Hermit Crabs (Decapoda: Anomura: Paguridea) from the Seychelles

P.A. McLaughlin & P.J. Hogarth

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Key words: Crustacea; Decapoda; Paguridea; Seychelles.
A report on the hermit crabs collected during the Netherlands Seychelles Expedition, 1992-1993, supplemented by materials collected for Enterprise Oil and examined by one of the authors. Twenty-seven species, representing three families, are recognized, including one new genus and four new species.

Introduction

A relatively small, but diverse, collection of hermit crabs from the Seychelles and Amirante Islands, obtained during The Netherlands 'Oceanic Reefs' Expedition (1992-1993) (cf. van der Land, 1994) represents the foundation of this report. This material has been supplemented by collections made for Enterprise Oil in connection with a proposed shore installation in the Seychelles and examined by one of the authors (PJH). The collection includes representatives of three hermit crab families and 13 genera, one of which is new. Although a number of the species are widely distributed throughout the Indo-Pacific region, new distributional records and four new species have been recognized.

Materials and Methods

Specimens have come from the 1992-1993 Seychelles Expedition undertaken by the scientific staff of the Nationaal Natuurhistorisch Museum, formerly Rijksmuseum van Natuurlijke Historie, Leiden (RMNH), The Netherlands, and from surveys made in 1992 for Enterprise Oil. All RMNH specimens have been returned to the Museum. Holotypes from the Hogarth collections have been deposited in The Natural History Museum, formerly British Museum (Natural History), London (NHM). Paratypes have been distributed, as availability permitted, to the Nationaal Natuurhistorisch Museum, Natural History Museum, and the National Museum of Natural History, formerly United States National Museum, Smithsonian Institution (USNM). Non-type materials remain in the personal collections of the authors (PMcL, PJH). One measurement, shield length (sl.), as measured from the tip of the rostrum or midpoint of the rounded rostral lobe to the posterior midpoint of the cephalothoracic shield, provides an indication of animal size. Under 'restricted synonymy' the reference to the first use of a new name or erroneous spelling is give as well as illustrated references pertinent to the species in this region.

Systematic account

Family Coenobitidae

Coenobita perlatus H. Milne Edwards, 1837

Restricted synonymy:
Cenobita perlata H. Milne Edwards, 1837: 242.
Coenobita perlatus; Ortmann, 1892: 319, pl. 12, fig. 25; Alcock, 1905: 145, pl. 14, figs. 2, 2a; Nakasone, 1988: 170, fig. 5.

Material.— RMNH D 47840: 1 ♂, 4 ♀ sl. 20.7-26.6 mm. NIOP-E SEY. Sta. 781: Poivre atoll, lagoon area of South Island; 05°46'S 53°18'E; 1.i.1993; snorkeling and shore collecting on reef flat and among mangroves.

Remarks.— Previously reported from the Seychelles by Richters (1880) and from Amirante by Miers (1884) and Laurie (1926).

Distribution.— Seychelles, Eagle and African Islands, Aldabra and Madagascar to Line and Gambier Islands; Bonin and Yaeyama Islands of Japan.

Coenobita rugosus H. Milne Edwards, 1837

Restricted synonymy:
Cenobita rugosa H. Milne Edwards, 1837: 241; Dana, 1852b: 471; Dana, 1855, pl. 30, fig. 1.
Caenobita clypeata Owen, 1839: 85, pl. 25, fig. 3 [not *Coenobita clypeatus* (Fabricius, 1787)].
Coenobita rugosus; Ortmann, 1892: 317, pl. 12, fig. 22; Alcock, 1905: 143, pl. 14, figs. 3, 3a; Holthuis, 1954: 16, figs. 4c, d; Lewinsohn, 1969: 93, fig. 17; Nakasone, 1988: 168, fig. 3A-G.
Coenobita rugosa; Richters, 1880: 160, pl. 17, figs. 14-17.
Coenobita rugosa var. A. *granulata*; Bouvier, 1890: 146.
Coenobita var. B. *compressa* Bouvier, 1890: 147 (not *Coenobita compressus* H. Milne Edwards, 1837).
Coenobita compressus; de Man, 1902: 742, pl. 24, fig. 45 (not *Coenobita compressus* H. Milne Edwards, 1837).

Material.— RMNH D 47841: 1 ♂, 3 ♀ sl. 4.80-9.75 mm. NIOP-E SEY. Sta. 756: St. Joseph atoll, N rim; 05°24'S 53°20'E; 27.iix.1992; scuba diving on reef slope.— RMNH D 47842: 1 ♂, 3 ♀, 2 ♀ ovigerous sl. 3.95-8.89 mm. NIOP-E SEY. Sta. 781: Poivre atoll, lagoon area of South Island; 05°46'S 53°18'E; 1.i. 1993; snorkeling and shore collecting on reef flat and among mangroves.— RMNH D 47843: 6 ♂, 3 ♀, 5 ovigerous ♀ sl. 7.3-11.3 mm. NIOP-E SEY. Sta. 787: Alphonse atoll, NW edge; 07°00'S 52°43'E; 3.i.1993; snorkeling and shore collecting on reef flat.

Remarks.— Females with shield lengths between 7.3 and 8.9 mm were ovigerous, each usually carrying in excess of 200 eggs (diameter 0.61-0.67 mm).

Distribution.— East African, Mascarenes, Madagascar and Seychelles, to Line Islands and Tuamotu Archipelago; Chichijima and Anijima Islands and Okinawa, Japan.

Family Diogenidae

Calcinus gaimardii (H. Milne Edwards, 1848) sensu lato

Restricted synonymy:
Pagurus gaimardii H. Milne Edwards, 1848: 63.
Calcinus gaimardii; Dana, 1852b: 457; Dana, 1855: pl. 28, fig. 9; Alcock, 1905: 56, pl. 5, fig. 3; Morgan, 1991: 876, figs. 10-13.
Calcinus gaimardi; Fize & Serène, 1955: 49, pl. 2, figs. 5-8, text figs. 7, 8.

Material.— RMNH D 47844: 1 ♂, 1 ♀ sl. 7.30, 6.90 mm. NIOP-E SEY. Sta. 604: Mahé, NE coast, North East Point; 04°35'S 55°28'E; 8.iix.1992; intertidal to 5 m; snorkeling on reef flat (with significant cover of *Zoanthus* and *Palythoa* and slope with many corals).

Colour.— In preservative: Shield predominately white, distal half of rostrum reddish-brown; lateral margins reddish-brown with white spots. Dorsal surfaces of ocular peduncles reddish-brown in proximal half, blue distally, but extending to proximal third on lateral surfaces; proximal portions of mesial, lateral and ventral surfaces reddish-yellow to reddish-orange, encircling band of reddish-brown at base of cornea. Antennular peduncles with basal and penultimate segments reddish-brown, distal segments brownish-yellow; flagella yellow. Distal segments of antennae, antennal acicles and flagella all yellow. Chelipeds and ambulatory legs deep reddish-brown, with tips of dactyls, fixed fingers, tubercles and spines white.

Remarks.— Several authors (e.g., Fize & Serène, 1955; Morgan, 1991; Rahayu, 1992; Asakura, 1995; Tudge, 1995; Poupin, 1997) have noted two distinct colour patterns in specimens identified as *C. gaimardii*. Although Morgan (1991) declined to separate the two colour morphs that he found occurring sympatrically in Australian waters, as distinct species, he did give credence to that possibility. Rahayu (1992) and Poupin (1997) expressed no doubt that two species have been confounded under the name *C. gaimardii*. Poupin noted that only one colour morph occurred in French Polynesia, and it was not the one representative of *C. gaimardii* sensu stricto, but he deferred to Rahayu's priority in assigning a new name to this taxon. It is this taxon which is represented in the Seychelles collection and we refer to it simply as *C. gaimardii* s.l.

Distribution.— *Calcinus gaimardii* s.l. is reported from eastern Africa across the Indian Ocean, including the Seychelles, to Indonesia, southern Japan, New Guinea, east to Hawaiian and Society Islands; Cocos (Keeling) and Christmas Islands; Australia including north Tasman Sea and Lord Howe Island.

Calcinus haigae Wooster, 1984

Restricted synonymy:
Calcinus haigae Wooster, 1984: 146, fig. 5; Morgan, 1991: 880, figs. 17-20.

Material.— RMNH D 47845: 1 ♀ sl. 3.0 mm. NIOP-E, Sta. SEY. 759: St. Joseph atoll, S. rim, 05°27'S 53°21'E; 28.xii.1992; scuba diving on reef slope.

Remarks.— Poupin (1997) expressed the opinion that Gherardi & McLaughlin's (1994) report of *C. haigae* from Mauritius might actually refer to *C. rosaceus* Heller,

1861. This supposition may have been based on the fact that Mauritius is the type locality for *Calcinus nitidus* var. *australis* Bouvier, 1915, a synonym of *C. rosaceus*, and Dechancé's (1964) account of *C. rosaceus* in neighboring Madagascar. However, the colour patterns Gherardi & McLaughlin reported for their *C. haigae* are not the uniform colour pattern of the chelipeds and ambulatory legs of *C. rosaceus* (cf. Forest, 1956a). *Calcinus haigae* more recently has been reported from the Maldives by Hogarth et al. (in press).

In the length of the ocular peduncles, slender bifid ocular acicles, and short ambulatory dactyls, the present specimen from the Seychelles agrees more closely with Wooster's (1984) illustrated specimen from Guam than with Morgan's (1991) illustrated specimen from Cocos (Keeling) Is. The Seychelles specimen is distinguished from *C. rosaceus* by having long, slender ocular peduncles, antennular peduncles that reach nearly to the bases of the corneae, and antennular peduncles that reach the distal third of the ocular peduncles. The colour of our specimen is appreciably faded, but the shield is predominately white with patches of colour anteriorly and posterolaterally; the proximal segments and proximal portion of the ultimate segment of the antennular peduncles are darkly coloured, whereas the distal half is distinctly white. When the specimen was first examined, faint orange spots could be seen on the ambulatory dactyls; however, these have now faded completely.

Distribution.— Mariana and Hawaiian Islands, western Australia; Mascarene archipelago and Maldive Islands. This is the first report of this species in the Seychelles.

Calcinus laevimanus (Randall, 1840)

Restricted synonymy:
Pagurus tibicen; H. Milne Edwards, 1836: 278; 1840: pl. 59, fig. 37. (not *Cancer tibicen* Herbst, 1791).
Pagurus laevimanus Randall, 1840: 135.
Pagurus lividus H. Milne Edwards, 1848: 63.
Calcinus tibicen; Dana, 1852b: 457, [not *Calcinus tibicen* (Herbst, 1791)].
Pagurus levimanus; Stimpson, 1858: 234.
Pagurus (Calcinus) tibicen; Hilgendorf, 1869: 97 [not *Calcinus tibicen* (Herbst, 1791)].
Calcinus Herbstii de Man, 1888b: 437.
Calcinus herbsti; Ortmann, 1892: 292.
Calcinus herbstii; de Man, 1898: 270; Alcock, 1905: 53, pl. 5, fig. 4.
Calcinus herbstii var. *lividus*; Borradaile, 1898: 462.
Calcinus Herbsti; Bouvier, 1898: 380.
Calcinus herbsti var. *lividus*; Alcock, 1905: 55.
Calcinus laevimanus; Rathbun, 1907: 208 (footnote); Barnard, 1950: 437, fig. 80e, f; Morgan, 1991: 888, figs. 30-33.
Calcinus herbstei - Fourmanoir, 1952: 177.

Material.— RMNH D 47846: 1 ♂, 1 ♀ sl. 6.7, 4.6 mm. NIOP-E SEY. Sta. 699: W coast of Mahé, Anse Boileau; 04°42'S 55°29'E; 30.i.1993; reef flat with old coral blocks.—RMNH D 47847: 1 ♂ sl. 4.1 mm. NIOP-E SEY. Sta. 754: St Joseph atoll, NW rim; 05°25'S 53°19'E; 26.xii.1992; snorkeling and shore collecting on reef flat.—RMNH D 47848: 1 ♀ sl. 3.7 mm. NIOP-E SEY. Sta. 758: St Joseph atoll, N rim; 05°24'S 53°20'E; 27.xii.1992; snorkeling and shore collecting on reef flat.—RMNH D 47849: 1 ♂ sl. 5.6 mm. NIOP-E SEY. Sta. 760: St Joseph atoll, S rim; 05°27'S 53°21'E; 28.xii.1992; snorkeling and shore collecting on reef flat.

Remarks.— This species has previously been reported from the Seychelles by Richters (1880) and Laurie (1926).

Distribution.— East Africa, across Indian Ocean; Indonesia; Philippines, Japan; Australia; New Caledonia, French Polynesia; Marianas; Cocos (Keeling) and Christmas Islands; Hawaiian Islands.

Calcinus latens (Randall, 1840)

Restricted synonymy:
Pagurus latens Randall, 1840: 135.
Pagurus cristimanus H. Milne Edwards, 1848: 64.
Calcinus latens; Dana, 1852b: 459; Dana, 1855: pl. 28, fig. 2; Alcock, 1905: 58, pl. 5, fig. 5; Nobili, 1906: 83, pl. 5, fig. 20; Tirmizi & Siddiqui, 1982: 61, figs. 32, 33; Morgan, 1991: 890, figs. 34-36.
Calcinus cristimanus; Stimpson, 1858: 234.
Pagurus (Calcinus) latens; Hilgendorf, 1879: 823.
Calcinus intermedius de Man, 1881: 102.
Calcinus terrae-reginae Haswell, 1882: 760; Alcock, 1905: 57, pl. 5, fig. 7.
Calcinus latens var. *terrae reginae*; Buitendijk, 1937: 269.
Calcinus abrolhensis Morgan, 1988: 218, fig. 1.
Not *Calcinus terrae-reginae*; de Man, 1888a: 226; de Man, 1888b: 439 [= *Calcinus gaimardii* (H. Milne Edwards, 1836)].

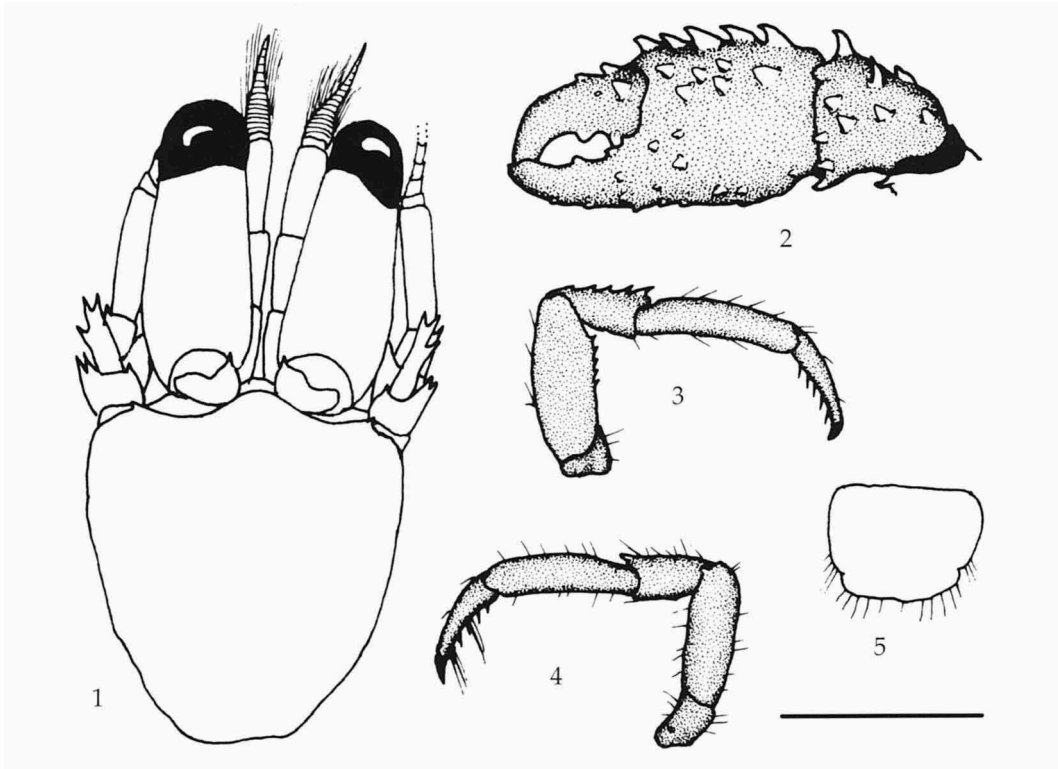
Material.— RMNH D 47850: 2 ♂ sl. 3.2, 3.3 mm. NIOP-E SEY. Sta. 604: Mahé, NE coast, North East Point; 04°35'S 55°28'E; 8.xii.1992; intertidal to 5 m; snorkeling; reef flat (with significant cover of *Zoanthus* and *Palythoa*) and slope with many corals.

Distribution.— East coast of Africa and Red Sea through the Indian Ocean to the Hawaiian and Gambier Islands.

? *Calcinus* spec.
(figs 1-5)

Material.— PMcL: 1 juvenile ♂ sl. 0.85 mm. Sta. N5000-B2; 06°24'S 56°11'E; 38 m; 13.i.1992; coll. Wimpey Environmental Ltd.— PMcL: 1 juvenile ♂ sl. 0.79 mm. Sta. Sta. S800B; 06°27'S 56°11'E; 42 m; 15.i.1992; coll. Wimpey Environmental Ltd.

Remarks.— The two specimens, both with male gonopores indicated, are clearly young juveniles, still retaining plainly delimited, albeit membraneous, abdominal tergites and nearly symmetrical uropods. Characters linking these juveniles to *Calcinus* include the characteristic "Y" shaped linea of the posterior portion of the shield; the shape of the ocular acicles; the presence of a spine on the fourth segment of the antennal peduncle, bifid terminal spine on the produced dorsolateral distal angle of the second segment, and the shape and armature of the antennal acicle; development of the crista dentata on the ischium of the third maxilliped; and shape of the coxae of the fifth pereiopods. The shapes of the chelae are certainly typical of *Calcinus*; however, the strong spination of the dorsal surface of the left, accompanied by the spinose outer faces of both the chela and carpus are not commonly seen in adults. The telson is still obviously under-developed; however, the general configuration is similar to that seen in adults of some species.



Figs. 1-5. ? *Calcinus* spec., juvenile ♂ sl. 0.85 mm, Sta. N5000-B2, PMcL. 1, shield and cephalic appendages; 2, chela and carpus of left cheliped, outer surface; 3, right second pereiopod, lateral view; 4, left third pereiopod, lateral view; 5, telson. Scale 1, 5 = 0.5 mm; 2-4 = 1 mm.

However, as can be seen in the illustrations, these specimens exhibit certain characters that are atypical of adults of known *Calcinus* species, particularly the carpi of second pereiopods, which each carry a row of spines. To the best of our knowledge, juvenile stages have not been described for any *Calcinus* species, thus it is not possible to say whether this juvenile armature is lost in the maturing adult, or whether these specimens represent a distinct species. Additionally, the propodi of the ambulatory legs are proportionately much longer and more slender than is typical of adults.

Although the two specimens differ in shield length by only 0.06 mm, the larger is at least one molt older, having a better calcified shield and only unpaired left pleopods. The smaller specimen still has rudimentary right pleopods on somites 2-5, with the four left pleopods not as well developed as in the larger individual. Only the larger specimen has all its appendages; its chelipeds are practically equal and both have a very pronounced hiatus between the dactyl and fixed finger.

Calcinus tropidomanus Lewinsohn, 1981

Restricted synonymy:
Calcinus tropidomanus Lewinsohn, 1981: 147, fig. 1; Reay & Haig, 1990: 582.

Material.— RMNH D 47851: 3 ♂ sl. 3.0-3.4 mm. NIOP-E SEY. Sta. 604: Mahé, NE coast, North East Point; 04°35'S 55°28'E; 8.xii.1992; intertidal to 5 m; snorkeling; reef flat (with significant cover of *Zoanthus* and *Palythoa*) and slope with many corals.

Remarks.— In his description of *C. tropidomanus* from Somalia, Lewinsohn (1981) reported that there were no spines visible on the telson. In all three specimens from the Seychelles, the left lobe has 4 or 5 spines on the rounded terminal margin extending down the lateral margin; one specimen had a small spine on the rounded apex of the right lobe.

Distribution.— Somalia; Oman. This is the first record of the species from the Seychelles.

Calcinus cf. *vachoni* Forest, 1958

Restricted synonymy:
Calcinus vachoni Forest, 1958: 285, figs. 2, 3, 9, 10, 15, 19; Morgan, 1991: 905, figs. 60-62.
Not *Calcinus vachoni*; Lewinsohn, 1982: 53 (= *Calcinus guamensis* Wooster, 1984).

Material.— RMNH D 47852: 1 intersex sl. 1.37 mm. NIOP-E SEY. Sta. 604: Mahé, NE coast, North East Point; 04°35'S 55°28'E; 8.xii.1992; intertidal to 5 m; snorkeling; reef flat (with significant cover of *Zoanthus* and *Palythoa*) and slope with many corals.— RMNH D 47853: ♂ sl. 1.10 mm; NIOP-E SEY. Sta. 699; W coast of Mahé, Anse Boileau; 04°42'S 55°29'E; 30.i.1993; reef flat with old coral blocks.

Remarks.— The two specimens included here lack all traces of colour, the principal diagnostic character used to differentiate species of *Calcinus*. The specimen from Sta. 604 is regarded as an intersex individual as both male and female gonopores are present; the pleopods are typical of male *Calcinus*. This specimen agrees well with the morphology of *C. vachoni* described by Forest (1958) and Morgan (1991). The specimen from Sta. 699 is unquestionably a male. It differs from the intersex specimen and from the description of *C. vachoni* in having simple ocular acicles, shorter rostrum, and fewer telsonal spines. This specimen is smaller than any reported by Morgan (1991) or Forest (1958), which may account for the observed differences.

Distribution.— Vietnam; northwestern Australia; Mauritius. This is the first record of the species from the Seychelles.

Ciliopagurus shebae (Lewinsohn, 1969)

Trizopagurus shebae Lewinsohn, 1969: 55, fig. 8.
Ciliopagurus shebae: Forest, 1995: 69, figs. 12e, 1a, 16, 33a, 37f, 41c, d.

Material.— RMNH D 47854: 1 ♂ sl. 5.7 mm. NIOP-E SEY. Sta. 751: NE of D'Arros Island; 05°24'S 53°19'E; 26.xii.1992; 56-59 m.

Remarks.— Forest (1995) indicated that *Ciliopagurus shebae* was known from only four specimens. The present specimen, the second recorded from the Seychelles, exhibits some variations from the characters described by Lewinsohn (1969) for the holotype and by Forest (1995) for the remainder. The chelae, for example, have the described four principal complete striae on the palm, but with only three interposed,

more shallow, shorter striae, on the left and one on the right. The carpi of the third pereiopods each has a very small dorsodistal spine and the meri of the second pair each has a small spine at the ventrolateral distal angle. The telson has a small, but distinct spine on the inner margin of the left posterior lobe and two smaller spines on the terminal margin of each lobe.

Although the specimen was not accompanied by a shell, the pronounced flattening of the cephalothorax is suggestive of *Conus* habitation.

Colour.— In preservative: Shield white. Ocular peduncles and acicles, antennular and antennal peduncles faint orange. Chelipeds and ambulatory legs with orange-red transverse striae bordered posteriorly and anteriorly by darker line of red-orange; white band beneath each adjacent fringe of short setae. Dactyls of the ambulatory legs are uniformly whitish-orange.

Distribution.— Red Sea; western Indian Ocean; Madagascar; La Réunion; Seychelles; 22-130 m.

Clibanarius virescens (Krauss, 1843)

Restricted synonymy:
Pagurus virescens Krauss, 1843: 56, pl. 4, fig. 3.
Pagurus (Clibanarius) virescens; Hilgendorf, 1879: 821, pl. 3, fig. 11.
Clibanarius virescens; Dana, 1852b: 466; Tirmizi & Siddiqui, 1982: 77, fig. 40.
Clibanarius aequabilis; Stebbing, 1920: 258 (not *Clibanarius aequabilis* Dana).
[?] *Clibanarius philippinensis* Yap-Chongco in Estampador, 1937: 501.

Material.— RMNH D 47855: 1 ♂ sl. 2.9 mm. NIOP-E SEY. Sta. 740: Mahé, SE coast, Anse Royale bay; 04°44'S 55°31'E; 24.xii.1992; to 10 m, scuba diving in deep lagoon, snorkeling and shore collecting.

Remarks.— This is the first record of *C. virescens* from the Seychelles; however, it has previously been reported from Madagascar by Dechancé (1964) and Rodrigues Islands by Gherardi & McLaughlin (1994).

Distribution.— East coast of Africa to Indonesia; Japan; Fiji Islands.

Dardanus dearmatus (Henderson, 1888)
(pl. 1, figs A-B)

Restricted synonymy:
Pagurus dearmatus Henderson, 1888: 58, pl. 6, fig. 5; Alcock, 1905: 91, pl. 9, fig. 6.
Pagurus dermatus; Estampador, 1937: 502 (misspelling).

Material.— RMNH D 47856: 1 ♂, 1 ♀ sl. 1.1, 5.6 mm. NIOP-E SEY. Sta. 766: N of Poivre Island; 05°44'S 53°20'E; 29.xii.1992; 43-48 m; coarse calcareous sand with rhodolites, few stony and soft corals.

Remarks.— This usually shallow-water species is recorded for the first time from the Seychelles group. However, Laurie (1926) identified a non-ovigerous female from Saya de Malha collected at a depth between 605 and 915 m as *D. dearmatus*.

Distribution.— Maldive to Admiralty Islands including Saya de Malha Bank.

Dardanus pedunculatus (Herbst, 1804) (pl. 1, figs C-D)

Restricted synonymy:
Cancer pedunculatus Herbst, 1804: 25, pl. 61, fig. 3.
Pagurus pedunculatus; Olivier, 1812: 647.
Pagurus pedunculatus var. *varipes*; Hilgendorf, 1879: 815. Not *Pagurus varipes* Heller, 1861.
Pagurus asper de Haan, 1849: 208, pl. 49, fig. 4; Alcock, 1905: 90, pl. 9, fig. 5.
Pagurus varipes; de Man, 1888b: 436. 420; Alcock, 1905: 90, pl. 9, fig. 7. Not *Pagurus varipes* Heller, 1861.
Pagurus sigmoidalis Zehntner, 1894: 192, pl. 8, figs. 19a, b.
Dardanus haani Rathbun, 1903: 34.
Pagurus haani; Laurie, 1926: 158.
Neopagurus horai Kamalaveni, 1950: 83, figs. 2a-c, 3.
Dardanus pedunculatus; Lewinsohn, 1969: 29, pl. 1, fig. 3.
Not *Pagurus pedunculatus*; Ortmann, 1894: 31; Barnard, 1950: 429, text fig.79a [= *Dardanus tinctor* (-Forskål, 1775)].

Material.— RMNH D 47857: 1 ♂ sl. 7.0 mm. NIOP-E SEY. Sta. 719: E of Bird Island; 03°44'S 55°14'E; 20.xii.1992; 45 m; sandy bottom with numerous small rhodolites.—RMNH D 47858: 1 ♀ sl. 7.2 mm. NIOP-E SEY. Sta. 766: N of Poivre Island; 05°44'S 53°20'E; 29.xii.1992; 43-48 m; coarse calcareous sand with rhodolites, few stony and soft corals.

Remarks.— Recorded from Praslin reef by Laurie (1926) as "*Pagurus haani* (Rathbun, 1902)". In the morphology of the left chela, the Seychelles specimens are very similar to *Dardanus deformis* (H. Milne Edwards, 1836), (pl. 1, fig. E); however, the two species are immediately distinguished by differences in the propodi and dactyls of the left third pereiopod (pl. 1, figs D, F).

Distribution.— Southern Japan, Kii Peninsula, Tosa Bay, Kyushu, and Okinawa; Taiwan; Philippines; Seychelles; Amboina; Timor; Hawaii; Australia.

Dardanus deformis (H. Milne Edwards, 1836) (pl. 1, figs E-F)

Restricted synonymy:
Pagurus deformis H. Milne Edwards, 1836: 272, pl. 13, fig. 4 (cf. Morgan, 1990) (or pl. 14, fig. 2 according to Alcock, 1905 and Lewinsohn, 1969); Alcock, 1905: 88, pl. 9, fig. 4.
Pagurus cultratus White, 1847a: 60 nomen nudum.
Pagurus cavipes White, 1847b: 122.
Pagurus difformis; Dana, 1852b: 449.
Pagurus biformis; Estampador, 1937: 502 (misspelling).
Pagurus bifermis; Estampador, 1937: 502 (misspelling).
Pagurus cultrerus; Estampador, 1937: 502 (misspelling).
Dardanus deformis; Edmondson, 1925: 24.

Material.— RMNH D 47859: 1 ♀ sl. 8.7 mm. NIOP-E SEY. Sta. 717: Bird Island, off E coast; 03°43'S 55°13'E; 20/21.xii.1992; scuba and snorkeling at edge of bank.

Remarks.— First reported from the Seychelles by Richters (1880). In addition to differences in the structure of the propodi and dactyls of the left third pereiopod, *D. deformis* is easily distinguished from *D. pedunculatus* by the light orange and creamy-

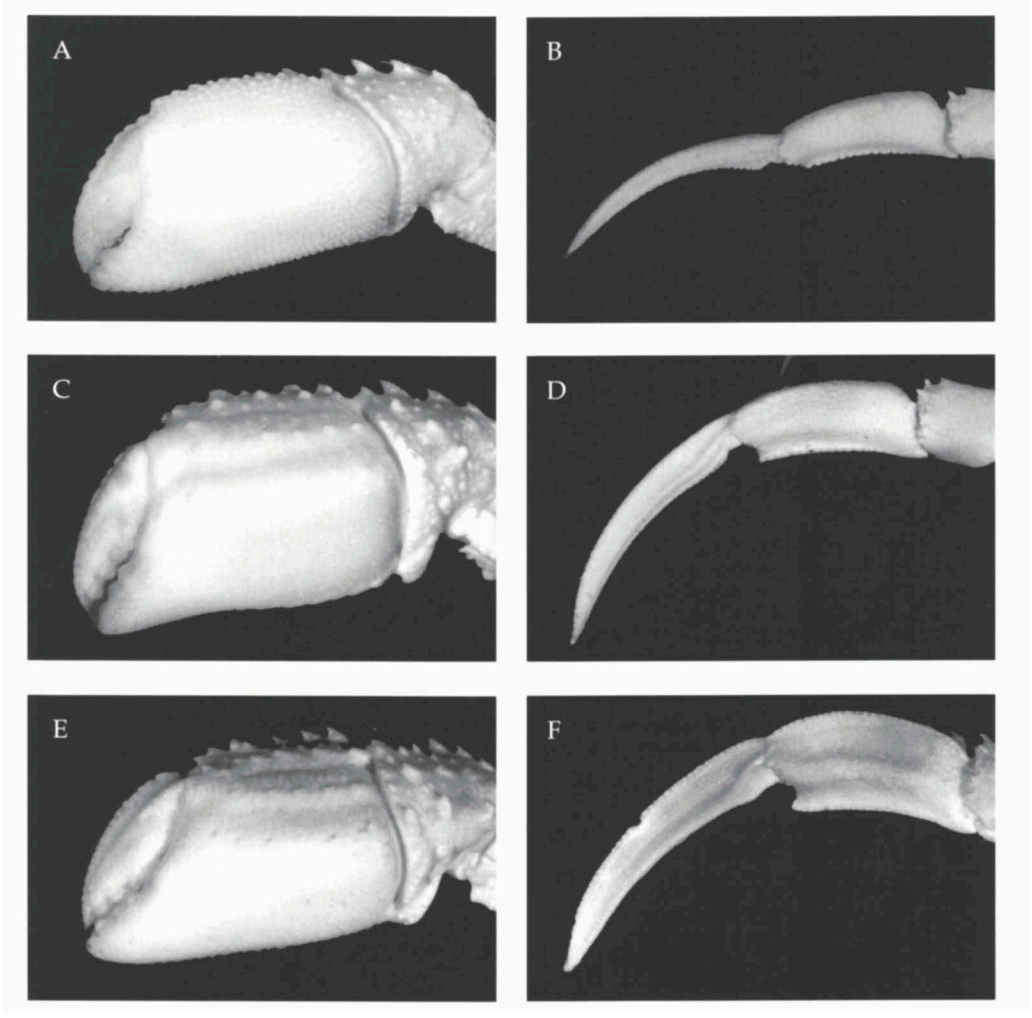


Plate 1. A-B, *Dardanus dearmatus* (Henderson, 1888), ♀, sl. 5.6 mm (RMNH D 47856); C-D, *Dardanus pedunculatus* (Herbst, 1804), ♂, sl. 7.0 mm (RMNH D 47857); E-F, *Dardanus deformis* (H. Milne Edwards, 1836), ♀, sl. 8.7 mm (RMNH D 47859).

white colour of its chelipeds, which is in marked contrast to reddish-purple chelipeds of the latter species.

Distribution.— East Africa; Seychelles; Madagascar; La Réunion; Mauritius; Red Sea to Hawaii; Philippines; Australia.

Dardanus megistos (Herbst, 1804)
(pl. 2, figs A-B)

Restricted synonymy:
Cancer megistos Herbst, 1804: 23, pl. 61, fig. 1.
Pagurus megistos; Olivier, 1812: 639; Barnard, 1950: 425, fig. 79c.

Pagurus punctulatus Olivier, 1812: 641; Quoy & Gaimard, 1824: 528, pl. 78, fig. 2; Dana, 1852b: 451; Dana, 1855, pl. 28, figs. 4a, b; Alcock,
1905: 81, pl. 8, fig. 1.
Pagurus spinimanus H. Milne Edwards, 1848: 61; Dana, 1852b: 452; Dana, 1855: pl. 28, fig. 5a-c.
Dardanus megistos: Rathbun, 1907: 205.
Cancer magistes; Estampador, 1937: 503 (misspelling).
Dardanus megsitos; Ward, 1942: 64 (misspelling).
Dardanus spinimanus; Holthuis, 1953: 49.

Material.— RMNH D 47860: 1 ♂ sl. 7.5 mm. NIOP-E SEY. Sta. 723: Bird Island, off N coast; 03°42'S 55°12'E; 21/22.xii.1992; 8-30 m; scuba diving near drop-off. RMNH D 47861: 1 ♀ sl. 8.6 mm. NIOP-E SEY. Sta. 758: St. Joseph atoll, N rim; 05°24'S 53°20'E; 27.xii.1992; snorkeling and shore collecting on reef flat.

Remarks.— Reported from the Seychelles by Laurie (1926). Characteristic of this species is overall reddish colouration of the chelipeds and ambulatory legs which are marked by numerous white spots ringed with black. This colouration is apparent even in specimens that have been preserved for several years.

Distribution.— Red Sea and east coast of Africa eastwards through the Indo-Pacific to the Liu-Kiu Islands; Australia; Sandwich Islands; French Polynesia.

Dardanus lagopodes (Forskål, 1775)
(pl. 2, figs C-D)

Restricted synonymy:
Cancer lagopodes Forskål, 1775: 93.
Pagurus sanguinolentus Quoy & Gaimard, 1824: 532, pl. 79, fig 2.
Pagurus affinis H. Milne Edwards, 1836: 274.
Pagurus euopsis Dana, 1852a: 7; Dana, 1855: 10, pl. 28, fig. 6; Alcock, 1905: 86, pl. 9, fig. 2.
Pagurus depressus Heller, 1861: 248.
Dardanus Hellerii Paul'son, 1875: 90, 91, pl. 12, fig. 4, 4a-c.
Dardanus hellerii Paul'son, 1961: 96, pl. 12, figs. 4, 4a-c (translation of Paul'son, 1875).
Dardanus euopsis; Maki & Tsuchiya, 1923: 98, pl. 8, fig. 4.
Dardanus sanguinolentus; Forest, 1956b: 49.
Dardanus affinis; Gordan, 1956: 312 (lit.).
Dardanus lagopodes; Lewinsohn, 1969: 32, pl. 2, figs.

Material.— RMNH D 47862: 1 ♂ sl. 9.5 mm. NIOP-E SEY. Sta. 711: S coast of Aride Island; 04°13'S 55°40'E; 18/19.xii.1992; scuba diving, snorkeling, shore collecting; sandy and rocky shore and calcareous reef and slope.— RMNH D 47863: 1 ♂ sl. 8.1 mm. NIOP-E SEY. Sta. 713: S of Aride Island; 04°13'S 55°40'E; 19.xii.1992; 35 m; calcareous nodules, red algae.— RMNH D 47864: 4 ♀, sl. 2.4-7.6 mm. NIOP-E SEY. Sta. 716: N of Aride Island; 04°12'S 55°40'E; 19.xii.1992; 40 m; calcareous nodules, red algae.— RMNH D 47865: 2 ♂ sl. 4.9, 5.2 mm. NIOP-E SEY. Sta. 719: E of Bird Island; 03°44'S 55°14'E; 20.xii.1992; 45 m; sandy bottom with numerous small rhodolites.— RMNH D 47866: 1 ♀, 2 ovigerous ♀ sl. 2.9-6.2 mm. NIOP-E SEY. Sta. 733: SW of La Digue island; 04°23'S 55°50'E; 23.xii.1992; 30 m; shells, some corals, some rhodolites.— RMNH D 47867: 3 ♂, 1 ♀ sl. 4.6-7.2 mm. NIOP-E SEY. Sta. 738: SE of Mahé; 04°45'S 55°33'E; 24.xii.1992; 35-45 m; dead and living corals, sponges, rhodolites.— RMNH D 47868: 1 ♂ sl. 8.9 mm. NIOP-E SEY. Sta. 741: Mahé, SE coast, Anse Royale bay off Ile Souris; 04°44'S 55°32'E; 24.xii.1992; scuba diving on outside of reef barrier.— RMNH D 47869: 1 ♂ sl. 3.0 mm. NIOP-E SEY. Sta. 766: N of Poivre Island; 05°44'S 53°20'E; 29.xii.1992; 43-48 m; coarse calcareous sand with rhodolites, few stony and soft corals.—RMNH D 47870: 3 ♂ sl. 1.7-3.8 mm. NIOP-E SEY. Sta.

776: N of Poivre Island; 05°42'S 53°18'E; 31.xii.1992; 42-45 m; calcareous gravel, *Halimeda* deposit and small rhodolites.— RMNH D 47871: 1 ♀ sl. 2.8 mm. NIOP-E SEY. Sta. 778: W of Poivre atoll; 05°46'S 53°11'E; 1.i.1993; 57 m; soft bottom with sponges and shells, soft corals.— RMNH D 47872: 1 ♂ sl. 7.4 mm. NIOP-E SEY. Sta. 788: Alphonse atoll, SE part of lagoon; 07°02'S 52°44'E; 4,6.i.1993; to 8 m; scuba diving and snorkeling on patch reefs and reef flat.

Remarks.— Reported from the Seychelles by Richters (1880) as *Pagurus euopsis* Dana, 1852a. *Dardanus lagopodes* is widely distributed in the Indian and western Pacific Oceans, and is the most common species of *Dardanus* found in the Seychelles.

Distribution.— East Africa; Seychelles; Mauritius; Madagascar; Red Sea; southern India; Philippines, Taiwan; Japan; Malaysia; New Guinea; Australia; Samoa; French Polynesia.

Dardanus guttatus (Olivier, 1812)
(pl. 2, figs E-F)

Restricted synonymy:

Pagurus guttatus Olivier, 1812: 640; Quoy & Gaimard, 1824: 533, pl. 79, fig. 3; Dana, 1852b: 451; Dana, 1855, pl. 28, fig. 3a-b; Alcock, 1905: 87, pl. 9, fig. 1.

Pagurus setifer; Hess, 1865: 35; Hilgendorf, 1879: 815, pl. 3, fig. 8. Not *Pagurus setifer* H. Milne Edwards, 1836.

Dardanus guttatus; Holthuis, 1953: 48.

Material.— RMNH D 47873: 1 ♀ sl. 6.2 mm. NIOP-E SEY. Sta. 758: St Joseph atoll, S rim; 05°27'S 53°21'E; 28.xii.1992; scuba diving on reef slope.

Remarks.— Reported from the Seychelles by Richters (1880). The single specimen collected during the 1992-1993 expedition is aberrant in having a much smaller than normal left cheliped (pl. 2, fig. E). The characteristic large patch of light colouration on the outer surfaces of the carpi of the chelipeds immediately sets *D. guttatus* apart from other species of the genus.

Distribution.— East coast of Africa; Seychelles; Mauritius; Madagascar; Indian Ocean; Indonesia; South China Sea; New Guinea; Australia; Samoa; Loyalty Islands.

Dardanus setifer (H. Milne Edwards, 1836).
(pl. 2, figs G-H)

Restricted synonymy:

Pagurus setifer H. Milne Edwards, 1836: 274; Alcock, 1905: 83, pl. 8, fig. 3.

Pagurus sculptipes Stimpson, 1858: 246.

Pagurus pavimentatus Hilgendorf, 1879: 816, pl. 3, figs. 1-5.

Dardanus setifer; Forest, 1956: 49; Tirmizi & Siddiqui, 1982: 80, figs. 41, 42.

Not *Pagurus setifer*; Hess, 1865: 35; Hilgendorf, 1878: 815, pl. 3, fig. 8 [= *Dardanus guttatus* (Olivier, 1812)].

Not *Pagurus setifer*; de Haan, 1849: 209; Terao et al., 1932: pl. 57, fig. 3; Barnard, 1950: 426, text fig. 79d [= *Dardanus crassimanus* (H. Milne Edwards, 1836)].

Material.— RMNH D 47874: 1 ♀ sl. 4.8 mm. NIOP-E SEY. Sta. 782: N of île Desnoeufs; 06°08'S 53°02'E; 2.i.1993; 54 m; soft bottom with sponges and seagrass roots, soft corals.

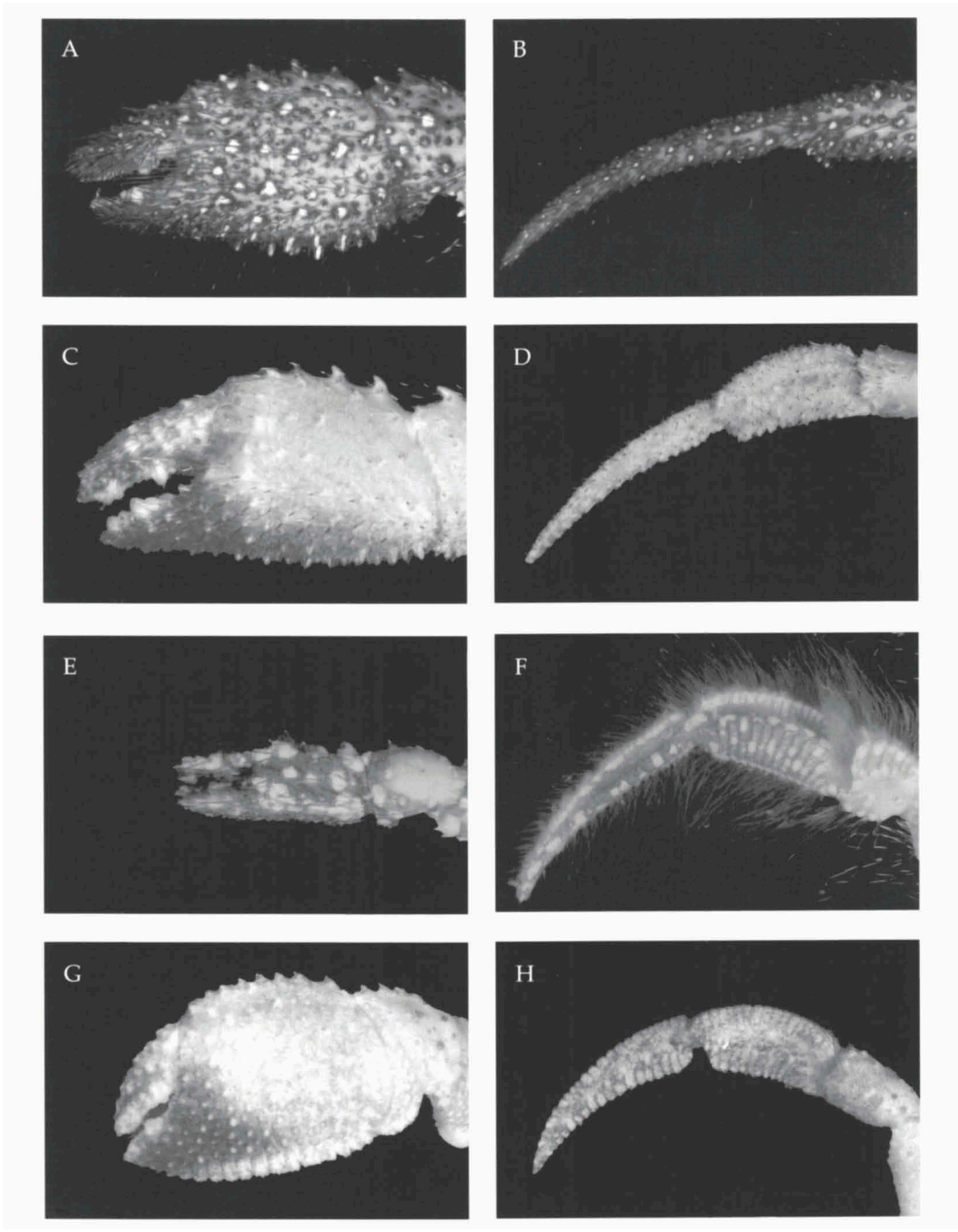


Plate 2. A-B, *Dardanus megistos* (Herbst, 1804), ♀ sl. 8.6 mm (RMNH D 47861); C-D, *Dardanus lagopodes* (Forskål, 1775), ♂, sl. 6.7 mm (RMNH D 47867); E-F, *Dardanus guttatus* (Olivier, 1812), ♀, sl. 6.2 mm (RMNH D 47873); G-H, *Dardanus setifer* (H. Milne Edwards, 1836), ♂, sl. 4.8 mm (RMNH D 47874).

Remarks.— This is the first report of this species from the Seychelles.

Distribution.— South Africa; Madagascar; Mauritius to Pakistan; India; Sri Lanka; Vietnam; Hong Kong; Australia; Torres Strait, Indonesia.

Diogenes avarus Heller, 1865

Restricted synonymy:

Diogenes avarus Heller, 1865: 83, pl. 7, fig. 2; Alcock, 1905: 68, pl. 6, figs. 6, 6a; Lewinsohn, 1969: 37, fig. 4; Tirmizi and Siddiqui, 1982: 54, fig. 29.

Diogenes rectimanus; Lanchester, 1902: 366 (in part). Not *Diogenes rectimanus* Miers, 1884.

Diogenes pugilator; Bouvier, 1892: 55; Nobili, 1906: 76; Balss, 1915: 9. Not *Diogenes pugilator* Roux, 1829.

Diogenes pugilator var. *avarus*; Nobili, 1906: 119.

Material.— RMNH D 47875: 1 ♀ sl. 1.6 mm. NIOP-E SEY. Sta. 700: NE of Mahé; 04°33'S 55°50'E; 15.xii.1992; 38 m; calcareous sand.

Remarks.— This small species of *Diogenes* is common throughout the Indian Ocean; however, not always recognized. For example, Lanchester (1902) identified specimens of *D. avarus* as *D. rectimanus* Miers, 1884 (cf. McLaughlin & Clark, 1997). As with all species of *Diogenes*, considerable intraspecific variation is seen in the left chela. *Diogenes avarus* is best recognized by its moderately short and stout ocular peduncles that are considerably overreached by the antennular peduncles, but equaling or only slightly overreached by the antennal peduncles, and by its broad ocular acicles armed with 3-5 spines, the median most prominent. Additionally, the telson has subequal lobes separated by a small median cleft. The left lobe is armed with strong spines on terminal and lateral margins, the right with only a few spines on terminal margin.

Distribution.— East Africa and Red Sea; across Indian Ocean to Malaysia; northern Arabian Sea; Philippines; Indonesia; northern and northwestern Australia.

Incertae sedis

Material.— PMcL: 1 megalopa sl. 0.67 mm. Sta. E500B: 06°27'S 56°11'E; 14.i.1992; 48 m; coll. Wimpey Environmental Ltd.

Remarks.— This specimen appears to represent a diogenid, but cannot be identified further. The telson and uropods are similar to those seen in megalopae of *Dardanus* (cf. Provenzano, 1963a, b) and *Trizopagurus* (cf. Provenzano, 1967), but ambulatory dactyls lack the strong spines reported for species of the former genus. No species of *Trizopagurus* have been reported from the Seychelles; however, a species of the closely allied *Ciliopagurus* does occur here. Unfortunately megalopae of *Ciliopagurus* have not been described.

Paguristes lauriei spec. nov.
(figs 6-10)

Paguristes mundus; Laurie, 1926: 154. Not *Paguristes mundus* Alcock, 1905.

Material.— RMNH D 47876: ovigerous ♀ sl. 3.68 mm (holotype). NIOP-E, Sta. SEY. 778: West of Poivre Island; 05°46'S 53°18'E; 31.xii.1992; 57 m; soft bottom with sponges and shells.

Description of female holotype.— Shield (fig. 6) longer than broad; dorsal surface rugose but without spines and only few sparse tufts of very short setae. Lateral projections subtriangular, acute, left unarmed, right with terminal spine. Rostrum slender, acute, reaching to mid-length of ocular acicles.

Ocular peduncles slender, unequal, left appreciably longer; overreaching both antennular and antennal peduncles; corneae not dilated. Ocular acicles small, subtriangular, with simple terminal spine; separated by more than basal width of rostrum.

Antennular peduncles when fully extended reaching to basal margin of cornea of left ocular peduncle. Ultimate and penultimate segments with few short setae. Basal segment with slender spine on dorsolateral margin.

Antennal peduncles reaching only to mid-length of left ocular peduncle. Fifth segment with few scattered short setae. Fourth segment with small dorsodistal spine. Third segment with strong ventrodistal spine. Second segment with dorsolateral distal angle produced, terminating in strong bifid spine; dorsomesial distal angle with prominent spine. First segment unarmed. Antennal acicle reaching to distal half of ultimate peduncular segment, with bifid terminal spine; mesial margin with 3 spines in proximal half, lateral margin with 2 spines in distal half. Antennal flagellum short, approximately 0.80 length of carapace; each article with 1 or 2 short (≤ 1 article length) setae.

Third maxilliped with 1 small spine on dorsodistal margin of merus, ventral margin with 5 spines; carpus with 1 dorsodistal and 1 ventral spine.

Chelipeds subequal; left (fig. 7) larger; armament generally similar. Dactyl slightly longer than palm; dorsomesial margin with row of strong spines, dorsal surface with 2 irregular rows of much smaller spines; cutting edge with row of very small calcareous teeth in proximal 0.65, corneous teeth distally; terminating in corneous claw and slightly overlapped by fixed finger. Palm slightly shorter than carpus, dorsoventrally swollen; dorsomesial margin with row of 6 (left) or 5 (right) strong spines, dorsal surface with numerous somewhat smaller spines, extending length of fixed finger; dorsolateral margin not delimited, dorsolateral surface convex, with numerous rather closely-spaced small tuberculate spines; mesial surface with 2 or 3 transverse rows of low tubercles; ventral surface with few prominent spinose corneous-tipped tubercles and scattered moderately long setae; cutting edge of fixed finger with row of small calcareous teeth; terminating in small corneous claw. Carpus slightly more than half length of merus; dorsomesial margin with row of strong spines, dorsal surface with 2 or 3 irregular rows of smaller spines; dorsolateral margin not delimited, lateral face with several small spines, laterodistal margin with row of small spines; mesial face with spines in dorsal half. Merus acutely triangular; dorsodistal and laterodistal margins each with spines; dorsal margin with row of spines decreasing in size proximally and extending onto lateral face dorsally in distal half; ventromesial and ventrolateral margins each with row of spines. Ischium with 2 (left) or 1 (right) minute spinule on ventromesial margin distally.

Ambulatory legs (figs 8, 9) overreaching tip of left cheliped by approximately half length of dactyls, very sparsely setose. Dactyls approximately 1.50 length of propodi;

dorsal margins each with row of small spines in proximal 0.65 of length accompanied by row of corneous bristles extending to claw (second), or only with row of corneous bristles (third); lateral faces each with longitudinal row of sparse tufts of short setae; mesial faces each with short, shallow longitudinal sulcus proximally and longitudinal row of widely-spaced small corneous spinules in dorsal half, few setae dorsally and ventrally, second left also with short row of widely-space spinules in proximal half adjacent to ventral margin; ventral margins each with row of 15-18 corneous spines. Propodi slightly longer than carpi; dorsal margins each with row of strong spines (second) or low protuberances (third); ventral margins with low protuberances armed with corneous spinules (second) or unarmed (third), mesial faces each with 2 small spines on distal margin ventrally (second) or 1 spine and 1 corneous spinule (third); mesial and lateral surfaces also with scattered setae. Carpi slightly more than half length of meri; dorsal margins each with row of strong spines (second) or strong dorsodistal spine and 1 or more spinules proximally (third); lateral faces each with weak longitudinal sulcus and sparse tufts of very short setae. Meri each with 1 or 2 spinules at dorsodistal margin, dorsal surface with low sometimes spinulose protuberances and few setae; ventral margins each with row of spines at least in distal half (second) or unarmed (third) and with some moderately long setae. Ischia with 1 or 2 spinules on dorsal margins distally, ventral margins each with 1 distal and 1 proximal small spinule (second) or unarmed (third).

Female gonopores paired; paired first gonopods well developed. Abdomen damaged; fourth and fifth pleopods, uropods and telson missing. Left second and third pleopods each carrying eggs attached to both rami; eggs 0.46-0.61 mm diameter. Brood pouch apparently represented by dense covering of plumose setae arising from longitudinal thickenings in tergal walls above acetabula of second and third pleopods (fig. 10).

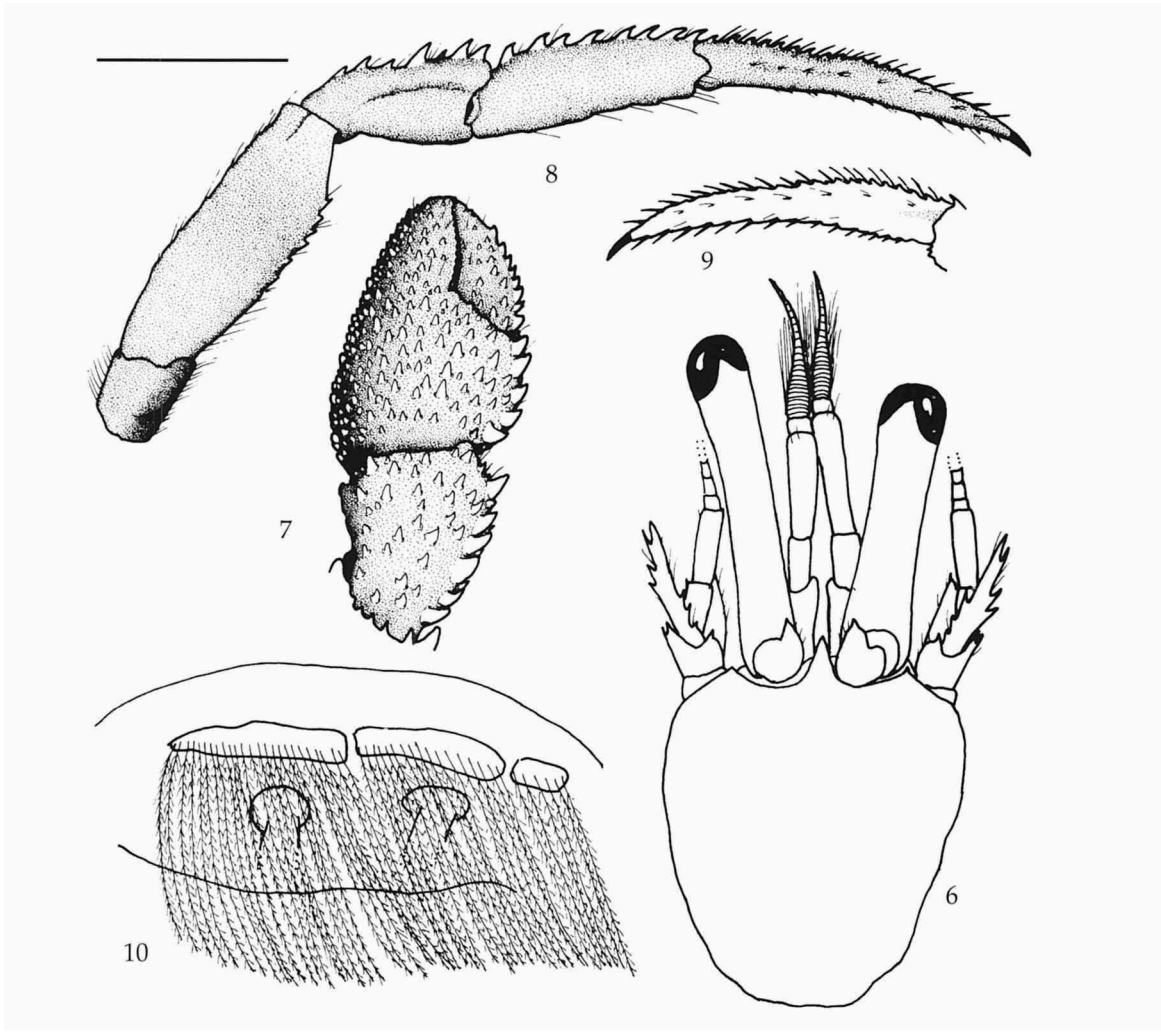
Etymology.— Named for R. Douglas Laurie, who first reported this species from the Seychelles and Amirante Islands.

Colour (in preservative).— Shield white with mottling of orange. Ocular peduncles solidly orange; ocular acicles mottled orange and white spines with reddish tips. Antennular peduncles with faint orange tint. Antennal peduncles with faintly tinted fifth, fourth and third segments; first and second segments and acicles mottled orange and white. Meri of chelipeds with faint orange tint, mesial and lateral faces each with circular patch of dark orange in distal third; carpi also with faint orange tint, some spines with slightly darker tint; chelae generally white, with few spines orange-tinted, dactyls each with submedian orange band. Ambulatory legs with scattered splotches of orange on white background colour; mottled orange bands as follows: one submedian band on merus and propodus, two, one subproximal and one subdistal on dactyl.

Habitat.— Collected on soft bottom with sponges, shells and soft corals; 57-80 m.

Distribution.— Seychelles and Amirante Islands.

Remarks.— Laurie (1926) reported the occurrence of *Paguristes mundus* Alcock, 1905 in the Seychelles and Amirante Islands based on four male specimens collected by J. Stanley Gardiner during the voyage of the H.M.S. "Sealark" to the western Indian Ocean in 1905. Although much of the "Sealark" material is housed in the University Museum of Zoology, Cambridge, Laurie's "*Paguristes mundus*" could not be



Figs. 6-10. *Paguristes lauriei* spec. nov., ovigerous ♀ sl. 3.68 mm, holotype RMNH D 47876. 6, shield and cephalic appendages; 7, chela and carpus of left cheliped; 8, right second pereiopod, lateral view; 9, dactyl of right second pereiopod, mesial view; 10, left anterior portion of abdomen showing tergal thickenings and setal brood pouch. Scale = 2 mm.

found (R. Symonds, pers. comm.). Laurie's description, including notes on colour, agrees extremely well with the female specimen in the present collection. Our specimen certainly does not belong to the taxon described and illustrated as *P. mundus* by Alcock (1905). Alcock's species reportedly has a broadly triangular rostrum that just overreaches the level of the lateral projections, but does not reach the mid-length of the ocular acicles. The ocular peduncles of *P. mundus* are described as stout and just longer than the anterior margin of the carapace and antennular peduncles, with large corneae. Alcock illustrated (pl. 3, fig. 5) a species with multifid ocular acicles. In none of these characters does the Seychelles species agree with *P. mundus*, nor did the spec-

imens reported by Laurie (1926). Neither does the Seychelles species agree with the colour (in preservative) that Alcock (1905) reported. We can only suspect that it was the similarity in the strength and general arrangement of the spines on the chelipeds of the Seychelles species and Alcock's taxon that led Laurie (1926) to identify his specimens as *P. mundus*, although as he pointed out, it is the left cheliped of *P. lauriei* spec. nov. that is noticeably larger, not the right as illustrated by Alcock (1905: pl. 3, fig. 5).

Laurie (1926) also compared his specimens to *P. balanophilus* Alcock, 1905, because of a resemblance in colour patterns, particularly the distinctive meral patch on the mesial and lateral surfaces of both chelae, and the band of colour on the dactyls of the ambulatory legs. Laurie mentioned the differences in the armature of the chelipeds and lack of setation in his specimens that distinguished it from *P. balanophilus*. Additionally, the antennal flagellum of *P. balanophilus* is reportedly longer than the carapace. In *P. lauriei* it is shorter. Likewise, Laurie distinguished his specimens from the generally similar *P. pusillus* Henderson, 1896 by its longer antennal flagella and shorter ocular peduncles. Alcock (1905: 38) reported that the meri of the chelipeds of *P. pusillus* each had a white patch on a pinkish background in preserved specimens, and females had very large eggs. As noted above, the meri of the chelipeds of *P. lauriei* each have a mesial and lateral patch of red (in preservative). The eggs of our female are not particularly large.

Paguristes lauriei is also superficially similar to *Paguristes oculatus rubropictus* A. Milne-Edwards & Bouvier, 1892 from the west coast of Africa in having elongate ocular peduncles that overreach both the antennular and antennal peduncles, simple ocular acicles, unequal and spinose chelae, and second pereiopods armed dorsally on the carpi, propodi and dactyls. However, *P. lauriei* spec. nov. is easily distinguished from that species by coloration, and particularly by the apparent absence of a female brood pouch.

Although the abdomen of our specimen is damaged posterior to the third pleopod, with fourth and fifth pleopods, uropods, and telson missing, the left pleopods two and three are still intact. The brood pouch, characteristic of the many *Paguristes* species (cf. Forest, 1954), develops as a fold of tissue arising between the third and fourth pleopods. In *P. lauriei* there appears to be no brood pouch. Instead the eggs are shielded by a uniform row of long, dense, plumose setae arising dorsally from a thickened longitudinal tergal ridge (fig. 10) that extends from anterior of the acetabulum of the second pleopod to just posterior of the third. The ridge is interrupted by a very short membraneous space between the acetabula of the second and third pleopods and again between the acetabulum of the third and the termination of the ridge, which, because of the shortness of the section, would lie anterior to the point of origin of the acetabulum of the fourth pleopod. To have long setae replace, or perhaps evolutionarily precede the development of a brood pouch is not unique to *P. lauriei*. McLaughlin & Provenzano (1974) reported the absence of a brood pouch in the western Atlantic *Paguristes anomalus* Bouvier, 1918, and in its place a short transverse row of moderately long setae. Similarly, in lieu of a brood pouch, *Paguristes setosus* (H. Milne Edwards, 1848) from New Zealand has a tuft of long dense setae arising from the integument between the third and fourth pleopods (Forest & McLaughlin, in press). What is different about the setal brood pouch of *P. lauriei* is that it arises from a semi-continuous thickened longitudinal ridge above the second and third pleopods,

a condition that, to our knowledge, has not been reported for other species of *Paguristes*.

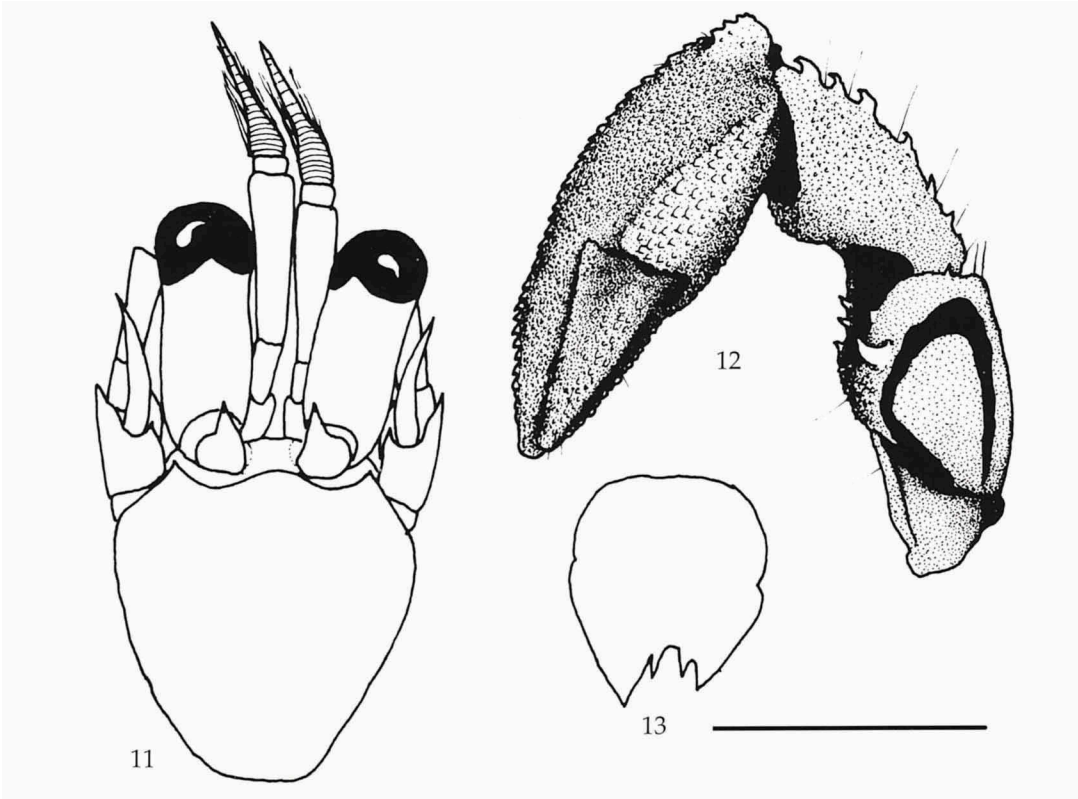
Family Paguridae

Anapagurus bonnieri Nobili, 1905
(figs 11-13)

Anapagurus Bonnieri Nobili, 1905: 239; Nobili, 1906 (in part: 89, pl. 5, fig. 19, 19a (not 19b).
Anapagurus bonnieri; Lewinsohn, 1969: 87, fig. 15; García-Gómez, 1994: 63, figs. 18, 19.
Anapagurus sp.; Haig & Ball, 1988: 179, fig. 9.

Material.— PMcL: 1 ovigerous ♀ sl. 1.07 mm. Sta. SE1200-BF: 06°03'S 56°19'E; 16.i.1992; coll. Wimpey Environmental Ltd.— PMcL: 1 ♀ sl. 0.79 mm. Sta. E1200B: 06°27'S, 56°12'E; 14.i.1992; 46 m; coll. Wimpey Environmental Ltd.— PJH: 1 ♂ sl 0.67 mm, 1 ♀ sl. 0.88 mm. Sta. 1200A: 06°27'S 56°11'E; 15.i.1992; coll. Wimpey Environmental Ltd.

Remarks.— *Anapagurus bonnieri* is represented in the Seychelles collection by four very small specimens, of which only the ovigerous female is not missing some or all appendages, and it is upon this specimen that we base our comparative remarks. In the configuration of the shield and cephalic appendages (fig. 11), our Seychelles specimen agrees better with the Red Sea specimens reported on by García-Gómez (1994) than Haig and Ball's (1988) Indonesian specimens that he also examined. However, there are differences. In our specimen, the shield is clearly longer than broad; the broadly rounded rostral lobe does not overreach the spinose lateral projection; and the antennal peduncles reach only to mid-length of the corneae. The right cheliped (fig. 12) and ambulatory legs agree more closely with the Indonesian specimen illustrated by Haig & Ball (1988: fig. 9, as *Anapagurus* spec.) than those described and illustrated by García-Gómez (1994: 63, fig. 18C-H); whereas, the left cheliped agrees better with the Red Sea specimen illustrated. The right cheliped of the Seychelles specimen has a distinctly more ovate chela than either of the other illustrated specimens; however, this is most probably a sexually dimorphic character. The specimens illustrated by Haig & Ball (1988: fig. 9D) and García-Gómez (1994, fig. 18C) are both males, while the Seychelles specimen, as noted above, is an ovigerous female. Other variations from García-Gómez's description include: 1) the dorsal surfaces of the dactyl and palm of our specimen are spinulose rather than granular; 2) the dorsomesial margin of the carpus has a row of 6 moderately-spaced spines, and the dorsomesial distal angle is not produced into a triangular structure; 3) the mesial face just above the ventromesial margin has a very large outwardly directed spine, rather than the large marginal tubercle described for the Red Sea specimens. The pilosity of the cheliped described by García-Gómez (1994) and illustrated by Haig & Ball (1988) is lacking in our Seychelles specimen. Haig & Ball's (1988) fig. 9B depicts the carpus of the left cheliped as completely unarmed in dorsal view, but with 1 small spine in lateral view (fig. 9C). Our Seychelles specimen has 3 widely-spaced spines on each dorsal margin of the carpus, as described and illustrated by García-Gómez (1994) for the Red Sea specimen; however, the dorsal surface of the palm and fixed finger of our specimen is much more spinulose than illustrated for the latter. The right second pereiopod of the



Figs. 11-13. *Anapagurus bonnieri* Nobili, 1905, ovigerous ♀ sl. 1.07 mm. Sta. SE1200-BF, PMcL. 11, shield and cephalic appendages; 12, right cheliped mesial view; 13, telson. Scale 11-12 = 1 mm, 13 = 0.5 mm.

Seychelles specimen has 3 small spines on the dorsal margin, rather than 4 as in the Indonesian specimen, or 6 as in the Red Sea specimen, but like the Indonesian specimen, our specimen lacks spines on the ventral margin of the merus; the carpus of the third right pereiopod has a dorsodistal spine, not illustrated for the Indonesian specimen, but reported to number 2-7 in Red Sea specimens. Judging from the armature of the carpi and the structure of the ischia of the ambulatory legs illustrated by García-Gómez (1994, fig. 18G, H) his figure legends are reversed. Figure 18G represents the third right pereiopod, whereas fig. 18H depicts the second. The telson of our specimen (fig. 13) agrees more closely with García-Gómez's Red Sea specimen than with the specimen illustrated from Indonesia.

Of the remaining three Seychelles specimens, the single male has no appendages, but can be identified by the development of its sexual tube. One of the non-ovigerous females is accompanied by a right cheliped, the other by a left. The spinose crest on the right cheliped of this very small specimen is only faintly distinguishable, the breadth of the palm is moderately narrow, and there is no observable protuberance or spine on the ventromesial margin or face of the merus. This specimen has a full complement of ambulatory legs; however, only the right second shows any development

of carpal spines. The left cheliped of the second female agrees with that of the ovigerous female in having two rows of widely-spaced, although quite small, spines on the dorsal surface of the carpus; of the two ambulatory legs present, the right second shows indications of 3 spinules on the dorsal surface of the carpus, whereas the third left is unarmed.

The ovigerous female is carrying 9 eggs, diameter 0.43-0.46 mm, with eyes clearly visible.

Colour.— Basically transparent, but with white chromatophores (Haig & Ball, 1988).

Habitat.— Collected from depths of 5-15 m in the Red Sea and Indonesia.

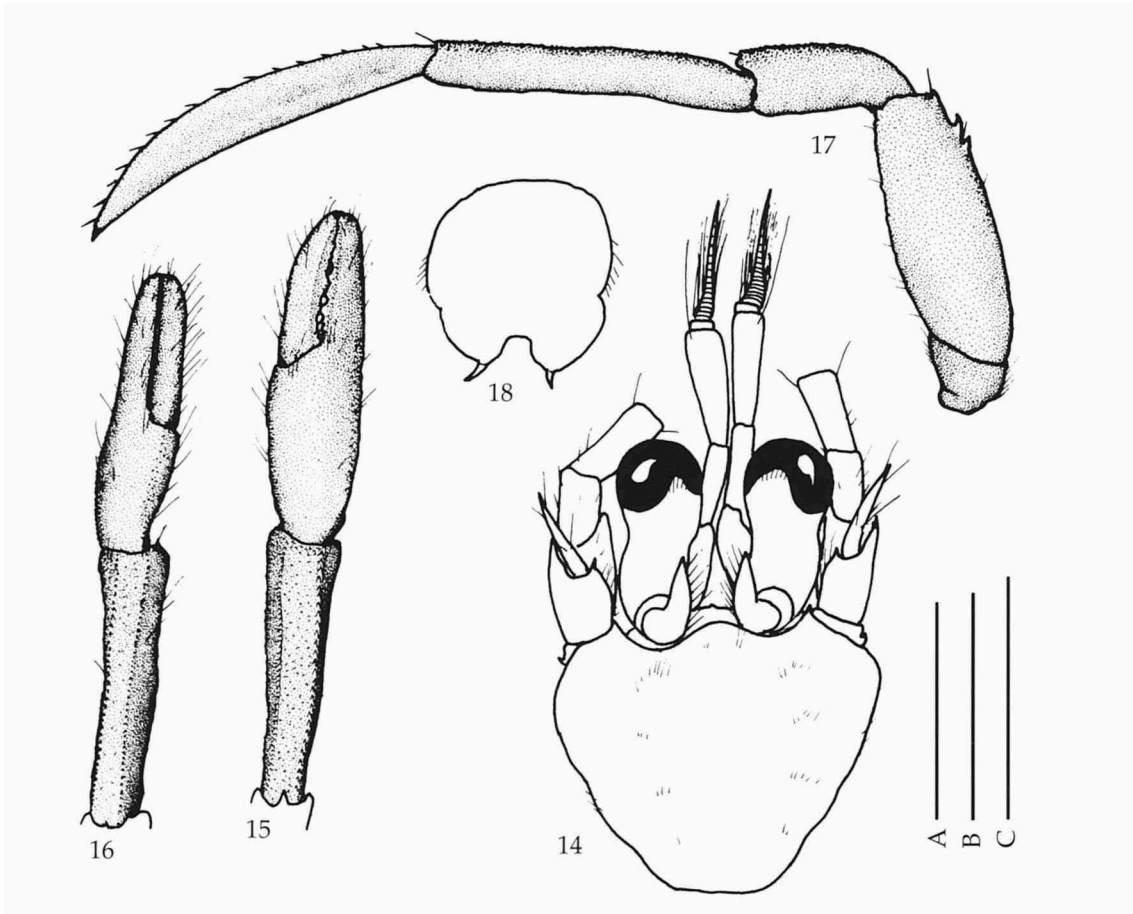
Distribution.— Red Sea and Persian Gulf, Indonesia. Reported for the first time from the Seychelles.

Catapagurus spec.
(figs 14-18)

Material.— RMNH D47877: 2 ovigerous ♀ sl. 1.58, 2.39 mm. NIOP-E SEY. Sta. 700: NE of Mahé; 04°33'S 55°50'E; 15.xii.1992; 38 m; calcareous sand.

Diagnosis.— Shield (fig. 14) broader than long; dorsal surface with few sparse tufts of fine setae. Rostrum broadly rounded, not reaching beyond well developed subtriangular lateral projections. Ocular peduncles approximately 0.80 shield length, with distinct median constriction; cornea dilated, maximum corneal width included approximately twice in peduncular length. Ocular acicles elongate, reaching nearly to mid-length of ocular peduncles, with small terminal spine. Antennular peduncles overreaching distal margins of corneae by 0.50 length of penultimate segment; basal segment with ventrodistal margin strongly and acutely produced. Antennal peduncles overreaching distal margins of corneae by 0.25-0.50 length of ultimate segment; second segment with dorsolateral distal angle produced beyond proximal margin of fourth segment, terminating in simple or bifid spine; first segment with hooked lateral spine and prominent ventrolateral spine. Crista dentata on ischium of third maxilliped with 5 or 6 teeth.

Right cheliped longer, but not appreciably stronger than left. Dactyl only slightly shorter than palm; dorsal surface convex, unarmed but with scattered moderately long setae dorsally and ventrally; cutting edge with row of very small calcareous teeth distinctly set off from dorsal surface. Palm (fig. 15) approximate 0.75 length of carpus; dorsomesial margin rounded, microscopically granular; dorsal surfaces of palm and fixed finger unarmed, dorsolateral margin microscopically granular or spinulose in distal 0.75, granulations extending onto fixed finger proximally; lateral face microscopically granular; cutting edge of fixed finger with row of very small calcareous teeth. Carpus with row of closely-spaced spinules, dorsolateral margin with row of small slender spines; dorsal, mesial, lateral and ventral surfaces minutely spinulose. Merus with 1 moderately strong spine just posterior to dorsodistal margin; ventromesial and ventrolateral margins spinulose. Left cheliped (fig. 16) generally similar, but armature weaker. Ambulatory legs (fig. 17) similar. Dactyls elongate, approximately equal to length of propodi, broadly spatulate; dorsal margins each



Figs. 14-18. *Catapagurus* spec. ovigerous ♀ sl. 2.39 mm, RMNH D 47877. 14, shield and cephalic appendages; 15, chela and carpus of right cheliped; 16, chela and carpus of left cheliped; 17, left third pereiopod, lateral view; 18, telson. Scale A: 14-16 = 2 mm. Scale B: 18 = 1 mm. Scale C: 17 = 3 mm.

with row of slender, moderately long spiniform bristles in distal half; ventral and lateral surfaces unarmed; mesial faces slightly concave, each with row of small corneous spinules adjacent to ventral margin. Propodi at least twice length of carpi; dorsal surfaces granular. Carpi with granular or spinulose dorsal surfaces, dorsodistal margins each with 1 or 2 larger spines at distal margin. Meri much more robust than other segments; dorsal surfaces each with 2 to 4 (usually 3) strong spines in distal third; ventral surfaces granular, ventrolateral distal angles each with spine. Fourth pereiopod with prominent preungual process at base of claw.

Telson (fig. 18) with posterior lobes roundly subtriangular, broadly separated; each with strong corneous terminal spine.

Colour.— Not known.

Habitat.— Shells of *Polinices* spec.

Distribution.— At present, uncertain.

Remarks.— As noted by McLaughlin (1997), serious inconsistencies and inaccura-

cies exist in the reports of earlier authors for Indo-Pacific species of *Catapagurus*. The Seychelles specimens are quite similar to *C. alcocki* McLaughlin (in Hogarth et al., in press) from the Maldives and *C. ensifer* sensu Lewinsohn (1969) (not *C. ensifer* Henderson, 1888) from the Red Sea, but appear to be distinct from both. Haig & Ball (1988) similarly reported a *C. ensifer*-type *Catapagurus* spec. from the Arafura Sea, indicating that while it probably represented an undescribed species, pronounced sexual dimorphism in species of this genus made it inadvisable to present a description or assign a name based on a single specimen. The genus currently is under review by A. Asakura (pers. comm.), and for this reason we have declined to propose a specific name for our two female specimens until such time as Dr. Asakura's study is complete.

Incertae sedis

Material.— PMcL: 2 ♂ sl. 0.88, 0.92 mm. Sta. S2500-A2: 06°28'S 56°11'E; 15.i.1992; coll. Wimpey Environmental Ltd.— PMcL: 1 ♀ sl. 0.95 mm. Sta. SE2500: 06°04'S 56°E; 16.i.1992; 31 m; coll. Wimpey Environmental Ltd.— PMcL: 1 juvenile sl. 0.46 mm. Sta. N5000-B2: 06°24'S 56°11'E; 13.i.1992; 38 m;coll. Wimpey Environmental Ltd.

Remarks.— The adults, two males and one female, lack all appendages, and cannot be assigned with confidence to any genera, although their placement in the Paguridae is not in doubt. The smaller of the males from station S2500-A2 has a very slight protrusion vas deferens from the right gonopore, suggesting early development of a sexual tube. No similar development could be seen in the slightly larger male. The female from station SE2500 has paired gonopores; no paired pleopods could be observed. The juvenile from station N5000-B2 has all of its appendages; however, the abdomen and telson are severely damaged. This specimen is most probably a pagurid, rather than a diogenid, but its small size and immaturity make generic placement impossible.

Nematopagurus holthuisi spec. nov.
(figs 19-26)

Nematopagurus muricatus; Laurie, 1926: 161. Not *Nematopagurus muricatus* (Henderson, 1896).

Material.— RMNH D 47878: ♂ sl. 2.87 mm (holotype). NIOP-E SEY. Sta. 720: E of Bird Island; 03°45'S 55°14'E; 45 m; 20.xii.1992; sediment mainly *Halimeda*, seagrass remnants, sponges and few rhodolites.— RMNH D 47879: moulted chelipeds, left second and third pereiopods (paratype). NIOP-E SEY. Sta. 714: NE of Aride Island; 04°10'S 55°44'E; 55 m; 19.xii.1992; muddy sand bottom with soft corals.— RMNH D 47880: 1 ♂ sl. 2.42 mm (paratype). NIOP-E SEY. Sta. 719: E of Bird Island; 03°44'S 55°14'E; 45 m; 20.xii.1992; sandy bottom with numerous small rhodolites.— RMNH D 47881: 1 ♂, 1 ovigerous ♀ sl. 1.73, 3.20 mm (paratypes). NIOP-E SEY. Sta. 720: E of Bird Island; 03°45'S 55°14'E; 45 m; 20.xii.1992; sediment mainly *Halimeda*, seagrass remnants, sponges and few rhodolites.

Composite description.— Shield (fig. 19) as broad or broader than long; anterolateral margins sloping; anterior margin between rostrum and lateral projections concave; posterior margin truncate; dorsal surface with sparse tufts of setae anteriorly and laterally. Rostrum broadly rounded, weakly produced or nearly obsolete, not

reaching level of lateral projections. Lateral projections roundly triangular, each usually with prominent submarginal spine.

Ocular peduncles 0.80-0.95 length of shield; dorsal surfaces each with median tuft of stiff setae at base of cornea, 1 additional tuft on mesial surface and sparse setae on dorsal surface; corneae somewhat dilated. Ocular acicles small, narrowly triangular; terminating acutely, with concave dorsal surface and prominent submarginal spine; widely separated.

Antennular peduncles when fully extended overreaching distal margin of corneae by 0.20-0.50 length of ultimate segment. Ultimate and penultimate segments with few short setae. Basal segment with small spine on lateral margin.

Antennal peduncles not overreaching distal margin of cornea. Fifth and fourth segments with few setae. Third segment with small spine at ventrodistal angle. Second segment with dorsolateral distal angle produced, terminating in simple or bifid spine, lateral margin with 1 or 2 tufts of stiff setae, occasionally also with tiny spinule; dorsomesial distal angle with small spine. First segment with 3 or 4 tiny spinules on ventrodistal margin. Antennal acicle moderately long, reaching distal half of ultimate peduncular segment; arcuate, terminating in acute spine; mesial margin with few moderately long stiff setae. Antennal flagella slightly longer than outstretched right cheliped; every article with 1 or 2 very short setae.

Chelipeds subequal; right (fig. 20) slightly longer and stronger. Dactyl 0.75 length of palm; cutting edge with calcareous teeth, terminating in small corneous claw and slightly overlapped by fixed finger; dorsal surface with several small spines most numerous proximally, few tufts of setae distally, dorsomesial margin with row of slightly stronger spines extending nearly to tip and accompanied by short plumose setae; mesial and ventral surfaces with tufts of long often iridescent setae. Palm slightly shorter than carpus; dorsomesial margin with row of small spines; dorsal surface covered with extremely short fine setae and small spines, numerous but not densely packed, median longitudinal row of spines slightly stronger; dorsolateral margin with row of spines strongest on fixed finger and accompanied by short plumose setae; dorsal surface of fixed finger with similar covering of small spines proximally and scattered setae distally; cutting edge usually with 1-3 large calcareous teeth, smaller calcareous teeth proximally and distally; terminating in small corneous or calcareous claw; mesial and ventral surfaces of palm with some long iridescent setae. Carpus approximately equal to length of merus; dorsodistal margin with 1 or 2 small spines, dorsomesial margin with row of strong spines; dorsal surface practically glabrous, dorsolateral margin with more irregular row of smaller spines; mesial, ventral, and to lesser extent lateral, surfaces with long stiff, iridescent setae; ventrolateral distal angle usually with spinule. Merus subtriangular; dorsodistal margin with row of stiff setae; dorsal margin and mesial and lateral faces with few moderately long stiff setae; ventrolateral margin with 2 strong spines distally; ventromesial margin also with 1 or 2 spines in distal half; ventral surface unarmed or with 1 or 2 transverse rows of 2 or 3 acute subacute or blunt spines and tufts of long stiff iridescent setae. Ischium with few setae dorsally and ventrally.

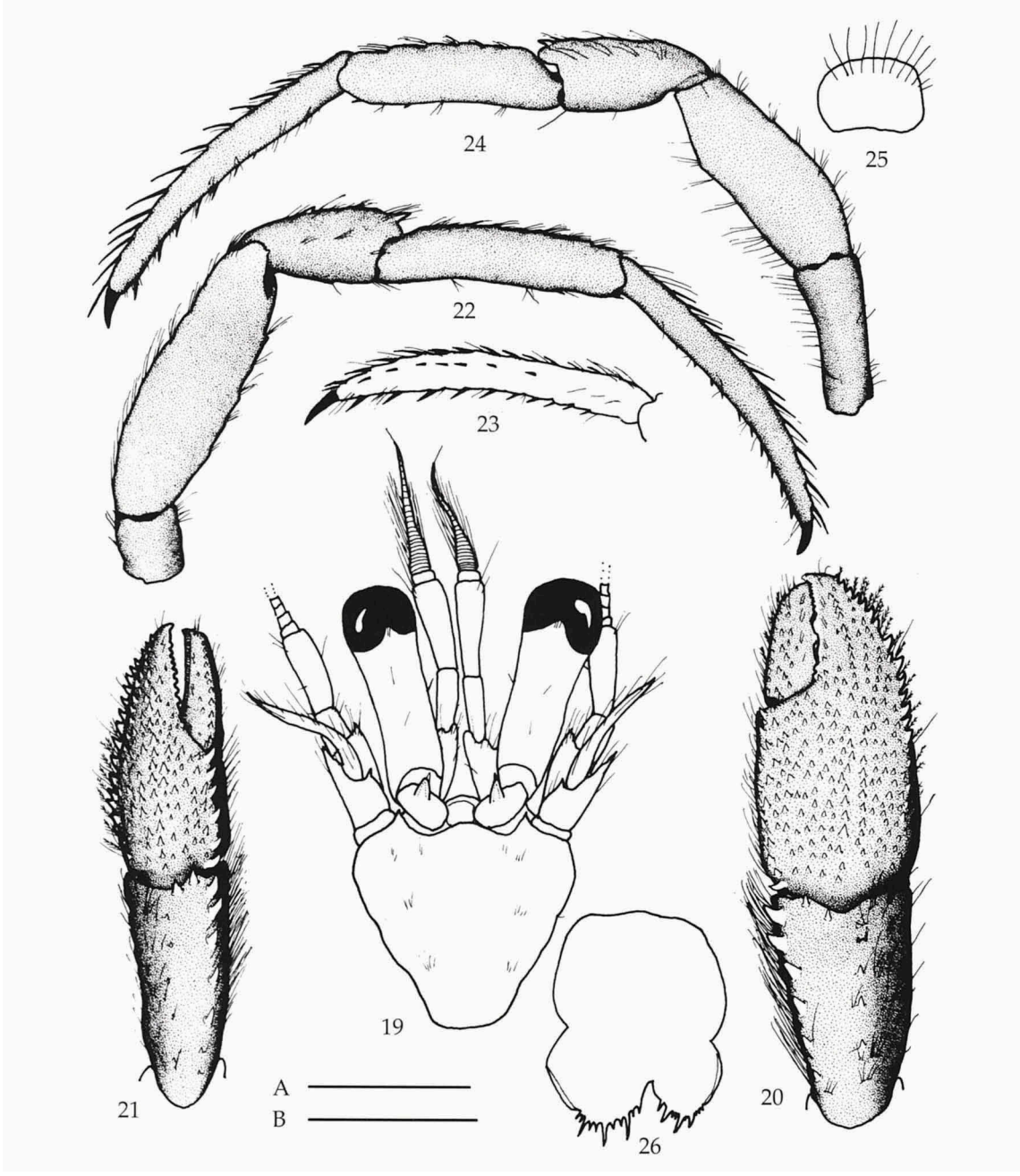
Left cheliped (fig. 21) long, reaching beyond base of dactyl of right; moderately slender. Dactyl equal to or slightly longer than palm; cutting edge with row of small corneous teeth, terminating in small corneous claw and slightly overlapped by fixed

finger; dorsal surface unarmed or with few small spines in proximal half, few sparse tufts of setae distally, dorsomesial margin with row of spines extending nearly to tip; dorsomesial margin, mesial and ventral surfaces usually all with long stiff setae. Palm 0.50-0.65 length of carpus; dorsomesial margin with row of small to moderately strong spines; dorsal surface covered with extremely short fine setae and numerous, but not densely packed, small spines, median longitudinal row on slightly raised midline usually more distinct proximally; dorsolateral margin with row of spines extending nearly to tip of fixed finger and accompanied by short plumose setae; cutting edge of fixed finger with row of small calcareous teeth; mesial, ventral, and to lesser extent, lateral surfaces with long stiff setae. Carpus slightly longer than merus; dorsodistal margin with 1 or 2 prominent spines; dorsomesial margin with row of strong spines, dorsolateral margin with row of spines or sometimes only spinules; mesial, lateral and ventral surfaces all with low protuberances and long stiff iridescent setae; ventrolateral distal angle with acute spine. Merus subtriangular; dorsal surface with transverse rows of stiff setae, particularly at distal margin; ventrolateral margin with 1-3 and ventromesial margin with 1 or 2 strong spines in distal half; ventral surface sometimes with transverse row of 3 small spines or tubercles distally, or with transverse unarmed setose ridges proximally and distally; mesial and lateral faces and ventral surface all with long stiff, often iridescent setae. Ischium sometimes with row of spinules on ventromesial margin.

Ambulatory legs (figs 22-24) all of approximately equal length. Dactyls of second pair 1.10-1.25 length of propodi, dactyls of third pair 1.25-1.50 length of propodi; dorsal surfaces each with row of corneous spines increasing in length, becoming spiniform bristles with increasing size and accompanied by few moderately long setae; mesial faces each with row of short corneous spines dorsally; lateral faces with few scattered setae; ventral margins each with row of 8-10 (second) or 11-12 (third) corneous spines. Propodi 1.10 to 1.35 length of carpi; dorsal surfaces each with low protuberances and tufts of short setae; 1 small corneous spine at each ventrodistal angle, and 1 additional corneous spine in distal half. Carpi 0.50-0.65 length of meri; all with small spine at dorsodistal angle; second pair each with 1 or 2 additional small spines on dorsal surface in proximal half. Meri with widely-spaced tufts of setae dorsally; ventral margins each with low protuberances (sometimes spinose on second) and tufts of stiff setae. Ischia with tufts of setae dorsally and ventrally. Anterior lobe of sternite of third pereiopods (fig. 25) roundly subquadrate, with few marginal setae. Fourth pereiopods semichelate; propodal rasp with 1 row of closely-spaced corneous scales.

Coxa of fifth right pereiopod with long sexual tube directed across ventral thorax and coiled in distal half; left tube short, directed somewhat posteriorly. Telson (fig. 26) with posterior lobes practically symmetrical; separated by moderately deep median cleft; terminal margins somewhat rounded, left with 3-5 moderately large spines, right with 3 or 4, all usually interspersed with smaller spines; lateral margins each with distinct chitinous plate, left sometimes with 1-3 tiny spinules. Female with numerous eggs 0.46-0.61 mm in diameter.

Colour.— In preservative: Most colour has faded; however, the shield has a patch of colour adjacent to each lateral margin. The ocular peduncles each has a band of colour near the proximal margin of the ultimate segment. One distal or subdistal and



Figs. 19-26. *Nematopagurus holthuisi* spec. nov., ♂ sl. 2.42 mm paratype, RMNH D 47880. 19. shield and cephalic appendages; 20, chela and carpus of right cheliped (short fine surface setae not shown); 21, chela and carpus of left cheliped (short fine surface setae not shown); 22, right second pereiopod, lateral view; 23, dactyl of right second pereiopod, mesial view; 24, left third pereiopod, lateral view; 25, anterior lobe of sternite of third pereiopods; 26, telson. Scale A: 19-24 = 2 mm. Scale B: 25-26 = 1 mm.

one median circular band of colour is apparent on both the dactyl and fixed finger of each cheliped. The ambulatory legs are longitudinally striped as follows: ischia each with 3 stripes on lateral face; meri, carpi and propodi each with 1 dorsal, 1 ventral, and 3 lateral stripes, with the upper and lower lateral stripes interrupted medially on the meri and propodi. Dactyls of the ambulatory legs have faint uniform colouration with a darker subdistal band.

Etymology.— This species is named for the imminent carcinologist of the Nationaal Natuurhistorisch Museum, Professor Dr. Lipke B. Holthuis.

Distribution. — Seychelles; North Zululand, South Africa.

Remarks.— Türkay (1986) called attention to the errors of Thompson (1943), Lewinsohn (1969) and Miyake (1978) in assigning their specimens to Henderson's (1896) *N. muricatus*. While Türkay described Lewinsohn's (1969) taxon as the new species *N. lewinsohni* Türkay, 1986, Thompson's (1943) and Miyake's (1978) specimens proved to represent *N. spinulosensoris* McLaughlin & Brock, 1974. Türkay commented that both Southwell's (1906) and Laurie's (1926) reports of *N. muricatus* remained to be verified.

Station 714 contained the moulted appendages of two species; however only those of *N. holthuisi* can be identified with confidence. McLaughlin (in press) has recorded *N. holthuisi* from from North Zululand, South Africa, southeast of the Kosi River.

Nematopagurus holthuisi is quite similar to *N. lewinsohni* in the general armature of the chelae, but the new species is readily distinguished by its: 1) the longer, more slender ocular peduncles with only slightly dilated corneae; 2) longer antennular peduncles; 3) ambulatory legs that all are of relatively equal total length; and 4) carpi of second pereiopods that have 1 or 2 proximal spines in addition to the dorsodistal spine.

Nematopagurus spinulosensoris McLaughlin & Brock, 1974

Nematopagurus spinulosensoris McLaughlin & Brock, 1974: 246, figs. 1-3; McLaughlin, 1997: 510, figs. 20d, h, 41a, b.

Nematopagurus spinulosensorius; Türkay, 1986: 139 (misspelling).

Nematopagurus muricatus; Thompson, 1943: 424; Miyake, 1978: 129. Not *Nematopagurus muricatus* (Henderson, 1896).

Material.— RMNH D 47882: 2 ♂ sl. 8.3, 9.0 mm. NIOP-E SEY. Sta. 785: S of Alphonse atoll, Canal de Mort; 07°03'S 53°43'E; 160-200 m; 3/5.i.1993; coral rubble.

Remarks.— While generally agreeing quite well with specimens from the Hawaiian Islands, the spines on the dorsal surfaces of the palms of both chelipeds are more numerous in the Seychelles specimens and the ambulatory dactyls are shorter and stouter. The telsons of these two specimens lack additional spines adjacent to the terminal margins, and the outer angles are more rounded than in Hawaiian specimens.

Distribution.— Hawaiian Islands, Japan, Maldive Islands, Indonesia; east coast of South Africa. This is the first report of the species in the Seychelles.

Porcellanopagurus adelocercus spec. nov.
(figs 27-36)

Material.— NHM 1997.719: ♂ sl. 2.27 mm (holotype). Sta. W2100-A1; 06°27'S 56°10'E; 14.i.1992; Wimpey Environmental Ltd.— RMNH D 47883: ♀ sl. 1.79 mm (paratype). Sta. W2100-B1; 06°27'S 56°10'E; 14.i.1992; Wimpey Environmental Ltd.— USNM 276080: ♂ sl. 1.37 mm (paratype). Sta. E800B; 06°27'S 56°11'E; 14.i.1992; Wimpey Environmental Ltd.— NHM 1997.720: ♂ sl. 1.28 mm (paratype).— Sta. S500-A1; 06°27'S 56°11'E; 15.i.1992; Wimpey Environmental Ltd.— NHM 1997.721: ♂ sl. 1.37 mm (paratype). Sta. NW1200B; 06°02'S 56°18'E; 17.i.1992; Wimpey Environmental Ltd.

Description of male holotype.— Anterior carapace (figs 27-28) vaulted; shield length considerably shorter than maximum breadth, total carapace length usually approximately equal; anterior margin between rostrum and lateral projections slightly concave; lateral margins each with short acute spine at anterolateral first process, broadly rounded, unarmed process at mid-length, and strong moderately slender subacute or denticulate process posterior to cervical groove; dorsal surface strongly calcified, with very faintly marked postrostral furrow and weakly delineated, usually somewhat globular posterolateral regions; posterior margin truncate. Cardiac sulci chitinous or weakly calcified; posteromedian plate not delineated. Rostrum well developed, broad, truncate, reaching only to bases of ocular peduncles; terminal margin slightly concave, with lateral angles slightly produced, with small median protuberance. Lateral projections acutely triangular; produced, but little if any, in advance of rostrum.

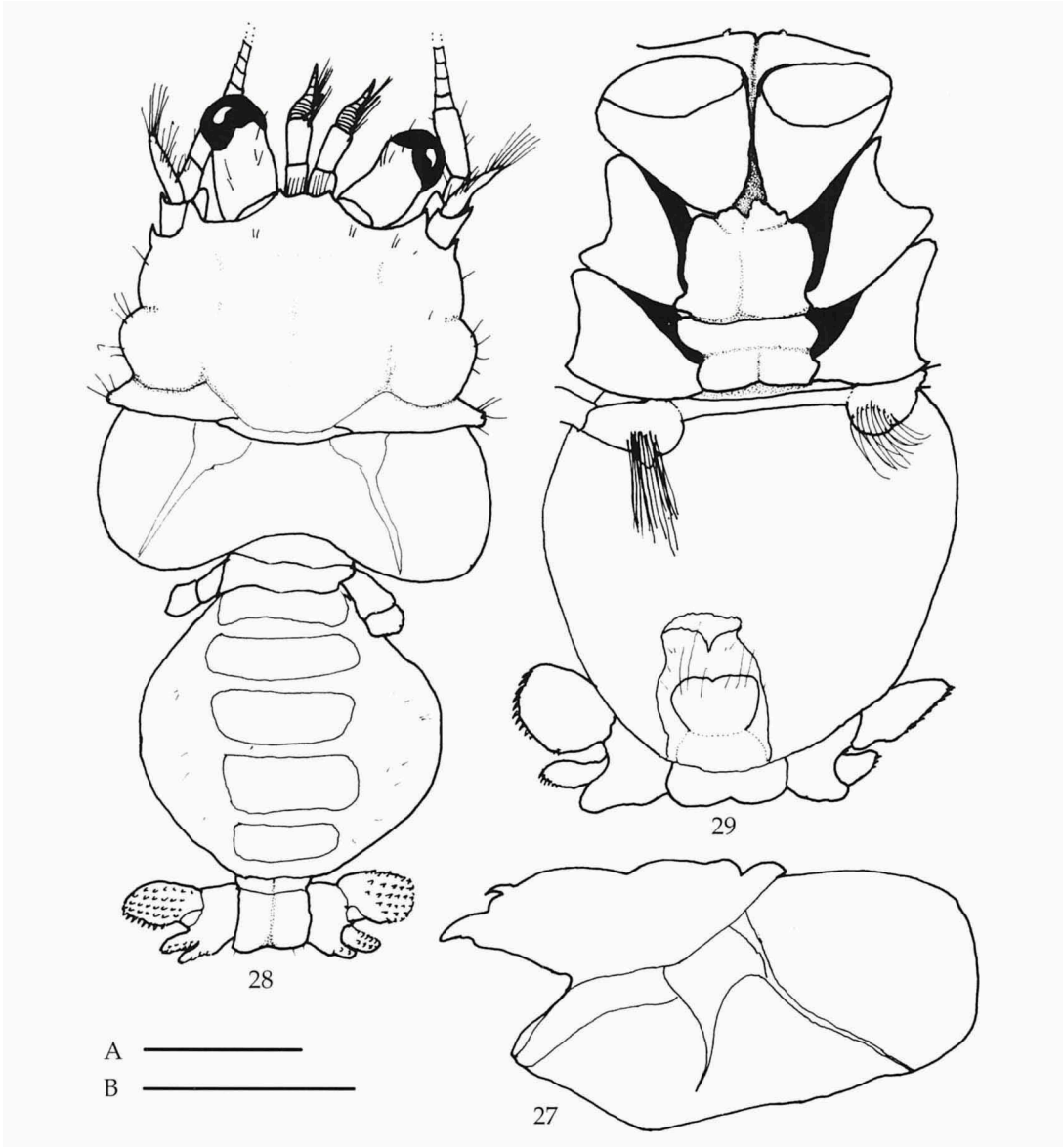
Ocular peduncles short, slightly less than half length of shield, with submedian constriction; cornea slightly dilated, diameter approximately 0.50 length of peduncle. Ocular acicles very small, acutely triangular, obscured from dorsal view by anterior margin of shield.

Antennular peduncles moderately short, but when fully extended, overreaching ocular peduncles by approximately 0.50 length of ultimate segment. Ultimate segment with 2 long setae on dorsodistal margin. Basal segment with spine on dorsolateral margin.

Antennal peduncles overreaching ocular peduncles by approximately 0.25 length of ultimate segment. Fifth and fourth segments with few scattered, very short setae. Third segment unarmed. Second segment with dorsolateral distal angle produced, terminating in acute spine; dorsomesial distal angle with small spine. First segment with 3 small spines on ventrolateral margin. Antennal acicle reaching beyond distal margin of fourth peduncular segment, terminating acutely. Antennal flagellum with 1 or 2 short setae every 1 or 2 articles, at least in proximal half.

Sternite of third maxillipeds (fig. 29) with spinule on either side of midline. Sternite of second pereiopods (fig. 29) broad, plate-like, with incomplete median longitudinal groove. Sternite of third pereiopods with subrectangular anterior lobe. Sternite of fourth pereiopods concealed from direct ventral view by sternite of third.

Right cheliped (fig. 30) stout; not much longer, but considerably stronger than left; propodal-carpal articulation twisted clockwise approximately 60° from perpendicular. Dactyl slightly shorter than palm; articulating obliquely; cutting edge with 4 prominent teeth; terminating in small calcareous claw, slightly overlapped by fixed finger; dorsal surface convex, armed with 3 irregular longitudinal rows of small



Figs. 27-29. *Porcellanopagurus adelocercus* spec. nov., ♂ sl. 2.27 mm holotype, NHM 1997.719. 27, carapace, lateral view; 28, cephalothorax and abdomen, dorsal view; 29, thorax and abdomen, ventral view. Scale A: 27 = 1 mm. Scale B: 28-29 = 2 mm.

tubercles, dorsomesial margin weakly faintly scalloped; ventral surface with few tufts of setae. Palm longer than carpus; somewhat swollen dorsoventrally; dorsal surface convex, with group of small rather widely-spaced tubercles dorsomesially near articulation of dactyl; dorsomesial and dorsolateral margins slightly elevated, unarmed; fixed finger with few tufts of short setae dorsal surface; cutting edge with 4 large teeth; ventral surface of palm and fixed finger with scattered tufts of setae. Carpus

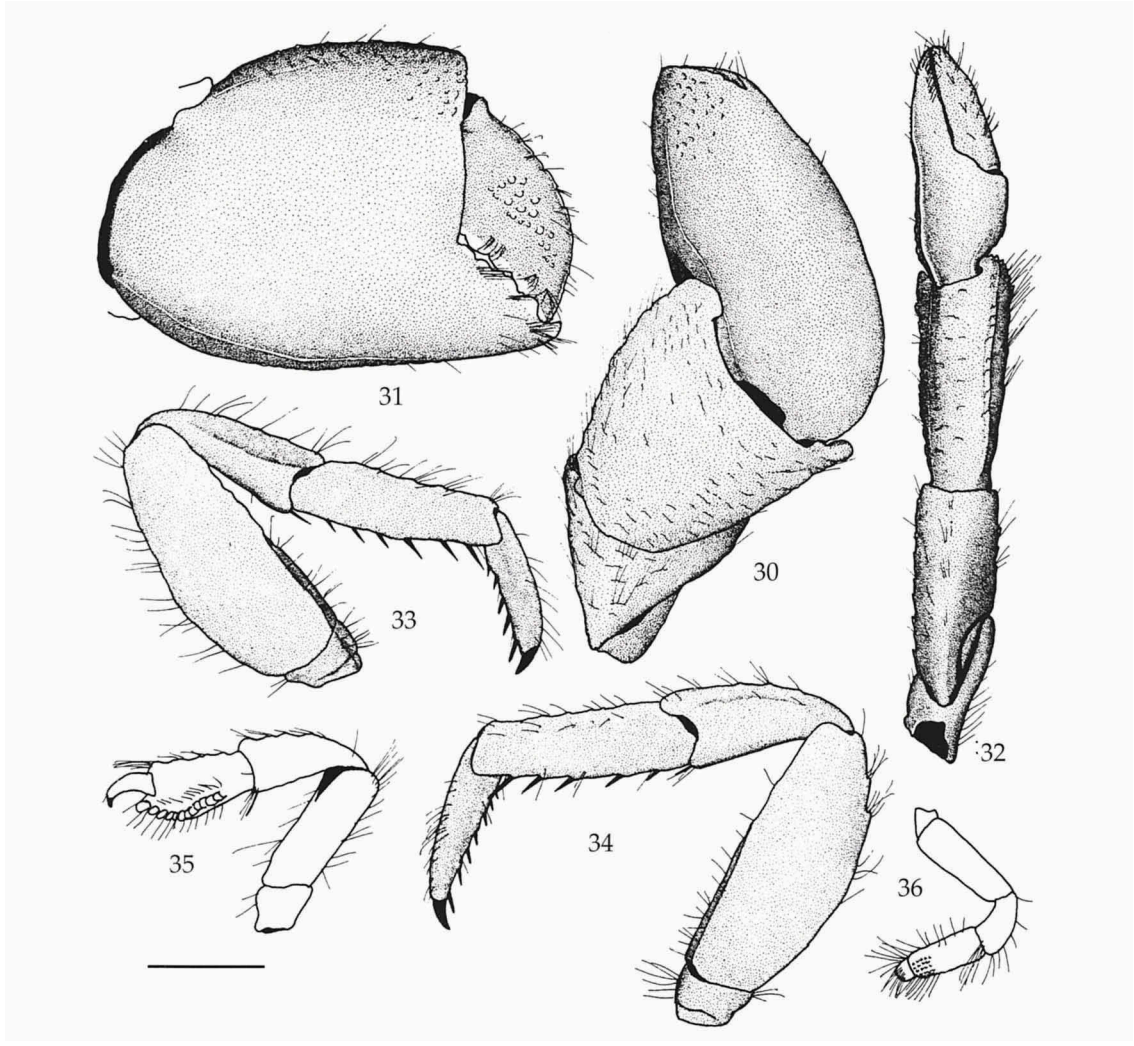
slightly longer than merus; dorsomesial and dorsolateral margins not delimited; surfaces with scattered short low, sometimes microscopically spinulose, transverse ridges providing rough-textured appearance. Merus broadly subtriangular; dorsal margin with several transverse ridges and few fine setae; ventromesial margin with 1 minute spinule proximally; ventrolateral margin with row of spines. Ischium with row of small spinules on ventromesial margin.

Left cheliped (fig. 32) with dactyl and fixed finger curved ventrally. Dactyl approximately 1.25 length of palm; cutting edge with row of corneous teeth; terminating in corneous claw and very slightly overlapped by fixed finger; dorsal surface unarmed, dorsomesial margin not delimited; mesial and ventral surfaces with numerous long setae. Palm less than 0.50 length of carpus; dorsal surface microscopically spinulose (not shown on illustration), dorsolateral margin and dorsomesial margin proximally slightly elevated, minutely serrate on fixed finger; ventral surface weakly granular; cutting edge of fixed finger with row of small calcareous teeth, terminating in corneous claw. Carpus slightly longer than merus; dorsal surface with low transverse ridges laterally and median longitudinal row of sometimes spinulose short ridges; dorsolateral margin slightly raised, unarmed; mesial, lateral and ventral surfaces each with few short transverse low ridges and sparse setae. Merus subtriangular; dorsal surface with few short transverse ridges and short setae; lateral face minutely spinulose; ventromesial margin with 1 small spine proximally; ventrolateral margin with row of stronger spines. Ischium with row of small tubercles on ventrolateral margin; row of small spines on ventromesial margin.

Ambulatory legs (figs 33, 34) moderately short and stout, generally similar. Dactyls 0.65-0.75 length of propodi; in dorsal and lateral views, nearly straight; dorsal margins with moderately sparse long setae; mesial and lateral faces with few short setae; ventral margins each with row of 5-7 corneous spines. Propodi equal to or slightly longer than carpi; dorsal surfaces with row of low protuberances and sparse setae; ventral margins each with row of 5 or 6 strong corneous spines. Carpi 0.65-0.80 length of meri; dorsal margins with few low protuberances, no distinct spine at distal angle; lateral faces each with longitudinal ridge separated by concavity from dorsal margin; ventrodistal margins each with corneous spine. Meri with protuberances on dorsal margins, at least distally; ventral surfaces slightly oblique (mesial view), ventromesial margins unarmed; ventrolateral margin unarmed, but formed as distinct ridge. Fourth pereiopods semichelate; propodal rasp (fig. 35) consisting of single row of corneous scales. Propodus of fifth pereiopods with small rasp of corneous scales (fig. 36).

Coxae of fifth pereiopods (fig. 29) somewhat asymmetrical, gonopores each masked by long setae; vas deferens of right produced as very short sexual tube.

Abdomen (figs 27, 29) somewhat reduced, globular. Tergite of first abdominal somite subrectangular, membraneous and weakly delineated. Tergites of somites 2 to 5 also membraneous, moderately broad, weakly indicated. Tergite of sixth somite moderately well calcified, divided into narrow rectangular anterior and broad subquadrate posterior lobes by transverse furrow, each with median furrow. Uropods symmetrical; protopods each with posteriorly directed subacute protuberance. Telson (fig. 29) ventral in position and not contiguous with posterior margin of sixth somite; with transverse incision separating thinly membranous anterior portion from weakly



Figs. 30-36. *Porcellanopagurus adelocercus* spec. nov., ♂ sl. 2.27 mm holotype, NHM 1997.719. 30, chela of right cheliped, outer face; 31, right cheliped, dorsal view; 32, left cheliped; 33, right second pereiopod, lateral view; 34, left third pereiopod, lateral view; 35, left fourth pereiopod, lateral view; 36, right fifth pereiopod, lateral view. Scale = 1 mm.

chitinized posterior portion; posterior lobes separated by very small median cleft, terminal margins rounded, unarmed.

Female allotype.— Shield length approximately 0.75 maximum breadth. Rostrum well developed, broad, truncate, terminal margin weakly concave, with lateral angles produced, without median protuberance, reaching slightly beyond bases of ocular peduncles. Lateral projections acutely triangular; produced, but by not reaching to level of rostral margin.

Ocular peduncles short and stout; with constriction adjacent to cornea; cornea not particularly dilated, diameter more than 0.50 length of peduncle.

Right cheliped with convex dorsal surface of dactyl armed with 1 irregular longitudinal row of small tubercles, dorsomesial margin weakly ridged. Palm with 3 irregular rows of spinules on rounded dorsomesial face adjacent to ridged dorsomesial margin. Merus with 2 small tubercles on ventromesial margin. Carpus of left cheliped with median longitudinal row of low tubercles, dorsolateral margin spinulose. Ventromesial margin of merus with row of small tubercles.

Abdomen short and laterally swollen; tergites only faintly visible; left unpaired pleopods 2-4 appearing to arise dorsally because of abdominal distortion. Telson ventrally positioned, but not as distant from posterior margin of sixth tergite.

None of the three male paratypes have chelipeds. All are smaller and only in one is the vas deferens of the right fifth coxa slightly produced. In these specimens the rostrum varies from being straight to weakly concave and may or may not have a median projection.

Etymology.— From the Greek, *adelos* meaning unseen, and *kerkos* meaning tail, referring to the easily overlooked telson of this species that is carried in an unusual ventral position.

Colour.— Not known.

Habitat.— Not known.

Distribution.— Known only from the Seychelles.

Remarks.— This small species of *Porcellanopagurus* most closely resembles *P. truncatifrons* Takeda, 1981 in having a broad, truncate rostrum. In his description of *P. truncatifrons*, and also in *P. nihonkaiensis* Takeda, 1985, Takeda (1981, 1985) indicated that the telson was absent. McLaughlin (1997) intentionally omitted reference to the telson in her generic diagnosis, noting that since both species were known only from their respective holotypes, it was unclear if the ostensible telson loss was evolutionary or accidental. If *P. adelocercus* is viewed dorsally (fig. 27), it too appears to lack a telson. However, in this species the telson is not contiguous with the posterior margin of the tergite of the sixth abdominal somite, and in fact is clearly separated and carried on the ventral side of the abdomen. This is the condition in all five specimens known; however, it appears that the separation of the telson from the sixth somite by membraneous tissue increases with increased animal size. The telson is only faintly, if at all, chitinized in *P. adelocercus* and is difficult to observe in the smaller specimens. Whether a similar condition exists in *P. truncatifrons* and *P. nihonkaiensis* will require reexamination of the holotypes to ascertain.

Despite the similarity of rostra in *P. adelocercus* and *P. truncatifrons*, the two species are easily distinguished. In *P. adelocercus* the terminal rostral margin is slightly concave between the produced outer angles, and may or may not have a median projection. In *P. truncatifrons* the rostrum is described and illustrated (Takeda, 1981: 11, figs 2, 3) as entirely truncate. The lateral projections of *P. adelocercus* are narrowly triangular and set at a substantial distance from the spinose first lateral lobe of the shield, whereas those of *P. truncatifrons* are broad, subacute and nearly confluent with the similarly broad first lateral lobe of the shield. From Takeda's description, the right cheliped of *P. truncatifrons* is regenerating; however, the tuberculate carpus of the left cheliped certainly differs from the left cheliped of *P. adelocercus*.

Whitelegge (1900) made mention in his description of *P. tridentatus* of tubular extension of the coxae of the fifth pereiopods in males, giving the impression that this

species possessed sexual tubes. Türkay (1986) reviewed Whitelegge's male syntype and could detect no sexual tubes. McLaughlin (1997) reported that the coxae of males of *P. jacquesi* McLaughlin, 1997 similarly were drawn out posteromedially, but that this condition did not represent the development of sexual tubes. McLaughlin's generic diagnosis of *Porcellanopagurus* stated that males lacked sexual tubes. However, the holotype of *P. adelocercus* does have a protrusion of the vas deferens from the right gonopore that must be considered a short sexual tube, rather than an artifact of preservation. One of the smaller paratypic males similarly has a protrusion from the right gonopore, although it is less definitive as a sexual tube.

? *Pygmaeopagurus* spec.
(figs 37-41)

Material.— PMcL: ovigerous ♀ sl. 0.76 mm. Sta. S1200B: 06°27'S 56°11'E; 5.i.1992; coll. Wimpey Environmental, Ltd.

Description.— Shield (fig. 37) longer than broad; anterior margin between rostrum and lateral projections concave; anterolateral margins sloping; posterior margin roundly truncate; dorsal surface glabrous. Rostrum triangular, reaching beyond bases of ocular acicles; terminating subacutely, without terminal spine. Lateral projections strongly developed, triangular, with terminal marginal or submarginal small spine. Ocular peduncles moderately short, broad basally and tapering to bluntly pointed corneae; ocular acicles small, triangular, dorsal surface convex, terminating acutely or subacutely; separated basally by approximately basal width of one acicle.

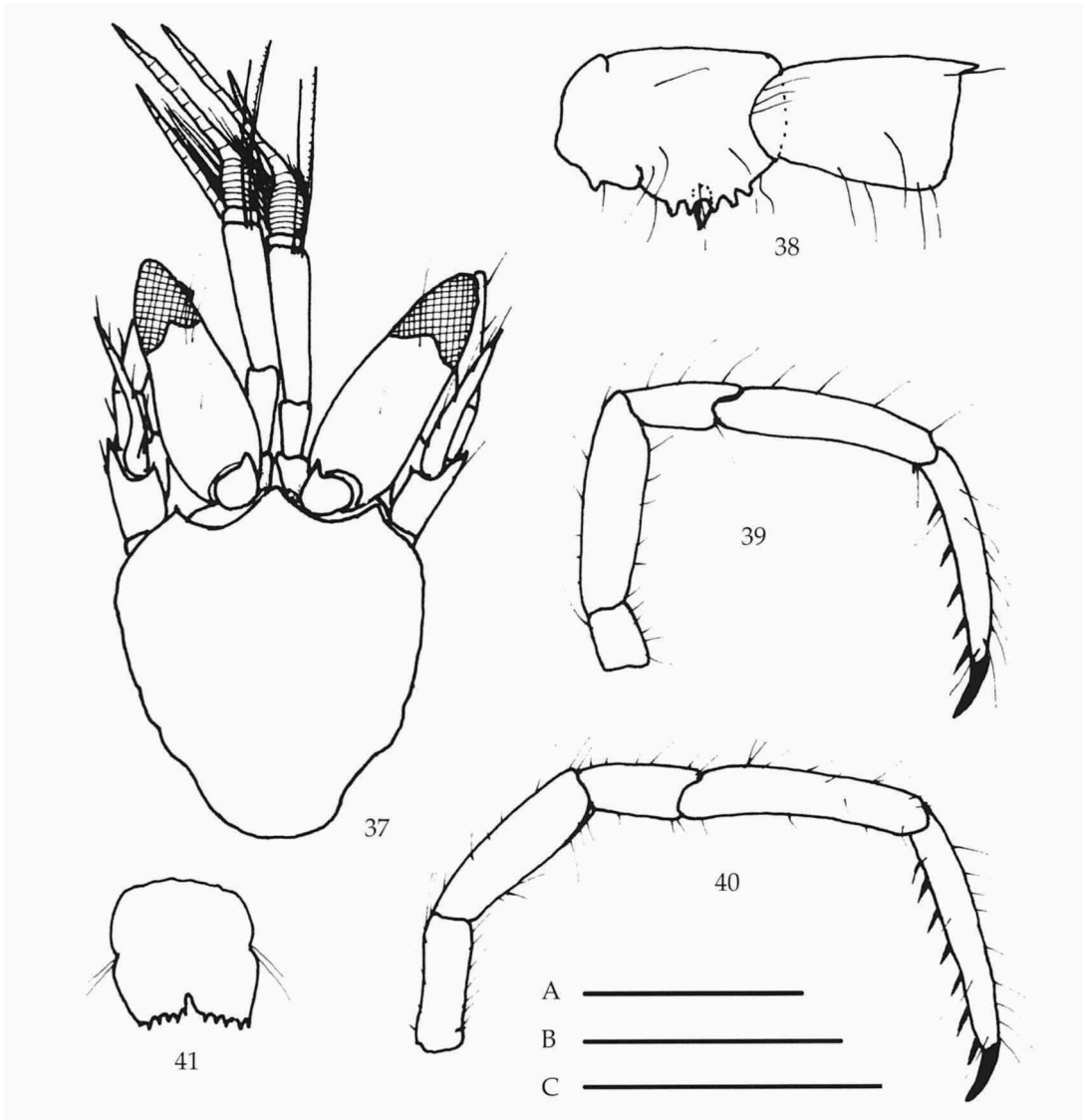
Fully extended antennular peduncles overreaching ocular peduncles by nearly 0.5 length of ultimate segment. Ultimate segments each with 1 long simple and 1 long pinnate seta on dorsodistal margin. Penultimate segments unarmed. Basal segments each with spine on dorsolateral margin. Upper flagellum or exopod (outer flagellum of Snow, 1973, 1974) with short proximal region carrying aesthetascs and long, thin, multiarticulate distal portion. Lower flagellum or endopod (inner flagellum of Snow, 1973, 1974) reaching to distal third of upper flagellum, with 6 or 7 articles.

Antennal peduncles reaching tip of corneae. Fifth and fourth segments with few scattered setae. Third segment with strong spine at ventrodistal margin. Second segment with dorsolateral angle produced, terminating in acute spine; dorsomesial distal angle with small spine. First segment with 2 spinules on ventrolateral margin. Antennal acicle slightly arcuate, terminating in small spine; mesial face with few long setae. Antennal flagella missing.

Third maxilliped with basis-ischium fusion nearly complete; crista dentata (fig. 38) composed of 5 teeth, accessory tooth present; merus with dorsodistal spine; carpus unarmed.

Both chelipeds missing.

Ambulatory legs (figs 39, 40) (left missing) with dactyls approximately equal to length of propodi; terminating in strong corneous claws; ventral margins with 5 (second) or 6 (third) corneous spines. Propodi approximately twice length of carpi; second with small corneous spinule on ventrodistal margin, third unarmed. Carpi, meri and ischia unarmed, but each with few fine setae. Fourth Pereopods missing. Sternite of third pereiopods roundly subrectangular.



Figs. 37-41. ? *Pygmaeopagurus* spec., ovigerous ♀ sl. 0.76 mm. Sta. S1200B, PMcL. 37, shield and cephalic appendages; 38, basis-ischium and merus of left third maxilliped, internal view; 39, right second pereiopod, lateral view; 40, left third pereiopod, lateral view; 41, telson. Scale A: 39-40 = 1 mm. Scale B: 38 = 0.25 mm. Scale C: 37 = 1 mm, 41 = 0.5 mm.

Four unpaired biramous pleopods, with first three carrying a collective total of 15 eggs (diameter 0.28 - 0.31 mm). Telson (fig. 41) with midlateral indentation indicating division of anterior and posterior portions; approximately equal posterior lobes separated by moderately shallow median cleft; terminal margins nearly straight, each with few small spines.

Colour.— Unknown.

Distribution.— Known only from the single collecting site in the Seychelles.

Remarks.— Accurate placement of a female specimen, particularly one lacking chelipeds and fourth pereiopods is difficult. There are only a few pagurid genera in which the female has only a single left gonopore. Of these, *Catapaguroides* A. Milne Edwards & Bouvier, 1892, *Decaphyllus* de Saint Laurent, 1968, *Solitariopagurus* Türkay, 1986, and *Scopaeopagurus* nov. gen., can immediately be excluded from consideration because in all the crista dentata lacks an accessory tooth. Of the genera that have an accessory tooth on the crista dentata, the general configuration of the shield and the reduced number of female abdominal pleopods similarly exclude *Alainopagurus* Lemaitre & McLaughlin, 1995 and *Alainopaguroides* McLaughlin, 1997 from consideration. Of the remaining genera, *Anapagrides* de Saint Laurent-Dechancé, 1966, *Trichopagurus* de Saint Laurent, 1970, and *Pygmaeopagurus* McLaughlin, 1986 all are characterized by species relatively small in size, moderately well developed rostra, and ambulatory dactyls with a ventral row of corneous spines. All have 11 pairs of gills; however, in *Trichopagurus* the structure of the gills is intermediate, where as it is phyllobranchiate in *Anapagrides* and *Pygmaeopagurus*.

In this small, but mature, female we were not able to detect a pleurobranch above the phyllobranch arthrobranchs of the fourth pereiopods, but whether it is actually absent or simply lost during manipulation is impossible to say with confidence when dealing with a single specimen. Although the shape of the telson bears a closer resemblance to species of *Anapagrides* [cf. McLaughlin, 1986 for *A. reesei* (McLaughlin, 1986) and McLaughlin & Sandberg, 1995 for *A. facetus* (Melin, 1939)], this female is questionably assigned to *Pygmaeopagurus* because of the shape of the ocular peduncles, corneae and acicles, and the greater development of the lower flagellum of the antennular peduncles (cf. McLaughlin, 1986, fig. 2a for *P. hadrochirus* McLaughlin, 1986). However, small ocular acicles, tapering ocular peduncles and corneae are not exclusively characters of *Pygmaeopagurus hadrochirus*. A comparable, but convergent, development of these structures is also found *Catapaguroides microps* A. Milne Edwards & Bouvier, 1892, as described and illustrated by de Saint Laurent (1968) and *Scopaeopagurus megalochirus* n. gen. n. spec. described herein. Nonetheless, even if additional specimens confirm the absence of a pleurobranch above the fourth pereiopod, the present taxon is readily distinguished from *C. microps*, not only by the accessory tooth on the crista dentata, but by the rostral development, fewer spines on the ambulatory dactyls, and structure of the telson. Similarly, not only the accessory tooth on the crista dentata, but structure of the telson and longer lower flagellum of the antennular peduncle similarly will separate this female from *S. megalochirus* spec. nov.

Scopaeopagurus gen. nov.

Type species.— *Scopaeopagurus megalochirus* spec. nov. Gender masculine.

Diagnosis.— Ten pairs of phyllobranchiate gills (no pleurobranch above arthrobranchs of fourth pereiopods). Ocular peduncles stout with cornea elongate and tapering to blunt point. Ultimate segment of antennular peduncle with 1 or 2 long pinnate setae. Antennal peduncle with supernumerary segmentation. Maxillule with 1 stiff bristle on moderately well developed internal lobe, external lobe slightly devel-

oped. Third maxilliped with crista dentata of ischium consisting of 2 or 3 strong curved, spine-like teeth; no accessory tooth. Fourth pereiopods with propodal rasp consisting of 1 row of corneous scales. Males with vas deferens of coxa of left fifth pereiopod produced as short sexual tube, coxa of right with only slight protuberance; 4 unequally biramous left pleopods. Females with single gonopore on coxa of third left pereiopod; 4 biramous left pleopods. Uropods markedly asymmetrical. Telson with mediolateral indentation faintly indicating anterior and posterior lobes; latter separated by distinct median cleft.

Etymology.— From the Greek *skopaios* meaning dwarf, and *paguros* a crab, indicative of the very small size of the type species of this genus. Gender masculine.

Remarks.— *Scopaeopagurus* bears a striking, but superficial, resemblance to *Pygmaeopagurus* in the tapering corneae of the ocular peduncles, structure of the maxillule, weakly semichelate fourth pereiopods, left male sexual tube, single left female gonopore, and subtriangular posterior telsonal lobes. Species of both genera are extremely small in size, but characterized by very large right chelipeds. However the two genera are easily differentiated. *Scopaeopagurus* has a crista dentata consisting of only 2 or 3 spine-like teeth and no accessory tooth. Males of this genus have four unpaired left pleopods; shorter, forwardly directed left sexual tube; and a gonopore on the coxa of the right fifth pereiopod with a slight protrusion of the vas deferens. In contrast, *Pygmaeopagurus* has a well developed crista dentata with 1 accessory tooth. Males have three unpaired left pleopods; an appreciably longer left sexual tube directed toward the exterior; and no gonopore on the right coxa.

Scopaeopagurus shares some characters with particular species of *Catapaguroides*, another genus in which the females have only a single left gonopore, the crista dentata lacks an accessory tooth, and a pleurobranch is missing above the arthrobranchs of the fourth pereiopods. In *C. japonicus* de Saint Laurent, 1968 the crista dentata is reduced to a single large proximal tooth, while in *C. microps* A. Milne Edwards & Bouvier, 1892 the ocular peduncles are taper and the corneae are cone-shaped. Although the two genera are related through pleurobranch loss and reduction of the crista dentata, with concurrent loss of the accessory tooth, and presence of at least one sexual tube (*Ostraconotus* group of de Saint Laurent-Dechancé, 1966), the characters shared with *C. japonicus* and *C. microps* are thought to be examples of convergence. The two genera are clearly distinct. For example, males of all species of *Catapaguroides* have an elongate right sexual tube that crosses from right to left under the thorax, and a small left tube concealed between two thick tufts of sternal setae. *Scopaeopagurus* males have only a short left tube. Additionally, only three unpaired male pleopods occur in species of *Catapaguroides*, whereas four are present in *Scopaeopagurus*.

Scopaeopagurus megalochirus spec. nov.
(figs 42-52)

Material.— NHM 1997.722: ♂ sl. 1.07 mm (holotype). Sta. S500A: 06°27'S 56°11'E; 15.i.1992; coll. Wimpey Environmental Ltd.— RMNH D 47884: 1 ♀ sl. 0.67 mm (allotype). Sta. S1200A: 06°27'S 56°11'E; 15.i.1992; coll. Wimpey Environmental Ltd.— USNM 276081: 1 ♂ sl. 0.34 mm (paratype). Sta. E1200B: 06°27'S, 56 12'E; 46 m; 13.i.1992; coll. Wimpey Environmental Ltd.— NHM 1997.721: 1 ♂ sl. 0.70 mm (paratype). Sta. N800A: 06°26'S 56°11'E; 46 m; 15.i.1992; coll. Wimpey Environmental Ltd.

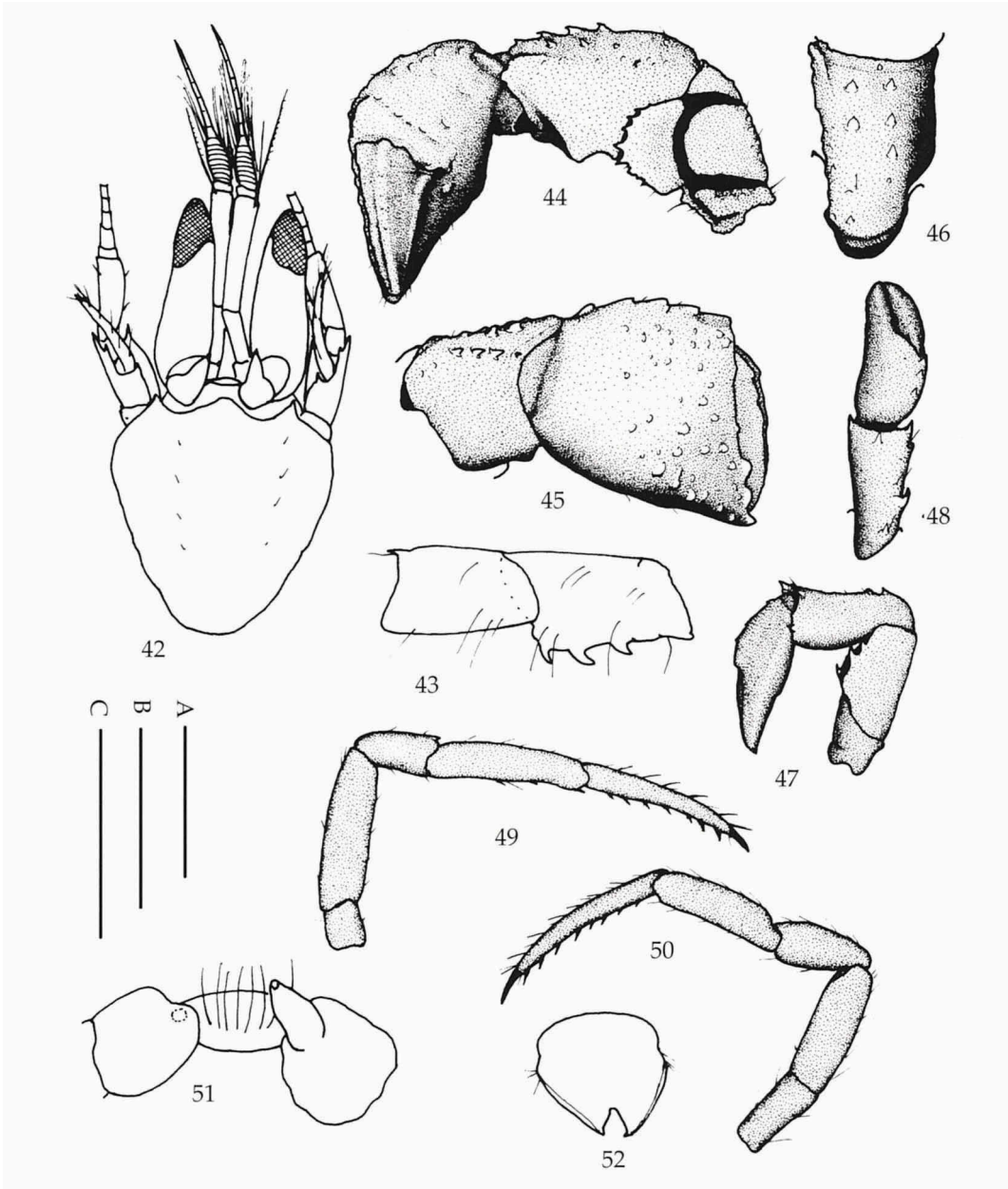
Description of male holotype.— Shield (fig. 42) longer than broad; anterior margin between rostrum and lateral projections concave; anterolateral margins sloping; posterior margin roundly truncate; dorsal surface with few setae. Rostrum obtusely triangular, nearly reaching to bases of ocular acicles; terminating subacutely, without terminal spine. Lateral projections strongly developed, broadly triangular, with terminal marginal or submarginal small spine. Ocular peduncles moderately short, broad basally and tapering to elongate, bluntly pointed corneae; dorsomesial face with 2 or 3 widely spaced setae; ocular acicles slender, acutely triangular, dorsal surface convex, terminating in small submarginal spine; separated basally by more than basal width of one acicle.

Fully extended antennular peduncles overreaching ocular peduncles by approximately 0.5 length of ultimate segment. Ultimate segment with 1 or 2 long pinnate setae on dorsodistal margin. Penultimate segment unarmed. Basal segment with spine on distolateral margin. Upper flagellum or exopod (outer flagellum of Snow, 1973, 1974) with short proximal region carrying aesthetascs and long, thin, multiarticulate distal portion. Lower flagellum or endopod (inner flagellum of Snow, 1973, 1974) not reaching to distal half of upper flagellum, with 4 articles.

Antennal peduncles reaching to mid-length of corneae. Fifth and fourth segments with few scattered setae. Third segment with strong spine at ventrodistal margin. Second segment with dorsolateral distal angle produced, terminating in acute spine and with additional spine on mesial margin; dorsomesial distal angle with small spine. First segment unarmed. Antennal acicle slightly arcuate, terminating in small spine; mesial face with few long setae. Antennal flagella with 1 or 2 moderately long setae every 1-3 articles, frequently interspersed with short setae.

Maxillule with 1 seta on internal lobe of endopod; external lobe weakly developed. Third maxilliped with crista dentata (fig. 43) composed of 2 or 3 strong, curved spine-like teeth; merus with small dorsodistal spines; carpus unarmed.

Right cheliped (fig. 44) massive; propodal-carpal articulation twisted approximately 45° clockwise from horizontal plane; dactyl with strongly oblique articulation. Dactyl only slightly shorter than length of palm, overlapped by fixed finger; cutting edge with 2 large calcareous teeth, terminating in very small corneous claw; dorsomesial margin produced as blunt keel, with small tubercle proximally and few more distal very faint protuberances, dorsal surface with rounded median longitudinal very faintly tuberculate ridge, mesial face centrally concave, fairly broad proximally, narrow distally. Palm (figs 44, 45) subrectangular, approximately equal to length of carpus; dorsomesial margin with 5 somewhat spinulose tubercles, dorsal surface with scattered small tubercles, dorsolateral margin not delimited proximally, with few tubercles distally and on fixed finger; mesial face broad, with perpendicular row of small tubercles distally; ventral surface convex, with 1 small but prominent tubercle and several scattered, much smaller, less distinct tubercles; lateral face rounded, faintly tuberculate; fixed finger much shorter than dactyl; dorsal surface flattened, with few small tubercles in mesial half; cutting edge with 1 quite small calcareous tooth proximally and 2 much larger teeth distally, terminating in calcareous claw. Carpus (figs 45, 46) with dorsal surface armed with 2 rows of small stout spines, dorsomesial margin with row of small spines and spinulose protuberances in proximal half, weak crest distally, dorsolateral margin rounded; ventral surface produced mesially into



Figs. 42-52. *Scopaeopagurus megalochirus* spec. nov., ♂ sl. 1.07 mm holotype, NHM 1997.722. 42, shield and cephalic appendages; 43, 1 ♂ sl. 0.70 mm paratype, NHM 1997.721, basis-ischium and merus of right third maxilliped, internal view; 44, ♂ sl. 1.07 mm holotype, NHM 1997.722, right cheliped, mesial view; 45, chela and carpus of right cheliped, dorsolateral view; 46, carpus of right cheliped, dorsal view; 47, left cheliped, lateral view; 48, chela and carpus of left cheliped, dorsal view; 49, right second pereiopod, lateral view; 50, left third pereiopod, lateral view; 51, coxae and sternite of fifth pereiopods; 52, telson. Scale A: 44-50 = 1 mm. Scale B: 43 = 0.25 mm. Scale C: 42 = 1 mm, 51-52 = 0.5 mm.

prominent distal and proximal protuberances. Merus triangular; dorsal surface with low protuberances and few short setae; mesial face with distal margin ventrally and ventral margin developed as wing-like projection and armed with row of acute spines; ventrolateral margin with acute spine near distal angle and 1 tiny spinulose tubercle at mid-length. Ischium unarmed.

Left cheliped (fig. 47) approximately 0.65 length of right, much less massive; slight counterclockwise articulation of palm with carpus. Dactyl approximately as long as palm; cutting edge with row of small corneous teeth, terminating in tiny corneous claw; surfaces unarmed. Palm (figs 47, 48) approximately 0.65 length of carpus; dorsomesial margin with 3 small spines; surfaces unarmed. Carpus (figs 47, 48) slightly longer than merus; dorsal surface with median spine distally; dorsomesial margin with spine and low protuberance distally, 1 strong hooked and 1 small spine in proximal half, dorsolateral distal angle depressed, armed with small acute spine. Merus triangular; dorsal margin with few short fine setae; ventrolateral with 2 acute spines medianly; ventromesial margin with 1 acute spine proximally. Ischium unarmed.

Second and third left (right third missing) pereiopods (figs 49, 50) not overreaching right cheliped. Dactyls of second pair very slightly longer than propodi, third left somewhat longer; terminating in strong, slender, corneous claws; ventral margins each with row of 7 (second) or 8 (third) moderately strong corneous spines; dorsal surfaces each with row of stiff spine-like bristles and few short fine setae. Propodi 1.25 (third) to nearly twice (second) length of carpi; dorsal surfaces with few fine setae; ventral margins each with 2 corneous spines in distal half (second) or unarmed (third). Carpi approximately 0.50 (second) to 0.80 (third) length of meri; dorsal surfaces with short fine setae and second each with tiny dorsodistal spinule. Meri and ischia each with few short fine setae on dorsal and ventral surfaces. Sternite of third pereiopods with roundly rectangular anterior lobe.

Anteriorly directed, moderately short, rather thick sexual tube (fig. 51) on slightly enlarged coxa of left fifth pereiopod, very slight protuberance of vas deferens from right gonopore; 4 unequally biramous pleopods. Telson (fig. 52) with short, oblique, unarmed terminal margins; lateral margins each with faint chitinous band.

Paratypes.— Both chelipeds, but no pereiopods are present with the female allotype. Although the rostrum is broadly rounded, and the posterior telson lobes are very weakly separated, this paratype agrees in all other respects with the male holotype. A single gonopore is present on the coxa of the left third pereiopod, and there are 4 unequally biramous pleopods.

One small male paratype has the right cheliped and both pairs of ambulatory legs. The less clearly developed structure of the right cheliped is attributed to the small size of this specimen; however, in general conformation, it is clearly representative of the species. The remaining paratype lacks all appendages, but is identifiable as representing this species by the structure of the ocular peduncles, crista dentata, and telson.

Colour.— Unknown.

Distribution.— Known only from the Seychelles.

Etymology.— From the Greek *megas* meaning large, and *cheir* a hand, indicative of the very large right cheliped in this species.

Remarks.— *Scopaeopagurus megalochirus* bears some resemblance to *Pygmaeopagurus hadrochirus*, in having tapered corneae, and an enormous right cheliped. However, in addition to the generic differences, the species are readily distinguished by the entirely different confirmations and armature of the right cheliped. The ventral surface of the chela in *S. megalochirus* is convex; the mesial face of the carpus has two ventrally produced lobes and the dorsal surface has 2 rows of small stout spines; the mesiodistal margin ventrally and ventromesial margin of the merus are developed into a wing-like projection. In contrast, the ventral surface of the right chela of *P. hadrochirus* is concave; the mesial face of the carpus has only a single ventrally produced lobe and the dorsal surface has a median row of spines; the mesiodistal margin ventrally and ventromesial margin of the merus are not produced into a wing-like protuberance. Additionally, the carpus of the left cheliped has a row of spines on the dorsolateral margin, 1 dorsomedian and 1 dorsolateral spine in *S. megalochirus*, whereas this segment is unarmed in *P. hadrochirus*. As has been previously noted, *S. megalochirus* also bears considerable superficial resemblance to the ovigerous female herein questionably assigned to *Pygmaeopagurus*.

Acknowledgements

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References

Alcock, A., 1905. Anomura. Fasc. I. Pagurides. Catalogue of the Indian decapod Crustacea in the collections of the Indian Museum 2: i-xi, 1-197, pls. 1-16.— Indian Museum, Calcutta.

Asakura, A., 1995. Anomura. In: S. Nishimura (ed.), Guide to Seashore Animals of Japan with color pictures and keys 2: 347-377, pls. 93-100.— Hoikusha Publishing Co. Ltd., Osaka.

Baba, K., 1986. In: K. Baba, K-I Hayashi & M. Toriyama. Decapod crustaceans from continental shelf and slope around Japan. The Intensive research of unexploited fishery resources on continental slopes: 336 pp., 176 colored figures.— Japan Fisheries Resource Conservation Association, Tokyo.

Balss, H., 1915. Die Decapoden des Roten Meeres. II. Anomuren, Dromiaceen und Oxystomen. Expeditionen S.M. Schiff "Pola" in das Rote Meer. Nördliche und südliche Häfte 1895/96-1897/98. Zoologische Ergebnisse XXXI.— Denkschr. Akad. Wiss. Wien, math. naturwiss. Kl. 92: 1-20, figs. 1-9.

Barnard, K.H., 1950. Descriptive catalogue of South African decapod Crustacea (crabs and shrimps).— Ann. S. Afr. Mus. 38: 1-837, figs. 1-154.

Borradaile, L.A., 1898. On some crustaceans from the South Pacific.— Part II. Macrura anomala.— Proc. zool. Soc., London, 1898: 457-468.

Bouvier, E.L., 1890. Révision des Cénobites du Muséum.— Bull. Soc. philom. Paris (8) 2 (4): 143-150.

Bouvier, E.L., 1892. Étude sur les Paguriens recueillis par M. le Dr. Jousseaume sur les cotes de la Mer Rouge.— Bull. Soc. philom. Paris (8) 4 (2): 50-55.

Bouvier, E.L., 1897. Sur deux paguriens nouveaux trouvés par M. Coutière dans réclifs madréporiques, à Djibouti.— Bull. Mus. Hist. nat. Paris 6: 229-233.

Bouvier, E.L., 1898. Sur quelques Crustacés anomures et brachyures recueillis par M. Diguet en Basse-Californie.— Bull. Mus. Hist. nat. Paris 4: 371-384.

Bouvier, E.L., 1915. Décapodes marcheurs (Reptantia) et Stomatopodes recueillis a l'île Maurice par M. Paul Carie.— Bull. sci. Fr. Belg. (7) 48 (3): 178-318, figs. 1-42, pls. 12-17.

Bouvier, E.L., 1918. Sur une petite collection de Crustacés de Cuba offerte au Muséum par M. de Boury.— Bull. Mus. natn. Hist. nat. 24: 6-15, figs. 1-5.

Buitendijk, A.M., 1937. Biological results of the Snellius expedition. IV. The Paguridea of the Snellius Expedition.— Temminckia 2: 251-280, figs. 1-19.

Dana, J.D., 1852a. Conspectus crustaceorum, etc., Conspectus of the Crustacea of the Exploring Expedition under Capt. Wilkes, U.S.N., including the Paguridea, continued, the Megalopidea, and the Macroura. Paguridea, continued, and subtribe Megalopidea.— (Preprint from) Proc. Acad. nat. Sci. Philadelphia 6: 6-28, 1854.

Dana, J.D., 1852b. Crustacea, part I. United States Exploring Expedition, during the years 1838, 1839, 1840, 1841, 1842, under the command of Charles Wilkes, U.S.N., 13: i-vii, 1-685.— C. Sherman, Philadelphia. Reprinted Antiquariaat Junk, Lochem, Netherlands, 1972.

Dana, J.D., 1855. Crustacea, United States Exploring Expedition, during the years 1838, 1839, 1840, 1841, 1842, under the command of Charles Wilkes, U.S.N., 13 (Atlas): 1-27, pls. 1-96.— C. Sherman, Philadelphia. Reprinted Antiquariaat Junk, Lochem, Netherlands, 1972.

Dechancé, M., 1964. Sur une collection de Crustacés Pagurides de Madagascar et des Comores.— Cah. O.R.S.T.O.M., sér. Océanogr. 2 (2): 27-45, figs. 1-10.

Edmondson, C.H., 1925. Marine zoology of tropical central Pacific. Crustacea.— Bernice P. Bishop Mus., Bull. 27: 3-62 (Tangier Expedition, publ. #1).

Estampador, E.P., 1937. A check list of Philippine crustacean decapods.— Philip. J. Sci. 62: 465-559.

Fabricius, J.C., 1787. Mantissa insectorum sistens eorum species nuper detectas adjectis characteribus genericis, differentiis specificis, emendationibus, observationibus, 1: xx + 348 pp.— Hafniae.

Fize, A. & R. Serène, 1955. Les Pagures du Vietnam.— Inst. Océanogr. Nhatrang, Note 45: ix, 1-228, figs. 1-35, pls. 1-6.

Forest, J., 1954. Les *Paguristes* des côtes occidentales et méridionales d'Afrique.— Ann. S. Afr. Mus. 41 (4): 159-213, text figs. 1-70, pl. 4.

Forest, J., 1956a. Sur *Calcinus nitidus* Heller et *C. rosaceus* Heller (Crust. Paguridae).— Bull. Mus. natn. Hist. nat. (2) 28 (2): 218-227, figs. 1-8.

Forest, J., 1956b. La faune des îles Cocos-Keelings Paguridea.— Bull. Raffles Mus. 27: 45-55, figs. 1-8.

Forest, J., 1958. Les Pagures du Viet-Nam. II. Sur quelques espèces du genre *Calcinus* Dana.— Bull. Mus. natn. Hist. nat. (2) 30 (2): 184-190, 285-290, figs. 1-19.

Forest, J., 1995. Crustacea Decapoda Anomura: Révision du genre *Trizopagurus* Forest, 1952 (Diogenidae), avec l'établissement de deux genres nouveaux. *In*: A. Crosnier (ed.), Résultalts des Campagnes MUSOROSTOM, vol. 13. Mém. Mus. natn. Hist. nat. 163: 9-149, figs. 1-42.

Forest J. & P.A. McLaughlin, in press. The Marine Fauna of New Zealand: Superfamily Coenobitoidea (Decapoda: Anomura: Paguridea). Mem. N.Z.O.I.

Forskål, P., 1775. Descriptiones animalium avium, piscium, amphibiorum, insectorum, vermium; quae in itinere orientali observavit: 1-19, i-xxxii, 1-164.

Fourmanoir, P., 1952. Observations sur la Faune Marine et la Pêche à l'île Europa.— Mém. Inst. Rec. Sci. Madagascar A 7 (2): 167-188.

García-Gómez, J., 1994. The systematics of the genus *Anapagurus* Henderson, 1886, and a new genus for *Anapagurus drachi* Forest, 1966 (Crustacea, Decapoda, Paguridae).— Zool. Verh. Leiden 295: 1-131, figs. 1-42.

Gherardi, F. & P.A. McLaughlin, 1994. Shallow-water hermit crabs (Crustacea: Decapoda: Anomura: Paguridea) from Mauritius and Rodrigues Islands, with the description of a new species of *Calcinus*.— Raffles Bull. Zool. 42 (3): 613-656, figs. 1-7.

Gordan, J., 1956. A bibliography of pagurid crabs, exclusive of Alcock, 1905.— Bull. Amer. Mus. nat. Hist. 108: 253-352.

Haan, W. de, 1833-1850. Crustacea. In: P.F. von Siebold, Fauna Japonica sive Descriptio Animalium, quae in Itinere per Japoniam, Jussu et Auspiciis Superiorum, qui Summum in India Batava Imperium Tenent, Suscepto, Annis 1823-1830 Collegit, Notis, Observationibus et Adumbrationibus Illustravit: i-xxxi, ix-xvi, 1-243, pls. A-J, L-Q, 1-55, circ. tab. 2.— Lugduni- Batavorum [Leiden].

Haig, J. & E.E. Ball, 1988. Hermit crabs from northern Australian and eastern Indonesian waters (Crustacea Decapoda: Anomura: Paguroidea) collected during the 1975 Alpha Helix Expedition.— Rec. Aust. Mus. 40: 151-196, figs. 1-14.

Haswell, W.A., 1882. Description of some new species of Australian Decapoda.— Linn. Soc. N.S.W. 6: 750-763.

Heller, C., 1861. Beiträge zur Crustaceen-Fauna des Rothern Meers, II. Teil.— Sitz-Ber. math.-phys. Kl. Akad. Wiss., Wien 44: 241-295, pls. 1-3.

Heller, C. 1865. Crustaceen. In: Reise der Österreichischen Fregatte Novara um die Erde in den Jahren 1857, 1858, 1859 unter den Befehlen des Commodors B. von Wüllerstorf-Urbair. Zoologischer Theil. 2 (3): 1-280, pls. 1-25.— Kaiserlich-königlichen Hof-und Staatsdruckerei, Wien.

Henderson, J.R., 1888. Report on the Anomura collected by H.M.S. Challenger during the years 1873-76.— Scientific Results of the Exploratory Voyage of HMS Challenger, (Zoology) 27: i-xi, 1-221, pls. 1-21.

Henderson, J.R., 1896. Natural history notes from H. M. 'Investigator' Commander C.F. Oldham, R.N., commanding.— Series II., No. 24. Report on the Paguridae collected during the season 1893-94.— J. Asiatic Soc. Bengal 65 (2): 516-536.

Herbst, J.F.W., 1791-96. Versuch einer Naturgeschichte der Krabben und Krebse nebst einer systematischen Beschreibung ihrer verschiedenen Arten, 2: i-viii, 1-226, pls. 22-46.— Stralsund, Berlin.

Herbst, J.F.W., 1804. Versuch einer Naturgeschichte der Krabben und Krebse nebst einer systematischen Beschreibung ihrer verschiedenen Arten, 3: 1-49, pls. 59-62.— Stralsund, Berlin.

Hess, W., 1865. Beiträge zur Kenntnisse der Decapoden-Krebse Ost-Australiens. 1-47.— Druck von Carl Georgi, Bonn.

Hilgendorf, F., 1869. Crustaceen. In: C.C. van der Decken, Reisen in Ost-Afrika in dem Jahren 1859-1865, 3 (1): 69-116.— C.F. Winter'sche Verlagshandlung, Leipzig, Heidelberg.

Hilgendorf, F., 1879. Die von Hrn. W. Peters in Moçambique gesammelten Crustaceen.— Monatsbr. Berl. Ak. Wissensch. 1878(1879): 782-851, pls. 1-4.

Hogarth, P.J., F. Gherardi & P.A. McLaughlin, in press. Hermit crabs of the Maldives, with the description of a new species of *Catapagurus*.— Tropical Zoology.

Holthuis, L.B., 1953. Enumeration of the decapod and stomatopod Crustacea from Pacific coral islands.— Atoll Res. Bull. 24: 1-62.

Holthuis, L.B., 1954. On a collection of decapod Crustacea from the republic of El Salvador (Central America).— Zool. Verh. Leiden 23: 1-43, figs. 1-15, pls. 1, 2.

Kamalaveni, S., 1950. On hermit-crabs (Family Paguridae) in the collection of the Indian Museum.— Rec. Indian Mus. 47: 77-85, figs. 1-3.

Krauss, F., 1843. Die Südafrikanischen Crustaceen. Eine Zusammenstellung aller bekannten Malacostraca. Bemerkungen über deren Lebensweise und geographische Verbreitung, nebst Beschreibung und Abbildung mehrerer neuen Arten: 1-68, pls. 1-4.— E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart.

Lanchester, W.F., 1902. On the Crustacea collected during the "Skeat Expedition" to the Malay Peninsula.— Proc. zool. Soc. Lond. 1902: 363-381, pls. 34, 35.

Land, J. van der, 1994. The 'Oceanic Reefs' Expedition to the Seychelles (1992-1993). In: J. van der Land (ed.), Results of the 'Oceanic Reefs' Expedition to the Seychelles (1992-1993), volume 1.— Zool. Verh. Leiden 297: 5-36, figs. 1-13.

Laurie, R.D., 1926. Anomura collected by Mr. J. Stanley Gardiner in the western Indian Ocean in H.M.S. "Sealark". Report of the Percy Sladen Trust expedition to the Indian Ocean in 1905.— Trans. Linn. Soc. Lond. (2) 19 (1): 121-167, pls. 8, 9.

Lemaitre, R. & P.A. McLaughlin, 1995. *Alainopagurus crosnieri* n. gen., n. sp. (Decapoda: Anomura: Paguridae) from the western Pacific.— Bull. Mus. natn. Hist. nat. (4) 17A (3-4): 273-282, figs 1-4.

Lewinsohn, Ch., 1969. Die Anomuren des Roten Meeres (Crustacea Decapoda: Paguridea, Galatheidea, Hippidea).— Zool. Verh. Leiden 104: 1-213, figs. 1-37, pl 1.

Lewinsohn, Ch., 1981. Researches on the coast of Somalia. *Calcinus tropidomanus* n. sp. a new hermit crab from Somalia.— Monit. Zool. Ital., n.s. Suppl. 14(10): 147-152, fig. 1.

Lewinsohn, Ch., 1982. Researches on the coast of Somalia. The shore and the dune of Sar Uanle. 33. Diogenidae, Paguridae and Coenobitidae (Crustacea Decapoda Paguridea).— Monit. Zool. Ital., n.s. Suppl. 16: 33-68.

Maki, M. & H. Tsuchiya, 1923. An illustrated monograph of the decapod crustacean fauna of Taiwan.— Dept. Agric. Gov. Res. Inst. Formosa (3): 1-215 (in Chinese).

Man, J.G. de, 1881. On a new collection of podophthalmous Crustacea, presented by Mr. J.A. Kruyt, collected in the Red Sea near the town of Djeddah.— Notes Leyden Mus. 3 (25): 93-107.

Man, J.G. de, 1888a. Report on the podophthalmous Crustacea of the Mergui Archipelago, collected for the Trustees of the Indian Museum, Calcutta, by Dr. John Anderson, F.R.S., Superintendent of the Museum.— J. Linn. Soc. Lond. 22: 1-312, pls. 1-19.

Man, J.G. de, 1888b. Bericht über die im indischen Archipel von Dr. J. Brock gesammelten Decapoden und Stomatopoden.— Arch. Naturgesch. (1887): 53: 215-600, pls. 7-22a.

Man, J.G. de, 1898. Description d'une espèce nouvelle du genre *Potamon* Sav. provenant du pays de Somalis.— Ann. Mus. Civ. Stor. mat. Giacomo Doria 39: 262-270.

Man, J.G. de, 1902. Die von Herrn Professor Kükenthal im indischen Archipel gesammelten Decapoden und Stomatopoden.— Abh. Senckenb. naturforsch. Ges. 25: 467-929, pls. 19-27.

McLaughlin, P.A., 1986. Three new genera and species of hermit crabs (Crustacea, Anomura, Paguridae) from Hawaii.— J. crust. Biol. 6 (4): 789-803, figs. 1-6.

McLaughlin, P.A., 1997. Crustacea Decapoda: Hermit crabs of the family Paguridae from the KARUBAR cruise in Indonesia. In: A. Crosnier & P. Bouchet (eds), Résultats des Campagnes MUSORSTOM, 16.— Mém. Mus. natn. Hist. nat. 172: 433-572, figs. 1-44.

McLaughlin, P.A., in press. Hermit crabs of the genus *Nematopagurus* (Crustacea: Decapoda: Paguridae) from southeastern South Africa and Madagascar: New records and new species.— Zoosystema.

McLaughlin, P.A. & J.H. Brock, 1974. A new species of hermit crab of the genus *Nematopagurus* (Crustacea: Decapoda: Paguridae) from Hawaii.— Proc. biol. Soc. Wash. 84 (23); 245-256, figs. 1-3.

McLaughlin, P.A. & P.S. Clark, 1997. A review of *Diogenes* (Crustacea: Anomura: Paguridea: Diogenidae) hermit crabs collected by Bedford and Lanchester from Singapore and from the 'Skeat' Expedition to the Malay Peninsula, with a description of a new species and notes on *Diogenes intermedius* de Man, 1892.— Bull. nat. Hist. Mus. London (Zool.) 63: 33-49, figs. 1-14.

McLaughlin, P.A. & A. J. Provenzano, Jr., 1974. Hermit crabs of the genus *Paguristes* (Crustacea: Decapoda: Diogenidae) from the western Atlantic. Part I. The *Paguristes tortugae* complex, with notes on variation.— Bull. mar. Sci. 24 (1): 165-234, figs. 1-27.

McLaughlin, P.A. & L. Sandberg, 1995. Redescriptions of Gustaf Melin's press 1939 *"Eupagurus (Pagurillus)" exiguus*, *"Eupagurus (Catapagurus)" vallatus*, and *"Eupagurus (Spiropagurus)" facetus* (Decapoda: Anomura: Paguridae) based on the type material.— J. crust. Biol. 15 (3): 569-587, figs. 1-5.

Melin, G., 1939. Paguriden und Galatheiden von Prof. Dr. Sixten Bocks Expedition nach den Bonin-Inseln 1914.— Kongl. Sven. Vetenskad. Handl. (3) 18 (2): 1-119, figs. 1-71.

Miers, E.J., 1884. Crustacea. In: Report on the zoological collections made in the Indo-Pacific Ocean during the voyage of H.M.S. "Alert" 1881-2: 178-322, 513-575, pls. 18-34, 46-52.— British Museum, London.

Milne-Edwards, A. & E.L. Bouvier, 1892. Observations préliminaires sur les paguriens recueillis par les expéditions du *Travailleur* et du *Talisman*.— Ann. Sci. nat. Paris (7) 13: 185-226.

Milne Edwards, H., 1836. Observations zoologiques sur les Pagures et description d'un nouveau genre de la tribu des Paguriens.— Ann. Sci. nat. Zool. Paris (2) 6: 257-288, pls. 13, 14.

Milne Edwards, H., 1837. Histoire naturelle des Crustacés, comprenant l'anatomie, la physiologie et la classification de ces animaux. 2: 1-532; atlas: 1-32, pls. 1-42.— Paris.

Milne Edwards, H., 1848. Note sur quelques nouvelles espèces du genre Pagure.— Ann. Sci. nat. Zool. Paris (3) 10: 59-64.

Miyake, S., 1978. The crustacean Anomura of Sagami Bay: 1-200 (English), 1-161 (Japanese), figs 1-72, pls 1-4.— Hoikusha Publishing Co., Tokyo.

Morgan, G.J., 1988. *Calcinus abrolhensis*, a new species of hermit crab from the Houtman Abrolhos, western Australia (Decapoda, Diogenidae).— Crustaceana 54 (2): 218-222, fig. 1.

Morgan, G.J., 1990. A collection of Thalassinidea, Anomura and Brachyura (Crustaca: Decapoda) from the Kimberley region of northwestern Australia.— Zool. Verh. Leiden 265: 1-90, figs. 1-6.

Morgan, G.J., 1991. A review of the hermit crab genus *Calcinus* Dana (Crustacea: Decapoda: Diogenidae) from Australia, with descriptions of two new species.— Invertebr. Taxon. 5: 869-913, figs. 1-63.

Nakasone, Y., 1988. Land hermit crabs from the Ryukyus, Japan, with a description of a new species from the Philippines (Crustacea, Decapoda, Coenobitidae).— Zool. Sci. 5: 165-178, figs. 1-9.

Nobili, G., 1905. Diagnoses préliminaires de 34 espèces et variétés nouvelles, et de 2 genres nouveaux de Décapodes de la Mer Rouge.— Bull. Mus. Hist. nat. Paris 11 (6): 393-411, figs. 1, 2.

Nobili, G., 1906. Crustacés Décapodes et Stomatopodes. Mission J. Bonnier et Ch. Pérez (Golfe Persique, 1901).— Bull. sci. Fr. Belg. 40: 13-159, figs. 1-3, pls. 2-7.

Olivier, G.A., 1811-1812. Pagure. *Pagurus*. In: Encyclopédie méthodique ... Histoire naturelle, (-Insectes) 8: 631-647. H. Agasse, Paris.

Ortmann, A., 1892. Die Decapoden-Krebse des Strassburger Museum, mit besonderer Berücksichtigung der von Herrn Dr. Döderlein bei Japan und bei den Liu-Kiu-Inseln gesammelten und zur Zeit im Strassburger Museum aufbewahrten Formen. IV. Die Abtheilungen Galatheidea und Paguridea.— Zool. Jb. Syst. 6: 241-326, pls. 11, 12.

Ortmann, A.E., 1894. Crustaceen. In: R. Semon, Zoologische Forschungsreisen in Australien und dem Malayischen Archipel.— Denkschr. med.-naturw. Ges. Jena 8: 1-80, pls. 1-3.

Owen, R., 1839. Crustacea: 77-92, pls 24-28. In: F.W. Beechey (ed.). The zoology of Captain Beechey's voyage; comp. from the collections and notes made by Captain Beechey, the officers and naturalist of the expedition to the Pacific and Behring's straits performed in His Majesty's ship "Blossom", under the command of Captain F.W. Beechey ... in the years 1825, 26, 27 and 28.— H.G. Bohn, London.

Paulson, O., 1875. Izsledovaniya rakoobraznykh krasnago morya s zametkami otnositel'no rakoobraznykh drugikh morei. Chast' 1. Podophthalmata i Edriophthalmata (Cumacea): i-xiv, 1-144, pls. 1-21.— S.V. Kul'zhenko, Kiev.

Paulson, O., 1961. Studies on Crustacea of the Red Sea with notes regarding other seas. Podopphthalmata and Edriophthalmata (Cumacea): 1-164, pls. 1-21.— Israel Program for Scientific Translations, National Science Foundation and Smithsonian Institution.

Poupin, J., 1997. Les pagures du genre *Calcinus* en Polynisie française, avec la description de trois nouvelles espèces (Decapoda, Anomura, Diogenidae).— Zoosystema 19 (4): 683-719, figs. 1-7.

Provenzano, A.J., Jr., 1963a. The glaucothöe stage of *Dardanus venosus* (H. Milne-Edwards) (Decapoda: Anomura).— Bull. mar. Sci. Gulf Carib., 13(1): 11-22, figs. 1-5.

Provenzano, A.J., Jr., 1963b. The glaucothoes of *Petrochirus diogenes* (L.) and two species of *Dardanus* (Decapoda: Diogenidae).— Bull. Mar. Sci. Gulf Carib. 13 (2): 242-261, figs. 1-9.

Provenzano, A.J., Jr., 1967. The zoeal stages and glaucothoe of the tropical eastern Pacific hermit crab *Trizopagurus magnificus* (Bouvier, 1898) (Decapoda; Diogenidae), reared in the laboratory.— Pacif. Sci., 21 (4): 457-473, figs. 1-9.

Quoy, J.R.C. & P. Gaimard, 1824-1826. Zoologie: 1-712. In: L. De Freycinet, Voyage autour du Monde, entrepris par Ordre du Roi, sous le ministère et conformément aux instructions de S. Exc. M. le Vicomte du Bouchage, secrétaire d'état au département de la Marine, exécuté su les corvettes de S.M. l'Uranie et la Physicienne, pendant les années 1817, 1818, 1819 2t 1820, .— Pillet Aîné, Paris.

Rahayu, D.L., 1992. Étude des pagures littoraux (Crustacés, Décapodes) d'Indonésie: systématique, écologie, et biogeographpy.— Thèse de Doctorat de l'Université de Paris VI, Océanographie Biologique: 1-232, figs. 1-26.

Randall, J.W., 1840. Catalogue of the Crustacea brought by Thomas Nuttall and J.K. Townsend, from the west coast of North America and the Sandwich Islands, with descriptions of such species as are apparently new, among which are included several species of different localities, previously

existing in the collection of the Academy.— J. Acad. nat. Sci. Philad. 8: 106-147, pls. 1-7.

Rathbun, M.J., 1903. Japanese stalk-eyed crustaceans.— Proc. U.S. natn. Mus. 26 (1307): 23-55, figs. 1-24.

Rathbun, M.J., 1907. Introductory and foot-notes. In: W. Stimpson. Report on the Crustacea (Brachyura and Anomura) collected by the North Pacific Exploring Expedition, 1853-1856.— Smiths. misc. Coll. 49: 1-230, pls. 1-26.

Reay, P.J. & J. Haig, 1990. Coastal hermit crabs (Decapoda: Anomura) from Kenya, with a review and key to east African species.— Bull. mar. Sci. 46 (3): 578-589.

Richters, F., 1880. Decapoda: 137-179, pls. 15-18. In: K. Moebius (ed.). Beiträge zur Meeres-Fauna der Insel Mauritius und der Seychellen. Part 3: 1-352, pls. 1-22.— Verlag der Gutmann'schen Buchhandlung (Otto Enslin), Berlin.

Roux, P., 1828-1830. Crustacés de la Méditerranée et de son littoral, décrits et lithographiés: iv + 176 unnumber pages, pls. 1-45; published in 9 parts: 1, 2 (pls. 1-10), 1828; 3 (pls. 11-15), 1829; 4-9 (pls. 16-45) 1830.— Paris and Marseille.

Saint Laurent-Dechancé, M. de, 1966. *Iridopagurus*, genre nouveau de Paguridae (Crustacés Décapodes) des mers tropicales américaines.— Bull. Mus. natn. Hist. nat. (2) 38 (2): 151-173, figs. 1-38.

Saint Laurent, M. de, 1968. Révision des genres *Catapaguroides* et *Cestopagurus* et description de quatre genres nouveaux. I. *Catapaguroides* A. Milne Edwards et Bouvier et *Dacaphyllus* nov. gen. (-Crustacés Décapodes Paguridae).— Bull. Mus. natn. Hist. nat. (2) 39 (5) (1967): 923-954.

Saint Laurent, M. de, 1970. Révision des genres *Catapaguroides* et *Cestopagurus* et description de quatre genres nouveaux. V. *Trichopagurus* de Saint Laurent (Crustacés Décapodes Paguridae). VI. Conclusion.— Bull. Mus. natn. Hist. nat. (2) 42 (1): 210-222, figs. 1-16.

Snow, P.J., 1973. The antennular activities of the hermit crab, *Pagurus alaskensis* (Benedict).— J. exp. Biol. 58: 745-765, figs. 1-5, pl. 1.

Snow, P.J., 1974. Surface structures of the antennular flagella of the hermit crab *Pagurus alaskensis* (Benedict): A light and scanning electron microscope study.— J. Morph. 144 (2): 195-204, pls. 1-5.

Southwell, T., 1906. Report on the Anomura collected by Professor Herdman, at Ceylon, in 1902. In: W.A. Herdman, Report to the government of Ceylon on the pearl oyster fisheries of the Gulf of Manaar, with supplementary reports upon the marine biology of Ceylon, by other naturalists, Part V: 211-224, figs. 1, 2.— Royal Society, London.

Stebbing, T.R.R., 1920. South African Crustacea (Part X of S. A. Crustacea, for the Marine Investigations in South Africa).— Ann. S. Afr. Mus. 17 (4): 231-272, pls. 98-107 (18-27).

Stimpson, W., 1858. Prodromus descriptionis animalium evertebratorum, quae in expeditione ad oceanum Pacificum septentrionalem, a Republica Federate missa, Cadwaldaro Ringgold et Johanne Rodgers ducibus, obseravit et descripsit. VII.— [Preprint (December 1858) from] Proc. Acad. nat. Sci. Philad. 1858: 225-252.

Takeda, M., 1981. A new hermit crab of the genus *Porcellanopagurus* from the Ogasawara Islands.— Bull. biogeogr. Soc. Japan 36 (2): 8-13, figs. 1-3.

Takeda, M., 1985. Occurrence of a new hermit crab of the genus *Porcellanopagurus* in the Sea of Japan.— Mem. natn. Sci. Mus. Tokyo 18: 141-144, figs. 1. 2.

Terao, A., 1913. A catalogue of hermit-crabs found in Japan (Paguridea excluding Lithodidae), with descriptions of four new species.— Annot. Zool. Jap. 8 (2); 355-391, figs. 1-4.

Terao, A., *et al.*, 1932. Illustration of Japanese aquatic plants and animals.— Fish. Soc. Japan, Tokyo 2: pls. 51-100.

Thompson, E.F., 1943. Paguridae and Coenobitidae.— In: The John Murray Expedition 1933-34, Scientific Reports 7 (5): 411-426, figs. 1-3.

Tirmizi, N.M. & F.A. Siddiqui, 1982. The marine fauna of Pakistan: 1 Hermit crabs (Crustacea, Anomura): 1-103, figs. 1-45.— University Grants Commission, Karachi.

Tudge, C.C., 1995. Hermit crabs of the Great Barrier Reef and coastal Queensland: 1-40, figs. 1-12, color pls. 1-4.— Backhyus Publishers, Leiden.

Türkay, M., 1986. Crustacea Decapoda Reptantia der Tiefsee des Roten Meeres.— Senckenbergiana Marit. 18 (3/6): 123-185, figs. 1-57, pls. 1-4.

Ward, M., 1942. Notes on the Crustacea of the Desjardins Museum, Mauritius Institute, with descriptions of new genera and species.— Mauritius Inst. Bull. 2 (2): 49-109, pls. 5, 6.

White, A., 1847a. List of the Specimens of Crustacea in the Collection of the British Museum: i-viii, 1-143.— British Museum, London.

White, A., 1847b. Descriptions of new or little-known Crustacea in the collection at the British Musuem.— Proc. zool. Soc. Lond. 1847: 118-122.

Whitelegge, T., 1900. Scientific results of the trawling expedition of HMS "Thetis", off the coast of New South Wales, February and March, 1898.— Aust. Mus. Mem. 4: 135-199, pls. 32-35.

Wooster, D.S., 1984. The genus *Calcinus* (Paguridea, Diogenidae) from the Mariana Islands including three new species.— Micronesica 18 (2): 121-162, figs. 1-5.

Yap-Chiongco, J.V., 1938. The littoral Paguridea in the collection of the University of the Philippines.— Philip. J. Sci. 66 (2): 183-219, pls. 1, 2.

Zehntner, L., 1894. Crustacés de l'Archipel Malais (Voyage de MM. M. Bedot et Ch. Pictet dans l'Archipel Malais).— Rev. Suisse Zool. 2: 135-214, pls. 7-9.

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