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A REVISION OF THE SPINY CRABS OF THE GENUS *HYPOTHALASSIA* GISTEL, 1848 (CRUSTACEA: DECAPODA: BRACHYURA: ERIPHIIDAE)

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ABSTRACT. - The spiny crab genus *Hypothalassia* Gistel, 1848 (Eriphiidae) previously regarded as monotypic, is revised and two species are now recognised. The type species, *Hypothalassia armata* (de Haan, 1835), is redescribed and its distribution restricted to the Pacific. A new species, *Hypothalassia acerba*, is described from Western and South Australia, being distinguished from the type species by live colours, carapace features, ambulatory leg proportions and structure of the gonopods.

KEY WORDS. - Eriphiidae, *Hypothalassia*, revision, new species.

INTRODUCTION

The taxonomy of the spiny crabs of the genus *Hypothalassia* Gistel, 1848 (Brachyura: Eriphiidae) is revised. The genus was previously regarded as monotypic with a single wide ranging Indo-West Pacific species, *Hypothalassia armata* (de Haan, 1835). Examination of a large series of specimens from throughout its range shows that two species can in fact be recognised, distinguished by a variety of carapace, leg and gonopodal characters. Their live colours are also quite distinct from each other. The present paper redefines *Hypothalassia armata* (de Haan, 1835) and describes a new species from Australia, here named *Hypothalassia acerba.*

Specimens examined are deposited in the Australian Museum, Sydney (AM); Queensland Museum, Brisbane (QM); Western Australian Museum, Perth (WAM); Zoological Reference Collection of the Raffles Museum of Biodiversity Research, National University of Singapore (ZRC); National Science Museum, Tokyo (NSMT, which includes the Showa Memorial Institute at Tsukuba for the late Japanese Emperor's collections); Kanagawa Prefectural Museum, Odawara (KPM); Institute of Zoology, Academia Sinica, Taipei (ASIZ); Taiwan Museum, Taipei (TMCD); National Taiwan Ocean University, Keelung (NTOU); Senckenberg Museum, Frankfurt am Main (SMF); Nationaal Naturhistorisch Museum (ex Rijksmuseum van Natuurlijke Historie, RMNH), Leiden; U.S. National Museum of Natural History, Smithsonian Institution, Washington D.C. (USNM); and Muséum national d'Histoire naturelle, Paris (MNHN).

Measurements provided are of the carapace length and width respectively (spines inclusive). The leg measurements (maximum length) are made along the longitudinal median on the outer (posterior) surface. The abbreviations G1 and G2 are used for the male first and second pleopods respectively.

TAXONOMY

Hypothalassia Gistel, 1848

Acanthodes de Haan, 1833:20 (nec *Acanthodes* Agassiz, 1833, fossil fish); Rathbun, 1897:166; Balss, 1922:116; Sakai, 1939:511, 515.
Hypothalassia Gistel, 1848:viii; McNeill, 1953:93; Gordon, 1954:97; Sakai, 1965:156; Sakai, 1976:469.
Acanthocarcinus Hilgendorf & Weltner, in Weltner, 1897:280.

Type species. - *Cancer* (*Acanthodes*) *armatus* de Haan, 1835, by monotypy.

Diagnosis. - Carapace hexagonal, dorsal surface

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relatively smooth, with spines anteriorly, scattered tubercles on both posterolateral and posterior regions. Regions well defined, grooves distinct. Front notched medially, U-shaped; with two spines adjacent to each side of notch. Orbital margin spinate; external and internal orbital spines well developed, orbital hiatus distinct. Anterolateral margin spinate, last few spines usually smaller in size. Posterolateral margin convergent posteriorly, with numerous scattered tubercles. Posterior carapace margin with row of distinct tubercles. Second antennular segment folding obliquely. Second antennal segment inserted in orbital hiatus; flagellum long, reaching beyond orbital margin. Merus of third maxilliped irregularly hexagonal; almost entire along outer margin. Branchial openings partially covered by meri of third maxillipeds. Chelipeds asymmetrical, spinate; denticles present at ventral margin of basis-ischium; anterior margin of merus with row of spines, increasing in size distally; inner median margin of carpus with prominent spine. Ambulatory leg surfaces pubescent with stiff setae, margins spinate; anterior margin of merus with row of spines, with two smaller rows of spines posteriorly; dorsal surfaces of last ambulatory legs tuberculate. Anterior male thoracic sternum smooth, usually pubescent. G1 stout, tapered distally, spinules present along inner margin, smaller ones present on outer margin. G2 slender, longer than G1; distalmost part suddenly narrowing into very slender, curved structure.

Remarks. - The nomenclature for this genus of crabs has had a somewhat confused history. Agassiz (1832) originally described *Acanthoessus* for a genus of fossil fish. Agassiz later (July, 1833) proposed *Acanthodes* as a replacement name for *Acanthoessus* Agassiz, 1832, which was a preoccupied name. De Haan (1833), apparently unaware of Agassiz's papers, established a new crab genus using the same name, *Acanthodes*. Realising the homonymy of Agassiz's and de Haan's names, and apparently believing (or somehow knowing) that Agassiz's name had priority, Gistel (1848) proposed *Hypothalassia* as a replacement name for *Acanthodes* de Haan, 1833. In a short addendum added to the end of Weltner's (1897) paper titled "Nachtragbemerkung zu p. 243. (Umänderung des Gattungsnamens Acanthodes.)", Hilgendorf & Weltner (1897: 280) noted [incorrectly] that the date of publication of de Haan's genus was 1835, and considered de Haan's name to be junior to Agassiz's name, and apparently unaware of Gistel's (1848) action, proposed yet another replacement name, *Acanthocarcinus* (see also Gordon, 1954).

Rathbun (1897), however, chose a very different course of action, and arguing that since there was no clear evidence exactly when de Haan's genus was published and if it was before or after Agassiz's (1833) name, she proposed to preserve the name *Acanthodes* de Haan, 1833, over *Acanthodes* Agassiz, 1833, instead. However, according to International Code of Zoological Nomenclature (ICZN, 1985), unless there is evidence to show that the name *Acanthodes* de Haan, 1833, was published earlier than *Acanthodes* Agassiz, 1833, de Haan's publication has to be regarded as being published on 31 December 1833. This is especially so since there was no record of any precise date for de Haan's work (Holthuis, 1953). Even in the most recent summary of the dates of publication of the fascicles of de Haan's volume by Yamaguchi (1993), the date of publication for fascicle 1 (which contains *Acanthodes* Agassiz, 1833) could not be narrowed down beyond just 1833. Agassiz's name, however, was definitely published in July 1833. *Acanthodes* Agassiz, 1833, must thus be regarded as the senior homonym of *Acanthodes* de Haan, 1833. As such, *Hypothalassia* Gistel, 1848, is the first valid replacement name for de Haan's genus. *Acanthocarcinus* Hilgendorf & Weltner, 1897, is also an objective junior synonym of *Hypothalassia* Gistel, 1848.

Hypothalassia has long being regarded as a monotypic genus with only its type species, *H. armata* (de Haan, 1835). Although *H. armata* has been reported from a wide area in the Indo-West Pacific, the present study shows that the specimens from southwestern and southern Australia belong to a separate species, here named *H. acerba*, new species.

Key to species of *Hypothalassia*

1a. Scattered long setae present on frontal region behind two frontal spines in adults (Fig. 3); length to width ratio of last ambulatory dactylus 4.7-6.1 (Figs. 1c, 2c, 5d); length to width ratio of last ambulatory merus 2.9-3.4 (Figs. 1c, 2c, 5d); colour in life usually reddish-brown (Fig. 12a) (Pacific)
..... *Hypothalassia armata* (de Haan, 1835)

1b. Numerous short setae present on frontal region in adults (Fig. 7a); length to width ratio of last ambulatory dactylus 3.7-4.3 (Fig. 10) ; length to width ratio of last ambulatory merus 2.4-2.8 (Fig. 10); colour in life usually beige to cream (Fig. 12b-d) (Indian Ocean)
..... *Hypothalassia acerba*, new species

Hypothalassia armata (de Haan, 1833) s. str.

(Figs. 1-5, 11a-c, 12a)

Cancer (*Acanthodes*) *armatus* de Haan, 1833: pl. 4; de Haan, 1835:52.

Acanthodes armatus Doflein, 1902: 661, pl. 2; Parisi, 1916: 187; Balss, 1922: 116. - Rathbun, 1923: 128, pls. 31, 32, fig. 1. - Urita, 1926: 16. - Sakai, 1934: 306; Sakai, 1935:165, pl. 50; Sakai, 1939:516, pl. 63; Kamita, 1941: 128, text-fig. 69.

Hypothalassia armata McNeill, 1953:94; Gordon, 1954: 97, fig. 1-3; Sakai, 1965:156, pl. 77; Sakai, 1976:469, pl. 167; Kaname et al., 1965:700, fig. 1291; Griffin, 1970:304, text-fig; Kaname & Toru, 1970:pl. 35, fig. 3; Kim, 1973:390, text-fig. 152, pl. 29, fig. 115;

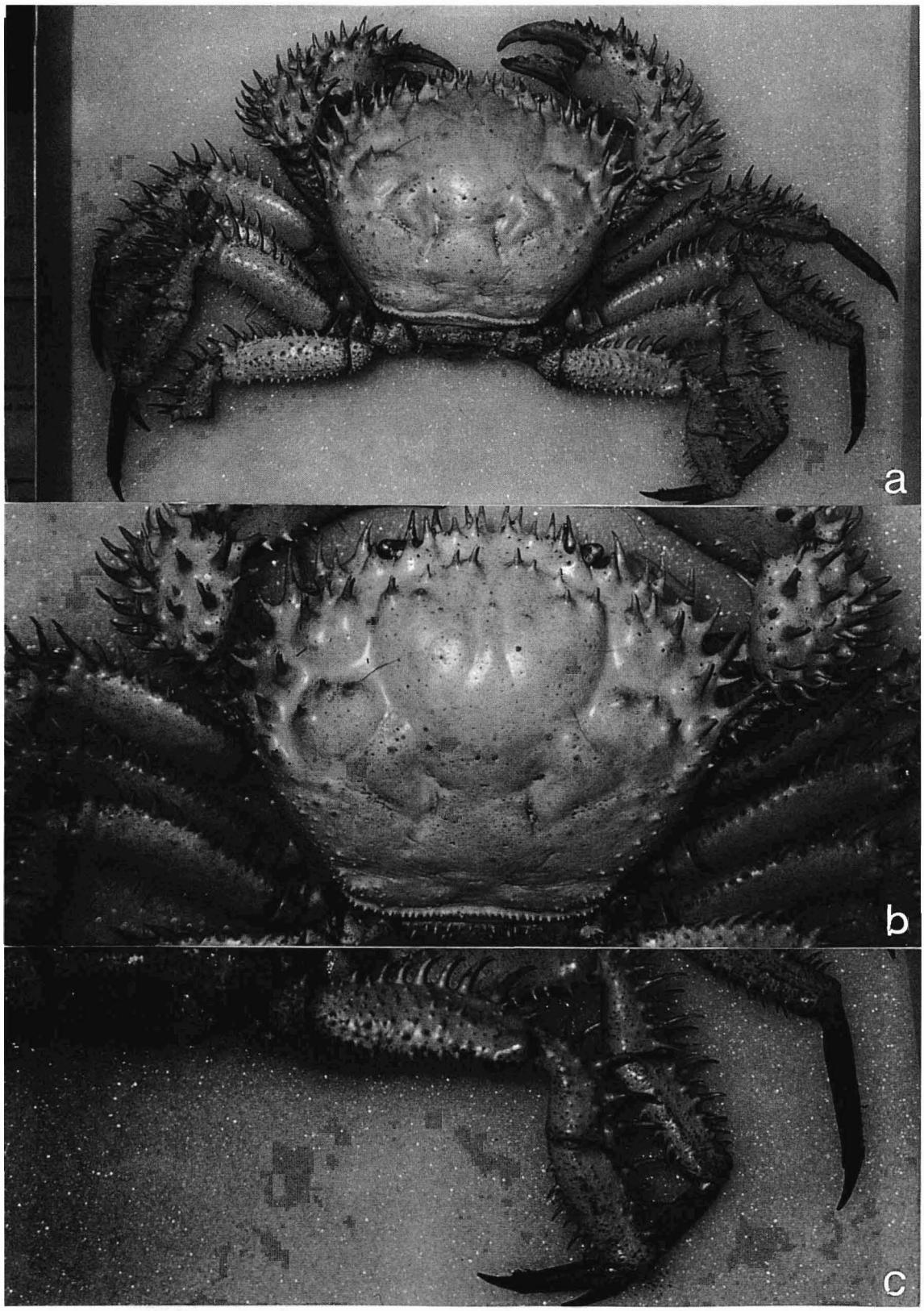

Fig. 1. *Hypothalassia armata*. Holotype female (89.5 by 109.2 mm) (RMNH D-21219), Japan (setae denuded). a, overall view; b, carapace; c, fourth right ambulatory leg.

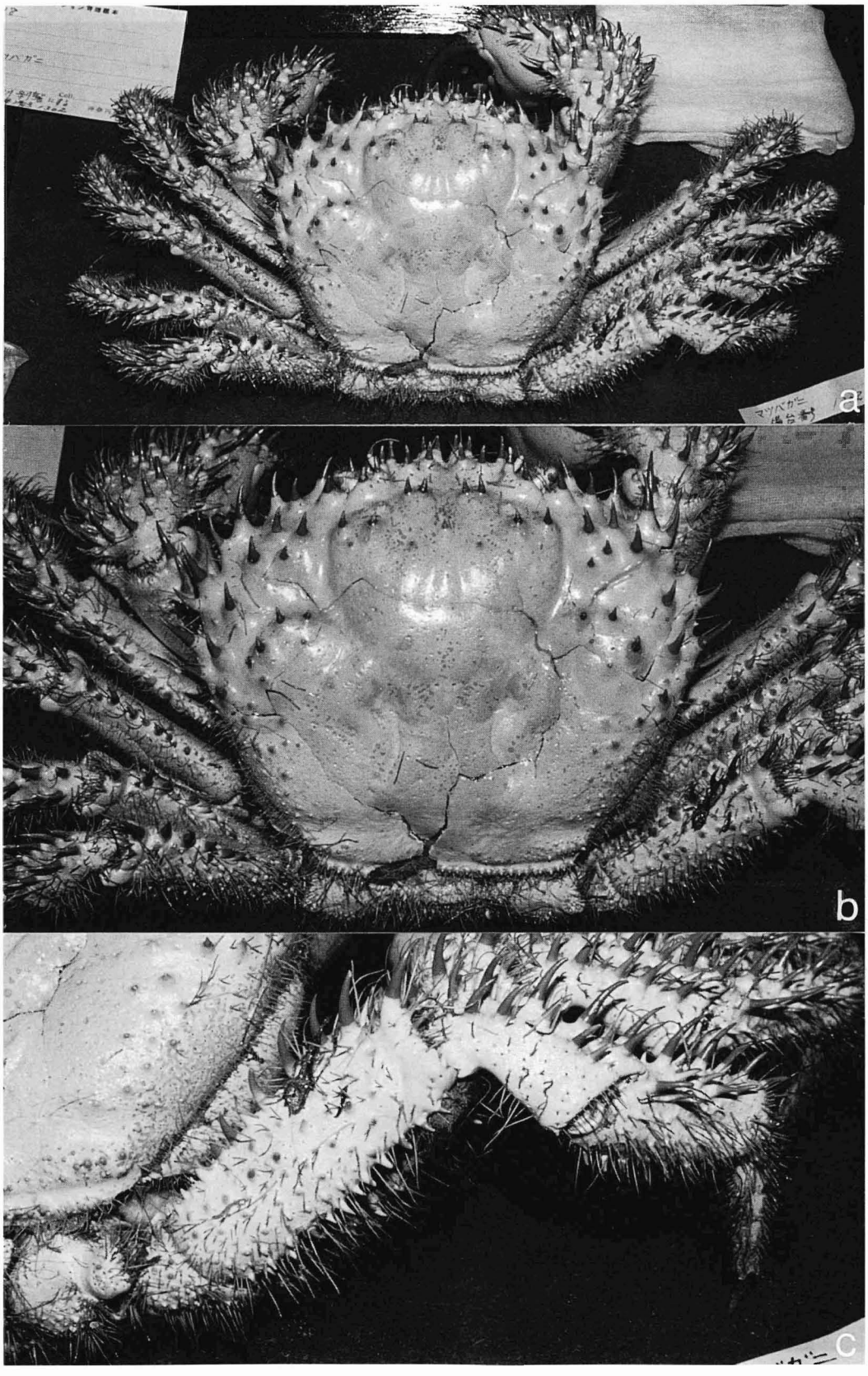

Fig. 2. *Hypothalassia armata*. Dried male (96.3 by 110.6 mm) (KPM 106818a), Japan. a, overall view; b, carapace; c, fourth right ambulatory leg.

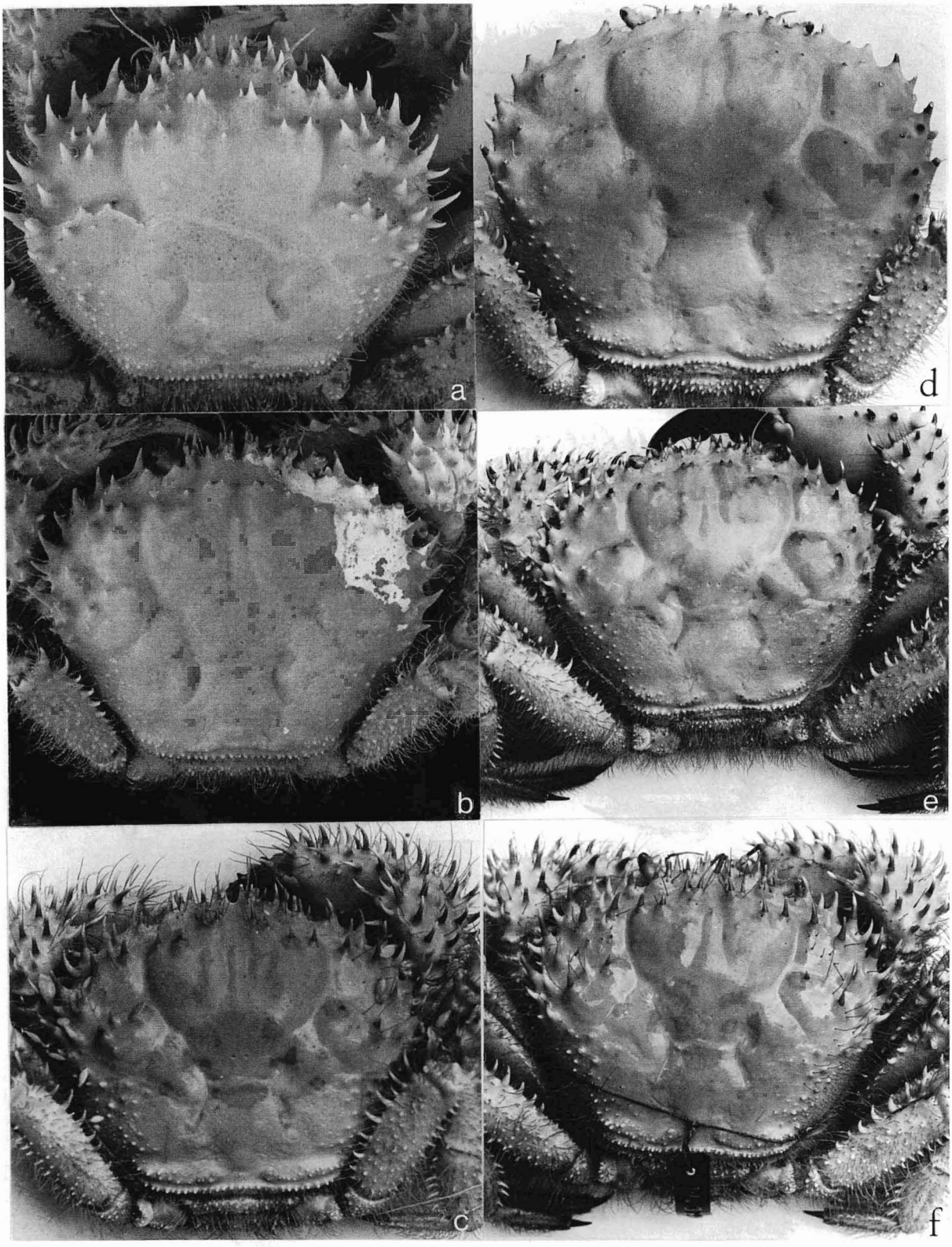

Fig. 3. *Hypothalassia armata*. Carapaces. a, dried female (83.0 by 100.0 mm) (SMF), Japan; b, dried female (114.0 by 140.0 mm) (SMF), Japan; c, female (72.0 by 84.2 mm) (USNM 260964), New Hebrides; d, male (125.4 by 146.2 mm) (USNM 260961), Marianas; e, male (93.6 by 112.9 mm) (MNHN), New Caledonia; f, male (79.0 by 92.1 mm) (QM W 3196), Queensland, Australia.

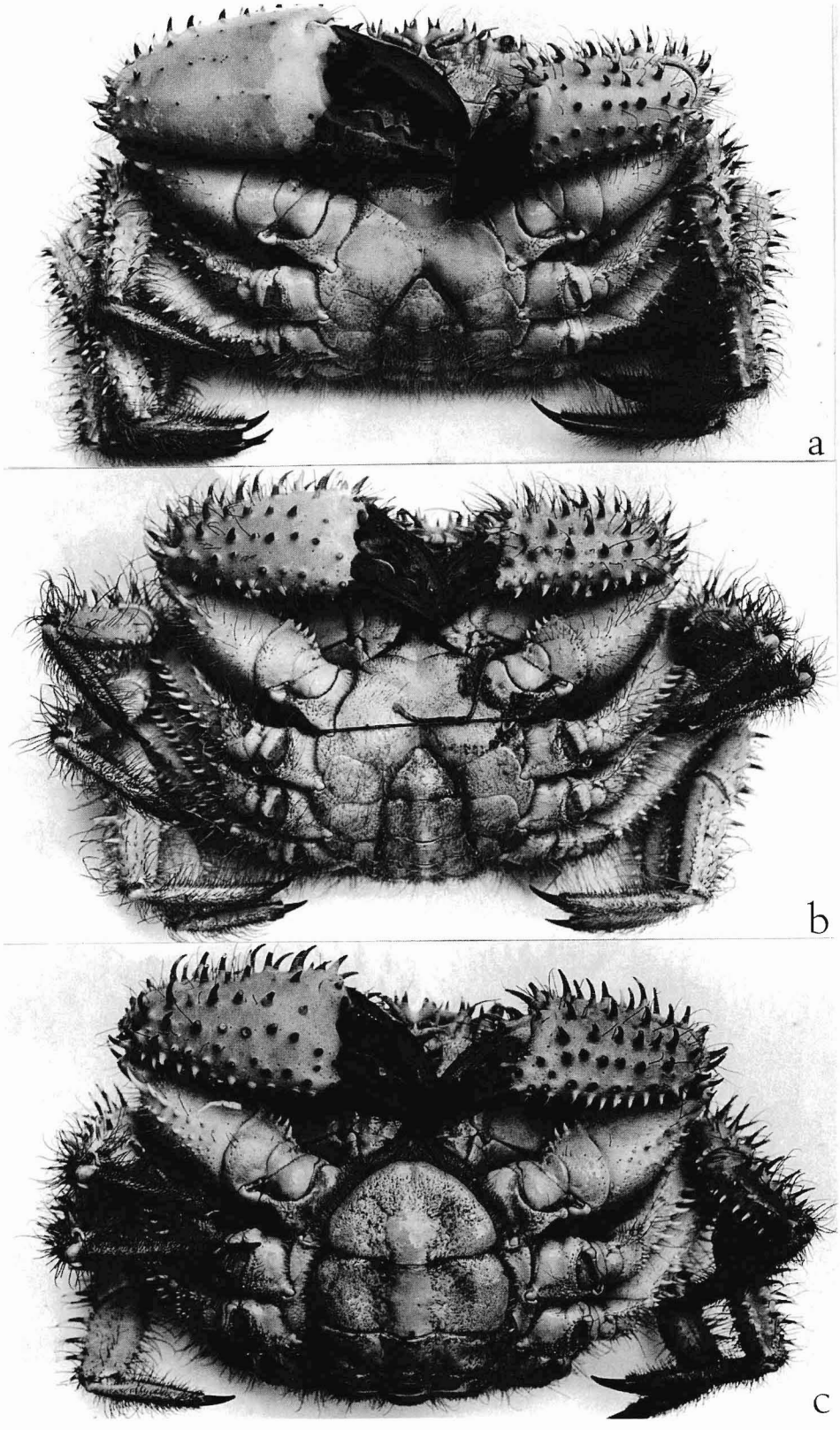

Fig. 4. *Hypothalassia armata*. Ventral views. a, male (93.6 by 112.9 mm) (MNHN), New Caledonia; b, male (79.0 by 92.1 mm) (QM W 3196), Queensland, Australia; c, female (107.0 by 128.5 mm) (QM W 10463) Queensland, Australia.

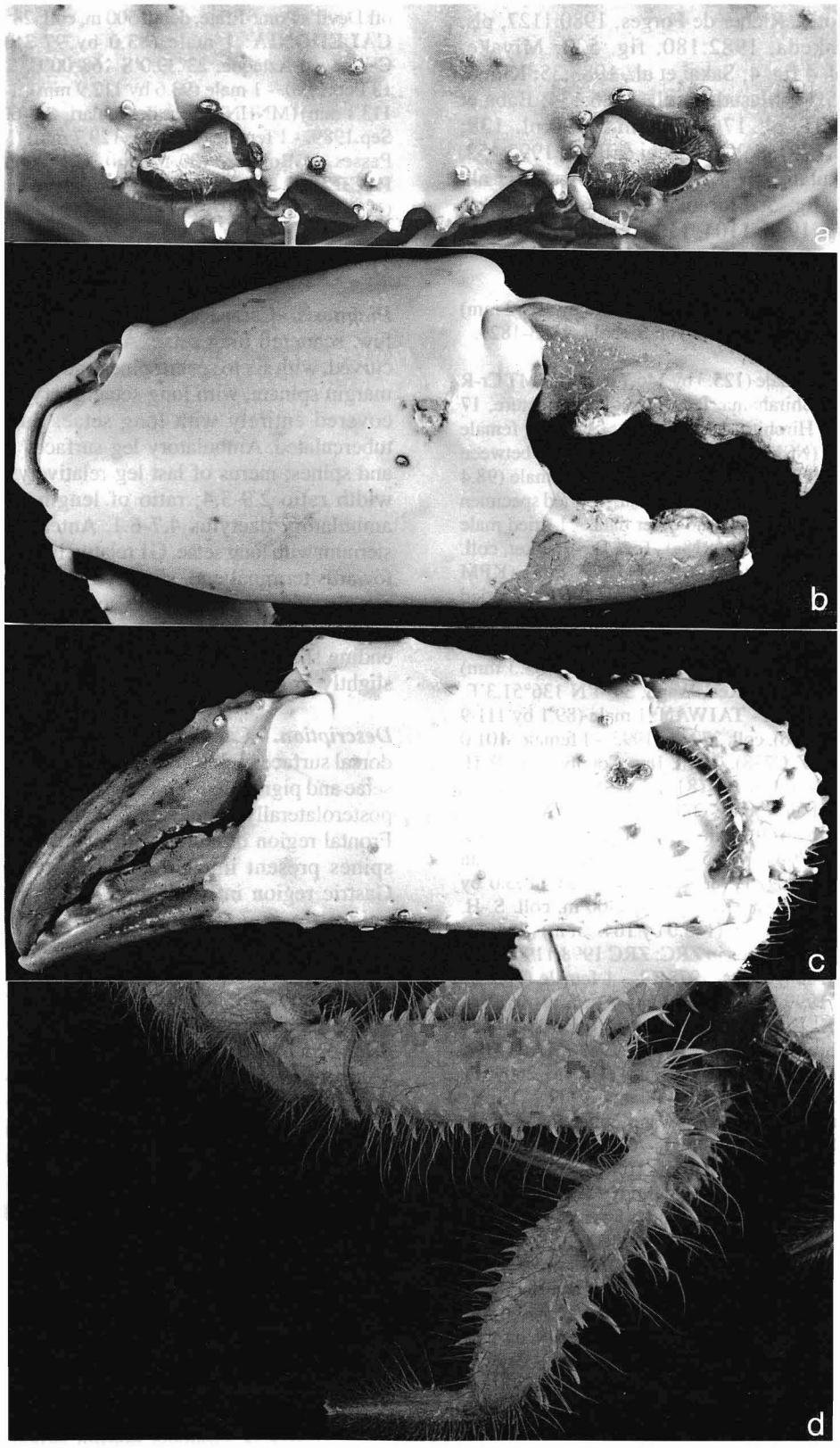

Fig. 5. *Hypothalassia armata*. a-c, male (125.4 by 146.2 mm) (USNM 260961), Marianas; d, male (86.2 by 101.3 mm) (USNM 260962), Guam. a, frontal view (setae broken off); b, right chela; c, left chela; d, last right ambulatory leg.

Takeda & Kurata, 1976:28; Matsuzawa, 1977:pl. 106, fig. 3; Guinot & Richer de Forges, 1980:1127, pls. 7, 3, 3a; Takeda, 1982:180, fig. 533; Miyake, 1982:128, pl. 4 fig. 4; Sakai et al., 1983:35; Kim & Chang, 1985:54; Masuda et al., 1986:134; Baba et al., 1986: 231, pl. 176; Utsumi, 1990:pl. 138; Anonymous, 1991: 8; Yamaguchi & Baba, 1993:452, fig. 168; Okutani, 1994:257, fig. 5; Utsumi et al., 1996:pl. 43, fig. 5; Muraoka, 1997:66; Muraoka, 1998: 43; Ng, 1998: 1104, 1106 (partim); Ho et al., 2000.

Material examined. - Holotype. - female (89.5 by 109.2 mm) (RMNH D-21219), Japan, coll. F. von Siebold, 1823-1829.

Others. - **JAPAN**: 1 female (125.3 by 146.7 mm) (NSMT Cr-R 4171), Sabane, off Shirahama, Izu, Shizuoka Prefecture, 17 fms, coll. Emperor Hirohito, 15 Feb.1977. - 1 young female (62.7 by 80.0 mm) (NSMT 9944), Torishima Island, between Izu and Ogasawara Islands, coll. T. Okutani. - 1 female (98.4 by 111.5 mm) (ZRC 1999.61), no other data. - 1 dried specimen (113.0 by 131.6 mm) (NSMT), no other data. - 1 dried male (96.3 by 110.6 mm) (KPM 106818a), Tosa Bay market, coll. T. Sakai, 1969. - 1 female (106.8 by 139.3 mm) (KPM 106818b), Tosa Bay market, coll. T. Sakai, 1969. - 2 dried females (83.0 by 100.0 mm, 114.0 by 140.0 mm) (SMF), T. Sakai's collection, no other data. - 1 dried female (KPM J10-025), no other data. - 1 dried male (54.7 by 65.3 mm) (SMF 9152), Honshu, Mie-Ken, Wagu, 34°4'N 136°51.3'E, 50 m, T. Sakai collection. - **TAIWAN**: 1 male (89.1 by 111.9 mm) (NTOU 9206-01-6), coll. 27 May 1992. - 1 female (101.0 by 116.0 mm) (ASIZ C738), Tashi, Ilan County, coll. P.-H. Ho, 5 Apr.1991. - 1 female (81.4 by 98.1 mm) (ZRC 1998.1196), Tashi, Ilan County, coll. P.-H. Ho, 27 May 1992. - 1 female (127.4 by 149.1 mm) (NTOU), coll. S.-H. Wu, Sep.1998. - 1 male (99.6 by 85.1 mm) (ASIZ), Tashi, Ilan County, coll. M.-S. Jeng, 1998. - 1 dried female (103.0 by 117.9 mm) (TMCD), Tashi, Ilan County, 400 m, coll. S.-H. Wu, Nov.1996. - 1 dried male (145.0 by 164.0 mm) (TMCD) (male abdomen and gonopods in ZRC: ZRC 1998.1195), seas off Taiwan, coll. fishing boats, 1978/79. - 1 female (74.5 by 88.3 mm) (ZRC 1999.999), Nang-Fang-Ao, Shu-Ao, Ilan County, coll. P. K. L. Ng, May 1999. - 1 dried specimen (TMCD 326), "Taiwan", coll. C.-Y. Wei, 1981. **MARIANA ISLANDS**: 1 male (125.4 by 146.2 mm) (USNM 260961), deep-water collection, coll. A. B. Williams, 1989. - 1 male (105.3 by 124.0 mm) (ZRC), deep-water collection, coll. A. B. Williams, 1989. **GUAM**: 1 male (86.2 by 101.3 mm) (USNM 260962), Haputo, bait trap, 100 fms, coll. A. B. Williams, 1989. **AUSTRALIA**: 1 female (103.0 by 122.3 mm) (AM P 12683), New South Wales, 8 miles north of Broughton Islands, 32°19'S 152°19' E, depth 82.3 m, crayfish pot, coll. H. Hunter, fisherman. - 1 male (96.6 by 108.8 mm) (QM W 3195), Cape Moreton, 10 m northeast of southeastern Queensland, 26.57°S 153.35°E, 137.16 m, marine sublittoral, coll. K. Rose Station, 30 May 1970. - 1 male (79.0 by 92.1 mm) (QM W 3196), off Cape Moreton, southeastern Queensland, 27.02°S 153.28°E, 188.87 m, sublittoral waters, coll. 1969. - 1 female (103.3 by 120.3 mm) (QM W 3749), off Cape Moreton, southeastern Queensland, 27.02°S, 153.28°E, trawled, sublittoral waters, prawn trawl, coll. CSIRO, 15 Jul.1972. - 1 female (107.0 by 128.5 mm) (QM W 10463), off Scarborough, southern Queensland, deep water, coll. Nov.1979. - 1 female (AM P 14038), MacLeay Area, Queensland, 30°52'S 152°09'E, coll. L. J. St. Hill, 1962. **NEW HEBRIDES**: 1 female (72.0 by 84.2 mm) (USNM 260964), off Devil's Point-Efate, depth 500 m, coll. 28 Jun.1980. **NEW CALEDONIA**: 1 male (83.0 by 97.2 mm) (MNHN), Campagne Aztèque, 23°39.0'S 168°00'E, 235-400 m, coll. 13 Feb.1990. - 1 male (93.6 by 112.9 mm), 1 female (97.1 by 113.1 mm) (MNHN), Passe de Boulari, 400-600 m, coll. 25-26 Sep.1989. - 1 female (109.0 by 129.7 mm) (MNHN B 6826), Passes de Boulari, 400 m, coll. C. Vadon, 13 Oct.1978. **PACIFIC**: 1 female (TMCD), somewhere in the Pacific, coll. C.-Y. Wei, 15 Jan.1973.

Type locality. - Japan.

Diagnosis. - Carapace highly convex. Frontal region with few, scattered long setae. Anterolateral margin gently curved, with six to seven spines and long setae. Posterior margin spinate, with long setae. Pterygostomial region covered entirely with long setae. Suborbital region tuberculated. Ambulatory leg surfaces with long setae and spines; merus of last leg relatively long, length to width ratio 2.9-3.4; ratio of length to width of last ambulatory dactylus 4.7-6.1. Anterior male thoracic sternum with long setae. G1 relatively long, stout, tapered towards terminal end, slightly truncated distally; inner margin with dense spinules, outer distal portion with minute spines; outer edge of basal portion narrower, ending sharply. G2 with broad basal portion, truncated slightly from rest of structure.

Description. - Carapace hexagonal, broader than long; dorsal surface highly convex; surface covered with long setae and pigmented spines anteriorly; tubercles present posterolaterally and posteriorly. Regions well defined. Frontal region of adults with scattered long setae; two spines present immediately behind frontal margin. Gastric region inflated; three spines present on each epigastric region; three spines anteriorly on each protogastric region. Hepatic region inflated, divided by oblique groove into two parts: anterior portion further divided into a larger and a smaller part by a longitudinal groove, larger part with four spines, arranged in a diamond shape; posterior portion divided by a non-continuous groove, three spines present anteriorly. Branchial region slightly tuberculated, especially near posterolateral margin. Front with two spines adjacent to both sides of frontal notch, followed immediately behind by short row of long setae. Orbit pear-shaped, deep, spinate; external and internal orbital spines present; supraorbital margin with three spines and two deep fissures, infraorbital margin with a few denticles and two spines; orbital hiatus distinct. Pterygostomial region completely covered with long setae. Suborbital region tuberculated. Anterolateral margin gently curved, with six to seven spines, interspersed with long setae. Posterolateral margins convergent towards posterior carapace margin, covered with small tubercles and short setae. Posterior carapace margin spinate, interspersed with long setae. Scattered acute denticles present at external antennular margin. Third maxilliped surface relatively smooth, pubescent, occasionally with denticles; merus irregularly hexagonal, surface entirely

covered with setae and tubercles, outer margin with long setae; inner margin denticulated.

Chelipeds prominently asymmetrical in adults (especially males), varying in strength and extent of spines and setae. Denticles present at ventral margin of basis-ischium. Anterior margin of merus with row of curved spines increasing in size distally, dorsal surface covered with short setae and row of minute spines anteriorly, some spines present at posterior distal margin. Carpus covered with spines and long setae on outer surface, with prominent spine at inner median margin. Chelae relatively long, surfaces with spines which may be eroded on major cheliped. Fingers long, slender in minor chela, with cutting edge denticulate, spines and setae sometimes extending to base of fingers. Fingers of major chela long, stout, cutting edge differentiated into several teeth, normally with a basal tooth on dactylus.

Ambulatory legs relatively long, merus subcylindrical. Surfaces entirely covered with long setae and spines. Merus relatively long; anterior margin with row of long curved spines, posterior margin with two rows of shorter spines; dorsal surface of last ambulatory leg with a few rows of acute spines; length to width ratio of fourth merus 2.9-3.4. Anterior margin of carpus with row of long curved spines, median anterior surface with two rows of shorter ones. Propodus with row of long curved spines at both margins; dorsal surface with a few rows of small spines. Dactylus relatively long, slender, densely pubescent except along median axis; length to width ratio of fourth dactylus 4.7-6.1.

Anterior male thoracic sternum covered with long setae; surface tuberculated. Abdominal surfaces covered with short and long setae, with median transverse part smooth. Outer surface of first three male abdominal segments with some tubercles. G1 long, stout, tapered towards terminal end, slightly truncated distally; inner margin with numerous spinules; outer distal portion with minute spines; outer edge of basal portion relatively narrower, tip relatively sharp. G2 longer, slender, broad basal part truncated; acute distal end curved.

Remarks. - *Hypothalassia armata* (de Haan, 1835) is known to have a patchy distribution. Described from Japan, it was subsequently reported from Australia (Rathbun, 1923; George, 1966, Jones & Morgan, 1991) and New Caledonia (Guinot & Richer de Forges, 1981). In this study, the records of this species from Western Australia are shown to actually represent a separate species. *Hypothalassia armata* s. str. is now known only from the western Pacific. The differences between *H. armata* and the new southwestern and southern Australian species, *H. acerba*, are discussed under the latter species.

Among the specimens, some variation was observed with respect to their size. Juvenile specimens have more spiny and more pubescent carapaces and chelae compared to adults. As the size increases, the density of spines and pubescence decreases, with the structures appearing less spiny and more glabrous. Sexual dimorphism is evident, with the females generally retaining their spines and pubescence even when they reach maturity (Fig. 3a, b). The appearance of the male changes substantially with size - as they become larger, they lose their spines and pubescence, becoming distinctly smoother in appearance (Fig. 3c-f). The spines may be totally lost, although their original bases are still clearly discernible as a dark spot. The outer surface of the chela, however, may feel smooth (Fig. 5b-c).

Japanese specimens are normally found in rocky places from 50 to 100 m (Sakai, 1939, 1976). However, specimens from New Caledonia were caught at a depth of 400 to 600 m. Specimens from the Mariana Islands were especially densely covered with tiny cirripeds (*Poecilasma* species). Weltner (1897) had recorded *Poecilasma kaempferi* from this host previously.

Colour. - The colour of *H. armata* is a relatively uniform brick red to red and pinkish-red, often with small patches of deep red scattered on the carapace, which are usually proportionately larger and more prominent in smaller specimens. The appendages are pinkish-red, interspersed with cream. The spines are usually uniformly pigmented black in large specimens, but small and medium sized ones often have the distal part of the spine lighter coloured and the median part black, giving it a somewhat banded appearance (Fig. 12a).

Distribution. - Japan, Taiwan, Mariana Islands (new record), Guam (new record), New Hebrides (new record), Fiji, New Caledonia, eastern Australia (New South Wales and Queensland).

Hypothalassia acerba, new species

(Figs. 6-10, 11d-f, 12b-d)

Acanthodes armatus - Rathbun, 1923:128, pls. 31, 32, fig. 1.

Hypothalassia armata - Gordon, 1954:97, fig. 1-3; George, 1966:223; Wadley & Evans, 1991:41, text-fig; Jones & Morgan, 1994:176.

Material examined. - Holotype male (127.2 by 146.4 mm) (WAM 8-84), off Mullaloo reef, Western Australia, 86 fms, coll. G. E. Ericson, 10 Jan.1974.

Paratypes. - 1 male (105.0 by 122.0 mm) (WAM 72-84), Lancelin, Western Australia, coll. Fisheries Department, Dec.1965. - 5 males (126.8-93.9 by 141.0-108.9 mm), 2 females (109.5 by 124.5 mm, 85.3 by 95.8 mm) (WAM 77-84), Rottnest, Western Australia, coll. Fisheries Department, 1 Feb.1966. - 1 male (87.7 by 102.3 mm) (WAM 127-71), 4 males, 2 females (AM), northwest of Rottnest Island, Western Australia, 104 fms, coll. Fisheries Department, Feb.1966. - 1 male (129.7 by 152.3 mm) (WAM 8-74), off Mullaloo reef, Western Australia, 86 fms, coll. G. E. Ericson, 10 Jan.1974. -

males (63.8 by 74.8 mm, 54.4 by 62.8 mm), 3 females (69.5-59.9 by 70.0-58.1 mm) (WAM 380-88), off Two Rocks, Western Australia, ca. 120 fms, in craypots. - 4 males (23.4-16.1 by 25.4-18.1 mm), 1 female (28.4 by 35.5 mm) (WAM 4965), between Geraldton and Freemantle, Western Australia, trawled by F.I.S. Endeavour, coll. W. B. Alexander, 1912. - 1 female (85.5 by 98.4 mm) (WAM 4966), between Geraldton and Freemantle, Western Australia, trawled by F.I.S. Endeavour, coll. W. B. Alexander, 1912. - 1 male (115.0 by 131.1 mm) (ZRC 1997.143), off Albany, Western Australia, purchased from restaurant by P. K. L. Ng, 1997. - 1 male (116.4 by 137.2 mm) (ZRC 1998.1192), off Albany, Western Australia, purchased from restaurant by P. K. L. Ng, 1997. - 2 males (111.1 by 124.7 mm, 103.4 by 116.2 mm) (ZRC 1998. 1197-1198), off Albany, Western Australia, coll. Western Australian Marine Research Laboratories, Sep.1998. - 2 females (112.5 by 130.2 mm, 89.2 by 101.2 mm) (ZRC 1998.1199-1200), off Albany, Western Australia, purchased from Australian fishermen by S. H. Tan & S. K. Koh, 1 Oct.1998. - 3 males (127.7-97.9 by 148.3-114.5 mm), 1 female (101.7 by 117.1 mm) (ZRC 1998.1188-1191), Jurien Bay, Western Australia, 120-130 m, muddy bottom, purchased from fishermen by S. H. Tan & S. K. Koh, 1 Oct.1998.

Others - 1 juvenile male (16.5 by 21.2 mm) (USNM 55171), Great Australian Bight, South Australia, coll. "EIS Endeavour" 1909-14, 1913. - 1 young male (AM P 6176), Great Australian Bight, 300 m, South Australia, coll. "EIS Endeavour" 1909-14, 4 Apr.1913. - 1 juvenile male (AM P 3664), Great Australian Bight, 218 m, South Australia, coll. "EIS Endeavour" 1909-14, Mar.1913. - In addition, about 20 adult specimens of both sexes collected from Jurien Bay were examined and their characteristics recorded at a local crab dealer in Perth. These were not preserved.

Diagnosis. - Carapace highly convex. Frontal region entirely covered with short setae. Anterolateral margin strongly curved, with six to seven spines and short setae. Posterior margin spinate, with short setae. Pterygostomial region completely covered with short setae. Suborbital region smooth. Ambulatory leg surfaces with short setae and spines; last merus relatively short, length to width ratio 2.4-2.8; length to width ratio of last dactylus 3.7-4.3. Anterior male thoracic sternum with short setae. G1 relatively long, stout, tapered towards terminal end, slightly truncated distally; inner margin with dense spinules, outer distal portion with minute spines; outer edge of basal portion broader, sloping gently. G2 longer than G1, broad basal portion distinctly truncated.

Description. - Carapace hexagonal, broader than long; dorsal surface highly convex. Dorsal surfaces covered with short setae and pigmented spines anteriorly; tubercles present posterolaterally and posteriorly. Regions well defined. Frontal region covered uniformly with short setae; with two spines present immediately behind frontal margin. Gastric region inflated; with three spines on each epigastric regions; three spines on each mesogastric regions anteriorly. Hepatic region inflated, divided by a oblique groove into two halves; anterior portion further divided into larger and smaller part by longitudinal groove, larger part with four spines, arranged in a diamond shape; posterior portion further divided by an non-continuous groove, with three spines anteriorly. Branchial regions slightly tuberculated, especially near posterolateral margin; small raised strip present on branchial region at both sides of posterior margin, lined with tubercles. Front with two spines adjacent to both sides of frontal notch, with very short setae behind spines. Orbit pear-shaped, deep, spinate; external and internal orbital spines present; supraorbital margin with three spines, two longitudinal fissures present (one deep, one shallow), infraorbital margin with a few denticles and two spines, orbital hiatus present. Pterygostomial region entirely covered with short setae. Suborbital region smooth. Anterolateral margin strongly curved, with five or seven spines, surrounded by short setae. Posterolateral margins gently convergent towards posterior carapace margin, appeared slightly swollen, covered with small tubercles and short setae. Posterior carapace margin spinate, interspersed with short setae. Some denticles present at external antennular margin. Third maxilliped surfaces relatively smooth, occasionally with denticles and setae; merus irregularly hexagonal, with setae and tubercles, outer margin with some long setae; inner margin denticulated.

Chelipeds prominently asymmetrical in adults (especially males), varying in extent of spines and setae. Denticles present at ventral margin of basis-ischium. Anterior margin of merus with row of spines increasing in size distally, dorsal surface covered with short setae. Carpus covered with spines and setae, with a prominent spine at inner medial margin; spines may be eroded in large males. Chela relatively long, surfaces with spines, extending to ventral surface sometimes, spines may be eroded in large chela, appearing smooth. Fingers long, slender in smaller chela, with cutting edge denticulate, spines sometimes extending to base of fingers. Fingers in major chela long, stout, cutting edge differentiated into several teeth, normally with basal tooth on dactylus.

Ambulatory legs relatively long, merus subcylindrical. Surfaces entirely covered with short setae and spines. Merus short, length to width ratio of last leg 2.4-2.8; anterior margin with row of long curved spines, posterior margin with two rows of shorter spines; dorsal surface of last ambulatory legs with a few rows of spines. Anterior margin of carpus with row of long curved spines, median anterior surface with another row of shorter ones. Propodus with row of long curved spines along both margins; dorsal surface with a few rows of small spines. Dactylus relatively slender, densely pubescent except along median axis, relatively short, stout; length to width ratio 3.7-4.3.

Anterior male thoracic sternum relatively smooth, last few sternal segments with more short setae, granulated, punctulated. Abdominal surfaces with short and long setae, median transverse part smooth. Outer surface of first three abdominal segments with some tubercles. G1 long, stout, tapered towards terminal end, slightly

truncated terminally; inner margin with numerous spinules; outer distal portion with minute spines; outer edge of basal portion relatively broader, gently tapering. G2 longer than G1; broad basal part rounded.

Etymology. - The word '*acerba*' means 'spine' in Latin and describes the spiny appearance of this species.

Taxonomic remarks. - *Hypothalassia acerba*, new species, is currently known only from southern and southwestern Australia. The records of *H. armata* by Gordon (1954), George (1966), Wadley & Evans (1991) and Jones & Morgan (1994) from Western and South Australia are here referred to *H. acerba*. Although the two species are superficially similar, they can easily be distinguished by a suite of characters. *Hypothalassia armata* has only a short row of long setae immediately behind the frontal spines (Fig. 3) while those on *H. acerba* are very dense and uniformly distributed on the frontal region (Fig. 7a). In addition, the setae on *H. armata* are generally always longer (Fig. 4) than those of *H. acerba* (Figs. 8, 9). The dactyli and meri of the last ambulatory legs of the two species differ in proportions. While the length of the dactylus varies in *H. armata*, its length to width ratio is always above 4.3 (4.3-6.0) (Figs. 1c, 5d) but is only 3.4 to 3.9 for *H. acerba* (Fig 10a). The length to width ratio of the merus varies from 2.9 to 3.4 in *H. armata* (Figs. 1c, 5d) but is only 2.6 to 2.8 in *H. acerba* (Fig. 10a).

The distribution of tubercles on the median posterior region of the carapace is also distinctly denser in *H. armata* (Fig. 3) compared to *H. acerba* (Fig. 8). In addition, the G1 basal portion of *H. armata* (Fig. 11a) is relatively narrower than that of *H. acerba* (Fig. 11d). The basal portion of the G2 in *H. armata* (Fig. 11b) is more truncated but that of *H. acerba* is more rounded (Fig. 11e). In adult specimens, the posterolateral margins of *H. acerba* are gently but distinctly convex and appear slightly swollen, giving the carapace a somewhat rounded appearance (Fig. 12b-d). In *H. armata*, however, the posterolateral margins are straighter and appear more strongly convergent, giving the carapace a distinctly more quadrate appearance (Fig. 12a). The live colours of the two species are usually diagnostic. The live carapace colour of *H. acerba* varies from a uniform cream to a cream background with uneven patches of pink (Fig. 12b-d). In *H. armata*, however, the carapace is a uniform red to reddish-pink, occasionally with reddish-brown patches (Fig. 12a).

A note on the length to width ratios of the ambulatory meri and dactyli is pertinent. For the merus, the length is taken along the outer longitudinal median axis of the segment (tip to tip), while the width is measured at the proximal end of the segment. Spines are not considered in the measurement. For the dactylus, the length is taken medially, while the width is measured at the proximal end, where the setae is most sparse. Although the ratios of these two segments are distinct for the two species, this is not applicable when the leg has clearly recently regenerated, regrown or have been damaged, in which case the values obtained are unreliable. An occasional problem encountered when measuring the segments is the difficulty in completely excluding the spines especially when they are very spiny.

When males of similar sizes are compared, *H. acerba* is always distinctively less spiny and pubescent than *H. armata*. In addition, as the carapace increases, the fingers of *H. armata* get proportionately longer, but are always less than the length of manus. In *H. acerba*, however, the fingers, especially those of the major chela, become as long as or even longer than the manus. This difference is valid for all specimens of comparable sizes.

Among the specimens of *H. acerba*, some variation is noted. Other the two main spines on infraobital margin, the number of denticles on the rest of the orbital margin varies from two to five (Fig. 6c). The spines on the anterolateral margin vary from five to seven (Fig. 8). Juveniles are similar in most aspects to adults regardless of sex. When compared to larger specimens, juveniles are more spiny and more pubescent (Fig. 9c). The spines are proportionately longer and more curved, while the setal distribution is denser and more uniform. As the carapace size increases, the spines lose their sharpness and the pubescence becomes concentrated along the margins (Fig. 8). The length of the setae varies with size. Smaller specimens of *H. acerba* tend to have longer setae (even on the frontal region), and in this respect, closely resemble *H. armata*.

Sexual dimorphism is evident in this species. The females retain their spines and pubescence even when they reach maturity, with the spines remaining curved and sharp, as well as being similarly dense on both chelae. In males, the density of the spines and degree of pubescence decrease considerably as the males increase in carapace size. At relatively small sizes (approximately carapace width 90 mm) (e.g. WAM 127-71), the spines on the carapace look small and eroded when compared to females of similar size (Fig. 9b). The armature of the chelipeds also changes with carapace size, with the major one losing its spines and setae, and becoming smooth. As the male specimens increase in size, the smoothness of the carapace and chela becomes more pronounced, leaving only rudimentary marks to indicate where the spines had been. Both chelae may be significantly asymmetrical in size (Fig. 9a, b).

Fisheries. - In Western Australia, *H. acerba* has been identified as a species having potential to become one of the more important commercial crustaceans in addition to the Western Australian spiny lobsters (R. Melville-Smith, pers. comm.). In recent years, the average yield annually has increased substantially to about 75 tonnes/year. Fisheries boats from the ports of Geraldton, Jurien and Albany are fishing the surrounding seas at an average of once to twice a week for

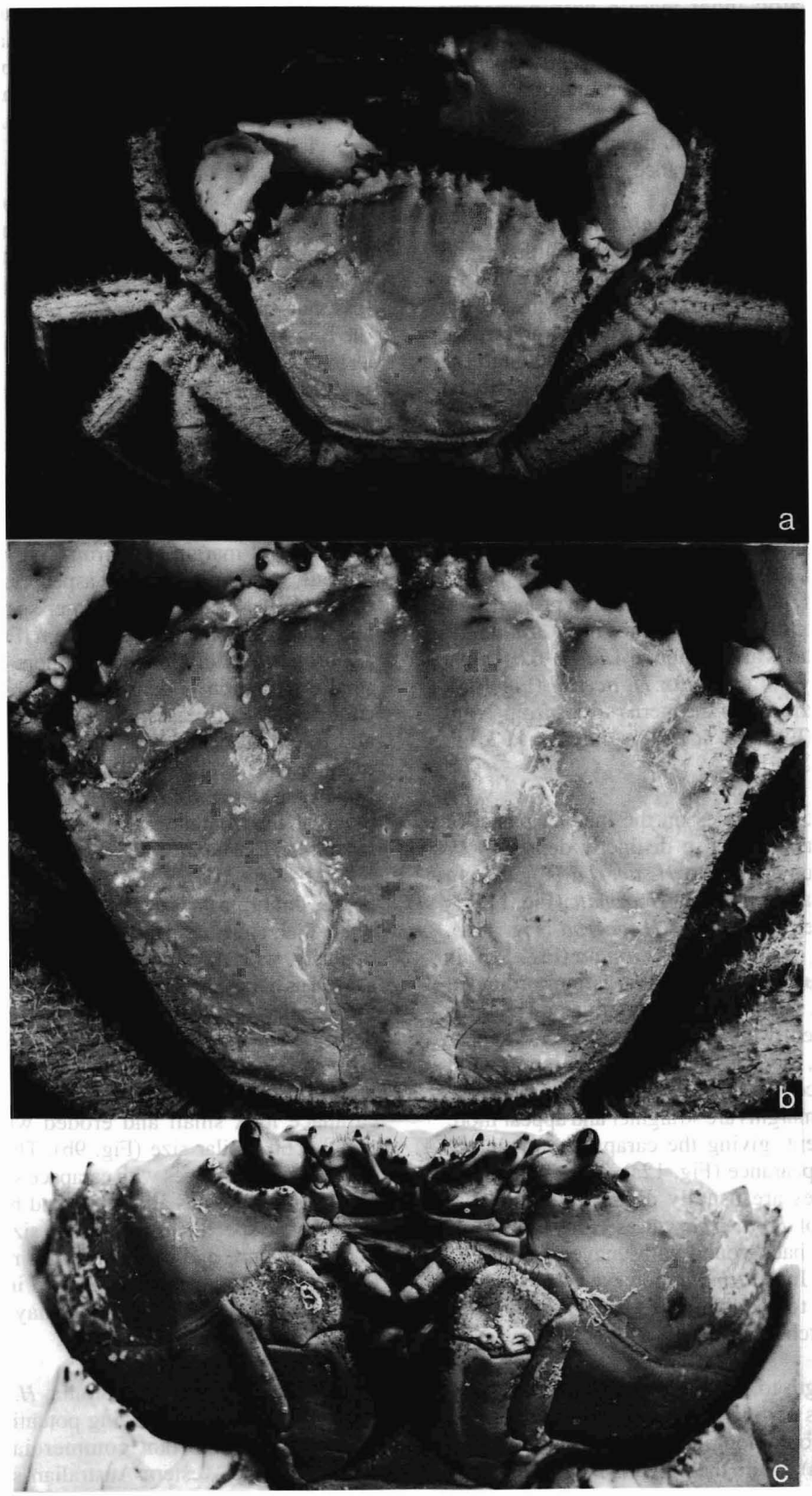

Fig. 6. *Hypothalassia acerba*. Holotype male (127.2 by 146.4 mm) (WAM 8-84), Western Australia. a, overall view; b, carapace; c, face.

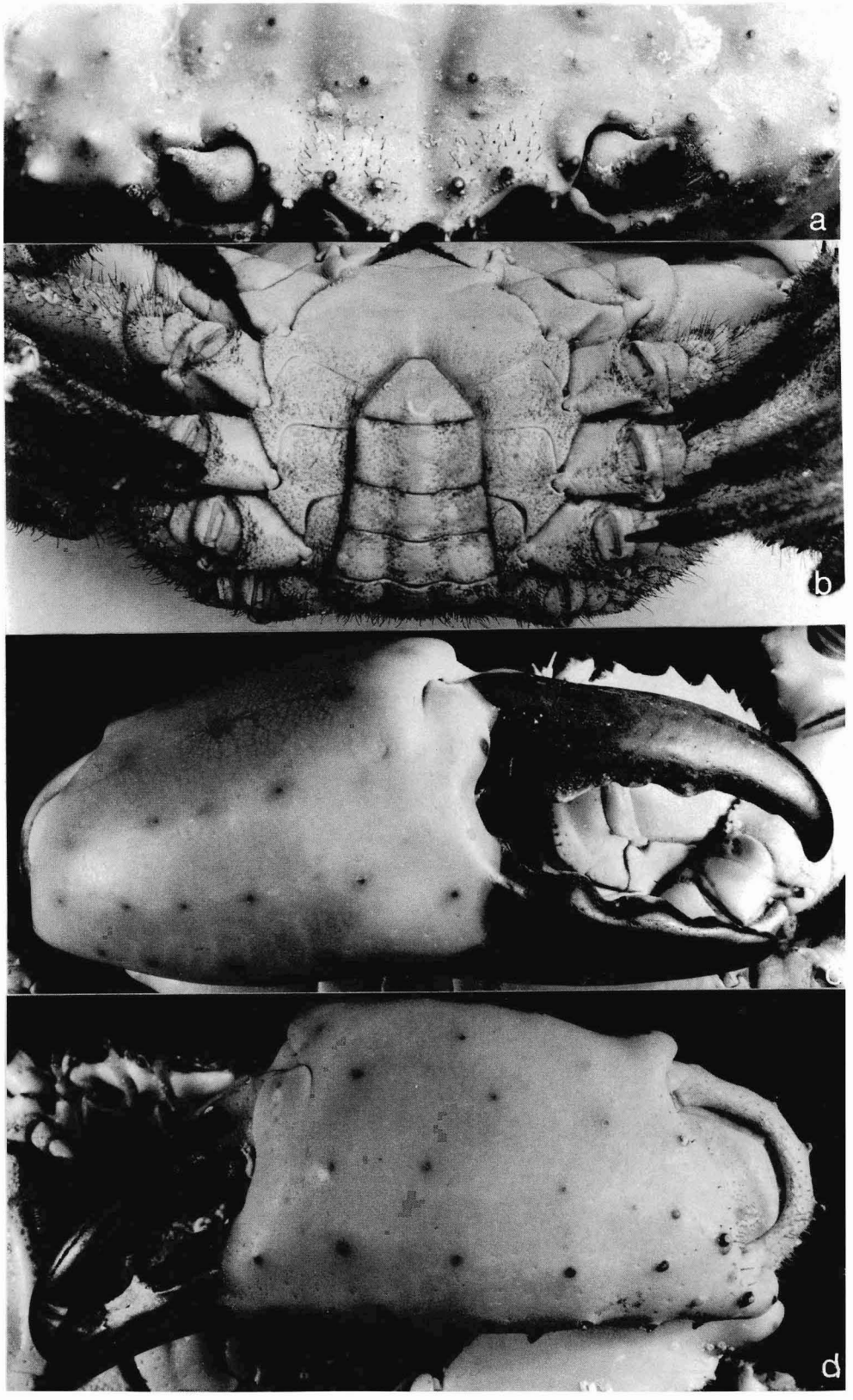

Fig. 7. *Hypothalassia acerba*. Holotype male (127.2 by 146.4 mm) (WAM 8-84), Western Australia. a, frontal view; b, anterior thoracic sternum and abdomen; c, right chela; d, left chela.

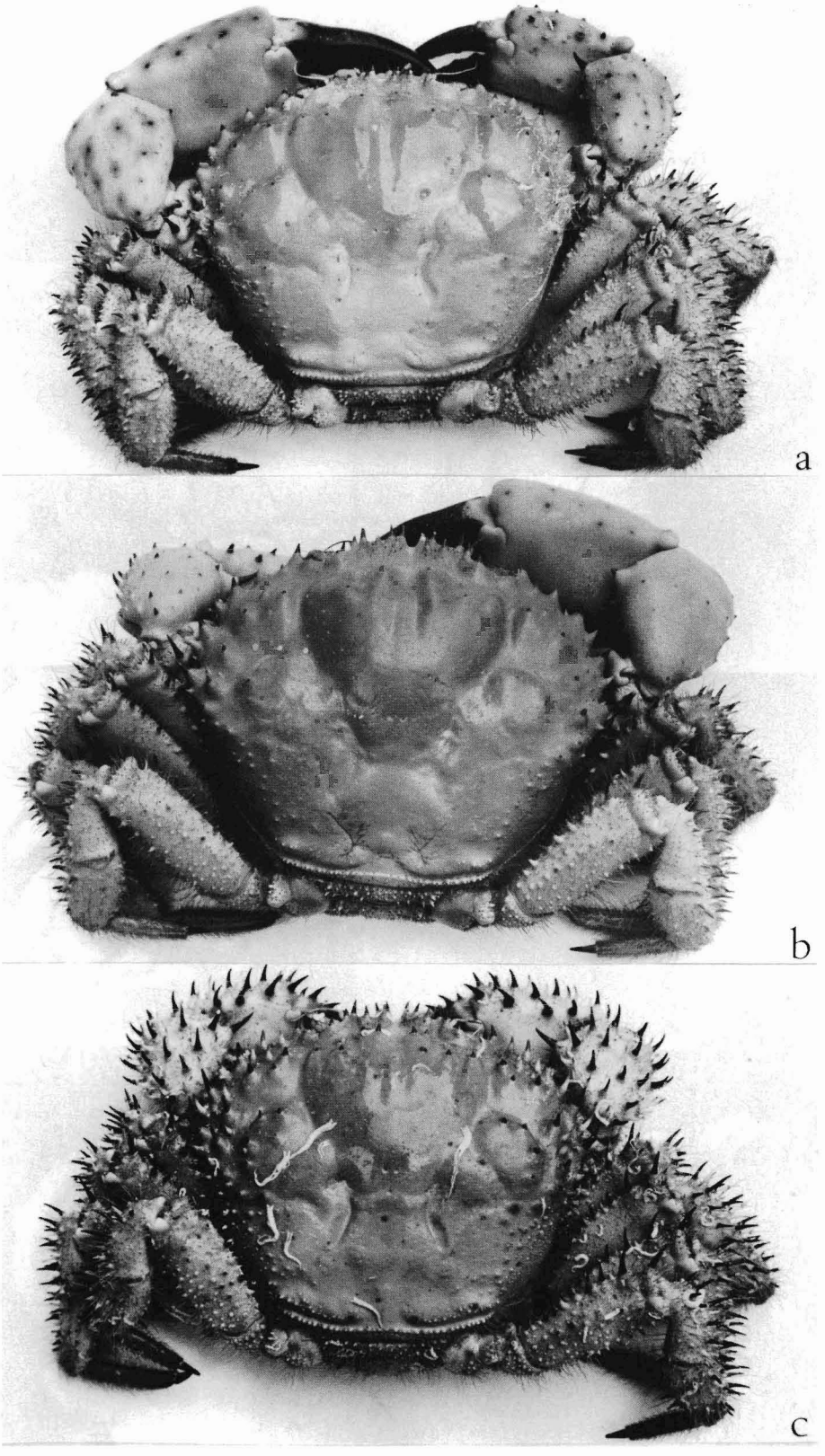

Fig. 8. *Hypothalassia acerba*. Overall view. a, male (127.7 by 148.3 mm) (ZRC 1998.1188), Western Australia; b, male (87.7 by 102.3 mm) (WAM 127-71), Western Australia; c, female (112.5 by 130.2 mm) (ZRC 1998.1199), Western Australia.

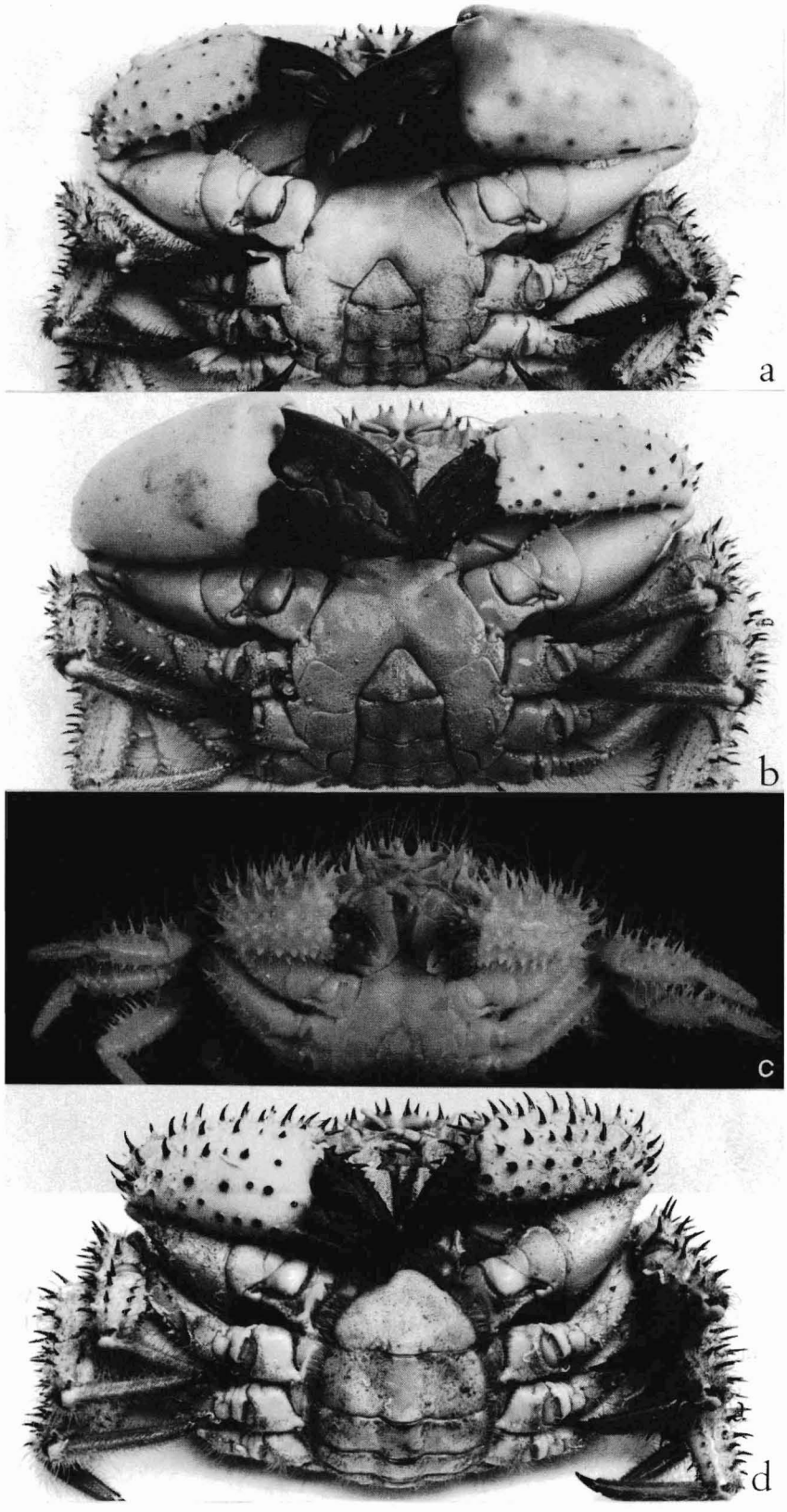

Fig. 9. *Hypothalassia acerba*. Ventral views. a, male (127.7 by 148.3 mm) (ZRC 1998.1188), Western Australia; b, male (87.7 by 102.3 mm) (WAM 127-71), Western Australia; c, juvenile male (16.5 by 21.2 mm) (USNM 55171), South Australia; d, female (112.5 by 130.2 mm) (ZRC 1998.1199), Western Australia.

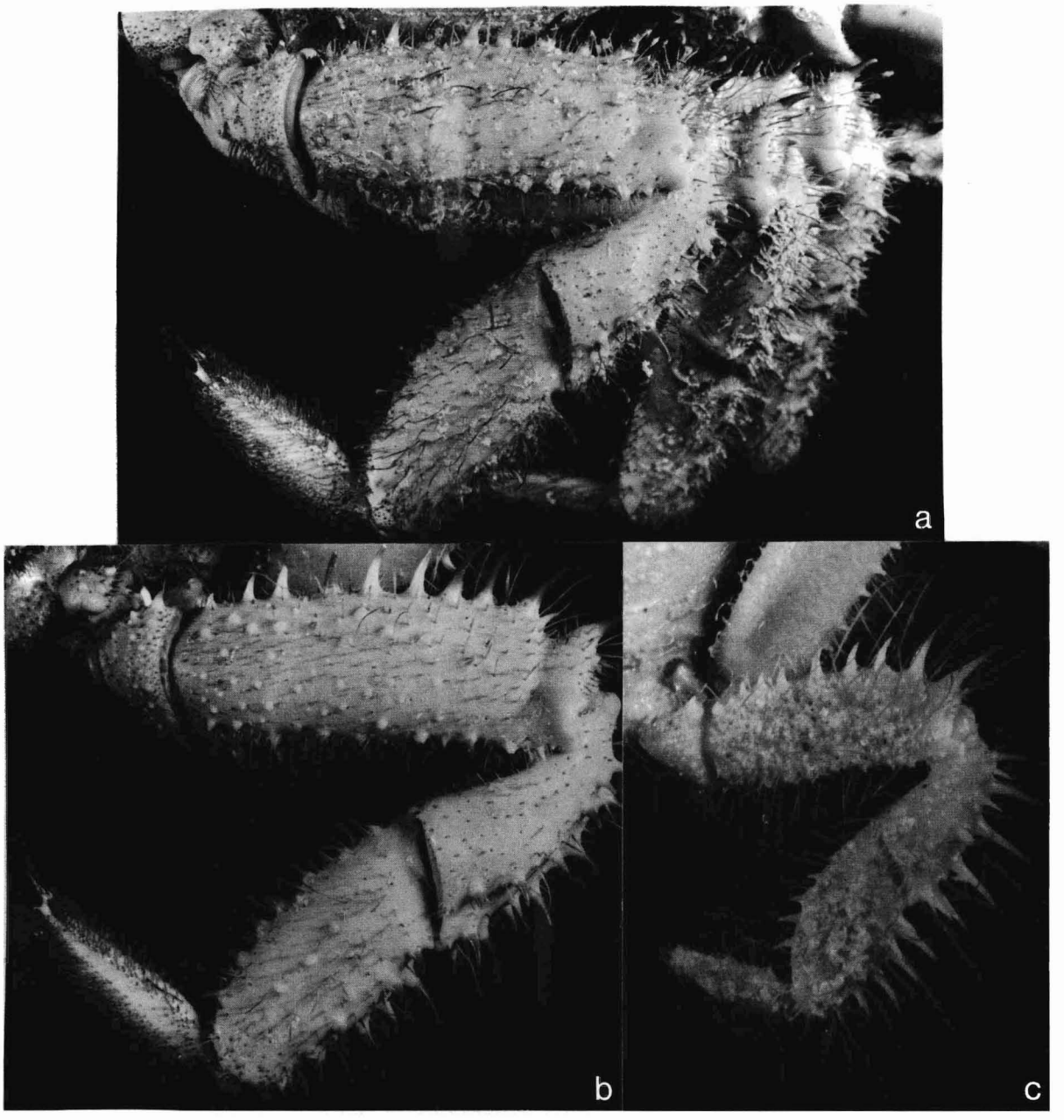

Fig. 10. *Hypothalassia acerba*. Last ambulatory legs. a, holotype male (127.2 by 146.4 mm) (WAM 8-84), Western Australia; b, male (87.7 by 102.3 mm) (WAM 127-71), Western Australia; c, juvenile male (16.5 by 21.2 mm) (USNM 55171), South Australia.

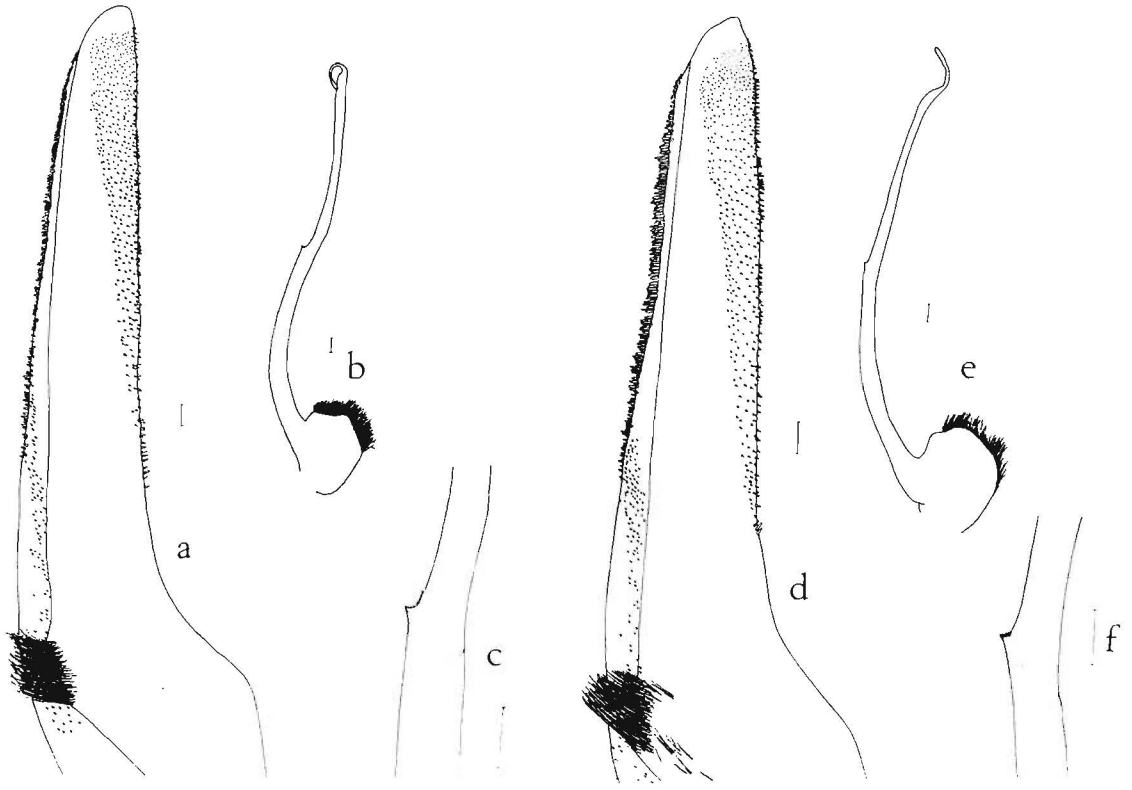

Fig. 11. Gonopods. a-c, *Hypothalassia armata*, male (125.4 by 146.2 mm) (USNM 260964), Marianas; d-f, *H. acerba*, holotype male (127.2 by 146.4 mm) (WAM 8-84), Western Australia. a, d, G1 (ventral view); b, c, G2; e, f, median part of G2.

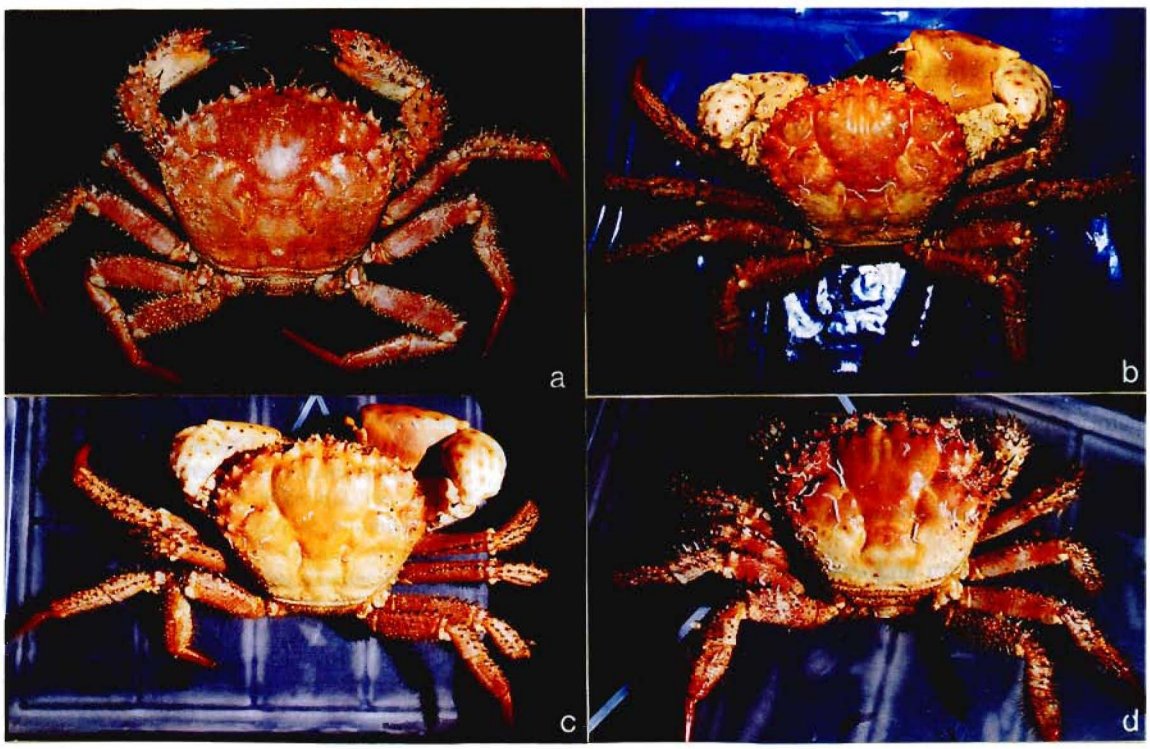

Fig. 12. Live colours. a, *Hypothalassia armata*, female (81.4 by 98.1 mm) (ZRC 1998.1196), Taiwan (photograph courtesy of P.-H. Ho); b-d, *H. acerba*, specimens from Jurien Bay, Western Australia, not preserved.

Hypothalassia, with an estimated catch of approximately 600 kg per trip. There are almost no fisheries regulations on this species except on the limitation of the lobster pots number (100 per fishing boat) and the minimum size of crabs caught (approximately adult size). Limitations on specific crab licenses to individual fishermen help control the harvest. The method of catching these crabs is similar in all the boats, by lobster pots, which are one metre square cages, with a top opening for the crabs to crawl in and many smaller ones to decant the water. Fish is generally used as bait. On arrival at the ports, they are immediately transferred to large water tanks where the temperature is kept at 16-17 degrees Celsius. The crabs are usually packed within a few days for export, mainly to mainland China and Hong Kong, with some destined for Singapore.

Previously, local fishermen used only pull off the larger chelae of the *H. acerba* harvested, throwing the 'clawless' crabs back into the sea (R. Melville-Smith, pers. comm.). The sale and export of whole crabs is a recent phenomenon. In Australia, they can are sold at approximately US$7/- per kg. In Singapore, *H. acerba* is sold under the name of "champagne crabs" (alluding to its supposedly fine taste) for ca. US$30/- per kg (Ng, 1998).

Not much is known about the biology of these crabs except for the specimens coming from Jurien Bay, Australia. Here, their preferred habitat seems to muddy substrates generally on the second continental slope right after the plateau, preferring depths of 120 to 130 m. According to local dealers in Australia, the lowest catch seems to be around December, coinciding with the period when more berried females are caught.

The largest male which we have seen at the Australian dealers weighs about two kg while the largest female is only about 1.2 kg. The latter also does not seem to grow larger than 140 mm in carapace width.

Colour. - The colour of life specimens varies. The anterior part of the carapace can be either pinkish or light orange, leaving the posterior part often cream coloured. They can also be uniformly cream-coloured. The chelipeds are usually cream coloured, while the ambulatory legs can have interspersed traces of pink and cream with the dactyli reddish-pink. The spines are always uniformly pigmented black to dark brown. The eyes are light yellow in colour in life (Fig. 12B-D).

Distribution. - Southern and southwestern Australia, ranging from Geraldton to the Great Australian Bight.

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