

SHALLOW-WATER HERMIT CRABS
(CRUSTACEA: DECAPODA: ANOMURA: PAGURIDEA)
FROM MAURITIUS AND RODRIGUES ISLANDS,
WITH THE DESCRIPTION OF
A NEW SPECIES OF *CALCINUS*

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ABSTRACT. - In a collection of hermit crabs from supralittoral, intertidal, and shallow subtidal areas of the Mascarene islands of Mauritius and Rodrigues (latitudes 19°40'-20°32'S, longitudes 57°18'-63°30'E), 18 species belonging to the genera *Coenobita*, *Calcinus*, *Clibanarius*, *Dardanus*, *Diogenes*, and *Pagurixus* were found. This hermit fauna was primarily composed of species widely distributed within the western Indian Ocean; however a few were previously known only from a few localities. *Calcinus haigae* Wooster, *Clibanarius humilis* Dana, *C. demani* Buitendijk, *Diogenes* cf. *serenei* Forest, and *Pagurixus* cf. *tweddiei* (Forest) are recorded for the first time in the western Indian Ocean, and a new species, *Calcinus vanninii*, is described and illustrated. The species composition from these islands is discussed and compared with lists previously compiled for two proximate island systems, the Seychelles and Madagascar. As shown by a clustering technique, these latter islands have a closer faunal similarity to each other than to the Mascarenes.

INTRODUCTION

As noted by Brown (1975), in most tropical coastal areas hermit crabs are a common, conspicuous, and diversified component of the intertidal and shallow subtidal marine fauna of the western Indian Ocean. However, general surveys of the Mascarene archipelago marine fauna (e.g., Baissac *et al.*, 1962) have ignored or underestimated hermit species, their abundance and diffusion. The existing literature provides only scattered records of hermit crabs from Mascarene islands (e.g., Quoy & Gaimard, 1824; H. Milne Edwards, 1836; A. Milne Edwards, 1862; Ortmann, 1892; Alcock, 1905; Laurie, 1926; Ward, 1942). Species lists compiled previously from less localized collections (Miers, 1879; Richters, 1880; Bouvier, 1915; Michel, 1974) implied the occurrence of only a few cosmopolitan western Indian Ocean species in this archipelago (e.g., *Calcinus latens* Randall, 1840, *Coenobita rugosus* H. Milne Edwards, 1837).

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The purpose of this study was to document the occurrence of hermit crab species from the Mascarene islands using the systematic collections made in July 1989, by Professor Marco Vannini (University of Florence, Italy) during an expedition to Mauritius and Rodrigues islands. Comparative material from the Muséum National d'Histoire Naturelle, Paris (MNHN) aided in determinations of *Clibanarius* species. A comparison with species reported from the Seychelles and Madagascar are also provided for the purpose of estimating the degree of hermit crab faunal similarities among adjacent island systems of the western Indian Ocean.

MATERIALS AND METHODS

Hermit crabs were obtained supra-, inter-tidally and/or by diving in the collecting sites as shown in Fig. 1. These localities provide a wide variety of habitats ranging from almost totally protected waters through protected areas with strong tidal currents to completely exposed coasts.

The collection contains 405 specimens (18 species), and is deposited, for the most part, in the Museo Zoologico, University of Florence, exceptions being the representative collection retained by one of the authors (PMcL), and one paratype of the new species of *Calcinus*, which has been deposited in the collections of the National Museum of Natural History, Smithsonian Institution (USNM).

For each species, we have included in the synonymies, only references to synonyms, illustrated systematic works, or those containing important information on behaviour and ecology. Records of geographical distribution are limited to the islands of the western Indian Ocean. Occurrences of hermit crabs in their elected habitats have been classified as: abundant, common, occasional, and rare, on the basis of qualitative field assessments of their densities.

Each specimen was sexed and measured. Measurements were made to the nearest 0.1 mm using an ocular micrometer. As an index of size we used shield length (SL), measured from the tip of the rostrum or the midpoint of the anterior margin of the shield to the midpoint of the cervical groove. Morphological terminology follows that of McLaughlin (1974) and/or Haig & McLaughlin (1984).

Quantitative analyses of morphological variation in presumed diagnostic characters were made for four species of *Clibanarius*. These analyses were based on measurements of the left cheliped: chela width (CW), dactyl length (DL), and palm length (PL), and left third pereopod: dactyl and propodus length (DC, PR), and width (DW, PW). From these measurements we computed the ratio (CR) of the dactyl + palm length (DL + PL) to the chela width (CW) and the ratio of the dactyl length to propodal length (DC : PR) for the left third pereopod. In order to represent the patterns of relative growth (y) with respect to animal size, as defined by shield length (SL), the logarithmic transformation ($\log y = \log a + b \log SL$) of the exponential function $y = a SL^b$ was used. This relation fits nearly all the instances of allometric growth in crustaceans (Hartnoll, 1982). The values of b define the type of allometry (b = 1 : isometry; b < 1 : negative allometry; b > 1 : positive allometry). This and the values of intercept (a) obtained through the Least-Squares Method, allowed us to use standard tests for significance, and to compare slopes and intercepts between sexes. Statistical analyses followed the recommendations of Siegel (1956) and Zar (1984). The level of significance under which the null hypothesis was rejected was $\alpha = 0.05$.

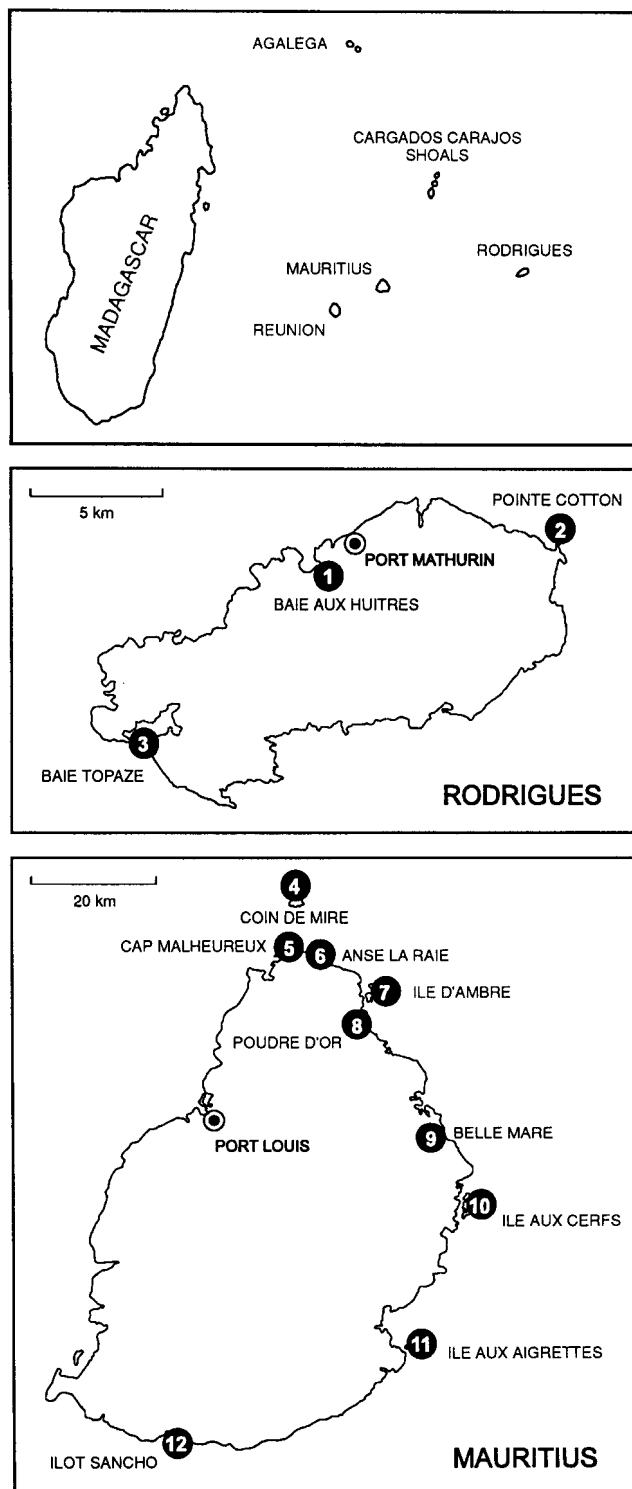


Fig. 1. Geographical location of Mauritius and Rodrigues islands within the western Indian Ocean, and map of the collection sites.

Illustrations of the new species were prepared using a Wild M-5 microscope with a camera lucida attachment.

FAMILY COENOBITIDAE

Genus *Coenobita* Latreille, 1829

Cénobita Latreille, 1825: 277.

Coenobita Latreille, 1829: 77; Morgan & Holthuis, 1988: 18; 1989: 176.

Type species. - By original designation, *Pagurus clypeatus* Fabricius, 1787. Gender: masculine.

Remarks. - In a manuscript submitted in 1987, but not appearing in print until 1989, Morgan & Holthuis discussed the confusion regarding the date and authorship of the genus *Coenobita* and the potential threat of replacement by two or three older, but unfamiliar names. These authors then applied to the International Commission on Zoological Nomenclature to conserve the name *Coenobita* and suppress the older names (Morgan & Holthuis, 1988). In these same publications, Morgan & Holthuis (1988, 1989) clarified the true authorship of the type species, *Coenobita clypeatus*, i.e., Fabricius (1787).

Coenobita rugosus H. Milne Edwards, 1837

Coenobita rugosa H. Milne Edwards, 1837: 241 (type locality: Indian Ocean); Dana, 1852d: 471; 1855, pl. 30, fig. 1.

Caenobita clypeata Owen, 1839: 85, pl. 25, fig. 3 [not *Coenobita clypeatus* (Fabricius, 1787)].

Cen. rugosus - Hilgendorf, 1869: 99, pl. 6, figs. 2, 3a, 4b.

Coenobita rugosus - Ortmann, 1892: 317, pl. 12, fig. 22; Alcock, 1905: 143, pl. 14, figs. 3, 3a; Yamaguchi, 1938: 163; Holthuis, 1954: 16, figs. 4c, d; Miyake, 1956: 333, figs. 22, 23a, b; 1960: 89, pl. rr, fig. 7; 1975: 279, pl. 117, fig. 2; 1978: 68, fig. 25; 1982: 115, pl. 39, fig. 1; Lewinsohn, 1969: 93, fig. 17; Ooishi, 1970: 90, pl. 12, fig. 14; Vannini, 1975a: 57; 1975b: 233; 1976a: 145; 1976b: 258; Vannini & Chelazzi, 1981: 135; Yu, 1985: 61, pl. 1, fig. D; Nakasone, 1988: 168, fig. 3A-G; Yu & Foo, 1991: 58, unnumbered colour fig.

Coenobita rugosa - Targioni-Tozzetti, 1877: 232, pl. 13, fig. 6; Richters, 1880: 160, pl. 17, figs. 14-17; Fize and Serène, 1955: 12, figs. 2, 3A, pl. 1, figs. 3, 5, 7-10.

Coenobita rugosa var. *A. granulata* - Bouvier, 1890: 146.

Coenobita var. *B. compressa* Bouvier, 1890: 147 (not *Coenobita compressus* H. Milne Edwards, 1837).

Coenobita rugosus var. *compressus* - Nobili, 1901: 27.

Coenobita compressus - De Man, 1902: 742, pl. 24, fig. 45 (not *Coenobita compressus* H. Milne Edwards, 1837).

Coenobita rugosus var. *granulata* - Alcock, 1905: 192.

Material examined. - Rodrigues: 1 male (SL = 41.7 mm), 2 females (SL = 11.7, 14.7 mm), site #1 (Baie aux Huitres); 1 male (SL = 7.2 mm), site #3 (Baie Topaze). Mauritius: 2 females (SL = 4.1, 7.8 mm), site #4 (Coin de Mire); 2 males (SL = 4.8, 4.8 mm), 1 female (SL = 8.8 mm), northern coast; 1 male (SL = 5.5 mm), 1 female (SL = 6.7 mm), northeastern coast; 1 juvenile, site #6 (Anse la Raie); 1 female (SL = 7.8 mm), site #10 (Île aux Cerfs).

Diagnosis. - Ocular peduncles reaching beyond middle of ultimate segment of antennular peduncles; ocular acicles narrow, sharply acuminate. Stridulatory mechanism composed of series of oblique laminar tubercles on upper outer surface of palm of left chela; strong

longitudinal ridge on middle of inner surface of palm of left chela below brush of setae. Mesial face of merus of right cheliped without dense tuft of setae. Lateral surfaces of propodus and dactyl of left third pereopod flattened and separated from dorsal surface by distinct ridge or crest. Ventromesial surfaces of dactyls of left second and third pereopods each with longitudinal ridge of closely-set, regular tubercles, forming part of stridulatory mechanism. Coxae of male fifth pereopods asymmetrical, produced posteriorly as short sexual tubes. Posterior lobes of telson with terminal fringe of short bristles and long, stiff setae.

Colour in preservative. - Cream or pinkish, usually with dark brownish or reddish patch on outer surface of left chela.

Occupied shells. - Neritidae; seldom Buccinidae.

Habitat. - Supralittoral zone of sandy beaches; daytime aggregations found under bushes and among debris.

Occurrence. - Common.

Distribution. - Records from the Mascarenes, Madagascar and Seychelles include: Seychelles (Richters, 1880; Laurie, 1926; Lenz, 1905); Madagascar (A. Milne Edwards, 1868; Lenz & Richters, 1881; Lenz, 1910; Gravier, 1920; Dechancé, 1969); Mascarenes (Mauritius: Bouvier, 1915; Baissac *et al.*, 1962; Michel, 1974; Rodrigues: Miers, 1879).

Remarks. - Although often confused by early carcinologists with *C. scaevola* (Forskål, 1775) (cf. Lewinsohn, 1969) and *C. compressus* (cf. Holthuis, 1954), *C. rugosus* clearly is a distinct species. It is easily separated from *C. scaevola* by the presence, in the latter species, of a tuft of long setae on the ventral margin of the merus of the left cheliped, and from *C. compressus* by the presence in that species of a strongly concave dactyl on the third right pereopod. Our specimens agree well with the descriptions and illustrations of Alcock (1905), Fize & Serène (1955), and Nakasone (1988). Accounts on the biology and ecology of this species have been provided by Vannini (1975a, b; 1976a, b) from Somalia and from the Aldabra Atoll by Vannini & Chelazzi (1981). Larval development in *C. rugosus* was described by Yamaguchi (1938).

FAMILY DIOGENIDAE

Genus *Calcinus* Dana, 1851

Cancer Linnaeus, 1758: 625 (in part); Herbst, 1791: 1 (in part).

Pagurus Fabricius, 1775: 410 (in part); H. Milne Edwards, 1836: 236 (in part).

Calcinus Dana, 1851: 267; 1852c: 122; 1852d: 456. Type species by subsequent selection by Dana (1852c): *Calcinus tibicen* (Herbst, 1791). Gender: masculine.

Remarks. - Although the date for the description of *Calcinus* often has been given as 1852 (e.g., Alcock, 1905; Gordan, 1956; Morgan, 1991), Dana's description first appeared in an 1851 preprint of the paper subsequently published in volume 5 of the Proceedings of the Academy of Natural Sciences of Philadelphia (Dana, 1852c).

Calcinus elegans (H. Milne Edwards, 1836)

Pagurus elegans H. Milne Edwards, 1836: 278, pl. 13, fig. 2 (type locality: New Ireland).

Pagurus pictus Owen, 1839: 83, pl. 25, figs. 2, 2a.

Pagurus decorus Randall, 1840: 134.

Calcinus elegans - Dana, 1851: 267; 1852d: 458; 1855: pl. 28 figs. 10a-c; Alcock, 1905: 55, pl. 5, fig. 2; Boone, 1935: 23, pl. 3; Yap-Chiongco, 1938: 206, pl. 2, fig. 10; Edmondson, 1946: 263, fig. 161b; Miyake, 1956: 18, figs. 12, 13; Lee, 1969: 54, fig. 10; Reese, 1969: 345; Michel, 1974: 257; Morgan, 1991: 874, figs. 7-9; Yu & Foo, 1991: 34, unnumbered colour fig.

Material examined. - Mauritius: 1 male (SL = 6.8 mm), site #4 (Coin de Mire); 1 male (SL = 3.8 mm), 1 female (SL = 4.8 mm), Îles aux Aigrettes; 1 female (SL = 4.6 mm), 1 female (SL = 1.6 mm), site #12 (Îlot Sancho).

Diagnosis. - Shield rectangular, longer than broad. Rostrum acute, extending well beyond lateral projections. Ocular peduncles overreaching antennal peduncles and equaling length of antennular peduncles; ocular acicles simple. Left cheliped larger and longer than right; outer face of palm with closely-spaced tubercles, upper margin with four or five more prominent tubercles. Right cheliped with five sharp spines on upper surface of palm; dorsal margin of carpus spinose. Dactyl of left third pereopod markedly shorter than propodus; four to eight tufts of long setae on ventral margin of dactyl and propodus distally, forming dense brush. Not more than three tufts of thin setae on ventral margin of dactyl of left second pereopod. Telson with asymmetrical posterior lobes, left lobe longer; terminal margins each with three to five spines.

Colour in preservative. - Shield cream with few red-orange patches; ocular acicles red-orange; peduncles medially pale blue, distally and proximally white with red-orange ring at base; chelipeds ochre with white tubercles and spines on palms and dactyls; second and third pereopods banded with red-orange on propodi, carpi and meri; dactyls with red-orange spots.

Occupied shells. - Nassariidae, Muricidae, Strombidae.

Habitat. - Always on hard bottoms; intertidal to 10 m. Found intertidally on wet erosion beaches and exposed rocky shores, and subtidally on outer edge of the reef-flat, on algal ridge and along its inner margin.

Occurrence. - Rare.

Distribution. - Records from the Mascarenes, Madagascar and the Seychelles include: Madagascar (Bouvier, 1915; Dehancé, 1969); Mauritius (Richters, 1880; Michel, 1974).

Remarks. - Most descriptions of this species have focused on the colour pattern. However, while patterns appear to remain constant, living colours seem to be subject to geographical variation. For example, bands on the ambulatory legs are reported to be blue in specimens from Australia (Morgan, 1991), the Marianas Islands (Wooster, 1984), Paumotu (= Tuamotu) Archipelago, and Wake Islands (Dana, 1852d), Indonesia (Haig & Ball, 1988), and South Africa (Barnard, 1950), but red in specimens from Vietnam (Fize & Serène, 1955), and orange in specimens from Hawaii (Haig & McLaughlin, 1984). Alcock (1905) provided a differential diagnosis for this species; however, the recent diagnosis by Morgan (1991) included several diagnostic characters not considered by early carcinologists.

***Calcinus haigae* Wooster, 1984**

Calcinus haigae Wooster, 1984: 146, fig. 5 (type locality: Adelupe Point, Guam); Morgan, 1991: 880, figs. 17-20.

Material examined. - Mauritius: 2 males (SL = 3.4, 3.3 mm), 1 female (SL = 4.8 mm), site #4 (Coin de Mire) (5 m depth).

Diagnosis. - Shield longer than broad, dorsal surface covered with many minute depressions and few setae on lateral margins; rostrum acute. Ocular peduncles approximately eight times longer than broad and longer than width of anterior margin of shield, inflated basally and with cornea slightly dilated; ocular acicles small, subtriangular and with two or three terminal spines. Antennular peduncles extending nearly to bases of corneae; antennal peduncles reaching to distal third of ocular peduncles. Left cheliped larger and longer than right, differences less evident in small specimens; proximal outer surface of palm of left cheliped smooth, becoming tuberculate distally and on fixed finger, upper margin with more prominent tubercles. Right cheliped more spinose and hirsute than left; palm with row of five or six strong spines on upper margin, outer face spinose dorsally and mesially; dactyl also with spinose upper margin, spines decreasing in size distally. Dactyl of left third pereopod shorter than propodus. Second and third pereopods similar, smooth with few setae; no more than three tufts of short, widely-spaced setae on ventral margins of dactyls of both left second and third pereopod. Telson with posterior lobes asymmetrical, left lobe longer and larger; terminal margins each with several spines.

Colour in preservative. - Shield orange with few marginal cream spots. Ocular peduncles brown-purple with cream-coloured ring at base of cornea. Chelipeds brown-purple with finger tips cream. Second and third pereopods brown-purple with tips of dactyls paler.

Habitat. - Subtidal, outside reef at depths of seven to 25 m; on coral and coral rubble.

Occurrence. - Rare.

Distribution. - This is first record from the western Indian Ocean region.

Remarks. - Wooster (1984) related *C. haigae* to *C. minutus* Buitendijk, 1937, *C. nitidus* Heller, 1865, *C. rosaceus* Heller, 1861, and *C. guamensis* Wooster, 1984, distinguishing it primarily by its "unique" colouration. Forest (1958a) and Morgan (1991) have speculated that *C. minutus* and *C. nitidus* are synonymous. Until further and more detailed morphological studies are conducted, it appears that colouration is the only assured means for distinguishing among these taxa, although some variations in the colour pattern of specimens of *C. haigae* from Australia were reported by Morgan.

***Calcinus laevimanus* (Randall, 1840)**

Pagurus tibicen - H. Milne Edwards, 1836: 278; 1840: pl. 59, fig. 37 (not *Cancer tibicen* Herbst, 1791).

Pagurus laevimanus Randall, 1840: 135 (Type locality: Sandwich Islands).

Pagurus lividus H. Milne Edwards, 1848: 63.

Calcinus tibicen - Dana, 1852d: 457 [not *Calcinus tibicen* (Herbst, 1791)].

Pagurus levimanus - Stimpson, 1858: 234.

Pagurus (Calcinus) tibicen - Hilgendorf, 1869: 97; 1879: 823 [not *Calcinus tibicen* (Herbst, 1791)].

Calcinus Herbstii De Man, 1888a: 437.

Calcinus herbsti - Ortmann, 1892: 292; Melin, 1939: 22, figs. 7, 8; Fize & Serène, 1955: 41, fig. 6, pl. 2, figs. 1-4.

Calcinus herbstii - De Man: 1898: 270; Alcock, 1905: 53, pl. 5, fig. 4; Edmondson, 1946: 264, fig. 161a; Boone, 1935: 20, pl. 2, fig. 1; Yap-Chiongco, 1938: 205, pl. 2, fig. 5; Forest, 1951: 89, figs. 2, 5, 6, 9; Baissac *et al.*, 1962: 271; Michel, 1974: 257.

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, figs. 80e, f; Miyake, 1956: 323, figs. 14, 15; Morgan, 1991: 888, figs. 30-33; Yu & Foo, 1991: 39, unnumbered colour fig.

Calcinus Herbstii - Vatova, 1943: 15.

Calcinus herbstei - Fourmanoir, 1952: 177.

Material examined. - Rodrigues: 2 males (SL = 2.9, 5.1 mm), 6 females (SL = 2.8-4.4 mm), site #2 (Pointe Cotton). Mauritius: 5 males (SL = 4.3-5.0 mm), 1 female (SL = 4.3 mm), northern coast; 2 males (SL = 5.2, 5.6 mm), 4 females (SL = 3.9-6.4 mm), site #7 (Île d'Ambre); 2 males (SL = 1.9, 1.7 mm), 2 females (SL = 3.5, 3.6 mm), site #9 (Belle Mare); 1 male (SL = 3.8 mm), 2 females (SL = 2.6, 3.2 mm), site #10 (Île aux Cerfs) (mangroves); 3 males (SL = 2.9-5.6 mm), 4 females (SL = 2.2-4.4 mm), site #12 (Îlot Sancho).

Diagnosis. - Shield smooth, nearly as broad as long, with two distinct symmetrical depressions laterad of midline posteriorly; rostrum triangular, extending slightly beyond lateral projections. Ocular peduncles inflated basally, narrowing in distal two-thirds, moderately short, extending only slightly beyond antennular peduncles, approximately as long as anterior margin of shield; ocular acicles triangular, simple. Chelipeds markedly unequal, left vastly larger and longer than right. Outer face of palm of left cheliped rounded and almost smooth, upper margin similar. Upper margin of palm of right chela and dorsal margin of carpus also smooth or only slightly granular. Dactyl of left third pereopod shorter than the propodus. Dactyls of second and third left pereopods each with two to four, usually three, tufts of fine setae on ventral margin of dactyl of left third pereopod; carpi each with single spine on dorsodistal margin. Telson with posterior lobes asymmetrical, left larger; terminal margins of both lobes unarmed or with single spine.

Colour in preservative. - Shield cream; ocular peduncles dark orange with proximal white and cream rings. Right chela brown (in some specimens purplish) palm, dactyl dark proximally, white distally on dactyl and fixed finger. Left chela brown (or purplish) proximally on palm, white distally and on fixed finger and dactyl. Dactyls of second and third pereopods with subdistal dark orange band and subproximal dark orange spot; carpus and merus with dark orange longitudinal stripes.

Occupied shells. - Mostly globose gastropod shells such as Neritidae: 57.9% Neritidae, 15.8% Cerithiidae, 15.8% Planaxidae, 10.5% Cymathidae (19 shells examined).

Habitat. - Intertidal, occasionally very shallow subtidal; on hard substrate of littoral zone, particularly in areas of shallow pools and ridges towards the upper part of the shore with sparse algal growth, occasionally on sand and mud flats. Associated with *Clibanarius humilis* Dana, 1851, and *Clibanarius virescens* Krauss, 1843.

Occurrence. - Abundant.

Distribution. - Records from the Mascarenes, Madagascar and the Seychelles include:

Seychelles (Richters, 1880; Laurie, 1926); Madagascar (Lenz & Richters, 1881; Lenz, 1910; Dechancé, 1969); Mauritius (Richters, 1880; Alcock, 1905; Bouvier, 1915; Ward, 1942; Baissac *et al.*, 1962; Michel, 1974).

Morphological variation. - We examined the size and sex ratio of *C. laevimanus* from Mauritius and Rodrigues islands (Fig. 2). Although no females were found in the 5.5 mm group, compared with 20% for males, no significant differences in the frequency distributions were observed ($G = 5.697$, $df = 2$, ns).

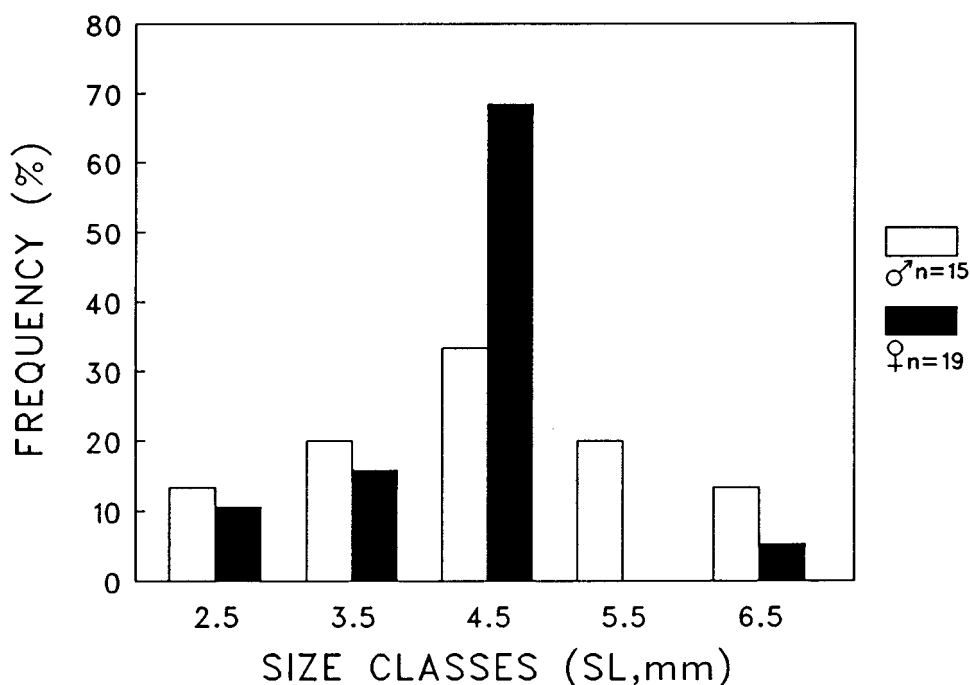


Fig. 2. Size frequency distribution between sexes in *Calcinus laevimanus* (Randall, 1840).

Remarks. - Herbst (1791) cited no type locality in his description of *Cancer tibicen* and as a result, subsequent authors applied his name to a common Indo-Pacific species characterized by the smooth appearance of the major cheliped (e.g., H. Milne Edwards, 1836; Dana, 1852d; Stimpson, 1858). In the interim, Randall (1840) had briefly described a similarly smooth Indo-Pacific species as *Pagurus laevimanus*. Hilgendorf (1879) suggested that Herbst' (1791) description applied more accurately to the western Atlantic species known as *Pagurus* (*Calcinus*) *sulcatus* H. Milne Edwards, 1836 than to the Indo-Pacific taxon. For *C. tibicen* sensu H. Milne Edwards, De Man (1888a) proposed the replacement name, *Calcinus herbstii*. De Man's name quickly gained acceptance; however, in a footnote to Stimpson's (1907) posthumously published "Report on the North Pacific Exploring Expedition of 1853-1856", Rathbun (1907) equated, without comment, *C. tibicen* (sensu Milne Edwards and Dana) to *C. laevimanus*. Acknowledging the accuracy of Rathbun's (1907) correction, Stebbing (1910) formally placed "*C. tibicen* sensu [Milne Edwards] Dana (not Herbst)" and *C. herbstii* De Man, in synonymy with *C. laevimanus*. Nonetheless, reports on *C. herbstii* continued to appear in the literature for nearly 65 years. *Pagurus lividus* was recognized as a pale colour variant of *C. herbstii* by Borradaile (1898), who cited it as a variety of *C. herbstii*.

H. Milne Edwards' (1836-1844) work that appeared in C. Cuvier's *Le Règne Animal*, ... was published in 23 parts between September 1836 and March 1844. Plate 59 was published in November 1840 (Manning & Holthuis, 1981).

***Calcinus latens* (Randall, 1840)**

Pagurus latens Randall, 1840: 135 (type locality: Sandwich Islands).

Pagurus cristimanus H. Milne Edwards, 1848: 64.

Calcinus latens - Dana, 1852d: 459; 1855: pl. 28, fig. 2; Alcock, 1905: 58, 59, pl. 5, fig. 5; Nobili, 1906: 83, pl. 5, fig. 20; Forest, 1951: 85, figs. 14-18; Fize & Serène, 1955: 58, figs. 9a, b, c, pl. 2, figs. 9-11; Miyake, 1956: 331, figs. 20, 21; Lee, 1969: 53, fig. 12; Michel, 1974: 257; Tirmizi & Siddiqui, 1982: 61, figs. 32, 33; Morgan, 1991: 890, figs. 34-36; Yu & Foo, 1991: 36, unnumbered colour fig.

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; Miyake, 1956: 328, figs. 18, 19.

Calcinus latens var. *terrae reginae* - Buitendijk, 1937: 269.

Calcinus abrolhensis Morgan, 1988: 218, fig. 1.

[Not *Calcinus terrae-reginae* - De Man, 1888a: 226; 1888b: 439 [= *Calcinus gaimardii* (H. Milne Edwards, 1836)].

Material examined. - Rodrigues: 9 males (SL = 1.6-4.3 mm), site #2 (Pointe Cotton). Mauritius: 1 ovigerous female (SL = 3.2 mm), 1 juvenile (SL = 1.8 mm), site #4 (Coin de Mire) (5 m depth); 1 male (SL = 2.1 mm), site #5 (Cap Malheureux); 26 males (SL = 1.3-4.0 mm), 23 females (SL = 1.8 - 3.8 mm), site #7 (Île d'Ambre); 10 males (SL = 2.4-4.8 mm), 8 females (SL = 2.3-3.6 mm), site #11 (Île aux Aigrettes) (3 m depth); 6 males (SL = 1.9-4.1 mm), 2 females (SL = 2.4, 2.9 mm), site #12 (Îlot Sancho).

Diagnosis. - Shield rectangular, longer than broad; rostrum acute, extending well beyond lateral projections. Ocular peduncles elongate, slender; ocular acicles small, simple (rarely with additional spinules). Left cheliped larger and longer than right; outer face of palm of left cheliped smooth and naked; upper margin variously armed with spines, spinules, tubercles, granules, or unarmed. Right cheliped with upper margin of palm armed with five strong spines; dorsal margin of carpus carinate and spinose. Dactyl of left third pereopod longer than propodus. Third pereopods with slightly greater development of long setae on dactyls and distal part of propodi than on second pereopods; carpi each with sharp spine on dorsodistal margin. Telson with one to six spines on terminal margin of left posterior lobe, terminal margin or right posterior lobe with zero to three spines, all directed ventrally.

Colour in preservative. - Generally yellowish; dactyls of second and third pereopods with proximal red, brown or purple band formed by several short, longitudinal pigmented stripes.

Occupied shells. - Nassariidae 40.3%, Planaxidae 14.3%, Neritidae 11.9%, Strombidae 7.1%, Cerithiidae 4.8%, Columbidae 4.8%, Conidae 2.4%, Cymatiidae 2.4%, Cypraeidae 2.4%, Melongenidae 2.4%, Thaididae 2.4%, Trochidae 2.4%, Turbinidae 2.4% (n = 42).

Habitat. - Intertidal and shallow subtidal to five meters; wide variety of habitats including inner and outer coral reef flats not exposed to high surf, rocky platforms, rock pools on lower shore, coral heads in lagoons, rubble and sand.

Occurrence. - Common.

Distribution. - Records from the Mascarenes, Madagascar and the Seychelles include: Seychelles (Laurie, 1926); Mauritius (Richters, 1880; Bouvier, 1915; Michel, 1974); Madagascar (Dechancé, 1969).

Morphological variation. - We compared the size/sex ratio for 86 specimens of *C. latens* collected at Mauritius and Rodrigues. As may be seen in Fig. 3, males attained significantly larger sizes than females ($\chi^2 = 17.178$, $df = 5$, $P < 0.01$). Variations were also observed in the tufts of setae on the ventral margins of the dactyls of the third pereopods and in the spination of the upper margin of the palm of the left cheliped. Of 59 specimens examined, variations in the number of tufts of setae on the ventral margins of dactyls were: two (1.7%), three (39%), four (59.3%). Even greater variation was found in the armature of the upper margin of the left cheliped. In the 71 specimens examined, six spines were present in 1.4% of the sample and two to nine spinules in 35.1%; in the remainder, tubercles were present in 9.9%, granules in 26.8%, and in 26.8% this surface was smooth.

Remarks. - The date of publication of *C. latens* has been given as 1839 by the vast majority of authors citing this taxon. As indicated by Lewinsohn (1969) and Manning & Holthuis (1981), the correct date of publication of Randall's catalogue is 1840. It is apparent from the synonymy cited for this species, uncertainty has existed regarding its actual identity. The complexity of the apparent synonyms of *C. latens* was reviewed by Fize & Serène (1955) and summarized by Morgan (1991).

As in other species of *Calcinus*, colour has been used as the primary diagnostic character for recognition. Fize & Serène (1955), Haig & Ball (1988), and Morgan (1991) have described, at some length, the colour of *C. latens* in life, and colour variations have been discussed by

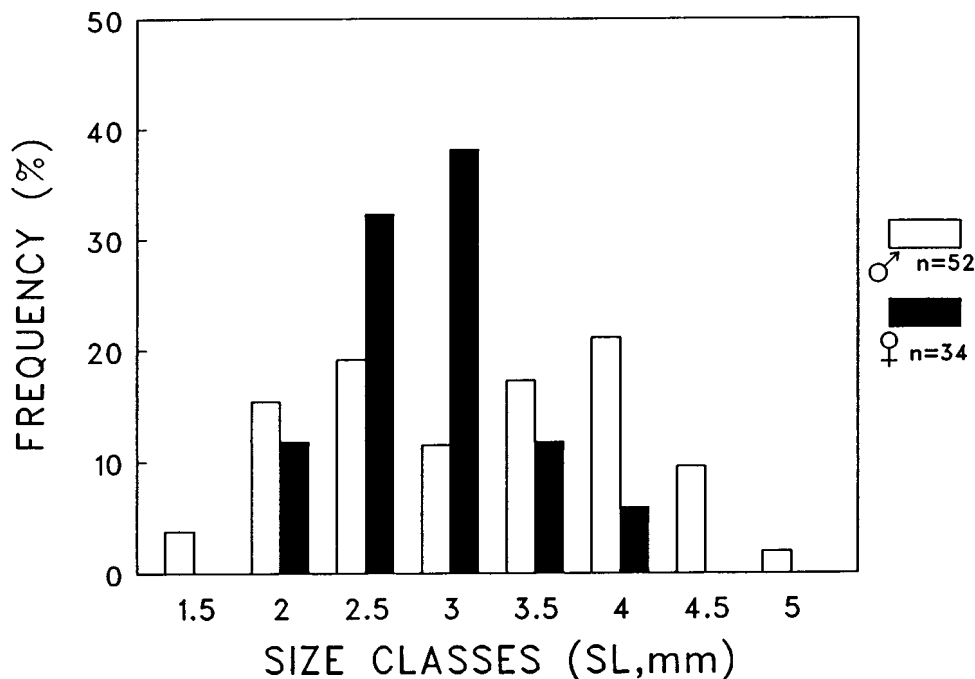


Fig. 3. Size frequency distribution between sexes in *Calcinus latens* (Randall, 1840).

Fize & Serène (1955), Haig & McLaughlin (1984), Haig & Ball (1988), and Morgan (1990). Haig & McLaughlin (1984) noted that the proximal purple band on the dactyls of walking legs, which had been reported as solid by several authors, was actually formed by short longitudinal stripes of blue and dark violet. Similar stripes were observed in our material. However, while this pattern was evident in preserved specimens from Maluku, Indonesia, Haig & Ball (1988) reported that a solid deep band actually was typical of the living animals.

***Calcinus vachoni* Forest, 1958**

Calcinus vachoni Forest, 1958a, 184; 1958b: 285, figs. 2, 3, 9, 10, 15, 19 (type locality: Rocher Noir, Vietnam); Morgan, 1990: 11, fig. 2; 1991: 905, figs. 60-62.

[Not *Calcinus vachoni* - Lewinsohn, 1982: 53 (= *Calcinus guamensis* Wooster, 1984)]

Material examined. - Mauritius: 2 males (SL = 2.8, 3.4 mm), 1 female (SL = 2.3 mm), site #11 (Île aux Aigrettes) (3 m depth).

Diagnosis. - Shield width approximately equaling length; rostrum well developed. Ocular peduncles longer than anterior margin of carapace, slender; ocular acicles trispinose. Antennular peduncles not extending to base of cornea; antennal peduncles reaching to distal third of ocular peduncles. Outer face of palm of left cheliped smooth or finely tuberculate, upper margin smooth or with small tubercles. Upper margin of palm of right cheliped with three to six small spines; dorsal margin of carpus with low spines. Dactyl of left third pereopod markedly shorter than propodus; moderate development of brush of setae on ventral margins of dactyl (three tufts) and propodus (five to seven tufts) distally, more pronounced than setation of left second pereopod; four or five corneous spines also present on ventral margin of dactyls. Telson markedly asymmetrical, left posterior lobe larger; terminal margins of both posterior lobes with several spines, extending onto lateral margins.

Colour in preservative. - Uniformly whitish yellow, with no distinctive colour pattern.

Habitat. - Subtidal to 20 m; coral and rocky reefs.

Occurrence. - Rare.

Distribution. - This is the first report of this species in the western Indian Ocean region.

Remarks. - Lewinsohn (1982) reported *C. vachoni* from Somalia. Our re-examination of Lewinsohn's material has shown that his specimens correctly should be assigned to *C. guamensis*. Colour in living specimens of *C. vachoni* was described by Morgan (1991).

***Calcinus vanninii*, new species (Figs. 4, 5)**

Material examined. - *Holotype*: Male (SL = 5.5 mm) (type locality: Mauritius: Îlot Sancho, site #12).

Paratypes: Mauritius: 1 male (SL = 4.9 mm) USNM 265373, 1 female (SL = 4.8 mm), Coin de Mire (site #4), 5 m depth.

Diagnosis. - Ocular acicles long and slender, equal or unequal; slightly to considerably overreaching antennular peduncles, and very considerably overreaching antennal peduncles; ocular acicles simple, bi- or trifid. Left chela with outer face marked by one or two shallow depressions and prominently keeled, tuberculate lower margin; upper margin with row of blunt or spinulose tubercles. Upper margin of propodus of right cheliped with row of five acute or blunt spines; dactyl with smaller double row of similarly acute or blunt spines; carpus with spine at dorsodistal angle. Third pereopods without brush of long setae on ventral margins of dactyls and propodi; ventral margins of dactyls with one prominent distal and row 10-13 smaller corneous spines. Telson with posterior lobes subequal, terminal margins each with one prominent spine usually directed ventrally.

Description. - Shield appreciably longer than broad; anterolateral margins sloping, posterior margin rounded; anterior margin between rostrum and lateral projections straight or slightly concave; dorsal surface punctate, particularly in anterior third. Rostrum prominent, acute or subacute, occasionally minutely bifid. Lateral projections obsolete or nearly so, but with tiny marginal or submarginal spinule.

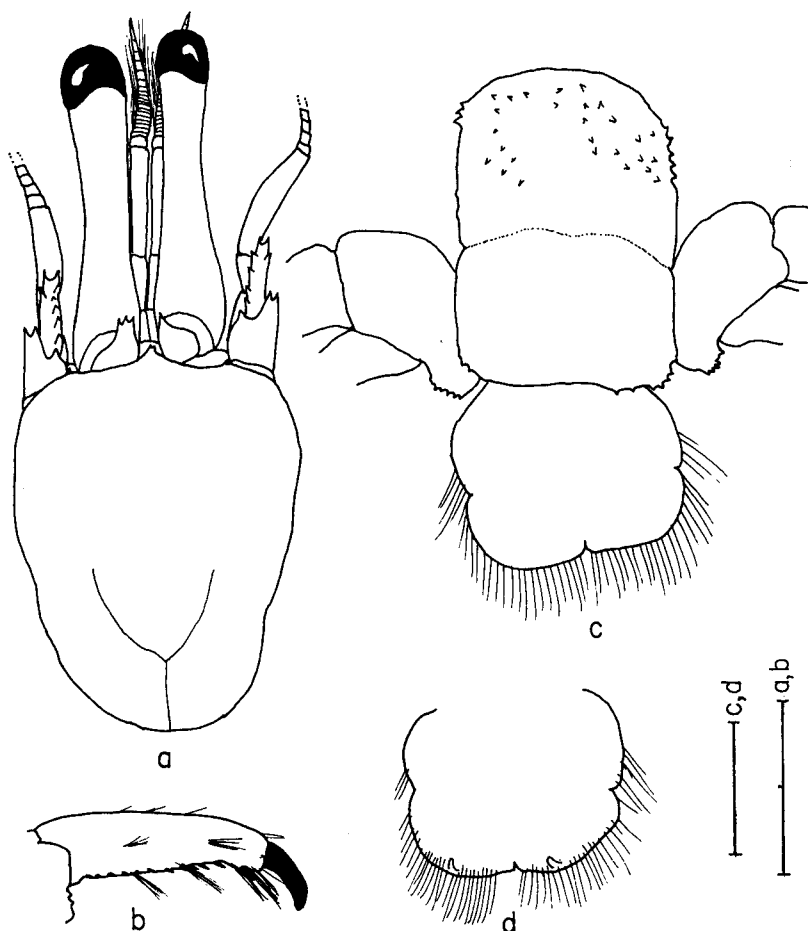


Fig. 4. *Calcinus vanninii*, new species. Female paratype, SL 4.8 mm, site #4 (Coin de Mire): a, shield and cephalic appendages; b, dactyl of left P3; c, sixth somite and telson (dorsal view); d, telson (ventral view). Scales equal 2 mm (a, b) & 1 mm (c, d).

Ocular peduncles long and slender, usually one and one half to twice width of anterior margin of shield and only slightly shorter than shield length; symmetrical or with one considerably longer than other; with noticeable medium constriction; cornea not dilated. Ocular acicles with one to three terminal spinules; with narrow basal separation.

Antennular peduncles slightly to considerably shorter than ocular peduncles. Ultimate and penultimate segments each with few scattered short setae; basal segment with one acute spine on dorsolateral margin distally.

Antennal peduncles usually not reaching to distal half of ocular peduncles; with supernumerary segmentation. Fifth segment with few scattered short setae; fourth segment with prominent dorsodistal spine; third segment with spine at ventrodistal margin and long setae on laterodistal margin; second segment with dorsolateral distal angle produced, terminating in strong bifid spine, dorsomesial distal angle with strong spine; first segment with four strong spines on ventral distolateral margin. Antennal acicle moderately broad and short, reaching to distal margin of penultimate peduncular segment or slightly beyond, terminating in strong acute simple or bifid spine and with two strong accessory spines laterally

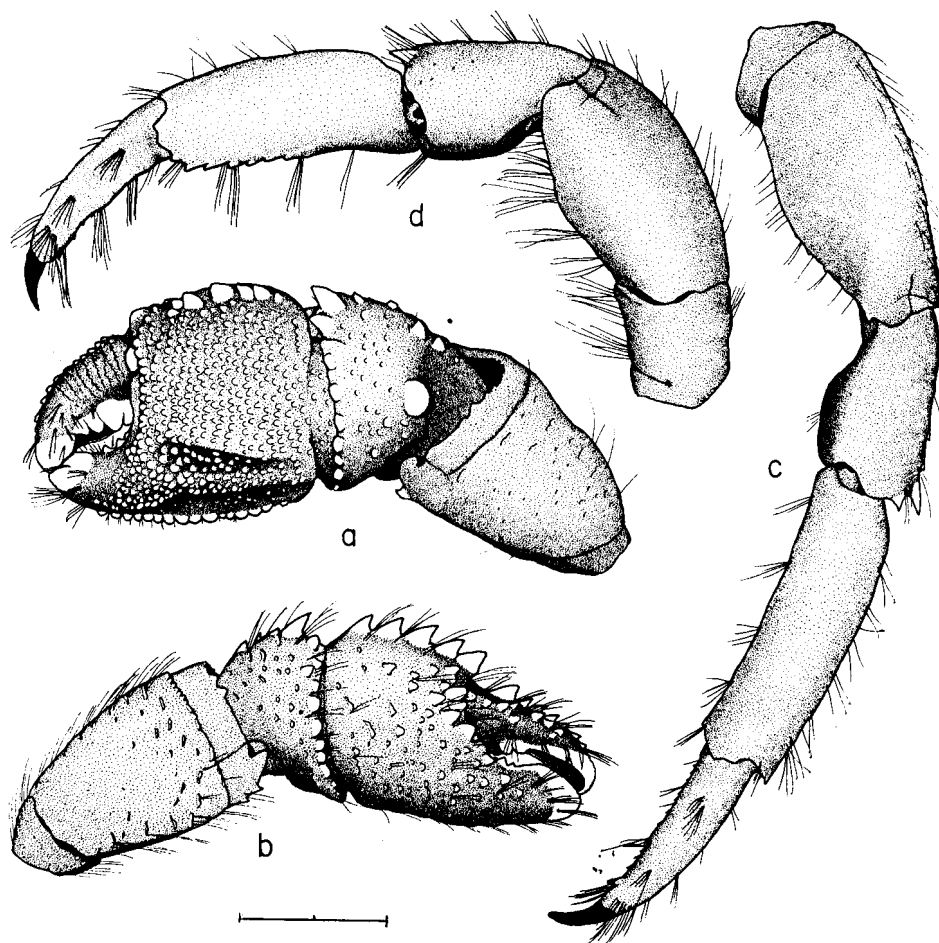


Fig. 5. *Calcinus vanninii*, new species. Female paratype, SL 4.8 mm, site #4 (Coin de Mire): a, left cheliped; b, right cheliped; c, right P2; d, left P3. Scale equals 2 mm.

and four or five mesially. Antennal flagellum overreaching right cheliped; each article with three to five minute setae.

Left cheliped (missing in male paratype) of male holotype with very weak hiatus between dactyl and fixed finger; dactyl only slightly shorter than palm; cutting edge with four calcareous teeth, strongest proximally; tip broken; outer and upper surfaces with closely-spaced, very low, flattened tubercles, inner face also with numerous flattened tubercles and two stronger tubercles proximally, all devoid of setae. Palm with outer surface convex, but with shallow depression distally in proximity of fixed finger, surface covered with closely-spaced, low, flattened tubercles; upper margin with irregular row of low tubercles, lower margin with distinct, tuberculate keel, extending almost entire length of fixed finger; inner surface of palm and fixed finger with scattered low tubercles and few tufts of short, stiff setae; outer surface of fixed finger covered with low, flattened tubercles; cutting edge with five calcareous teeth and large calcareous hoof-shaped claw. Carpus broadly triangular, approximately two-thirds length of merus; dorsal margin with prominent tubercle at distal margin and few low tubercles proximally; lateral face with scattered low, flattened tubercles, one prominent tubercle in dorsoproximal half, distal margin with row of low tubercles extending onto ventrodistal margin; mesial face with three low tubercles on distal margin and few smaller tubercles scattered on surface. Merus with dorsodistal margin very weakly denticulate, dorsal margin with row of very low, very short, transverse ridges, each with few fine, short setae; lateral face with two spinulose tubercles dorsally, several short, low transverse ridges with short fine setae, ventrodistal margin with one blunt spine; mesial face with three small tubercles at ventrodistal margin.

Left cheliped of female paratype (Fig. 5) with moderately distinct hiatus between dactyl and fixed finger; outer surface of dactyl covered with low, flattened tubercles, each with row of very short stiff setae on anterior margin; upper margin of dactyl with row of larger, somewhat spinulose, tubercles, inner surface with few tubercles in proximal third. Palm with convex outer face marked by two shallow depressions, lower depression contiguous with longitudinal groove delimiting lower marginal tuberculate keel extending to claw of fixed finger, surfaces of palm and fixed finger with closely-spaced low, flattened tubercles, many of which accompanied by anterior row of very short stiff setae; upper margin of palm with row low, blunt spines in proximal two-thirds, low tubercles in distal third, inner surface with low flattened tubercles in upper half; ventral surface with blunt spiniform process and few tubercles. Carpus with irregular row of spinulose tubercles on dorsal margin and one acute and one small blunt spine at dorsodistal margin, lateral face weakly punctate and with scattered tubercles, very prominent tubercle proximally in dorsal half, distal margin with row of tubercles extending onto the ventral margin, mesial face with two tubercles on distal margin ventrally. Merus with few spinules on dorsodistal and laterodistal margins, ventrolateral margin with one acute spine, ventromesial margin with three small denticles.

Right cheliped of males with no hiatus between dactyl and fixed finger; dactyl slightly shorter than palm; cutting edge with two calcareous teeth and very large, calcareous hoof-shaped claw; upper margin with double row of tubercles, inner and outer faces with scattered low tubercles and few tufts of short, stiff setae. Palm approximately equal to carpus in length; upper margin with row of five strong, blunt, corneous-tipped spines, outer face weakly tuberculate and with row of larger tubercles just posterior to articulation of dactyl and extending onto surface of fixed finger; inner face with few very low tubercles. Carpus triangular, slightly more than half length of merus; dorsal margin with one low denticulate tubercle and one small spine in distal half, dorsodistal margin with one strong and one small spine; lateral face

with few scattered low tubercles, distal margin with row of more prominent tubercles becoming bi- or trilobed in ventral half; mesial face with two short, low transverse ridges and row of setae, ventrodistal angle with small spine. Merus with dorsodistal margin weakly tuberculate, dorsal margin with row of very low, short, transverse ridges and short to moderately long setae; mesial face with few tufts of setae, ventromesial margin with row of spines in distal half and low tubercle at proximal angle; lateral face with few tufts of short, fine setae, ventrolateral distal angle with acute spine. Right cheliped of female with small hiatus between dactyl and fixed finger; armature generally similar, but stronger and more acute.

Second pereopods similar, slightly longer than third. Dactyls approximately two-thirds length of propodi; terminating in curved corneous claws; mesial and lateral faces unarmed, but with rows of widely spaced long setae, row of shorter setae on dorsal surfaces; ventral margins each with one prominent, blunt corneous spine near base of claw and row of 10-13 short corneous spines, decreasing in size proximally, also with one or two tufts of long, stiff setae. Propodi each with small blunt or acute spine at dorsodistal and mesiodistal margins; ventrodistal margins each with two blunt spines or tubercles, ventral surfaces with few widely-spaced tufts of long setae arising from low protuberances more prominent in males; lateral surfaces smooth or minutely granular. Carpi each with one strong and one smaller spine on dorsodistal margin, dorsal surface with three or four low, sometimes spiniform protuberances and few setae; mesial face with small spine (female) or protuberance (male) on distal margin in dorsal half. Meri with ventromesial and ventrolateral margins weakly crenulate, each also with strong spine on ventrolateral distal angle; dorsal margins with tufts of fine setae.

Third pereopods dissimilar in armature, but not in setation. Dactyls without brush of setae on ventral margins. Left dactyl slightly shorter than right and with very faint longitudinal sulcus on lateral face; ventral margins each with two or three widely-spaced tufts of long stiff setae, one prominent corneous spine near base of claw and row of 11-13 small corneous spines, decreasing in size proximally. Propodus of left slightly shorter and broader than right, with ventrolateral margin delimited by row of tubercles, low and blunt in males, but prominent and spinulose in female; dorsodistal margins of both left and right usually with very small spine or tubercle, mesial and lateral distal margins of right unarmed or with very small tubercle. Carpi each with one spine at dorsodistal margin and two or three low blunt or spinulose protuberances and tufts of setae on dorsal margin proximally; mesiodistal margins usually with two or three very small tubercles. Meri with row of tufts of fine setae on dorsal margins; ventrolateral distal angles each with acute spine (males) or unarmed (female).

Sternite of third pereopods with roundly rectangular anterior lobe divided into two lobes by median depression.

Tergite of sixth abdominal somite very well calcified; divided into anterior and posterior lobes by shallow, transverse groove. Anterior lobe with lateral margins each armed with few small spines, dorsal surface with numerous small spines; posterior lobe with anterolateral margins armed with few to several spines. Uropods markedly asymmetrical; protopods each with one or two strong spines and dense long setae on ventral surfaces, posterior margins with numerous small spines. Telson with posterior lobes subequal; terminal margins each with row of long setae and one strong, ventrally directed spine; lateral margins unarmed, but with long setae.

Colour in preservative. - Shield red-orange, darkest anteriorly and laterally, with one white patch on each side at level of "Y"; anterior margin cream-coloured with orange tint. Ocular

peduncles dark red-orange basally, fading to cream in distal two-thirds; ocular acicles dark red-orange. Antennular peduncles purplish-brown on basal and penultimate segments; ultimate segment and flagellum purple. Antennae with acicle and proximal peduncular segments orange-yellow; ultimate segment and flagellum yellow with faint orange tint. Chelipeds dark red-orange with distal-most tips of dactyls and fixed fingers white; tubercles, spines (at least distally), protuberances and punctae white. Meri, carpi, and proximal three-fourths of propodi of ambulatory legs uniformly red-orange with white spines, tubercles and protuberances; distal fourth of propodi and dactyls reddish-purple, with tips of dactyls white.

Etymology. - This species is named for its collector, Professor Marco Vannini.

Occurrence. - Rare.

Distribution. - At present known only from Mauritius.

Remarks. - In general colouration, *C. vanninii* resembles both *C. gaimardii* (H. Milne Edwards, 1848) and the undescribed *Calcinus* species reported by Reay & Haig (1990) from East Africa. *Calcinus vanninii* is immediately distinguished from *C. gaimardii* by the presence, in the latter species, of a dense brush of setae on the ventral margins of the dactyls and propodi of the third pereopods. The only diagnostic characters provided by Reay & Haig for their undescribed species were unequal ocular peduncles (left longest), multidentate ocular acicles, and the absence of a dense brush of setae on the third pereopods. Ocular peduncle length is variable in *C. vanninii*, as is spination of the ocular acicles. As indicated above, the third pereopods lack a dense brush of setae. It is possible that *C. vanninii* and Reay & Haig's taxon are one in the same; however, we have not been able to examine their species.

In the sculpturing of the outer face of the palm of the left cheliped, *C. vanninii* bears some resemblance to *C. imperialis* Whitelegge, 1901. The two species are readily distinguished not only by the differences in colour patterns on the ambulatory legs (dactyls, propodi and meri banded in *C. imperialis*; meri and carpi and proximal three-fourths of propodi and dactyls solidly coloured in *C. vanninii*), but by the presence of a dense brush of setae on the ventral margin of the dactyl and ventral distal half of the propodus in *C. imperialis* that is absent in *C. vanninii*.

Genus *Clibanarius* Dana, 1852

Clibanarius Dana, 1852a: 6. Type species by original designation, *Pagurus clibanarius* (Herbst, 1791).
Gender: masculine.

Clibanarius humilis Dana, 1851

Pagurus humilis Dana, 1851: 271 (type locality: "Viti" and "Tongatabu").

Clibanarius humilis - Dana, 1852d: 469, pl. 29, fig. 9; Forest, 1953a: 443, figs. 1, 5.

Clibanarius aequabilis - Nobili, 1907: 367 [not *Clibanarius aequabilis* (Dana, 1851)].

Clibanarius aequabilis var. *merguiensis* - Bouvier, 1915: 29 (not *Clibanarius* var. *merguiensis* De Man, 1888b).

Material examined. - Rodrigues: 51 males (SL = 1.6-3.6 mm), 43 females (SL = 1.4-3.0 mm), 14 ovigerous females (SL = 1.6-2.0 mm), 1 juvenile (SL = 1.1 mm), site #2 (Pointe Cotton). Mauritius: 11 males (SL = 3.2-4.0 mm), northern coast; 29 males (SL = 1.5-3.6 mm), 10 females (SL = 1.8-3.0 mm), site #7 (Île d'Ambre); 7 males (SL = 1.8-3.1 mm), 1 female (SL = 2.4 mm), site #9 (Belle Mare); 19 males (SL = 1.7-2.8 mm), 27 females (SL = 1.4-2.2 mm), 6 juveniles (SL = 1.2-1.6 mm), site #10 (Île aux Cerfs); 1 male (SL = 1.2 mm), 2 females (SL = 1.3, 1.6 mm), 2 ovigerous females (SL = 1.6, 1.7 mm), 2 juveniles (SL = 1.4, 1.6 mm), site #12 (Îlot Sancho).

Diagnosis. - Shield slightly longer than broad; rostrum short, exceeding lateral projections only slightly. Ocular peduncles nearly equaling length of anterior margin of shield, but shorter than antennular peduncles; cornea less than one-fourth length of peduncles; ocular acicles armed with three or four spines. Antennal peduncles reaching to or slightly beyond bases of corneae. Chelipeds usually slightly asymmetrical, right palm longer and broader than left. Left chela with row of sharp spines on dorsal margin of dactyl; dorsal margin of palm with row of sharp spines (usually five, sometimes four or six), dorsal and lateral surfaces covered with small, sometimes spinulose tubercles and row of one to four subacute spines parallel to dorsal margin. Right chela with similar, but less prominent, arrangement of spines. Dactyl of left third pereopod slightly shorter than propodus; dorsolateral margin of propodus with well defined carina, ventral margin unarmed but with few scattered tufts of thin setae; dactyls each with five or six corneous spines on ventral margin. Telson asymmetrical; terminal margins of posterior lobes unarmed or with few (not more than four) thin spines.

Maximum diameter of eggs 0.38-0.46 mm.

Colour in preservative. - Shield whitish, with peculiar large red patch at each anterolateral corner. Ocular peduncles generally reddish, with broad white ring at base of cornea, and large white spot medially at basal margin; ocular acicles red; chelipeds uniformly reddish

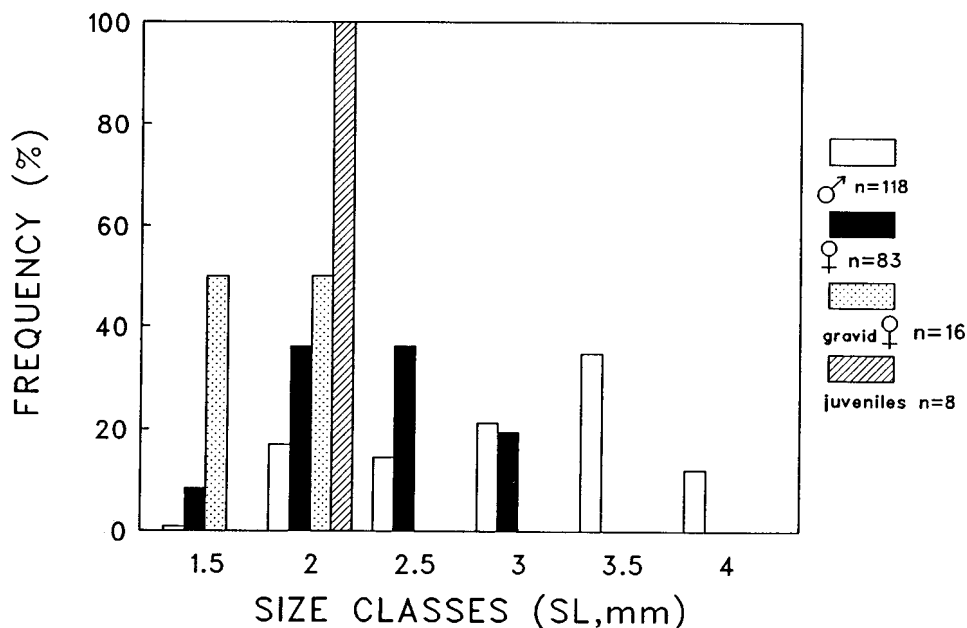


Fig. 6. Size frequency distribution between sexes, and reproductive states in *Clibanarius humilis* Dana, 1851.

with white tubercles; claws black. Dactyls of pereopods with white lateral faces, trimmed with brownish-stripe dorsally and ventrally, propodi reddish or purplish with brownish band on lateral and mesial faces extending from proximal margin dorsally and ventrally to distal fourth; carpus either reddish or purplish with lighter longitudinal band on lateral face.

Occupied shells. - Cerithiidae 81.45%, Naticidae 5.66%, Planaxidae 4.72%, Trochidae 3.14%, Neritidae 2.2%, Nassariidae 0.63%, Potamididae 0.63%, Strombidae 0.63%, Columbidae 0.31%, Littorinidae 0.31%, Architectonicidae 0.31% (N = 220).

Habitat. - Mangroves at Île aux Cerfs; under stones at Pointe Cotton.

Occurrence. - Abundant.

Distribution. - Records from the Mascarenes, Madagascar and the Seychelles include: Mauritius, under the name *C. aequabilis* var. *merguiensis* (as determined by Bouvier, 1915) according to Buitendijk (1937).

Morphological variation. - As may be seen in Fig. 6, females occupied the lower end of the size frequency distribution curve ($\chi^2 = 74.551$, $df = 5$, $P < 0.001$); females were ovigerous within an even narrower range (SL = 1.6-2.0 mm). This is apparently not an unusual situation for species of *Clibanarius* (Wenner, 1972; Harvey, 1988). Based on Wenner's (1972) data for *C. zebra* (Dana, 1851), Charniaux-Cotton & Payen (1985) hypothesized that proterogyny occurs in some anomurans. Harvey (1988), on the other hand, attributed the larger size of males in *C. digueti* Bouvier, to sexual differences in selective pressures and male mating success.

With few exceptions, the right cheliped is always longer and broader than the left. In our sample we found one male (SL = 3.2 mm) with a longer left cheliped, and five other specimens (one juvenile, SL = 1.2 mm; two males, SL = 2.9 and 3.2 mm; two females, SL = 1.48 and 1.88 mm) with both chelipeds of similar length. The dactyl of the left third pereopod is consistently slightly shorter than the propodus. As may be seen in Table 1, this character is not effected by either size or sex (males: 0.82 ± 0.007 , $n = 66$; females: 0.815 ± 0.008 , $n = 56$; Student's $t = 0.373$, $df = 120$, ns).

Negative allometry was observed in cheliped development (Tables 1, 2). Smaller specimens were found to have relatively longer chelipeds; the relationship between body size (shield length) and cheliped development decreasing with increasing size in both sexes.

Remarks. - Dana's (1851) description, repeated in his treatise on the U.S. Exploring Expedition (1852d) was brief and quite general; his figure (Dana, 1855: pl. 29, fig. 9) was small and lacking in detail. It was not until Forest (1953a) redescribed materials collected from Tahiti and Takumé and compared them with Nobili's (1907) specimens from Tuamotu (as *C. aequabilis*) and Bouvier's (1915) specimens from Île Maurice (as *C. aequabilis* var. *merguiensis*) that the confusion regarding the true identity of this species was resolved.

Table 1. Morphometry of *Clibanarius humilis* Dana, 1851. SL = shield length; CW = left chela, width of palm; DL = left chela, length of dactyl; PL = left chela, length of palm; PR = left third pereopod, length of propodus; DC = left third pereopod, length of dactyl; PW = left third pereopod, width of propodus; DW = left third pereopod, width of dactyl.

ln(SL) vs:	male				female			
	r	b	n	t:b=1	r	b	n	t:b=1
ln(CW)	0.939*	0.876	67	3.11* <	0.930*	0.757	56	5.96* <
ln(DL)	0.899*	0.748	67	5.60* <	0.869*	0.664	56	6.55* <
ln(PL)	0.887*	0.691	67	6.93* <	0.867*	0.672	56	6.22* <
ln(CS)	0.828*	0.524	67	10.80* <	0.769*	0.532	56	7.78* <
ln(PR)	0.963*	0.952	67	1.45 =	0.924*	0.855	56	3.00* <
ln(DC)	0.961*	0.918	58	2.31 =	0.904*	0.794	56	4.03* <
ln(PW)	0.923*	0.563	67	15.06* <	0.885*	0.532	56	12.29* <
ln(DW)	0.887*	0.470	67	17.47* <	0.844*	0.397	56	17.61* <

* = P<.01

r = correlation coefficient

b = slope of the regression line

b<1 : negative allometry

b=1 : isometry

n = sample size

t = statistic after Student's t test

Table 2. *Clibanarius humilis* Dana, 1851: males vs females.
Abbreviations as in Table 1.

	b		t	df	a		t	df
	male	female			male	female		
CW	0.876	0.757	1.93	119	-0.276	-0.157	2.12*	120
DL	0.748	0.664	1.17	119	-0.191	-0.122	2.55*	120
PL	0.691	0.672	0.25	119	-0.200	-0.219	3.31**	120
CR	0.524	0.532	0.10	119	0.394	0.347	2.89**	120
PR	0.952	0.855	1.64	119	-0.128	-0.066	5.44**	120
DC	0.918	0.794	1.99*	110	-0.215	-0.113	-	-
PW	0.563	0.532	0.62	119	-0.164	-0.152	3.02**	120
DW	0.470	0.397	1.51	119	-0.171	-0.106	2.75**	120

* = P<.02

** = P<.01

a = elevation of the regression line

b = slope of the regression line

df = degrees of freedom

t = statistic after Student's t test

- = test not applicable

Clibanarius striolatus Dana, 1852

Clibanarius striolatus Dana, 1852a: 7 (type locality: "Tongatabu" and "Viti" archipelago); 1852d: 463; 1855: pl. 29, figs. 3a-e; Alcock, 1905: 46, pl. 4, fig. 7; Dechancé, 1969: 32, fig. 6; Miyake, 1978: 51, fig. 18; Rahayu & Forest, 1993: 758.

? *Clibanarius striolatus* - Yap-Chiongco, 1938: 192, pl. 1, fig. 1; Thomas, 1989: 66, pl. 1E.

Clibanarius A Fize & Serène, 1955: 109, fig. 15, pl. 3, fig. 6.

[Not *Clibanarius striolatus* - Fize & Serène, 1955: 97, fig. 13A-C, pls., 3, 4 (= *Clibanarius demani* Buitendijk, 1937)]

Material examined. - Rodrigues: 1 female (SL = 3.0 mm), site #2 (Pointe Cotton). Mauritius: 8

males (SL = 2.8 - 4.8 mm), 1 female (SL = 3.6 mm), 1 juvenile (SL = 2.6 mm), site #5 (Cap Malheureux); 1 male (SL = 3.6 mm), 1 unsexed (SL = 3.8 mm), site #6 (Anse la Raie).

Diagnosis. - Shield subquadrate or slightly longer than broad; rostrum triangular, terminating acutely or bluntly. Ocular peduncles approximately as long as anterior margin of carapace, corneae not noticeably dilated; ocular acicles narrow, approximate distally, with one to four terminal spines. Antennular peduncles, when extended, slightly shorter to slightly longer than ocular peduncles; basal segment with one to five acute spines on laterodistal margin ventrally. Antennal peduncles reaching to distal third of ocular peduncles; antennal acicles reaching beyond distal margin of fourth segment. Chelipeds asymmetrical, right longer and broader at level of palm; dorsal and lateral faces of both chelae covered with spinose tubercles or small spines, strongest on left chela, and with sparse long setae; dorsal margins of palms each with row of four to six (more often five) strong, often hooked spines. Carpi each with two or three strong spines on dorsal margin. Meri of second pereopods, and often also third, with small spines on ventral margins. Third left pereopod with dactyl slightly longer than propodus; lateral face of propodus somewhat flattened, dorsolateral margin angular; ventrodistal margin usually with prominent spine and frequently one or two small spines or tubercles on laterodistal margin ventrally. Pereopodal dactyls each with row of five to seven small corneous spinules on distal third of ventral margin and frequently one or two additional widely-spaced spinules in proximal two-thirds. Telson with slightly asymmetrical posterior lobes; terminal margins either unarmed or with few (one to six) spines; when armed, outermost one or two spines strongest.

Colour in preservative. - Shield ochre with red spots. Ocular peduncles uniformly ochre; ocular acicles with faint red-orange stripes. Chelipeds with red-orange poorly defined stripes on ochre background. Ambulatory legs each with four longitudinal, continuous red-orange stripes on ochre background on propodi and dactyls; no distal band of white on propodi but with light-coloured patch at proximal margin of dactyls. Claws black.

Occupied shells. - Cerithiidae, Neritidae, and Planaxidae.

Habitat. - Mangroves, intertidal.

Distribution. - Records from the Mascarenes, Madagascar and the Seychelles include: Seychelles (Richters, 1880); Madagascar (Hoffman, 1874; Dechancé, 1969).

Occurrence. - Abundant.

Morphological variation. - Allometric growth in some characters of the left chela and left third pereopod are shown in Table 3. The pattern is isometric with respect to SL for cheliped width (CW) and third pereopodal propodus and dactyl length (PR, DC), while it is negatively allometric for dactyl and palm length of chela (PL, DL) and propodus and dactyl width (PW, DW) of pereopod. As may be seen in Table 4, the ratio of dactyl to propodal length in the third left pereopod is smaller in *C. striolatus* than in the other species of *Clibanarius* in our collection.

Remarks. - The species reported by Fize & Serène (1955) as *C. striolatus* was subsequently considered by Rahayu & Forest (1993) to probably represent *C. demani* Buitendijk, whereas the species designated only as *Clibanarius* A by Fize & Serène (1955) was determined by the latter authors to be *C. striolatus*. Rahayu & Forest (1993) included

Table 3. Morphometry of *Clibanarius striolatus* Dana, 1852.
Abbreviations as in Table 1.

ln (SL) vs:	r	n	b	b±1:t	a
ln(CW)	0.952**	12	0.78	2.76 =	-0.179
ln(DL)	0.864**	12	0.637	3.09* <	0.018
ln(PL)	0.873**	12	0.492	5.85** <	0.097
ln(CR)	0.722*	12	0.382	5.35** <	0.660
ln(PR)	0.954**	13	0.953	0.523 =	-0.067
ln(DC)	0.942**	13	1.014	0.13 =	-0.032
ln(PW)	0.939**	13	0.687	4.12** <	-0.301
ln(DW)	0.957**	13	0.564	8.40** <	-0.326

* = P<.02

** = P<.01

a = elevation of the regression line

b = slope of the regression line

b <1: negative allometry

b = 1: isometry

n = sample size

r = correlation coefficient

t = statistic after Student's t test

Table 4. Ratio of dactyl length (DC) to propodus length (PR) of the left third pereopod in the four *Clibanarius* species present in this collection. For each species, shield length was plotted against DC:PR, and the correlation coefficient was computed. None were significant.

	r	average	SE	n
<i>C. humilis</i> Dana, 1851	0.126	0.818	0.050	126
<i>C. striolatus</i> Dana, 1852	0.060	1.183	0.022	13
<i>C. demani</i> Buitendijk, 1937	0.257	1.267	0.075	3
<i>C. virescens</i> (Krauss, 1843)	0.034	0.706	0.048	3

n = sample size

r = correlation coefficient

SE = standard error

in their synonymy of *C. striolatus*, Miyake's (1978) description and figure, although Miyake (1978: 52) described the ocular peduncles as having coloured stripes. Since Miyake's (1978, fig. 18) illustration does not indicate striped peduncles, it is probable that an error in translation occurred and Rahayu & Forest (1993) were correct including Miyake's citation. The reports of *C. striolatus* by Yap-Chiongco (1938) and Thomas (1989) are lacking in detail, and the illustrations are unclear. As we have found great morphological similarity between *C. striolatus* and *C. demani* in our Mascarene material, we can only questionably assign the reports of these authors to this taxon.

Our material agrees generally quite well with the five specimens of *C. striolatus* (MNHN pg 5133) that we have examined. However, certain differences do exist. In our specimens the right cheliped is somewhat larger than the left; the dactyls of the ambulatory legs are a little longer than the propodi, and the spines on the ventral margins of the meri of the second pereopods are stronger.

As noted by Rahayu & Forest (1993), *C. striolatus* has frequently been compared with *C. longitarsus* (De Haan, 1849), *C. padavensis* De Man, 1890, *C. lineatus* Dana, 1852 (= *C. danai* Rahayu & Forest, 1993), and *C. laevimanus* Buitendijk, 1937. *Clibanarius*

padavensis is distinguished from *C. striolatus* and the three other species by its longer ocular peduncles, which are marked by longitudinal coloured stripes. *Clibanarius striolatus* and *C. demani* both are characterized by antennal acicles that overreach the distal margin of the fourth peduncular segment, and by the angular shape of the dorsolateral margin of the propodus of the third pereopod. In both *C. danai* and *C. longitarsus* the antennal acicles are short and do not reach the distal margin of the fourth peduncular segment. *Clibanarius laevimanus* is readily distinguished from *C. striolatus* by the longitudinal pigmented stripes on the lateral faces of the ambulatory legs that do not reach to the proximal and distal margins of the segments.

***Clibanarius demani* Buitendijk, 1937**

Clibanarius demani Buitendijk, 1937: 252, figs. 1, 2 (type localities: Bima, Soembawa, Flores, Kaledoepa, Toekang Besi Islands); Rahayu & Forest, 1993: 759, figs. 4a, 5a, 6a.

Clibanarius striolatus - Fize & Serène, 1955: 105, fig. 14, pl. 3, fig. 5 (not *Clibanarius striolatus* Dana, 1852).

Material examined. - Mauritius: 1 male (SL = 4.6 mm), site #7 (Île d'Ambre); 2 males (SL = 5.2, 5.7 mm), site #8 (Poudre d'Or).

Diagnosis. - Shield longer than broad; rostrum not reaching base of ocular acicles. Ocular peduncles longer than anterior margin of carapace, overreaching both antennular and antennal peduncles; ocular acicles small, with two or three terminal spines and tufts of setae. Antennal peduncles extending to distal third of ocular peduncles. Chelipeds subequal, right somewhat longer and broader. Left cheliped with row of four or five sharp, often hooked, spines on dorsal margin of palm, dorsal and lateral faces of palm and fixed finger with tubercles or small spines and tufts of setae. Carpus with one to three spines on dorsomesial margin. Palm and fixed finger of right cheliped with scattered small spines or tubercles on dorsal and lateral surfaces. Ambulatory legs with dactyls usually considerably longer than propodi; all segments with numerous tufts of setae, particularly dorsally and ventrally; dactyls each with nine to 11 small corneous spinules on ventral margin in distal two-thirds; carpi each with strong spine at dorsodistal margin. Propodus of left third pereopod with dorsolateral margin distinctly angular, distolateral margin with one or two spines ventrally; ventrolateral distal angle with prominent spine, ventral surface with widely-spaced low protuberances. Meri of second pereopods and occasionally also third each with few small spinules. Telson slightly asymmetrical; terminal margin of left posterior lobe with row of small spines and one or two sharp spines at outer angle; right posterior lobe with row of small spines.

Colour in preservative. - Shield yellowish. Ocular peduncles uniformly yellowish, without dorsal, longitudinal stripes. Lateral faces of ambulatory legs each with four longitudinal red stripes on yellowish background.

Occupied shells. - Trochidae.

Habitat. - Subtidal, shallow water (one or two m depth), hard substrate.

Occurrence. - Occasional.

Distribution. - This is the first report for the western Indian Ocean.

Remarks. - Buitendijk's (1937) description was very brief and lacking in many diagnostic characters. She illustrated only the cephalic appendages and left cheliped. The species had not been reported again until it was recognized among littoral *Clibanarius* species from Indonesia by Rahayu & Forest (1993) who redescribed and more adequately illustrated it. These latter authors concluded that Fize & Serène's (1955) description of *C. striolatus* actually pertained to Buitendijk's (1937) taxon rather than Dana's (1852). We have not personally examined any of Rahayu & Forest's specimens of *C. demani*, but our Mascarene material agrees quite well with their description and illustrations, with the following exceptions. These authors described and illustrated the ocular acicles as being multispinose, the propodus of the left third pereopod as being unarmed. Our specimens all have bi- or trifold ocular acicles; the propodi of the left third pereopods all have a spine at the ventrodistal margin, and frequently one or two additional small spines or tubercles on the laterodistal margin ventrally. Similar armature of the propodus of the third pereopod was illustrated by Fize & Serène (1955: fig. 13c) for their *C. striolatus*, thus we believe that our assignment is correct.

Rahayu & Forest (1993) remarked on the similarity of *C. demani* with *C. striolatus*, *C. longitarsus*, and *C. padavensis*. As previously noted, *Clibanarius demani* is distinguished from *C. padavensis* by the absence of longitudinal stripes on the ocular peduncles, and from *C. longitarsus* by its longer antennal acicle, shorter antennal peduncle, and bi- to multifid ocular acicles. The only characters mentioned by Rahayu & Forest to distinguish *C. demani* from *C. striolatus* were the unequal chelipeds, tubercle strength and setation. In *C. demani* the right cheliped is reported as larger, the tubercles weaker, and the setation less dense. Based upon our Mascarene specimens, these characters appear to be variable. We have compared several of Rahayu & Forest's Indonesian specimens identified as *C. striolatus* (MNHN pg 5133) with our Mascarene specimens of *C. striolatus* and *C. demani*, and found the two species to be extremely similar. The principal characters upon which we were able to clearly separate the taxa were the presence, in *C. demani*, of appreciably longer pereopodal dactyls, the ventral margins of which were each armed with a row of nine to 11 small corneous spines in the distal two-thirds.

Clibanarius virescens Krauss, 1843

- Pagurus virescens* Krauss, 1843: 56, pl. 4, fig. 3 (type locality: Durban Bay, South Africa).
Pagurus (Clibanarius) virescens - Hilgendorf, 1869: 95; 1879: 821, pl. 3, fig. 11.
Clibanarius virescens - Dana, 1852d: 466; McCulloch, 1913: 351, pl. 11, fig. 2; Barnard, 1950: 435, figs. 80b, c; Fize & Serène, 1955: 138, fig. 21; Miyake, 1956: 315, figs. 8, 9; Tirmizi & Siddiqui, 1982: 77, fig. 40; Haig & Ball, 1988: 163.
Clibanarius aequabilis - Stebbing, 1920: 258 (not *Clibanarius aequabilis* Dana, 1851).
Calcinus astathes Stebbing, 1924: 239, pl. 2.
 [?] *Clibanarius philippinensis*: Yap-Chiongco, in Estampador, 1937: 501.

Material examined. - Rodrigues: 2 males (SL = 3.2, 3.6 mm), 1 female (SL = 2.4 mm), 1 unsexed (SL = 2.6 mm), site #2 (Pointe Cotton).

Diagnosis. - Shield longer than broad; rostrum not exceeding lateral projections. Ocular peduncles slightly shorter than antennular peduncles; ocular acicles armed with three or four spinules. Antennal peduncles reaching to distal third of ocular peduncles. Chelipeds asymmetrical, right longer and broader; palm and dactyl of both chelipeds with conical tubercles, some black-tipped; five or six strong spines on dorsomesial margin of palm of left chela. Dactyl of left third pereopod shorter than propodus (Table 4); lateral surface of propodus

flattened, with acute dorsolateral margin; distomesial and distolateral margins each with one or two small spines or tubercles; ventrodistal angle with prominent spine and occasionally one small spine on ventral surface in distal third. Pereopodal dactyls each with six or seven strong corneous spines on ventral margin; tufts of long setae dorsally and ventrally. Telson slightly asymmetrical; terminal margins of posterior lobes each with several rather widely-spaced small spines, strongest on left lobe.

Colour in preservative. - Mascarene specimens with shield uniformly cream coloured; ocular peduncles orange with whitish dots; antennular and antennal flagella blue; dactyl and propodus of the left third pereopod whitish and orange respectively, tips dark. No dark transverse band on pereopodal dactyls.

Occupied shells. - Cerithiidae.

Occurrence. - Abundant.

Habitat. - Intertidal; littoral rocky platforms or very shallow sublittoral, on bottom of coral, sand and/or rock.

Distribution. - Records from the Mascarenes, Madagascar and the Seychelles include: Madagascar (Dechancé, 1969).

Remarks. - Lewinsohn (1982) noted that in his original description, Krauss (1843) neglected to mention the sharp upper margin of the propodus and part of the dactyl of the left third pereopod, nor did he mention the length ratio of these segments. This ratio appears to be variable. For example, the dactyl was described as being equal to the propodus by Buitendijk (1937) and Miyake (1978), but shorter by Barnard (1950) and Fize & Serène (1955). Lewinsohn (1982) reported that this ratio was equal in his Somalian specimens, whereas Rahayu & Forest (1993) found the dactyl longer than the propodus in small specimens but shorter in larger animals. In our Mascarene specimens the dactyls are shorter.

Haig & Ball (1988) tentatively placed *C. philippinensis* Yap-Chiongco in synonymy with *C. virescens*, as their specimens from the Banda Islands agreed both in morphology and colour with Yap-Chiongco's (in Estampador, 1937) description of the Philippine taxon. However, this conspecificity could not be verified as Yap-Chiongco's type material was destroyed during World War II (Estampador, 1959).

Despite the common use of color patterns in descriptions and identification keys, colour patterns of *C. virescens* show considerable variation, as was pointed out by McCulloch (1913), Fize & Serène (1955), and Lewinsohn (1982). Fize & Serène (1955) distinguished three colour morphs of *C. virescens* on the basis of the general colour pattern: A - green-blue, B - brown, and C - olive green. Lewinsohn (1982) found that colour varied among specimens collected in the same locality and day, and that the presumably diagnostic dark band on the pereopodal dactyls could be present or absent. In the Mascarene specimens, like those from the Banda Islands (Haig & Ball, 1988), this dark band is missing.

Together with *Calcinus laevimanus*, *Clibanarius virescens* dominates the upper littoral zone of rocky shores. It often formed dense aggregations around the edges of small pools during periods of low water, and could also be found aggregating under stones and in crevices. Gherardi & Vannini (1989) did an in depth study of the spatial and temporal dynamics of clustering in a Somali population of this species.

Genus *Dardanus* Paul'son, 1875

Pagurus - Dana, 1851: 268 (not *Pagurus* Fabricius, 1775).

Dardanus Paul'son, 1875: 90. Type species by monotypy: *Dardanus hellerii* Paul'son, 1875; Rathbun, 1903: 33. Gender: masculine.

Pagurias Benedict, 1901: 141.

Remarks. - When non crab-like decapods were removed from the Linnean genus *Cancer* by Fabricius (1775), 13 species were assigned to *Pagurus* Fabricius. For the next three-quarters of a century newly described hermit crabs most commonly were assigned to this genus. Although H. Milne Edwards (1836, 1848) subdivided *Pagurus* into three major groups and subdivisions, it was Dana (1851, 1852a, b) who first applied formal names to these groups. "Right-handed" hermits were assigned to *Bernhardus* Dana, while some "left-handed" species were retained in *Pagurus* (sensu Dana). Although Brandt's (1851) *Eupagurus*, as the senior synonym, replaced *Bernhardus* as the generic name for "right-handed" hermits, *Pagurus* continued to be applied to "left-handed" species typified by *Pagurus punctulatus* Olivier, 1811. Paul'son (1875) erected the genus *Dardanus* for *Pagurus depressus* Heller, 1861, renaming this taxon *Dardanus hellerii* Paul'son. The characters used by Paul'son (1875) to differentiate *Dardanus* from *Pagurus* (sensu Dana) were shown by Kossmann (1880) to be invalid, and *Dardanus* became a junior synonym of Dana's *Pagurus*.

Benedict (1896) pointed out that *Pagurus* (sensu Dana) contained none of the species originally placed in the genus by Fabricius (1775) and that Latreille (1810) had selected *Cancer bernhardus* Linnaeus, 1758, as the type of the genus *Pagurus* (sensu Fabricius). Benedict (1901) proposed the replacement name *Pagurias* for *Pagurus* (sensu Dana); however, as *Dardanus* was an earlier available name (Rathbun, 1903), it became the generic name applied by some carcinologists to Dana's (1851) group of "left-handed" pagurids. Unfortunately, acceptance of *Dardanus* was not universal and while American and Russian carcinologists referred species to *Dardanus* and *Pagurus* (sensu Fabricius), most European and Asian carcinologists continued to use *Eupagurus* for "right-handed" hermits and *Pagurus* (sensu Dana) for "left-handed" species. The result was a great deal of nomenclatorial confusion. The matter was finally brought before the International Commission on Zoological Nomenclature (Forest & Holthuis, 1955), and in Opinion 472 (1957), the Commission directed that *Pagurus* (sensu Fabricius), with type species *Cancer bernhardus*, and *Dardanus* Paul'son, with type species *Dardanus hellerii*, be recognized.

Dardanus deformis (H. Milne Edwards, 1836)

Pagurus deformis H. Milne Edwards, 1836: 272, pl. 14, fig. 2 (type locality Seychelles and Aldabra); Miers, 1874: 3, pl. 2, fig. 3; Zehntner, 1894: 191, pl. 8, fig. 20; Alcock, 1905: 88, pl. 9, fig. 4; Cowles, 1919: 83, pl. 1; Boone, 1935: 28, pl. 5; Fize & Serène, 1955: 199, figs. 31, 33E, F, pl. 4, fig. 6; Gillett & McNeill, 1959: 118, pl. 117.

Pagurus cultratus White, 1847a: 60 (nomen nudum).

Pagurus cavipes White, 1847b: 122.

Pagurus difformis - Dana, 1852d: 449.

Pagurus (s.s.) *deformis* - Hilgendorf, 1879: 818, pl. 3, figs. 6, 7.

Pagurus near *difformis* - Studer, 1889: 248.

Pagurus biformis - Estampador, 1937: 502 (misspelling of *Pagurus deformis* H. Milne Edwards).

Pagurus bifermis - Estampador, 1937: 502 (misspelling of *Pagurus deformis* H. Milne Edwards).

Pagurus cultrerus - Estampador, 1937: 502 (misspelling of *Pagurus cultratus* White, 1847a).

Dardanus deformis - Edmondson, 1925: 24; Sakai, 1973: 644, fig. 1081; Miyake, 1982: 108, pl. 36, fig. 4.

Material examined. - Mauritius: 1 female (SL = 6.7 mm), northern coast; 1 female (SL = 10.5 mm), site #12 (Îlot Sancho).

Diagnosis. - Carapace not particularly depressed. Ocular peduncles short, broadened distally, cornea approximately one-half length of ocular peduncles; ocular acicles multispinose. Left cheliped massive; upper margin of dactyl with crenulate crest; upper margin of palm with row of spines, outer face with two or three parallel rows of tubercles or granules in upper third. Upper margins and outer faces of dactyl and palm of right chela each with two or three rows of small spines and tufts of long setae. Dactyl and propodus of left third pereopod considerably broader than right; dactyl slightly longer than propodus, lateral surface concave, unarmed, dorsolateral and ventrolateral margins each with crenulate crest; propodus with unarmed lateral face concave dorsally and ventrally and convex medianly, dorsolateral and ventrolateral margins crenulate, and often forming crest. Telson markedly asymmetrical; left posterior lobe largest; terminal margins of posterior lobes each armed with several spinules.

Colour in preservative. - Biscuit yellow with reddish tinge on legs, ocular peduncles and carapace.

Habitat. - Sandy substrate of the lower shore and shallow sublittoral.

Occurrence. - Occasional.

Distribution. - Records from the Mascarenes, Madagascar and the Seychelles include: Seychelles (H. Milne Edwards, 1836; Richters, 1880; Lenz, 1905); Madagascar (Lenz & Richters, 1881; Lenz, 1910; Gravier, 1920; Dechancé, 1969); Mascarenes (Réunion: A. Milne Edwards, 1862; Mauritius: Bouvier, 1915).

Remarks. - *Dardanus deformis* is a well known species best recognized by the crenulate crest on the upper surface of the dactyl of the left chela and double row of tubercles or granules on the upper surface of the palm. This species is unique among species of the genus because the males have not only typical male gonopores on the coxae of the fifth pereopods, but female gonopores on the coxae of the third pereopods as well (Lewinsohn, 1982).

Dardanus guttatus (Olivier, 1812)

Pagurus guttatus Olivier, 1812: 640 (type locality: Mari Pacific); Quoy & Gaimard, 1824: 533, pl. 79, fig. 3; Dana, 1852d: 451; 1855: 28, fig. 3a-b; Alcock, 1905: 87, pl. 9, fig. 1; Yap-Chiongco, 1938: 200, pl. 1, fig. 13; Fize & Serène, 1955: 173, fig. 26.

Pagurus guttatus - Guérin-Méneville, 1831: pl. 16, fig. 2.

Pagurus (s.s.) *setifer* - Hilgendorf, 1879: 815, pl. 3, fig. 8 (not *Pagurus setifer* H. Milne Edwards, 1836).

?*Eupagurus setifer* - Haswell, 1882: 154.

Dardanus guttatus - Holthuis, 1953: 48; Miyake, 1982: 109; Haig & Ball, 1988: 165.

Material examined. - Mauritius: 3 males (SL = 3.3-5.6 mm), site #12 (Îlot Sancho).

Diagnosis. - Carapace and abdomen markedly flattened. Ocular peduncles subcylindrical, broadened distally, cornea occupying less than one-fourth of peduncle. Left cheliped larger, but not massive and not much longer than right; outer faces of dactyl, fixed finger and palm with rows of acute, usually dark-tipped spines, often obscured by tufts of very long, denticulate setae. Lateral face of propodus of left third pereopod with broad longitudinal groove in dorsal

third, dorsal margin with row of closely-spaced, rectangular scutes and tufts of very long, dense, denticulate setae, ventral two-thirds rounded and marked by transverse incisions and row of scutes ventrally often obscured by tufts of long, dense, denticulate setae. Dactyl slender and approximately twice as long as propodus; lateral face with deep longitudinal groove, dorsal margin with row of subquadrate scutes and tufts of dense, denticulate setae, ventrolateral surface with row of semicircular, usually slightly overlapping scutes in proximal four-fifths; ventral margin with row of scutes often obscured by tufts of long, dense, denticulate setae. Setae of other pereopods also denticulate, but much less dense. Telson asymmetrical, left posterior lobe considerably larger; terminal margins each armed with five or six sharp, ventrally directed, and often dark tipped spines.

Colour in preservative. - Shield cream coloured or white. Chelipeds and pereopods red to dark maroon, with white spots. Characteristic naked white patch present on dorsal surfaces of carpi of chelipeds and ambulatory legs. Setae yellow or straw coloured with light tips.

Occupied shells. - Conidae, which probably accounts for the marked compression of the body.

Habitat. - Deep tide pools over the plateau; lower shore with hard substrates; reef-crest.

Occurrence. - Rare.

Distribution. - Records from the Mascarenes, Madagascar and the Seychelles include: Seychelles (Richters, 1880); Mauritius (Richters, 1880; Ortmann, 1892; Bouvier, 1915; Michel, 1974); Madagascar (Dechancé, 1969).

Remarks. - The date of publication of Olivier's description of *Pagurus guttatus* is usually cited as 1811, but the description of the species was published in 1812 in the second part of volume 8 of the Encyclopédie Méthodique (pp. 361-722) (Lewinsohn, 1982).

Dardanus guttatus most closely resembles *D. setifer*, but is immediately distinguished from that species by its distinctive white carpal patches. As noted by Fize & Serène (1955) and Lewinsohn (1982) the two taxa are also distinguished by the shapes of the chelae and propodi and dactyls of the left third pereopods in the absence of colour.

***Dardanus lagopodes* (Forskål, 1775)**

Cancer lagopodes Forskål, 1775: 93 (type locality, Red Sea).

Pagurus sanguinolentus Quoy & Gaimard, 1824: 532, pl. 79, fig. 2; Forest, 1953b: 559, figs. 12-14;

Fize & Serène, 1955: 166, figs. 25A, B, C, pl. 4a, figs. 4, 5.

Pagurus affinis H. Milne Edwards, 1836: 274.

Pagurus euopsis Dana, 1852a: 7; 1852d: 452; 1855: 10, pl. 28, fig. 6; Yap-Chiongco, 1938: 200, pl. 1, fig. 7.

Pagurus depressus Heller, 1861: 248.

Pagurus Hellerii Paul'son, 1875: 90, pl. 12, figs. 4, 4a-c.

Pagurus enopsis - Stebbing, 1917: 439 (misspelling of *Pagurus euopsis* Dana, 1852).

Pagurus euopsis - Stella, 1953: 56 (misspelling of *Pagurus euopsis* Dana, 1852).

Dardanus euopsis - Maki & Tsuchiya, 1923: 98, pl. 8, fig. 4.

Dardanus sanguinolentus - Forest, 1956a: 49; Miyake, 1965: 644, fig. 1081; Utinomi, 1968: 64, pl. 32, fig. 7; Minei, 1973: 49, text fig. 8.

Dardanus affinis - Gordan, 1956: 312 (lit.).

Dardanus lagopodes - Lewinsohn, 1969: 32, pl. 2, figs. 1, 2; Miyake, 1978: 55, fig. 19; 1982: 110, pl. 37, fig. 4.

Material examined. - Mauritius: 1 male (SL = 11.7 mm), site #4 (Coin de Mire).

Diagnosis. - Carapace depressed. Ocular peduncles subcylindrical, much longer than anterior border of carapace, and longer than antennular peduncles; decidedly broadened distally; cornea occupying no more than one-fifth of peduncle. Left cheliped broad, but not massive, and not much longer than right; upper margin and outer surface of palm with rows of acute spines, not obscured by long setae. Dactyl of left third pereopod nearly equaling length of propodus, not laterally compressed, lateral face with median longitudinal groove flanked dorsally and ventrally by row(s) of strongly corneous-tipped spines or tubercles; propodus armed dorsally and ventrally with strongly corneous-tipped spines or tubercles, lateral face weakly concave and with median longitudinal row of long, stiff, simple setae. Telson strongly asymmetrical; posterior lobes each with terminal row of corneous-tipped, ventrally directed spines, weaker on right, but extending further on lateral margin.

Colour in preservative. - Carapace whitish; chelipeds reddish with white spots; pereopods orange, with not well defined longitudinal red stripes on propodi and dactyls. Setae brownish or red and white.

Occupied shells. - Naticidae.

Habitat. - Hard substrates of the shallow sublittoral, including coral heads in lagoons.

Occurrence. - Occasional.

Distribution. - Records from the Mascarenes, Madagascar and the Seychelles include: Seychelles (Richters, 1880; Laurie, 1926); Mauritius (Bouvier, 1915; Michel, 1974); Madagascar (Dechancé, 1969).

Remarks. - This species has been described under several names because of variations in both colour and certain morphological features. Fize & Serène (1955) discussed variations in this species under the name *Pagurus sanguinolentus*. Two colour morphs (black and red) were distinguished in living specimens by Ball & Haig (1972) and the black form has been described more recently in greater detail (Morgan, 1987; Haig & Ball, 1988). As colour notes for our specimen were not recorded in the field, it is not possible to determine to which morph the Mascarene specimen belongs. Varying degrees of flattening and broadening of the propodus of the left third pereopod have been frequently reported among specimens collected at a single locality (Fize & Serène, 1955).

***Dardanus scutellatus* (H. Milne Edwards, 1848)**

Pagurus scutellatus H. Milne Edwards, 1848: 61 (type locality, Grand Port, Maurice); Bouvier, 1915: 210, fig. 14; Fize & Serène, 1955: 189, figs. 29A-C, pl. 6, figs. 5-10.

Pagurus fabimanus Dana, 1851: 270; 1852d: 454; 1855: pl. 28, figs. 7a-e; 819; Alcock, 1905: 84, pl. 8, fig. 2; Yap-Chiongco, 1938: 199, pl. 1, fig. 2.

Dardanus fabimanus - Buitendijk, 1937: 273, figs. 18, 19.

Dardanus scutellatus - Buitendijk, 1937: 273, figs. 16, 17.

Material examined. - Rodrigues: 1 male (SL = 8.33 mm), site #2 (Pointe Cotton). Mauritius: 1 female (SL = 3.4 mm), site #7 (Île d'Ambre).

Diagnosis. - Carapace somewhat depressed. Ocular peduncles subcylindrical, slightly broadened anteriorly, and longer than antennular peduncles; cornea not strongly dilated. Left cheliped massive; ventral margin and ventrolateral distal angle of merus, and dorsal surface of carpus spinulose; upper margins of palm and dactyl with small spines, outer faces spinulose or granular. Right cheliped with upper margins of palm and dactyl each with row of small spines, outer faces with scattered tufts of long setae. Dactyl of left third pereopod longer than propodus, dorsal and ventral margins each with row of well developed spinose scutes and long, simple setae, lateral face with longitudinal groove, surface usually with low tubercles or granules and very short, stiff setae; propodus with dorsal and ventral marginal row of spinose scutes and long, simple setae, lateral face concave in dorsal half, convex in ventral half, surface with low tubercles and very short, stiff setae. Telson considerably asymmetrical, left lobes large; terminal margins of posterior lobes each with row of acute, curved, often dark-tipped spines directed ventrally. Chelipeds and ambulatory legs all with long, simple setae.

Colour in preservative. - Shield yellowish with two small orange spots anteriorly and mesially. Dactyls and propodi of pereopods yellow, remaining segments with orange spots.

Occupied shells. - Trochidae, plus one unidentified because of damage. One stomatopod (*Gonodactylus lanchesteri* Manning) and two male amphipods (*Maera serrata* Schellenberg) were found inside the shell of the latter individual.

Habitat. - Sandy substrate of the lower shore and shallow sublittoral, often associated with seagrass.

Occurrence. - Rare.

Distribution. - Records from the Mascarenes, Madagascar and the Seychelles include: Mauritius (Bouvier, 1915); Madagascar (Dechancé, 1969).

Remarks. - A detailed description and synonymy of this species were given by Fize & Serène (1955) (as *Pagurus scutellatus*). Although closely allied to *D. setifer* by Forest (1956a), it also superficially resembles another Mascarene species of *Dardanus*, i.e., *D. guttatus*. Prominent scutes arm the dorsal and ventral margins of the dactyl and propodus of the third left pereopod in both taxa; however, they are easily differentiated by the armature of the lateral faces of the propodi: covered with low tubercles or granules accompanied by short stiff setae in *D. scutellatus* and unarmed, but marked by transverse incisions in the ventral half in *D. guttatus*.

Genus *Diogenes* Dana, 1851

Pagurus - Fabricius, 1798: 412 (in part); H. Milne Edwards, 1836: 284; 1837: 235 (in part); De Haan, 1849: 211 (in part).

Diogenes Dana, 1851: 268. Type species by subsequent selection by Dana (1852b: 122), *Pagurus miles* Fabricius, 1787.

Remarks. - Most frequently, selection of the type species of *Diogenes* has been credited

to Stimpson (1858). However, as recognized by the International Commission on Zoological Nomenclature (Opinion 472, 1957), it was Dana (1852b) who first selected *Pagurus miles* as the type species of this genus.

***Diogenes cf. serenei* Forest, 1956**

?*Diogenes serenei* Forest, 1956b: 530, figs. 12-15; Ball & Haig, 1972: 91; Morgan, 1987: 176; 1989: 402.

Material examined. - Rodrigues: 2 females (SL = 2.3, 2.1 mm), site #2 (Pointe Cotton).

Diagnosis. - Shield slightly longer than broad, lateral margins each with several strong hooked spines and additional one or two irregular rows on surface laterally. Rostrum broadly rounded; intercalary process roundly triangular with long, slender acute tip, equaling or slightly overreaching longest spine of ocular acicles; no strong ventral tooth apparent. Ocular peduncles slender; ocular acicles armed with four or five slender, acute spines. Antennal peduncles shorter than ocular peduncles. Upper margin of dactyl of left chela with row of small spines; upper margin of palm with row of very strong, slender, curved spines, outer face with median nearly double row of prominent spines; carpus with row of strong spines on dorsal margin and lateral face. Telson missing.

Color in preservative. - Entirely white.

Habitat. - Sublittoral waters, associated with coral.

Occurrence. - Rare.

Distribution. - No previous records from the western Indian Ocean.

Remarks. - Both specimens are small and in a very poor condition; right chelipeds and telsons are missing from both; all color is lacking. In general, they agree with Forest's (1956b) original description of *D. serenei*; however, in neither specimen could a strong intercalary ventral spine be detected. Similarly, both lack the posterior dorsal spine on carpi of the third pereopods, although a small spine is present posteriorly on the second. Our specimens differ from *D. gardineri* Alcock, 1905, in having the ocular peduncles overreaching the antennular peduncles by the length of the corneae, as reported by Forest (1956b) for *D. serenei*. Differences between our specimens and *Diogenes pallescens* Whitelegge, 1897 include the lack of the second spine on the carpi of the third pereopods, considerably shorter and less curved pereopodal dactyls, and differences in the armature of the palm and dactyl of the left cheliped.

***Diogenes* sp.**

Material examined. - Rodrigues: 1 ovigerous female (SL 1.7 mm), site #2 (Pointe Cotton).

Diagnosis. - Shield slightly longer than broad; dorsal surface with numerous short, transverse, spinulose ridges laterally; rostrum broadly rounded, not exceeding lateral projections. Intercalary process roundly triangular, with slender tip, not quite reaching tip of longest spines of ocular acicles. Dorsal margin of branchiostegite with row of strong, acute

spines, extending slightly more than half length of shield. Ocular peduncles very short and stout, approximately equaling length of antennal peduncles but considerably shorter than antennular peduncles; ocular acicles laterally rounded, each with one strong median spine and few smaller spines laterally. Antennal acicle not bifid. Left cheliped short and stout. Upper surface of dactyl with two and upper surface of palm with several irregular rows of small spinulose tubercles, outer faces granular, short protuberance ridge on posterior midline of palm; carpus with row of spines on dorsal surface. Ambulatory legs with long, slender, curved dactyls, approximately one-fourth again length of propodi; carpi of second pereopods each with row of acute spines on dorsal surface; carpi of third with only dorsodistal spine. Telson asymmetrical; left terminal margin with two widely-spaced strong spines and several smaller spines, extending down lateral margin; right terminal margin with one strong spine and several smaller spines, also extending down lateral margin.

Remarks. - We are unable to assign this small, albeit mature, female to any known species, but are reluctant to suggest that it represents an undescribed species, given the great morphological variation seen in species of *Diogenes*. It differs from *D. costatus* Henderson, 1893, in the following characters: the antennal peduncles reach only to the distal margin of the corneae; the propodi of the second pereopods are unarmed; and the third pereopods have only a dorsodistal spine on the carpi. It differs from those specimens of *D. avarus* Heller, 1865, that have relatively short antennal peduncles (cf. Lewinsohn, 1969) in having a row of strong spines on the branchiostegites and lacking spinulose tubercles on the carpi and propodi of the pereopods. Our specimen differs from both *D. leptocerus* Forest, 1956, and *D. viridis* Haig & Ball, 1988, by having a median cleft in the telson, and from *D. gardineri* Alcock, 1905, in having short ocular peduncles, a row of spines of the carpus of the second pereopods and transverse ridges on the shield. In many characters our specimen is rather similar to Lewinsohn's (1982: 49) *Diogenes* species A, which we have examined; however it lacks the ventral spine on the intercalary process that is present on Lewinsohn's specimen. Additionally, Lewinsohn's species A has a proximal spine on the dorsal surface of the carpus of the third pereopod that is absent in our specimen.

FAMILY PAGURIDAE

Genus *Pagurixus* Melin, 1939

Pagurixus cf. *tweediei* (Forest, 1956)

Eupagurus (*Pagurixus*) *tweediei* Forest, 1956a: 50, pl. 4 figs. 1-8 (type locality: Cocos-Keeling Islands) (*Pagurixus* by implication).

Pagurus (*Pagurixus*) *tweediei* - Dechancé, 1964: 38.

?*Pagurixus* cf. *tweediei* - McLaughlin & Haig, 1984: 134, fig. 4.

Material examined. - Mauritius: 1 male (SL 2.0 mm), site #4 (Coin de Mire) (at 5 m depth).

Diagnosis. - Shield longer than broad. Rostrum elongate, triangular, terminating acutely. Ocular peduncles short, stout; ocular acicles roundly triangular, terminating subacutely and with small submarginal spine. Antennular peduncles with several long setae at dorsolateral distal angle of ultimate segment, ventral surface with row of setae. Second segment of antennal peduncle with dorsolateral distal angle terminating in bifid spine. Right cheliped moderately short; dactyl slightly longer than palm; dorsal surface of palm and fixed finger minutely spinulose, ventral surface with scattered small spinules; dorsal surface of carpus with scattered

small spines, laterodistal margin minutely tuberculate; merus with two acute spines on ventrolateral margin distally. Second and third pereopods with dactyls appreciably shorter than propodi; ventral margins with row of five or six strong corneous spines; propodi each with four or five corneous spines on ventral margin, two stronger corneous spines at ventrodistal margins; carpi each with dorsodistal spine; meri of second pereopods with few protuberances or spines on ventral margins, one acute spine at ventrolateral distal angle. Anterior lobe of sternite of third pereopods subrectangular, one small spine near each anterolateral angle.

Habitat. - Hard substrate of the sublittoral.

Occurrence. - Rare.

Distribution. - This is the first report, albeit tentative, of this species in the western Indian Ocean.

Remarks. - The identification is tentative, because both the left cheliped and the telson are missing. Our specimen agrees better with Forest's (1956a) original description and figures than with the diagnosis presented by McLaughlin & Haig (1984) for *Pagurixus* cf. *tweediei* from the Philippine Islands. In the configuration and armature of the right cheliped, our specimen more closely resembles Forest's (1956a: fig. 5) of the female, but given the small size of our male this is not unexpected. The dorsolateral distal angle of the second antennal peduncular segment was described as simple or bifid by Forest, and illustrated as simple by McLaughlin & Haig (1984). The termination is bifid on both right and left in our specimen. McLaughlin & Haig (1984: fig. 4) illustrate, but do not described the first segment of the antennal peduncle as having a distolateral spine. No such spine is present in our specimen, nor was such a spine described by Forest (1956a). The right cheliped was described by Forest as having a small spine on the dorsodistal margin of the merus. McLaughlin & Haig (1984) found no spine on this margin in their Philippine specimen, and no spine is present in our specimen.

DISCUSSION

The hermit crab fauna of the Mascarene islands is composed primarily of species with broad distributions within the western Indian Ocean (*Coenobita rugosus*, *Dardanus deformis*, *D. guttatus*, *D. lagopodes*, *D. scutellatus*, *Calcinus elegans*, *C. laevimanus*, *C. latens*, *Clibanarius striolatus*, and *C. virescens*). Two were previously known only from a few localities (*Diogenes serenei* from Mozambique, *Calcinus vachoni* from Somalia). In the present survey, *Calcinus haigae*, *Clibanarius humilis*, *C. demani*, *Diogenes* cf. *serenei*, and *Pagurixus* cf. *tweediei*, are recorded for the first time in the western Indian Ocean, and a new species, *Calcinus vanninii*, is described.

Certainly, attempts at tracing hermit crabs' geographical distribution are biased by the sporadic nature of most collections, as well as by inequitable collecting efforts. Hermit crabs living in a terrestrial or intertidal environment are obviously easier to collect than those living subtidally. In addition, most species that appear to be narrowly distributed are either poorly known (e.g., *Clibanarius demani*, *Pagurixus tweediei*), or only recently described for the first time (e.g., *Calcinus haigae*). Notwithstanding, a comparison of the Mascarene fauna with those of adjacent island systems may provide insight for future exploratory research.

The hermit crab species recorded from the Mascarenes were compared with species lists compiled for the Seychelles and Madagascar, using data provided by Forest (1984) and Reay & Haig (1990) (Table 5). The Ochiai Coefficient of Similarity (Sokal & Sneath, 1963) was used as the basis for a cluster analysis following the UPGMA method (Sneath & Sokal, 1973). As might be expected, the Seychelles and Madagascar showed a close resemblance to one another (Ochiai Coefficient of Similarity = 0.664). In contrast, hermit crab faunal resemblance between these islands and the Mascarenes was considerably lower (0.488 and 0.531 respectively), and the latter fell on a branch of the similarity tree which diverged from the cluster composed by the other two island systems starting from the level of approximately 0.5 (Fig. 7).

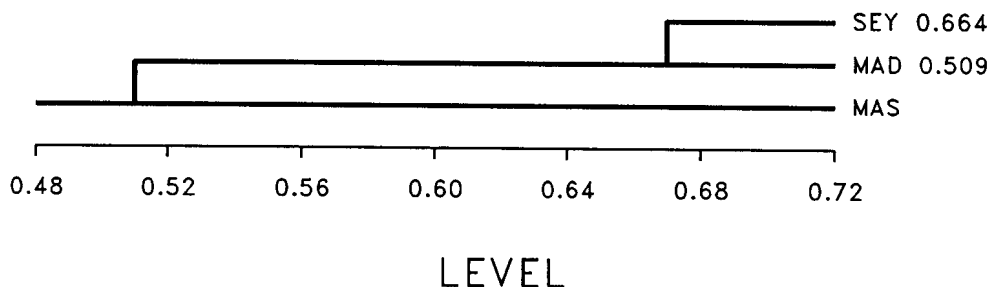


Fig. 7. Cladogram of similarities for the hermit crab fauna of the Mascarenes (MAS) and the two adjacent island systems, Seychelles (SEY), and Madagascar (MAD).

These results differ from those of Hogarth (1988), who analyzed hermit crab faunal assemblages from 14 regions of the western Indian Ocean. Although Hogarth used the Ochiai Coefficient of Similarity, as in the present study, his data came from a number of sources not considered in this study (e.g., Titgen, 1982). Hogarth found a greater correlation between Mauritius and Somalia than between Mauritius and the Seychelles; Madagascar was not considered. At this point, no reasonable hypothesis can be set forth to explain the differences observed. Much more substantive information is needed on the many factors that influence hermit crab biogeography, such as larval dispersal, current systems, and ecological constraints.

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Table 5. Occurrence of hermit crabs within the island systems: SEY = Seychelles (including Aldabra), MAD = Madagascar (including the Comoros), MAS = Mascarene islands; + and - indicate found or not found, respectively; [] indicates records from other authors, * indicates new records for the western Indian Ocean). Bibliographical data for SEY and MAD are taken from Forest (1984) and Reay & Haig (1990).

	SEY	MAD	MAS
<i>Birgus latro</i> (Linnaeus, 1767)	+	+	-
<i>Coenobita brevipennis</i> Dana, 1852	+	+	-
<i>Coenobita cavipes</i> Stimpson, 1858	+	+	-
<i>Coenobita perlatus</i> H. Milne Edwards, 1837	+	+	-
<i>Coenobita rugosus</i> H. Milne Edwards, 1837	+	+	+
<i>Aniculus ursus</i> (Olivier, 1811)	+	+	[+]
<i>Aniculus maximus</i> Edmondson, 1952	+	-	-
<i>Calcinus elegans</i> (H. Milne Edwards, 1836)	+	+	+
<i>Calcinus gaimardii</i> (H. Milne Edwards, 1848)	-	+	-
* <i>Calcinus haigae</i> Wooster, 1984	-	-	+
<i>Calcinus laevimanus</i> (Randall, 1839)	+	+	+
<i>Calcinus latens</i> (Randall, 1839)	-	+	+
<i>Calcinus rosaceus</i> Heller, 1861	-	+	[+]
<i>Calcinus vachoni</i> Forest, 1958	-	-	+
* <i>Calcinus vanninii</i> , new species	-	-	+
<i>Clibanarius eurysternus</i> (Hilgendorf, 1879)	-	+	-
* <i>Clibanarius humilis</i> Dana, 1851	-	-	+
<i>Clibanarius laevimanus</i> Buitendijk, 1937	-	+	-
<i>Clibanarius striolatus</i> Dana, 1852	-	-	+
<i>Clibanarius longitarsus</i> (De Haan, 1849)	-	+	-
<i>Clibanarius merguensis</i> De Man, 1888	-	+	-
* <i>Clibanarius demani</i> Buitendijk, 1937	+	+	+
<i>Clibanarius virescens</i> (Krauss, 1843)	-	+	+
<i>Dardanus brachyops</i> Forest, 1963	-	+	-
<i>Dardanus deformis</i> (H. Milne Edwards, 1836)	+	+	+
<i>Dardanus gemmatus</i> (H. Milne Edwards, 1848)	-	+	-
<i>Dardanus guttatus</i> (Olivier, 1811)	+	+	+
<i>Dardanus lagopodes</i> (Forskål, 1775)	+	+	+
<i>Dardanus megistos</i> (Herbst, 1804)	+	+	[+]
<i>Dardanus pedunculatus</i> (Herbst, 1804)	+	+	-
<i>Dardanus scutellatus</i> (H. Milne Edwards, 1848)	-	+	+
<i>Dardanus setifer</i> (H. Milne Edwards, 1836)	-	+	-
<i>Diogenes costatus</i> Henderson, 1893	+	-	-
<i>Diogenes crosnieri</i> Dechancé, 1969	-	+	-
<i>Diogenes planimanus</i> Henderson, 1893	-	+	-
* <i>Diogenes</i> cf. <i>serenei</i> Forest, 1956	-	-	+
<i>Paguristes abbreviatus</i> Dechancé, 1963	-	+	-
* <i>Pagurixus</i> cf. <i>tweediei</i> (Forest, 1956)	-	-	+
<i>Pagurus hirtimanus</i> Miers, 1880	+	+	-

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