

Kropp, 1990

J. Martin

Pacific Science (1990), vol. 44, no. 4: 417-448
© 1990 by University of Hawaii Press. All rights reserved

Revision of the Genera of Gall Crabs (Crustacea: Cryptochiridae)¹ Occurring in the Pacific Ocean

ROY K. KROPP²

ABSTRACT: The coral gall crabs, Family Cryptochiridae, occurring in the Pacific Ocean are reviewed. Fifteen genera, including four new genera, are recognized: *Cryptochirus* Heller; *Dacryomaia*, new genus; *Fizesereneia* Takeda & Tamura; *Fungicola* Serène; *Hapalocarcinus* Stimpson; *Hiroia* Takeda & Tamura; *Lithoscaptus* Milne Edwards; *Neotroglocarcinus* Takeda & Tamura; *Opecarcinus* Kropp & Manning; *Pelycomaia*, new genus; *Pseudocryptochirus* Hiro; *Pseudohapalocarcinus* Fize & Serène; *Sphenomaia*, new genus; *Utinomiella* Kropp & Takeda; and *Xynomaia*, new genus. Host, depth, and distribution records are given for each genus. A key to the females of all gall crab genera is included.

THE CORAL GALL CRABS, Family Cryptochiridae, are obligate associates of living scleractinian corals. Not only do they reside in galls, tunnels, or pits in the coral skeleton, but they also feed on the host coral mucus and tissues (Kropp 1986). Though the family has been known for 130 yr, its taxonomy has been marred by many errors. These errors have resulted from failures to consider type material or available literature, use of inappropriate characters to define taxa, or failure to follow proper taxonomic procedures.

Two problems related to failure to consider type material were resolved by the reestablishment of *Lithoscaptus* Milne Edwards and *Cryptochirus hongkongensis* Shen, the latter as the type species of *Neotroglocarcinus* Takeda & Tamura (Kropp 1988a,b).

Two characters inappropriate for use in the definition of genera were the nature (uni-

ramous or biramous) of the second pleopod of the female and the host coral taxon on which the crab species occurred. McCain and Coles (1979) found the second pleopod to be uniramous on one side of the abdomen of an individual, biramous on the other, and variable among individuals of *Utinomiella dimorpha* (Henderson 1906). I have made similar observations for this and other species among my collections from Micronesia. Cryptochirids show some degree of host specificity, which some authors thought could be used to define genera (Fize and Serène 1957, McCain and Coles 1979). Both features subsequently were shown to be unreliable (Kropp and Manning 1987).

In a monograph of the gall crabs from Vietnam, Fize and Serène (1957) created a new genus, *Neotroglocarcinus*, and initiated the use of subgenera in the genus *Troglocarcinus* Verrill. The subgenera they established were based on the family of corals on which the crabs were found. However, they erred in creating the subgenus *Mussicola* by including within it *T. corallicola* Verrill, the type species of *Troglocarcinus*. They further erred by not naming type species for any of their newly created genus-group taxa. Thus, the new genus-group names were unavailable.

Serène (1966) made two generic names available when he designated *Cryptochirus rugosus* Edmondson as the type species of

¹Contribution no. 284 from the University of Guam Marine Laboratory. Financial support was provided by the University of Maryland Department of Zoology and Graduate School, a grant to G. J. Vermeij by the Biological Oceanography Section of the National Science Foundation, and the Lerner-Gray Fund for Marine Research. This is from a dissertation submitted to the Graduate School, University of Maryland, in partial fulfillment of the requirements for the Ph.D. degree in zoology. Manuscript accepted 10 February 1990.

²Present address: Battelle Ocean Sciences, 1431 Spinnaker Drive, Ventura, California 93001.

Favicola and *Troglocarcinus utinomi* Fize & Serène as the type of *Fungicola*. His actions also helped establish the host taxon as a generic character.

By the beginning of the 1980s the taxonomic situation of the family was far from serene, but the work of Takeda and Tamura in Japan had begun to unravel some of the confusion. Takeda and Tamura (1981b) removed *Pseudocryptochirus* as a "catch all" taxon by creating two new genera, *Hiroia* and *Utinomia*, for some species previously assigned to *Pseudocryptochirus*. *Utinomia* Takeda & Tamura, 1981 was later determined to be a junior homonym of *Utinomia* Tomlinson, 1963, a genus of acrothoracican barnacle, and was replaced by *Utinomiella* Kropp & Takeda 1988.

Takeda and Tamura (1980b) also erected a new genus, *Fizesereneia*, to accommodate species placed in the erroneously created *Mussicola* Fize & Serène, 1957. However, they did not realize that *Mussicola* could be used as an available name by designating one of the species in it as its type. Kropp and Manning (1987) rectified this by naming *T. corallicola* as the type species of *Mussicola*, rendering *Mussicola* a junior synonym of *Troglocarcinus*. Takeda and Tamura (1980b) further erred by misidentifying the type species of their new genus *Fizesereneia*. Kropp (1988c) petitioned the International Commission on Zoological Nomenclature to confirm *Troglocarcinus heimi* Fize & Serène, 1956 as the type species of *Fizesereneia*.

However, many morphological inconsistencies within the generic structure of the family still remained by the mid-1980s. Here, I use morphology to reorganize the generic placement of the species of gall crabs occurring in the Pacific, removing totally the concept of host affinity as a generic character. I also provide a key to the females of all known cryptocarid genera. The species of gall crabs occurring in the Atlantic were reviewed by Kropp and Manning (1987).

MATERIALS AND METHODS

I collected much of the material used in this revision in Micronesia and Hawai'i in 1984

and 1986. Specimens from these collections have been deposited in the National Museum of Natural History, Smithsonian Institution (NMNH), Washington, D.C.; the Bernice P. Bishop Museum (BPBM), Honolulu, Hawai'i; and the Natural History Museum of Los Angeles (LACM), Los Angeles, California. Supplementary material was borrowed from the BPBM; the NMNH; the British Museum of Natural History (BMNH), London, England; the Muséum National d'Histoire Naturelle (MNHN), Paris, France; the Naturhistorisches Museum (NMW), Vienna, Austria; and the National Science Museum (NSMT), Tokyo, Japan. I examined the types of many species; these are marked by an asterisk in the lists of species.

Most of the figures are based on material from Micronesia and were prepared with the use of a camera lucida on a Wild M-5 dissection microscope or were traced from scanning electron microscope (SEM) micrographs. The type species of each genus is figured. Setae on the surfaces of the carapace and pereopods are not shown. Specimens for SEM study were prepared as described in Kropp (1986).

I have restricted the synonymies to the first usage of a particular name for a taxon, including erroneous spellings. Abbreviations used in the text or figures are as follows: m, meters; mm, millimeters; MXL, maxilla; MXP, maxilliped; P, pereopod; PLP, pleopod; and TL, type locality.

In the diagnoses the male P-1 is described as robust if the height of the manus is subequal to the length of its dorsal margin, slender if the height of the manus is much less than the length of its dorsal margin. Similarly, the propodus of leg P-2 of the female is described as thick if its height is subequal to its length; slender if the length is 1.5 or more times the height. The median indentation of the anterior margin of the epistome is characterized as narrow if its maximum width is less than half or wide if its maximum width is greater than half the width of the anterior margin. Also, the median indentation is termed shallow if its depth is less than half or deep if its depth is greater than half the length of the epistome. In some genera the median indentation is barely noticeable and is termed slight.

I have listed only those host, depth, and distribution records that I am reasonably certain are accurate. The acronym "RKK" in-

icates unpublished data from my collections in Micronesia and Hawai'i.

KEY TO GENERA OF GALL CRABS, FAMILY CRYPTOCHIRIDAE

(Based on Females)

1. Carapace deflected anteriorly 2
1. Carapace not deflected anteriorly 10
2. Anterior extension of sternite of P-1 smooth 3
2. Anterior extension of sternite of P-1 with granules or tubercles 6
3. Anterior carapace with two bowl-shaped concavities 4
3. Anterior carapace without bowl-shaped concavities 5
4. Distal margin of antennal segment 2 with lateral spine; pterygostomial region not fused to carapace *Pelycomaia* Kropp, new genus
4. Distal margin of antennal segment 2 without lateral spine; pterygostomial region fused to carapace *Pelycomaia*
5. Pterygostomial region fused to carapace; P-2 merus lacking distomesial expansion *Lithoscaptus*
5. Pterygostomial region not fused to carapace; P-2 merus with distomesial expansion *Troglocarcinus* (Atlantic)
6. P-2 merus with distomesial expansion 7
6. P-2 merus without distomesial expansion 8
7. Pterygostomial region fused to carapace; P-4 sternite with median suture *Opecarcinus*
7. Pterygostomial region not fused to carapace; P-4 sternite without median suture *Neotroglocarcinus*
8. Midportion of carapace with clusters of rounded tubercles *Cryptochirus*
8. Midportion of carapace with isolated tubercles and granules 9
9. Carapace widest at midlength; anterior carapace without deep inverted V-shaped groove *Sphenomaia* Kropp, new genus
9. Carapace widest anterior to midlength; anterior carapace with deep V-shaped groove *Dacryomaia* Kropp, new genus
10. Pterygostomial region fused to carapace 11
10. Pterygostomial region not fused to carapace 16
11. P-3 coxa with well-developed anterior lobe 12
11. P-3 coxa anterior lobe lacking or reduced 13
12. MXP-3 with exopod *Fungicola*
12. MXP-3 lacking exopod *Utinomiella*
13. Carapace about as long as wide 14
13. Carapace longer than wide 17
14. P-4, P-5 coxal lobes well-developed *Pseudohapalocarcinus*
14. P-4, P-5 coxal lobes absent *Hapalocarcinus*
15. MXP-3 with exopod *Hiroia*
15. MXP-3 lacking exopod *Detocarcinus* (Atlantic)
16. Merus of P-2 with distomesial expansion; distal margin of antennal segment 2 lacking lateral spine 17
16. Merus of P-2 without distomesial expansion; distal margin of antennal segment 2 with lateral spine *Xynomaia* Kropp, new genus
17. Anterior extension of P-1 sternite with granules *Pseudocryptochirus*
17. Anterior extension of P-1 sternite smooth *Cecidocarcinus* (Atlantic)

SYSTEMATIC ACCOUNT

Family CRYPTOCHIRIDAE Paulson, 1875

Lithoscaptus Milne Edwards, 1862: F10 [vernacular name; type genus *Lithoscaptus* Milne Edwards, 1862].

Cryptochirinae Paulson, 1875: 72 [p. 78 in translation; type genus *Cryptochirus* Heller, 1861].

Cryptochiridae.—Richters, 1880: 159; Kropp and Manning, 1985: 954.

Lithoscaptidae.—Richters, 1880: 159.

Hapalocarcinidae Calman, 1900: 49 [type genus *Hapalocarcinus* Stimpson, 1859].

Hapalogarcinidae.—Coêlho & Ramos, 1972: 205 [erroneous spelling].

Genus *Cryptochirus* Heller, 1861

Cryptochirus Heller, 1861: 19 [type species: *Cryptochirus coralliodytes* Heller, 1861: 19, by monotypy; gender masculine].

Cryptochyrus.—Nobili, 1906: 325 [erroneous spelling].

Favicola Fize & Serène, 1957: 84 [name unavailable].

Favicola Serène, 1966: 396 [type species: *Cryptochirus rugosus* Edmondson, 1933: 6, by original designation; gender masculine].

DIAGNOSIS: Carapace rectangular, longer than broad, widest near midlength, convex in lateral view, deflected anteriorly; mesogastric region inflated. Posterior region of carapace isolated by system of grooves, cardiointestinal region outlined. Pterygostomial region fused to carapace. Epistome with parallel lateral ridges, anterior margin sinuous with shallow, wide median indentation. Lateral lobe of antennule elliptical, extending beyond eye-stalk. Antennal segment 2 longer than broad, distal margin lacking lateral spine. MXP-3 with exopod; merus with distolateral projection, mesial margin with setae. Inner surface of second segment of MXP-2 endopod with setae at distal margin. MXP-1 endopod triangular, widest distal to midlength; distal margin convex. Ventral thorax longer than wide, concave mesially. Anterior extension of sternite of P-1 with granules. Sternite of P-4 with suture. Female gonopore oval, with anterior

hood. P-1 cutting edges entire. P-2 merus lacking distomesial projection; propodus slender. P-3 coxa with reduced, P-4 coxa with well-developed anterior lobe. P-5 dactylus rotated anteriorly. PLP-3 of female uniramous. Male with robust P-1; abdomen length 3.3 times width, segments subequal in width, lateral margins parallel. PLP-1 curved laterally, apex pointed, lateral margin with simple setae, mesial margin with few pappose setae proximally.

REMARKS: Fize and Serène (1957) failed to designate a type species for *Troglocarcinus* (*Favicola*), thus rendering *Favicola* Fize & Serène unavailable for use as a genus-group name [International Code of Zoological Nomenclature (ICZN) Art. 13(b)]. Serène (1966) designated *Cryptochirus rugosus* Edmondson as the type species of *Favicola*. Kropp (1988b) determined *Cryptochirus rugosus* to be a junior synonym of *C. coralliodytes*.

HOSTS: Faviidae—*Cyphastrea*, *Barabattoia*, *Favia*, *Favites*, *Goniastrea*, *Leptoria*, *Montastrea*, *Platygyra* (see Fize and Serène 1957, RKK). Oculinidae—*Cyathelia* (see Takeda and Tamura 1983).

DEPTH: <1 to 30 m (Takeda and Tamura 1983, RKK).

DISTRIBUTION: Red Sea (Heller 1861); Vietnam (Fize and Serène 1957); Japan (Takeda and Tamura 1983); Micronesia—Palau, Guam, Pohnpei (RKK).

Cryptochirus coralliodytes Heller, 1861

Figure 1

Cryptochirus coralliodytes Heller, 1861: 19 [TL: Red Sea; lectotype* NMW].

Cryptochirus rugosus Edmondson, 1933: 6 [TL: Washington Island (now known as Teraina, Kiribati); holotype* BPBM S3668].

Troglocarcinus (*Favicola*) *rugosus*.—Fize & Serène, 1957: 85.

Favicola rugosus.—Serène, 1966: 396.

Favicola rugosum.—Lundøer, 1974: 10.

Favicola rugosa.—Takeda & Tamura, 1981a: 43.

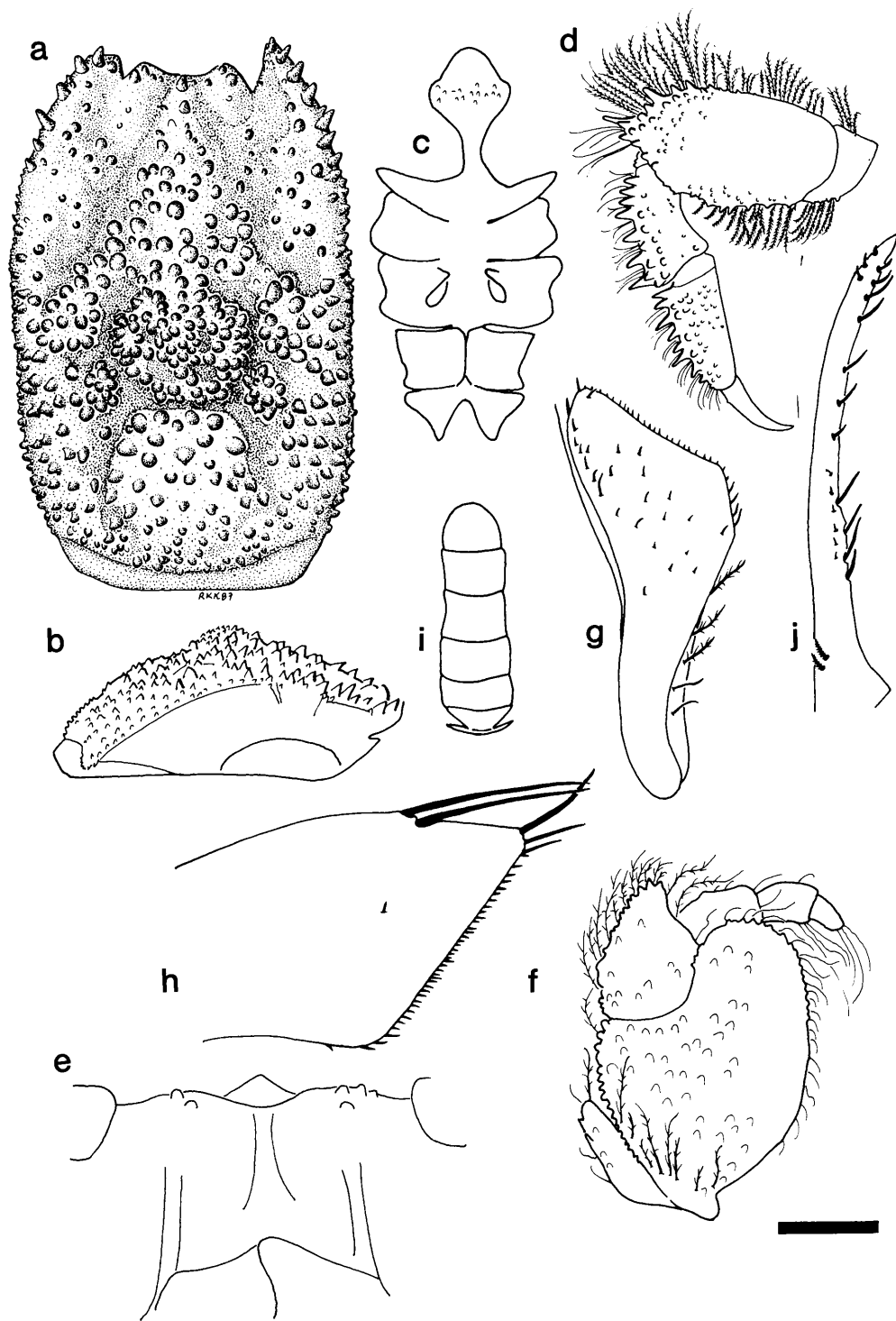


FIGURE 1. *Cryptochirus coralliodytes* Heller. Female lectotype (Red Sea): a, dorsal view of carapace; b, lateral view; c, thoracic sternites; d, P-2; e, epistome; f, MXP-3; g, endopod of MXP-1; h, MXL-1. Male (Guam): i, abdomen; j, PLP. Scale: b = 2.1 mm; c = 1.0 mm; a = 0.8 mm; d, i = 0.7 mm; f = 0.4 mm; e = 0.3 mm; g, j = 0.2 mm; h = 0.1 mm.

Cryptochirus planus (Takeda & Tamura, 1983), new combination

Favicola plana Takeda & Tamura, 1983:4 [TL Koza, Japan; holotype* NSMT-Cr 8556].

Genus *Dacryomaia* Kropp, new genus

Dacryomaia Kropp, new genus [type species: *Cryptochirus edmonsoni* Fize & Serène, 1956b: 379, by original designation; gender feminine].

DIAGNOSIS: Carapace rectangular, longer than broad, widest anterior to midlength, convex in lateral view, deflected anteriorly; with deep inverted V-shaped groove flanking mesogastic region, latter inflated. Cardiointestinal region outlined by depression. Pterygostomial region fused to carapace. Epistome with parallel lateral ridges, anterior margin straight with slight median indentation. Lateral lobe of antennule oval, extending to or just beyond eyestalk. Antennal segment 2 longer than broad, distal margin lacking spine. MXP-3 with exopod; merus with distolateral projection, mesial margin with setae. Inner surface of second segment of MXP-2 endopod with setae at distal margin. MXP-1 endopod triangular, widest at midlength; distal margin evenly convex. Ventral thorax longer than broad, flat. Anterior extension of sternite of P-1 with transverse band of granules. Sternite of P-4 with suture. Female gonopore elliptical, with anterior hood. P-1 dactylus with low tooth proximally on cutting edge. P-2 merus lacking distomesial projection; propodus thick. P-3, P-4 coxae with well-developed anterior lobes. P-5 dactylus rotated anteriorly. PLP-3 of female uniramous. Male with robust P-1; abdomen length 2.6 times width, segment 3 widest, lateral margins subparallel. PLP-1 slightly curved laterally, apex pointed, lateral margin with several simple setae, with few pappose setae proximally, mesial margin with few simple setae proximally.

ETYMOLOGY: From the Greek, *dakryon*, meaning droplet, in combination with *maia*, a kind of crab, in reference to the shape of the tubercles on the anterior part of the carapace.

REMARKS: *Dacryomaia* is most closely related to *Hiroia* (see Kropp 1988d), but is distinguishable from it by having the anterior portion of the carapace deflected and by having a well-developed anterior lobe on the coxa of P-3. In *Hiroia* the anterior carapace is not deflected and the coxa of P-3 lacks an anterior lobe. Two early works by Fize and Serène (1956a,b) have been frequently cited as Fize and Serène (1955a,b). Fize and Serène (1957) used both dates: 1955 in the text (p. 48 and others) and 1956 in the bibliography (p.183). However, Ruth Cooper (pers. comm., 1988), a zoologist with the International Commission on Zoological Nomenclature, informed me that the actual publication date of Parts 5 and 6 was 31 March 1956. Therefore, all taxa described in those articles should be dated 1956.

HOSTS: Thamnasteriidae—*Psammocora* (see Fize and Serène 1957). Siderastreidae—*Coscinaraea* (RKK). Faviidae—*Cyphastrea*, *Goniastrea*, *Leptastrea* (see Takeda and Tamura 1981a, RKK). Fize and Serène (1957) listed *Pavona* (Agariciidae) as a host for *D. edmonsoni*. However, the host was figured and the crescentic pit made by the crab is typical for species of *Opecarcinus*, not *D. edmonsoni*. Therefore, I think that host record was an error.

DEPTH: < 1 to 8 m (RKK).

DISTRIBUTION: Vietnam (Fize and Serène 1957); Japan—Izu Islands, Ogasawara Islands, Ryukyu Islands (Takeda and Tamura 1980d, 1981a, 1983); Micronesia—Palau, Guam (RKK).

Dacryomaia edmonsoni (Fize & Serène, 1956), new combination

Figure 2

Cryptochirus edmonsoni Fize & Serène, 1956b: 379 [TL: Nhatrang, Vietnam; location of type unknown].

Dacryomaia japonica (Takeda & Tamura, 1981), new combination

Favicola japonica Takeda & Tamura, 1981a: 47 [TL: Kuroshima, Ryukyu, Japan; holotype* NSMT-Cr 7422].

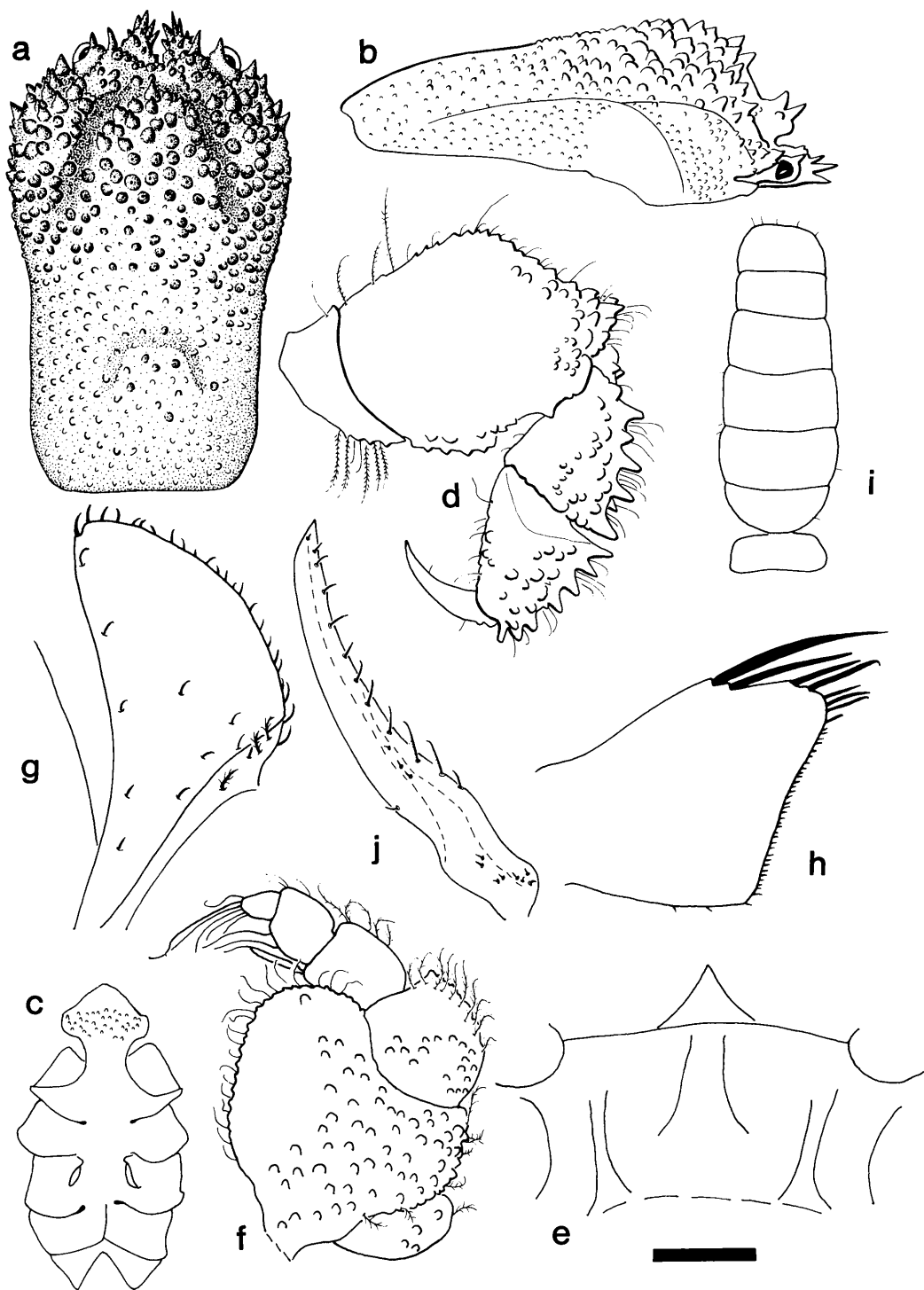


FIGURE 2. *Dacryomaia edmonsoni* (Fize & Serène). Female (Guam: a, dorsal view of carapace; b, lateral view; c, thoracic sternites; d, P-2; e, epistome; f, MXP-3; g, endopod of MXP-1; h, MXL-1. Male (Guam): i, abdomen; j, PLP. Scale: a-c, i = 1.0 mm; d = 0.5 mm; f = 0.3 mm; e = 0.2 mm; g, h, j = 0.1 mm.

Genus *Fizesereneia* Takeda & Tamura, 1980

Fizesereneia Takeda & Tamura, 1980b:137 [type species: *Troglocarcinus heimi* Fize & Serène, 1956a:378, pending confirmation by the International Commission on Zoological Nomenclature (Kropp 1988c); gender feminine].

Fizesereneia.—Kropp & Manning, 1987:2 [erroneous spelling].

DIAGNOSIS: Carapace hexagonal, longer than broad, widest anterior to midlength, convex in lateral view, deflected anteriorly, formed into 2 bowl-shaped concavities; mesogastric region inflated. Cardiointestinal region flanked by 2 depressions. Pterygostomial region not fused to carapace. Epistome with parallel lateral ridges, anterior margin sinuous with shallow, wide median indentation. Lateral lobe of antennule oval, extending beyond eyestalk. Antennal segment 2 longer than broad, distal margin with lateral spine. MXP-3 with exopod; merus with distolateral projection, mesial margin with setae. Inner surface of second segment of MXP-2 endopod with setae at distal margin. MXP-1 endopod triangular, widest distal to midlength; distal margin convex. Ventral thorax longer than wide, flat. Anterior extension of sternite of P-1 smooth. Sternite of P-4 with suture. Female gonopore elliptical, with anterior hood. P-1 cutting edge entire. P-2 merus lacking distomesial projection; propodus slender. P-3, P-4 coxae with moderate anterior lobes. P-5 dactylus rotated anteriorly. PLP-3 of female uniramous. Male with robust P-1; abdomen length 2.3 times width, segment 4 widest, lateral margins convex. PLP-1 curved laterally, apex pointed, lateral margin with many simple setae, mesial margin with few simple setae proximally.

REMARKS: Takeda and Tamura (1980b) designated *T. heimi* as the type species of *Fizesereneia*, a genus named in honor of the two Gaul crab specialists. However, the species they described and figured was not *T. heimi*, but an undescribed species. Their figured species differs from *T. heimi* by having the median ridge incompletely separating the concavities on the anterior carapace, by hav-

ing a hexagonally shaped carapace, and by being a different color. The type of *T. heimi* (see Fize and Serène 1957: fig. 29A) has the median ridge completely dividing the anterior concavities and has a rectangular carapace. The color of *T. heimi* that I collected in Guam was predominately gray, matching that figured by Fize and Serène (1957: pl. 18B) and differing from the predominately green color of the undescribed species, also figured by Fize and Serène (1957: pl. 18A). Because the genus was based on a misidentified type species, I petitioned the International Commission on Zoological Nomenclature to confirm *T. heimi* Fize & Serène as the type species of *Fizesereneia* (see Kropp 1988c).

HOSTS: Mussidae—*Lobophyllia*, *Symphylia*, *Acanthastrea* (see Fize and Serène 1957, Takeda and Tamura 1980b).

DEPTH: 1 to 15 m (Takeda and Tamura 1980b, RKK).

DISTRIBUTION: Vietnam (Fize and Serène 1957); Indonesia (Serène et al. 1974); Japan—Izu Islands, Ryukyu Islands (Takeda and Tamura 1980b); Australia (McNeill 1968); Micronesia—Palau, Guam, Pohnpei (RKK).

Fizesereneia heimi (Fize & Serène, 1956)
Figure 3

Troglocarcinus heimi Fize & Serène, 1956a: 378 [TL: Nhatrang, Vietnam; location of type unknown].

Troglocarcinus (Mussicola) heimi.—Fize & Serène, 1957:111.

Fizesereneia heimi.—Takeda & Tamura, 1980b:137.

Fizesereneia ishikawai Takeda & Tamura, 1980

Fizesereneia ishikawai Takeda & Tamura, 1980b:144 [TL: Ishigakijima Island, Ryukyu Islands, Japan; holotype* NSMT-Cr 6340].

Fizesereneia stimpsoni (Fize & Serène, 1956)

Troglocarcinus stimpsoni Fize & Serène, 1956b:380 [TL: Nhatrang, Vietnam; location of type unknown].

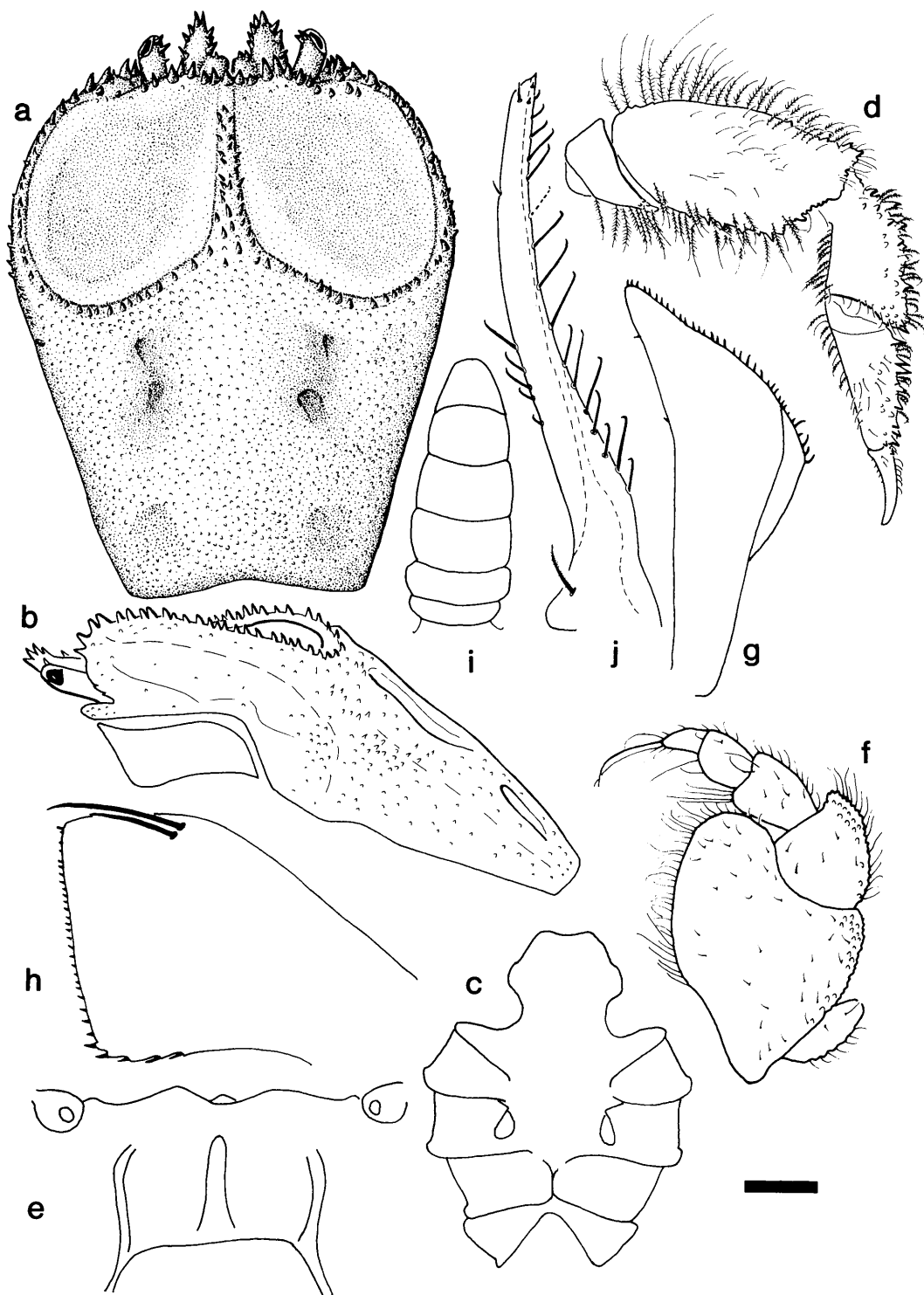


FIGURE 3. *Fizesereneia heimi* (Fize & Serène). Female (Guam): a, dorsal view of carapace; b, lateral view; c, thoracic sternites; d, P-2; e, epistome; f, MXP-3; g, endopod of MXP-1; h, MXL-1. Male (Guam): i, abdomen; j, PLP. Scale: a, b, d, i = 1.0 mm; c = 0.9 mm; e = 0.3 mm; g, h, j = 0.1 mm.

Troglocarcinus (Mussicola) stimpsoni.—Fize & Serène, 1957: 116.

Fizesereneia stimpsoni.—Takeda & Tamura, 1980b: 146.

Genus *Fungicola* Serène, 1966

Fungicola Fize & Serène, 1957: 122 [name unavailable].

Fungicola Serène, 1966: 396 [type species: *Troglocarcinus utinomi* Fize & Serène, 1956a: 377, by original designation; gender masculine].

Fungicora.—Takeda & Tamura, 1986: 64 [erroneous spelling].

DIAGNOSIS: Carapace rectangular, longer than broad, widest anterior to midlength, flat in lateral view, not deflected anteriorly, with broad inverted U-shaped depression; mesogastric region slightly inflated. Cardiointestinal region outlined. Pterygostomial region fused to carapace. Epistome with parallel lateral ridges, anterior margin sinuous with shallow, wide median indentation. Lateral lobe of antennule oval, extending just beyond eye-stalk. Antennal segment 2 longer than broad, distal margin lacking lateral spine. MXP-3 with exopod, merus with distolateral projection, mesial margin with setae. Inner surface of second segment of MXP-2 endopod with setae at distal margin. MXP-1 endopod triangular, widest distal to midlength, distal margin convex. Ventral thorax longer than broad, flat. Anterior extension of sternite of P-1 with few granules. Sternite of P-4 with suture. Female gonopore oval, with anterior hood. P-1 cutting edges entire. P-2 merus without distomesial projection; propodus thick. P-3, P-4 coxae with well-developed anterior lobes. P-5 dactylus rotated anteriorly. PLP-3 of female uniramous. Male with slender P-1; abdomen length 1.2 times width, segment 3 widest, lateral margins markedly convex. PLP-1 slightly curved laterally, apex pointed; lateral margin with simple setae distally, pappose setae proximally, mesial margin with pappose and simple setae.

REMARKS: Because Fize and Serène (1957) did not designate a type species for *Troglocarcinus (Fungicola)*, the name *Fungicola* was un-

available [ICZN Art. 13(b)] until Serène (1966) designated *T. utinomi* as the type species for the genus.

Serène (1966), and later Takeda and Tamura (1979), emended the specific name *utinomi* to *utinomii*. These actions were improper, as the ICZN [Art. 31(a) (ii)] specifies that the stem of a species-group name is determined by the action of the original author. Fize and Serène (1956a) originally used *utinomi*, thus defining the stem as "*utinom*."

I examined the holotype, a male, of *Pseudocryptochirus ishigakiensis* and determined that it differed from some of the males of *F. utinomi* only by having a less convex abdominal outline. However, this condition occurred in some other males of *F. utinomi* that I examined, thereby making it of dubious value for distinguishing the two species, much less placing them in separate genera.

HOSTS: Fungiidae—*Fungia*, *Podobacia*, *Sandalolitha* (as *Parahalomitra*) (see Fize and Serène 1957, Monod and Serène 1976).

DEPTH: 1 to 15 m (RKK).

DISTRIBUTION: Vietnam (Fize and Serène 1957); Indonesia (Serène et al. 1974); Japan—Ryukyu Islands (Takeda and Tamura 1979); Micronesia—Palau, Guam (RKK).

Fungicola utinomi (Fize & Serène, 1956)

Figure 4

Troglocarcinus utinomi Fize & Serène, 1956a: 377 [TL: Nhatrang, Vietnam; location of type unknown].

Troglocarcinus (Fungicola) utinomi.—Fize & Serène, 1957: 124.

Fungicola utinomii.—Serène, 1966: 396 [unjustified emendation].

Pseudocryptochirus ishigakiensis Takeda & Tamura, 1979: 188 [TL; Ishigakijima Island, Ryukyu, Japan; holotype* NSMT-Cr 5898].

Hiroia ishigakiensis.—Takeda & Tamura, 1981b: 20.

Fungicola fagei (Fize & Serène, 1956)

Troglocarcinus fagei Fize & Serène, 1956a: 378 [TL: Nhatrang, Vietnam; location of type unknown].

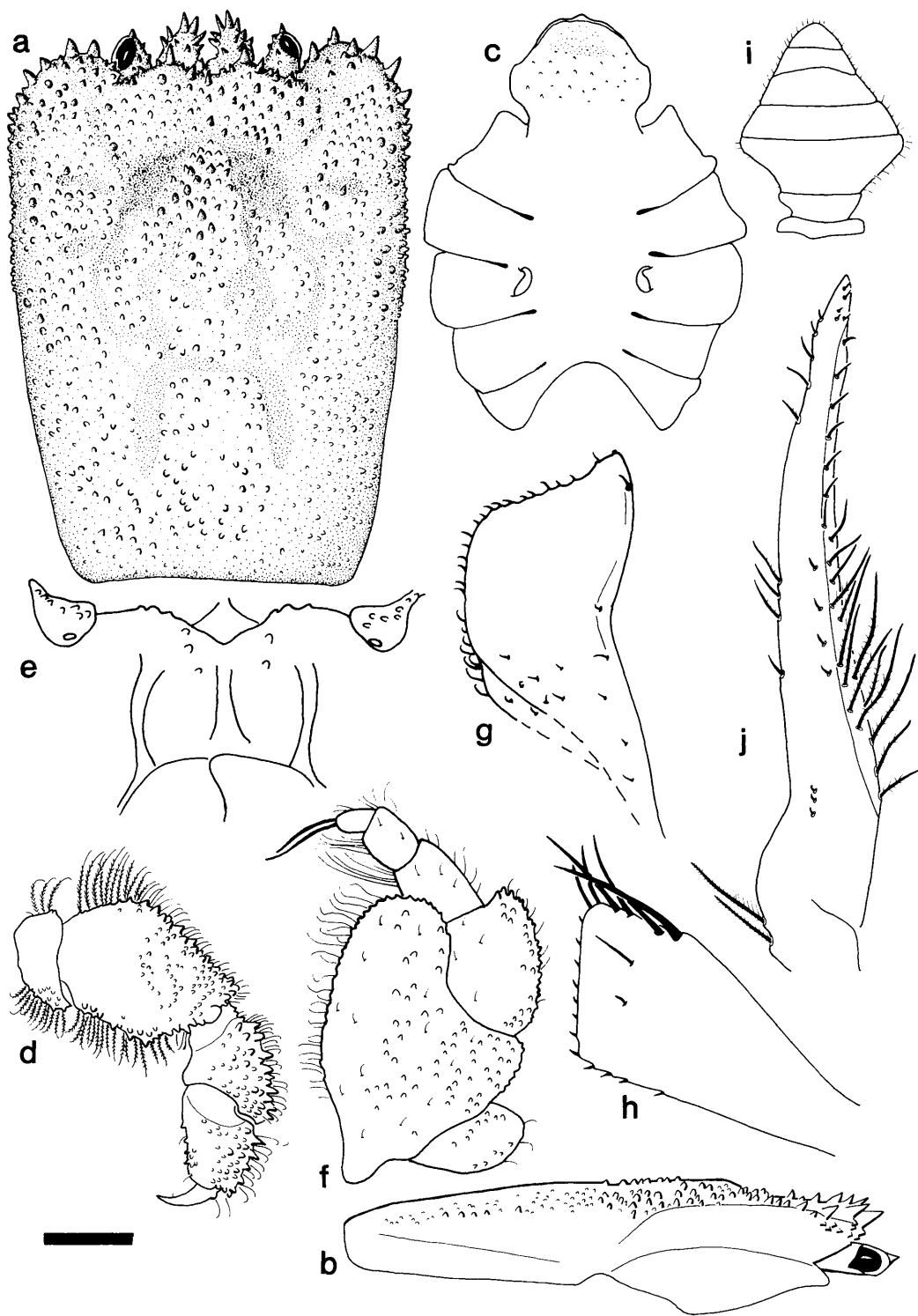


FIGURE 4. *Fungicola utinomi* (Fize & Serène). Female (Palau): a, dorsal view of carapace; b, lateral view; c, thoracic sternites; d, P-2; e, epistome; f, MXP-3; g, endopod of MXP-1; h, MXL-1. Male (Palau): i, abdomen; j, PLP. Scale: a, b = 1.0 mm; c, d, i = 0.9 mm; e, f = 0.3 mm; g = 0.2 mm; h, j = 0.1 mm.

Troglocarcinus (*Fungicola*) *fagei*.—Fize & Serène, 1957:131.

Fungicola fagei.—Serène, 1966:397.

Genus *Haplocarcinus* Stimpson, 1859

Haplocarcinus Stimpson, 1859:412 [type species: *Haplocarcinus marsupialis* Stimpson, 1859:412, by monotypy; gender masculine].

DIAGNOSIS: Carapace quadrate, as long as wide, widest at midlength, slightly convex in lateral view, not deflected anteriorly, lacking depressions; mesogastric region not inflated. Cardiointestinal region not outlined by depressions. Pterygostomial region fused to carapace. Epistome without lateral ridges, anterior margin sinuous with deep, wide median indentation. Antennule not produced past midlength of eyestalk, apex pointed or rounded. Antennal segment 2 longer than broad, margin lacking lateral spine. MXP-3 with exopod; merus without distolateral projection, mesial margin lacking setae. Second segment of MXP-2 endopod with setae at distal margin of inner surface. MXP-1 endopod quadrangular. Ventral thorax wider than long, flat. Sternite of P-1 smooth. Sternite of P-4 without suture. Female gonopore circular, without hood. P-1 dactylus with or without proximal tooth on cutting edge. P-2 merus lacking distomesial projection, propodus thin. P-3, P-4 coxae lacking anterior lobes. P-5 dactylus not rotated anteriorly. PLP-3 of female uniramous. Male with robust P-1; abdomen length 1.7 times width, segment 4 widest, lateral margins convex. PLP-1 curved laterally, apex pointed, lateral margin lacking setae, mesial margin with few pappose setae.

HOSTS: *Pocilloporidae*—*Pocillopora*, *Stylophora*, *Seriatopora* (see Fize and Serène 1957).

DEPTH: <1 to 27 m (RKK).

DISTRIBUTION: Indo-West Pacific—South Africa and Red Sea to Colombia (see references in Takeda and Tamura 1986).

Haplocarcinus marsupialis Stimpson, 1859
Figure 5

Haplocarcinus marsupialis Stimpson, 1859:412 [TL: Hilo, Hawaii; location of type unknown].

Cryptochirus marsupialis.—Taylor, 1971:100.

Genus *Hiroia* Takeda & Tamura, 1981

Hiroia Takeda & Tamura, 1981b:20 [type species: *Troglocarcinus krempfi* Fize & Serène, 1956a:378, by original designation; gender feminine].

DIAGNOSIS: Carapace rectangular, longer than broad, widest at midlength, flat in lateral view, not deflected anteriorly, with broad, shallow W-shaped depression; mesogastric region slightly inflated. Cardiointestinal region outlined by depression. Pterygostomial region fused to carapace. Epistome with subparallel lateral ridges, converging slightly anteriorly, anterior margin sinuous with slight median indentation. Lateral lobe of antennule oval, extending beyond eyestalk. Antennal segment 2 longer than broad, distal margin lacking lateral spine. MXP-3 with exopod; merus with distolateral projection, mesial margin with setae. Inner surface of second segment of MXP-2 endopod with setae at distal margin. MXP-1 endopod triangular, widest distal to midlength; distal margin convex. Ventral thorax longer than wide, concave mesially. Anterior extension of sternite of P-1 with few granules. Sternite of P-4 with suture. Female gonopore oval, with anterior hood. P-1 cutting edges entire. P-2 merus lacking distomesial projection; propodus thick. P-3 coxa lacking, P-4 coxa with reduced anterior lobe. P-5 dactylus rotated anteriorly. PLP-3 of female uniramous. Male with robust P-1; abdomen length 1.9 times width, segment 4 widest, lateral margins convex. PLP-1 slightly curved laterally, apex pointed, lateral margin with several pappose, with few simple setae, mesial margin with several simple setae proximally.

HOSTS: *Faviidae*—*Cyphastrea*, *Hydnophora* (see Fize and Serène 1957, RKK). *Merulinidae*—*Merulina* (see Fize and Serène 1957).

DEPTH: 1 to 19 m (RKK).

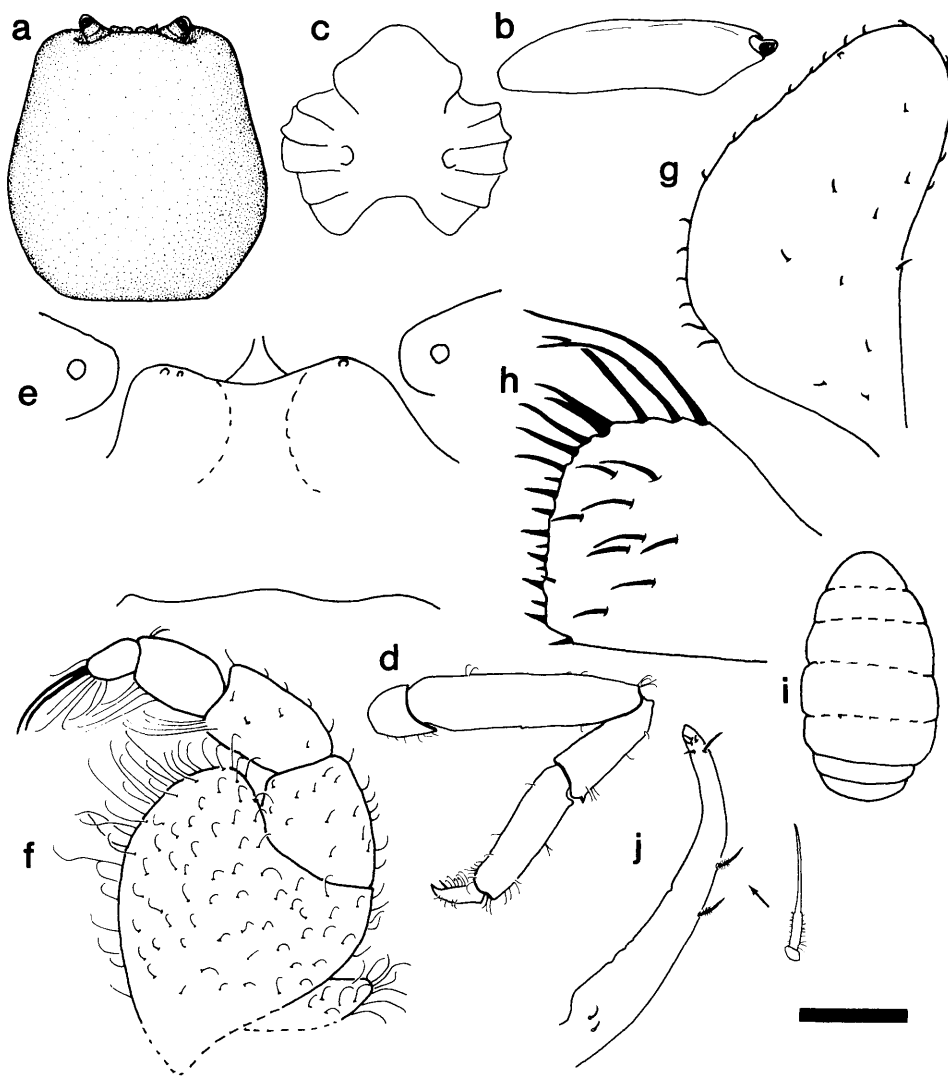


FIGURE 5. *Haplocarcinus marsupialis* Stimpson. Female (Guam): a, dorsal view of carapace; b, lateral view; c, thoracic sternites; d, P-2; e, epistome; f, MXP-3; g, endopod of MXP-1; h, MXL-1. Male (Papua New Guinea): i, abdomen; j, PLP (from MacNamee 1961). Scale: a-c = 2.1 mm; d = 1.0 mm; i = 0.4 mm; f = 0.3 mm; e, g = 0.2 mm; h = 0.1 mm; j, not to scale.

DISTRIBUTION: Vietnam (Fize and Serène 1957); Japan—Izu Islands, Ryukyu Islands (Takeda and Tamura 1981b); Micronesia—Palau, Guam (RKK).

Hiroia krempfi (Fize & Serène, 1956)

Figure 6

Troglocarcinus krempfi Fize & Serène, 1956a:

378 [TL: Nhatrang, Vietnam; location of type unknown].

Troglocarcinus (*Troglocarcinus*) *krempfi*.—Fize & Serène, 1957:79.

Pseudocryptochirus krempfi.—Serène, 1966:396.

Hiroia krempfi.—Takeda & Tamura, 1981b:20.

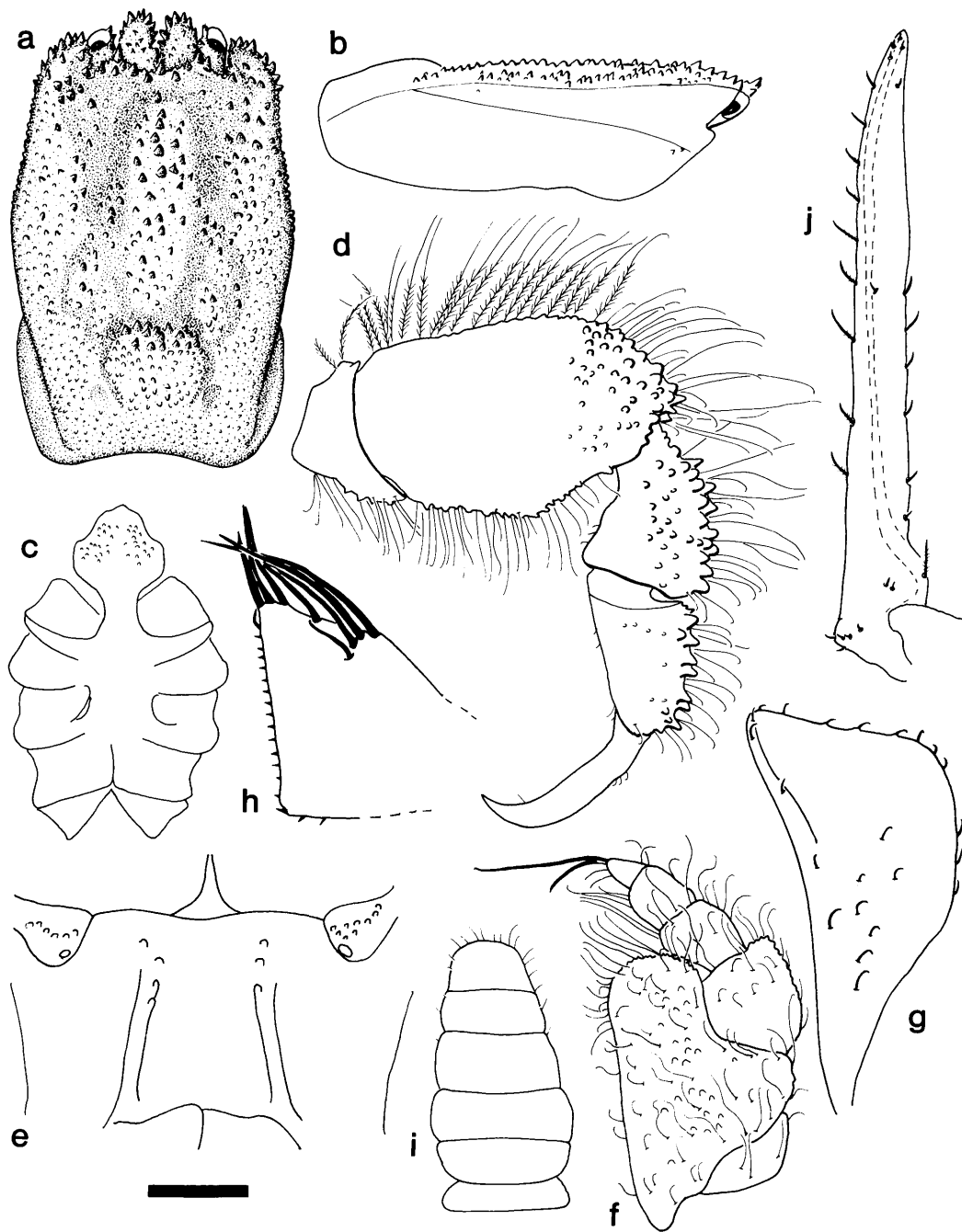


FIGURE 6. *Hiroia krempfi* (Fize & Serène). Female (Palau): a, dorsal view of carapace; b, lateral view; c, thoracic sternites; d, P-2; e, epistome; f, MXP-3; g, endopod of MXP-1; h, MXL-1. Male (Pohnpei): i, abdomen; j, PLP. Scale: a-c = 1.0 mm; d, i = 0.5 mm; f = 0.3 mm; e = 0.2 mm; g, h, j = 0.1 mm.

Genus *Lithoscaptus* Milne Edwards, 1862

Lithoscaptus Milne Edwards, 1862: F10 [type species: *Lithoscaptus paradoxus* Milne Edwards, 1862: F10, by monotypy; gender masculine].

DIAGNOSIS: Carapace rectangular, longer than broad, widest near midlength, sharply convex in lateral view, deflected anteriorly, with broad W-shaped depression; mesogastric region inflated. Cardiointestinal region outlined by inverted U-shaped depression. Pterygostomial region fused to carapace. Epistome with parallel lateral ridges, anterior margin straight with slight median indentation. Lateral lobe of antennule oval, extending beyond eyestalk. Antennal segment 2 longer than broad, distal margin lacking lateral spine. MXP-3 with exopod; merus with distolateral projection, mesial margin with setae. Inner surface of second segment of MXP-2 endopod with setae at distal margin. MXP-1 endopod triangular, widest distal to midlength; distal margin convex. Ventral thorax longer than wide, concave mesially. Anterior extension of sternite of P-1 smooth. Sternite of P-4 with suture. Female gonopore oval, with anterior hood. P-1 dactylus cutting edge with tooth proximally. P-2 merus lacking distomesial projection; propodus slender. P-3, P-4 coxae with reduced anterior lobes. P-5 dactylus rotated anteriorly. PLP-3 of female uniramous. Male with robust P-1; abdomen length 3.8 times width, segments subequal in width, lateral margins parallel. PLP-1 curved laterally, apex pointed; lateral margin with simple setae, mesial margin with shorter simple setae proximally.

HOSTS: Faviidae—*Cyphastrea*, *Echinopora*, *Favia*, *Favites*, *Hydnophora*, *Goniastrea*, *Leptastrea*, *Platygyra*, *Plesiastrea* (see Fize and Serène 1957, RKK). Merulinidae—*Merulina* (see Fize and Serène 1957).

DEPTH: <1 to 12 m (RKK).

DISTRIBUTION: Réunion (Milne Edwards 1862); Vietnam (Fize and Serène 1957); Japan—Izu Islands, Kushimoto, Ogasawara Islands, Ryukyu Islands (Takeda and Tamura 1980d, 1981a, 1983, 1986); Micronesia—

Palau, Guam, Pohnpei (RKK); Palmyra Island and Teraina (Edmondson 1933).

Lithoscaptus paradoxus Milne Edwards, 1862 Figure 7

Lithoscaptus paradoxus Milne Edwards, 1862: F10 [TL: Réunion Island; lectotype* MNHN].

Cryptochirus coralliodytes var. *rubrolineata* Fize & Serène, 1957:40 [TL: Nhatrang, Vietnam; location of type unknown].

Cryptochirus coralliodytes var. *fusca* Fize & Serène, 1957:40 [TL: Nhatrang, Vietnam; location of type unknown].

Cryptochirus coralliodytes var. *parvulus* Fize & Serène, 1957:40 [TL: Nhatrang, Vietnam; location of type unknown].

Cryptochirus bani Fize & Serène, 1957:44 [TL: Nhatrang, Vietnam; location of type unknown].

?*Lithoscaptus pacificus* (Edmondson, 1933), new combination

Cryptochirus pacificus Edmondson, 1933:8 [TL: Palmyra Island; holotype* BPBM S3669].

REMARKS: The type of *Cryptochirus pacificus* Edmondson is not in good condition; therefore the placement of that species in *Lithoscaptus* is tentative.

Lithoscaptus tri (Fize & Serène, 1956), new combination

Cryptochirus tri Fize & Serène, 1956b: 379 [TL: Nhatrang, Vietnam; location of type unknown].

Cryptochirus trii.—Takeda & Tamura, 1980d: 51 [unjustified emendation].

REMARKS: The emendation of the specific name *tri* to *trii* by Takeda and Tamura (1980d) was not justified, as the root of the name is "tr" (see analogous argument for *Fungicola utinomi* in "Remarks" section under the genus *Fungicola*).

Lithoscaptus helleri (Fize & Serène, 1957), new combination

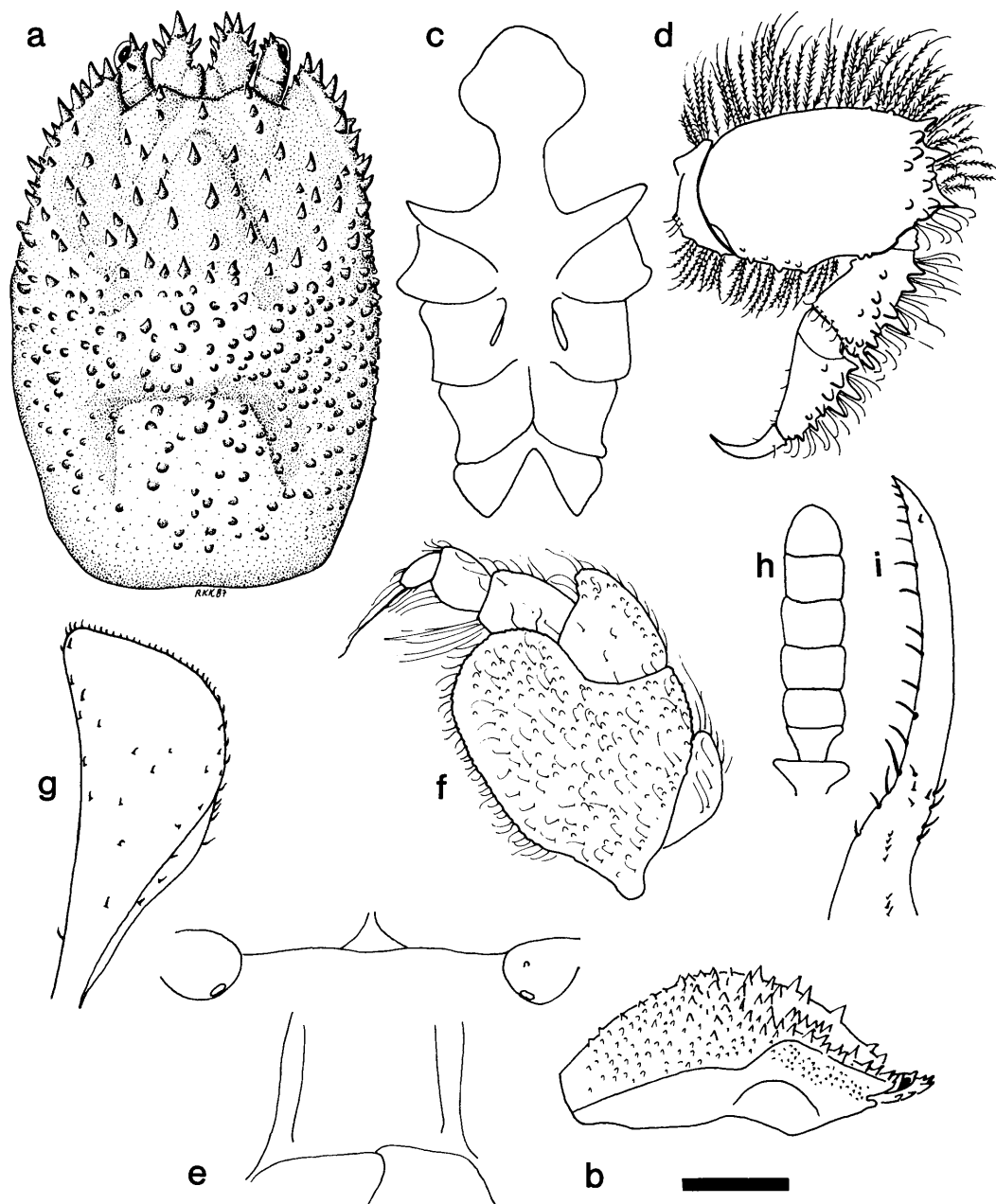


FIGURE 7. *Lithoscaaptus paradoxus* Milne Edwards. Female (Guam): a, dorsal view of carapace; b, lateral view; c, thoracic sternites; d, P-2; e, epistome; f, MXP-3; g, endopod of MXP-1. Male (Guam): h, abdomen; i, PLP. Scale: b = 2.1 mm; c = 1.0 mm; a = 0.8 mm; d, h = 0.7 mm; f = 0.5 mm; e = 0.3 mm; g = 0.2 mm; i = 0.1 mm.

Troglocarcinus (Favicola) helleri Fize & Serène, 1957:93 [TL: Nhatrang, Vietnam; location of type unknown].

Favicola helleri.—Serène, 1966:397.

Lithoscaptus nami (Fize & Serène, 1957), new combination

Cryptochirus nami Fize & Serène, 1957:46 [TL: Nhatrang, Vietnam; location of type unknown].

Lithoscaptus grandis (Takeda & Tamura, 1983), new combination

Cryptochirus grandis Takeda & Tamura, 1983:2 [TL: Kushimoto, Japan; holotype* NSMT-Cr 8551].

Genus *Neotroglocarcinus* Takeda & Tamura, 1980

Neotroglocarcinus Fize & Serène, 1957:135 [name unavailable].

Neotroglocarcinus Takeda & Tamura, 1980c: 147 [type species: *Troglocarcinus monodi* Fize & Serène, 1956a:375, a subjective junior synonym of *Cryptochirus hongkongensis* Shen, 1936 (see Kropp 1988a), by original designation; gender masculine].

DIAGNOSIS: Carapace vase-shaped, longer than broad, widest posterior to midlength, flat in lateral view, deflected anteriorly; with irregular depression flanking mesogastric region, latter slightly inflated. Cardiointestinal region outlined by depression. Pterygostomial region not fused to carapace. Epistome with parallel lateral ridges, anterior margin sinuous with deep, narrow median indentation. Lateral lobe of antennule triangular, extending beyond eyestalk. Antennal segment 2 longer than broad, distal margin lacking lateral spine. MXP-3 with exopod; merus without distolateral projection, mesial margin with setae. Inner surface of second segment of MXP-2 endopod lacking setae at distal margin. MXP-1 endopod triangular, widest near distal margin; latter concave. Ventral thorax about as long as wide, flat. Anterior extension of sternite of P-1 with tubercles. Sternite of P-4 lacking suture. Female gonopore semi-

circular, with anterior hood. P-1 cutting edges entire. P-2 merus with distomesial projection; propodus thick. P-3, P-4 coxae with well-developed anterior lobes. P-5 dactylus not rotated anteriorly. PLP-3 of female biramous. Male with slender P-1; abdomen length 1.7 times width, segment 3 widest, lateral margins convex. PLP-1 angularly curved laterally, apex blunt, lateral and mesial margins with long pappose setae at midlength.

REMARKS: Fize and Serène (1957) did not designate a type species for *Neotroglocarcinus*, rendering that name unavailable (ICZN Art. 13(b)). Takeda and Tamura (1980c), by designating *Troglocarcinus monodi* as the type species of the genus, made the name *Neotroglocarcinus* available. Kropp (1988a) determined *T. monodi* to be a subjective junior synonym of *Cryptochirus hongkongensis* Shen.

HOSTS: Dendrophyllidae—*Turbinaria* (see Fize and Serène 1957).

DEPTH: <1 to 13 m (RKK).

DISTRIBUTION: Vietnam (Fize and Serène 1957); Japan—Izu Islands, Ryukyu Islands (Takeda and Tamura 1980c, 1986); Micronesia—Palau, Guam, Pohnpei (RKK), Enewetak (Garth et al. 1987).

Neotroglocarcinus hongkongensis (Shen, 1936) Figure 8

Cryptochirus hongkongensis Shen, 1936:23 [TL: Hong Kong; location of type unknown].

Pseudocryptochirus hongkongensis.—Takeda & Tamura, 1981b:15.

Troglocarcinus monodi Fize & Serène, 1956a:375 [TL: Nhatrang, Vietnam; location of type unknown].

Neotroglocarcinus monodi.—Fize & Serène, 1957:137.

Neotroglocarcinus hongkongensis.—Kropp, 1988a:870.

Neotroglocarcinus dawydoffi (Fize & Serène, 1956)

Troglocarcinus dawydoffi Fize & Serène, 1956a:376 [TL: Nhatrang, Vietnam; location of type unknown].

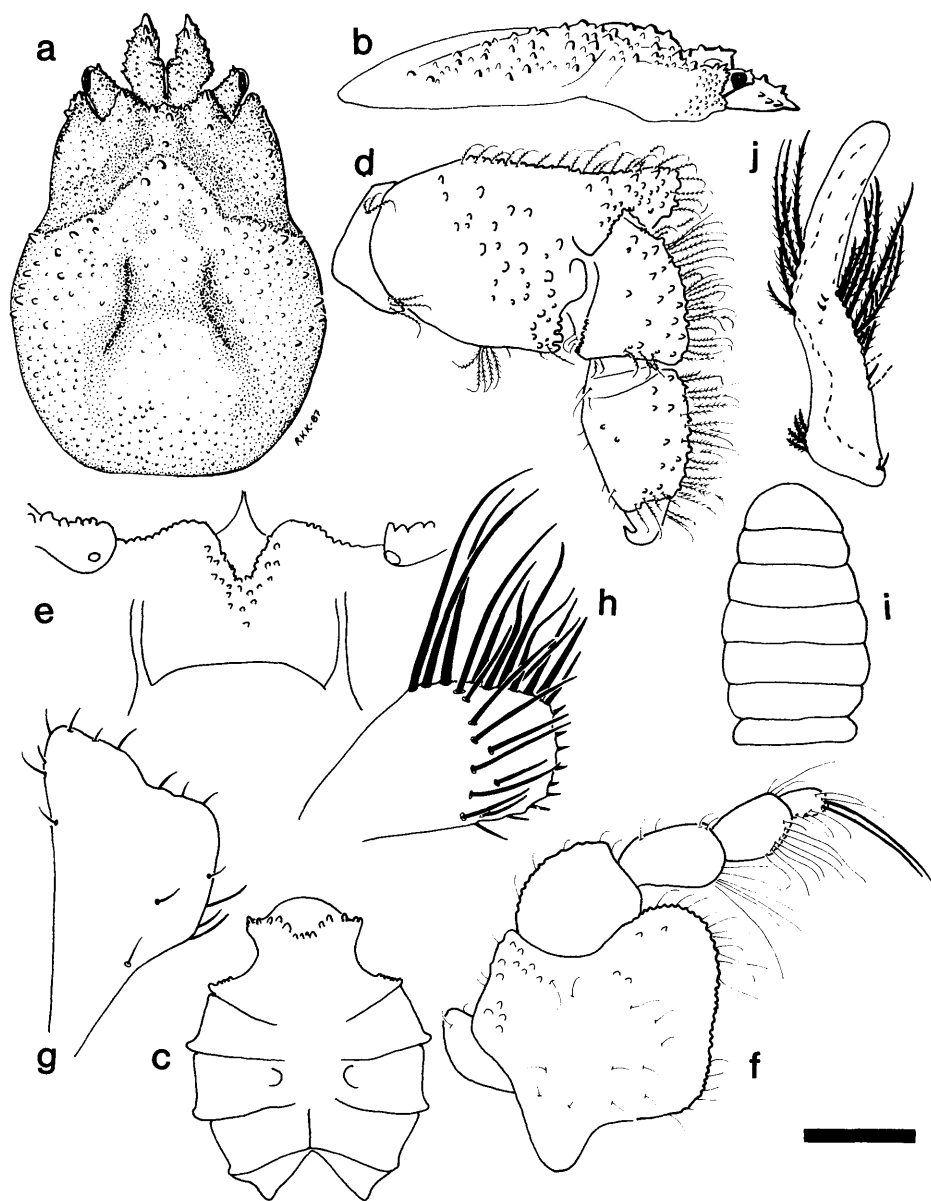


FIGURE 8. *Neotroglocarcinus hongkongensis* (Shen). Female (Vietnam): *a*, dorsal view of carapace; *b*, lateral view; *c*, thoracic sternites; *d*, P-2; *e*, epistome; *f*, MXP-3; *g*, endopod of MXP-1; *h*, MXL-1. Male (Vietnam): *i*, abdomen; *j*, PLP. Scale: *a*–*c* = 2.1 mm; *d* = 1.0 mm; *e* = 0.5 mm; *f* = 0.2 mm; *g*, *h*, *j* = 0.1 mm.

Neotroglocarcinus dawydoffi.—Fize & Serène, 1957:144.

Genus *Opecarcinus* Kropp & Manning, 1987

Opecarcinus Kropp & Manning, 1987:9 [type species: *Pseudocryptochirus hypostegus* Shaw & Hopkins, 1977:179, by original designation; gender masculine].

DIAGNOSIS: Carapace vase-shaped, longer than broad, widest posterior to midlength, convex in lateral view, deflected anteriorly, with transverse depression on protogastric region; mesogastric region slightly inflated. Cardiointestinal region outlined by depression. Pterygostomial region fused to carapace. Epistome with parallel lateral ridges, anterior margin sinuous with shallow, wide median indentation. Lateral lobe of antennule triangular, extending beyond eyestalk. Antennal segment 2 longer than broad, distal margin lacking lateral spine. MXP-3 with exopod; merus with distolateral projection, mesial margin with setae. Inner surface of second segment of MXP-2 endopod lacking setae at distal margin. MXP-1 endopod triangular, widest near midlength; distal margin convex. Ventral thorax longer than wide, flat. Anterior extension of sternite of P-1 with tubercles. Sternite of P-4 with suture. Female gonopore oval, lacking or with anterior hood. P-1 cutting edges entire. P-2 merus with distomesial projection; propodus thick. P-3, P-4 coxae with well-developed anterior lobes. P-5 dactylus rotated anteriorly. PLP-3 of female uniramous. Male with robust P-1; abdomen length 1.8 times width, segment 3 widest, lateral margins convex. PLP-1 curved laterally, apex blunt, lateral margin with several, mesial margin with few stout simple setae.

HOSTS: Agariciidae—*Agaricia*, *Gardineroseris*, *Leptoseris*, *Pavona* (see Fize & Serène 1957, Scott 1985, RKK). Siderasteriidae—*Siderastrea* (see Scott 1985), *Coscinaraea* [recorded as ?*Coscinastrea* of Agariciidae by Takeda and Tamura (1983)].

DEPTH: <1 to 82 m (Shen 1936, RKK).

DISTRIBUTION: Christmas Island (Indian Ocean) (Shen 1936); Vietnam and Japan to

the west coast of Mexico (see Kropp 1989). Also Atlantic (Kropp and Manning 1987).

Opecarcinus crescentus (Edmondson, 1925)

Cryptochirus crescentus Edmondson, 1925:33 [TL: Johnston Island; holotype* BPBM S1805].

Pseudocryptochirus crescentus.—Utinomi, 1944:697.

Troglocarcinus (*Troglocarcinus*) *crescentus*.—Fize & Serène, 1957:62.

Opecarcinus crescentus.—Kropp & Manning, 1987:9; Kropp 1989:99.

Opecarcinus granulatus (Shen, 1936)

Cryptochirus granulatus Shen, 1936:23 [TL: Hong Kong; holotype* BMNH 1911.8.15.2].

Opecarcinus granulatus.—Kropp, 1989:104.

Opecarcinus hypostegus (Shaw & Hopkins, 1977)

Figure 9

Pseudocryptochirus hypostegus Shaw & Hopkins, 1977:179 [TL: Florida Middle Ground, Florida; holotype* NMNH 168533].

Opecarcinus hypostegus.—Kropp & Manning, 1987:10.

Opecarcinus aurantius Kropp, 1989

Opecarcinus aurantius Kropp, 1989:108 [TL: Cetti Bay, Guam; holotype* NMNH 234266].

Opecarcinus lobifrons Kropp, 1989

Troglocarcinus (*Troglocarcinus*) *crescentus*.—Garth, 1965:8 [not *Cryptochirus crescentus* Edmondson].

Pseudocryptochirus crescentus.—Garth & Hopkins, 1968:41 [in part; not *Cryptochirus crescentus* Edmondson].

Opecarcinus lobifrons Kropp, 1989:112 (TL: Tanguisson Point, Guam; holotype* NMNH 234269).

Opecarcinus peliops Kropp, 1989

Opecarcinus peliops Kropp, 1989:116 [TL: Pakin Atoll, Pohnpei; holotype* NMNH 234272].

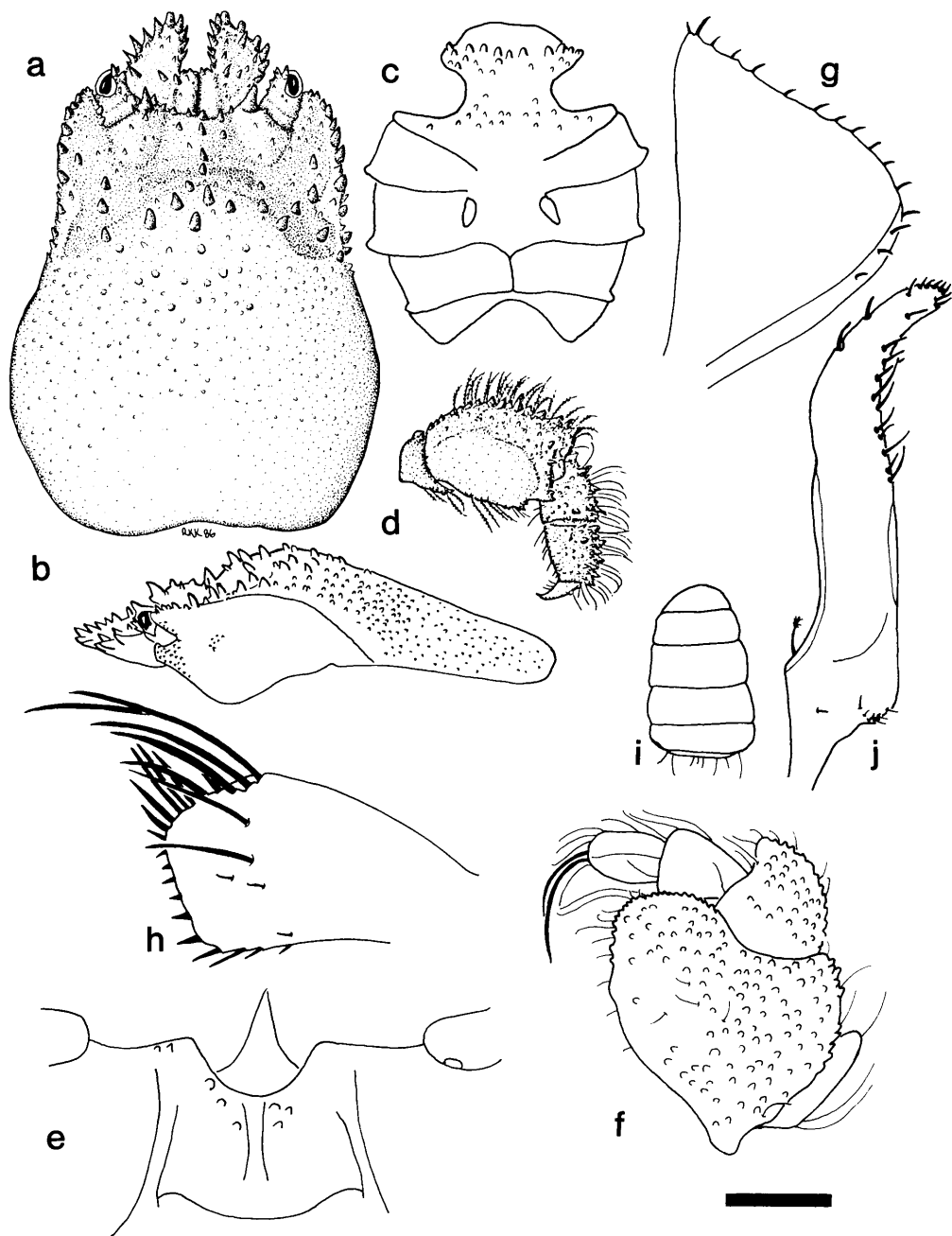


FIGURE 9. *Opecarcinus hypostegus* (Shaw & Hopkins). Female holotype (Florida): *a*, dorsal view of carapace; *b*, lateral view; *c*, thoracic sternites; *d*, P-2; *e*, epistome; *f*, MXP-3; *g*, endopod of MXP-1; *h*, MXL-1. Male paratype (Florida): *i*, abdomen; *j*, PLP. Scale: *c* = 1.2 mm; *b*, *d* = 1.0 mm; *a* = 0.7 mm; *f*, *i* = 0.5 mm; *e* = 0.3 mm; *h*, *j* = 0.2 mm; *g* = 0.1 mm.

Opecarcinus pholeter Kropp, 1989

Opecarcinus pholeter Kropp, 1989: 118 [TL: Cetti Bay, Guam; holotype* NMNH 234275].

Opecarcinus sierra Kropp, 1989

Opecarcinus sierra Kropp, 1989: 122 [TL: Agat Bay, Guam; holotype* NHNH 234278].

Genus *Pelycomaia* Kropp, new genus

Pelycomaia Kropp, new genus [type species *Cryptochirus minutus* Edmondson, 1933: 12, by original designation; gender feminine].

DIAGNOSIS: Carapace rectangular, longer than broad, widest anterior to midlength, convex in lateral view, deflected anteriorly, with two bowl-shaped concavities anteriorly; mesogastric region slightly inflated. Cardiointestinal region outlined by depression. Pterygostomial region fused to carapace. Epistome with parallel lateral ridges, anterior margin straight with slight median indentation. Lateral lobe of antennule oval, extending just beyond eyestalk. Antennal segment 2 longer than broad, distal margin lacking lateral spine. MXP-3 with exopod; merus with distolateral projection, mesial margin with setae. Inner surface of second segment of MXP-2 endopod with setae at distal margin. MXP-1 endopod triangular, widest to midlength; distal margin convex. Ventral thorax longer than wide, concave mesially. Anterior extension of sternite of P-1 smooth. Sternite of P-4 with suture. Female gonopore elliptical, with anterior hood. P-1 dactylus with low tooth proximally on cutting edge. P-2 merus lacking distomesial projection; propodus thick. P-3 coxa with reduced, P-4 coxa with well-developed anterior lobes. P-5 dactylus rotated anteriorly. PLP-3 of female uniramous. Male with robust P-1; abdomen length 3.0 times width, segment 5 widest, lateral margins subparallel. PLP-1 not available for study.

ETYMOLOGY: From the Greek, *peykos*, bowl, in combination with *maia*, a kind of

crab, in reference to the bowl-shaped concavities on the anterior carapace.

REMARKS: *Pelycomaia* is most closely related to *Fungicola* (see Kropp 1988d), but can be distinguished from it by the two bowl-shaped concavities on the anterior carapace and by having a reduced anterior lobe on the coxa of P-3. *Fungicola* lacks bowl-shaped concavities on the carapace and has a well-developed lobe on the coxa of P-3.

HOSTS: Faviidae—*Cyphastrea*, *Leptastrea* (see Fize & Serène 1957).

DEPTH: < 2 m (RKK).

DISTRIBUTION: Vietnam (Fize & Serène 1957); Micronesia—Guam (RKK); Hawai'i (Edmondson 1933).

Pelycomaia minuta (Edmondson, 1933)
Figure 10

Cryptochirus minutus Edmondson, 1933: 12 [TL: Oahu, Hawaii, holotype* BPBM S3671].

Troglocarcinus (Favicola) minutus.—Fize & Serène, 1957: 106.

Favicola minutus.—Serène, 1966: 397.

Favicola minutum.—Serène et al., 1976: 20.

Favicola minuta.—Takeda & Tamura, 1981a: 43.

Genus *Pseudocryptochirus* Hiro, 1938

Pseudocryptochirus Hiro, 1938: 149 [type species: *Pseudocryptochirus viridis* Hiro, 1938: 149, by monotypy; gender masculine].

DIAGNOSIS: Carapace vase-shaped, longer than broad, widest posterior to midlength, convex in lateral view, not deflected anteriorly, lacking depression; mesogastric region very slightly inflated. Cardiointestinal region not outlined by depression. Pterygostomial region not fused to carapace. Epistome with parallel lateral ridges, anterior margin sinuous with shallow, narrow median indentation. Lateral lobe of antennule quadrangular, extending beyond eyestalk. Antennal segment 2 shorter than broad, distal margin lacking lateral spine. MXP-3 with exopod; merus with-

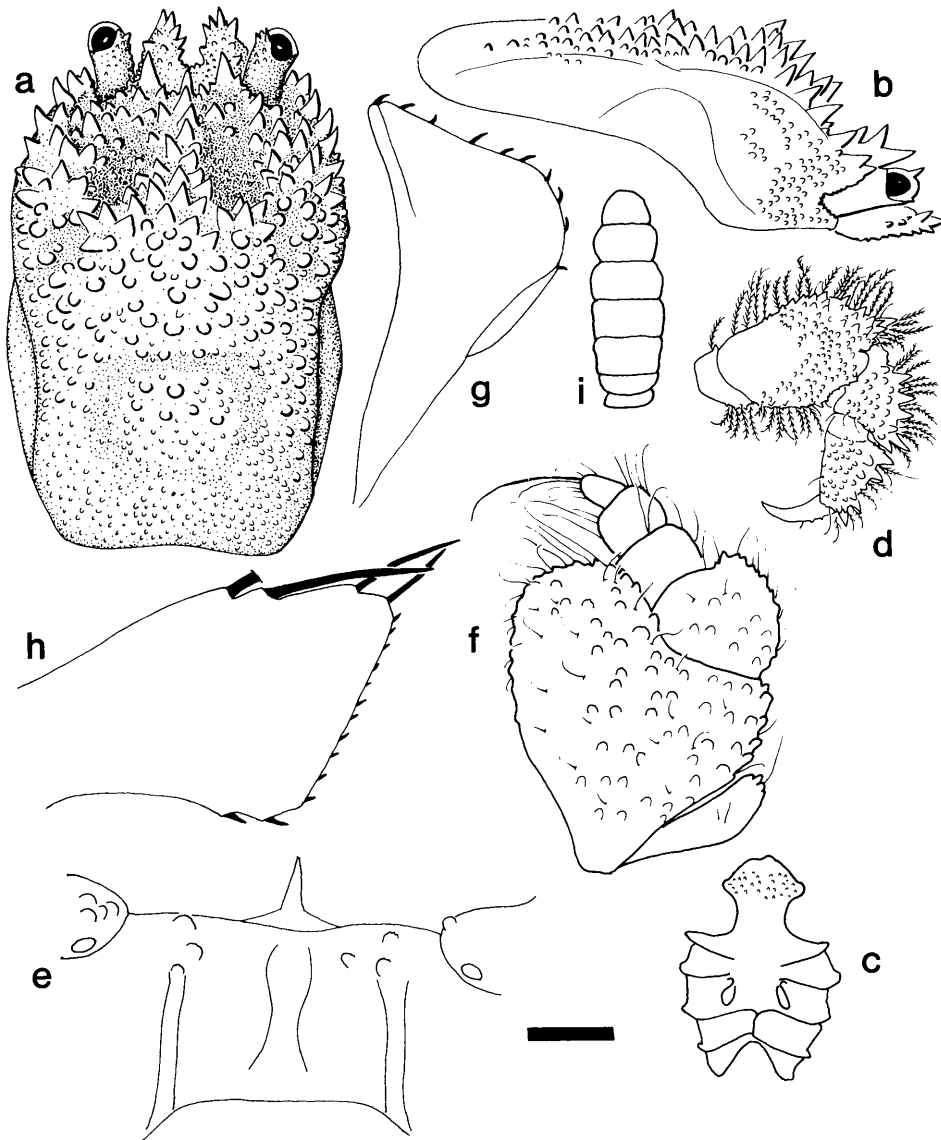


FIGURE 10. *Pelycomaia minuta* (Edmondson). Female (Hawai'i): a, dorsal view of carapace; b, lateral view; c, thoracic sternites; d, P-2; e, epistome; f, MXP-3; g, endopod of MXP-1; h, MXL-1. Male (Hawai'i, from Edmondson 1933): i, abdomen. Scale: c = 0.8 mm; a, b, d = 0.5 mm; f = 0.2 mm; e, g, h = 0.1 mm; i, not to scale.

out distolateral projection, mesial margin with setae. Inner surface of second segment of MXP-2 endopod lacking setae at distal margin. MXP-1 endopod triangular, widest near distal margin; latter concave. Ventral thorax about as long as wide, flat. Anterior extension of sternite of P-1 with few granules. Sternite

of P-4 with partial suture. Female gonopore oval, with anterior hood. P-1 cutting edges entire. P-2 merus with distomesial projection; propodus thick. P-3, P-4 coxae with well-developed anterior lobes. P-5 dactylus not rotated anteriorly. PLP-3 of female uniramous. Male with slender P-1; abdomen length

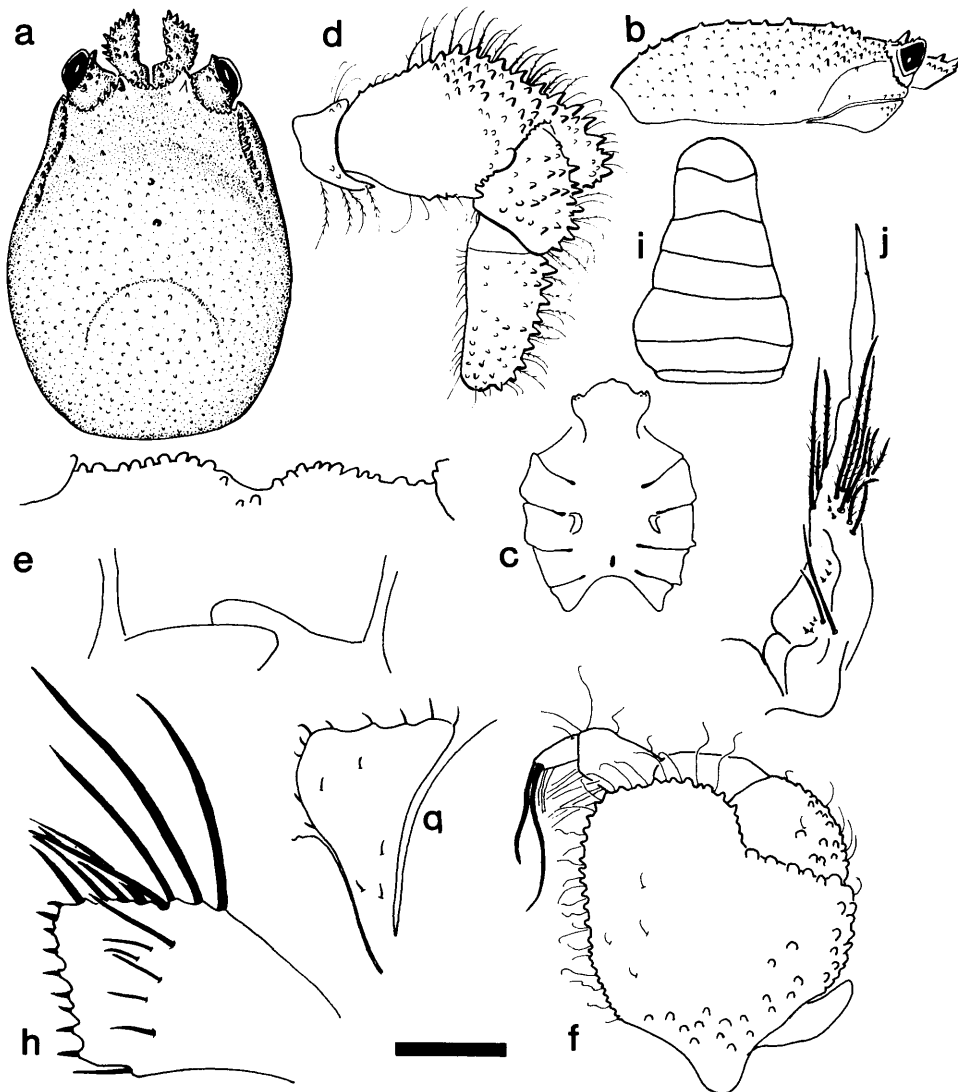


FIGURE 11. *Pseudocryptochirus viridis* Hiro. Female (Palau): a, dorsal view of carapace; b, lateral view; c, thoracic sternites; d, P-2; e, epistome; f, MXP-3; g, endopod of MXP-1; h, MXL-1. Male (Palau): i, abdomen; j, PLP. Scale: a = 1.2 mm; b, c = 1.0 mm; d = 0.5 mm; e, f = 0.2 mm; g, h, j = 0.1 mm.

1.4 times width, segment 3 widest, lateral margins concave. PLP-1 slightly curved laterally, apex sharply pointed, lateral and mesial margins with long pappose setae at midlength.

HOSTS: Dendrophylliidae—*Turbinaria* (see Fize & Serène 1957).

DEPTH: 1 to 6 m (RKK).

DISTRIBUTION: Vietnam (Fize & Serène

1957); Indonesia (Serène et al. 1974); Japan—Izu Islands (Takeda and Tamura 1981b, 1986); Micronesia—Palau, Guam, Pohnpei (RKK). A record of the species from Enewetak (Garth and Hopkins 1968) is apparently erroneous (Garth et al. 1987).

Pseudocryptochirus viridis Hiro, 1938
Figure 11

Pseudocryptochirus viridis Hiro, 1938:150 [TL: Tanabe Bay, Japan; location of type unknown].

Genus *Pseudohapalocarcinus* Fize & Serène, 1956

Pseudohapalocarcinus Fize & Serène, 1956a: 378 [type species: *Pseudohapalocarcinus ransonii* Fize & Serène, 1956a:378, by monotypy; gender masculine].

DIAGNOSIS: Carapace subquadrate, as long as broad, widest posterior to midlength, evenly convex in lateral view, not deflected anteriorly, lacking depression; mesogastric region not inflated. Cardiointestinal region not outlined by depression. Pterygostomial region fused to carapace. Epistome with parallel lateral ridges, anterior margin sinuous with deep, wide median indentation. Lateral lobe of antennule quadrangular, not extending beyond eyestalk. Antennal segment 2 shorter than broad, distal margin lacking lateral spine. MXP-3 with exopod; merus without distolateral projection, mesial margin with setae. Inner surface of second segment of MXP-2 endopod lacking setae at distal margin. MXP-1 endopod triangular, widest near midlength; distal margin convex. Ventral thorax wider than long, flat. Anterior extension of sternite of P-1 smooth. Sternite of P-4 without suture. Female gonopore semicircular, lacking anterior hood. P-1 cutting edges entire. P-2 merus lacking distomesial projection; propodus slender. P-3, P-4 coxae with well-developed anterior lobes. P-5 dactylus not rotated anteriorly. PLP-3 of female uniramous. Male with robust P-1; abdomen length 1.4 times width, segment 4 widest, lateral margins convex. PLP-1 slightly curved distally, apex blunt, lateral and mesial margins with few simple setae.

HOSTS: Agariciidae—*Pavona* (see Fize & Serène 1957).

DEPTH: <1 to 21 m (RKK).

DISTRIBUTION: Vietnam (Fize & Serène 1957); Japan—Ryukyu Islands (Takeda and Tamura 1980a); Micronesia—Palau, Guam, Pohnpei (RKK).

Pseudohapalocarcinus ransonii Fize & Serène, 1956

Figure 12

Pseudohapalocarcinus ransonii Fize & Serène, 1956a:378 [TL: Nhatrang, Vietnam; location of type unknown].

Genus *Sphenomaia* Kropp, new genus

Sphenomaia Kropp, new genus [type species: *Cryptochirus pyriformis* Edmondson, 1933: 10, by original designation and monotypy; gender feminine].

DIAGNOSIS: Carapace rectangular, longer than broad, widest at midlength, strongly convex in lateral view, not deflected anteriorly, with broad depression over entire anterior portion; mesogastric region not inflated. Cardiointestinal region outlined by inverted U-shaped depression. Pterygostomial region fused to carapace. Epistome with parallel lateral ridges, anterior margin sinuous with shallow, wide median indentation. Lateral lobe of antennule subquadangular, extending to or just beyond eyestalk. Antennal segment 2 longer than broad, distal margin lacking lateral spine. MXP-3 with exopod; merus without distolateral projection, mesial margin with setae. Inner surface of second segment of MXP-2 endopod with setae at distal margin. MXP-1 endopod triangular, widest distally; distal margin slightly convex. Ventral thorax longer than wide, concave mesially. Anterior extension of sternite of P-1 with granules. Sternite of P-4 with suture. Female gonopore elliptical, with anterior hood. P-1 cutting edges entire. P-2 merus lacking distomesial projection; propodus slender. P-3, P-4 coxae with well-developed anterior lobes. P-5 dactylus rotated anteriorly. PLP-3 of female uniramous. Male not available for study.

ETYMOLOGY: From the Greek, *sphenos*, wedge, in combination with *maia*, a kind of crab, in reference to the appearance of the carapace in lateral view.

REMARKS: *Sphenomaia* is most closely related to a group of genera: *Cryptochirus*, *Lithoscaptus*, *Fizesereneia*, and *Xynomaia* (see Kropp 1988d). *Sphenomaia*, *Cryptochirus*,

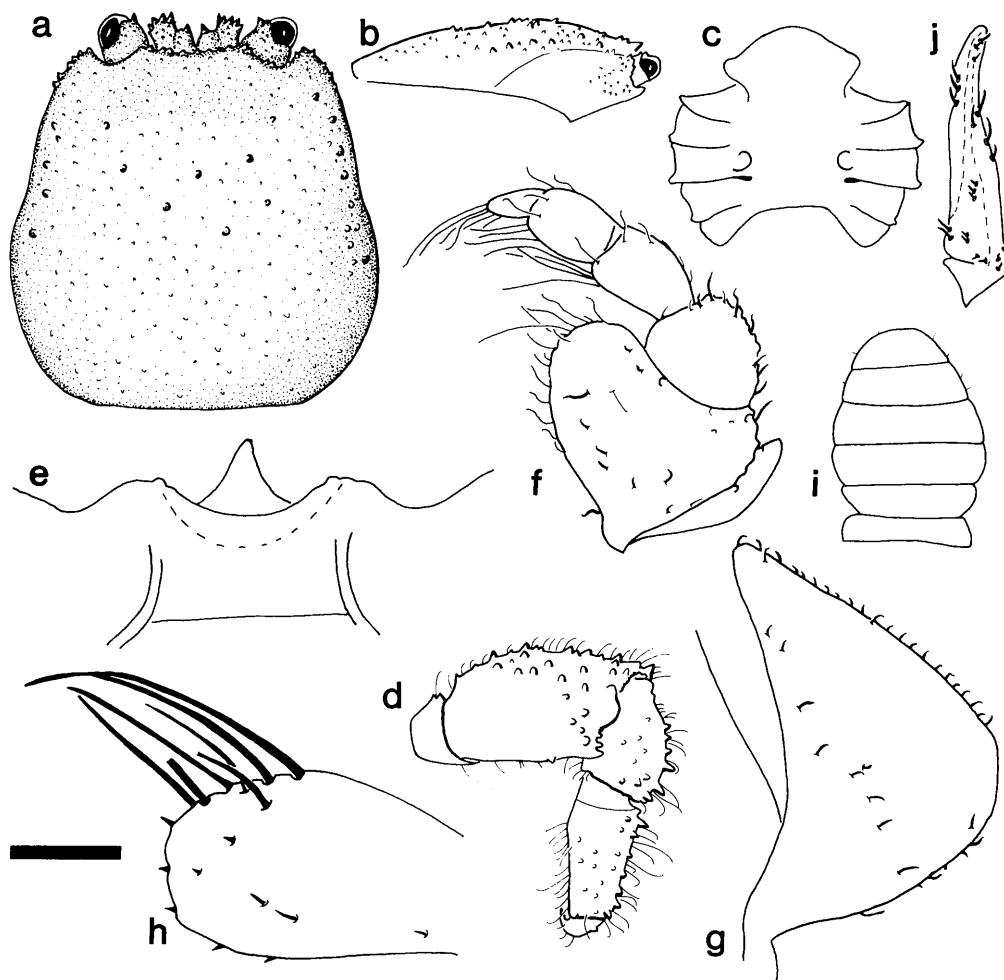


FIGURE 12. *Pseudohapalocarcinus ransoni* (Fize & Serène). Female (Guam): a, dorsal view of carapace; b, lateral view; c, thoracic sternites; d, P-2; e, epistome; f, MXP-3; g, endopod of MXP-1; h, MXL-1. Male (Palau): i, abdomen; j, PLP. Scale: a, b = 1.0 mm; c, d, i = 0.5 mm; e, f = 0.3 mm; g, h, j = 0.1 mm.

and *Lithoscaptus*, by having the pterygostomial region fused to the carapace, differ from *Fizesereneia* and *Xynomaia*, in which the pterygostomial region is not fused to the carapace. The clusters of rounded tubercles and network of grooves on the posterior carapace of *Cryptochirus* distinguish it from *Sphenomaia*, which has isolated tubercles and lacks grooves on the posterior carapace. *Sphenomaia*, by having a sinuous anterior margin of the epistome, differs from *Lithoscaptus*, which has a straight anterior margin.

HOSTS: Faviidae—*Favites*, *Hydnophora*, *Platygyra* (see Edmondson 1933).

DEPTH: Not recorded.

DISTRIBUTION: Central Pacific—Teraina (Edmondson 1933).

Sphenomaia pyriforma (Edmondson, 1933), new combination

Figure 13

Cryptochirus pyriformis Edmondson, 1933: 10 [TL: Washington Island (now known

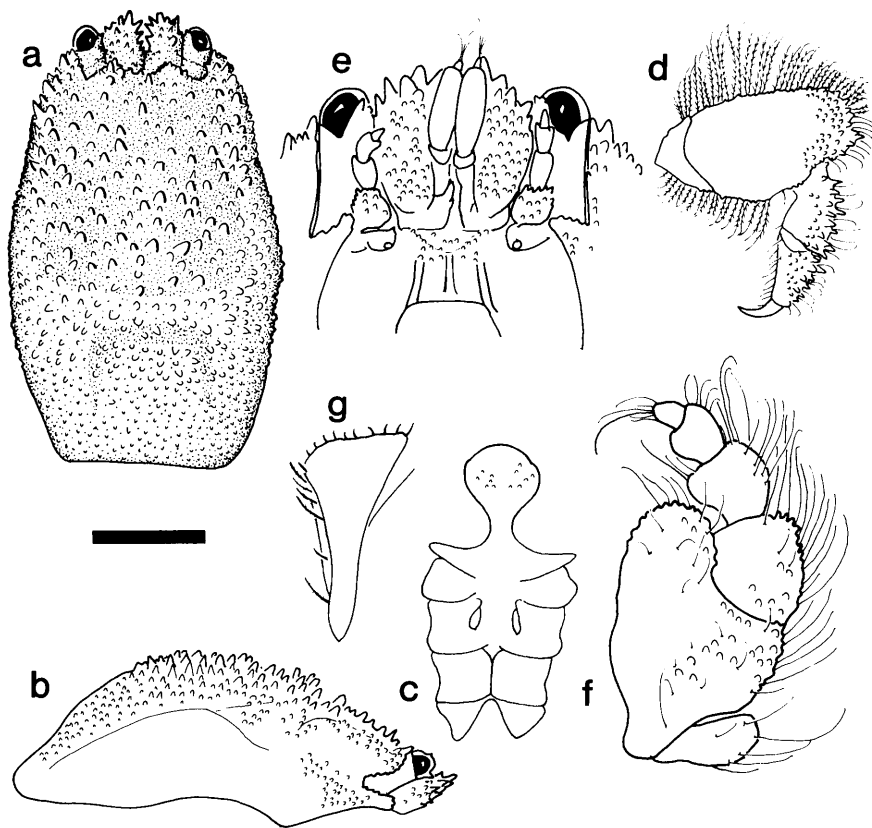


FIGURE 13. *Sphenomaia pyriforma* (Edmondson). Female (Teraina): a, dorsal view of carapace; b, lateral view; c, thoracic sternites; d, P-2; e, epistome; f, MXP-3; g, endopod of MXP-1. Scale: a-d = 1.0 mm; e = 0.5 mm; f = 0.3 mm; g = 0.2 mm.

as Teraina, Kiribati); holotype* BPBM S3670].

Troglocarcinus (*Favicola*) *pyriformis*.—Fize & Serène, 1957: 84.

Favicola pyriformis.—Serène, 1966: 397.

Genus *Utinomiella* Kropp & Takeda, 1988

Utinomiella Kropp & Takeda, 1988: 29 [type species: *Cryptochirus dimorphus* Henderson, 1906: 214, by original designation and monotypy; gender feminine].

Utinomia Takeda & Tamura, 1981b: 23 [a junior homonym of *Utinomia* Tomlinson, 1963: 264 (Crustacea: Acrothoracica)].

DIAGNOSIS: Carapace vase-shaped, longer than broad, widest posterior to midlength, flat

in lateral view, not deflected anteriorly, with broad, shallow depression; mesogastric region slightly inflated. Cardiointestinal region outlined by depression. Pterygostomial region fused to carapace. Epistome lacking lateral ridges, anterior margin sinuous with shallow, wide median indentation. Lateral lobe of antennule rectangular, extending to tip of eye-stalk. Antennal segment 2 longer than broad, distal margin lacking lateral spine. MXP-3 lacking exopod; merus without distolateral projection, mesial margin without setae. Inner surface of second segment of MXP-2 endopod with setae at distal margin. MXP-1 endopod triangular, widest near distal margin; latter convex. Ventral thorax longer than wide, flat. Anterior extension of sternite of P-1 smooth. Sternite of P-4 with partial suture. Female

gonopore semicircular, lacking anterior hood. P-1 cutting edges entire. P-2 merus lacking distomesial projection; propodus slender. P-3 coxa with reduced, P-4 coxa with well-developed anterior lobes. P-5 dactylus not rotated anteriorly. PLP-3 of female uniramous. Male with robust P-1; abdomen length 1.7 times width, segment 3 widest, lateral margins convex. PLP-1 slightly curved distally, apex blunt, lateral and mesial margins with few long pappose setae distally.

HOSTS: Pocilloporidae—*Pocillopora*, *Stylophora* (see Takeda and Tamura 1981b, RKK).

DEPTH: 1 to 29 m (RKK).

DISTRIBUTION: Andaman Islands (Henderson 1906); Japan—Ryukyu Islands (Takeda and Tamura 1981b; Micronesia—Palau, Guam, Pohnpei (RKK); Hawai'i (McCain and Coles 1979).

Utinomiella dimorpha (Henderson, 1906)

Figure 14

Cryptochirus dimorphus Henderson, 1906:214 [TL: Andaman Islands; location of type unknown].

Pseudocryptochirus kahe McCain & Coles, 1979:81 [TL: Kahe Point, O'ahu, Hawai'i; holotype* BPBM S8512].

Pseudocryptochirus dimorphus.—Takeda & Tamura, 1980d:47.

Utinomia dimorpha.—Takeda & Tamura, 1981b:23.

Utinomiella dimorpha.—Kropp & Takeda, 1988:29.

Genus *Xynomaia* Kropp, new genus

Xynomaia Kropp, new genus [type species: *Troglocarcinus sheni* Fize & Serène, 1956b:380, by original designation; gender feminine].

DIAGNOSIS: Carapace rectangular, longer than broad, widest at midlength, convex in lateral view, not deflected anteriorly, with broadly W-shaped depression; mesogastric region slightly inflated. Cardiointestinal region outlined by depression. Pterygostomial region not fused to carapace. Epistome with

parallel lateral ridges, anterior margin straight with slight median indentation. Lateral lobe of antennule oval, extending to tip of eyestalk. Antennal segment 2 longer than broad, distal margin lacking lateral spine. MXP-3 with exopod; merus with distolateral projection, mesial margin with setae. Inner surface of second segment of MXP-2 endopod with setae at distal margin. MXP-1 endopod triangular, widest proximal to midlength; distal margin evenly convex. Ventral thorax longer than wide, flat. Anterior extension of sternite of P-1 smooth or with fine granules. Sternite of P-4 with suture. Female gonopore elliptical, with anterior hood. P-1 dactylus with low tooth on cutting edge. P-2 merus lacking distomesial projection; propodus slender. P-3 coxa with poorly developed, P-4 coxa with well-developed anterior lobe. P-5 dactylus rotated anteriorly. PLP-3 of female uniramous. Male with robust P-1; abdomen length 2.8 times width, segment 4 widest, lateral margins subparallel. PLP-1 slightly curved distally, apex pointed, lateral margin with many proximally pappose setae, few simple setae, mesial margin with several short simple setae.

ETYMOLOGY: From the Greek, *xynon*, companion, in combination with *maia*, a kind of crab, in reference to the symbiotic life-style of the crab.

REMARKS: *Xynomaia* is most closely related to *Fizesereneia* (see Kropp 1988d), but is distinguished from it by having a W-shaped depression on the anterior carapace, not the two bowl-shaped concavities on the anterior carapace characteristic of *Fizesereneia*. Also, the carapace of *Xynomaia* is not deflected anteriorly, whereas that of *Fizesereneia* is deflected.

HOSTS: Faviidae—*Favia*, *Goniastrea*, *Montastrea*, *Oulophyllia*, *Platygyra*, (see Fize and Serène 1957, RKK). Merulinidae—*Merulina* (see Fize and Serène 1957). Pectiniidae—*Pectinia* (RKK).

DEPTH: 1 to 15 m (RKK).

DISTRIBUTION: Vietnam (Fize and Serène 1957); Sumatra (Serène 1966); Japan—Izu Islands, Kushimoto (Takeda and Tamura 1983, 1986); Micronesia—Palau, Guam (RKK).

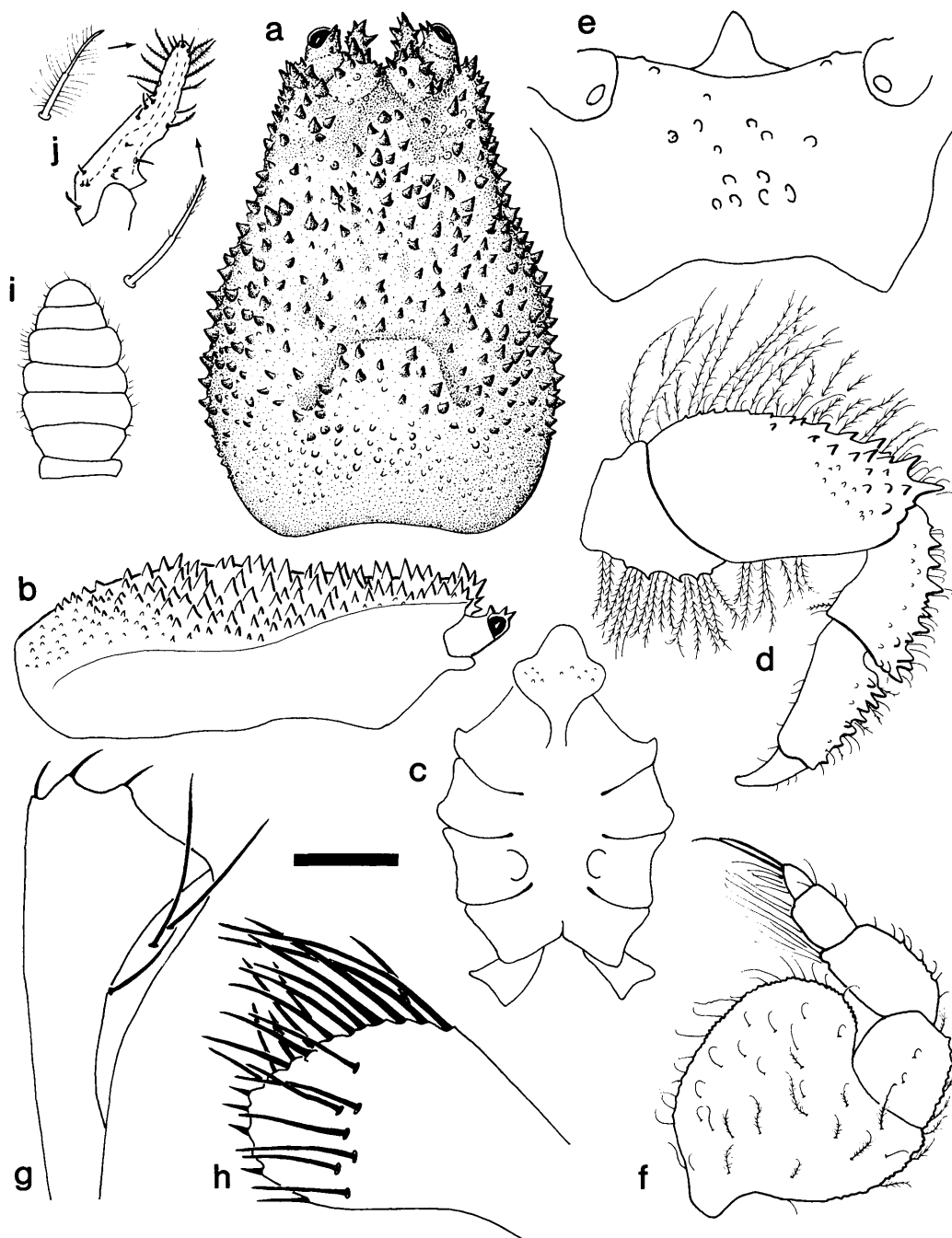


FIGURE 14. *Utinomiella dimorpha* (Henderson). Female (Palau): *a*, dorsal view of carapace; *b*, lateral view; *c*, thoracic sternites; *d*, P-2; *e*, epistome; *f*, MXP-3; *g*, endopod of MXP-1; *h*, MXL-1. Male (Guam): *i*, abdomen; *j*, PLP. Scale: *a*-*c*, *i* = 1.0 mm; *d* = 0.5 mm; *f* = 0.3 mm; *e* = 0.2 mm; *g*, *h*, *j* = 0.1 mm.

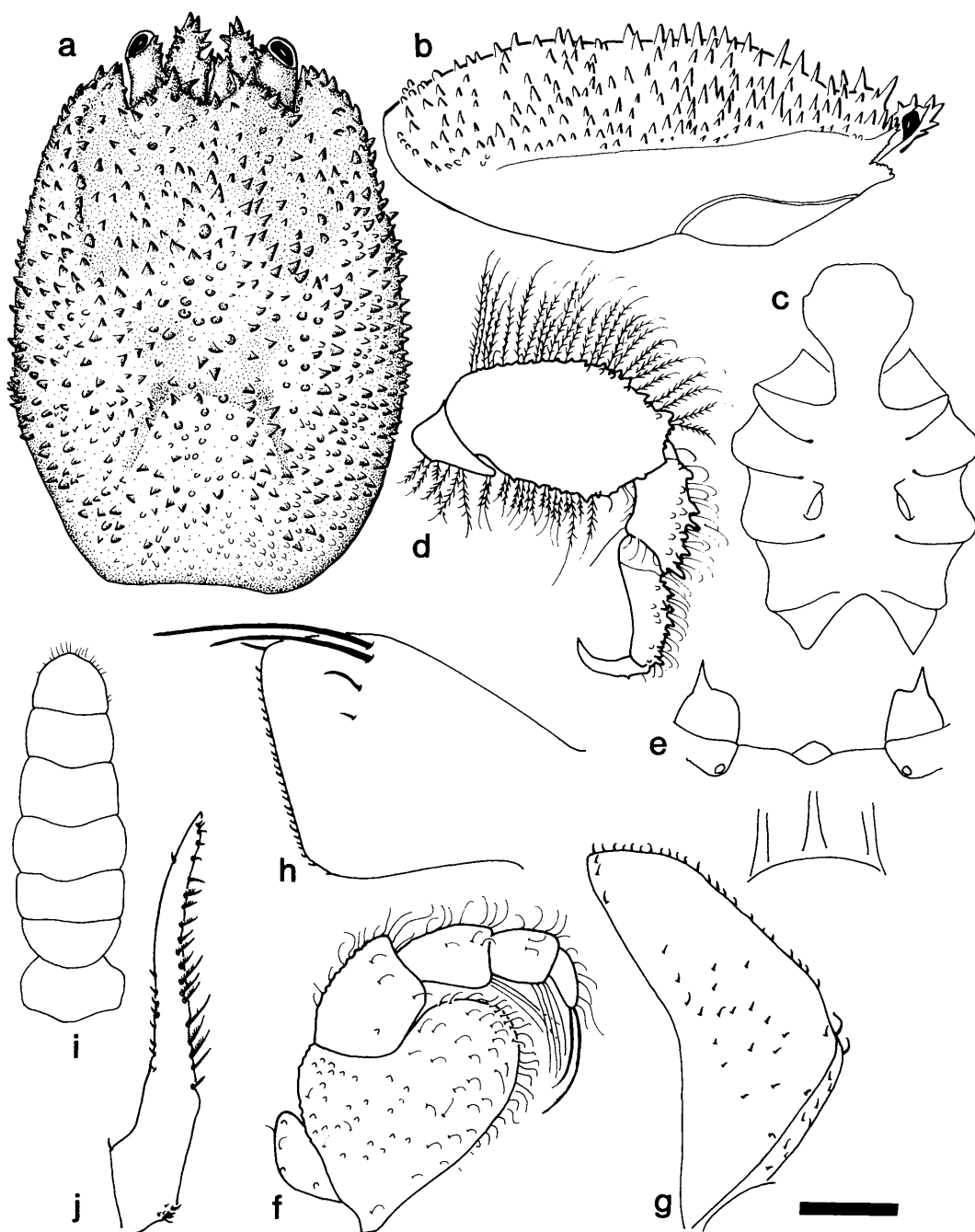


FIGURE 15. *Xynomaia sheni* (Fize & Serène). Female (Guam): a, dorsal view of carapace; b, lateral view; c, thoracic sternites; d, P-2; e, epistome; f, MXP-3; g, endopod of MXP-1; h, MXL-1. Male (Guam): i, abdomen; j, PLP. Scale: a-c, i = 1.0 mm; e = 0.5 mm; d, f = 0.3 mm; g, h, j = 0.1 mm.

Xynomaia sheni (Fize & Serène, 1956), new combination

Figure 15

Troglocarcinus sheni Fize & Serène, 1956b:380 [TL: Nhatrang, Vietnam; location of type unknown].

Troglocarcinus (Troglocarcinus) sheni.—Fize & Serène, 1957:74.

Pseudocryptochirus sheni.—Serène, 1966:396.

Hiroia sheni.—Takeda & Tamura, 1981b:20.

Xynomaia boissoni (Fize & Serène, 1956), new combination

Troglocarcinus boissoni Fize & Serène, 1956a:376 [TL: Nhatrang, Vietnam; location of type unknown].

Troglocarcinus (Troglocarcinus) boissoni.—Fize & Serène, 1957:69.

Pseudocryptochirus boissoni.—Serène, 1966:396.

Hiroia boissoni.—Takeda & Tamura, 1981b:20.

Xynomaia verrilli (Fize & Serène, 1957) new combination

Troglocarcinus (Favicola) verrilli Fize & Serène, 1957:101 [TL: Nhatrang, Vietnam; location of holotype unknown, paratype MNHN (not seen)].

Favicola verrilli.—Serène, 1966:397.

ACKNOWLEDGMENTS

I thank the University of Guam Marine Laboratory and the Micronesia Mariculture Demonstration Center for supporting my fieldwork in Micronesia and the Division of Crustacea (NMNH) for supporting my systematics studies. Specimens used in this study were kindly provided by A. Crosnier (MNHN), R. Ingle, (BMNH), M. Takeda (NSMT), B. Burch (BPBM), and V. Stagl (NMW). R. H. Randall identified the coral hosts of crabs collected in Micronesia. R. B. Manning, L. G. Eldredge, and G. J. Vermeij reviewed the manuscript.

LITERATURE CITED

- CALMAN, W. T. 1900. On a collection of Brachyura from Torres Straits. Trans. Linn. Soc. London, 2d Ser. (Zool.) 8(1): 1–50, pl. 1–3.
- COELHO, P. A. and M. A. RAMOS. 1972. A constituição e a distribuição de fauna de decapodos do litoral leste da América do Sol entre las latitudes 5° N 39° S. Trab. Oceanogr. Univ. Fed. Pernambuco 13: 133–236, figs. 1–4.
- EDMONDSON, C. H. 1925. Marine zoology of the central Pacific: Crustacea. Bull. Bernice P. Bishop Mus. 27:3–62.
- . 1933. *Cryptochirus* of the central Pacific: Occas. Pap. Bernice Pauai Bishop Mus. 10(5): 1–23, figs. 1–6, pl. 1–4.
- FIZE, A., and R. SERÈNE. 1956a. Note préliminaire sur huit espèces nouvelles, dont une d'un genre nouveau, D'Hapalocarcinidés. Bull. Soc. Zool. Fr. 80(5–6): 375–378, figs. 1–2.
- . 1956b. Note préliminaire quatre espèces nouvelles D'Hapalocarcinidés avec quelques remarques au sujet du *Cryptochirus rugosus* Edmonson [sic]. Bull. Soc. Zool. Fr. 80(5–6): 379–382, fig. 1.
- . 1957. Les hapalocarcinidés du Vietnam. Arch. Mus. Natl. Hist. Nat. (Paris), ser. 7, 5:1–202, figs. 1–43, pl. 1–18.
- GARTH, J. S. 1965. The brachyuran decapod crustaceans of Clipperton Island. Proc. Calif. Acad. Sci., 4th ser., 33:1–46, figs. 1–26.
- GARTH, J. S., and T. S. HOPKINS. 1968. *Pseudocryptochirus crescentus* (Edmondson), a second crab of the corallicolous family Hapalocarcinidae (Crustacea, Decapoda) from the eastern Pacific. Bull. South Calif. Acad. Sci. 67:40–48, figs. 1–2.
- GARTH, J. S., J. HAIG, and J. W. KNUDSEN. 1987. Crustacea, Decapoda (Brachyura and Anomura) of Enewetak Atoll. Pages 235–261 in D. M. Devaney, E. S. Reese, B. L. Burch, and P. Helfrich, eds. The natural history of Enewetak Atoll. Vol. II. Biogeography and systematics. U. S. Dep. Energy, Washington, D.C.
- HELLER, C. 1861. Synopsis der im rothen

- Meere vorkommenden Crustaceen. Verh. Zool.-Bot. Ges. Wien 11:1-32.
- HENDERSON, J. R. 1906. On a new species of coral-infesting crab taken by the R.I.M.S. "Investigator" at the Andaman Islands. Ann. Mag. Nat. Hist., ser. 7, 18:211-219, pl. 8.
- HIRO, F. 1938. A new coral-inhabiting crab, *Pseudocryptochirus viridis* gen. et sp. nov. (Hapalocarcinidae, Brachyura). Zool. Mag., Tokyo 50:149-151.
- KROPP, R. K. 1986. Feeding biology and mouthpart morphology of three species of coral gall crabs (Decapoda: Cryptochiridae). J. Crust. Biol. 6:377-384, figs. 1-2.
- . 1988a. The status of *Cryptochirus hongkongensis* Shen, 1936 (Brachyura: Cryptochiridae). Proc. Biol. Soc. Wash. 101:866-871, figs. 1-2.
- . 1988b. The status of *Cryptochirus coralliodytes* Heller and *Lithoscaptus paradoxus* Milne Edwards (Brachyura: Cryptochiridae). Proc. Biol. Soc. Wash. 101:872-882, figs. 1-6.
- . 1988c. Case 2636. *Fizesereneia* Takeda and Tamura, 1980 (Crustacea, Decapoda): Proposed confirmation of *Troglocarcinus heimi* Fize & Serène, 1956 as the type species. Bull. Zool. Nomencl. 45:262-263.
- . 1988d. Biology and systematics of coral gall crabs (Crustacea: Cryptochiridae). Ph.D. diss., University of Maryland, College Park.
- . 1989. A revision of the Pacific species of gall crabs, genus *Opecarcinus* (Crustacea: Cryptochiridae). Bull. Mar. Sci. 45:98-129.
- KROPP, R. K., and R. B. MANNING. 1985. Cryptochiridae, the correct name for the family containing the gall crabs (Crustacea: Decapoda: Brachyura). Proc. Biol. Soc. Wash. 98:954-955.
- . 1987. The Atlantic gall crabs, family Cryptochiridae (Crustacea: Decapoda: Brachyura). Smithsonian Contrib. Zool. 462:1-21, figs. 1-10.
- KROPP, R. K., and M. TAKEDA. 1988. *Utinomiella*, a replacement name for *Utinomia* Takeda and Tamura, 1981 (Crustacea, Decapoda), non Tomlinson, 1963 (Crustacea, Acrothoracica). Bull. Biogeogr. Soc. Jpn. 43:29.
- LUNDØER, S. 1974. A checklist of the marine Brachyura in the reference collection at PMBC, Thailand. Phuket Mar. Biol. Cent. Res. Bull. 4:3-11.
- MCCAIN, J. C., and S. L. COLES. 1979. A new species of crab (Brachyura, Hapalocarcinidae) inhabiting pocilloporid corals in Hawaii. Crustaceana (Leiden) 36:81-89, figs. 1-3, pl. 1.
- MACNAMEE, C. G. 1961. Life history, morphology, habits and taxonomy of *Hapalocarcinus marsupialis* Stimpson (Arthropoda, Crustacea, Decapoda). M.S. thesis, University of Hawaii, Honolulu.
- MCNEILL, F. A. 1968. Crustacea, Decapoda & Stomatopoda. Scientific Reports, Great Barrier Reef Expedition, 1928-29, 7(1):1-98, figs. 1-2, pl. 1-2.
- MILNE EDWARDS, A. 1862. Faune carcinologique de l'île de la Réunion, Annexe F de l'ouvrage intitulé: Notes sur l'île de la Réunion par L. Maillard. Pages F1-F16, pl. 17-19 in L. Maillard, Notes sur l'île de la Réunion (Bourbon). Paris.
- MONOD, TH., and R. SERÈNE. 1976. Parasitic, commensal, and inquiline crustaceans collected during the Rumphius Expedition II. Osean. Indones. 6:23-27.
- NOBILI, G. 1906. Faune carcinologique de la Mer Rouge. Decapodes et Stomatopodes. Ann. Sci. Nat. Zool. (a) 4:1-347.
- PAULSON, O. 1875. Podophthalmata and Edriophthalmata (Cumacea). Studies on Crustacea of the Red Sea with notes regarding other seas, Part I. xiv + 144 p., pl. 1-21. Kiev. [Original in Russian. Reprinted 1961, in English, with different pagination, by the Israel Program for Scientific Translations, Jerusalem.]
- RICHTERS, F. 1880. Decapoda. Pages 139-178, pl. 15-18 in K. Möbius, Beiträge zur Meeresfauna der Insel Mauritius und der Seychelles.
- SCOTT, P. J. B. 1985. Aspects of living coral associates in Jamaica. Proc. 5th Int. Coral Reef Congr., Tahiti 5:345-350.
- SERÈNE, R. 1966. Note sur la taxonomie et la

- distribution geographic des Hapalocarcinidae (Decapoda-Brachyura). Proc. Symp. Crustacea, Ernakulam, 12-15 January 1965, Mar. Biol. Assoc. India Part I: 395-398.
- SERÈNE, R., K. ROMIMOHTARTO, and M. K. MOOSA. 1974. The Hippidea and Brachyura collected by the Rumphius Expedition I. Osean. Indones. 1:17-26.
- . 1976. Hippidea, Brachyura, and Stomatopoda of the Rumphius Expedition II. Osean. Indones. 6:15-21.
- SHAW, K., and T. S. HOPKINS. 1977. The distribution of the family Hapalocarcinidae (Decapoda, Brachyura) on the Florida Middle Ground with a description of *Pseudocryptochirus hypostegus* new species. Proc. 3rd Int. Coral Reef Symp., Miami 1:177-183, figs. 1-3.
- SHEN, C. J. 1936. Notes on the family Hapalocarcinidae (coral-infesting crabs) with descriptions of two new species. Hong Kong Nat. Suppl. (5): 21-26, pl. 1-2.
- STIMPSON, W. 1859. [Communication, *Hapalocarcinus marsupialis*.] Proc. Boston Soc. Nat. Hist. 6:412-413.
- TAKEDA, M., and Y. TAMURA. 1979. Coral-inhabiting crabs of the family Hapalocarcinidae from Japan. I. Three species obtained from mushroom coral, *Fungia*. Bull. Natl. Sci. Mus. Tokyo, ser. A (Zool.) 5(3): 183-192, figs. 1-4.
- . 1980a. Coral-inhabiting crabs of the family Hapalocarcinidae from Japan. II. Genus *Pseudohapalocarcinus*. Proc. Jpn. Soc. Syst. Zool. 18: 54-59, pl. 2-5.
- . 1980b. Coral-inhabiting crabs of the family Hapalocarcinidae from Japan. III. New genus *Fizesereneia*. Bull. Natl. Sci. Mus. Tokyo, ser. A (Zool.) 6(3): 137-146, figs. 1-5.
- . 1980c. Coral-inhabiting crabs of the family Hapalocarcinidae from Japan. IV. Genus *Neotroglocarcinus*. Bull. Natl. Sci. Mus. Tokyo, ser. A (Zool.) 6(3): 147-151., figs. 1-2.
- . 1980d. Coral-inhabiting crabs of the family Hapalocarcinidae from Japan. V. Genus *Cryptochirus*. Res. Crustacea 10: 45-56, text-figs. 1-2, pl. 2-4.
- . 1981a. Coral-inhabiting crabs of the family Hapalocarcinidae from Japan. VII. Genus *Favicola*. Res. Crustacea 11:41-50, text-figs. 1-3, pl. 1-3.
- . 1981b. Coral-inhabiting crabs of the family Hapalocarcinidae from Japan. VIII. Genus *Pseudocryptochirus* and two new genera. Bull. Biogeogr. Soc. Jpn 36(3): 14-27, figs. 1-3, pl. 1-4.
- . 1983. Coral-inhabiting crabs of the family Hapalocarcinidae from Japan. IX. A small collection made at Kushimoto and Koza, the Kii Peninsula. Bull. Natl. Sci. Mus. Tokyo, ser. A (Zool.) 9(1): 1-11, figs. 1-4, pl. 2-4.
- . 1986. Coral-inhabiting crabs of the family Hapalocarcinidae from Japan. XI. Biogeographical distribution. Bull. Biogeogr. Soc. Jpn 41(8): 61-70, figs. 1-9.
- TAYLOR, J. D. 1971. Crustacea: Brachyura and Anomura from Diego Garcia. Atoll Res. Bull. 149:93-101.
- TOMLINSON, J. T. 1963. Two new acrothoracican barnacles from Japan. Publ. Seto Mar. Biol. Lab. 11(2): 263-280.
- UTINOMI, H. 1944. Studies on the animals inhabiting reef corals, III. A revision of the family Hapalocarcinidae (Brachyura), with some remarks on their morphological peculiarities. Palao Trop. Biol. Stn. Stud. 2(4): 687-731, figs. 1-17, pl. 3-5.