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# A new species of sesarmine crab (Brachyura : Grapsidae) from Japan and Taiwan, previously known as *Sesarma erythodactyla* Hess, 1865

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***Abstract.*** **A new species of intertidal sesarmine crab, *Parasesarma acis*, is described from Japan and Taiwan. This species has been known under the name *Sesarma* (*Parasesarma*) *erythodactyla* Hess, 1865, but it is established here that *P. erythodactyla* is endemic to the eastern coast of Australia. *Parasesarma acis* is known to occur from Sagami Bay, Japan, south to Taiwan, but there are no mainland records. The two species can be easily separated on male chela characters, including the shape and number of the dactylar tubercles, and the disposition of the dorsal pectinate crests.**

## Introduction

*Parasesarma erythodactyla* (Hess, 1865) is a very common species of the sub-tropical and sub-temperate regions of the eastern coast of Australia. Despite being identified from Japan by Ortmann, as long ago as 1894, there have been no records from intervening localities. As part of my ongoing revisionary work on the Sesarminae, beginning with Davie (1992), I was led to check whether or not Japanese specimens were, in fact, conspecific with the Australian *P. erythodactyla*. Work by Greenwood & Fielder (1988) comparing the larval morphology of Australian specimens with that described for Japanese crabs, has also provided further evidence supporting the separation into two species.

The identity of *P. erythodactyla*, has been further confused in the past by Ortmann's (1894b) description of a subspecies, *Sesarma erythodactyla* var. *africanum*, from Mikindani, Dar es Salaam, East Africa, which he said was distributed to Zanzibar and Madagascar. Crosnier (1965) in his study of the Grapsidae and Ocypodidae of Madagascar recorded a species of the subgenus *Holometopus* that he believed to be Ortmann's *africana*, but the type, which should have been lodged in Strasbourg could not be found. He described a new species *Sesarma* (*Holometopus*) *ortmanni* to receive his specimens because the name *Sesarma africana* had already been used by H. Milne Edwards (1837) for a West African crab. Therefore what Ortmann referred to as *Sesarma erythodactyla* var. *africana* must now be known as *Chiromantes ortmanni* Crosnier, 1965, the name of the genus being changed in line with the work of Holthuis (1977, 1978). I believe however that *ortmanni* is far from a typical example of *Chiromantes* and that its generic status remains to be clarified.

Abbreviations used in the text are: QM, Queensland Museum, Brisbane; c. b., carapace breadth; G1, male first gonopod; ppt, parts-per-thousand salinity. The descriptions for this paper were prepared using the DELTA computer system for generating taxonomic descriptions (Dallwitz & Paine, 1986).

Measurements given in the text are of the carapace breadth at the widest point, followed by length. Leg segments were measured in a straight line to give maximum dorsal length and so are not always the

maximum possible length, and this should be borne in mind when using the ratios. The width of the hind margin was measured at the point at which the lateral carapace suture meets the rear margin. Gonopod terminology follows that of Sakai & Yatsuzuka (1979).

### ***Parasesarma acis*** new species
Figs. 1 A-E, 2

*Sesarma erythrodactyla*. — Ortmann, 1894a: 726 [not Hess, 1865].
*Sesarma (Parasesarma) erythrodactyla*. — Sakai, 1939: 684 (no specimen); 1965: 201, pl. 96, fig. 4; 1976: 657, text-fig. 359. — Suzuki, 1985: 57.
*Sesarma (Parasesarma) erythrodactylum*. — Miyake, 1963: 68. — Fukui, Wada & Wang, 1989: 229-230, fig. 19. — Shih, Lue & Wang, 1991: 126.
*Parasesarma erythrodactylum*. — Hirata, Nakasone & Shokita, 1988: 21, col. pl. — Miyake, 1991: 181, pl. 60, fig. 6.

*Material*. — Holotype, QM W19000, ♂ (16.3×12.7 mm), Shirahama, Wakayama, Japan, 16.3. 1980, Y. Fukui. Paratypes, QM W18998, ♂(12.9×9.9), ♀(8.3×6.2 mm), data as for holotype. QM W18999, ovigerous ♀(16.2×12.9 mm), Shirahama, Wakayama, Japan, 22.7. 1982, Y. Fukui. QM W19001, ovigerous ♀(16.2×12.6 mm), data as for W18999.

*Description*. — Carapace rectangular; greatest width between exorbital angles, or slightly behind; 1.25-1.3 times broader than long. Carapace slightly vaulted. Regions moderately defined. Lateral margins subparallel, slightly concave. Front *c*. 0.55 times fronto-orbital width; sinuous; lateral angles obtuse. Post-frontal lobes distinct; median lobes slightly broader than laterals. Epi-branchial and branchial ridges prominent. Carapace surface relatively smooth. Setae very short, sparsely scattered over entire surface. Antennal flagellum small, entering orbit. Basal antennular segment not swollen. Inter-antennular septum moderately wide, *c*. 0.25 times width of front.

Chelipeds subequal, large and robust; merus with posterior border carinate, minutely granulate; without distinct subdistal spine; anterior border forming an acute, broad, sub-distal spine; carpus with inner angle not produced; inner margin granular; outer margin and dorsal surface striated. Upper surface of palm with three transverse pectinate crests (holotype with slight indication of a fourth). Primary crest composed of 15-20 tall, broad teeth (19 and 20 on holotype; 15 and 17 on smaller male). Secondary crest strongly developed; shorter than primary; with 10-13 smaller teeth. Outer surface of palm sparsely granular; with a very indistinct median longitudinal row. Outer surface of palm naked except for scattered tiny setae; and small patch in front of first pectinate crest. Inner surface of palm with a strongly raised granular vertical crest curving towards fixed finger. Fixed finger rounded on outer surface, with a triangular depression basally; length cutting edge *c*. 0.45 times length propodus. Ventral border of chela slightly concave at base of fixed finger. Dorsal surface of dactyl with 22-24 symmetrical calcareous tubercles, all distinct, closely spaced proximally, becoming well separated and more rounded towards tip, transversely widening medially. Fingers spooned, tips chitinous; curved inwards; a moderate gape between cutting margins over distal half.

Walking legs medium length; flattened; very broad; third pair the longest, *c*. 1.7 times maximum carapace width. Merus of third leg *c*. 2.4 times as long as wide; propodus *c*. 2.2 times as long as wide in holotype (2.4 in paratype male); dactyli *c*. 1.0-1.1 times length of propodus; about equal to length of propodi; stout, slightly recurved; terminating in acute chitinous tip. Merus anterior margin with acute sub-distal spine; unarmed terminally. Carpus with accessory carinae on upper surface. Propodus with accessory carina on inferior

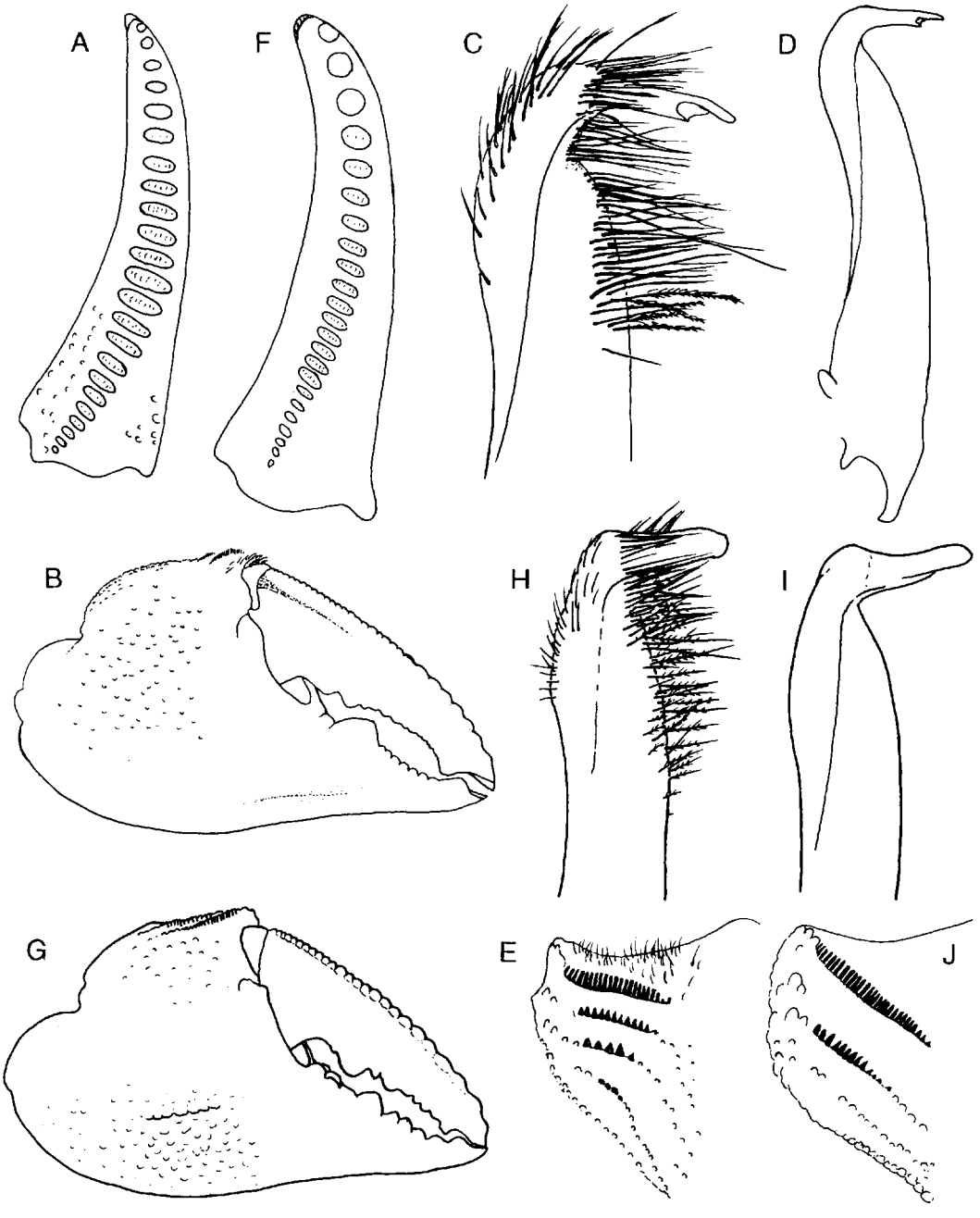


Fig. 1. A–E, *Parasesarma acis* new species, holotype: A, dorsal view of dactyl of cheliped; B, outer face of cheliped; C, enlargement of tip of gonopod one; D, gonopod one denuded of setae; E, dorsal surface of chela showing disposition of pectinate crests. F–J, *P. erythodactyla* (Hess) (F, J, QM W5215, ♂, 18.0 mm c. b.; G, H, I, QM W18997, ♂, 17.4 mm c. b.): F, dorsal view of dactyl of cheliped; G, outer face of cheliped; H, enlargement of tip of gonopod one; I, tip of gonopod one denuded of setae; J, dorsal surface of chela showing disposition of pectinate crests.

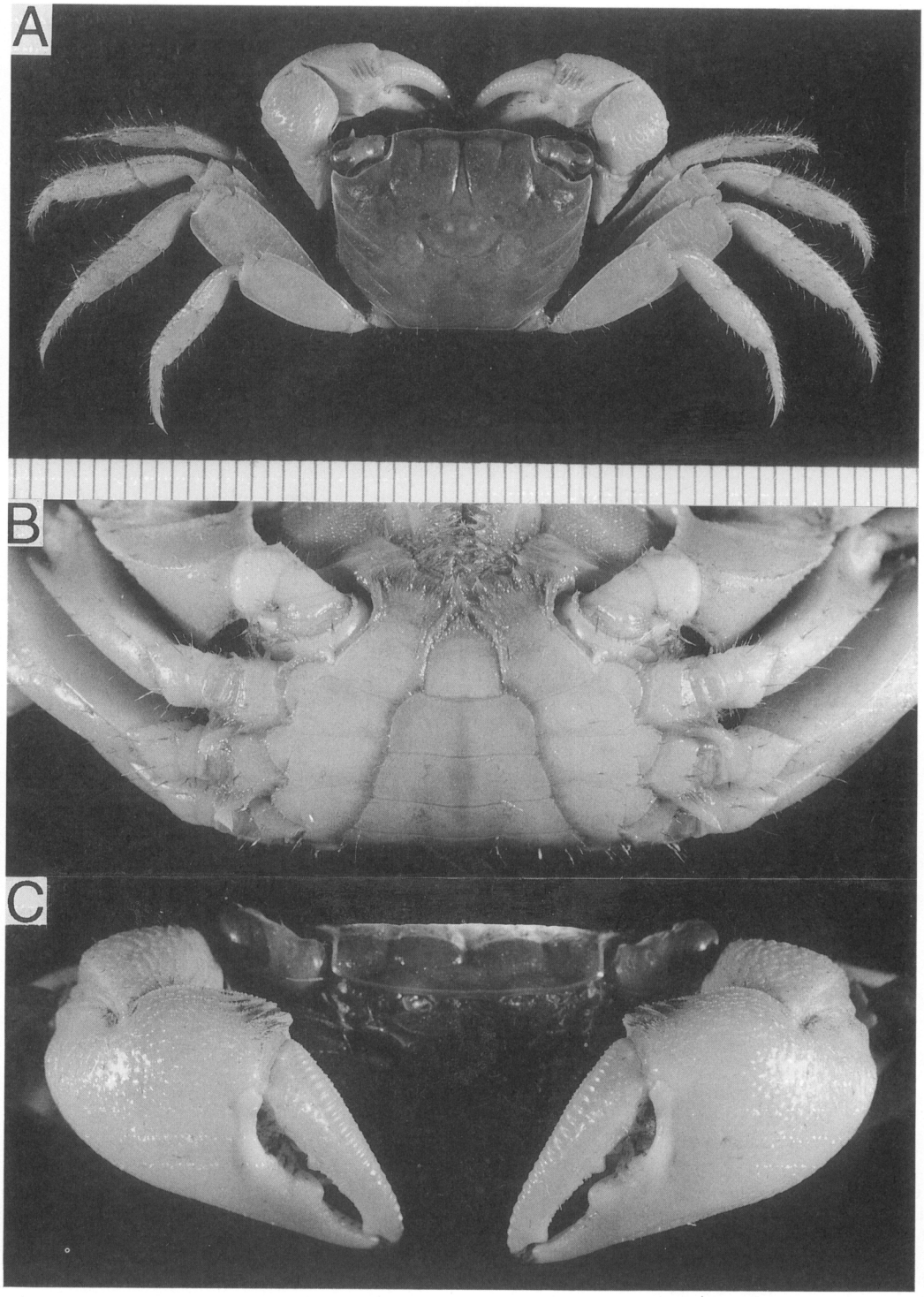


Fig. 2. *Parasesarma acis* new species, holotype: A, dorsal view; B, ventral view; C, frontal view of chelae. Scale in mm.

proximal portion of upper surface. Meri of legs 1–3 with scattered, small, distally directed prickles on cuticular terraces. Legs fringed with stiff bristles except on meri. Small patch of fur on ventro-distal border of propodi and ventral border of dactyli of first and second legs.

Male abdomen moderately broad; third segment the widest. First segment narrow. Segment six *c.* 2.6 times wider than long. Telson longer than preceding segments; about as long as wide; evenly rounded.

Male G1 moderately stout, moderately curved; apical process corneous, strongly produced, lying at 90° to stem. Gonopore sub-terminal, tip cut away ventrally. Long setae mainly restricted to inner margin of distal third and around tip; mostly simple but some feathered setae proximally.

*Larval morphology*. — First zoeal stage described by Baba & Fukuda (1975).

*Habitat*. — "... is most abundant and is usually found confined in, but over the various types of, the reed marsh developed on the intertidal zone of estuary, and utilizes as its shelter the underside of refuse, the abandoned burrow of other crabs and crevices of rocks." (Hara & Ono, 1976).

*Biology*. — Hara & Ono (1976) have described the daily movement and feeding activity in Tatara-Umi river estuary, Fukuoka. Yoshimura (1990) has reported on the incidence of parasitic nematode infections in this species.

*Etymology*. — Named after the mythological figure, *Acis*, the son of the naiad, Symaethis. The naiads were nymphs who derived their vitality from, and in turn gave life to, the water in which they lived.

*Distribution*. — Known from Japan: Sagami Bay, Tosa Bay (Ortmann, 1894a; Sakai, 1976), Yoron Is. (Sakai, 1976), Fukuoka (Hara & Ono, 1976), Iriomote-jima, Ryukyu Islands (Miyake, 1963), Okinawa (Hirata *et al.*, 1988); and Taiwan (Suzuki, 1985; Fukui *et al.*, 1989; Shih *et al.*, 1991).

### ***Parasesarma erythodactyla*** (Hess, 1865)
Figs. 1 F-J, 3

*Sesarma erytho-dactyla* Hess, 1865: 151, pl. 6, fig. 10.

*Sesarma erythrodactyla*: Haswell, 1882: 109. De Man, 1887: 656, 686 7; 1889: 436; 1890: 100. — Ortmann, 1894a: 726. — Gunn, 1972: 76.

*Sesarma* (*Parasesarma*) *erythrodactyla*: De Man, 1895: 189. — Tesch, 1917: 149, 254 (no new record).

Type locality: Sydney, Australia.

Type specimen: It was originally deposited in the Zoological Museum of Goetingen. De Man (1889) gave measurements of three 'Originalexemplaren des Göttinger Museums', 2 ♂♂(21.2×17.3; 19.8×16.5 mm) and 1 ♀(21.2×17.5 mm), however none of these agree with the measurements given by Hess, *viz.* 3 cm×2.7 cm. The Göttingen collection is now housed in the Senckenberg Museum, Frankfurt, but a careful search has failed to find any trace of type material. It must be considered lost. There is no justification at present for the designation of a neotype as this species is apparently endemic to Australia, and is easily separable from its congeners.

*Material*. — QM W18996, 2 ♂♂(18.5×15.0; 18.9×14.9 mm), ovig. ♀(18.4×15.0 mm), ♀(12.5×10.0 mm), Bassett Ck., Mackay, Queensland, B. Campbell. QM W5388, 5 ♂♂(10.2×8.1; 13.6×10.5; 14.4×11.4; 15.8×12.6; 16.0×12.7 mm), near mouth of Moon Ck., Fraser Is., 25.11°S, 153.04°E, 22.07.1975, P. Davie. QM W18997, 2 ♂♂(16.4×13.2; 17.4×14.0 mm), ovig. ♀(13.7×10.7 mm), Mooloolah River, south-east Queensland, coll. W. Macnae. QM W5212, 2 ♂♂(20.7×17.1; 19.8×16.5 mm) Jacksons Ck., transect 3 site C, 27.23°S, 153.05°E, Oct. 1972, B. Campbell *et al.* QM W5215, ♂(18.0×15.6 mm), Serpentine Ck., transect 4 site B, 27.24°S, 153.05°E, August

1972, B. Campbell *et al.* QM W3449, ♂(22.2×18.2 mm), ♀(19.1×15.2 mm), Canons Creek, Western Port Bay, 38.22°S, 145.32.0° E, 11.09. 1970, Museum of Victoria.

*Description.* — Carapace rectangular; greatest width between or slightly behind exorbital angles; *c.* 1.25 (range 1.15 1.3) times broader than long. Carapace slightly vaulted. Regions moderately defined. Lateral margins subparallel, slightly concave. Front *c.* 0.6 times fronto-orbital width, sinuous, lateral angles obtuse. Post-frontal lobes distinct; median lobes slightly broader than laterals. Epi-branchial and branchial ridges prominent. Carapace surface smooth and minutely punctate. Setae in short rows on anterior half and sparsely scattered laterally, otherwise mostly absent. Antennal flagellum small, and entering orbit. Basal antennular segment not swollen. Inter-antennular septum moderately wide; *c.* 0.25 times width of front.

Chelipeds subequal, large and robust. Merus with posterior border carinate and minutely granulate, without distinct subdistal spine; anterior border forming an acute broad sub-distal spine. Carpus with inner angle not produced, outer margin and across dorsal surface striated. Upper surface of palm with two transverse pectinate crests. Primary crest composed of 23–29 tall, narrow teeth. Secondary crest with 8–14 lower and broader teeth; shorter than primary. Outer surface of palm granular; with marked median longitudinal row; naked. Inner surface of palm with a strongly raised granular crest, short, straight, oblique, sloping towards fixed finger. Fixed finger rounded on outer surface; without ventral ridge; moderately long; length cutting edge *c.* 0.45 times length propodus. Ventral border of chela slightly concave at base of fixed finger. Dorsal surface of dactyl with 23–26 symmetrical calcareous tubercles; all distinct; closely spaced proximally, becoming broader, rounder, and more widely separated distally, such that round at tip. Fingers spooned, tips chitinous, curved inwards, a narrow gape between cutting margins.

In the female the pectinate crests are not developed, the tuberculation of the dactyl is indistinct, and the ridge on the inner surface of the chelae is not developed.

Walking legs medium length, flattened, broad; second and third pairs sub-equal and longer than others, *c.* 1.5 times maximum carapace width. Merus of third leg *c.* 2.1 times as long as wide; propodus *c.* 1.7–1.8 times as long as wide. Dactyli about equal to length of propodi; stout, slightly recurved, terminating in an acute chitinous tip. Anterior margin of merus with an acute sub-distal spine; unarmed terminally. Carpus with accessory carinae on upper surface. Propodus with an accessory carina on inferior proximal portion of upper surface. Meri of legs 1–3 with scattering of small distally directed prickles on cuticular terraces. Legs thickly covered with a fur of short setae on upper, frontal, and lower faces of carpi, propodi and dactyli. Small patch of fur on ventro-distal border of propodi and ventral border of dactyli of first two pairs of legs.

Male abdomen moderately broad; third segment the widest. First segment narrow. Segment six *c.* 2.3 times wider than long. Telson longer than preceding segments; about as wide as long; evenly rounded.

Male gonopod 1 short, moderately stout, curved. Apical process corneous, strongly produced, lying at about 90° to stem. Gonopore terminal. Setae long, simple and feathered; mainly restricted to inner margin of distal third and around tip.

*Colouration.* — Carapace varies from dark brown/black to bright green. Chelae pale cream with bright orange-red finger tips.

*Larval morphology.* Green & Anderson (1973) and Greenwood & Fielder (1988) have reported on the zoeal larval stages and the megalopa for this species. Greenwood &

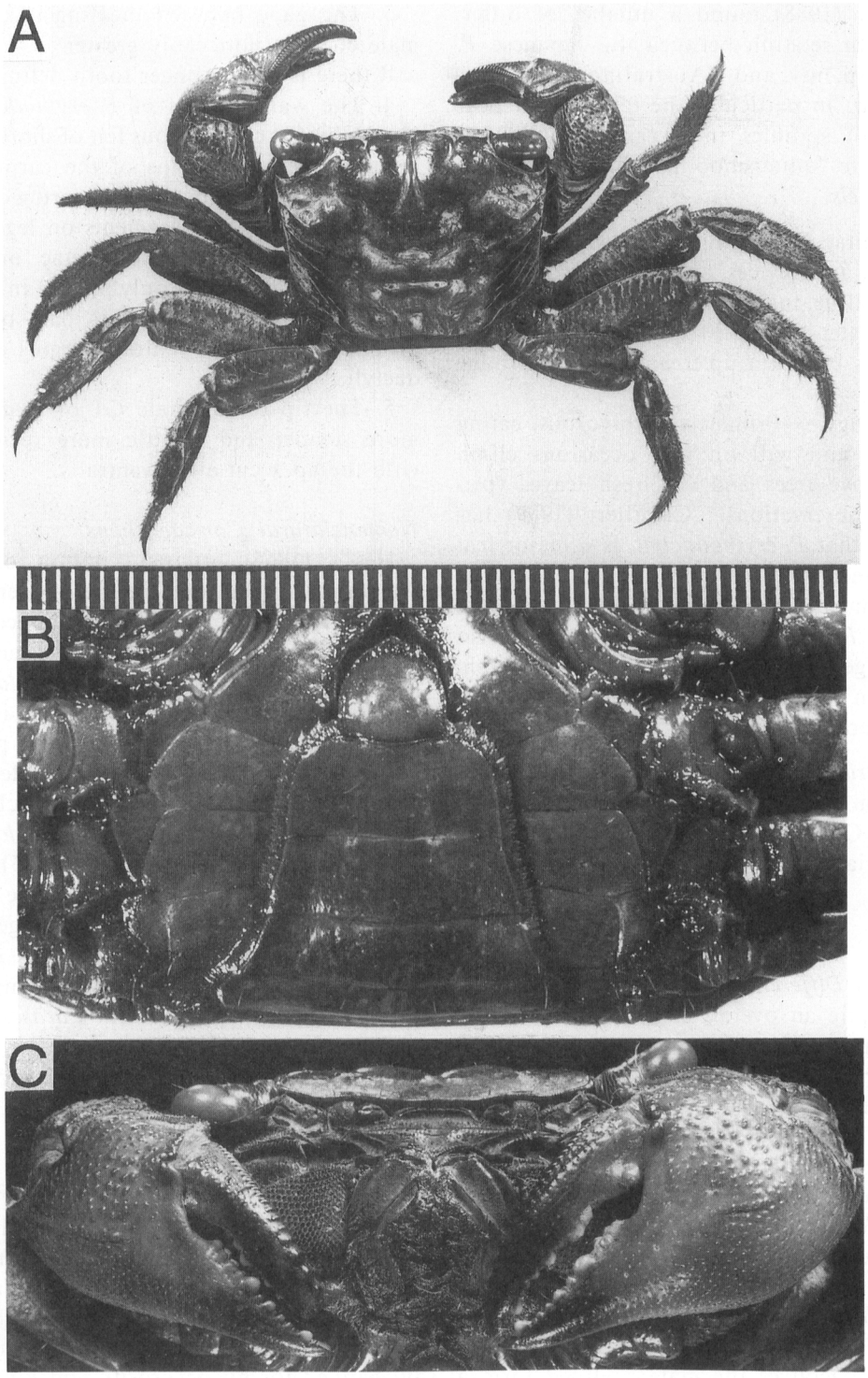


Fig. 3. *Parasesarma erythodactyla* (Hess). QM W18996,♂: A, dorsal view; B, ventral view; C, frontal view of chelae. Scale in mm.

Fielder (1988) found a number of differences in setation between the Japanese *P. acis* sp. nov. and Australian *P. erythodactyla*; in particular the telson rami bear rows of spinules in *P. erythodactyla* but these are "quite smooth without fine setae" in *P. acis*.

Habitat. — Above high water, under stones, in crevices and burrows in bank. Euryhaline, found in salinities from 3 ppt at high water neap to 30 ppt at low water neap; extends *c.* 60 km upstream in the Brisbane River.

Biology. — Primarily herbivorous, eating leaves, and will on rare occasions climb mangrove trees and eat fresh leaves (personal observation). Camilleri (1989) has found that *P. erythodactyla* is a major leaf consumer/shredder, and that in leaf choice experiments it preferred *Avicennia* over either *Rhizophora* or *Bruguiera*, and also that aged leaves were prefered over fresh. Warren (1988) has reported on the behavioural ecology.

*Distribution.* — Only known with certainty from eastern Australia between Mackay, north Queensland, and Western Port Bay, Victoria.

## Remarks

*Species Differences*

Despite an overall similarity in external appearance the differences between *Parasesarma acis* sp. nov. and *P. erythodactyla* Hess, are numerous.

1. The pectinate crests on top of the palm of the male cheliped are arranged nearly transversely in *P. acis*, but in *P. erythodactyla* are oblique. In *P. acis* there are three crests strongly marked, with a slight indication of a fourth; whereas in *P. erythodactyla* there are only two rows.

2. The tubercles along the dorsal margin of the dactyl of the male cheliped form a much broader band in *P. acis* (compare Fig. 1, A and F).

3. The gape between the fingers of the male chela is noticeably greater in *P. acis*, and there is also stronger tooth definition.

4. The walking legs of *P. erythodactyla* always have a conspicuous felt of short setae on the anterior margins of the carpi and propodi, which form a thick covering on the frontal faces of these segments on legs 1–3. *P. acis* has numerous stiff setae on the walking legs but felt is only present in small patches on the disto-ventral part of the propodi and on the ventral margins of the dactyli.

5. The tip of the male G1 of *P. acis* is more slender and a little more recurved, with the apex cut away ventrally.

*Nomenclatural Considerations*

Hess's (1865) original citation of the Australian species used the spelling 'erytho' instead of 'erythro' which is the correct Greek word meaning red. This was emended by Haswell (1882), and *erythrodactyla* has since been universally used. As it had the same spelling twice in different places within Hess(1865), it must be considered a case of incorrect transliteration (Article 32c of the *International Code of Zoological Nomenclature* – Third Edition, 1985), and therefore the original spelling must be used.

Several workers have recently changed the species name of *erythodactyla* to *erythodactylum*, presumably in an attempt to make it agree in gender with *Parasesarma* which is neuter. This is unnecessary however as *erythodactyla* is a noun in apposition.

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is thanked for making available the drawings of *P. erythodactyla*. Dr. Bob Domrow once again very kindly lent me his knowledge of the classical languages and his great understanding of the *Code of Zoological Nomenclature*. Special thanks are due to Peter Ng for carefully refereeing the paper, and bringing to my attention some additional literature. Dr. Keiji Baba is also especially thanked for his encouragement during the preparation of this manuscript. Finally I am grateful to Gary Cranitch of the Queensland Museum for printing the photographs.

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