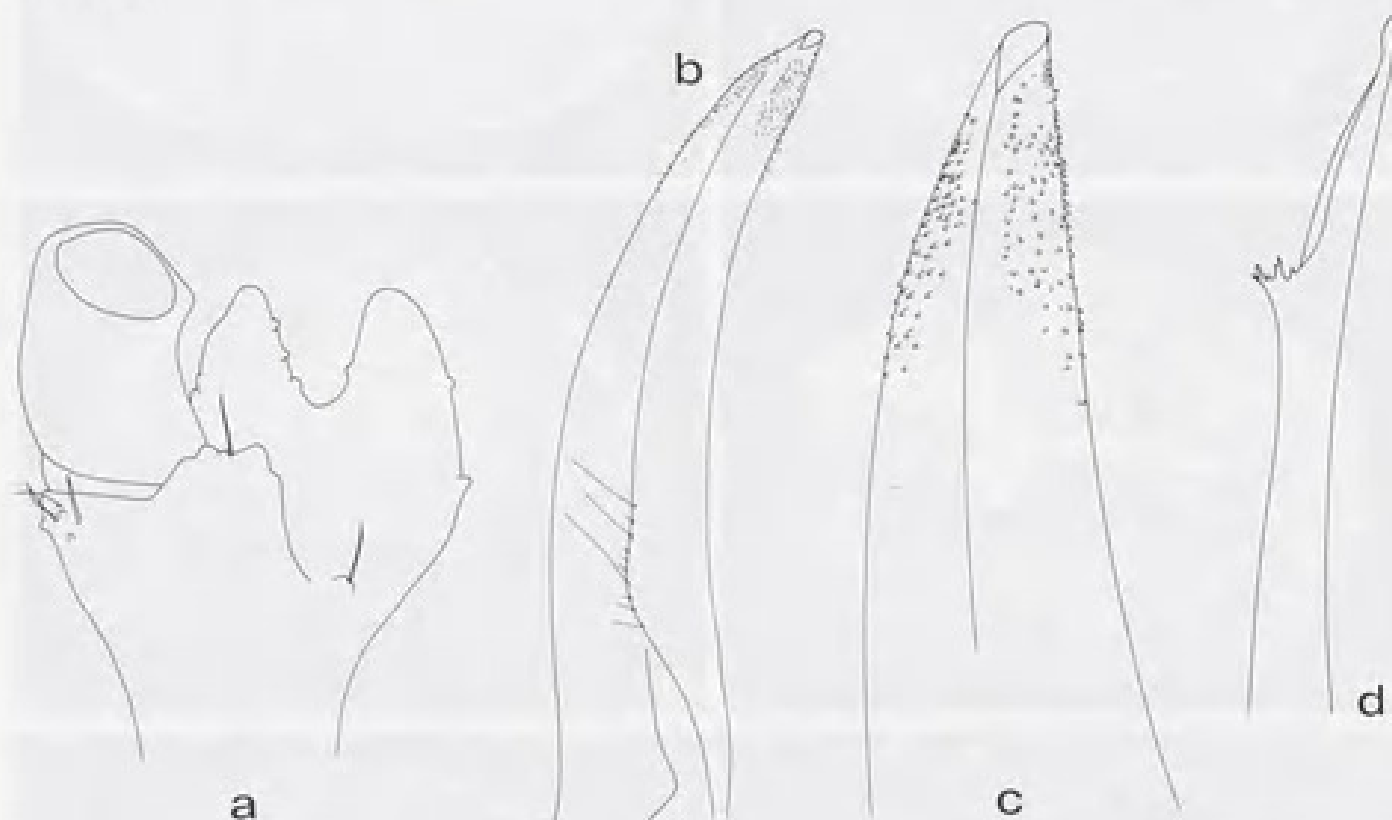


FIG. 2. — *Calappa bicornis* Miers, 1884, ♂ 39.4 mm, Madagascar, 13°05'S, 48°21'E, 50 m (MNHN): a, first article of antenna; b-c, first pleopod male with enlargement of distal part; d, second pleopod male, enlargement of distal part.

Color. — Carapace orange-yellow with red markings across branchial region. Chela internally with red reticulate pattern. Ambulatories striped in red. Color photograph in MIYAKE (1983).

REMARKS. — MIERS (1884), while describing *bicornis* as a variety of *C. gallus*, wrote "It may not improbably prove to be a distinct species". RATHBUN (1911) first recognized it as distinct species and then submerged it within *C. gallus* (1937) together with *C. galloides* and *C. capellonis*, claiming wide variation "in relative length and breadth due to greater or less convexity; in size and prominence of dorsal tubercles; and in distinctness of rostral teeth, some having four teeth, others having no median sinus".

C. bicornis differs from both *C. gallus* and *C. capellonis* in having anterior margin of basal antennal article bidentate rather than concave; front prominently bidentate rather than truncate; conical rather than foliate teeth on cheliped crest and in form of second male pleopod. The damaged female specimen (USNM 112522) from St. Helena I., identified by CHACE (1966) as *C. gallus* and by MANNING & CHACE (1990) as *C. bicornis*, is assigned to *C. galloides*.

DISTRIBUTION (fig. 29). — Seychelles, Madagascar, Philippines, Japan. Sand and pebble bottoms, 15-150 m.

Calappa calappa (Linnaeus, 1758)

Fig. 1 b, 3, 4 b, 29

Cancer calappoides Rumphius, 1741: 21, pl. 11 figs 2-3.*Cancer calappa* Linnaeus, 1758: 630; 1764: 449; 1767: 1048. — HERBST, 1785: 196, pl. 12 figs 73-74. — FABRICIUS, 1793: 454.*Cancer flosculosus* Seba, 1759, pl. 19 fig. 24.*Cancer heracleoticus* Seba, 1759: 51, pl. 20 figs 7-8.*Cancer fornicatus* Fabricius, 1781: 502; 1793: 453.*Calappa fornicata* - WEBER, 1795: 92. — FABRICIUS, 1798: 345. — BOSC, 1802: 183; 1830: 213 (nec pl. 3 fig. 3).

— LATREILLE, 1803: 393; 1806: 28; 1817: 50; 1829: 66. — DESMAREST, 1825: 109. — GUÉRIN MÉNEVILLE, 1827: 4.

— H. MILNE EDWARDS, 1837: 106. — DANA, 1853: 394, pl. 25 fig. 1. — A. MILNE EDWARDS, 1868: 72; 1874: 56.

— HILGENDORF, 1869: 92. — BRITO CAPELLO, 1871: 133, pl. 2 fig. 5. — HOFFMANN, 1874: 41. — NAUCK, 1880:

46. — ORTMANN, 1892: 569. — ALCOCK, 1896: 142. — BOUVIER, 1915: 216. — SERÈNE, 1937: 78; 1968: 41

(list). — SOKOLOWSKY, 1945: 74, pl. 2 figs 7-9.

Calappa - GUÉRIN MÉNEVILLE, 1827: 4.*Calappa (Camara) fornicata* - DE HAAN, 1837: 69. — HERKLOTS, 1861: 25.*Camara calappa* - WHITE, 1847: 44. — MIERS, 1880: 315.*Calappa calappa* - RATHBUN, 1906: 887; 1911: 197. — PARISI, 1914: 286. — IHLE, 1918: 184. — BALSS, 1922: 123.

— T. SAKAI, 1934: 284; 1936: 43, text-fig. 6; 1937: 90, pl. 17 fig. 1; 1956: 8; 1965: 55 (list); 1976: 129, pl. 39

figs 1, 3. — WARD, 1942: 69. — DAWYDOFF, 1952: 139. — UTINOMI, 1956: 70, pl. 35 fig. 7. — TYNDALE-BISCOE &

GEORGE, 1962: 69. — MICHEL, 1964: 36. — TINKER, 1965: 70, pl. 23. — GUINOT, 1967: 245 (list). — SERÈNE,

1968: 41 (list). — TAKEDA, 1973: 83; 1982: 105, fig. 308. — MATSUZAWA, 1977, pl. 91 fig. 1. — MIYAKE, 1983:

19, pl. 7 fig. 1. — NOMURA *et al.*, 1988: 64. — TAKEDA & SHIKATANI, 1990: 477. — CHEN, 1993: 678, fig. 1.

— YAMAGUCHI & BABA, 1993: 306, fig. 92. — ALLEN & STEENE, 1994: 154.

Calappa fornicata - ZIMSEN, 1964: 650 [erroneous spelling]. —**MATERIAL EXAMINED.** — **Kenya.** Andromache Reef, off Mombasa, 16.11.1964: 7 juv. 10.8-25.6 mm (USNM).**Seychelles.** N. of Bird Id., 3°42'S, 55°13'E, 45-55 m, 21.12.1992, coll. "Tyro": 1 ♀ 35.8 mm (RMNH). — Aldabra I., coll. W.L. ABBOTT: 2 ♂ 55.5, 62.7 mm (USNM 17746).**Madagascar.** N.W. coast, Nosy Be, 4 m, April 1959, coll. & det. A. CROSNIER: 3 ♂ 25.1-55.4 mm; 2 ♀ 22.3, 23.5 mm (MNHN). — Nosy Be, intertidal, September 1959, coll. & det. A. CROSNIER: 1 ♀ 68.4 mm (MNHN). — W coast, Morombe, coll. B. KOECHLIN: 1 ♂ 61.9 mm (MNHN-B 12333).**Indian Ocean.** 1 dry specimen (RMNH 43055).**Indonesia.** *Moluccas*. 1821-1822, coll. C.G.C. REINWARDT, det. HERKLOTS as *C. (Camara) Fornicata*, redet. L.B. HOLTHUIS: 1 dry specimen (RMNH 43057). — 1895, coll. W.A. MORAUX: 1 ♀ 76.5 mm (RMNH 7294). — Amboina Bay, shore at lowtide, February 1922, coll. Th. MORTENSEN: 1 ♀ 70.9 mm (ZM CRU1793). — Ternate, coll. H.A. BERNSTEIN: 1 ♂ 71.0 mm (RMNH 761).**Irian Jaya.** Sekru, coll. K. SCHADLER: 1 dry specimen (RMNH 43056). — Manokwari, 1954, coll. J.C. BAUWENS: 1 ♀ 73.6 mm (RMNH 12842). — Mansiman nr Manokwari, July 1952, coll. J.C. BAUWENS: 1 ♂ 69.6 mm (RMNH 9861).**Sulawesi.** Selat Lembeh, Pulau Lembeh, 01°29'N, 12°5.15'E, sandy bay, 5-10 m, 21.10.1994, coll. Sulawesi Exped: 1 ♀ 34.0 mm (RMNH).**Papua New Guinea.** Bismarck Arch., New Britain, Kilenge, 28 July 1973, coll. A.A. GERBRANDS: 1 ♂ 75.1 mm (RMNH 29377).**Philippines.** Borocay I., January 1979, coll. J.P. NACIART: 1 ♀ 31.3 mm (MNHN).**Japan.** 1 ♂ 54.0 mm (RMNH 762). — Shikoku I., Kochi-Ken, Nakamura, Saga, 33°04'N, 133°06.6'E, 10-20 m, 29.10.1979, coll. M. TÜRKAY: 1 ♂ 54.5 mm (SMF 18674). — Cape Muroto, 14.10.1986, coll. K. MATSUZAWA, det. K. SAKAI: 1 ♂ 56.4 mm (SMF). — Kushimoto, Wakayama, 20 m, March 1995, coll. K. NOMURA: 1 ♀ 60.4 mm (SMF).**Bonin Is.** Coll. C.B. CLAUSEN, 16.06.1913: 2 ♂ 42.3, 45.1 mm (ZM CRU1799).**New Caledonia.** Coll. CLOUE: 2 specimens (MNHN B.10799).**French Polynesia.** Society Is., Raiatea I., 1908, coll. A. CANQUE: 2 specimens (MNHN-B 4076). — Marquesas Is., Nuku Hiva I., coll. M. MERCIER: 1 ♀ 39.9 mm (MNHN-B 45).**Hawaii Is.** Ohau I., Makapuu Pt., 4 m, colls ROPER, SWEENEY & YOUNG: 1 ♂ 42.6 mm; 1 ♀ 45.9 mm (USNM 268811).**DESCRIPTION.** — Carapace markedly convex, 1.6-1.7 wide as long, regions undefined. Surface minutely squamose, anteriorly with barely distinguished flattened tubercles, posteriorly with minutely beaded transverse lines, increasing in length laterally, longest line running parallel to posterior margin. Front projecting, with two

triangular teeth separated by deep sulcus. Anterior margin of basal antennal article bicuspidate, peduncle emerging from distal angle. Afferent branchial canal ending below orbit in rounded granulate process. Endostomial septum visible with first maxillipeds closed, anterior margin straight. Anterior margin of first maxillipeds straight. Anterolateral margin carinate, scalloped. Clypeiform process greatly developed. Posterolateral margin entire, smooth. Posterior margin smooth. Merus of cheliped distally with well developed laminar carina, margin setose. External surface of chela with minutely beaded transverse lines, increasing in length inferiorly, interspaced with granules. Crest of larger chela with six teeth, proximalmost lowest. External beaded row on lower margin running entire length of chela, internal row only distal half. Internal surface of chela inferiorly granulate, with beaded row parallel to lower margin. First male pleopod stout, nearly straight, distally spinulate; second pleopod slender, straight, subdistal denticulate flange and digitate tip.

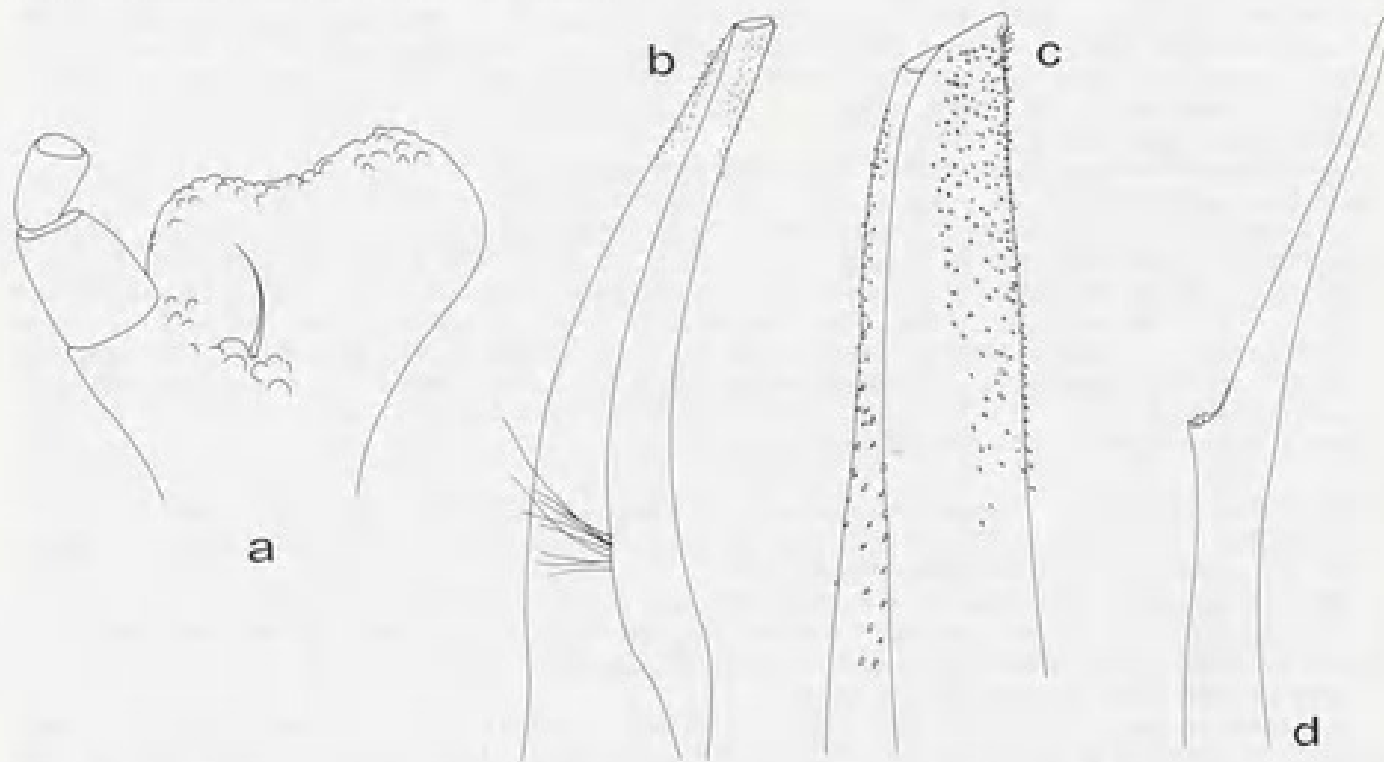


FIG. 3. — *Calappa calappa* (Linnaeus, 1758), ♂ 55.4 mm, Madagascar, Nosy Be, 4 m (MNHN): a, first article of antenna; b-c, first pleopod male with enlargement of distal part; d, second pleopod male, enlargement of distal part.

Color. — TINKER (1965) wrote "A form of this species, in which the back of the carapace is covered by dark spots of varying sizes, occurs in Hawaii, Japan, and probably elsewhere" and presented BW photos of both forms (pl. 23). SAKAI (1976) collected in one location both "Uniformly light yellowish brown" specimens (pl. 39 fig. 1) and those with "dark purplish mottles of various sizes" (pl. 39 fig. 3). MIYAKE (1983, pl. 7 fig. 1) and ALLEN and STEENE (1994: 154) provided color photographs of both forms. MATSUZAWA (1977, pl. 91 fig. 1) furnished us with an excellent color photo of a remarkable leopard-patterned specimen, its carapace densely covered with chocolate colored irregular spots.

REMARKS. — RUMPHIUS (1741: 21, pl. 11 figs 2-3) description and drawings being very clear, there has never been any confusion over the identity of this aptly named "broken coconut-shell crab". Though LINNAEUS (1758, 1764, 1767) described correctly its "Habitat in Asia", HERBST (1785) wrote "Ihr Ausenthalt ist in dem ost-und westindischen Meere", FABRICIUS (1793, 1798) "Habitat in Oceano Americano" and LATREILLE (1803) "Il se trouve dans l'océan Américain". This was set right again by LATREILLE (1806).

C. calappa is easily distinguished from all its congeners in having margins of clypeiform expansions entire. Examination of both spotted and uniformly-colored specimens revealed no morphological differences.

DISTRIBUTION (fig. 29). — East Africa to Japan, Australia and Hawaii. On sandy bottoms, intertidal to 50 m.

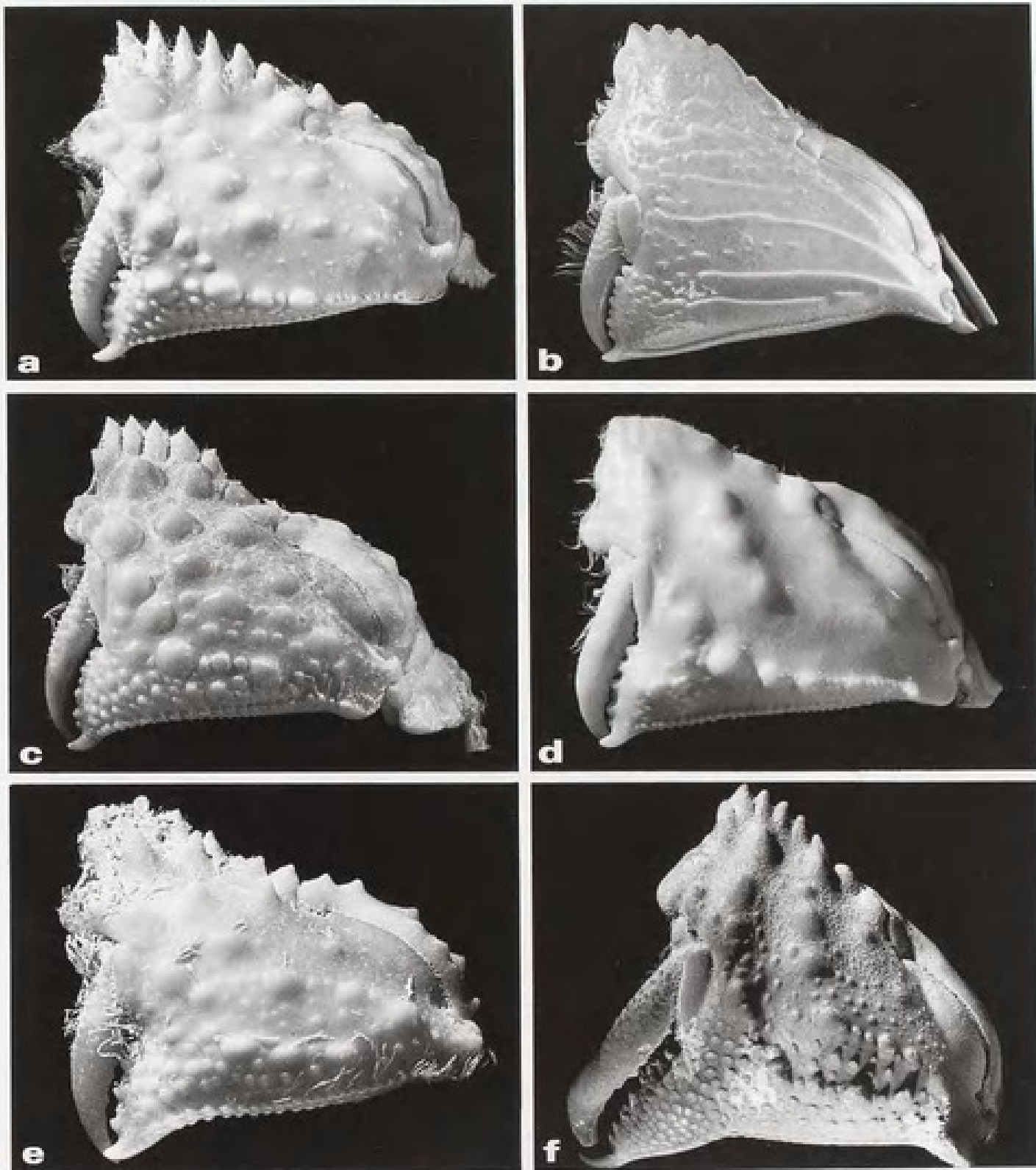


FIG. 4. — Cheliped, external view: a. *Calappa bicornis* Miers, 1884, ♂ 39.4 mm, Madagascar, 13°05'S, 48°21'E, 50 m (MNHN). — b. *Calappa calappa* (Linnaeus, 1758), ♂ 55.4 mm, Madagascar, Nosy Be, 4 m (MNHN). — c. *Calappa capellonis* (Laurie, 1906), ♂ 36.6 mm, Seychelles, "REVES 2", stn 25, 4°54.6'S, 55°20.5'E, 60 m (MNHN). — d. *Calappa clypeata* (Borradaile, 1903), ♂ 36.0 mm, Madagascar, Majunja, "Vauban" stn 129, 15°25'S, 46°03.5'E, 57 m (MNHN). — e. *Calappa conifera* sp. nov., ♂ 18.6 mm, South Africa, holotype (SAM A463). — f. *Calappa convexa* Saussure, 1853, ♂ 68.1 mm, Panama (USNM 144344).

Calappa capellonis (Laurie, 1906)

Fig. 1 c, 4 c, 5, 29, 35 a

Calappa gallus capellonis Laurie, 1906: 355. — URITA, 1926: 37. — SAKAI, 1934: 284; 1937: 95, pl. 17 fig. 3; 1976: 131, text-fig. 73. — SERÈNE, 1968: 41 (list). — TAKEDA & SUGA, 1979: 43. — MIYAKE, 1983: 199 (list).

Calappa gallus - RATHBUN, 1937: 214 (part).

Calappa capellonis - TAKEDA & KOYAMA, 1974: 104, pl. 10 fig. b. — TAKEDA, 1983: 125. — TAKEDA & SHIKATANI, 1990: 477. — CHEN, 1993: 685, fig. 6.

MATERIAL EXAMINED. — Sri Lanka. Gulf of Manaar, Pearl banks, 1902, coll. W.H. HERDMAN: 2 ♂ 32.8, 21.7 mm; 1 ♀ 19.5 mm; 1 juv. (NHM 1907.5.22.13-15), Syntypes. — Coral reefs, 1 ♂ 16.0 mm; 1 ♀ 25.3 mm (NHM 1907.5.22.16-17), Syntypes. — 1 ♀ 37.2 mm (NHM 75.14). — Gulf of Manaar, coll. Miss HERDMAN: 1 (broken); 5 juvs 12.1-17.7 mm (NHM 1934.1.15-18). — 1 ♂ 21.2 mm (NHM 1934.1.16.12). — Off Kaltura, coll. Miss HERDMAN: 1 ♂ 17.6 mm (NHM 1934.1.19-22). — Aripu coral reefs, coll. Miss HERDMAN: 1 ♀ 13.6 mm (NHM 1934.1.19-22). — N. of Cheval, 10 m. coll. Miss HERDMAN: 1 juv. 7.6 mm (NHM 1934.1.19-22). — W. of Periya Paar, 57-80 m, 1902, coll. Miss HERDMAN: 2 juvs 12.2, 10.9 mm (NHM 1934.1.19-22).

nr Djibouti. "Meteor": stn 236, 12°21.2'N, 43°27.1'E, 35-45 m, 6.03.1987: 1 ♂ 24.3 mm, 1 juv. (SMF).

Seychelles. Off Mahe, 40 m, 1974, coll. C. RATCLIFFE: 1 ♂ 38.1 mm (NHM). — REYES 2: stn 25, 4°54.6'S, 55°20.5'E, 60 m, 8.09.1980: 1 ♂ 36.6 mm; 1 ♀ 40.0 mm (MNHN).

Madagascar. West coast: "FAO 60", 16°33'S, 44°19'E, 10 m: 1 ♂ 46.9 mm; 1 ♀, 25.0 mm (MNHN). — NW coast, baie d'Ambaro, 9 m, 27.07.1958, coll. A. CROSNIER: 2 ♂ 42.9, 27.9 mm (MNHN). — Nosy Be, 15 m, January 1962, coll. A. CROSNIER: 1 ♂ 45.9 mm; 1 ♀ 32.3 mm (MNHN). — NW coast, 13°05'S, 48°21'E, 50 m, 19.06.1967, coll. R. PLANTE: 1 ♂ 47.4 mm; 3 ♀ 31.7-42.2 mm (MNHN).

Pakistan. Karachi: 1 ♀ 21.1 mm (NHM 1897.9.12.25).

Indonesia. Celebes. Manado, 1836, coll. A.J. VAN DELDEN: 1 ♀ 24.1 mm (RMNH 760). — Irian Jaya. Tiger I., S. of Pulau Tarupa Kecil, 6°32.7'S, 121°8.7'E, sand, 53-57 m, 18.10.1984: 1 ♂ 17.6 mm (RMNH).

New Guinea. Padaido Is., Geelvinck Bay, February 1956, coll. T. ABBOTT: 1 ♂ 20.1 mm (RMNH 27085).

Japan. Honshu I., Wakayama-Ken, Minabe, 6.06.1974, coll. T. SAKAI: 1 ♀ 49.1 mm (SMF 22937).

Taiwan. Takao, 3.12.1914, id. M.J. RATHBUN as *C. gallus*: 1 ♀ 37.6 mm (USNM 47933).

Australia. NW shelf, coll. "Solea": 1 ♀ 17.3 mm; 3 juvs (QM W19796). — 19°29.6'S, 118°52.2'E, 38-39 m, 30.08.1983, coll. "Solea": 3 juvs (QM W19793). — 19°05.4'S, 118°53.9'E, 80 m, 30.10.1983, coll. "Solea": 1 ♀ 16.5 mm; 1 juv. (QM W19792). — Southport: 1 ♀ 41.3 mm (QM W105). — 12°6.4'S, 143°17.6'E, 16 m, September 1979: 1 ♂ 22.7 mm (QM W9878).

New Caledonia. Îlot Maître, 28.05.1984: 1 ♂ 48.9 mm; 1 ♀ 45.5 mm (MNHN). — Îlot Maître, 28.05.1984: 1 ♂ 49.0 mm; 1 ♀ 36.7 mm (MNHN). — 30 m, 3.07.1986, coll. P. LABOUTE: 1 ♀ 40.4 mm (MNHN). — North lagoon, stn DW 1215, 19°48'S, 163°4'E, 26 m, 3.11.1989, coll. B. RICHER DE FORGES: 1 ♀ 39.0 mm (MNHN). — Nr Nouméa, stn 58, 22°09'S, 166°13'E, 22 m, coll. B. RICHER DE FORGES: 1 ♀ 37.2 mm (MNHN). — St. Vincent Bay, stn 163, 22°12'S, 166°07'E, 15 m, coll. B. RICHER DE FORGES: 1 ♀ 34.0 mm (MNHN). — St. Vincent Bay, stn 179, 22°01'S, 166°04'E, 12 m, coll. B. RICHER DE FORGES: 1 ♂ 37.8 mm (MNHN).

DESCRIPTION. — Carapace convex, 1.3 wide as long, surface minutely granulate. Hepatic region depressed, gastro-cardial region delimited by deep longitudinal grooves. Branchial region and clypeiform process anteriorly with large mammilate tubercles. Cardiac and metabranchial regions with beaded tubercles. Front projecting, anteriorly bidentate. Basal antennal article granulate, anterior margin slightly concave, peduncle emerging from distal angle. Endostomial septum visible with first maxillipeds closed, with convex anterior margin. Distal margin of first maxillipeds deeply scooped, anterointernal angle acute. Anterolateral margin arcuate, carinate, anteriorly unevenly granulate, posteriorly with mammilate tubercles. Posterolateral margin setose, with six marginally beaded triangular teeth, three posterior teeth with median beaded ridges. Posterior margin sinuous, closely beaded. Merus of cheliped distally with quadrilobate lamina. External surface of chela minutely granulate, horizontally traversed by rounded tubercles, largest near upper crest. Crest of larger chela cut into seven foliate teeth increasing in size distally, proximalmost flattened. Lower margin with two beaded files. First male pleopod stout, slightly curved, tapering apically, distally spinulate; second pleopod slender, straight, with subdistal denticulate flange and digitate tip.

Color. — Carapace orange-red, red markings on branchial regions, interior surface of chela with red reticulation. Color photographs in TAKEDA & KOYAMA (1974), TAKEDA (1982).

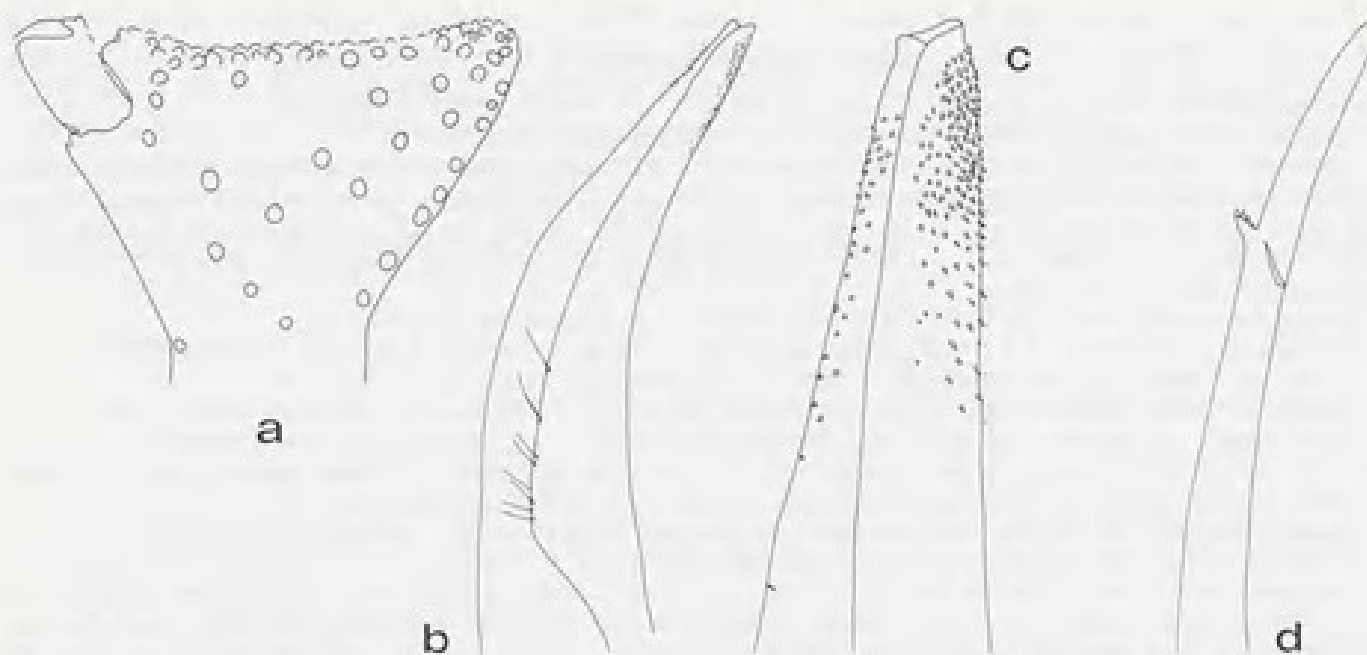


FIG. 5. — *Calappa capellonis* (Laurie, 1906), ♂ 36.6 mm, Seychelles, "REVES 2", stn 25, 4°54.6'S, 55°20.5'E, 60 m (MNHN): a, first article of antenna; b-c, first pleopod male with enlargement of distal part; d, second pleopod male, enlargement of distal part.

REMARKS. — LAURIE (1906) describing *C. gallus* divided his material into "two morphological series" and named his series (B) var. *capellonis*. RATHBUN (1937) submerged *capellonis* within *C. gallus* claiming the differences are but intraspecific variations (see above), but TAKEDA & KOYAMA (1974) recognized it as a distinct species. *C. capellonis* differs from *C. gallus* in having front emarginate rather than thickly truncate, tubercles on branchial region, clypeiform processes and outer surface of chelae more prominent and closely-set, and hepatic regions less markedly depressed.

DISTRIBUTION (fig. 29). — Seychelles and Madagascar to South China Sea, Japan and New Caledonia; on sand, pebbles, rocky bottoms; 9-80 m.

Calappa clypeata (Borradaile, 1903)

Fig. 1 d, 4 d, 6, 34, 35 d

Calappa pustulosa var. *clypeata* Borradaile, 1903: 436.

Calappa terraereginae Ward, 1936: 11, pl. 3 figs 9-11. — SAKAI, 1937: 92, pl. 18 fig. 1, text-figs 6b, 7; 1956: 8; 1976: 130, text-figs 72a-b. — TYNDALE-BISCOE & GEORGE, 1962: 70, pl. 1 fig. 2, pl. 2 fig. 2. — SERÈNE, 1968: 41 (list). — KIM, 1970: 11. — MIYAKE, 1983: 199. — DAI *et al.*, 1986: 92, fig. 50, pl. 11 fig. 5. — TAKEDA & SHIKATANI, 1990: 483. — DAI & YANG, 1991: 103, fig. 50, pl. 11 fig. 5. — CHEN, 1993: 682, fig. 4a. — YAMAGUCHI & BABA, 1993: 311, fig. 95.

Calappa lophos - BUITENDIJK, 1939: 231 (part). [Non Herbst, 1782].

MATERIAL EXAMINED. — **Maldivé Is.** Haddumati Atoll, 1900, coll. J.S. GARDINER: 1 juv. (UMZC), syntype of *C. pustulosa* var. *clypeata* Borradaile, 1903. — Mulaku Atoll, 1900, coll. J.S. GARDINER: 1 juv. (UMZC), syntype of *C. pustulosa* var. *clypeata* Borradaile, 1903.

Seychelles. REVES 2 (coll. E. MARCHAL): stn 3, 5°13.7'S, 56°41.4'E, 50 m, 2.09.1980: 1 juv. (MNHN). — Stn 36, 4°40.7'S, 55°03.0'E, 55-62 m, 10.09.1980: 1 ♀ 23.2 mm (MNHN). — Stn 68, 60-65 m, 21.09.1980: 1 ♀ 24.2 mm (MNHN).

Zanzibar. 7-9 m, coll. I. GORDON: 1 ♂ 18.0 mm (NHM 1964.7.1.120).

Madagascar. *North west coast:* Nosy Be, 6-8 m, May 1957, coll. & det. P. FOURMANOIR: 3 ♂ 33.9, 37.1, 37.7 mm; 6 ♀ 32.7-40.5 mm (MMHN). — *Nr Nosy-Iranja*, 18.11.1969, coll. R. PLANTE: 1 ♀ 30.8 mm (MNHN). — 13°27'S,

48°12'E, 30 m, 24.08.1967, coll. R. PLANTE: 1 ♀ 23.8 mm (MNHN). — 12°49.5'S, 48°30.0'E, 55 m, 2.08.1973, coll. A. CROSNIER: 2 juvs (MNHN). — Majunja, "Vauban", stn 129, 15°25'S, 46°03.5'E, 57 m, 19.01.1975, coll. A. CROSNIER: 3 ♂ 35.6-36.0 mm (MNHN). — West coast: Pracel Bank, 65 m, June 1959, coll. & det. A. CROSNIER: 3 juvs (MNHN). — East coast: Antongil Bay, 18 m, 2.04.1973, coll. J. MARCILLE: 1 ♂ (MNHN).

Burma. Gulf of Martaban, 18-37 m, coll. OATES: 1 ♀ 36.0 mm (NHM 1888.34).

Thailand. Aokrabai, 15.02.1966, coll. V.A. GALLARDO: 1 ♂ 27.0 mm (USNM). — Gulf of Thailand, 20 miles S. Koh Samit, 37 m, 31.01.1900, coll. Th. MORTENSEN: 1 ♂ 31.5 mm (USNM 39668). — 4 miles S of Koh Sakait, 16 m, 3.02.1900, coll. Th. MORTENSEN: 1 ♀ 33.1 mm (USNM 39668). — 180 km SE of Bangkok, 16.12.1988, colls A.C.J. BURGERS & L.B. HOLTHUIS: 2 ♂ 37.6, 36.7 mm (RMNH 37565). — Phuket fishery port, November 1995, coll. T. KOMAI: 1 ♂ 27.3 mm (CBM ZC).

Malay Peninsula. 9°46'N, 98°22'E, 25 m, 6.03.1966: 1 ♂ 30.9 mm (ZM CRU1820).

Philippines. Off S. Luzon I., "Albatross" stn 5104, 33-60 m, 8.01.1908: 1 ♀ 49.8 mm (USNM 65359). — Lingayen Gulf, "Albatross", stn D5442, 11.05.1909: 1 ♀ 41.3 mm (USNM 122723).

Indonesia. "Indes orientales" coll. K.A.A. VON HUGEL, 1833-36: 1 ♂ 35.1 mm; 1 ♀ 39.2 mm (NMW 11006).

Sunda Straits, 5°57'S, 105°32'E, 31.07.1922, coll. Th. MORTENSEN: 1 ♀ 33.8 mm; 1 juv. (ZM CRU1830). — 6°37'S, 105°27'E, mud, 30.07.1922, coll. Th. MORTENSEN: 1 ♀ 35.4 mm (ZM CRU1829). — Timor, Koepang Bay, 2.12.1929, 10-15 m, "Snellius" Exped., det. A.M. BUITENDIJK as *C. lophos*: 1 ♀ 18.8 mm (RMNH 4240).

Japan. 1826-1833, coll. H. BURGER, taken from a lot identified by DE HAAN as *C. philargius* by YAMAGUCHI & BABA (1993: 311), redet. L.B. HOLTHUIS: 2 dry specimens (RMNH 43131).

Australia. North west coast: 19°29.4'S, 118°52.1'E, "Soela", 38-39 m, 26.04.1983: 2 juvs (QM W19775). — 19°59.1'S, 117°49'E, "Soela", 43 m, 25.06.1983: 1 ♂ 13.7 mm (QM W19777). — 19°59'S, 117°51'E, "Soela", 42 m, 25.06.1983: 1 ♀ 19.8 mm (QM W19783). — 19°55.6'S, 117°56'E, "Soela", 43-44 m, 26.08.1983: 1 ♂ 10.9 mm (QM W19778). — North coast: Gulf of Carpentaria, 1965: 1 ♀ 29.8 mm (QM W2403). — Gulf of Carpentaria, 14°27.5'S, 138°42'E, "Southern Surveyor", 52 m, 12.12.1991: 1 ♂ 29.6 mm; 2 ♀ 19.6, 17.8 mm (QM W17345). — Torres Straits, 10°12'S, 143°12'E, "Kulasi", 27 m, 27.09.1988: 1 ♀ 27.7 mm (QM W16095). — East coast: Cairns, 17°00'S, 146°07'E, 35 m, 25.04.1982: 1 ♂ 40.7 mm; 1 ♀ 38.8 mm (QM W9966). — 12°34.5'S, 143°48.6'E, 16 m, September 1979: 1 ♀ 25.2 mm (QM W9889). — Darnley I., coll. Dr. TOSH: 1 ♂ 22.5 mm (QM W12267). — Bowen, coll. E.H. RAINFORD: 1 ♂ 20.2 mm (QM W216). — Nr Layoak I., 9°48'S, 143°18'E, "Kulasi", 33 m, 26.09.1988: 1 ♂ 27.5 mm (QM W16096).

New Caledonia. LAGON (coll. B. RICHER DE FORGES): stn 7, 22°24'S, 166°19.7'E, 14 m, 21.05.1984: 5 ♂ 26.3-30.8 mm; 5 ♀ 24.4-35.8 mm (MNHN). — Stn 12, 22°17'S, 166°23'E, 23 m, 21.05.1984: 1 ♀ 38.1 mm (MNHN). — Stn 512, 19°24'S, 163°35'E, 59 m, 5.03.1985: 1 ♂ 34.4 mm; 1 ♀ 37.8 mm (MNHN). — Stn 513, 19°20'S, 163°35'E, 55 m, 5.03.1985: 3 ♀ 28.4, 39.5, 41.5 mm (MNHN). — Stn 527, 19°22'S, 163°34'E, 59 m, 5.03.1985: 1 ♂ 18.5 mm; 1 ♀ 20.6 mm (MNHN). — Stn 988, 20°17.1'S, 163°58.7'E, 19-20 m, 30.04.1988: 1 ♂ 25.9 mm (MNHN). — Stn 1066, 19°5' S, 163°52.2'E, 20 m, 23.10.1989: 1 ♀ (MNHN). — Stn 1067, 19°55.8'S, 163°52.8'E, 28 m, 23.10.1989: 1 ♂ 20.8 mm; 6 ♀ 18.3-27.0 mm; 7 juv. (MNHN). — Stn 1068, 19°57.3'S, 163°52.8'E, 26 m, 23.10.1989: 1 ♂ 19.9 mm; 1 ♀ 19.1 mm; 5 juvs (MNHN). — Stn 1069, 19°59.1'S, 163°52.5'E, 30 m, 23.10.1989: 1 ♀ 24.9 mm (MNHN). — Stn 1076, 19°52.3'S, 163°54.9'E, 31 m, 23.10.1989: 1 ♀ 12.8 mm (MNHN). — Stn 1109, 19°43.8'S, 163°44.2'E, 38 m, 25.11.1989: 1 ♂ 35.4 mm (MNHN). — Stn 1194, 19°29.5'S, 163°22.9'E, 57 m, 1.11.1989: 1 juv. (MNHN). — Stn 1199, 19°37.8'S, 163°27.9'E, 43 m, 2.11.1989: 1 ♀ (MNHN). — Stn 1214, 19°49.9'S, 163°36.6'E, 29 m, 3.11.1989: 2 juvs (MNHN).

North Lagoon (M. KULBICKI coll.): stn 2, 19°54.3'S, 163°50'E, 30-33 m, 13.06.1985: 2 ♀ 31.4, 33.7 mm (MNHN). — Stn 6, 19°46.5'S, 163°47.2'E, 37 m, 14.06.1985: 1 ♂ 24.5 mm; 1 ♀ 24.4 mm (MNHN). — Stn 8, 19°54.8'S, 163°45.10'E, 33-36 m, 14.06.1985: 3 ♂ 19.6-30.0 mm; 5 ♀ 17.3-37.6 mm (MNHN). — Stn 9, 19°54.1'S, 163°42.9'E, 33 m, 14.06.1985: 3 ♀ 34.0-37.4 mm (MNHN). — Stn 13, 19°40.2'S, 163°47.2'E, 42 m, 15.06.1985: 2 ♂ 29.2, 29.5 mm (MNHN). — Stn 20, 19°19.5'S, 163°36.0'E, 55-58 m, 18.06.1985: 1 ♂ 31.5 mm; 1 ♀ 40.5 mm (MNHN). — Stn 21, 19°41.8'S, 163°31.2'E, 40 m, 19.06.1985: 3 ♀ 33.6-38.8 mm (MNHN). — Stn 30, 19°36.5'S, 163°39.5'E, 40 m, 20.06.1985: 1 ♂ 29.9 mm; 1 ♀ 36.6 mm (MNHN). — Stn 34, 19°18.2'S, 163°40.3'E, 50-54 m, 18.06.1985: 1 ♂ 32.7 mm (MNHN). — Stn 36, 19°14.1'S, 163°21.2'E, 60-62 m, 21.06.1985: 1 ♀ 25.3 mm (MNHN). — Stn 39, 19°29.0'S, 163°25.4'E, 52-56 m, 22.06.1985: 3 ♂ 31.9-33.7 mm; 2 ♀ 26.7, 29.1 mm (MNHN). — Stn 43, 19°32.8'S, 163°40.6'E, 45-50 m, 23.06.1985: 2 ♂ 31.9, 33.7 mm; 2 ♀ 26.7, 29.1 mm (MNHN). — Stn 44, 19°46.5'S, 163°47.4'E, 38 m, 23.06.1985: 6 ♂ 26.4-33.9 mm; 2 ♀ 21.4, 24.2 mm (MNHN).

St Vincent Bay (M. KULBICKI coll.): 22°04.19'S, 166°00.5'E, 13-20 m, 29.04.1985: 1 ♂ (MNHN). — 22°05.5'S, 166°05.5'E, 15 m, 20.08.1985: 1 ♂ 29.0 mm (MNHN).

DESCRIPTION. — Carapace convex, 1.4 wide as long, surface finely punctate. Front only slightly projecting, with two rounded teeth separated by triangular sulcus. Basal antennal article with anterior proximal angle produced, peduncle emerging medially. Afferent branchial canal ending below orbit in rounded process. Endostomial septum visible with first maxillipeds closed, with slightly rounded anterior margin. First maxillipeds with small triangular notch on anterior margin. Branchial ridges prominent in young, barely distinguished, anteriorly with flattened

tubercles. Anterolateral margin carinate, scalloped. Clypeiform expansion smooth. Posterolateral margin lamellar, with four marginally beaded lacinate teeth followed by two shallow teeth. Posterior margin produced, sinuous, finely beaded. Merus of cheliped distally with indistinctly quadrilobate lamina. Crest of larger chela with shallow teeth. External surface of chela obliquely traversed by three rows of flattened tubercles, median row most developed. Unevenly tuberculate ridge running subparallel to lower margin, from proximal lamellar tooth to base of dactyl, tubercles larger distally. Lower margin narrow, two beaded files contiguous distally. Internal surface of chela inferiorly granulate, beaded file parallel to lower margin. First male pleopod slightly curved, tapering apically to spinulate tip; second pleopod slender, slightly curved, tip spatulate.

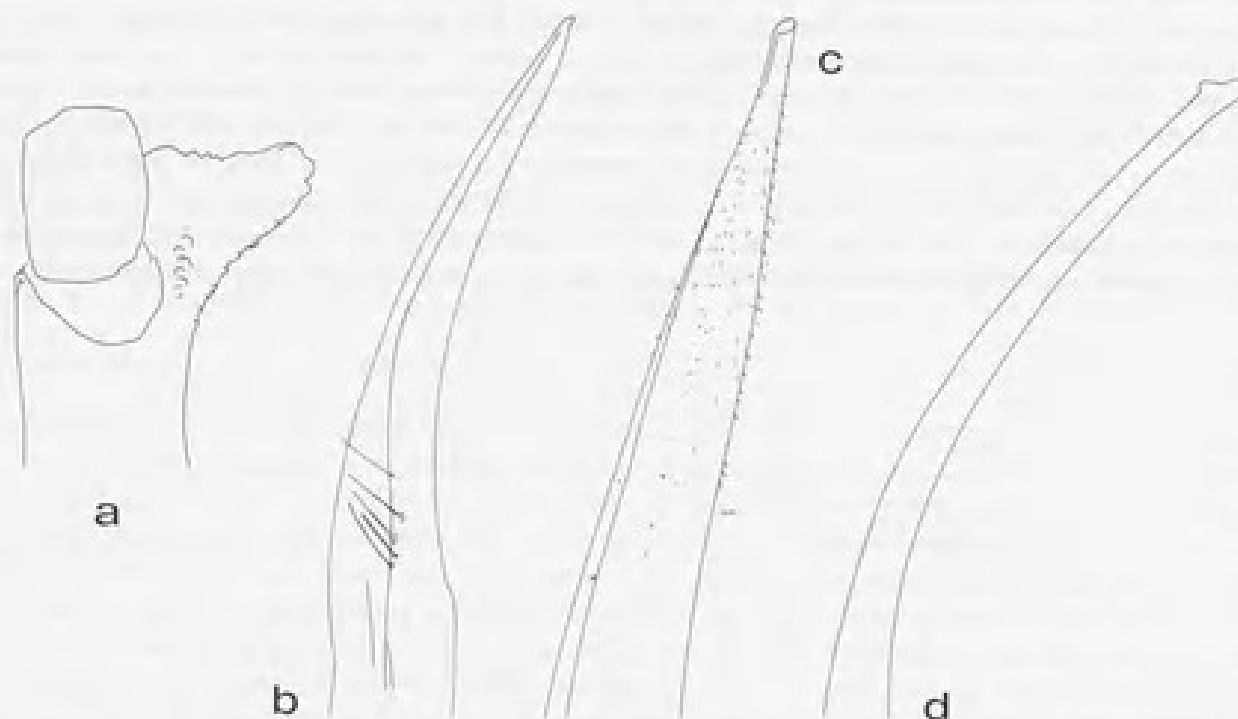


FIG. 6. — *Calappa clypeata* (Borradaile, 1903), ♂ 36.0 mm, Madagascar, Majunja, "Vauban" stn 129, 15°25'S, 46°03.5'E, 57 m (MNHN): a, first article of antenna; b-c, first pleopod male with enlargement of distal part; d, second pleopod male, enlargement of distal part.

Color (in alcohol). — "Pale grey-pink on carapace, inside of the palm marked with orange" (TYNDALE-BISCOE & GEORGE, 1962).

REMARKS. — BORRADAILE (1903) distinguished var. *clypeata* from the typical *C. pustulosa* as having the clypeiform expansions similar to those of *C. depressa* and denticulate anterolateral margins. Indeed, its carapace is as smooth and glabrous as that of *C. pustulosa*, but it differs from that species in having clypeiform expansions; it is easily distinguished from *C. depressa* by its smooth, convex carapace.

As *clypeata* Borradaile, 1903 is older than *terraereginae* Ward, 1936, it has priority. The fact that *clypeata* was proposed conditionally does not make it unavailable, as this was done before 1961 (International Code of Zoological Nomenclature, Articles 11(d)(i) and 15).

DISTRIBUTION (fig. 34). — From east African coast to Japan, the Philippines and New Caledonia, at 6-160 m.

Calappa conifera sp. nov.

Fig. 1 e, 4 e, 7

MATERIAL EXAMINED. — **South Africa.** "Pieter Faure": Off Port Shepstone, 43 m: 1 ♂ 18.6 mm (SAM A43141); 1 ♀ 18.8 mm (SAM A43142). — Tongaat River, 65 m: 2 ♂ 10.5 and 10.9 mm, 1 broken specimen (SAM A463).

TYPE MATERIAL. — The male collected off Port Shepstone is the holotype. The other specimens are paratypes.

DESCRIPTION. — Carapace markedly convex, 1.2-1.3 wide as long, deep longitudinal groove separating gastrocardial from inflated branchial regions, hepatic region markedly depressed. Surface prominently tuberculate anteriorly, branchial tubercles largest, conical, intestinal region with granulate tubercles. Front projecting, with two triangular teeth separated by sulcus. Basal antennal article distally granulate, anterior margin bidentate, peduncle emerging from distal angle. Afferent branchial canal ending below orbit in tridentate process. Endostomial septum visible with first maxillipeds closed, with straight anterior margin. First maxillipeds with triangular notch on anterointernal margin. Anterolateral margin setose, carinate, with granulate, triangular teeth, anterior tooth prominent. Clypeiform expansion moderate, margin setose, beaded, four anterior teeth triangular, distalmost largest, two posterior teeth shallow, with beaded median ridges. Posterior margin sinuous, beaded. Merus of cheliped distally with setose quadrilobate lamina. Carpus tuberculate. External surface of chela inferiorly granulose, obliquely traversed by three rows of conical tubercles, median row most prominent. Crest of larger chela cut into seven conical teeth increasing in size distally, proximalmost tooth bicuspidate. Lower margin narrow, two beaded files contiguous distally. Internal surface of chela inferiorly granulate. First male pleopod stout, tapering apically, slightly curved, distally spinulate; second pleopod slender, with subdistal denticulate flange and digitate tip.

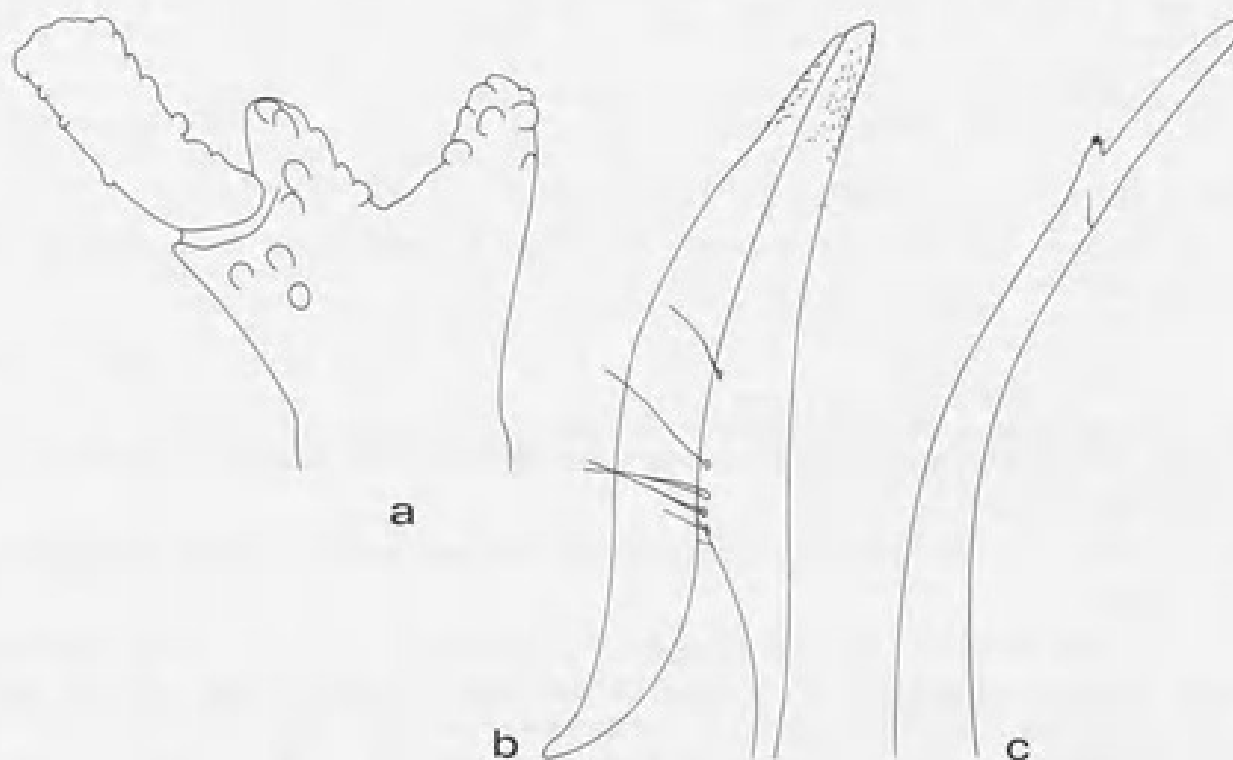


FIG. 7. — *Calappa conifera* sp. nov., ♂ cl 18.6 mm, South Africa, holotype (SAM A463) : a, first article of antenna; b, first pleopod male; c, second pleopod male, enlargement of distal part.

ETYMOLOGY. — From the Latin, *conus*, cone, after the conical tubercles on carapace and chelae, and the verb *fero*, bear.

REMARKS. — The deep longitudinal grooves separating the gastrocardial from inflated branchial regions and the markedly depressed hepatic region of *C. conifera* are similar to those of *C. gallus*. However, *C. conifera* is easily distinguished from the latter by its bidentate front, bidentate basal antennal article, prominently dentate anterolateral margin, moderate clypeiform expansion and conical tubercles on chelae.

DISTRIBUTION. — Known only from the type locality, South Africa, at 43-65 m.

Calappa convexa Saussure, 1853

Fig. 1 f, 4 f, 8

Calappa convexa Saussure, 1853: 362, pl. 13 fig. 3. — STIMPSON, 1889: 470. — NOBILI, 1901: 29. — RATHBUN, 1907: 74; 1910b: 593; 1924a: 159; 1937: 206, pl. 62 figs 1-3. — BOONE, 1927: 280, fig. 99. — GARTH, 1946a: 360, pl. 62 fig. 6; 1946b: 620 (list); 1948: 19; 1960: 121 (list); 1966: 12. — PRAHL & SANCHEZ, 1986: 23. — LEMAITRE & ALVAREZ-LEON, 1992: 50 (list). — HENDRICKX, 1992: 9 (list); 1993a: 8 (list); 1993b: 311 (list); 1994: 576.

Calappa xanthusiana Stimpson, 1860: 237.

MATERIAL EXAMINED. — Mexico, Mazatlan, 1862, coll. SALMIN: 1 ♀ 19.6 mm (NMW 10984). — 1903, coll. A. MILNE EDWARDS: 1 ♂ (MNHN-B 4089). — Isabel I., "Velero", stn 747-37, 18-33 m, 2.04.1937: 1 ♀ 24 mm (LAM). — Isabel I., "Velero", stn 870-38, 18-27 m, 8.03.1938: 3 juvs (LAM). — 1939-40: 1 ♀ 27.2 mm (USNM). — Guaymas, 1946, coll. A. SORENSON: 1 ♂ 26.4 mm (USNM 173206). — Sinaloa, La Lechoguilla, 28 July 1964, colls F. GARCIA & E. CHAPARRO: 1 ♂ 85.2 mm (RMNH 25485).

Costa Rica. Salinas Bay, 3 m, coarse sand, 11.02.1935, coll. W.L. SCHMITT, id. M.J. RATHBUN as *C. saussurei*, id. A.B. WILLIAMS as *C. convexa*: 1 juv. (USNM 131571).

Panama. Coll. J.M. Dow: 1 ♂, 1 ♀ (USNM 3263). — La Venta, 11.03.1937, coll. S.F. HILDEBRAND: 1 ♂ 78.6 mm (USNM 144344). — Changame, 1.05.1938, coll. ROBSON: 2 ♂ 68.1, 68.4 mm (USNM 161887). — Taboga I., "Velero", stn 960-39, 4-9 m, 2.05.1939: 1 ♂ 28.8 mm (LAM). — Taboguilla I., 26.12.1963, coll. F.M. BAYER: 1 juv. 12.7 mm (RMNH 23684).

Colombia. Port Utria, "Velero", stn 856-38, 27-55 m, 25.02.1938: 1 ♂ 27.8 mm (LAM).

DESCRIPTION. — Carapace markedly convex, 1.5 wide as long, surface minutely granulate. Branchial, gastric regions with flattened tubercles, posterior third transversed by beaded carinae. Longitudinal groove separating gastrocervical from branchial regions. Front only slightly projecting, with two triangular teeth. Anterior margin of basal antennal article bicuspidate, peduncle emerging from distal angle. Afferent branchial canal ending below orbit in granulate tridentate process. Endostomial septum visible with first maxillipeds closed, with slightly rounded anterior margin. Distal margin of first maxillipeds obliquely cut, anteroventral angle acute. Branchial ridges indistinct. Anterolateral margin carinate, posteriorly with granulate teeth. Posterolateral margin granulate, with six medially beaded teeth. Posterior margin sinuous, closely beaded. Merus of cheliped distally with quadrilobate lamina, two distal lobes acuminate. External surface of chela coarsely granulate, granules closely set near lower margin; obliquely traversed by three flattened tubercles, similar tubercles distally above dactyl. Uneven tubercles running subparallel to lower margin, from proximal keel-like tooth to base of fixed finger, tubercles larger distally. Crest of larger chela cut into six teeth increasing in size distally, proximalmost lowest. Lower margin narrow, two beaded files contiguous distally. First male pleopod sinuous, distally spinulate; second pleopod slender, sickle-shaped distally.

Color. — *C. convexa* was named "Grey Box Crab" by RATHBUN (1924), who then (1937) proceeded to describe a splendid specimen with "carapace dull red with fine dots of pale yellow; granulated ridges also yellow. On the carpus and distal end of merus of chelipeds the yellow spots are larger; on the upper half of the manus the ground is red with irregular splotches of yellow, on the lower half the ground is yellow with little red. Carpus and propodus of legs red with white spots; on the merus the white predominates". BOONE (1927) called it "Purple Box Crab" with carapace "an exquisite shade of lilac-lavender. The ambulatory legs are banded alternately with light rose and lavender on the three distal joints". According to GARTH (1946a) "Carapace hazel... Eugenia red patch on anterolateral area... but almost covered with small patterns of ochraceous orange and russet. Marginal teeth ochraceous orange. Eyestalks tawny; eye pale blue. Chelipeds same as carapace with a large Eugenia red spot across distal end of hand and base of movable finger. Fingers tawny olive shading to very light tips". CRANE in GARTH (1966) saw it as "Lavender spotted finely with white. Inside of cheliped orange. Ambulatories and chelipeds spotted with yellow and mottled with white and lavender".

REMARKS. — NOBILI (1901) remarked: "Questa specie [*C. convexa*] che rappresenta sulla costa occidentale dell'America la *C. flammea*, e a questa molto affine, ma e facile distinguerla". RATHBUN (1937) too found it "Allied to *C. flammea* in its little protruded front and in the character of the surface. It is, however, more convex

than that species, and the triangular teeth of the posterolateral margins are more strongly carinated along the middle above; also there are numerous short transverse crenulated carinae on the posterior third of the carapace". GARTH (1946a) considered *C. convexa* "nearly related [to] *C. saussurei* Rathbun". However, the latter belongs altogether to a separate genus (see later).

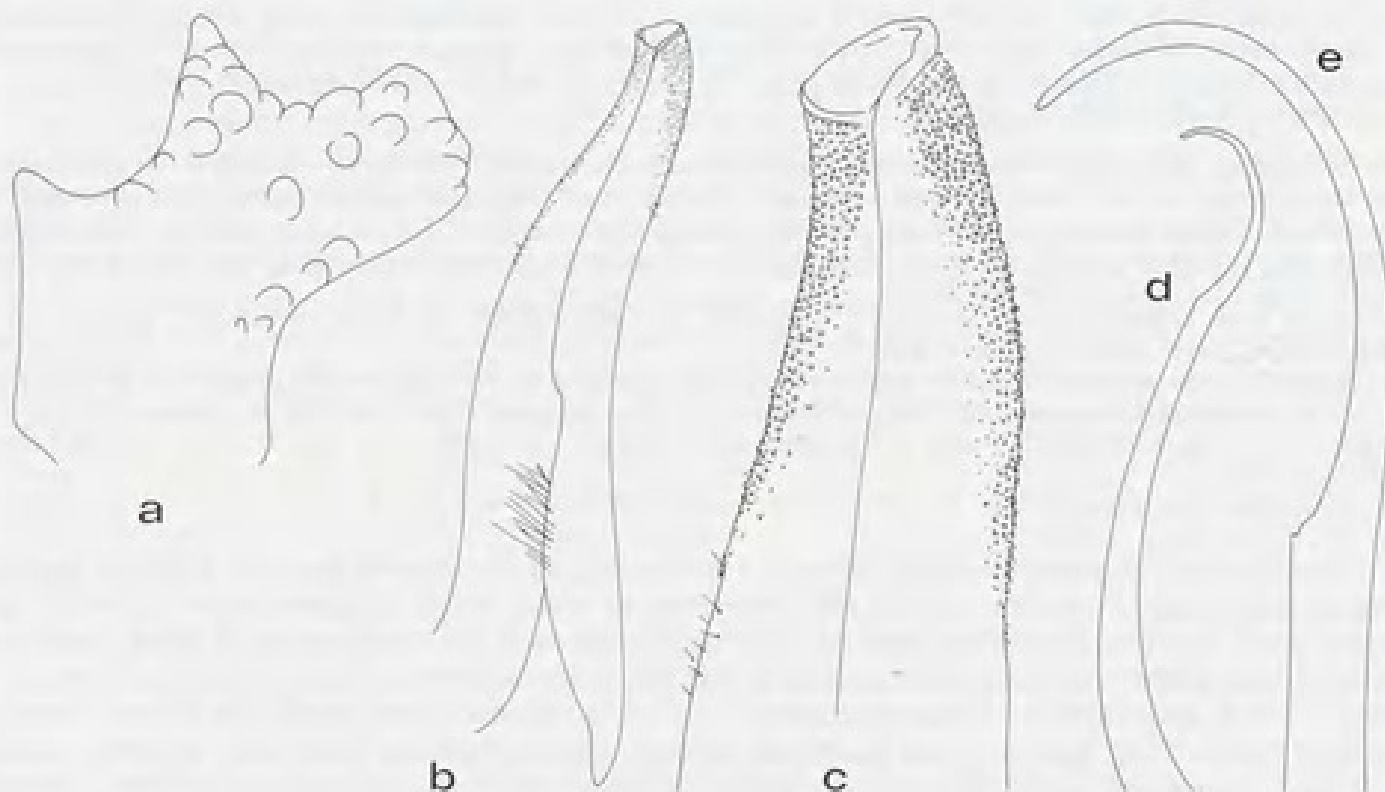


FIG. 8. — *Calappa convexa* Saussure, 1853, ♂ 68.1 mm, Panama (USNM 144344): a, first article of antenna; b-e, first pleopod male with enlargement of distal part; d-e, second pleopod male with enlargement of distal part.

DISTRIBUTION. — Lower California, Mexico, to Ecuador and Galapagos; intertidal to 60 m; on gravelly sand, crushed shell, dead coral, rocks, sand and algae.

Calappa depressa Miers, 1886

Fig. 9, 10 a, 11, 13 a, 30, 35 e-f

Calappa depressa Miers, 1886: 287, pl. 23 fig. 2. — BORRADAILE, 1903: 436. — HALE, 1927: 190, fig. 191. — TYNDALE-BISCOE & GEORGE, 1962: 70. — SERÈNE, 1968: 41 (list).

Calappa woodmasoni Alcock, 1896: 148, pl. 6 fig. 2. — ALCOCK & ANDERSON, 1897, pl. 28 figs 2, 2a. — IHLE, 1918: 181. — SERÈNE, 1968: 41 (list).

Calappa alata Rathbun, 1911: 198, pl. 15 fig. 2. — SERÈNE, 1968: 41 (list).

Calappa depressus Chopra, 1933: 31.

Calappa elata - GUINOT, 1967: 25 (list) [erroneous spelling].

MATERIAL EXAMINED. — **Australia.** *South coast*: 4-18 m, April 1874: 1 ♀ holotype, 18.0 mm (NHM 1884.31). — *North-west shelf*: 19°56.8'S, 117°53.4'E, 42 m, 22.04.1983, coll. "Soela": 2 ♀ 20.5, 14.0 mm (QM W19779). — 19°29.4'S, 118°51.5'E, 40 m, 25.10.1983, coll. "Soela": 1 ♂ 13.6 mm (QM W19776). — 19°30.9'S, 118°49.2'E, 38-39 m, 25.10.1983, coll. "Soela": 1 ♂ 14.4 mm (QM W19779). — 19°29.4'S, 118°52.4'E, 38 m, 25.10.1983, coll. "Soela": 3 juvs (QM W19780).

Somalia. 1 ♂ 24.1 mm (NHM 1950.8.8.37).

Seychelles. Amirante I., "Sealark", stn E9, 62 m, 9.10.1905: 1 ♂ 17.9 mm (USNM 41057), holotype of *C. alata*.

REVES 2 (coll. E. MARCHAL): stn 22, 5°16.3'S, 55°58.42'E, 60 m, 6.09.1980: 2 ♀ 14.7, 16.7 mm (MNHN). — Stn 25, 4°54.6'S, 55°20.5'E, 60 m, 8.09.1980: 2 ♂ 22.0, 19.8 mm; 1 ♀ 17.7 mm (MNHN). — Stn 29, 4°44.0'S, 54°38.3'E, 56 m, 9.09.1980: 1 ♂ 13.4 mm (MNHN). — Stn 30, 4°42.4'S, 54°24.9'E, 50-55 m, 9.09.1980: 1 ♀ ovig. 18.0 mm (MNHN). — Stn 31, 4°37.4'S, 54°20.7'E, 50 m, 9.09.1980: 1 ♂ 13.0 mm (MNHN). — Stn 54, 3°53.2'S, 55°09.1'E, 50 m, 17.09.1980: 1 ♀ 18.6 mm (MNHN). — Stn 55, 3°48.0'S, 55°6.2'E, 50-55 m, 17.09.1980: 1 ♂ 19.2 mm (MNHN). — Stn 60, 4°11.2'S, 55°12.6'E, 40-50 m, 19.09.1980: 1 ♀ ovig. 18.2 mm (MNHN).

W. of Poivre Atoll, 5°46'S, 53°11'E, 57 m, 1.01.1993, coll. "Tyro" Exped.: 1 ♀ 16.1 mm (RMNH). — SW of La Digue I., 4°23'S, 55°51'E, 25 m, 23.12.1992, coll. "Tyro" Exped.: 1 juv. 8.8 mm (RMNH).

Comoro Is. Mayotte lagoon, August 1959, coll. A. CROSNIER (as *C. alata*): 1 ♂ 19.9 mm (MNHN). — 50 m, September 1959, coll. A. CROSNIER (as *C. alata*): 1 ♂ 12.5 mm; 1 ♀ 11.2 mm (MNHN).

Madagascar. North-west coast: S. of Nosy Iranja, 20 m, 19.09.1960, colls HUMES & FOSTER: 1 ♂ 18.4 mm, 1 ♀ 20.3 mm (MNHN). — West coast: Tuléar, 8 m: 1 ♀ ovig. 13.0 mm (MNHN).

New Caledonia. LAGON (coll. B. RICHER DE FORGES): stn 4, 22°22.5'S, 166°20.7'E, 9 m, 21.05.1984: 1 ♀ 23.3 mm (MNHN). — Stn 10, 22°19.9'S, 166°20.4'E, 15 m, 21.05.1984: 1 ♀ (MNHN). — Stn 45, 22°11.9'S, 166°19.2'E, 14 m, 25.05.1984: 1 ♂ 20.5 mm (MNHN). — Stn 376, 22°33.6'S, 167°06.2'E, 75-76 m, 21.01.1985: 1 ♂ 17.2 mm (MNHN). — Stn 403, 22°34.5'S, 167°17.5'E, 45 m, 23.01.1985: 1 ♀ 17.3 mm (MNHN). — Stn 405, 22°37.5'S, 167°19.5'E, 27 m, 23.01.1985: 1 ♂ 19.9 mm (MNHN). — Stn 444, 18°15.3'S, 162°58.8'E, 300-350 m, 28.02.1985: 1 ♂ 18.9 mm (MNHN). — Stn 519, 19°02.5'S, 163°34.0'E, 5.03.1985: 3 ♂ 13.4-17.2 mm (MNHN). — Stn 581, 22°41.5'S, 167°26.1'E, 24 m, 18.07.1985: 1 ♀ 18.4 mm (MNHN). — Stn 911, 20°56.8'S, 164°34.8'E, 13-19 m, 26.04.1988: 1 juv (MNHN). — Stn 934, 20°43.0'S, 164°16.8'E, 10 m, 27.04.1988: 1 ♀ ovig. 20.1 mm (MNHN). — Stn 940, 20°38.1'S, 164°15.5'E, 10 m, 27.04.1988: 1 ♂ 16.7 mm (MNHN). — Stn 949, 20°33.1'S, 164°10.6'E, 12 m, 28.04.1988: 1 ♂ 19.0 mm (MNHN). — Stn 1015, 20°10.1'S, 163°51.6'E, 12 m, 3.04.1988: 1 ♂ 12.4 mm (MNHN). — Stn 730, 21°17.2'S, 165°54.5'E, 40-43 m, 12.08.1986: 1 ♀ ovig. 10.1 mm (MNHN). — Stn 771, 21°09.0'S, 165°42.45'E, 34 m, 8.01.1987: 1 ♀ 16.3 mm (MNHN). — Stn 865, 20°38.7'S, 165°04.4'E, 24 m, 13.01.1987: 2 ♂ 15.5, 15.5 mm; 2 ♀ 12.0, 13.9 mm (MNHN). — Stn 888, 20°22.0'S, 164°37.9'E, 20 m, 14.01.1987: 1 ♂ 12.1 mm (MNHN). — Stn 1071, 19°54.7'S, 163°59.0'E, 26 m, 23.10.1989: 1 ♂ 11.8 mm (MNHN). — Stn 1072, 19°56.0'S, 164°02.4'E, 20 m, 23.10.1989: 2 ♀ 11.9, 12.9 mm (MNHN). — Stn 1075, 19°52.0'S, 163°58.4'E, 28 m, 23.10.1989: 2 ♂ 16.7, 17.0 mm (MNHN). — Stn 1078, 19°48.3'S, 163°59.5'E, 24 m, 24.10.1989: 1 juv. (MNHN). — Stn 1094, 19°54.4'S, 163°41.2'E, 26 m, 24.10.1989: 1 ♀ 18.4 mm (MNHN). — Stn 1105, 19°40.0'S, 163°57.8'E, 25 m, 25.10.1989: 2 ♀ 11.9, 15.2 mm (MNHN). — Stn 1129, 19°29.2'S, 163°48.8'E, 40 m, 26.10.1989: 2 ♀ 12.2, 17.2 mm (MNHN). — Stn 1158, 19°10.0'S, 163°06.5'E, 48 m, 30.10.1989: 2 juvs (MNHN). — Stn 1174, 19°21.2'S, 163°13.7'E, 53 m, 31.10.1989: 2 ♀ ovig. 12.6, 15.8 mm (MNHN). — Stn 1196, 19°32.5'S, 163°21'E, 30 m, 1.11.1989: 2 juvs (MNHN). — Stn 1205, 19°41.6'S, 163°25.6'E, 38 m, 2.11.1989: 1 ♂ 17.6 mm (MNHN). — Stn 1214, 19°49.9'S, 163°36.6'E, 29 m, 3.11.1989: 1 ♂ 15.1 mm (MNHN).

St. Vincent Bay, 7-8 m, 7.12.1961, coll. Mission Singer-Polignac: 2 ♂ 19.0, 20.8 mm; 1 ♀ 16.7 mm (MNHN).

Lagoon (coll. P. LABOUTE): 22°18.35'S, 166°25.06'E, 14 m, 11.02.1985: 1 ♀ 18.5 mm (MNHN). — 20°01.8'S, 161°33.1'E, 2.12.1986: 1 ♂ 24.8 mm (MNHN).

DESCRIPTION. — Carapace flattened, 1.4 wide as long. Surface anteriorly granulate, with granulate tubercles on gastrocardial, hepatic and branchial regions; posteriorly granules set in transverse, setiferous rows, rows increasing in length laterally. Front only slightly projecting, with two obliquely triangular teeth separated by triangular sulcus. Basal antennal article anteriorly spatulate, peduncle emerging medially. Afferent branchial canal ending below orbit in rounded process. Endostomial septum visible with first maxillipeds closed, with slightly rounded anterior margin. First maxillipeds with triangular notch on anterointernal margin. Anterolateral margin carinate, scalloped, setose. Posterolateral margin lamellar, setose, beaded, with five triangular teeth followed by two shallow indentations. Posterior margin slightly convex, beaded, setose. Merus of cheliped distally with indistinctly quadrilobate lamina, distalmost lobe acuminate, ram-like. External surface of carpus tuberculate. Crest of larger chela with seven teeth, proximalmost bicuspidate. External surface of chela unevenly granulate, obliquely traversed by two parallel granulate rows. Lower margin narrow, with two contiguous beaded rows. Internal surface of chela unevenly granulate. First male pleopod slightly curved, tapering apically to narrow spinulate tip; second pleopod slender, nearly straight, tip spatulate.

Color (in alcohol). — "Light yellow-brown; the lateral expansions of the carapace, outer surface of the chelipeds, and the ambulatory legs of a pinker hue; the inner surface of the palms are brownish-pink upon a yellowish ground; the coloration being disposed, in places, in wavy lines" (MIERS, 1886). "Pale brown mottled with pink; some sharp pink markings on palm of chelipeds" (TYNDALE-BISCOE & GEORGE, 1962).

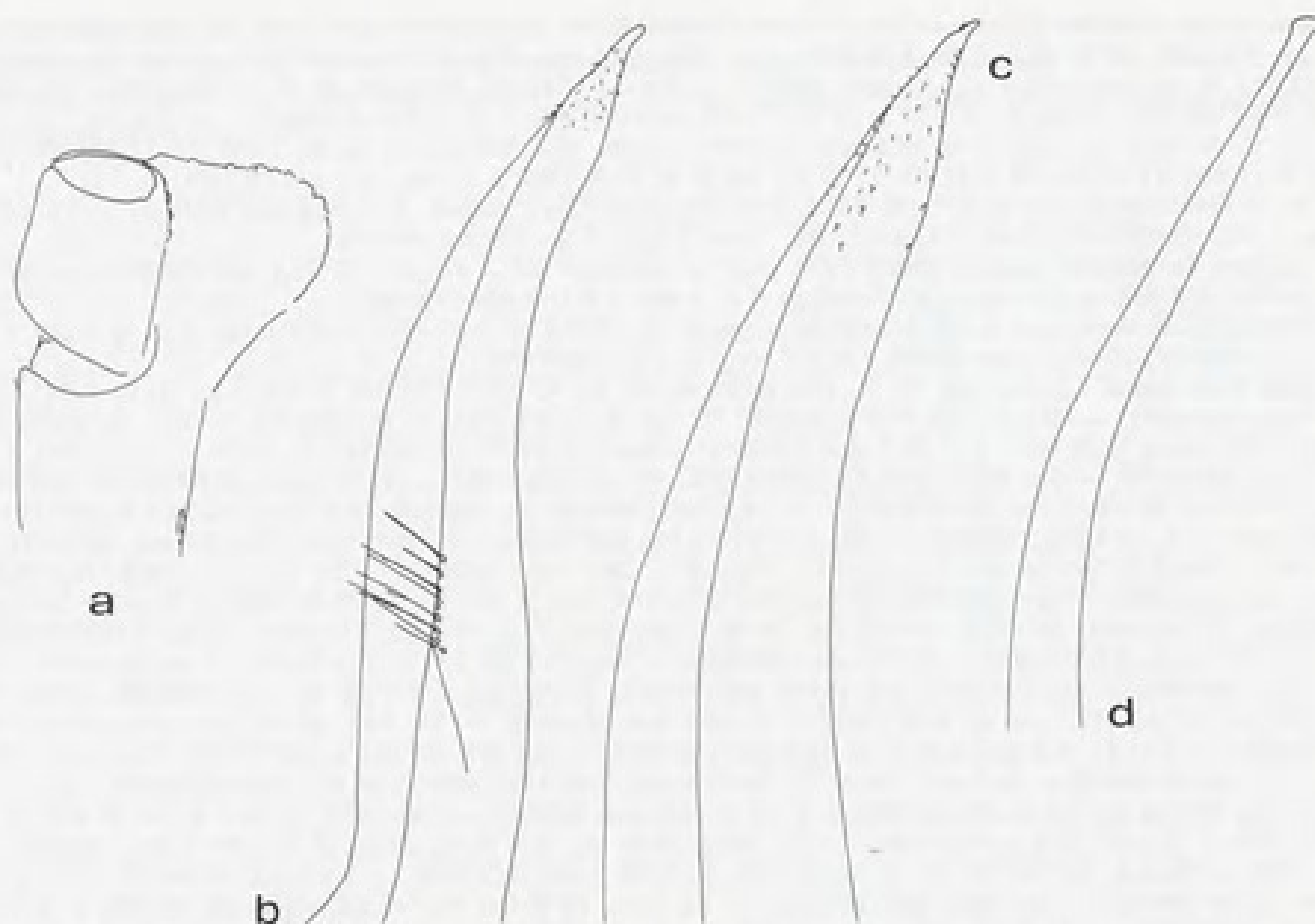


FIG. 9. — *Calappa depressa* Miers, 1886, ♂ 24.8 mm, New Caledonia, 20°01.8'S, 161°33.1'E (MNHN): a, first article of antenna; b-c, first pleopod male with enlargement of distal part; d, second pleopod male, enlargement of distal part.

REMARKS. — ALCOCK (1896) described *C. woodmasoni* as "Very closely allied to *C. depressa*". His drawings and description depict most likely a juvenile specimen of *C. depressa*. RATHBUN (1911) distinguished *C. depressa* Miers from *C. alata* "in its relatively narrower and more triangular carapace, the wings following the antero-lateral outline; obscure antero-lateral teeth; nearly transverse frontal lobes; in having two regular lines of granules on lower half of outer surface of palm." This comparison must have been based solely on MIERS' drawing. Examination of both MIERS' and RATHBUN's type specimens revealed they are one and the same species.

DISTRIBUTION (fig. 30). — Somalia, Comoro Is., Seychelles, Madagascar, Maldives Is (Suvadiva Atoll), Australia, New Caledonia, 2-350 m.

Calappa dumortieri Guinot, 1962

Fig. 10 b, 11, 13 b, 30, 35 b

Calappa cristata - H. Milne Edwards, 1837: 105; 1840: 17, pl. 20 fig. 1 [Non Fabricius, 1798].

Calappa philargius - NOBILI, 1906: 148. — HOLTHUIS, 1958a: 45 [Non Linnaeus, 1758].

Calappa dumortieri Guinot, 1962: 21, figs 7-10, 16, 19a-b, 20, pl. 1 fig. 2, pl. 2 fig. 2; 1967: 245 (list). — SERÈNE, 1968: 41 (list).

MATERIAL EXAMINED. — "Mers d'Asie", det. H. MILNE EDWARDS as *C. cristata*: 1 ♂ 48.6 mm (MNHN B.3985), Paratype.

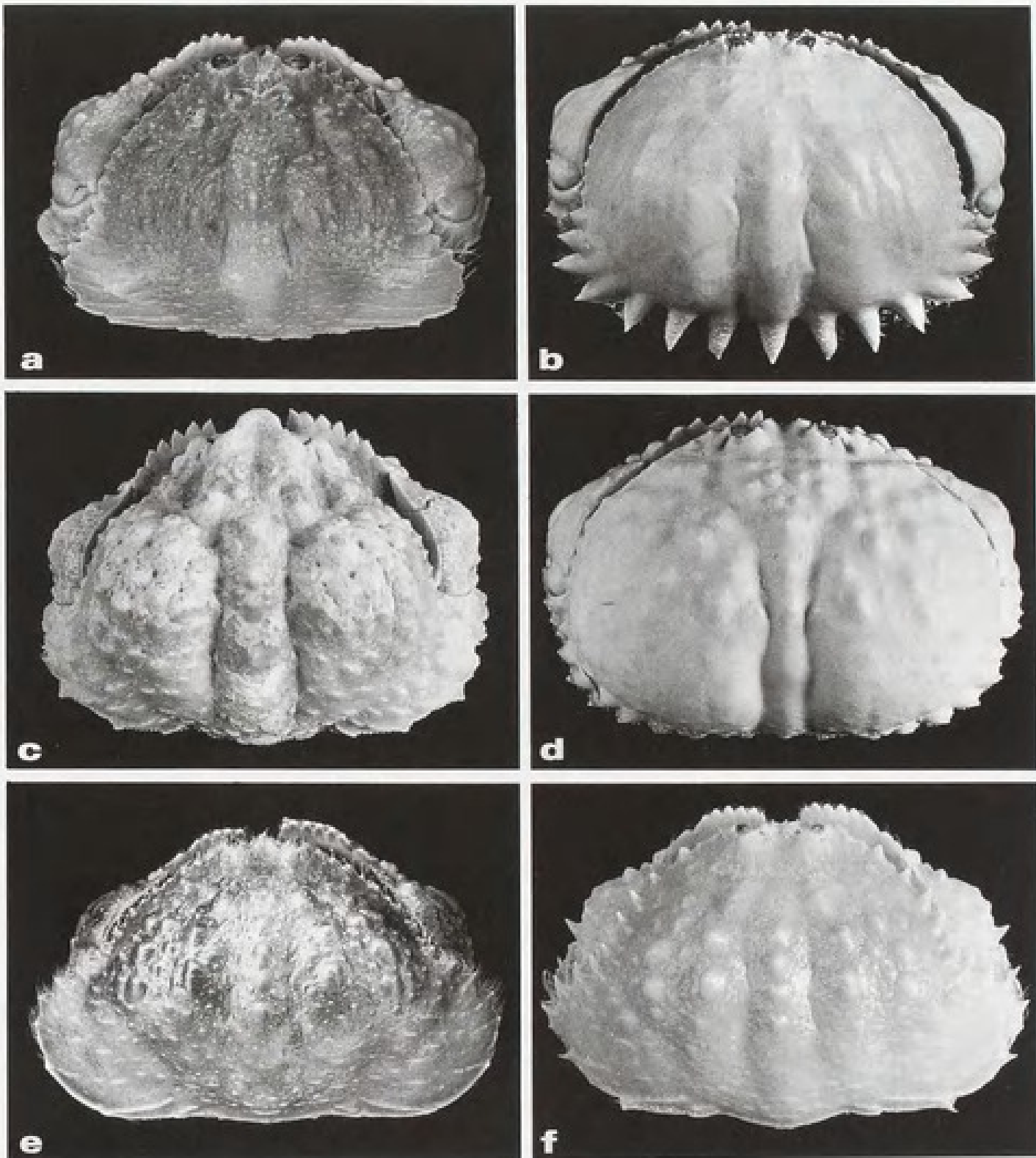


FIG. 10. — Whole crab, dorsal view: a, *Calappa depressa* Miers, 1886, ♂ 24.8 mm, New Caledonia, 20°01.8'S, 161°33.1'E (MNHN). — b, *Calappa dumortieri* Guinot, 1962, ♀ 67.1 mm, Assab (MF 1512). — c, *Calappa gallus* (Herbst, 1803), ♀ 53.3 mm, South Africa (SAM 462). — d, *Calappa japonica* Ortmann, 1892, ♂ 58.4 mm, Bay of Bengal, syntype of *C. exhamentosa* (NHM 1896.9.8.8). — e, *Calappa hepatica* (Linnaeus, 1758), ♂ 46.2 mm, New Caledonia, Platier de Touaourou (MNHN); f, *idem*, ♀ 32.8 mm, Aldabra, Île Picard (USNM 268809).

Red Sea. 1897, coll. F.P. JOUSSEAUME, det. G. NOBILI: 1 ♂ damaged (MNHN-B 13465). — 1957-58, coll. A. BEN TUVIA: 1 ♂ 42.9 mm (RMNH 25609). — Eilat: 1 ♀ 55 mm (TAU E58/86); 2 juv (TAU E58/86). — 5 m, October 1994, coll. N. POPPER: 1 ♀ 61.0 mm (TAU). — Eritrea, North Massawa Channel, 9.12.1957, coll. A. BEN TUVIA: 1 ♂ 48.5 mm, paratype (RMNH 16900). — S. Red Sea, 1957-58, coll. A. BEN TUVIA: 1 ♂ 62.0 mm, paratype (RMNH 16901). — Assab, 1880-1882, coll. RAGAZZINI: 1 ♀ 67.1 mm (MF 1512). — 1884, coll. SCARDUCCI: 1 ♀ 64.4 mm (MF 783). — 16.01.1966, coll. B. DE WILDE: 1 ♂ 64.2 mm (RMNH 25570).

Gulf of Aden. 12°03.9'N, 44°47.7'E, 76 m, "Meteor", stn 283, 16.03.1987: 1 ♂ damaged (SMF). — nr Djibouti, 12°21.2'N, 43°27.1'E, 35-45 m, "Meteor", stn 236, 6.03.1987: 1 ♀ 80.6 mm (SMF).

DESCRIPTION. — Carapace convex, 1.4 wide as long, frontal and epigastric regions minutely granulate. Front with two triangular teeth. Anterior margin of basal antennal article concave, proximal lobe dilated, peduncle emerging from distal angle. Afferent branchial canal ending below orbit in granulate tridentate process. Endostomial septum visible with first maxillipeds closed, with convex anterior margin. Distal margin of first maxillipeds obliquely cut, anterointernal angle acute. Branchial ridges indistinct, anteriorly with few flattened tubercles. Anterolateral margin carinate, unevenly granulate. Posterolateral margins setose, with four marginally beaded lacinate teeth, distalmost largest, and three elongate, granulate, conical teeth. Posterior margin with long, conical, granulate median tooth. Merus of cheliped distally with quadrilobate lamina, two distalmost acuminate. External surface of chela minutely granulate, vertically traversed by three nearly flattened tubercles. Crest of larger chela cut into seven teeth increasing in size distally, proximalmost bicuspidate. Granulate, tuberculate ridge running subparallel to beaded lower margin, from proximal keel-like tooth to base of pollex. Lower margin narrow, two beaded files contiguous distally. First male pleopod markedly curved distad, tapering apically to narrow spinulate tip, second pleopod slender, slightly curved, tip short, digitate.

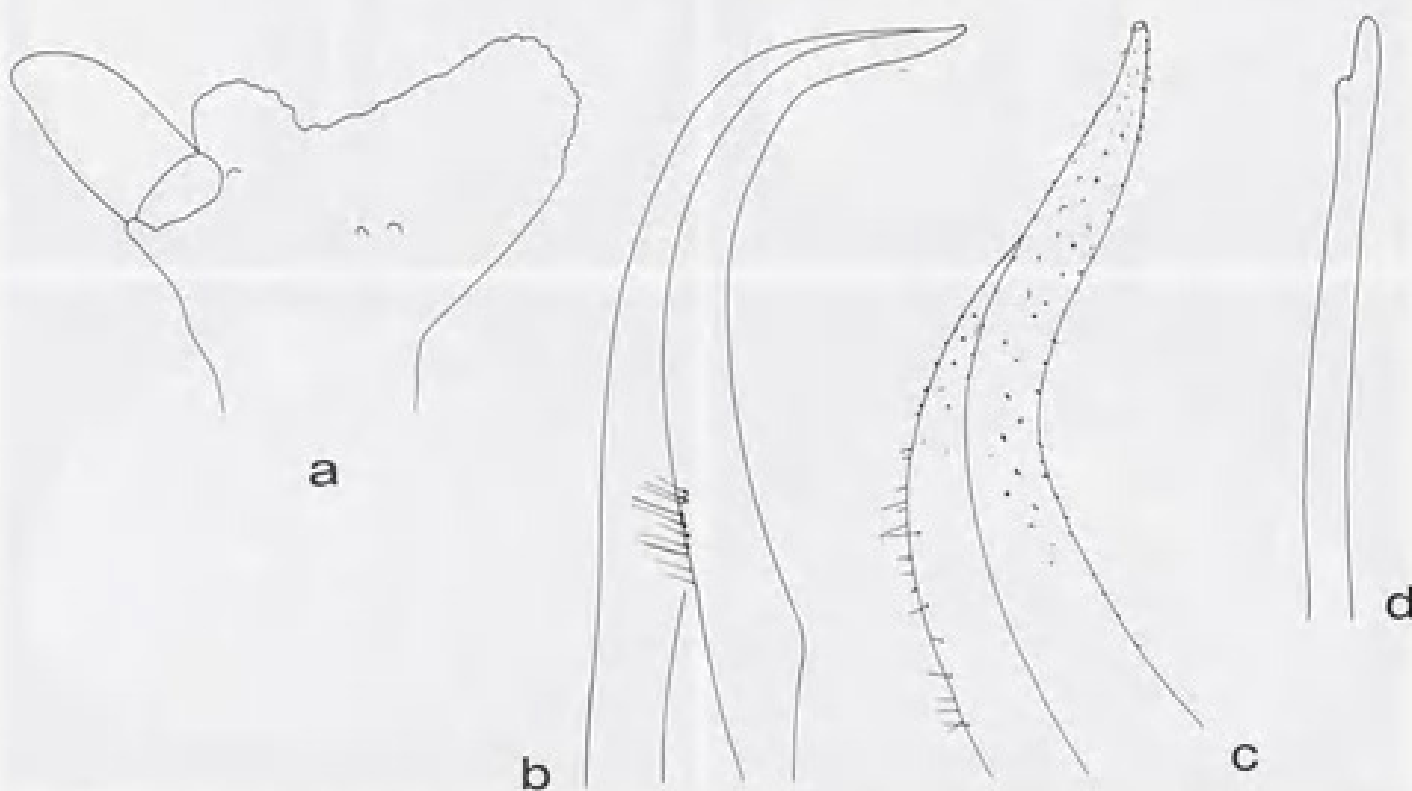


FIG. 11. — *Calappa dumortieri* Guinot, 1962, ♂ 64.2 mm, Red Sea (RMNH 25570): a, first article of antenna; b-c, first pleopod male with enlargement of distal part; d, second pleopod male, enlargement of distal part.

Color. — Carapace and chelae densely covered with numerous rich brown spots on pale background, leaving clear thin wavy lines, spots larger near posterolateral margins; posterolateral teeth pale yellow, wide brown lines on grooves separating teeth; brown reticulation on inner surface of chela.

REMARKS. — H. MILNE EDWARDS' drawing of *C. cristata* (1840, pl. 20 fig. 1) is quite accurate, but for the color scheme. According to GUINOT (1962), *C. dumortieri* is distinguished from the closely related *C. philargius* in having longer spiniform teeth on posterior margin, spinose interior angle anteriorly on first maxilliped endopod rather than obliquely truncate anterior margin, lesser pubescence on third maxilliped, and granulate tubercles on ridge running parallel to larger chela lower margin. *C. dumortieri* lacks the conspicuous maroon crescents near eyes and large maroon spots on chelipeds characteristic of *C. philargius*, rather its carapace and chelae are covered with numerous brown dots, posterolateral teeth yellow.

DISTRIBUTION (fig. 30). — Red Sea and Somalia, 5-76 m.

Calappa gallus (Herbst, 1803)

Fig. 10 c, 12, 13 c, 31

Cancer gallus Herbst, 1803: 18, 46, pl. 58 fig. 1.

Cancer (Calappa) gallus - LATREILLE, 1817: 24.

Gallus gallus - DE HAAN, 1837: 70.

Calappa gallus - H. MILNE EDWARDS, 1837: 105. — WHITE, 1847: 45. — DANA, 1853: 393. — A. MILNE EDWARDS, 1862: 10; 1874: 55. — BRITO CAPELLO, 1871: 133, pl. 2 figs 4, 14. — HOFFMANN, 1874: 26. — RICHTERS, 1880: 157. — MULLER, 1887: 473. — DE MAN, 1888a: 388; 1888b: 197. — ORTMANN, 1892: 567. — HENDERSON, 1893: 395. — ALCOCK, 1896: 146. — NOBILI, 1899: 249; 1906: 148. — THURSTON, 1890: 82. — DOPLEIN, 1900: 137. — BORRADAILE, 1903: 436. — LENZ, 1905: 346. — KLUNZINGER, 1906: 61, pl. 2 fig. 14. — LAURIE, 1906: 354; 1915: 409 (list). — RATHBUN, 1906: 887; 1911: 197. — IHLE, 1918: 181. — SAKAI, 1936: 47, text-fig. 10; 1937: 94, pl. 17 fig. 2; 1965: 55, pl. 2 fig. 3; 1976: 131, pl. 39 fig. 2. — ESTAMPADOR, 1937: 515. — STEPHENSEN, 1945: 65. — SOKOLOWSKY, 1945: 65, pl. 1 figs 4-6. — BARNARD, 1947: 372; 1950: 350, figs 66e-i (part). — LIN, 1949: 13 (list). — DAWYDOFF, 1952: 139. — UTINOMI, 1956: 70, pl. 35 fig. 6. — MICHEL, 1964: 36. — GUINOT, 1967a: 245. — SERÈNE, 1968: 41 (list). — ZARENKOV, 1971: 170. — TAKEDA, 1982: 106, fig. 311. — MIYAKE, 1983: 19, 199, pl. 7 fig. 2. — DAI *et al.*, 1986: 94, text-fig. 51. — TAKEDA & SHIKATANI, 1990: 478. — TIRMEZI & KAZMI, 1991: 54, fig. 16. — DAI & YANG, 1991: 105, text-fig. 51. — CHEN, 1993: 683, fig. 5.

Calappa lophos - BUITENDIJK, 1939: 231 pl. 8 fig. 5 (part). [Non Herbst, 1782].

Not *Calappa gallus* - MIERS, 1886: 286. — OSORIO, 1887a: 227; 1887b: 188; 1889: 135; 1890: 47; 1898: 193. — RATHBUN, 1897: 36; 1898a: 609; 1898b: 290; 1900: 297; 1902a: 85; 1920: 15; 1921: 66; 1936: 388; 1937: 214, pl. 65 figs 2-3. — BOUVIER, 1907: 496; 1922: 57. — BALSS, 1921: 50. — MONOD, 1927: 606; 1928: 116, figs 2b, 3, 9d; 1956: 100, figs 115-116; 1967: 178. — ROSSIGNOL, 1957: 76, 127 (key), fig. 1; 1962: 114. — LONGHURST, 1958: 87. — GAULD, 1960: 68. — GUINOT & RIBEIRO, 1962: 26. — RIBEIRO, 1964: 4; 1973: 5. — CHACE, 1966: 636. — FOREST & GUINOT, 1966: 51. — FILHO, 1967: 41 (list). — COELHO, 1971: 234 (list). — COELHO & RAMOS, 1972: 180. — MANNING & HOLTHUIS, 1981: 51 (= *C. galloides* Stimpson, 1859 *vide* MANNING & CHACE, 1990: 45).

MATERIAL EXAMINED. — Red Sea. Sharm el Naga, 33 kms S Hurgada, 28-31.08.1988, colls J. GOUD & W. VAN DONGEN, det. L.B. HOLTHUIS: 1 ♀ (RMNH 38534).

Gulf of Aden. nr Djibouti, 12°21.2'N, 43°27.1'E, 35-45 m, "Meteor", stn 236, 6.03.1987: 1 ♀ 80.6 mm (SMF).

Seychelles. S.W. La Digue I., 4°23'S, 55°49'E, 30 m, 23.12.1992, coll. "Tyro" Exped.: 1 ♂ 22.9 mm (RMNH).

Mozambique Channel. Europa I., coll. P. FOURMANOIR: 2 ♀ 21.9, 37.5 mm (MNHN).

South Africa. Port Shepstone: 1 ♀ 53.3 mm (SAM 462).

Madagascar. North-west coast: Nosy Be, intertidal, coll. M. CHAVANE: 1 ♂ (broken) (MNHN). — Nosy Be, intertidal, December 1958, coll. A. CROSNIER: 3 ♀ 13.1-27.7 mm (MNHN). — 13°17.5'S, 48°07'E, 30 m, 24.08.1967, coll. R. PLANTE: 1 ♂ 44.9 mm; 1 ♀ 22.8 mm (MNHN). — West coast: Tuléar, 1976, coll. P. GALENON: 1 ♀ 35.8 mm (MNHN).

Glorieuses Is. Intertidal, 30.01.1971, coll. A. CROSNIER: 1 ♀ 24.6 mm (MNHN).

Mauritius. Det. HERKLOTS as *C. (Gallus) gallus*: 1 dry specimen (RMNH 43071).

Indonesia. Moluccas, Ambon, 9 m, 4.07.1956: 1 ♂ 43.7 mm (MNHN-B 13461). — Timor, nr Koepang, 4.12.1929, coll. & det. A.M. BUITENDIJK as *C. lophos*: 1 juv. (RMNH 4238). — Irian Jaya, Manokwari, 1962, coll. D. SMITS: 1 ♀ 28.8 mm (RMNH 17739).

Japan. Shikoku I., E. of Cape Muroto, 21.10.1973, coll. K. MATSUZAWA, det. K. SAKAI: 1 ♀ 43.0 mm (SMF).

New Caledonia. Coll. A. MILNE EDWARDS, det. E.L. BOUVIER: 2 ♂ 22.4, 32.3 mm (MNHN 48); 1 juv. (MNHN 47).

Tonga Is. Nukualofa, 6 m, January 1956: 1 ♀ damaged (ZM CRU1816).

Hawaii. "Albatross" stn 4061: 1 ♂ 40.1 mm (USNM 29892). — Honolulu, 1915, coll. Th. MORTENSEN: 1 ♂ 39.6 mm; 1 ♀ 44.5 mm (ZM CRU1812).

DESCRIPTION. — Carapace convex, 1.3 wide as long, surface rugose. Hepatic region markedly depressed. Gastric, cardinal regions delimited by deep longitudinal grooves. Branchial, gastric regions with flattened tubercles, posteriorly transversed by beaded carinae. Front projecting, truncate. Basal antennal article closely granulate, anterior margin concave, peduncle emerging from distal angle. Endostomial septum visible with first maxillipeds closed, with convex anterior margin. Distal margin of first maxillipeds obliquely cut, anterointernal angle acute. Anterolateral margin sinuous, carinate, unevenly granulate. Posterolateral margin setose, with three small, marginally granulate teeth anteriorly, and three shallow, medially beaded teeth posteriorly. Posterior margin marginally beaded, sinuous. Merus of cheliped distally with quadrilobate lamina. External surface of chela minutely granulate, obliquely traversed by rounded tubercles, largest near upper crest. Crest of larger chela cut into seven teeth increasing in size distally, proximalmost flattened. Lower margin with two beaded files. First male pleopod stout, slightly curved, tapering apically, distally spinulate; second pleopod slender, curved, with subdistal denticulate flange and digitate tip.

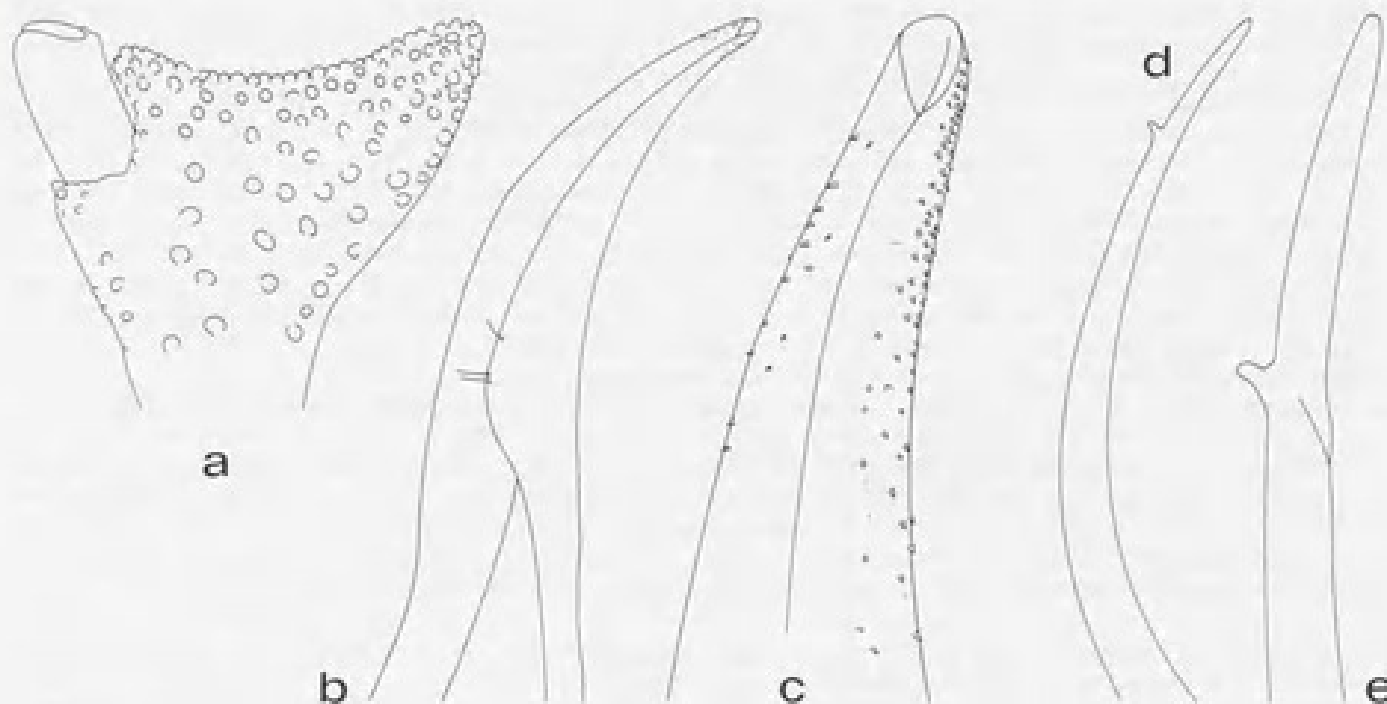


FIG. 12. — *Calappa gallus* (Herbst, 1803), ♂ 44.9 mm, Madagascar, 30 m (MNHN): a, first article of antenna; b-c, first pleopod male with enlargement of distal part; d-e, second pleopod male with enlargement of distal part.

Color. — Legs yellow, chelipeds and carapace mottled yellowish-reddish and greyish-brown; undersurface mottled yellow and white. Color photographs in TAKEDA (1982, fig. 311), MIYAKE (1983, pl. 7 fig. 2).

REMARKS. — HERBST (1803) described *C. gallus* as differing from its congeners in its markedly beveled anterior carapace, thick, truncate front, and black fingers. However, the presence of an Atlantic species - *C. galloides* Stimpson, 1859 - which shares these characters, gave rise to confusion. Since both HERBST's and STIMPSON's types were lost, many authors presumed, like RATHBUN (1937), that *C. gallus* is a widely distributed species in which the "carapace varies in relative length and breadth due to the greater or less convexity; in size and prominence of dorsal tubercles; and in distinctness of rostral teeth, some having four teeth, others having no median sinus, or the lateral teeth slightly developed", and that "The variations do not correspond with geographical regions".

DANA (1853) erroneously cited RUPPELL's *Krabben des rothen Meeres* (1830: 18, pl. 4 fig. 5) in his list of synonymies and RICHTERS obviously copied it without checking.

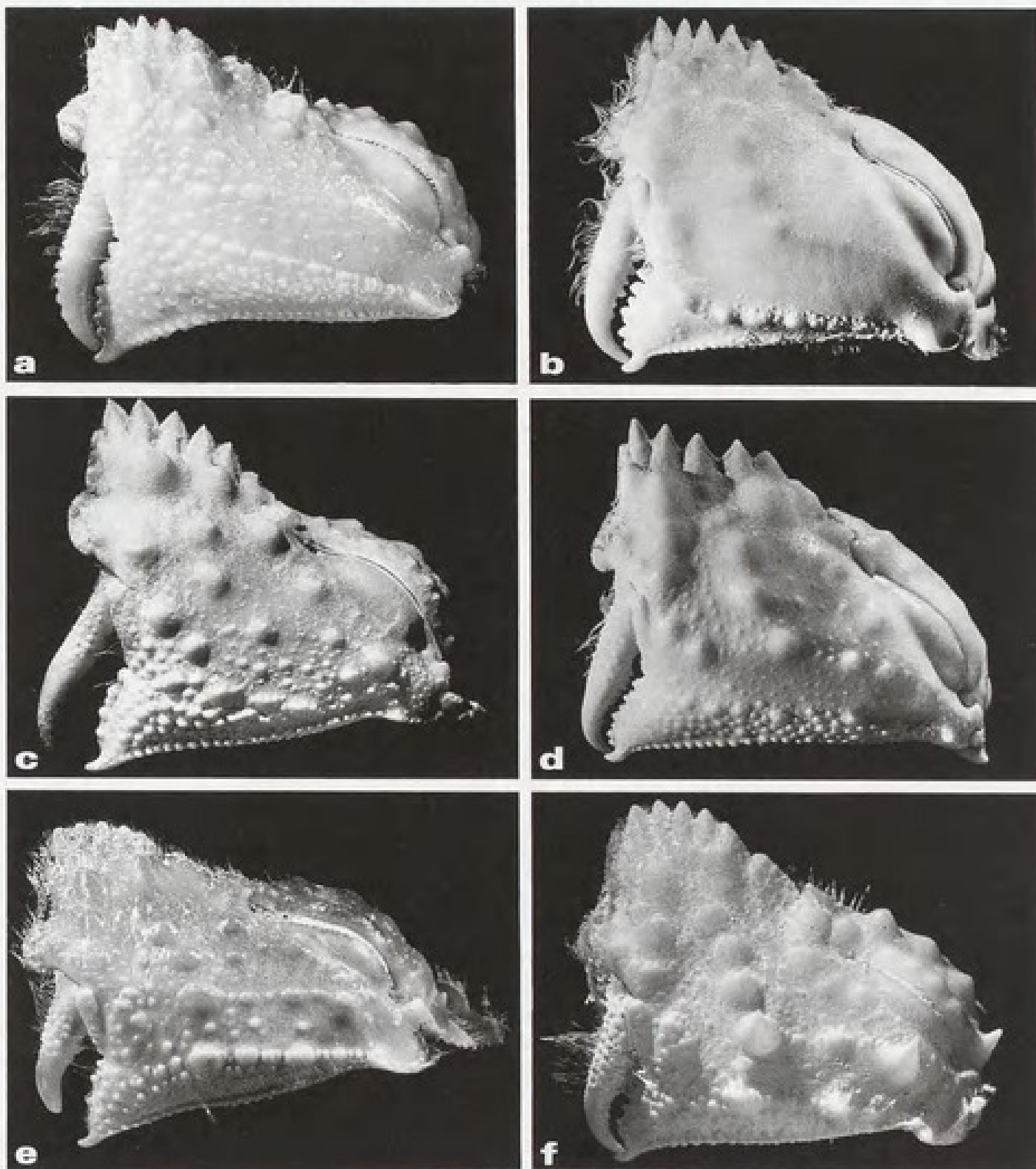


FIG. 13. — Cheliped, external view: a, *Calappa depressa* Miers, 1886, ♂ 24.8 mm, New Caledonia, 20°01.8'S, 161°33.1'E (MNHN). — b, *Calappa dumortieri* Guinot, 1962, ♀ 67.1 mm, Assab (MF 1512). — c, *Calappa gallus* (Herbst, 1803), ♀ 53.3 mm, South Africa (SAM 462). — d, *Calappa japonica* Ortmann, 1892, ♂ 58.4 mm, Bay of Bengal, syntype of *C. exhamentosa* (NHM 1896.9.8.8). — e, *Calappa hepatica* (Linnaeus, 1758), ♂ 46.2 mm, New Caledonia, Platier de Touaourou (MNHN); f, *idem*, ♀ 32.8 mm, Aldabra, Ile Picard (USNM 268809).

Of BUITENDIJK's (1939) material from Timor identified as *C. lophos*, the specimen that appears in pl. 8 fig. 5 was redetermined as *C. gallus*.

DISTRIBUTION (fig. 31). — Red Sea, Seychelles and Madagascar, to New Caledonia and Hawaii. On sandy, muddy, shelly bottoms, coral reefs, intertidal - 160 m.

Calappa hepatica (Linnaeus, 1758)

Fig. 10 e-f, 13 e-f, 14, 31

Cancer hepaticus Linnaeus, 1758: 630; 1764: 448; 1767: 1048.

Cancer tuberculatus Herbst, 1785: 204, pl. 13 fig. 78. — FABRICIUS, 1793: 454. — BOSC, 1802: 183.

Calappa tuberculata - WEBER, 1795: 92. — FABRICIUS, 1798: 345. — BOSC, 1802: 183; 1830: 213. — LATREILLE, 1803: 392; 1806: 28; 1829: 139. — DESMAREST, 1825: 109, pl. 10 fig. 1. — H. MILNE EDWARDS, 1837: 106. — EYDOUX & SOULEYET, 1842: 245. — KRAUSS, 1843: 52. — WHITE, 1847: 45. — GIBBES, 1850: 183. — HERKLOTS, 1851: 24. — DANA, 1853: 393. — STIMPSON, 1859a: 162; 1907: 165. — HELLER, 1861b: 372; 1865: 69. — HESS, 1865: 157. — MARTENS, 1866: 381. — A. MILNE EDWARDS, 1868: 72; 1874: 55. — HILGENDORF, 1869: 92; 1878: 809. — BRITO CAPELLO, 1871: 133, pl. 2 fig. 8, 13. — HOFFMAN, 1874: 25, pl. 6 figs 39-44. — BROCCHI, 1875: 101, pl. 18 figs 160-161. — PAULSON, 1875: 74, 75, pl. 9 fig. 5. — KOSSMANN, 1877: 63. — STREETS, 1877: 116. — DE MAN, 1880: 184; 1888a: 388. — NAUCK, 1880: 46. — RICHTERS, 1880: 157. — LENZ & RICHTERS, 1881: 425. — MÜLLER, 1887: 473. — SERÈNE, 1937: 78; 1968: 41 (list). — DAWYDOFF, 1952: 139. — ZIMSEN, 1964: 647.

Calappa tuberculosa Guérin Méneville, 1829, pl. 12 figs 2a-b.

Calappa (Calappa) hepatica - DE HAAN, 1837: 70. — HERKLOTS, 1861: 25.

Calappa spinosissima H. Milne Edwards, 1837: 106. — A. MILNE EDWARDS, 1847: 55. — RICHTERS, 1880: 157. — ALCOCK, 1896: 144.

Calappa sandwichien Eydoux & Souleyet, 1842, pl. 3 figs 9-10.

Calappa hepatica - WHITE, 1847: 44. — MIERS, 1876: 55; 1877: 238; 1879: 491; 1884: 257, 550; 1886: 285. — HILGENDORF, 1879: 809. — HASWELL, 1882: 136. — FILHOL, 1886: 406. — CANO, 1889a: 94; 1889b: 249. — WHITELEGGE, 1889: 231. — THURSTON, 1890: 82. — THALLWITZ, 1891: 52. — ORTMANN, 1892: 568. — HENDERSON, 1893: 395. — ALCOCK & ANDERSON, 1895: 203. — ALCOCK, 1896: 142. — DE MAN, 1896: 360; 1902: 687. — NOBILI, 1899: 249; 1900: 496; 1906: 148. — CALMAN, 1900: 25. — SCHENKEL, 1902: 574. — BORRADAILE, 1903: 436, pl. 22 fig. 6. — LENZ, 1905: 346. — GRANT & McCULLOCH, 1906: 24. — RATHBUN, 1906: 887; 1911: 197. — KLUNZINGER, 1906: 60. — STEBBING, 1910: 333. — PESTA, 1911: 37. — PARISI, 1914: 285. — BOUVIER, 1915: 215. — LAURIE, 1915: 409, 427. — BALSS, 1915: 15; 1922: 123; 1938: 8. — IHLE, 1918: 183, fig. 80. — GRAVIER, 1920: 379. — McNEILL, 1926: 306. — URITA, 1926: 36. — GRAVELY, 1927: 142, pl. 22 fig. 27. — MONOD, 1928: 124, fig. 13a. — WARD, 1928: 243, pl. 27; 1941: 1; 1942: 69. — McNEILL & WARD, 1930: 373. — ANDRÉ, 1931: 639. — STEPHENSON *et al.*, 1931: 44, 52. — BOONE, 1934: 32, figs 8-10; 1938: 212. — GORDON, 1934: 73. — SAKAI, 1934: 284; 1936: 44, text-fig. 7; 1937: 89, pl. 12 fig. 2; 1956: 8; 1960: 33, pl. 16 fig. 4; 1965: 55; 1976: 128, pl. 38 figs 1, 3. — MIYAKE, 1936: 507; 1939: 198; 1983: 20, pl. 7 fig. 6. — MONOD, 1935: 96. — CHOPRA & DAS, 1937: 382. — SERÈNE, 1937: 78. — ESTAMPADOR, 1937: 515. — BUITENDIJK, 1939: 230. — SOKOLOWSKY, 1945: 62. — STEPHENSEN, 1945: 65. — LIN, 1949: 13 (list). — BARNARD, 1950: 348, figs 66a-d. — TWEEDIE, 1950: 106. — DAWYDOFF, 1952: 139. — HOLTHUIS, 1953: 3; 1958a: 45. — STELLA, 1953: 58. — FOREST & GUINOT, 1961: 11, figs 1a-b, 2. — TYNDALE-BISCOE & GEORGE, 1962: 69. — SANKARANKUTTY, 1961: 135; 1962: 152. — MICHEL, 1964: 37. — GARTH, 1965: 7, figs 9-10. — GUINOT, 1967: 245 (list). — ROMIMOHTARTO, 1967: 4. — McNEILL, 1968: 43. — KIM, 1970: 11. — ZARENKOV, 1971: 170. — TAKEDA, 1973: 83; 1982: 105, fig. 307. — TAKEDA & NUNOMURA, 1976: 65. — SHIRAI, 1980: 415. — DAI *et al.*, 1986: 91, fig. 49, pl. 11 fig. 3. — NOMURA *et al.*, 1988: 18. — TAKEDA & SHIKATANI, 1990: 478. — DAI & YANG, 1991: 102, fig. 49, pl. 11 fig. 3. — CHEN, 1993: 677.

Calappa uberculata - HELLER, 1861a: 20 [erroneous spelling].

Calappa spinosissimus - STEBBING, 1917: 19.

Cancer alata - CURTISS, 1938: 170. [Non Rathbun, 1911].

Calappa hepatica var. *spinosissima* - BUITENDIJK, 1939: 231.

Calappa hepatica hepatica - SERÈNE, 1968: 41 (list).

Calappa hepatica spinosissima - SERÈNE, 1968: 41 (list).

MATERIAL EXAMINED. — Red Sea, det. HERKLOTS as *C. (Calappa) Hepatica*: 1 dry specimen (RMNH 43098). — 1846-1854, coll. L.W. RUYSSENAERS, det. L.B. HOLTHUIS: 3 dry specimens (RMNH 43094). — 1880, coll. R. KOSSMANN: 1 ♂ (RMNH 3113). — Gulf of Eilat, November 1956: 1 ♂ 31.8 mm (TAU NS21299). — Eilat, 8.07.1969, coll.

D. POPPER: 3 ♂ 19.1-19.4 mm; 4 ♀ 23.6-34.6 mm; 2 parasitised (TAU NS7288). — 20.06.1986: 2 ♂ 29.6, 32.0 mm (TAU). — Coll. L. FISHELSON: 1 ♂ 27.0 mm (TAU NS21294). — Ras Burqa, 28.04.1973, coll. L.B. HOLTHUIS: 1 ♂ 27.3 mm (RMNH 29231). — Nabeg, 9.06.1975: 1 ♂ 32.4 mm (TAU NS21298). — 3 km S Nabeg, sand, 0-0.5 m, 8.11.1981, colls L.B. HOLTHUIS & Ch. LEWINSOHN: 7 ♂ 17.3-35.9 mm; 3 ♀ 22.1-32.9 mm; 2 juvs (TAU NS21292). — Mersa Mukabeila, July 1977, coll. N. GUNDERMAN: 1 ♂ 30.1 mm (TAU NS21297). — Shurat el Manqata, intertidal flat, 25.04.1976, colls L.B. HOLTHUIS & Ch. LEWINSOHN: 1 ♂ 39.7 mm (TAU NS21290). — Abu Zabad, 1.01.1957, coll. H. STEINITZ: 1 ♂ 34.6 mm (RMNH 12135). — Dahab, 26-27.04.1973, coll. & det. L.B. HOLTHUIS: 4 dry specimens (RMNH 43099). — Tiran I., 23.09.1981, coll. A. KELLER: 1 ♀ 26.9 mm (TAU). — Mingar, 5 km off Hurgada, rocky platform, 25.08.1988, colls J. GOUD & W. VAN DONGEN, det. L.B. HOLTHUIS: 1 ♂ (RMNH 38558). — Sudanese Red Sea, October 1904 - May 1905, coll. C. CROSSLAND: 2 ♂ 22.0, 21.0 mm (NHM 1934.1.17.4-6). — Mersa Makdah, 16.02.1905, coll. C. CROSSLAND: 2 juvs (NHM). — WE Shubuk, 16.02.1905, coll. C. CROSSLAND: 2 juvs (NHM). — Eritrea, Dahlak Archipelago, Entedebir I., Landing Bay, 0-2 m, 20.10.1965, coll. ISRSE: 1 ♀ 29.5 mm (TAU ISRSE1509). — Umm Aabak, 23.03.1962, coll. ISRSE: 1 ♀ 27.3 mm (RMNH 24860). — Harmil, coll. STEEN: 1 ♂ 27.3 mm (RMNH 25998). — Coll. ISRSE: 2 ♂ 15.1 and 15.8 mm; 3 juvs (RMNH).

Djibouti. Obock, 1897, coll. F.P. JOUSSEAUME, det. A. MILNE EDWARDS: 15 ♂ 15.0-32.5 mm; 3 ♀ 24.8-28.1 mm; 3 juvs (MNHN-B 16287). — Coll. "*Calypso*": 1 ♂ 23.4 mm (MNHN-B 19560). — Nr Djibouti, 12°21.2'N, 43°27.1'E, 35-45 m, "*Meteor*", stn 236, 6.03.1987: 9 juvs (SMF).

Socotra I. N. coast, 22-27 m, coll. H.M.S. "*Weston*": 1 ♀ 16.7 mm; 1 juv. (NHM).

Persian Gulf. Janah I., 11.10.1956, coll. C.E. DAWSON: 1 ♀ 22.2 mm (RMNH 16649).

Kenya. Tiwi Beach, 10 km S. of Mombasa, November 1969, coll. & det. L.B. HOLTHUIS: 1 dry specimen (RMNH 43104). — Mombasa, 1973, coll. J.O. YOUNG: 2 ♂ 39.2, 36.4 mm (NHM). — Bamburi Beach, 12 km N. of Mombasa, 10-15.12.1974, coll. & det. L.B. HOLTHUIS: 2 ♂ 38.2, 30.1 mm; 1 ♀ 25.5 mm (RMNH 29911). — 4 dry specimens (RMNH 43095). — Between Bamburi and Nyali, 10 km N. of Mombasa, 12.12.1974, coll. & det. L.B. HOLTHUIS: 1 dry specimen (RMNH 43096).

Tanzania. Bagamoyo, coll. H.W.P. VAN BARNEVELD, det. L.B. HOLTHUIS: 1 dry specimen (RMNH 43101).

Zanzibar. Don. SALMIN, 1864: 1 juv. (NMW10983). — 1864: 1 juv. (NMW 10983). — 7-9 m, coll. I. GORDON: 1 ♂ 15.1 mm (NHM 1964.7.1.119).

Seychelles. Coll. E. WRIGHT: 2 ♂ 34.9, 36.0 mm (NHM 1875.20). — St Joseph Atoll, 5°24'S, 53°20'E, reef flat, 27.12.1992, coll. "*Tyro*" Exped.: 1 ♂ 24.7 mm (RMNH). — Mahe, Beau Vallon, 4°37'S, 55°26'E, sandy shore with beachrock, 12.12.1992, coll. "*Tyro*" Exped.: 1 ♂ 26.3 mm (RMNH). — Mahe, Terang, coll. N. POLUNIN: 2 ♂ 38.2, 34.0 mm (NHM 1974.557). — Aldabra I., coll. J.D. TAYLOR: 1 juv. (NHM 1977.77). — Passe Gronnet, coll. J.D. TAYLOR: 1 juv. (NHM 1977.71). — Ile Picard, lagoon, 09°22.40'S, 46°14.40'E, 0-1 m, 3.12.1964, coll. "*Anton Bruun*", stn HA-16: 1 ♀ 32.8 mm (USNM 268809).

Mozambique. 3 ♂ 34.1-39.6 mm; 3 ♀ 23.4-32.2 mm (SAM 2212). — Coll. O.S. TATTERSAL: 2 ♂ 33.4, 34.1 mm; 1 ♀ 33.3 mm (NHM 1951.9.13.1-2). — Inhaca I., 22.02.1982, coll. J. WALENKAMP: 3 ♂ 25.9-35.2 mm (RMNH). — Ponta Punduini, 27.07.1982, coll. J. WALENKAMP: 1 ♀ (RMNH). — W coast, 11.01.1983: 1 ♂; 1 ♀ (RMNH). — Ponta Rana, 1.08.1984, coll. J. WALENKAMP: 1 ♂ 32.4 mm (RMNH). — Tidal flat, 2.08.1984, coll. J. WALENKAMP: 1 ♂ 30.2 mm; 1 ♀ 34.9 mm (RMNH). — Tidal flat, 3.08.1984, coll. J. WALENKAMP: 1 ♂ 27.4 mm (RMNH). — 13.08.1984, coll. J. WALENKAMP: 1 ♀ (RMNH). — 8.01.1986: 1 ♂ 22.9 mm (RMNH).

South Africa. Durban, coll. & det. STEBBING as *C. spinosissimus*: 1 ♀ 16.9 mm (NHM 1928.12.1.209). — 1 ♂ 41.4 mm (NHM 1928.12.1.208). — Natal: 1 ♂ 35.2 mm; 2 ♀ 32.8, 25.2 mm (NHM 1896.9.30.1-3).

Madagascar. 1903, det. H. BALSS: 1 ♂, 1 specimen damaged (MNHN-B 16317). — 1871, coll. M. LANTZ, det. H. BALSS: 6 ♂ 25.7-44.9 mm (MNHN-B 16306). — 2 ♂ 29.8, 33.9 mm (MNHN). — *East coast*: Diégo Suarez, 1919, coll. Li R. DECARY: 5 ♂ 19.0-35.7 mm; 1 ♀ 39.3 mm (MNHN-B 56). — Ivongo, det. A. CROSNIER: 1 ♀ 42.0 mm (MNHN). — Ile Sainte Marie, intertidal, coll. A. CROSNIER: 1 ♂ 39.6 mm (MNHN). — *North-west coast*: Nosy Be, 16.08.1958, coll. & det. A. CROSNIER: 5 ♂ 11.5-27.1 mm; 3 ♀ 18.2-21.4 mm (MNHN). — Nosy Be, intertidal, coll. A. CROSNIER: 1 ♂ 28.5 mm (MNHN). — Nosy Be, intertidal, coll. A. CROSNIER: 1 ♂ 28.3 mm; 1 ♀ 24.2 mm (MNHN). — East of Nosy Be, 8 m, May 1958, coll. & det. A. CROSNIER: 3 ♀ 26.1-37.0 mm (MNHN). — *West coast*: Morombe, coll. B. KOECHLIN: 1 specimen (MNHN-B 16314). — Tuléar, intertidal, October 1958, coll. & det. A. CROSNIER: 2 ♂ 19.6, 41.0 mm (MNHN).

Glorieuses Is. Grande Glorieuse, 30.01.1971, intertidal, coll. A. CROSNIER: 1 ♂ 22.8 mm (MNHN).

Mauritius. coll. de BELLOQUET: 4 specimens (MNHN-B 4078); 4 ♂ 40.8-46.6 mm (MNHN-B 70). — coll. REGNARD: 1 ♂ 44.3 mm; 1 ♀ 40.6 mm (ZM CRU1810). — Grand Bay, 4 m, sand, 4.10.1929, coll. Th. MORTENSEN: 12 juvs (ZM CRU1833). — October 1929, coll. Th. MORTENSEN: 2 ♂ 6.2, 43.9 mm; 1 juv. (ZM CRU1813). — Cannonius Pt., sand, October 1929, coll. Th. MORTENSEN: 1 ♂ 42.8 mm (ZM CRU1834). — Tourneau I., 20.10.1960, coll. C. MICHEL: 1 ♀ 37.6 mm (RMNH 17538). — Flic en Flac, 1-15.05.1995, coll. B. GALIL: 2 ♂ 40.1, 42.7 mm; 1 ♀ 48.4 mm; 1 juv. (NHM).

Maldives Is. 15.01.1957, sand, coll. W.W. PHILIPS: 2 ♂ 41.7, 40.8 mm (NHM 1957.6.21).

Chagos Arch. Diego Garcia, coll. J.D. TAYLOR: 1 ♂ 33.5 mm (NHM 1969.1170.1).

India. Palk Str., Pamban, coll. E. THURSTON: 2 ♀ 46.1, 47.9 mm (NHM 1890.10.20).

Sri Lanka. 1 ♂ 32.3 mm (NHM 1894.8.1.14). — Krusadai, 12-16.10.1951, coll. H. LEMCHE: 1 ♂ 51.3 mm (ZM CRU1801).

Thailand. N.W. corner of Koh Lon I., 24.02.1966, 5th Thai-Danish Exped.: 1 ♂ 39.6 mm (ZM CRU1805).

Cocos-Keeling Is. Coll. J. GRANT: 1 ♂ 41.4 mm; 1 ♀ 35.4 mm (NHM 1926.8.24.1-2).

Malaysia. Borneo, Sabah, Bohaydolong, coll. D. GEORGE: 1 ♂ 39.1 mm (NHM 1985:17). — 1 ♂ 39.5 mm; 1 ♀ 30.9 mm (NHM 1985:19).

Indonesia. 23 dry specimens (RMNH 43091). — 18 m, "Challenger": 1 ♀ 36.5 mm (NHM 1884:31). — April 1915, coll. P. BUITENDIJK: 1 ♂; 2 ♀ (RMNH 3112). — 1915, coll. P. BUITENDIJK: 1 ♂ 35.3 mm (RMNH 3109). — Natuna Is., coll. SHELFORD: 1 ♀ 36.3 mm (NHM 1900.12.1.25). — February 1922, coll. Th. MORTENSEN: 1 ♂ 34.8 mm (ZM CRU1823).

Sumatra. Poeloe Weh, October 1923, coll. P. BUITENDIJK: 1 ♀ (RMNH 3111).

Java: 1816-1822, coll. C.G.C. REINWARDT, det. HERKLOTS as *C. (Calappa) Hepatica*, redet. L.B. HOLTHUIS: 12 + 1 *spinossissima* dry specimens (RMNH 43090).

Komodo I. Slawi Bay, 8°34.5'S, 119°31.3'E, sublittoral, 17.09.1984: 1 ♂ 19.0 mm (RMNH).

Moluccas. Ambon, coll. E.W.A. LUDEKING: 1 ♀ 28.0 mm (RMNH 3107). — Waihai, coll. E.W.A. LUDEKING: 1 ♀ (RMNH 779). — Banda Is., Lontor, 6.06.1922, on beach at low tide, coll. Th. MORTENSEN: 2 ♂ 23.7 and 29.0 mm; 1 ♀ 39.5 mm (ZM CRU1827). — 7.06.1922, coll. Th. MORTENSEN: 3 ♂ 30.0-34.4 mm; 4 ♀ 19.8-35.1 mm (ZM CRU1826).

Timor. Kisar I., N.E. of Timor, 1898, coll. K. SCHADLER, det. L.B. HOLTHUIS: 1 dry specimen (RMNH 43100).

Irian Jaya. Sekroe, 1897, coll. K. SCHADLER, det. L.B. HOLTHUIS: 2 dry specimens (RMNH 43089). — Padoado I., Mios Woendi, 1/2 m. SE Oeriv I., 7-10 m, 28.01.1956, det. L.B. HOLTHUIS: 1 dry specimen (RMNH 43097). — Fakfak, 1952-55, coll. S. WOLF: 1 ♀ 38.2 mm (RMNH 25997). — Kampong Saba, S.E. Biak, 30.03.1952, coll. G. VAN DEN HOEK: 1 ♀ 34.8 mm (RMNH 13002).

"*Snellius*" EXPED.: Sulawesi, Paleleh, 22.08.1929: 1 ♀ 29.2 mm (RMNH 4215). — Kafal, Misool grp., 3-5.10.1929: 1 ♂ 22.0 mm (RMNH 4218). — Kera, nr Timor, 11-16.11.1929: 1 ♀ 31.8 mm (RMNH 4221); 1 ♀ 30.8 mm (RMNH 4236). — 22-23.11.1929: 2 ♂ 26.3, 18.0 mm; 1 ♀ 28.8 mm (RMNH 4222). — Timor, Koepang, 2.12.1929: 1 ♂ 19.1 mm (RMNH 4224).

RUMPHIUS EXPED. **Moluccas:** Ambon, Batumerah, littoral, 9.11.1990: 1 ♂ 29.9 mm (RMNH). — Pombo, 15.11.1990, coll. C. VAN EGMOND: 1 ♀ 23.4 mm (RMNH). — Littoral, 21.11.1990: 3 ♀ 24.1-18.8 mm (RMNH). — Ambon, littoral, 2.12.1990: 1 ♂ 31.6 mm; 2 ♀ 36.9, 41.8 mm (RMNH). — Rumahtiga, littoral, 3.12.1990: 2 ♂ 37.5, 35.3 mm (RMNH).

SULAWESI EXPED.: Bay of Tanjungnanas, 1°28'N, 125°13'E, muddy bay with algae, stones and coral patches, littoral, 12.13.19.10.1994: 2 ♂ 23.3, 26.8 mm (RMNH); — 1°30'N, 125°16'E, sandy bay, 0-5 m, 22.10.1994: 1 ♀ 20.7 mm (RMNH). — Bay S of Pulau Putus, 1°31'N, 125°16'E, rocky shore and sandy beach, 14-27.10.1994: 1 ♀ 21.1 mm (RMNH). — Selat Lembah, Pulau Lembah, 1°29'N, 125°15'E, sandy bay, 5-10 m, 21.10.1994: 1 ♂ 15.9 mm (RMNH). — Bay of Tanjung, 1°26'N, 125°11'E, sandy and muddy bay littoral, 23.10.1994: 1 ♂ 13.3 mm (RMNH). — 1°28'N, 125°14'E, sandy beach, 5 m, 31.10.1994: 1 ♂ 34.6 mm (RMNH).

Papua New Guinea. Bismarck Is., Manus I., Ndrilo, 15.06.1962, coll. T. WOLFF: 1 ♂ 38.5 mm (ZM CRU1836).

Philippines. Mindoro, Puerto Galera, shore, 2.02.1929, coll. Th. MORTENSEN: 2 ♂ 19.5, 30.6 mm; 1 ♀ 23.9 mm (ZM CRU1835). — 20-21.06.1936, coll. G.R. OESCH: 1 ♂ 29.9 mm (AMNH 7722). — Gulf of Davao, Padada Beach, June 1939, coll. G.R. OESCH: 1 ♂ 36.1 mm (AMNH 10385). — July 1940, coll. G.R. OESCH: 1 ♂ 38.2 mm (AMNH 12877); 2 ♂ 27.8, 35.4 mm (AMNH). — Cebu, 1978, coll. V. STORCH, det. L.B. HOLTHUIS: 1 dry specimen (RMNH 43103).

Caroline Is. Coll. F.W. CHRISTIAN: 6 ♂ 27.0-40.3 mm; 4 ♀ 20.7-26.6 mm (NHM 1898.11.1.6-11).

Mariana Is. Saipan, Garapan, 12.08.1990, coll. A. ALLSPACH: 1 ♂ 47.5 mm (SMF 19499).

Bonin Is. 16.06.1913, coll. C.B. CLAUSEN: 2 ♂ 42.3, 45.1 mm (ZM CRU1799).

Japan. Kii Peninsula, coll. T. SAKAI: 1 ♂ 35.2 mm (SMF 7632).

Australia. Off Clairmont I., coral reef, H.M.S. "Alert": 1 ♂ 38.4 mm (NHM 1882:7). — N.W. Cape, 3.04.1961, coll. R.W. GEORGE: 1 ♀ (RMNH 17383).

East coast, Queensland: Thursday I., Torres Str., 15.08.1938, coll. J. McNULTY: 1 ♀ 49.6 mm (QM W12272). — Torres Str., coll. A.C. HADDON: 2 ♀ 39.3, 29.2 mm (NHM 1954.9.14.173-175). — Torres Str. sand bank, 29.07.1974: 2 ♂ 43.1, 43.5 mm (QM W12535). — Pandora Reef, Brooke I., October 1923, coll. H. LONGMAN: 1 ♂ 46.2 mm (QM W12270). — Double I., Reef, off Cairns, coral sand, 27.08.1961, coll. J.H. BARNES: 1 ♂ 39.6 mm; 1 ♀ 36.6 mm (QM W2214). — Barron Beach, Cairns, 19.11.1940, coll. A.A. READ: 1 ♂ 41.4 mm (QM W1170). — Palm I., coll. MACKERRAS: 1 ♀ 40.4 mm (QM W12276). — Garden I., off N. Hinchinbrook I., sandy shore, 16.07.1981, coll. J. JOHNSON: 1 ♀ 37.3 mm (QM W9715). — Hannibal I., coll. A. WATSON: 1 ♂ 46.0 mm; 1 ♀ 31.2 mm (QM W12275). — Magnetic I.: 1 ♀ 44.4 mm (QM W1720). — Cockle Bay, 28.07.1944: 1 ♂ 43.0 mm (QM W12273). — Heron I., lagoon, 15.07.1975: 1 ♀ 22.8 mm (QM W4905). — Tin Can Bay, nr Gympie, 13.02.1952: 1 ♀ 41.1 mm (QM W1834). — Stradbroke I., January 1922: 1 ♀ 44.1 mm (QM W12269). — Myora, N. Stradbroke I., 22-23.04.1969: 1 ♂ 46.4 mm (QM W15934).

New Zealand. August 1917, coll. REISCHEK: 1 ♂ 41.2 mm (NMW 10985).

New Caledonia. 1 dry specimen (RMNH 43093). — Goro, April 1984: 1 ♂ 43.0 mm (MNHN). — Bourake, 2.09.1985, 1 ♂. — 8.11.1986, intertidal: 1 ♂ 26.9 mm (MNHN). — Coll. B. RICHER DE FORGES: 2 ♀ 27.5, 40.8 mm (MNHN). — Platier de Touaourou, 25.10.1988, coll. P. LABOUTE: 1 ♂ 46.2 mm; 1 ♀ 18.5 mm (MNHN). — Platier de Yate: 1 ♂ 42.8 mm (MNHN).

Fiji Is. Suva, Viti Levu, 29.05.1934, "Monsunen": 1 ♂ 39.9 mm (ZM CRU1831). — 12 km E of Mbau I., SE Viti Levu, 4.05.1965, coll. T. WOLFF: 1 ♂ 34.0 mm (ZM CRU1837). — Viti I., coll. E. GRAEFFE: 1 juv. (NMW10982).

Tonga Is. Tongatapu, reef, H.M.S. "Challenger": 1 ♂ 34.3 mm (NHM 1884.31). — Nukualofa, January 1956, tidal zone, coll. S. MIELCHE: 1 ♂ 25.7 mm (ZM CRU1847).

Samoa Is. 1 ♂ 48.8 mm (NHM 1875.5). — Upolu, coll. S.J. WHITNEY: 1 ♀ 17.3 mm (NHM 1874.54). — Apia, coll. BURTON & HOPKINS: 1 ♀ 27.9 mm (NHM 1931.5.26.22). — Viti I., coll. E. GRAEFFE: 1 juv. (NMW 10982).

French Polynesia. *Society Is.* Tahiti, July-September 1909, coll. H.E. CRAMPTON: 2 ♀ 35.1, 38.6 mm (AMNH 3411). — Tahiti, 17°40'S, 149°20'W, February-March 1994, coll. & det. J. POUPIN: 1 ♂ 26.7 mm (MNHN). — Tahaa, Tapuamu Bay, 14.09.1994, coll. & det. J. POUPIN: 1 ♂ 31.8 mm (MNHN). — *Tuamotu Is.* Takarua I., coral reef, 16.03.1934, "Monsunen": 1 ♂ 41.7 mm; 2 ♀ 41.5, 44.4 mm (ZM CRU1815). — South Marutea, 9.11.1965: 1 ♂ 20.0 mm (MNHN). — Gambier Is., coll. Y. PLESSIS, det. J. POUPIN: 2 ♂ 35.0, 39.0 mm (MNHN). — Mururoa, 1966: 1 ♂ 31.9 mm (MNHN). — Mururoa, 1993, coll. BABLET, det. J. POUPIN: 1 ♂ 41.8 mm (MNHN). — *Marquesas Is.* Nuku Hiva, 8°48.8'S, 140°05'W, 52 m, 24.01.1991, coll. J. POUPIN: 1 ♂ 27.3 mm (MNHN).

Line Is. Tabuaeran atoll, Fanning I., Inner Lagoon, 16.12.1913, coll. F. BAKER: 1 ♂ 28.4 mm (USNM 50513).

Hawaii. Ohau I., 1925, coll. A.E. VERRILL: 2 ♂ (post moult) (AMNH 5744). — 5 ♂ (USNM 2307). — Honolulu, "Challenger": 1 ♀ 43.5 mm (NHM 1884.31). — 1 ♀ 42.4 mm (NHM 1883.22). — Hilo, rockpool, 7.04.1915, coll. Th. MORTENSEN: 1 ♂ 43.8 mm (ZM CRU1832). — Honolulu, 1915, coll. Th. MORTENSEN: 4 ♀ 39.7-40.1 mm (ZM CRU1812).

Clipperton I. 1966, coll. CHUITON: 1 ♂ 28.9 mm (MNHN-B 16319).

DESCRIPTION. — Carapace convex, 1.6-1.7 wide as long. Surface with rounded granulate tubercles on gastrocardial, hepatic and branchial regions; posteriorly granules set in transverse, setiferous rows, rows increasing in length laterally. Front small, triangulate, apically emarginate. Basal antennal article spatulate, anterior margin slightly concave, peduncle emerging from median process. Afferent branchial canal ending below orbit in rounded process. Endostomial septum visible with first maxillipeds closed, with rounded anterior margin. First maxillipeds with triangular notch on anterior margin. Anterolateral margin crenulate, irregularly dentate, setose. Clypeiform expansions markedly developed. Posterolateral margin setose, with four marginally beaded triangular teeth followed by three denticles. Posterior margin slightly convex, beaded, setose. Merus of cheliped distally with quadrilobate lamina, two distal lobes acuminate. Crest of larger chela with seven teeth, proximalmost bicuspidate. External surface of chela unevenly granulate, obliquely traversed medially by three tubercles. Two unevenly granulate rows running subparallel to lower margin from proximal ram-like tooth to base of pollex. External beaded row on lower margin running entire length of chela, internal row only distal half. Internal surface of chela unevenly granulate inferiorly, with beaded file parallel to lower margin. First male pleopod stout, curved distad, tapering apically to narrow spinulate tip; second pleopod slender, slightly curved, tip spatulate.

Color. — "Hellgrau oder gelb bis olivengrün, mit violetten Flecken, Strichen und Punkten. Der hintere Teil des Rückenschildes und die aussere Fläche der Scherenfüsse rot genetzt. Füsse und Unterfläche des Körpers mehr violett" (KLUNZINGER, 1906). "Varies from very pale olive green, almost white, to a full olive grey or olive yellow" (TWEEDIE, 1950). A color photograph provided by MIYAKE (1983, pl. 7 fig. 3).

REMARKS. — LINNAEUS' (1758: 630) preliminary account of *Cancer hepaticus* was unduly brief: "thorace verrucoso gibbo semiorbiculato: margine serrato". This was rectified (LINNAEUS, 1764: 448), and as HERBST's (1785) description of *Cancer tuberculatus* included a fine drawing (pl. 13 fig. 78), many authors were inclined to follow him.

H. MILNE EDWARDS (1837) described *C. spinosissima* as resembling *C. tuberculata* [*C. hepatica*] but "armée sur les bords d'une série de dents spiniformes très pointues et relevées... Trois épines semblables et très aiguës sur la face externe des mains.". HILGENDORF (1869) remarked that though *C. tuberculata* [*C. hepatica*] "variiert sie nur wenig. Eine geringe Verschiedenheit zeigte sich in der Ausbildung der Zähne des vorderen Theiles des Seitenrandes". HOFFMANN (1874) noted: "En comparant les extrêmes on pourrait être tenté de les considérer comme deux espèces, mais nous avons devant nous tous les degrés intermédiaires". BUITENDIJK (1939: 231) too, found intermediate specimens with some spiniform teeth indistinct or missing. ALCOCK (1896) concluded that "it is

impossible to express any opinion as to whether this species [*C. spinosissima*] is... a variety of *C. hepatica*, or not". An examination of series of specimens covering the whole distributional range of *C. hepatica* revealed it to be but one species.

DISTRIBUTION (fig. 31). — From the Red Sea to Clipperton Island; on sandy, muddy or gravelly bottoms, intertidal to 100 m.

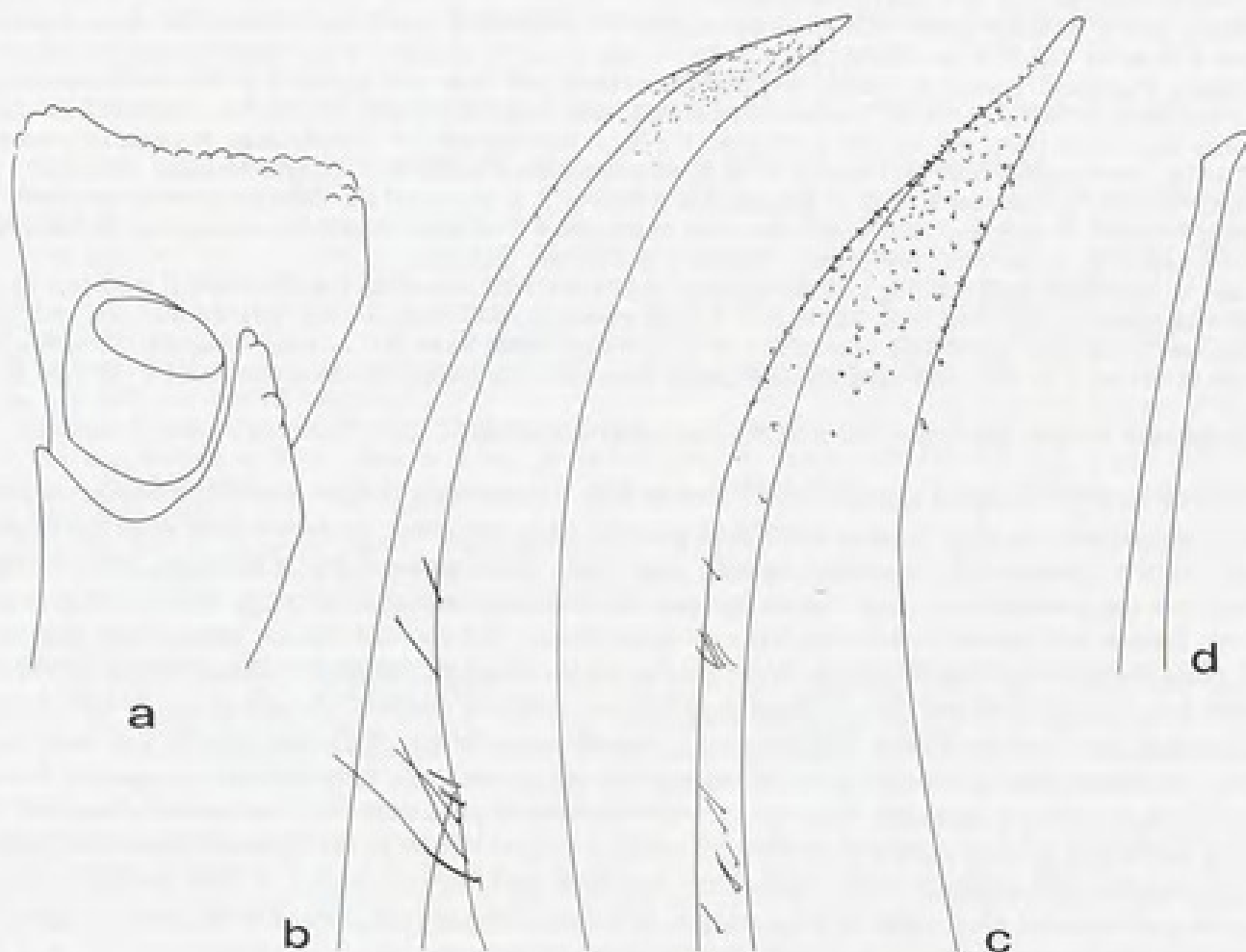


FIG. 14. — *Calappa hepatica* (Linnaeus, 1758), ♂ 39.6 mm, Madagascar, Île Sainte Marie, intertidal (MNHN): a, first article of antenna; b-c, first pleopod male with enlargement of distal part; d, second pleopod male, enlargement of distal part.

Calappa japonica Ortmann, 1892

Fig. 10 d, 13 d, 15, 32.

Calappa japonica Ortmann, 1892: 566, pl. 26 fig. 8. — PARISI, 1914: 287, pl. 11. — IHLE, 1918: 301, 308 (list). — BALSS, 1922: 123. — SAKAI, 1936: 46, text-fig. 9; 1937: 96, pl. 18 fig. 4; 1956: 8; 1965: 57, pl. 23 fig. 1; 1976: 133, pl. 40 fig. 2. — BARNARD, 1947: 372; 1950: 352, figs 66n-p. — UCHIDA, 1949: 723, fig. 2093. — UTINOMI, 1956: 71, pl. 36 fig. 1. — GRINDLEY, 1961: 132. — GUINOT, 1967: 245 (list). — SERÈNE, 1968: 40 (list). — CAMPBELL, 1971: 31. — SANKARANKUTTY & SUBRAMANIAN, 1976: 21. — MATSUZAWA, 1977, pl. 91 fig. 3. — SHIRAI, 1980: 415. — TAKEDA, 1982: 107, fig. 313. — MIYAKE, 1983: 20, pl. 7 fig. 5. — YAMAGUCHI & HOLTHUIS, 1993: 664, figs 76-78.

Calappa exanthematosus Alcock & Anderson, 1894: 177; 1895 pl. 15 figs 1, 1a. — ALCOCK, 1896: 146; 1899: 21. — SERÈNE, 1968: 41 (list).

Calappa granulata - DE HAAN, 1837: 70. [Non Linnaeus, 1758].

Calappa flammea - BARNARD, 1926: 120. [Non Herbst, 1794].

Calappa frammea - LIN, 1949: 13 (list) [erroneous spelling]. [Non Herbst, 1794].

Calappa cf. pustulosa - TURKAY, 1986: 150, pl. 1 fig. 4-5.

MATERIAL EXAMINED. — **Indian Ocean.** Bay of Bengal, 1 ♂ 58.4 mm (NHM 1896.9.8.8), syntype of *Calappa exanthematosa*.

Red Sea. Ras el Aswad-Jeddah, "Valdivia", stn 238, 21°22'N, 39°04'E, 383-363 m, 17.04.1979: 3 juvs (SMF 13592).

Kenya. Mombasa, 1974, coll. A.J. BRUCE: 1 ♂ 84.2 mm (RMNH 30335).

South Africa. Algoa Bay, between Bushman river & Bird I., 1905: 1 ♀ 83.2 mm (SAM 724). — Kentani coast, February 1952: 1 ♂ 77.1 mm (SAM 8495).

Pakistan. Mckran, 24°50'N, 61°52'E, mud, 135-148 m, 27.10.1963, coll. P. HANSEN: 1 ♂ 40.1 mm (ZM CRU1846).

Australia. Off Cape Moreton, March 1966, 128 m, coll. B. BEUTEL: 1 ♂ 102.8 mm (QM W2414).

Japan. Nagasaki, May 1909, coll. J. JORDAN: 1 ♂ 93.9 mm (ZM CRU1797). — Misaki, May 1914, coll. Th. MORTENSEN: 1 ♀ 10.7 mm (ZM CRU1794).

DESCRIPTION. — Carapace oval, 1.35 wide as long, markedly convex, inflated branchial region separated by furrow from gastrocervical region. Surface minutely granulate, branchial ridges indistinct, anteriorly with large flattened tubercles, granules above posterior margin. Front only slightly projecting, with two rounded teeth separated by wide sulcus. Anterior margin of basal antennal article bicuspidate, peduncle emerging from distal angle. Afferent branchial canal ending below orbit in granulate tridentate process. Endostomial septum invisible with first maxillipeds closed, with straight anterior margin. Distal margin of first maxillipeds nearly straight, with acute anterointernal angle. Anterolateral margin cristate, unevenly tuberculate, tubercles larger posteriorly. Clypeiform expansion with eight granulate, lacinate teeth. Posterior margin beaded. Merus of cheliped distally with quadridentate crest. Crest of larger chela cut into seven teeth increasing in size distally. External surface of chela minutely granulate, obliquely traversed by row of flattened tubercles; closely beaded inferiorly. Tooth proximally near lower margin small, tuberculate. Lower margin wide, with several unevenly granulate rows. First male pleopod stout, slightly curved, tapering, distally spinulate; second pleopod curved, distally crook-like.

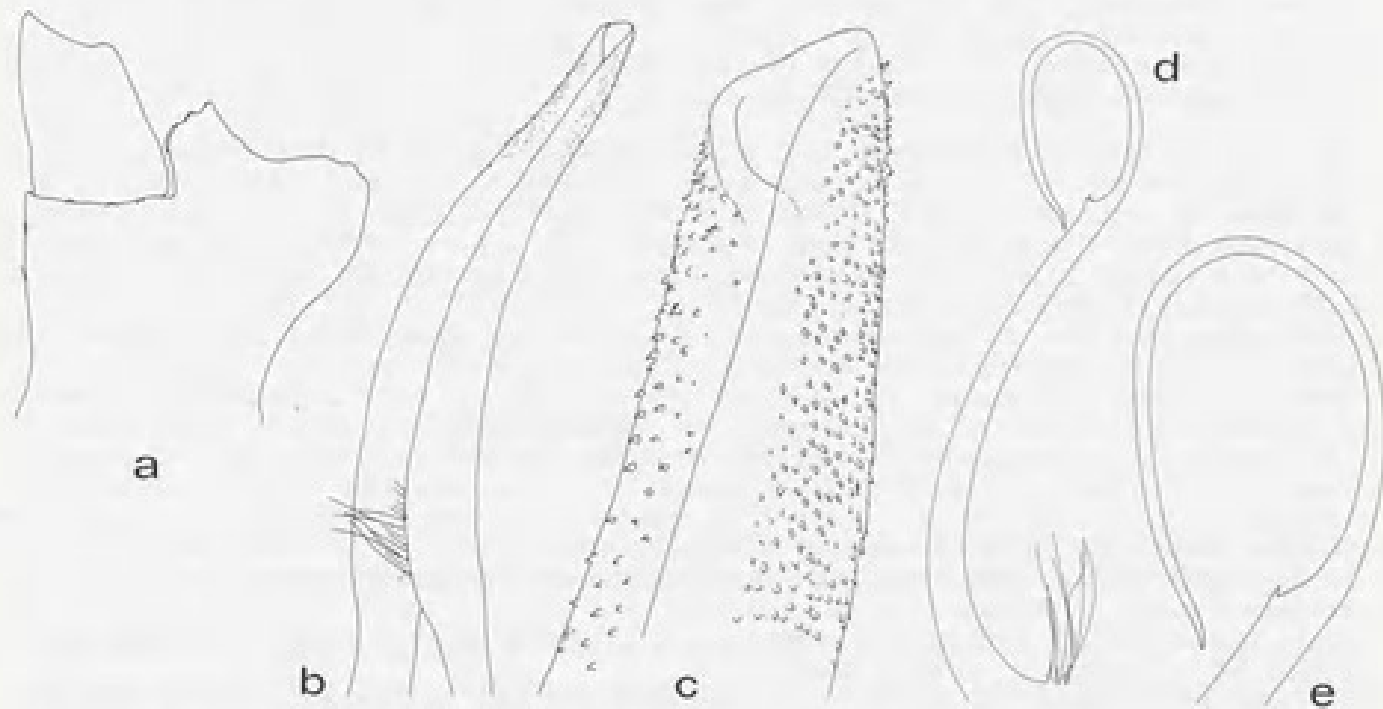


FIG. 15. — *Calappa japonica* Ortmann, 1892, ♂ 58.4 mm, Bay of Bengal, syntype of *C. exanthematosa* (NHM 1896.9.8.8): a, first article of antenna; b-c, first pleopod male with enlargement of distal part; d-e, second pleopod male with enlargement of distal part.

Color. — "Anterior half [of carapace] is covered with numerous large smooth tubercles, which by their colouration (red base and shining yellow apex) exactly resemble ripe small-pox postules" (ALCOCK & ANDERSON, 1894). Color photographs in MATSUZAWA (1977), MIYAKE (1983).

REMARKS. — *C. japonica* was compared by ORTMANN (1892) and PARISI (1914) to *C. granulata* and *C. flammea*. PARISI (1914) found it "facilmente distinguibile da tutte e due". *C. japonica* is notable for its carapace size and coloration.

DISTRIBUTION (fig. 32). — East Africa to Japan and New Caledonia. On sandy or shelly bottom, 30-380 m.

Calappa lophos (Herbst, 1782)

Fig. 16, 17 a, 20 a, 32, 35 c

Cancer lophos Herbst, 1782: 201, pl.13, fig. 77.

Calappa lophos - FABRICIUS, 1798: 346. — BOSCH, 1802: 184; 1830: 214. — LATREILLE, 1803: 393; 1829: 139. — H. MILNE EDWARDS, 1837: 104. — WHITE, 1847: 45. — GIBBES, 1850: 183. — HERKLOTS, 1861: 25. — HELLER, 1865: 69. — MIERS, 1880: 315; 1886: 286. — NAUCK, 1880: 46. — DE MAN, 1888a: 389. — WALKER, 1887: 111. — WHITELEGGE, 1889: 231. — ORTMANN, 1892: 565 (key). — HENDERSON, 1893: 395. — ALCOCK & ANDERSON, 1895: 203. — ALCOCK, 1896: 144. — DOFLEIN, 1902: 654; 1904: 35. — LAURIE, 1906: 353. — RATHBUN, 1910: 15; 1923: 137. — PARISI, 1914: 283. — IHLE, 1918: 182. — BALSS, 1922: 123; 1935: 116. — MONOD, 1928: 124, fig. 13a. — ANDRÉ, 1931: 640. — CHOPRA, 1933: 28. — SAKAI, 1934: 284; 1936: 44, text-fig. 6a; 1937: 90, pl. 12 fig. 1; 1956: 8; 1960: 33, pl. 16 fig. 5; 1965: 56, pl. 22 figs 2-3; 1976: 129, pl. 37 fig. 1, pl. 38 fig. 2. — SHEN, 1936: 64. — SERÈNE, 1937: 78; 1968: 41 (list). — BUITENDIJK, 1939: 231, (part). — STEPHENSEN, 1945: 65, figs 5a-b. — BARNARD, 1947: 372; 1950: 351, fig. 66 j-m. — SUVATTI, 1947: 56. — LIN, 1949: 13. — PILLAI, 1951: 8. — DAWYDOFF, 1952: 139. — UBINOMI, 1956: 70, pl. 35 fig. 5. — CHHAPGAR, 1957: 404, pl. 1. — TYNDAL-BISCOE & GEORGE, 1962: 70. — GUINOT, 1967: 245 (list). — KENSLEY, 1969: 151 (list). — KIM, 1970: 11. — HOLTHUIS & SAKAI, 1970: 117, pl. 9. — GRIFFIN, 1972: 64. — MATSUZAWA, 1977, pl. 91 fig.2. — SHIRAI, 1980: 415. — TAKEDA, 1982: 105, fig. 309. — MIYAKE, 1983: 19, pl. 7 fig. 3. — DAI *et al.*, 1986: 91, fig. 49, pl. 11 fig. 4. — DAI & YANG, 1991: 103, fig. 49, pl. 11 fig. 4. — TIRMIZI & KASMI, 1991: 54, fig. 16. — CHEN, 1993: 680, fig. 3. — YAMAGUCHI & HOLTHUIS, 1993: 664, figs 81-82. — YAMAGUCHI & BABA, 1993: 309, fig. 94 a-b.

Calappa (Lophos) lophos - DE HAAN, 1837: 72, pl. 20 fig. 1.

Calappa guerini Brito Capello, 1871: 128, 133, pl. 2 fig. 2. — SERÈNE, 1968: 41 (list).

Calappa quadrimaculata Takeda & Shikatani, 1990: 479, fig. 1-4.

MATERIAL EXAMINED. — Gulf of Oman, 33-46 m, coll. A.W. WHITE: 1 ♀ 55.9 mm (NHM 1971:223).

Mozambique. 19°09'S, 36°20'E, 27-30 m, "Anton Bruun" cr. 8, stn 403-A, 9.10.1964: 1 ♂ 76.7 mm (USNM).

Seychelles. N. Desnoeuys I., 6°08'S, 53°02'E, 54 m, 2.01.1993, "Tyro" Exped.: 1 ♀ 75.7 mm (RMNH). — W. Poivre Atoll, 5°46'S, 53°11'E, 57 m, 1.01.1993, "Tyro" Exped.: 1 juv. 12.4 mm (RMNH). — N.E. Aride I., 4°10'S, 55°44'E, muddy sand, 55 m, 19.12.1992, "Tyro" Exped.: 2 juvs 15.6, 9.4 mm (RMNH). — Mahe, west coast, 42 m, 6.06.1974, coll. C. RATCLIFF: 2 ♂ 57.0, 59.5 mm (NHM).

South Africa. Natal coast: 1 ♂ 40.0 mm (SAM 8332). — Durban, coll. STEBBING: 1 ♂ 54.5 mm (NHM 1928.12.1.175). — Capetown, 1929-1930, coll. Th. MORTENSEN: 1 ♂ 61.7 mm (ZM CRU1796).

Madagascar. North-west coast: Nosy Be, 6-8 m, 4.08.1965, coll. R. PLANTE: 1 ♂ 47.3 mm (MNHN). — Passe de Nosy Komba, 10 m, March 1971, coll. CORFDIR: 1 juv. (MNHN). — 13°05'S, 48°21'E, 50 m, 19.06.1967, coll. A. CROSNIER: 1 ♂ 71.6 mm (MNHN). — West coast: Pracel Bank, June 1959, 35 m, coll. & det. A. CROSNIER: 1 ♀ 71.6 mm (MNHN). — Tuléar, 8 m, 4-5.01.1967, coll. MAUGÉ: 1 ♀ 34.8 mm (MNHN-B 16308). — South-east coast: Fort-Dauphin, 75 m, October 1958, coll. & det. A. CROSNIER: 1 ♂ 31.6 mm; 2 ♀ 71.1, 71.9 mm (MNHN). — Fort-Dauphin, October 1958, coll. A. CROSNIER: 1 ♀ 90.9 mm (MNHN).

La Réunion (Ile Bourbon). 1903, collection A. MILNE EDWARDS: 1 specimen (MNHN 4085).

Pakistan. Karachi: 1 ♂ 38.0 mm (NHM 1903.7.29.4).

India. Madras, coll. J.R. HENDERSON: 1 ♂ 49.0 mm; 1 juv. (NHM 1892.7.15.334-6). — Pondicherry, 5 m, 22.09.1966, coll. H. BERRY: 1 ♀ 35.7 mm (USNM).

Sri Lanka. Gulf of Manaar, coll. W.A. HERDMAN: 1 juv. (NHM 1907.5.22). — Trincomalee, coll. W.A. HERDMAN: 1 juv. (NHM 1934.1.16.9).

"Archipel Indien". 1 ♂ 42.2 mm; 1 ♀ 49.7 mm (MNHN-B 58).

"Mer des Indes". 1 ♀ 86.1 mm (MNHN-B 59).

Coast of China. Det. HERKLOTS as *C. (Lophos) Lophos*: 1 dry specimen (RMNH 43111).

Japan. 1 ♂ 77.3 mm (NHM 1894.7.8.9). — 1824-1834, colls P.F. VON SIEBOLD & H. BURGER, det. P.F. VON SIEBOLD: 6 dry specimens (RMNH 43107). — 1824-1829, coll. & det. P.F. VON SIEBOLD: 7 dry specimens (RMNH 43108). — 1826-1833, coll. H. BURGER, det. HERKLOTS as *C. (Lophos) Lophos*: 1 dry specimen (RMNH 43109). — 1823-1835, colls P.F. VON SIEBOLD & H. BURGER: 1 ♂ 65 mm; 84 juvs (RMNH 768). — Nagasaki, 1.07.1911, coll. J. JORDAN: 5 ♀ 31.8-61.7 mm (ZM CRU1798). — Shikoku I., Misaki, May 1914, coll. Th. MORTENSEN: 1 ♂ 46.9 mm (ZM CRU1795). — 1930, id. M.J. RATHBUN: 1 ♂ 35.9 mm; 1 ♀ 31.5 mm (USNM 63678). — Sagami Bay, coll. SAKAI: 1 ♂ 31.6 mm (NHM 1961.6.5.27). — Shikoku I., Kochi, 17.05.1979, colls H. SUZUKI & L.B. HOLTHUIS: 4 ♂ 22.3-42.1 mm; 1 ♀ 55.1 mm (RMNH 32772). — Saga, 10-20 m, 29.10.1979: 3 juvs (SMF).

Taiwan. Taichi, NE Taiwan, 3-4.08.1996, coll. P.K.L. NG: 1 juv; 29.0 mm; 1 ♂ 32.4 mm (NUS).

Indonesia. *Sumatra*: Poeloe Weh, January 1929, coll. P. BUITENDIJK: 1 ♀ 24.3 mm (RMNH 3116). — Poeloe Weh, 1930, coll. P. BUITENDIJK: 1 ♀ 18.1 mm (RMNH 3117). — *Belawan*, 1926, coll. P. BUITENDIJK: 1 ♂ 22.2 mm (RMNH 3203). — *Java*: 1839, coll. S. MULLER: 1 ♀ (RMNH 767). — *Timor*: Koepang Bay, 6-15 m, 4.12.1929, coll. P. BUITENDIJK: 1 juv. (RMNH 4239). — *Sulawesi*: Macassar, 1 ♂ 31.0 mm (NHM 1880.6). — *Moluccas*: 1821-1822, coll. C.G.C. REINWARDT, det. HERKLOTS as *C. (Lophos) Lophos*: 1 dry specimen (RMNH 43114). — *Amboina*, 1864, coll. E.W.A. LUDEKING: 1 ♀ ovig. 37.1 mm (RMNH 766).

Australia. Mission Beach, NE Qld. 17°53.7'S, 146°51.2'E, "Solea", 140-142 m, 20.01.1986: 2 ♂ 35.0 and 31.5 mm; 1 juv. (QM W16980).

Chesterfield Is. CORAIL 2: stn 53, 19°17.19'S, 158°36.26'E, 67-68 m, 24.08.1988, coll. B. RICHER DE FORGES: 1 ♀ 91.8 mm (MNHN).

New Caledonia. LAGON: stn 745, 22°13.6'S, 167°02.8'E, 78-80 m, 13.08.1986, coll. B. RICHER DE FORGES: 1 juv. (MNHN). — Stn 241, 22°22'S, 167°02'E, 35 m, Ouen I., Prony Bay, coll. B. RICHER DE FORGES: 1 ♀ 31.6 mm (MNHN).

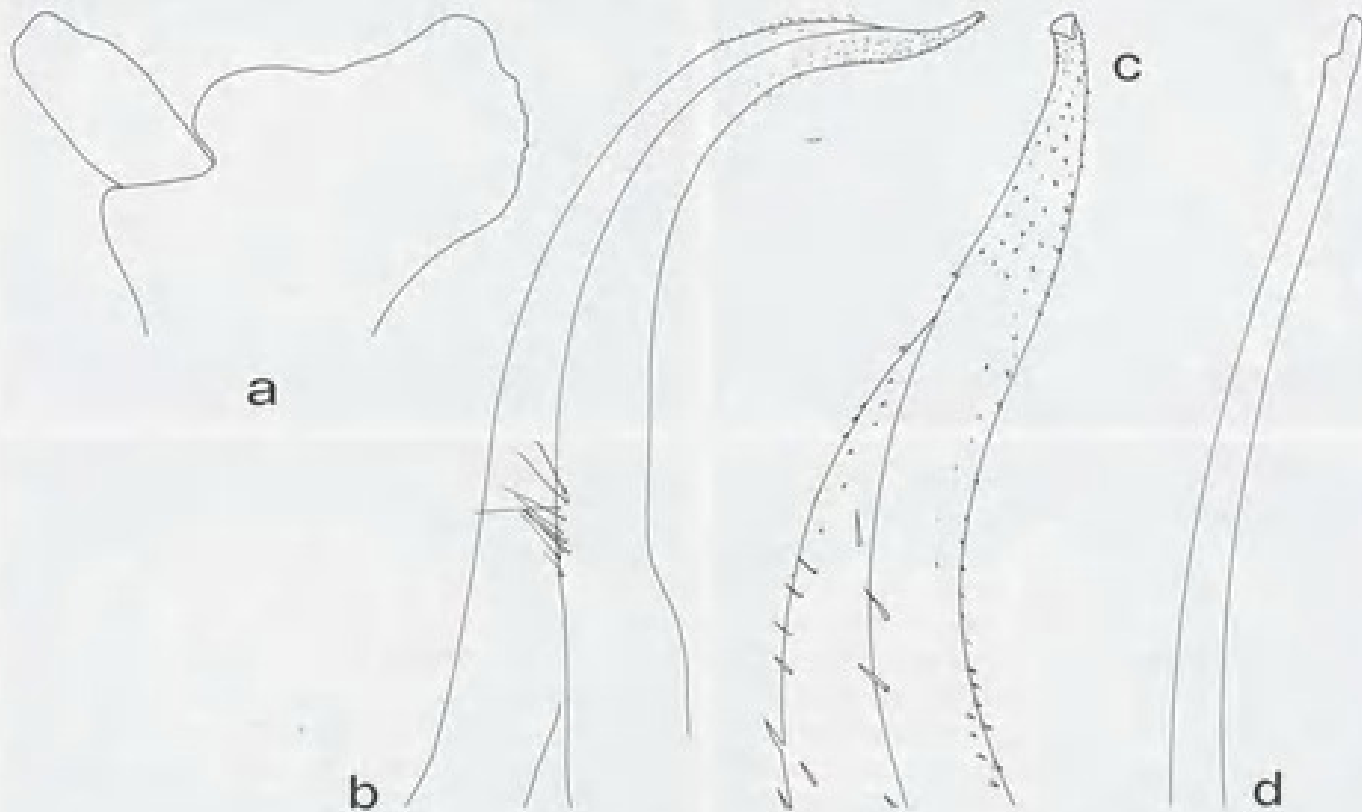


FIG. 16. — *Calappa lophos* (Herbst, 1782), ♂ 47.3 mm, Madagascar, Nosy Be, 6-8 m (MNHN): a, first article of antenna; b-c, first pleopod male with enlargement of distal part; d, second pleopod male, enlargement of distal part.

DESCRIPTION. — Carapace convex, 1.6 wide as long. Frontal and epigastric regions with small tubercles. Front, slightly projecting, with two triangular teeth separated by wide sulcus. Anterior margin of basal antennal article concave, proximal lobe dilate, peduncle emerging from distal angle. Afferent branchial canal ending below orbit in granulate tridentate process. Endostomial septum visible with first maxillipeds closed, with slightly rounded anterior margin. Distal margin of first maxillipeds straight. Branchial ridges, prominent in young, indistinct, anteriorly with flattened tubercles. Anterolateral margin carinate, unevenly granulate. Posterolateral margin

with four marginally beaded lacinate teeth, distalmost largest, and three granulate teeth. Posterior margin beaded. Merus of cheliped distally with quadrilobate lamina, two distalmost lobes acuminate. External surface of chela minutely granulate, few flattened tubercles below crest. Crest of larger chela cut into seven teeth increasing in size distally. Unevenly granulate ridge running subparallel to lower margin, from proximal ramlike tooth to base of fixed finger. Lower margin narrow, two beaded files contiguous distally. First male pleopod stout, markedly curved distad, tapering apically to narrow spinulate tip; second pleopod slender, slightly curved, tip short, digitate.

Color. — "In the juvenile form, the carapace is traversed by longitudinal stripes of reddish brown and also marked with a pair of large ocelli, one on each epibranchial region" (SAKAI, 1937). "*C. lophos* is a beautifully coloured species. The overall colour is pinkish with very small red specks; red ocelli arranged in curved lines are present along the anterolateral margin of the carapace scattered red ocelli are present in the middle of the carapace, wide transverse lines of red colour are found on the grooves separating the teeth of the clypeiform expansions and on the chelipeds. The fingers of chelipeds are yellowish." (TIRMIZI & KASMI, 1991). Color photographs in MATSUZAWA (1977), MIYAKE (1983).

REMARKS. — HERBST's (1782) description and drawing being very clear, there has never been any confusion over the identity of this handsome species. However when TAKEDA and SHIKATANI (1990) distinguished *C. quadrimaculata* from *C. lophos* "by the proportional difference of the carapace and the morphological difference of the posterior lobes of the carapace" they described features typical to young *C. lophos* specimens.

DISTRIBUTION (fig. 32). — East Africa to Japan and Australia. On sand, mud, gravel bottom, 5-140 m.

Calappa matsuzawa sp. nov.

Fig. 17 b, 18, 20 b, 32

MATERIAL EXAMINED. — Japan. Kii Peninsula, coll. T. WATABE: 1 ♂ 38.1 mm (SMF 7649). — Collection T. SAKAI: 1 ♀ 55.2 mm (SMF 22938). — Shikoku I., E. of Cape Muroto, 10.05.1987, coll. K. MATSUZAWA: 1 ♀ 57.6 mm (SMF).

TYPE MATERIAL. — The male collected at Kii Peninsula (SMF 7649) is the holotype. The other specimens are paratypes.

DESCRIPTION. — Carapace convex, 1.3 wide as long, shallow longitudinal groove separating gastrocervical from branchial regions, hepatic region depressed. Carapace surface tuberculate, branchial tubercles largest, intestinal, metabranchial regions with minutely beaded transverse lines, increasing in length laterally. Front quadridentate, two median teeth projecting. Basal antennal article granulate, anterior margin concave, proximal lobe dilate, peduncle emerging from distal angle. Afferent branchial canal ending below orbit in granulate tridentate process. Endostomial septum visible with first maxillipeds closed, with straight anterior margin. Distal margin of first maxillipeds with triangular notch. Anterolateral margin arcuate, carinate, unevenly granulate anteriorly, anterior tooth prominent, with six triangulate teeth posteriorly. Posterolateral margin setose, beaded, three anterior teeth triangulate, growing in size posteriorly, three posterior teeth shallow, with beaded median ridges. Posterior margin sinuous, beaded. Merus of cheliped distally with setose, quadrilobate lamina. External surface of chela inferiorly granulose, obliquely traversed by three rows of minutely granulate tubercles, largest tubercles just below crest. Crest of larger chela cut into seven teeth increasing in size distally, proximalmost bicuspidate. Lower margin closely beaded from proximal lamellar tooth to pollex.

ETYMOLOGY. — Celebrating the 70th birthday of Mr Keisuke MATSUZAWA, who kindly supplied me with one of the paratypes.

REMARKS. — *C. matsuzawa* is related to the "*gallus*" group, most closely to *C. undulata*. However, the two species are readily distinguished by the rugose carapace and quadridentate front in *C. matsuzawa* as compared with the smoother carapace and bidentate front of *C. undulata*.

DISTRIBUTION (fig. 32). — Known only from Japan. Depth unknown.

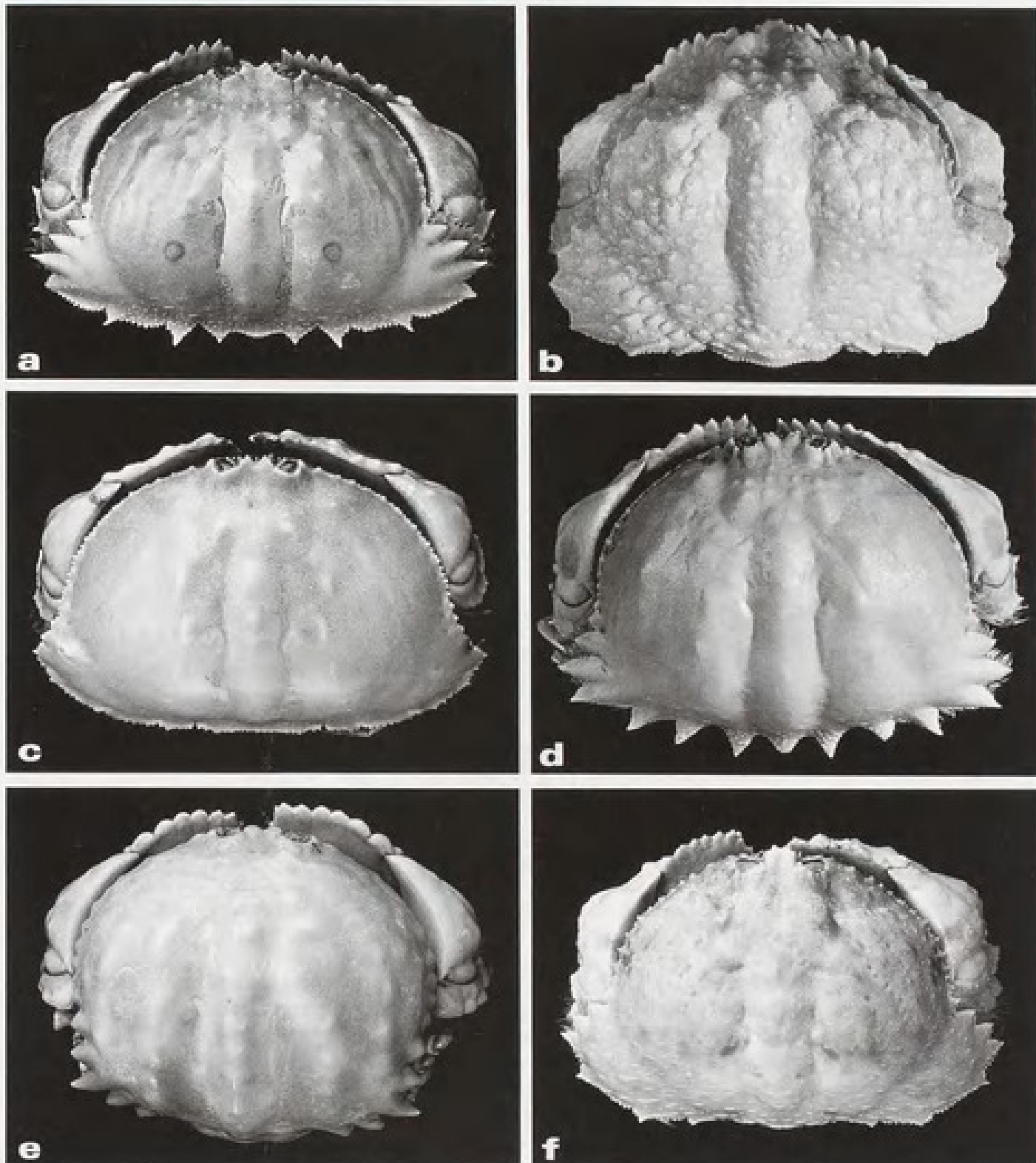


FIG. 17. — Whole crab, dorsal view: a, *Calappa lophos* (Herbst, 1782), ♂ 47.3 mm, Madagascar, Nosy Be, 6-8 m (MNHN). — b, *Calappa matsuzawa* sp. nov., ♂ paratype, 55.2 mm, Japan (SMF 22938). — c, *Calappa monilicanthus* sp. nov., ♂ holotype, 53.7 mm, Seychelles, "REVES 2" stn 45, 4°12.3'S, 55°59.6'E, 60-65 m (MNHN-B 25693). — d, *Calappa philargius* (Linnaeus, 1758), ♂ 55.5 mm, Australia, Cape Morton, 119 m (QM W3325). — e, *Calappa pustulosa* Alcock, 1896, ♀ 50.8 mm, Vietnam, Nha Trang Bay (MNHN-B 13464). — f, *Calappa sebastieni* sp. nov., ♂ holotype, 66.1 mm, Marquesas Is., stn 288, 9°20.5'S, 140°02'W, 120 m (MNHN-B 25690).

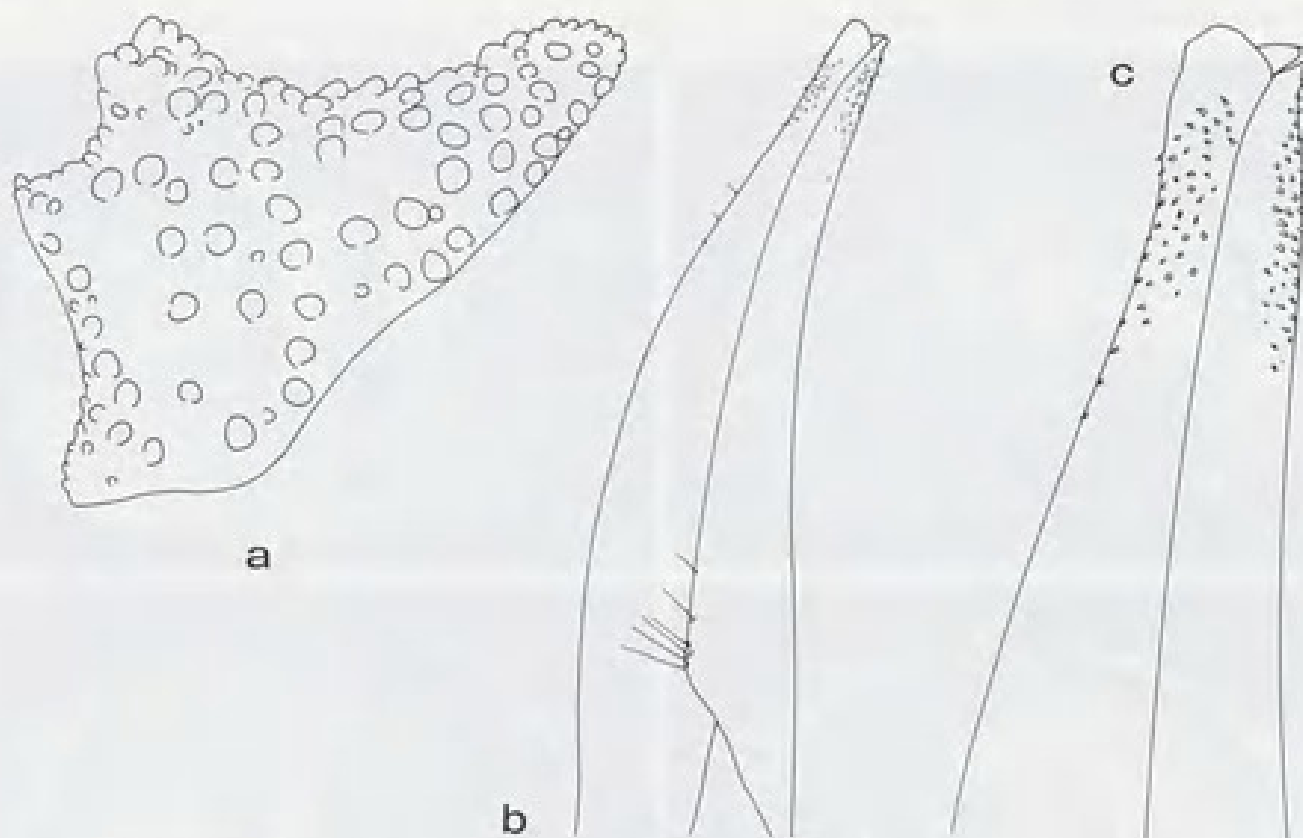


FIG. 18. — *Calappa matsuzawa* sp. nov., ♂ holotype, 38.1 mm, Japan, Kii peninsula (SMF 7649): a, first article of antenna; b-c, first pleopod male with enlargement of distal part.

Calappa monilicanthus sp. nov.

Fig. 17 c, 19, 20 c, 32

MATERIAL EXAMINED. — Seychelles, REVES 2 (E. MARCHAL coll.): stn 5, 5°04.4'S, 56°23.8'E, 33 m, 4.09.1980: 1 ♀ 61.7 mm (MNHN-B 25694). — Stn 45, 4°12.3'S, 55°59.6'E, 60-65 m, 14.09.1980: 1 ♂ 53.7 mm (MNHN-B 25693). — Stn 64, 50 m, 20.09.1980: 1 ♀ 61.2 mm (MNHN-B 25695).

TYPE MATERIAL. — The male (MNHN-B 25693) from the station 45 of the cruise REVES 2 is the holotype. The other specimens are paratypes.

DESCRIPTION. — Carapace convex, 1.5 wide as long, surface minutely squamose, frontal and epigastric regions more densely granulate. Front only slightly projecting, with two triangular teeth. Anterior margin of basal antennal article concave, proximal lobe dilate, peduncle emerging from distal angle. Afferent branchial canal ending below orbit in granulate tridentate process. Endostomial septum visible with first maxillipeds closed, with straight anterior margin. Distal margin of first maxillipeds obliquely cut, anterointerior angle acute. Branchial ridges indistinguished, anteriorly with few flattened lumps. Anterolateral margin carinate, unevenly granulate. Posterolateral margin lamellar, granulate, indistinctly lobate. Posterior margin sinuous, granular, separated from posterolateral margin by deep sulcus. Merus of cheliped distally with quadrilobate lamina. External surface of chela minutely granulate, few flattened tubercles below crest. Crest of larger chela cut into seven teeth increasing in size distally, proximalmost bicuspidate. Unevenly granulate ridge running subparallel to lower margin, from small proximal lamellar tooth to base of fixed finger. Lower margin narrow, two beaded files contiguous distally. First male pleopod curved distad, tapering apically to narrow spinulate tip; second pleopod slender, slightly curved, tip short, digitate.

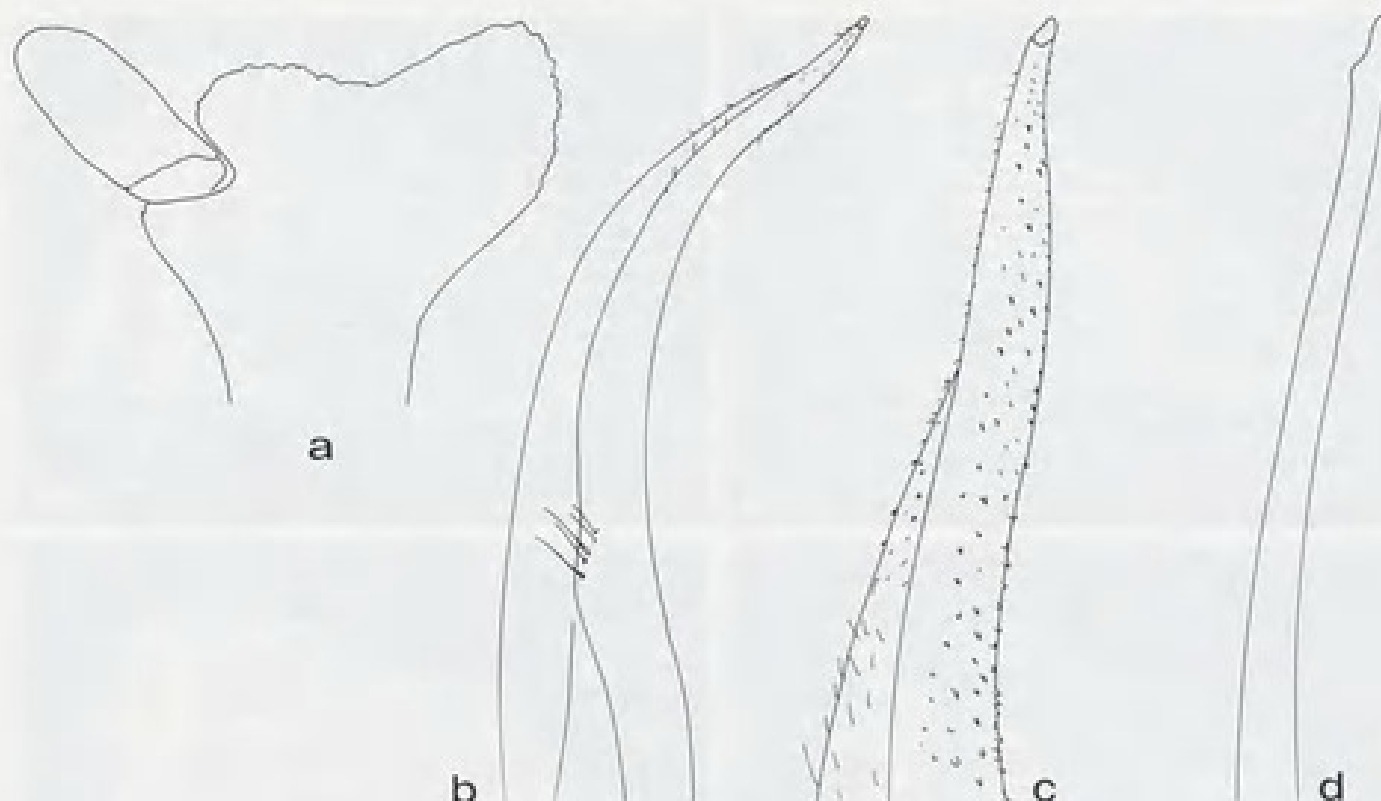


FIG. 19. — *Calappa monilicanthus* sp. nov., ♂ holotype, 53.7 mm, Seychelles, "REVES 2", stn 45, 4°12.3'S, 55°59.6'E, 60-65 m (MNHN-B 25693): a, first article of antenna; b-c, first pleopod male with enlargement of distal part; d, second pleopod male, enlargement of distal part.

ETYMOLOGY. — From the Latin, *monile* = necklace, string of beads and *canthus* = rim, edge; after the beaded margins.

REMARKS. — *C. monilicanthus* is related to *C. lophos*. However, the two are readily distinguished by the form of the posterolateral and posterior margins, being indistinctly lobate, granulate in *C. monilicanthus* as compared with the prominently lacinate margins of *C. lophos*.

DISTRIBUTION (fig. 32). — Known only from the Seychelles, at 33-65 m.

Calappa philargius (Linnaeus, 1758)

Fig. 17 d, 20 d, 21, 33

Cancer philargius Linnaeus, 1758: 626; 1764: 432; 1767: 1042.

Cancer philargius - HERBST, 1785: 203. — WHITE, 1847: 44.

Cancer inconspicua Herbst, 1794: 162, pl. 40 fig. 3; 1799: 22.

Calappa cristata Fabricius, 1798: 346. — LATREILLE, 1803: 393. — BERTHOLD, 1847: 20. — GIBBES, 1850: 183. — STIMPSON, 1858a: 162; 1907: 165. — WHITELEGGE, 1890: 231. — THALLWITZ, 1892: 52. — ORTMANN, 1892: 565. — DOPLEIN, 1902: 653. — SERÈNE, 1937: 78. — SOKOLOWSKY, 1945: 71, pl. 2 figs 1-3.

Calappa inconspicua - BOSC, 1801: 185; 1830: 215.

Calappa (Lophos) philargius - DE HAAN, 1837: 71, pl. 19 fig. 1.

Calappa philargius - HERKLOTS, 1861: 25. — NAUCK, 1880: 46. — DE MAN, 1888a: 388; 1888b: 196. — HENDERSON, 1893: 396. — ALCOCK, 1896: 145. — NOBILI, 1899: 249; 1900: 497; 1903: 23. — RATHBUN, 1902b: 30; 1924b: 27. — LAURIE, 1906: 353; 1915: 409 (list). — PARISI, 1914: 284. — IHLE, 1918: 183. — BALSS, 1922: 122. — McNEILL & WARD, 1930: 372. — ANDRÉ, 1931: 640. — SHEN, 1931: 104, text-figs 10-11, pl. 8. — SAKAI, 1936: 45, pl. 8 fig. 2; 1937: 93, pl. 12 fig. 3; 1956: 8; 1960: 33, pl. 16 fig. 3; 1965: 56, pl. 22 fig. 1; 1976: 130, pl. 37 fig. 2. —

SERÈNE, 1937: 78; 1968: 41 (list). — BOONE, 1938: 210, pls 72-73. — WARD, 1941: 1. — STEPHENSEN, 1945: 66. — SOKOLOWSKY, 1945: 72, pl. 2 figs 4-6. — LIN, 1949: 13 (list). — DAWYDOFF, 1952: 139. — UTINOMI, 1956: 70, pl. 35 fig. 8; 1974: 70, pl. 35 fig. 8. — GUINOT, 1962: 26, figs 11-15, 17a-b, 18a-b, pl. 1 fig. 1, pl. 2 fig. 1; 1967: 245 (list). — TYNDALE-BISCOE & GEORGE 1962: 69. — SANKARANKUTTY, 1962: 153. — KIM, 1970: 11. — CAMPBELL & STEPHENSON, 1970: 246. — HOLTHUIS & SAKAI, 1970: 116, pl. 10 fig. 1. — SHIRAI, 1980: 415. — TAKEDA, 1982: 106, fig. 310. — MIYAKE, 1983: 20. — DAI *et al.*, 1986: 93, fig. 50, pl. 11 fig. 6. — NOMURA *et al.*, 1988: 63. — TAKEDA & SHIKATANI, 1990: 479. — DAI & YANG, 1991: 104, fig. 50, pl. 11 fig. 6. — CHEN, 1993: 679, fig. 2. — YAMAGUCHI & BABA, 1993: 306, figs 93a-b. — YAMAGUCHI & HOLTHUIS, 1993: 666, pl. 7 figs 74-75.

Calappa philargicus - ESTAMPADOR, 1937: 515 [erroneous spelling].

Calappa philargius - MIYAKE, 1939: 199 [erroneous spelling].

Not *Calappa philargius* - NOBILI, 1906: 148. — HOLTHUIS, 1958a: 45 (= *C. dumortieri* Guinot 1963).

MATERIAL EXAMINED. — **Red Sea.** 1880, coll. R. KOSSMANN: 1 ♀ 62.8 mm (RMNH 2507).

"Archipel Indien". 1 ♀ 67.7 mm (MNHN-B 43).

"Mers d'Asie". Det. H. MILNE EDWARDS as *C. cristata*: 1 ♂ 43.4 mm (MNHN-B 3984); 1 ♂ 61.2 mm (MNHN-B 3986).

Sri Lanka. Gulf of Manaar, Negombo, coll. W.A. HERDMAN: 1 ♀ 29.5 mm; 2 juvs (NHM 1907.3.22.5-7). — 1 ♂ 38.1 mm (paratized); 3 juvs (NHM 1934.1.16.10-11).

Thailand. Aokrabi, 15.02.1966, coll. V.A. GALLARDO: 2 ♀ 57.7, 62.5 mm (USNM). — ?Phuket, 14.01.1966: 2 ♂ 59.7, 57.6 mm (ZM CRU1803). — 7°29'N, 99°07'E, 29 m, 12.02.1966, 5th Thai-Danish Exped.: 1 ♀ 35.4 mm (ZM CRU1806).

South China Sea. 1 ♂ 67.4 mm (NHM 1968.293.1).

Hong Kong. Coll. W. STIMPSON: 1 ♂ 66.7 mm; 1 ♀ 53.9 mm (USNM 2110). — Coll. C.J. SHEN: 1 ♂ 46.1 mm; 2 juvs (NHM 1935.3.19.144).

China. Det. HERKLOTS as *C. (Lophos) Cristata*, redet. L.B. HOLTHUIS: 1 dry specimen (RMNH 43123). — Shantou, 1 ♀ 67.9 mm (NHM 1884.2).

Taiwan. Tung Kang, S. Kaoshiung, SW Taiwan, 5.08.1996, coll. P.K.L. NG: 1 ♂ 44.1 mm; 1 ♀ 29.9 mm; 1 juv. 25.2 mm (NUS). — Taiwan Straits: 1 ♂ 67.0 mm; 1 ♀ 60.0 mm (ZM CRU1800).

Japan. 1824-1833, colls P.F. VON SIEBOLD & H. BURGER, det. J.A. HERKLOTS as *C. (Lophos) Philargius*, redet. L.B. HOLTHUIS: 8 dry specimens (RMNH 43122). — 1824-1829, coll. P.F. VON SIEBOLD, det. J.A. HERKLOTS as *C. (Lophos) Cristata*, redet. L.B. HOLTHUIS: 2 dry specimens (RMNH 43125). — 1826-1833, coll. H. BURGER, det. J.A. HERKLOTS as *C. (Lophos) Philargius*, redet. L.B. HOLTHUIS: 12 dry specimens (RMNH 43121). — 1826-1833, coll. H. BURGER, det. J.A. HERKLOTS as *C. (Lophos) Cristata*, redet. L.B. HOLTHUIS: 1 dry specimen (RMNH 43128). — Suzuki, coll. H.M. SMITH: 1 ♂ 55.7 mm (USNM 45853). — Nagasaki, June 1909, coll. J. JORDAN: 1 ♀ 44.8 mm (ZM CRU1797).

Philippines. Iloilo, Panay I., March-May 1929, coll. H.C. KELLER: 3 ♂ 27.7-55.8 mm; 2 ♀ 36.2 and 37.0 mm (USNM). — Gulf of Davao, Mouth of Padada River, 23-24.06.1936, coll. G.R. OESCH, det. M. WARD: 1 ♂ 36.5 mm; 1 ♀ 39.9 mm (AMNH 7892). — September 1937, coll. W.G. VAN NAME, det. M. WARD: 1 ♂ 49.9 mm (AMNH 8415). — SW Luzon, Sangay, 3.03.1981, coll. B. GINDELBERGER: 1 ♂ 37.0 mm (RMNH 35201).

Malaysia. N Borneo, Sandakan, 30.06.1929: 1 ♂ 60.2 mm (USNM 122953).

Indonesia. Java, ?det. J.A. HERKLOTS as *C. (Lophos) Cristata*, redet. L.B. HOLTHUIS: 2 dry specimens (RMNH 43129). — Balayan Bay, 27.08.1927: 2 ♂ 44.2, 45.8 mm (USNM). — Batavia Bay (= Bay of Jakarta), July 1904, coll. P. BUITENDIJK: 1 ♂ 48.9 mm (RMNH 2503). — Mollucas, April-September 1821, coll. C.G.C. REINWARDT, redet. L.B. HOLTHUIS: 1 dry specimen (RMNH 43124). — Amboina, coll. E.W.A. LUDEKING: 1 ♂ 71.1 mm (RMNH 1706).

New Guinea. Humboldt Bay, 25.06.1955: 1 ♀ (RMNH 12843).

Australia. *East coast, Queensland:* Sydney, February 1975, coll. V. CUSUMANO: 1 ♀ 44.1 mm (AMNH 16188). — SE Queensland, Bribie I.: 1 ♀ 76.9 mm (QM W1832). — 25.07.1958, coll. A. BEALE: 1 ♀ 75.7 mm (QM W1998). — Toorbul Pt, 29.04.1957: 1 ♂ 74.7 mm (QM W1977). — Maroochy River mouth, 7.03.1952: 1 ♀ 76.0 mm (QM W1800). — Moreton Bay, 7.05.1957, coll. J.T. WALKER: 1 ♂ 70.2 mm (QM W1979). — Nr Smoky Cape, 46-55 m, August 1962: 1 ♂ 29.3 mm (QM W2724). — Between Moreton I. and Stradbroke I.: 1 ♀ 74.5 mm (QM W2656). — Between Cape Moreton and Mooloolaba, 1970, coll. F. WALLACE: 1 ♀ (QM W3382). — Tin Can Bay: 1 ♂ 70.5 mm (QM W2073). — 19°04.9'S, 118°50.6'E, "Soela", 81 m, 30.10.1983: 1 ♀ 40.3 mm (QM W19784). — Off Cape Moreton, 119 m, 1969, coll. P. HARRIS: 1 ♂ 55.5 mm (QM W3325).

North and north west coast: Weipa, July 1961, coll. G. WEBSTER: 1 ♂ 41.3 mm (QM W2218). — 19°28.4'S, 118°55.2'E, "Soela", 39 m, 31.10.1983: 1 ♀ 18.7 mm (QM W19794). — Gulf of Carpentaria, "Southern Surveyor", 1991: 1 ♂ 19.9 mm (QM W19798). — Yirrkala, August 1987: 2 ♀ 39.0, 68.4 mm (USNM 178294). — NW Australia, coll. B. GRAY: 1 ♂ 67.0 mm (NHM 1931.5.15.39).

New Caledonia. Coll. ROUGIER, det. E.L. BOUVIER as *C. cristata*: 1 ♀ 65.0 mm (MNHN 42). — North-west lagoon, stn CP 1061, 20°12.4'S, 164°12.4'E, 13-17 m, 5.05.1986, coll. B. RICHER DE FORGES: 1 juv. (MNHN). — St. Vincent Bay, stn 167, 22°07'S, 166°10'E, 11 m, coll. B. RICHER DE FORGES: 1 ♀ (broken) (MNHN).

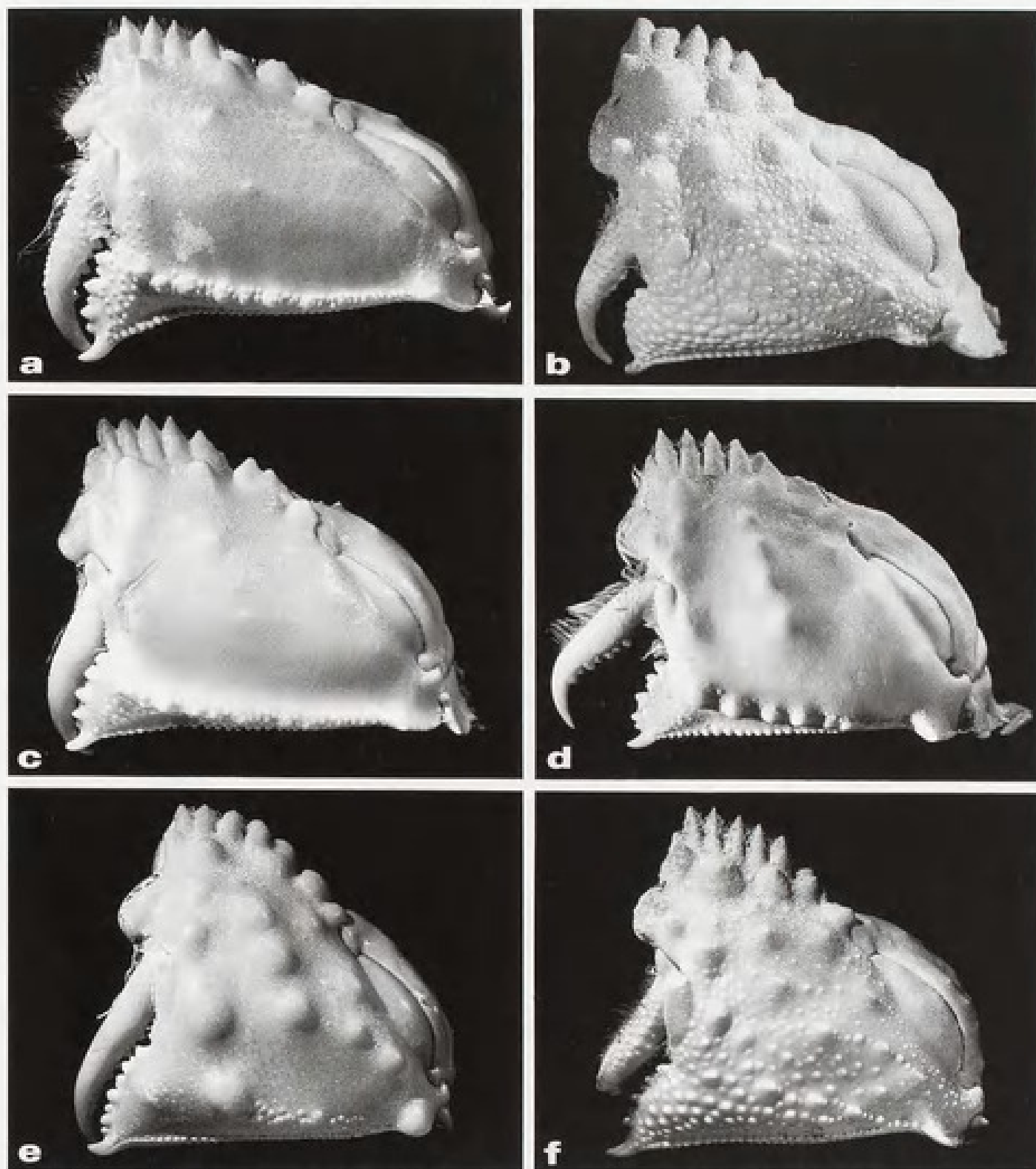


FIG. 20. — Cheliped, external view: a, *Calappa lophos* (Herbst, 1782), ♂ 47.3 mm, Madagascar, Nosy Be, 6-8 m (MNHN). — b, *Calappa matsuzawa* sp. nov., ♂ paratype, 55.2 mm, Japan (SMF 22938). — c, *Calappa monilicanthus* sp. nov., ♂ holotype, 53.7 mm, Seychelles, "REVES 2" stn 45, 4°12.3'S, 55°59.6'E, 60-65 m (MNHN-B 25693). — d, *Calappa philargius* (Linnaeus, 1758), ♂ 55.5 mm, Australia, Cape Morton, 119 m (QM W3325). — e, *Calappa pustulosa* Alcock, 1896, ♀ 50.8 mm, Vietnam, Nha Trang Bay (MNHN-B 13464). — f, *Calappa sebastieni* sp. nov., ♂ holotype, 66.1 mm, Marquesas Is., stn 288, 9°20.5'S, 140°02'W, 120 m (MNHN-B 25690).

DESCRIPTION. — Carapace convex, 1.5 wide as long, surface minutely granulate, frontal and epigastric regions more densely granulate. Front only slightly projecting, with two triangular teeth. Anterior margin of basal antennal article concave, proximal lobe dilate, peduncle emerging from distal angle. Afferent branchial canal ending below orbit in granulate tridentate process. Endostomial septum visible with first maxillipeds closed, with slightly rounded anterior margin. Distal margin of first maxillipeds obliquely cut. Branchial ridges prominent in young, barely distinguished, anteriorly with flattened tubercles. Anterolateral margin carinate, unevenly granulate. Posterolateral margin with four marginally beaded lacinate teeth, distalmost largest, and three triangular, granulate teeth. Posterior margin with obtuse median tooth, shorter than adjacent teeth. Merus of cheliped distally with quadrilobate lamina, two distalmost acuminate. External surface of chela minutely granulate, vertically traversed by three flattened tubercles, similar tubercles distally above dactyl. Crest of larger chela cut into seven teeth increasing in size distally, proximalmost bicuspidate. Unevenly tuberculate ridge running subparallel to lower margin, from proximal keel-like tooth to base of fixed finger, tubercles larger distally. Lower margin narrow, two beaded files contiguous distally. First male pleopod markedly curved distad, tapering apically to narrow spinulate tip; second pleopod slender, slightly curved, tip short, digitate.

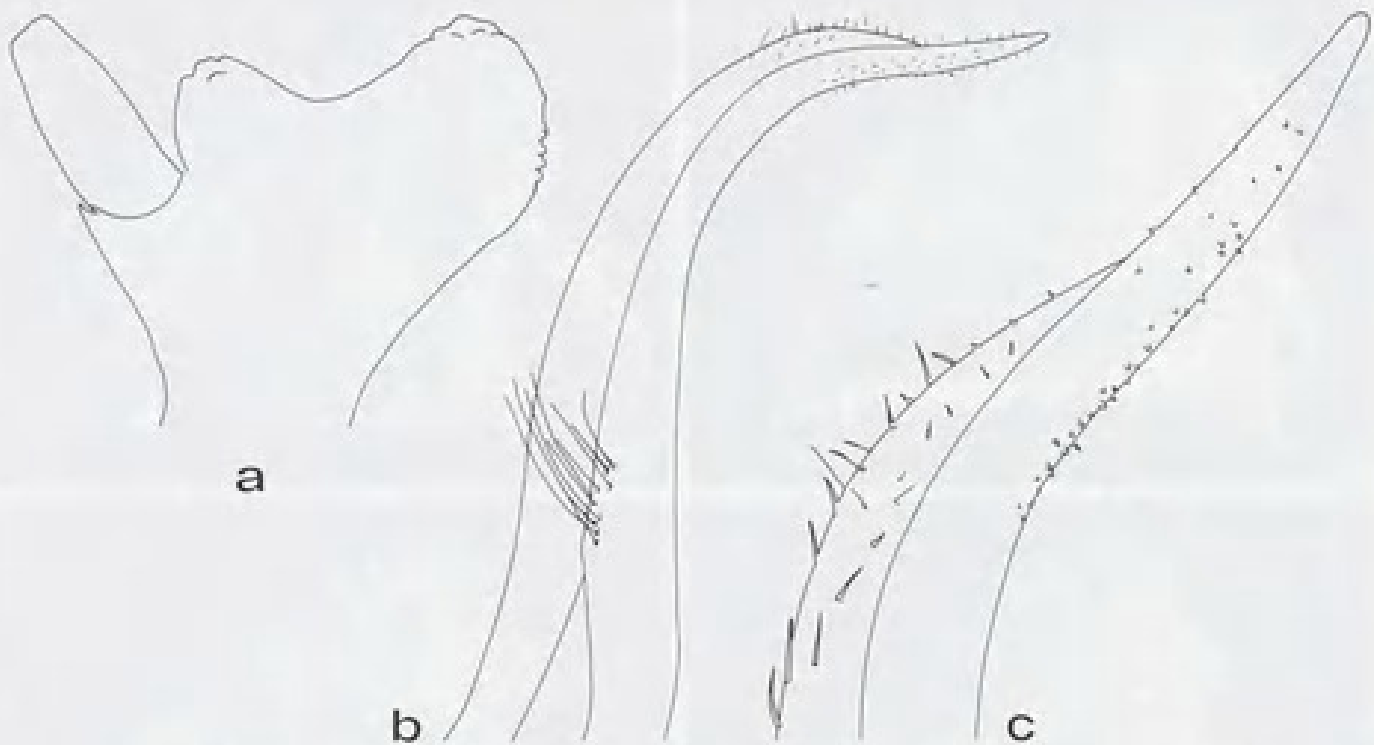


FIG. 21. — *Calappa philargius* (Linnaeus, 1758), ♂ 55.5 mm, Australia, Cape Morton, 119 m (QM W3325): a, first article of antenna; b-c, first pleopod male with enlargement of distal part.

Color. — "Pale brick-red above, the surface being covered with crowded punctae of that color. The eyes are longitudinally striped with black, the stripes or lines being about seven in number. A large, well-defined deep red spot on the carpus, and one on the front of the hand. Inner side of hand with red spots or blotches arranged in lines. Lower side of brachia deep red. Inferior surface of body white, with the exception of two oblique red lines on each cheek" (STIMPSON, 1907). "A pair of large maroon spots on either claw, and a maroon horse-shoe [marking] around each eye; the general colour fawn with a tinge of lavender centrally" (McNEILL & WARD, 1930). Color photograph in TAKEDA (1982).

REMARKS. — LINNAEUS' (1758) description of *C. philargius*: "thorace laevi integerrimo convexo: postice quindecim-dentato" is accurate but exceedingly terse. HERBST's (1794, 1799) color description and drawing of *C. inconspicua* leave no doubt that the species depicted is indeed *C. philargius*. FABRICIUS' (1798) establishment

of *C. cristata* owes much to arithmetics: whereas LINNAEUS counted 15 teeth on the posterior margin (including posterolateral), FABRICIUS counted only seven (posterior proper). LATREILLE (1803) realized that *cristata* and *inconspecta* are one and the same, but it was DE HAAN (1837) who synonymized both with *C. philargius*.

DISTRIBUTION (fig. 33). — Indian Ocean to Japan, Australia and Samoa, 8-120 m.

Calappa pustulosa Alcock, 1896

Pl. 17 c, 20 c, 22, 33

Calappa pustulosa Alcock, 1896: 147, pl. 6 fig. 1. — ALCOCK & ANDERSON, 1897, pl. 28 figs 1-1a. — IHLE 1918: 306 (list). — ANDRÉ, 1931: 640. — CHOPRA, 1933: 29. — SERÈNE, 1937: 78; 1968: 41 (list). — SAKAI, 1937: 97, pl. 18 figs 2-3; 1956: 8; 1965: 57, pl. 23 fig. 2; 1976: 134, pl. 41 fig. 1. — DAWYDOFF, 1952: 139. — MIYAKE, 1983: 199. — DAI *et al.*, 1986: 94, text-fig. 52, pl. 12 fig. 1. — DAI & YANG, 1991: 106, text-fig. 52, pl. 12 fig. 1. — CHEN, 1993: 686, fig. 4b.

Not *Calappa pustulosa* var. *clypeata* Borradaile, 1903: 436 [= *C. clypeata* (Borradaile, 1903)].

MATERIAL EXAMINED. — Burma. Gulf of Martaban: 1 ♂ 17.0 mm (NHM 1899.1.20.4).

Vietnam. Nha Trang Bay, 1930, coll. A. KREMPF: 2 ♀ 39.7, 50.8 mm (MNHN B.13464).

Philippines. Marinduque I., 2.03.1909, "Albatross", stn 5376, 165 m, det. M. WARD: 2 ♀ 29.3, 30.9 mm (USNM 65429).

Taiwan. Kaoshiung, SW Taiwan, 24.11.1987, coll. LIN CHOON CHONG: 1 ♂ 62.3 mm (NUS).

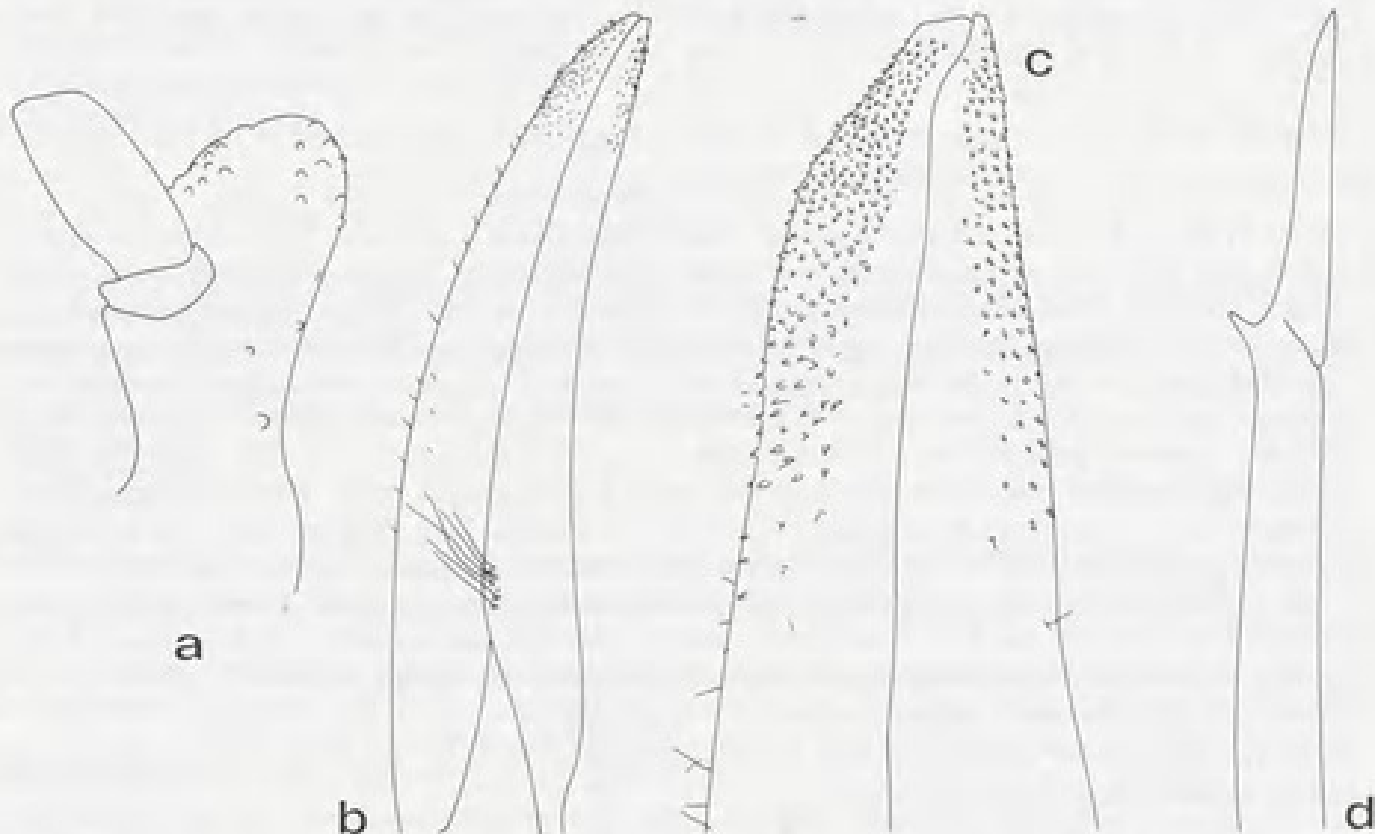


FIG. 22. — *Calappa pustulosa* Alcock, 1896, ♂ 62.3 mm, Taiwan, Kaoshiung (NUS 1995.605): a, first article of antenna; b-c, first pleopod male with enlargement of distal part; d, second pleopod male, enlargement of distal part.

DESCRIPTION. — Carapace prominently convex, subcircular, 1.1 wide as long, surface minutely granulate. Front only slightly projecting, with two low, rounded teeth. Basal antennal article not dilated anteriorly, peduncle

emerging from distal angle. Afferent branchial canal ending below orbit with medially-notched rounded process. Endostomial septum invisible with first maxillipeds closed, with straight anterior margin. First maxillipeds with triangular notch on anterointernal margin. Branchial ridges, prominent in young, indistinct, bullous. Anterolateral margin unevenly tuberculate. Clypeiform expansions moderate. Posterolateral margin with five triangular, granulate teeth, median longest. Posterior margin projecting, beaded. Merus of cheliped distally quadridentate, three proximal teeth rounded, distalmost tooth acuminate, ram-like. External surface of carpus with nearly obsolete tubercles. External surface of chela minutely granulate, obliquely traversed by three rows of tubercles, median row most prominent. Crest of larger chela cut into seven teeth, two proximalmost rounded. Unevenly granulate ridge running subparallel to lower margin, from proximal rounded tooth to base of pollex. Lower margin wide, two beaded files contiguous distally. Internal surface of chela inferiorly with beaded file subparallel to lower margin.

Color. — Carapace light brown, irregular reddish spots anteriorly (SAKAI, 1976, pl. 41 fig. 1).

REMARKS. — ALCOCK's (1896) description and drawings being accurate, the identity of *C. pustulosa* has never been in doubt. *C. pustulosa* differs from its congeners by its subcircular carapace lacking clypeiform expansions.

DISTRIBUTION (fig. 33). — India, Philippines, China, Japan. On sandy or muddy bottoms, 40-165 m.

Calappa sebastieni sp. nov.

Fig. 17 f, 20 f, 23, 33

MATERIAL EXAMINED. — French Polynesia (coll. J. POUPIN). *Marquesas Is*: Ua Pou, stn 288, 9°20.5'S, 140°02'W, 120 m, 28.08.1990: 1 ♂ 66.1 mm (MNHN-B 25690). — Fatu Huku, stn 291, 9°25.6'S, 138°55.7'W, 110 m, 29.08.1990: 2 ♂ 51.5, 66.0 mm (MNHN-B 25691). — Hiva Oau, stn 294, 9°46.5'S, 139°01.1'W, 100 m, 30.08.1990: 1 ♂ (MNHN-B 25692).

TYPE MATERIAL. — The male (MNHN-B 25690) from the station 288, collected at Ua Pou (Marquesas Islands) is the holotype. The other specimens are paratypes.

DESCRIPTION. — Carapace convex, 1.6 wide as long. Surface minutely granulate, flattened lumps on gastroduodenal, hepatic and branchial regions; transverse beaded rows posteriorly, increasing in length laterally. Front prominent, bidentate. Basal antennal article prominently granulate, anterior margin concave, proximal angle produced, peduncle emerging from distal angle. Afferent branchial canal ending below orbit in granulate tridentate process. Endostomial septum visible with first maxillipeds closed, with straight anterior margin. First maxillipeds with deep triangular notch on anterior margin. Anterolateral margin crenulate, granulate, dentate, setose. Clypeiform expansions greatly developed. Posterolateral margin lamellar, setose, with four marginally beaded lacinate teeth followed by two shallow teeth. Posterior margin sinuous, beaded, setose. Merus of cheliped distally with marginally setose quadrilobate lamina, two distal lobes acuminate. Crest of larger chela with seven teeth, proximalmost bicuspidate. External surface of chela unevenly granulate, with mammillary tubercles superiorly and two unevenly granulate rows running obliquely from proximal ram-like tooth to pollex. External beaded row on lower margin running entire length of chela, internal row only distal half. Internal surface of chela smooth, beaded file parallel to lower margin. First male pleopod stout, slightly curved, tapering apically, distally spinulate; second pleopod slender, slightly curved, subdistal denticulate flange, tip digitate.

Color (in alcohol). — Carapace ivory-colored with irregular russet stains, interior surfaces of cheliped and clypeiform expansions reticulated with orange.

ETYMOLOGY. — Named after Sébastien, son of J. POUPIN, scientist of the SMSRB (Service mixte de surveillance radiologique et biologique des Armées) who collected all the specimens of this species studied here.

REMARKS. — *C. sebastieni* differs from the closely related *C. undulata* in its wider clypeiform expansion, form of lacinate teeth on posterolateral margin, lack of tubercles on branchial, gastric regions, bidentate front and color pattern.

DISTRIBUTION (fig. 33). — Known only from the Marquesas Islands, at 100-120 m.

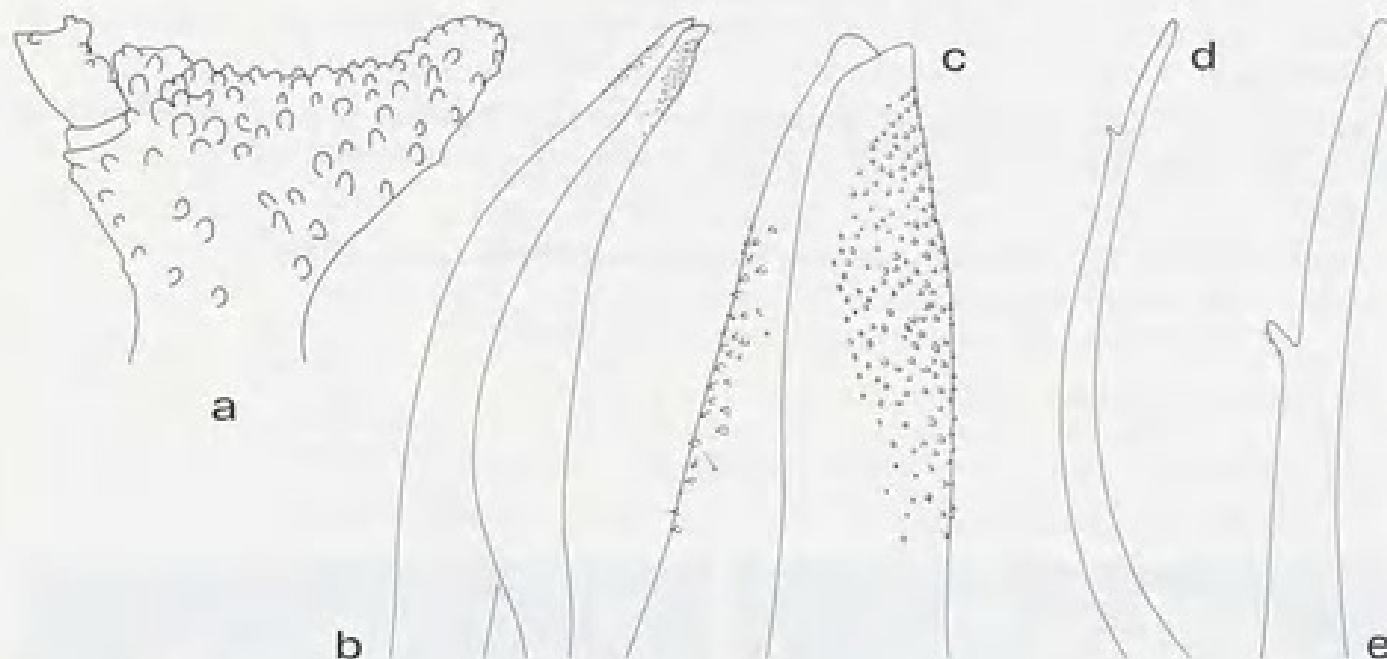


FIG. 23. — *Calappa sebastieni* sp. nov., ♂ holotype, 66.1 mm, Marquesas Is., stn 288, 9°20.5'S, 140°02'W, 120 m (MNHN-B 25690): a, first article of antenna; b-c, first pleopod male with enlargement of distal part; d-e, second pleopod male with enlargement of distal part.

Calappa torulosa sp. nov.

Fig. 24, 26 a-b, 34

MATERIAL EXAMINED. — Wallis Is. MUSORSTOM 7: lagoon, 13°17.9'S, 176°08.4'W, 45 m, 25.05.1992: 1 ♂ 30.5 mm (MNHN-B 25689).

Indonesia. Menado, N Sulawesi, 1836, coll. A.J. VAN DELDEN: 1 ♀ 43.3 mm (RMNH). — Ambon, 28.11.1990, 2 m, muddy-sand, Rumphius Exped., coll. H.L. STRACK: 1 ♀ 26.8 mm (RMNH). — Banda Sea, 5°36'S, 132°55'E, 85 m, sand, 9.05.1922, coll. Th. MORTENSEN: 1 ♀ 41.2 mm (ZM CRU1825).

Australia. Holothuria Bank, 13°25'S, 126°05'E, 44 m, coll. P.W. BASSETT-SMITH: 2 ♂ 23.8, 22.9 mm (NHM 1892.3.26.171-172).

Marshall Is. Eniwetok I., May 1975: 1 ♂ 19.2 mm (USNM 267079).

TYPE MATERIAL. — The male (MNHN-B 25689) collected in the lagoon of Wallis is the holotype. The two females (LC = 26.8 and 43.3 mm) collected in Indonesia and kept at the RMNH are paratypes.

DESCRIPTION. — Carapace markedly convex, 1.2-1.3 wide as long, surface finely punctate, prominently tuberculate anteriorly, meso- and metabranchial regions with short granulate rows. Front only slightly projecting, anterior margin obtuse. Basal antennal article granulate, anterior margin concave, proximal angle produced, peduncle emerging from distal angle. Afferent branchial canal ending below orbit in rounded process. Endostomial septum visible with first maxillipeds closed, with slightly rounded anterior margin. First maxillipeds with triangular notch on anterior margin. Anterolateral margin arcuate, carinate, scalloped. Posterolateral margin lamellar, with six marginally beaded triangular teeth, third and fourth teeth largest. Posterior margin produced, sinuous, closely beaded. Merus of cheliped distally with indistinctly quadrilobate lamina, anteriormost lobe keel-like. Crest of larger chela with six teeth. External surface of chela obliquely traversed by three rows of tubercles, median row most prominent, inferiorly granulate. Lower margin narrow, two beaded files contiguous distally. Internal surface of chela inferiorly minutely granulate, beaded file parallel to lower margin. First male pleopod

stout, slightly curved, tapering apically to spinulate tip; second pleopod slender, slightly curved, subdistal denticulate flange, tip digitate.

ETYMOLOGY. — From the Latin, *torus* = protuberance, bulge, for the tubercle-covered carapace, and the suffix *-osus*.

REMARKS. — *C. torulosa* is distinguished from the closely related *C. capelloni* in its truncate, obtuse front, lack of large rounded tubercles anteriorly on clypeiform process, and more pronounced teeth on posterolateral margins.

DISTRIBUTION (fig. 34). — Indonesia, Australia, Marshall Islands, Wallis Islands, 2-85 m.

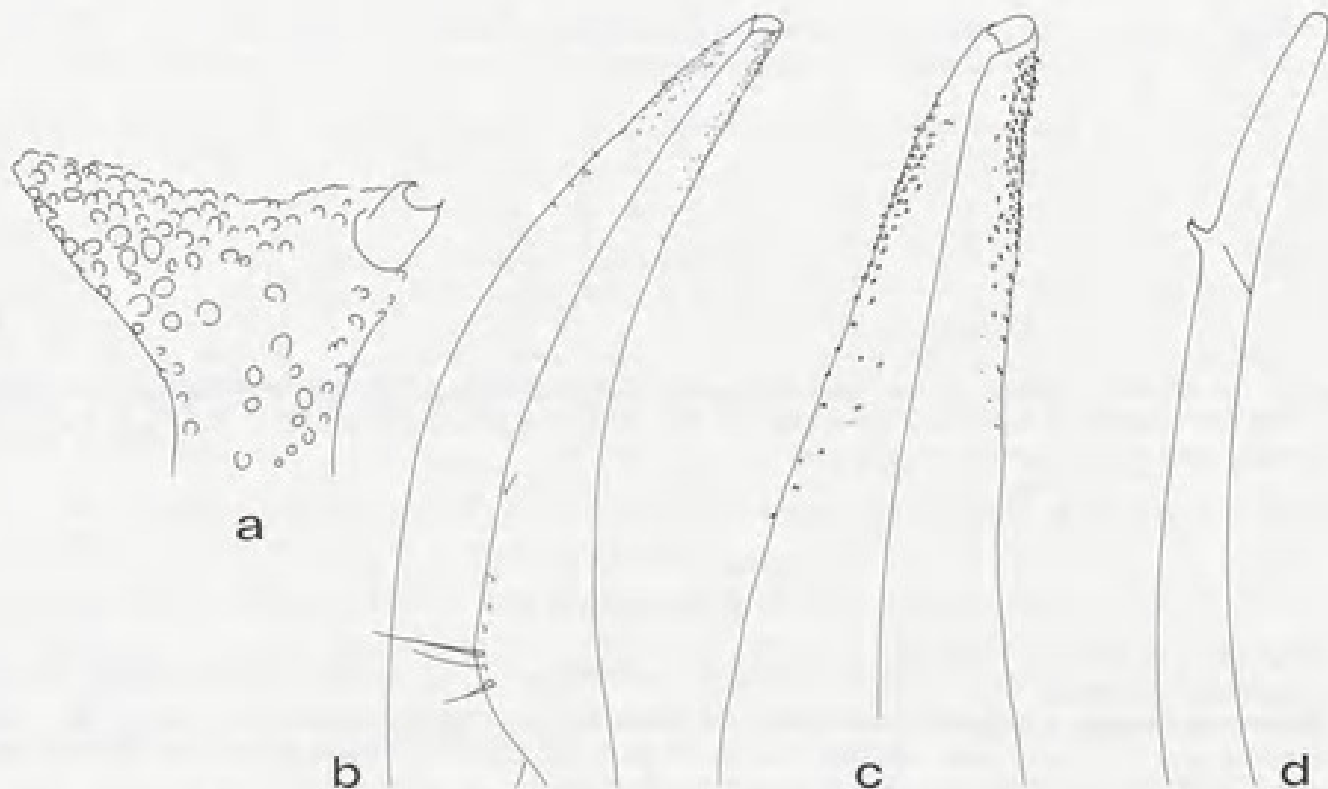


FIG. 24. — *Calappa torulosa* sp. nov., ♂ holotype, 30.5 mm, Wallis Is., "MUSORSTOM 7", 13°18'S, 176°08'W, 45 m (MNHN-B 25689): a, first article of antenna; b-c, first pleopod male with enlargement of distal part; d, second pleopod male, enlargement of distal part.

Calappa undulata Dai, 1991

Fig. 25, 26 c-d, 34

Calappa undulata Dai, 1991: 101 (key). — CHEN, 1993: 686, fig 7a-h.

MATERIAL EXAMINED. — South China Sea. Nansha Islands, 60 m, 30.05.1993: 1 ♀ 37.9 mm (IOCAS).

DESCRIPTION. — Carapace convex, 1.3 wide as long, surface minutely granulate anteriorly. Front projecting, anterior margin with v-shaped notch, bidentate. Basal antennal article granulate, anterior margin concave, peduncle emerging from distal angle. Endostomial septum visible with first maxillipeds closed, with straight anterior margin. Hepatic region slightly depressed. Gastric, cardiac regions delimited by shallow longitudinal grooves. Branchial, gastric regions with rounded tubercles, posteriorly traversed by few beaded tubercles. Anterolateral margin arcuate, anteriorly indistinctly dentate, posteriorly with six beaded denticles. Posterolateral margin setose.

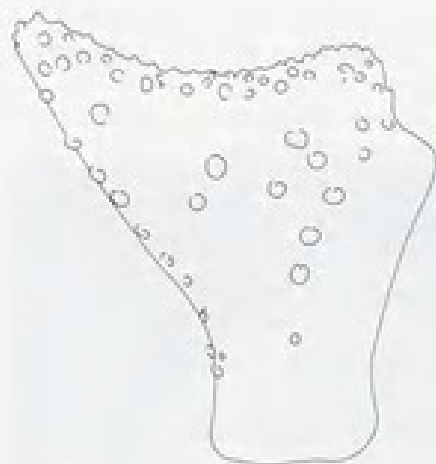


FIG. 25. — *Calappa undulata* Dai, 1991, ♀ 37.9 mm, South China Sea, Nansha I., 60 m (IOCAS): first article of antenna.

cut into six marginally beaded lacinate teeth, three posterior teeth medially beaded. Posterior margin somewhat produced, sinuous, finely beaded. Merus of cheliped distally quadrilobate. Crest of larger chela cut into seven teeth. External surface of chela obliquely traversed by three rows of flattened tubercles, larger, wart-like, anteriorly, pollex densely granulate, lacking proximal lamellar tooth. Lower margin narrow, two beaded files contiguous distally. Internal surface of chela with beaded file parallel to lower margin. First male pleopod stout, slightly curved, tapering apically to denticulate tip; second pleopod slender, slightly curved, subdistal denticulate flange, tip digitate.

Color (in alcohol). — "Carapace yellowish, and with reddish tubercles. Posterior 1/3 of carapace with reddish wavy mottles" (CHEN, 1993).

REMARKS. — *C. undulata* is distinguished from the closely related *C. capellonis* and *C. torulosa* in lacking the closely set mammilate tubercles on branchial regions of carapace, and generally smoother carapace.

DISTRIBUTION (fig. 34). — Known from South China Sea, at 39-66 m.

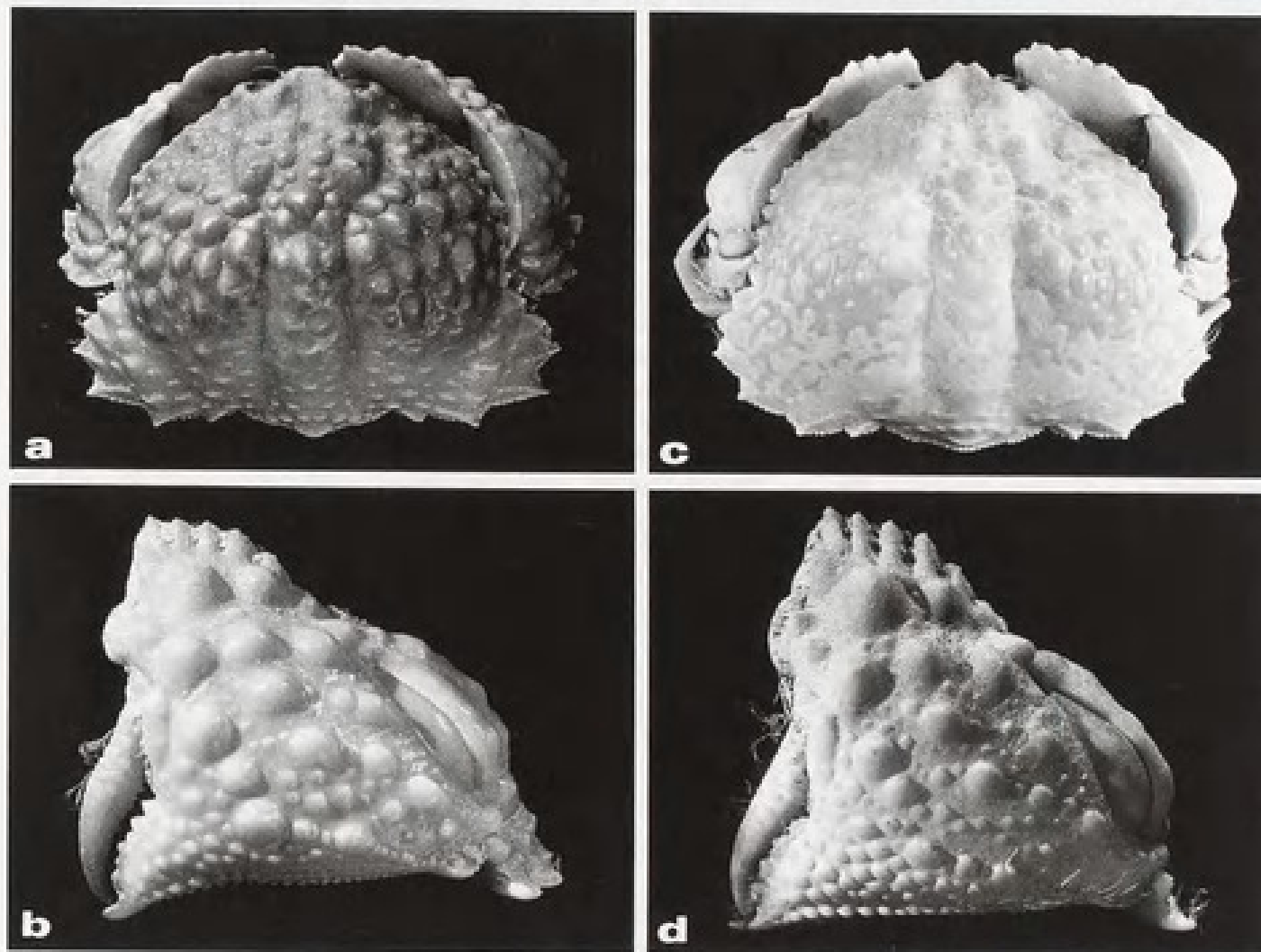


FIG. 26 a-b. — *Calappa torulosa* sp. nov., ♂ holotype, 30.5 mm, Wallis Is. "MUSORSTOM 7", 13°18'S, 176°08'W, 45 m (MNHN-B 25689): a, whole crab, dorsal view; b, cheliped, external view.

FIG. 26 c-d. — *Calappa undulata* Dai, 1991, ♀ 37.9 mm, South China Sea, Nansha I., 60 m (IOCAS): c, whole crab, dorsal view; d, cheliped, external view.

Calappa yamasitae Sakai, 1980

Fig. 34

Calappa yamasitae Sakai, 1980: 5, frontispiece fig. 2, text-figs 2a-b, 3a-c. — MIYAKE, 1983: 199 (list).

DESCRIPTION. — Carapace convex, 1.6 wide as long. Surface coarsely granulate, with large mammillate tubercles covering branchial region. Front projecting, with two obtuse teeth separated by deep U-shaped sulcus. Gastric, cardiac regions delimited by shallow longitudinal grooves. Anterolateral margin coarsely dentate or serrate. Posterolateral margin setose, marginally beaded, six anterior teeth triangular, distalmost largest, three posterior teeth shallow, with prominent, beaded, median ridges. Posterior margin sinuous, beaded. Merus of cheliped distally quadrilobate. Crest of larger chela cut into 9-10 prominent teeth. External surface of chela coarsely granulate, with scattered tubercles, larger, wart-like, anteriorly. Lower margin narrow, with beaded tubercles. First male pleopod stout, slightly curved, tapering apically.

Color. — Carapace orange-red with tubercles somewhat darker (SAKAI, 1980, frontispiece fig. 2).

REMARKS. — The two known specimens of *C. yamasitae* were not available for study.

DISTRIBUTION. — Known only from type location, Mie Prefecture, Honshu I., Japan. Depth unknown.

Genus *CALAPPULA* nov.

TYPE SPECIES: *Calappa saussurei* Rathbun, 1898a.

DIAGNOSIS. — Carapace somewhat convex, granulate, tuberculate, regions undefined, furrows bordering cardiac region pronounced. Front as wide as orbit, downturned, trilobate, median lobe invisible in dorsal view. Antennules folding obliquely beneath front. Anterolateral margin arcuate, crenate, dentate or granulate. Posterolateral margin moderately expanded, lacinate, concealing flexed ambulatory legs beneath. Eyes filling orbits, eyestalk short, stocky, cornea large. Supraorbital margin swollen, unifissured. Basal article of antennae subquadrate, forming inner orbital margin, flagellum short. Buccal cavity elongate, lacking median septum anteriorly. Subhepatic regions and outer maxillipeds densely setose. Chelipeds massive, subequal. Merus with transverse dentate crest externally, distalmost tooth largest, keel-like. Carpus trigonal. External surface of chela swollen, upper margin crested, lobate; keel-like laminar tooth proximally near lower margin; lower margin with two parallel files of tubercles. Internal surface of chela densely setose along lower margin; finely milled ridge extending from mid crest to base of dactyl, preceded by smaller milled ridge on third tooth of crest. Larger dactylus proximally with crochet tooth fitting into molariform depression, dactylus' upper margin setose, granulate, with rounded tooth proximally. Pereiopods smooth, laterally compressed, dactyli styliform. Male abdomen five-segmented, second segment granulate, with prominent lateral lobes. First male pleopod stout, tapering, distally spinulose. Second male pleopod filamentose, distally crook-shaped.

REMARKS. — WILLIAMS & CHILD (1989), while establishing *Cyclozodion* to accomodate two Western Atlantic species - *C. angustum* (A. Milne Edwards, 1880) and *C. tuberatum* Williams & Child, 1989 - placed it between *Calappa* and *Paracyclois*. *Calappula*, combining features characteristic of both *Calappa* and *Cyclozodion*, is distinguished from the former by its unifissured supraorbital border, downturned trilobate front, stridulating organ consisting of milled ridge vertically transversing interior surface of chela and postorbital tubercles, and lack of median septum anteriorly in buccal cavity, features it shares in common with both *Cyclozodion* and *Paracyclois*. *Calappula* is distinguished from those in possessing expanded posterolateral margin large enough to conceal flexed ambulatory legs beneath, and keel-like tooth proximally on external surface of chela.

Calappula comprises two species - *C. saussurei* and *C. tortugae* (Rathbun, 1933) comb. nov., one on each side of the Central American Isthmus.

ETYMOLOGY. — From the Latin; *-ula* is a diminutive suffix to denote the smaller-sized species.

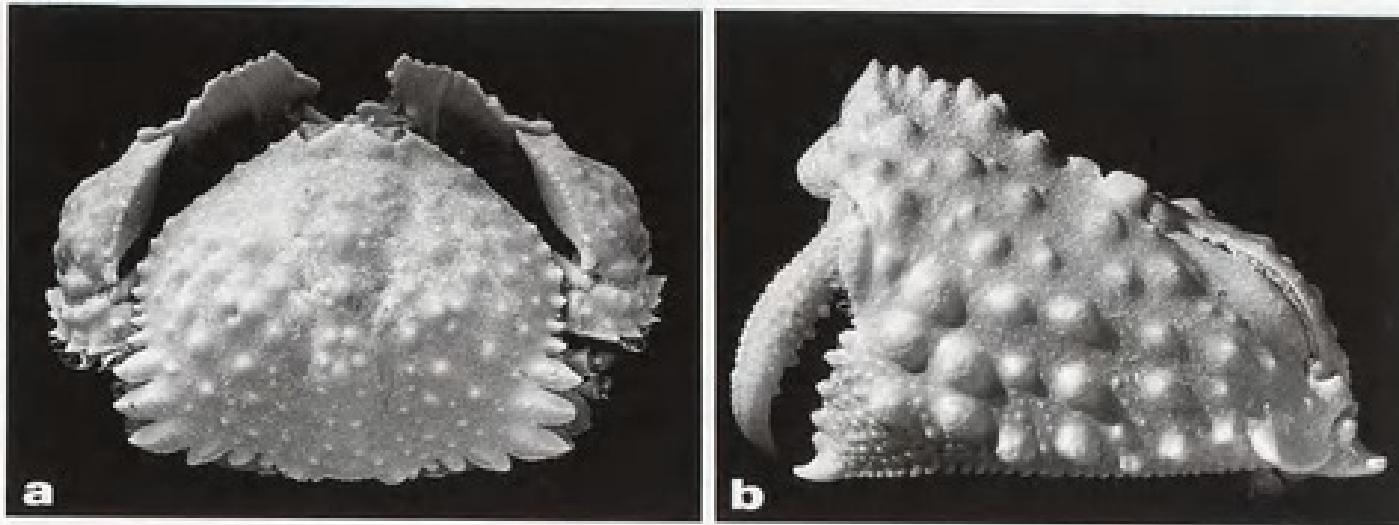


FIG. 27. — *Calappula saussurei* comb. nov., ♂ 31.5 mm, Ecuador (MNHN-B.17249) : a, whole crab, dorsal view; b, cheliped, external view.

Calappula saussurei (Rathbun, 1898) comb.nov.

Fig. 27, 28, 34

Calappa saussurei Rathbun, 1898a: 609, pl. 41 fig. 6; 1937: 206, fig. 43, pl. 63 figs 1-4. — FINNEGAN, 1931: 611. — CRANE, 1937: 98. — GARTH, 1948: 19; 1960: 121 (list); 1966: 12. — PRAHL & SANCHEZ, 1986: 24. — WILLIAMS & CHILD, 1989: 109. — LEMAITRE & ALVAREZ-LEON, 1992: 51 (list). — HENDRICKX, 1992: 9 (list); 1993a: 8 (list); 1993b: 311 (list); 1994: 577.

MATERIAL EXAMINED. — Mexico. Gulf of California. La Paz Bay, 24°18'N, 110°22'W, 30.04.1888, "Albatross", stn 2823, 48 m: 1 ♂ holotype, 20.3 mm (USNM 21596). — Off Boca de la Trinidad, 21.01.1940, 93-104 m, coll. J.S. GARTH: 2 ♀ 25.2, 24.1 mm (LAM). — E. of Espiritu Santo, 95-106 m, 15.02.1940: 1 ♂ 18.6 mm; 1 ♀ 21.5 mm (LAM). — California. Farallon I., off San Ignacio, 1.04.1959, 91-119 m, coll. Scripps Exped.: 2 ♂ 13.5, 23.6 mm (LAM). — 60 mi. N. of Guaymas, 55-64 m, December 1963: 1 ♂ 24.0 mm; 3 juvs (USNM). — Gulf of California. Off Rio Fuente, 20.03.1985: 1 ♂ 25.7 mm; 1 ♀ ovig. 25.5 mm (MNHN-B 20867). — Banderas Bay, 13.02.1938, 46-73 m, coll. S.A. GLASSELL: 1 ♀ 23.0 mm (USNM 207834).

Costa Rica. April 1968, 80 m: 1 ♂ 34.1 mm (USNM 273953).

Panama. Isla de Joge, 28.06.1969, 73 m: 1 ♂ 26.9 mm (USNM 300691). — Bahia Honda, btn Medidor and Pacora I., 7°44.19'N, 8°35.23'W, 21.02.1934, "Velero III", stn 244, 55-64 m, coll. W.L. SCHMITT, det. M.J. RATHBUN: 1 ♂ 18.5 mm (USNM 69227). — Secas I., 7°58.02'N, 82°00.30'W, 29.03.1939, "Velero III", stn 945-39, 46-48 m: 3 juvs (LAM).

Colombia. Port Utria, 24.01.1935, 45 m, coll. W.L. SCHMITT, det. M.J. RATHBUN: 1 ♂ 37.5 mm (USNM 77161).

Ecuador. La Plata I., 10.02.1934, 82-101 m, coll. W.L. SCHMITT, det. M.J. RATHBUN: 1 ♂ 31.2 mm; 1 ♀ 24.4 mm (USNM 69228). — Off Guayaquil, 1979, coll. A. CROSNIER: 1 ♂ 31.5 mm (MNHN-B 17249).

Galapagos Is. Between Seymour and Daphne Is., 0°24.50'S, 90°21.40'W, 13.12.1934, "Velero III", stn 345, 55 m, coll. W.L. SCHMITT, det. M.J. RATHBUN: 1 ♀ 17.3 mm (USNM 76671).

DESCRIPTION. — Carapace moderately convex, subcircular, 1.2 wide as long. Surface granulate, irregularly tuberculate, tubercles more prominent on midbranchial region. Distinct longitudinal groove separating gastrocardial from branchial, hepatic regions. Front barely projecting, with two rounded teeth separated by shallow sulcus. Anterior margin of basal antennal article rounded, peduncle emerging distally. Afferent branchial canal

ending below orbit with rounded process. Anterior margin of first maxilliped concave. Anterolateral margin carinate, unevenly granulate anteriorly, prominently dentate posteriorly. Posterolateral margin beaded, with four granulate, lacinate teeth, penultimate largest, followed by two rounded teeth. Posterior margin produced, sinuous, irregularly beaded. Merus of cheliped distally with four granulate teeth, distalmost largest, bicuspidate. External surface of carpus tuberculate. External surface of chela granulate, traversed, subparallel to lower margin, by five irregular rows of granulate tubercles increasing in size inferiorly. Crest of larger chela with seven teeth, proximalmost bicuspidate. Inferior proximal tooth lamellar, ram-like. Lower margin with two contiguous beaded rows. First male pleopod stout, slightly curved, somewhat tapering, distally spinulate. Second male pleopod crook-shaped.

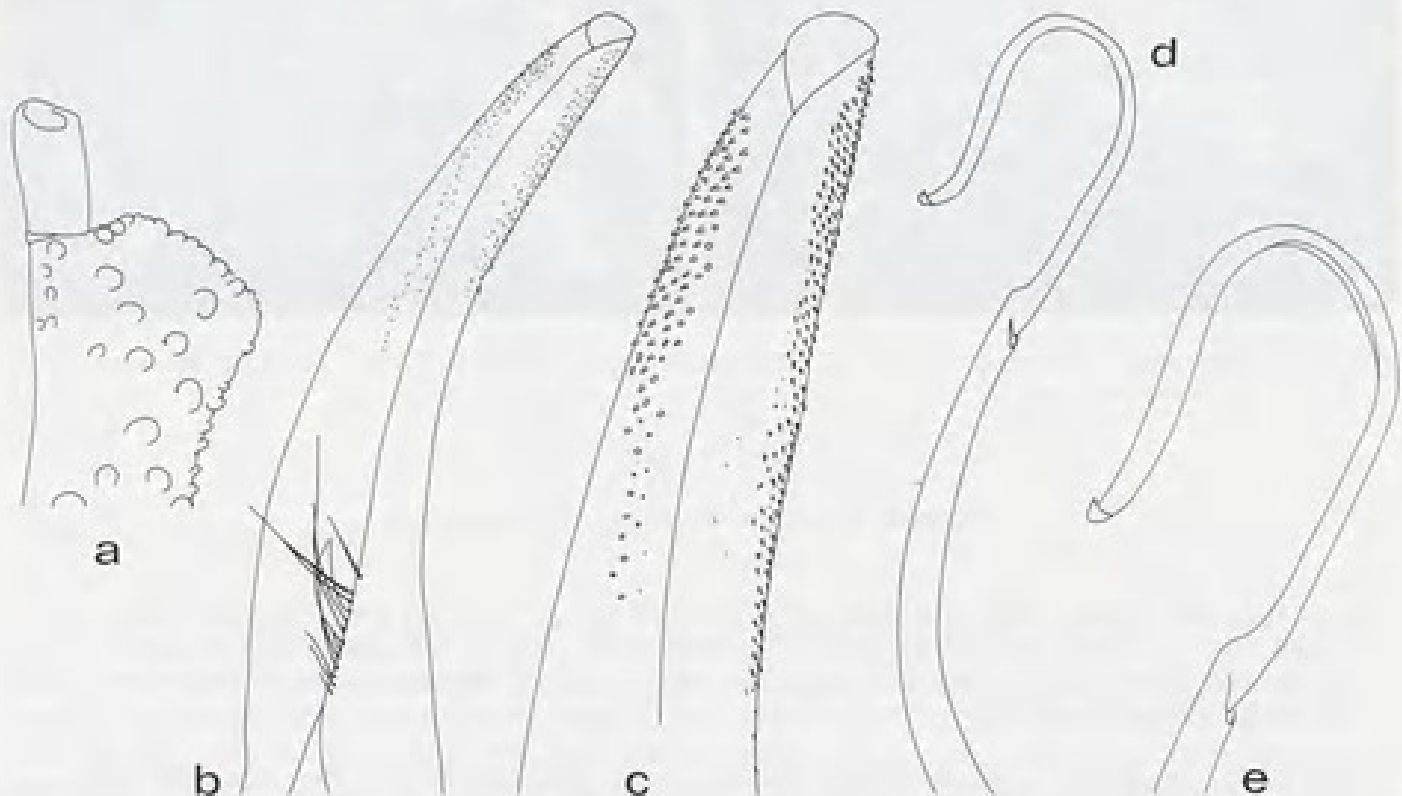


FIG. 28. — *Calappula saussurei* comb. nov., 1980, ♂ 31.5 mm, Ecuador (MNHN-B 17249): a, first article of antenna; b-c, first pleopod male with enlargement of distal part; d-e, second pleopod male with enlargement of distal part.

Color. — "Typical specimens from sandy bottoms were colored as follows: Carapace violet brown or tan anteriorly, fading posteriorly to white; all tubercles of carapace bright orange; chelipeds tan, the tubercles orange and white; ambulatories white banded at the joints with pale tan. Most of the specimens from muddy bottoms, on the other hand, had the entire carapace and sometimes the legs suffused with bright coral red or orange, while the tubercles were usually distinctly coral pink rather than orange... Eggs coral red to vermilion." (CRANE, 1937).

REMARKS. — RATHBUN (1898a), describing *C. saussurei*, recognized that "This species is analogous to *C. angusta* A. Milne Edwards of the West Indies". WILLIAMS & CHILD (1989), while clarifying the position of *C. tortugae* (Rathbun, 1933), concurred: "These two species of *Calappa* are similar enough to be regarded as a geminate pair from either side of the Central American land mass".

C. saussurei is distinguished from its close relative, *C. tortugae*, by the presence of five horizontal rows of granulate tubercles on external surface of chela.

DISTRIBUTION. — Gulf of California to Ecuador, Galapagos Is. Sand, mud, gravel, broken shell and coral bottoms, 1-300 m.

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GEOGRAPHICAL DISTRIBUTION MAPS

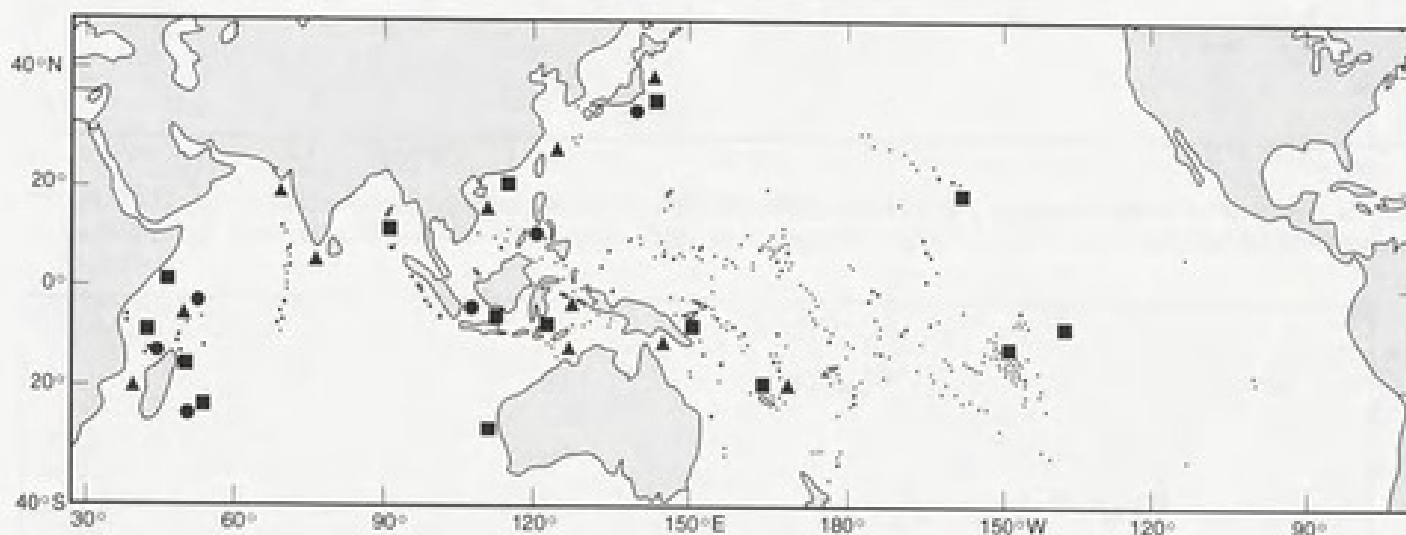


FIG. 29. — Geographic distribution of: ●, *Calappa bicornis* Miers, 1884; ■, *Calappa calappa* (Linnaeus, 1758); ▲, *Calappa capellonis* (Laurie, 1906), in the Indo-Pacific Ocean.

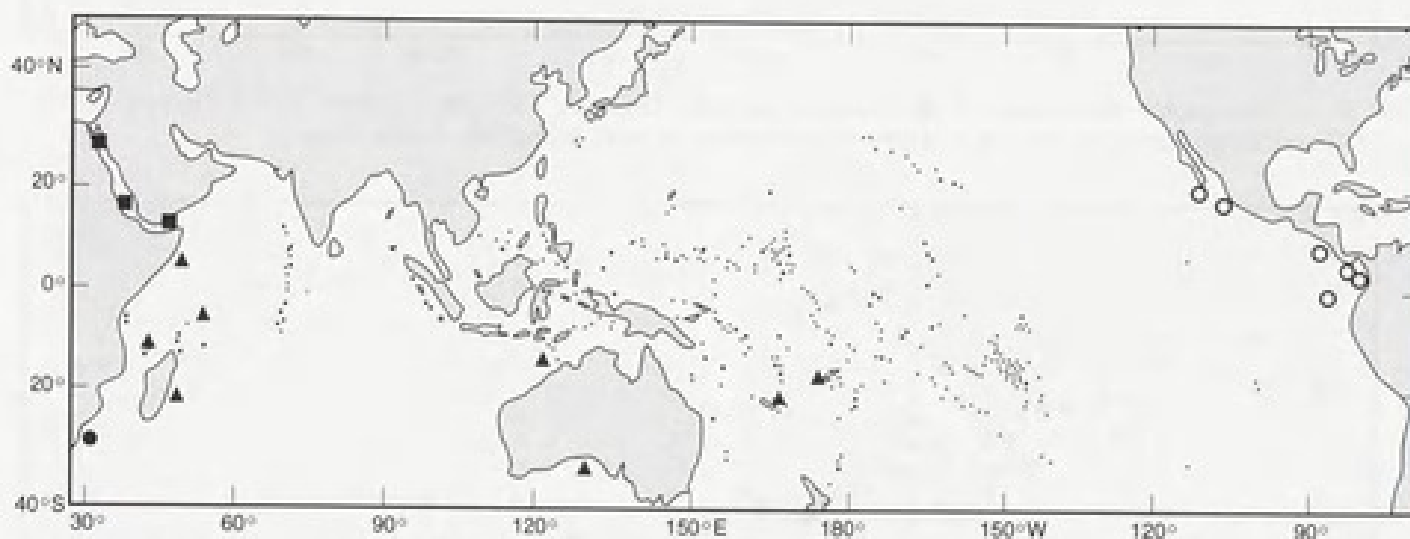


FIG. 30. — Geographic distribution of: ●, *Calappa conifera* sp. nov.; ○, *Calappa convexa* Saussure, 1853; ▲, *Calappa depressa* Miers, 1886; ■, *Calappa dumortieri* Guinot, 1962, in the Indo-Pacific Ocean.

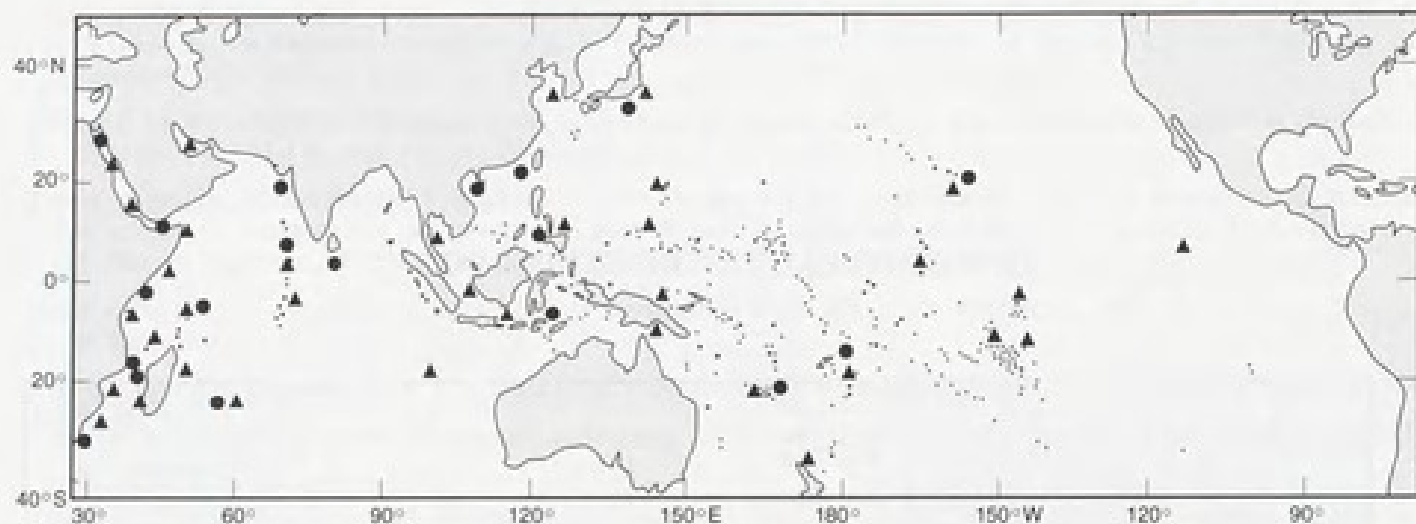


FIG. 31. — Geographic distribution of: ●, *Calappa gallus* (Herbst, 1803); ▲, *Calappa hepatica* (Linnaeus, 1758), in the Indo-Pacific Ocean.

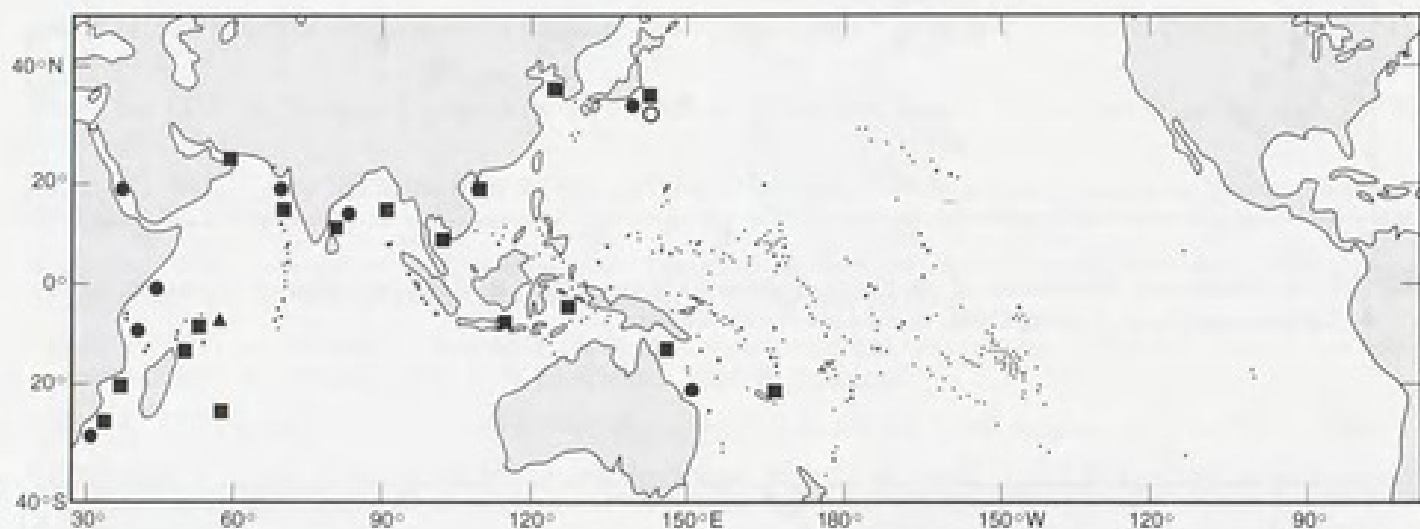


FIG. 32. — Geographic distribution of: ●, *Calappa japonica* Ortmann, 1892; ■, *Calappa lophos* (Herbst, 1782); ○, *Calappa matsuzawa* sp. nov.; ▲, *Calappa monilicanthus* sp. nov., in the Indo-Pacific Ocean.

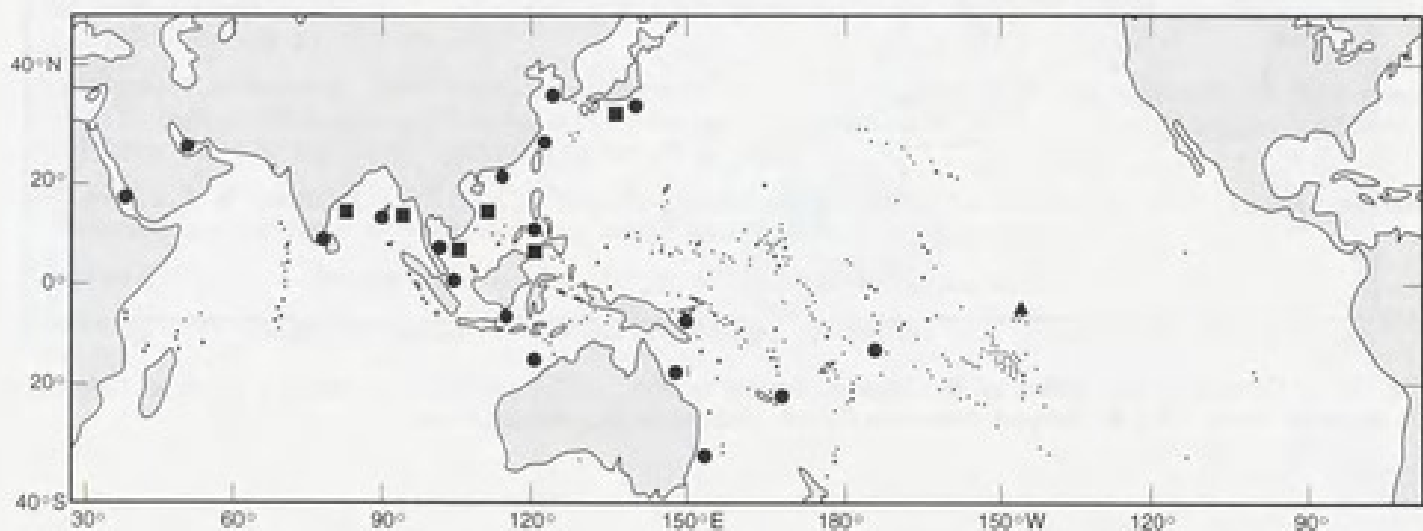


FIG. 33. — Geographic distribution of: ●, *Calappa philargius* (Linnaeus, 1758); ■, *Calappa pustulosa* Alcock, 1896; ▲, *Calappa sebastieni* sp. nov., in the Indo-Pacific Ocean.

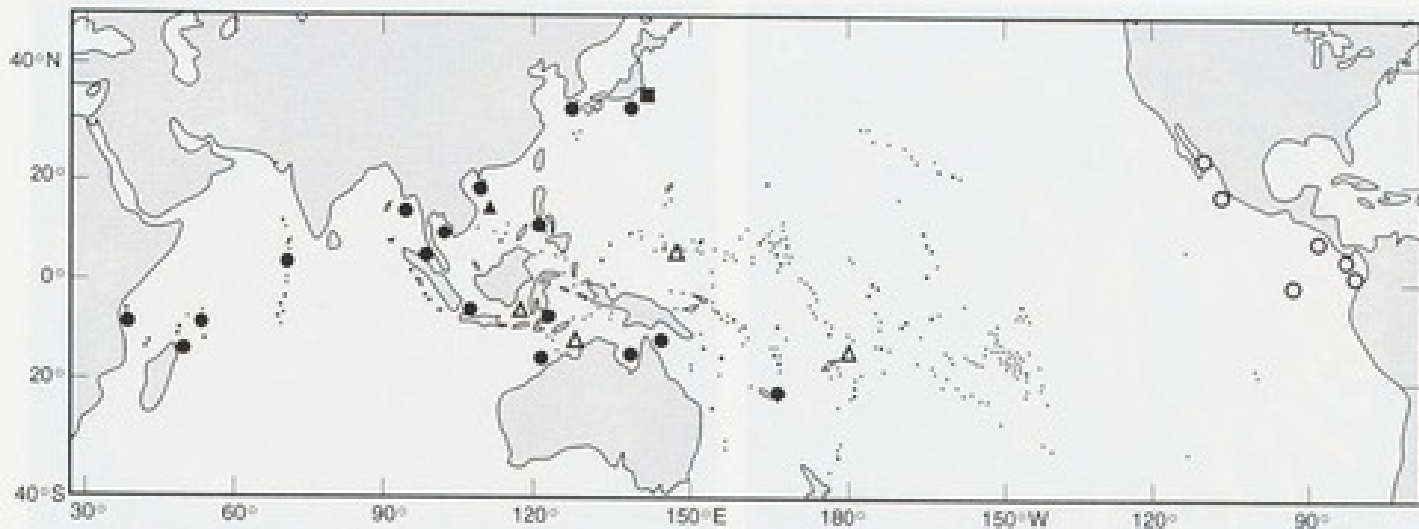
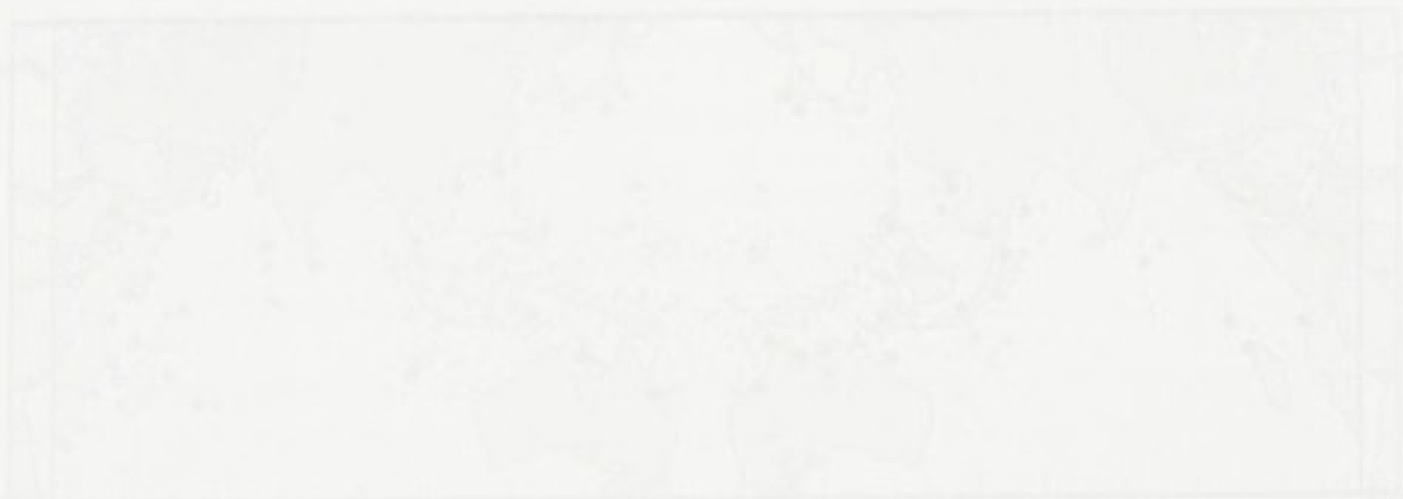


FIG. 34. — Geographic distribution of: ●, *Calappa clypeata* (Borradaile, 1903); Δ, *Calappa torulosa* sp. nov.; ▲, *Calappa undulata* Dai, 1991; ■, *Calappa yamasitae* Sakai, 1980; ○, *Calappula saussurei* comb. nov., 1980, in the Indo-Pacific Ocean.



FIGURES IN COLOUR

FIG. 35 a. — *Calappa capellonis* (Laurie, 1906). New Caledonia, north lagoon, 30 m.

FIG. 35 b. — *Calappa dumortieri* Guinot, 1962. Red Sea, Eilath.

FIG. 35 c. — *Calappa lophos* (Herbst, 1782), young specimen. New Caledonia, east lagoon, 78-80 m.

FIG. 35 d. — *Calappa clypeata* (Borradaile, 1903). New Caledonia, north lagoon, 22-24 m.

FIG. 35 e. — *Calappa depressa* (Miers, 1886). New Caledonia, east lagoon, 20 m.

FIG. 35 f. — *Calappa depressa* (Miers, 1886), young specimen. New Caledonia, east lagoon, 42 m.

Photographs 35a, 35 b, 35 d by Pierre LABOUTE and 35 e, 35 f by Jean-Louis MENOU, both from ORSTOM.

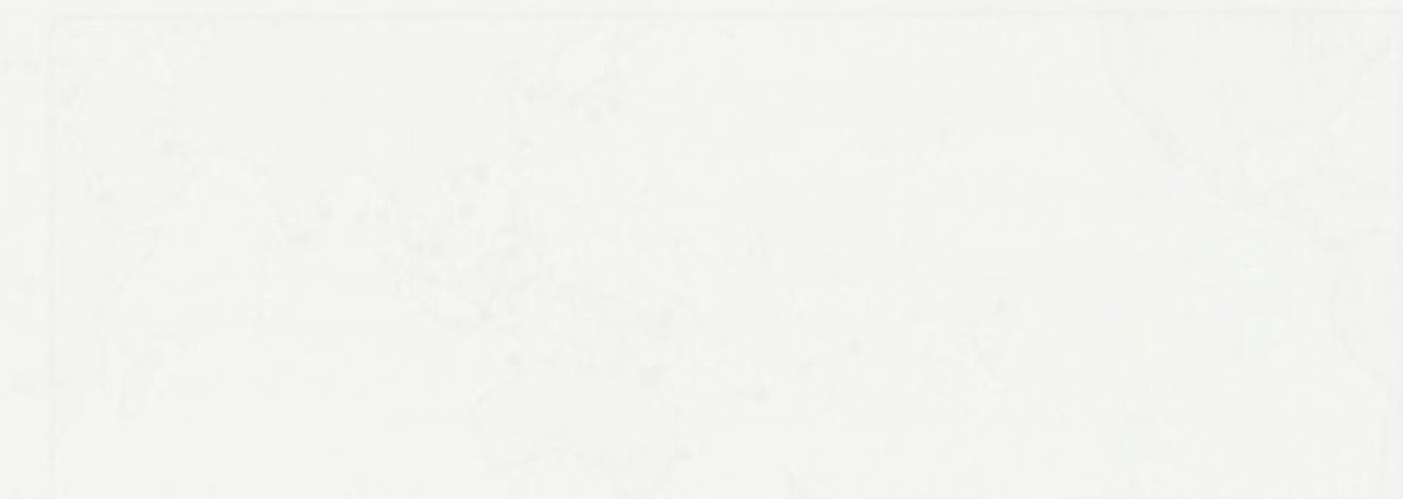
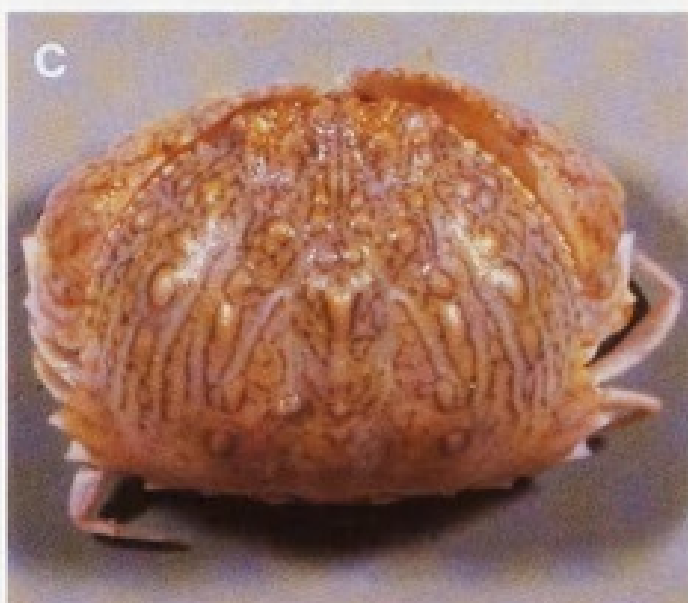


FIG. 35 — *Calappa* species: a) *Calappa capellonis* (Laurie, 1906); b) *Calappa dumortieri* Guinot, 1962; c) *Calappa lophos* (Herbst, 1782); d) *Calappa clypeata* (Borradaile, 1903); e) *Calappa depressa* (Miers, 1886); f) *Calappa depressa* (Miers, 1886), young specimen.





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