

To John  
with all best  
wishes  
Chanan  
Lewinsohn, 1979

# Monitore zoologico italiano

## ITALIAN JOURNAL OF ZOOLOGY

PUBBLICATO DALLA UNIVERSITA DEGLI STUDI DI FIRENZE  
CON IL CONTRIBUTO DEL CONSIGLIO NAZIONALE DELLE RICERCHE

N. S. SUPPLEMENTO XII

30 . 6 . 1979

NO. 6 : 39-57

RESEARCHES ON THE COAST OF SOMALIA.  
THE SHORE AND THE DUNE OF SAR UANLE.  
23. PORCELLANIDAE (CRUSTACEA DECAPODA ANOMURA)

(PUBBLICAZIONI DEL CENTRO DI STUDIO  
PER LA FAUNISTICA ED ECOLOGIA TROPICALI DEL C.N.R.: CLXX)

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Received 6 July 1978

The material on which the present paper is based was collected in the western part of the Indian Ocean on the coast of Somalia during a research programme (1) carried out by the Centro di Studio per la Faunistica ed Ecologia Tropicali of the Consiglio Nazionale delle Ricerche of Florence (Director, Prof. L. Pardi). Most of the specimens originate from Sar Uanle (about 20 km south of Chisimaio) and from Gesira (10 km south of Mogadiscio). A few animals were obtained from near Mogadiscio and from Bender Mtoni (south of Chisimaio), while a single specimen is from Lac Badanà (about 80 km south of Chisimaio).

To date no Porcellanidae have been reported from Somalia, the present collection fills an important gap in our knowledge of the distribution of this family along the East African coast. All specimens are in an excellent state of preservation and they could be identified without exception as far as the species.

Three of the species — *Petrolisthes lamarckii* (Leach), *P. moluccensis* (De Man) and *P. penicillatus* (Heller) — have a wide range within the Indo-West Pacific region. The other seven species have been reported so far from the Indian Ocean only. Five of the 10 species are also found in the Red Sea.

(1) In 1971 and 1975 (see PARDI, 1976), and 1976 (*Mission n. 14* «Shore Programme»: M. Vannini, G. Chelazzi, S. Turillazzi, R. Innocenti).

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JUL 7 · 1980

All species of the collection are typical shallow water forms, as are most of the Porcellanidae. The animals live in the tidal zone and in depths down to a few metres at the most. For none of the species are the actual depth limits known.

Apart from a few duplicates deposited in the Rijksmuseum van Natuurlijke Historie, Leiden (= R.N.H.) and in the Zoological Museum, Tel-Aviv University (= Z.M.T.-A.U.), all the material is preserved in the Museo Zoologico of the University of Florence (= M.F.).

Of the widely distributed species the synonymies given here are restricted to those records dealing with specimens from the western Indian Ocean.

The abbreviation cl. is used for carapace length.

I should like to express my gratitude to Dr M. VANNINI (Istituto di Zoologia of the University of Florence) for entrusting to me the study of this interesting material and to Prof. L. B. HOLTHUIS (Rijksmuseum van Natuurlijke Historie, Leiden) for assistance with the literature and help with the English text. Furthermore, I am most indebted to Dr G. PRETZMANN (Naturhistorischen Museum, Wien) for the loan of the type material of *Petrolisthea penicillatus* (Heller) and to Miss J. HAIG (Allan Hancock Foundation, Los Angeles) for advice and for the loan of material of *Pachycheles tomentosus* Henderson.

*Petrolisthes lamarckii* (Leach, 1820).

*Pisidia lamarckii* LEACH, 1820, p. 54.

*Petrolisthes lamarckii*; MIERS, 1884, p. 557; ORTMANN, 1894, pp. 26, 27; LAURIE, 1926, pp. 140, 141; BARNARD, 1950, pp. 477-479, fig. 89a-d; TARAMELLI, 1955, p. 42; MACNAE & KALK, 1958, pp. 34, 73, 83, 118, 126, fig. 18a; HAIG, 1964, pp. 362, 363; HAIG, 1966a, p. 41; DERIJARD, 1966, p. 176; DAY, 1969, p. 106; KENSLEY, 1970, p. 105.

(Synonymies restricted to the name *P. lamarckii* only).

*Material examined:*

Sar Uanle, reef flat; 2 ♀♀ n. 454 M.F., X.1971;

Sar Uanle, rocky step at LWNT level; 1 ♂ Z.M.T.-A.U., XII.1976;

Sar Uanle; 1 ♂ n. 453 M.F., XII.1976;

Bender Mtoni; 1 ♂, ovig. ♀, R.N.H., VIII.1975;

Bender Mtoni, tide pools; 3 ♂♂, 4 ♀♀ (1 ovig.), n. 456 M.F., XI.1976;

Gesira, tide pools; 1 ♂ Z.M.T.-A.U., XII.1976;

Mogadiscio, tide pools; 1 ♂ n. 555 M.F., IX.1976.

cl. 6.0-14.0 mm.

*Remarks:* in the literature *P. lamarckii* has been reported from almost all parts of the tropical Indo-West Pacific. HAIG (1964) stated:

« *P. lamarckii* ranges throughout the entire Indo-West Pacific, where it is the most abundant littoral porcellanid ». This remark is too general, as in some parts of the Indo-West Pacific *P. lamarckii* has not been found, e.g., in the Red Sea. Also JOHNSON (1970) remarked: « *P. lamarckii* is distinctly rare at Singapore » and: « ...but it is strikingly rare in central Sundaland... ». At present it is not quite clear whether the records in the literature pertain to a single variable species, or that several species have been confused under the name *P. lamarckii*. ORTMANN (1894) and BORRADAILE (1898) synonymized several species with *P. lamarckii*. Part of this synonymy is also accepted by modern authors, but several of the supposed synonyms later proved to be good species, e.g., *P. rufescens*\* (Heller). *P. rufescens*, namely, was synonymized with *P. lamarckii* by ORTMANN (1894), BORRADAILE (1898) and MIYAKE (1942, 1943); however, HAIG (1964) could prove that HELLER's species is a valid one. A thorough revision of the *P. lamarckii* complex is highly desirable.

The specimens here assigned to *P. lamarckii* agree well with the description of that species as given by BARNARD (1950). Our specimens were compared with the very closely related *P. boscii* (Audouin). Nowhere in the literature could I find a careful direct comparison of the two species, probably because their differences were considered very obvious. HAIG (1965, p. 99) mentioned the following character for *P. boscii*: « Gape of fingers with a short thick pubescence extending to their tips ». This is confirmed by MIYAKE (1943). Such pubescence is not shown by *P. lamarckii*. However, in material of *P. boscii* from the Red Sea (the type locality of the species) such a pubescence is always lacking on the fingers of the chelipeds. It is possible that under the name *P. boscii* two species are confused (one with, the other without the velvety pubescence of the fingers of the chelipeds). Whatever the case may be, it is clear that the main character used to distinguish *P. boscii* from *P. lamarckii*, does not hold.

The differences between Red Sea material of *P. boscii*, and the present specimens that are assigned to *P. lamarckii*, are the following:

1. In *P. boscii* the entire dorsal surface of the carapace is covered with squamiform lines, which at their anterior margin bear fine setae; such lines are practically entirely absent from the central and posterior parts of the carapace in *P. lamarckii*, they are well developed there in the anterior part only.

2. In *P. boscii* the front is clearly wider, and the inner orbital angles are more distinct than in *P. lamarckii*, even though they are rounded.

3. The sculpturing of the upper surface of the chelipeds in *P. boscii* is considerably better developed than in *P. lamarckii*, while the

lower surface of the palm shows distinct lines which extend obliquely forward.

4. In *P. boscii* the inner margin of the carpus of the chelipeds bears 3 or 4 teeth which are better developed (especially the distal ones) than in *P. lamarckii* and have the outer margin serrate. In *P. lamarckii* there are 4 or 5 teeth there; the most distal of these are less distinct and their outer margin is smooth.

5. The carpus of the chelipeds is relatively shorter in *P. boscii* than in *P. lamarckii*.

6. The dorsal surface of the merus of the third walking leg of *P. boscii* shows a distinct squamiform pattern, which bears fine setae and between these several stiff bristles. In *P. lamarckii* such a squamiform structure is hardly noticeable and the longer stiff setae are not present.

7. The upper margin of the meri of the walking legs in both species is provided with a fringe of plumose setae, but in *P. boscii* there are longer stiff setae among these plumose ones.

8. In *P. boscii* the upper margin of the carpus of the first and second walking leg bears a distal spine; in *P. lamarckii* such a spine is present in the carpus of the first walking leg only.

It should be stressed again that the only material of *E. lamarckii* used for this comparison is that from Somalia.

*Geographical distribution:* widely distributed throughout the Indo-West Pacific from the east coast of Africa to Japan and the Tuamotu islands. *P. lamarckii*, as such, has been reported from the following localities in the western Indian Ocean: Natal, South Africa (BARNARD, 1950; DAY, 1969). Mozambique (BARNARD, 1950; MACNAE & KALK, 1958; HAIG, 1964; DAY, 1969; KENSLEY, 1970). Dar es Salaam, Tanzania (ORTMANN, 1894). Zanzibar, Tanzania (TARAMELLI, 1955). Europa Island (DERIJARD, 1966). Comoro islands; Madagascar (HAIG, 1966a). Mauritius (HAIG, 1964). Seychelles; Chagos Archipelago (LAURIE, 1926).

#### *Petrolisthes rufescens* (Heller, 1861).

*Porcellana rufescens* HELLER, 1861, p. 255, pl. 2 fig. 4.

*Porcellana (Petrolisthes) rufescens*; HILGENDORF, 1879, p. 825, pl. 2 fig. 7.

*Petrolisthes rufescens*; LENZ, 1905, p. 374; NOBILI, 1906a, pp. 66, 67; NOBILI, 1906b, pp. 130, 131; BOUVIER, 1915, p. 28; HAIG, 1964, pp. 363, 364; HAIG, 1966a, pp. 40, 41; HAIG, 1966c, pp. 52, 53; LEWINSOHN, 1969, pp. 138-141, fig. 29 (Red Sea); MICHEL, 1974, p. 257 (list.).

#### *Material examined:*

Lac Badanà, estuary; 3 ♂♂, 1 ♀, n. 436 M.F., 27.X.1971;

Sar Uanle, reef flat; 1 ♂ n. 441 M.F., IX.1971;

Sar Uanle, reef flat; 1 ♂ n. 435 M.F., X.1972;

- Sar Uanle; 2 ♂♂, 1 ♀, n. 440 M.F., X.1972;  
 Sar Uanle, stones at cliff base; 4 ♂♂ Z.M.T.-A.U., 1 ovig. ♀ n. 437 M.F., XI.1976;  
 Bender Mtoni; 2 ♂♂ R.N.H., VIII.1975;  
 Bender Mtoni, tide pools of sheltered beach; 3 spec. (1 ovig. ♀) n. 439 M.F., XI.1976;  
 Gesira, tide pools; 1 spec. n. 442 M.F., XI.1976;  
 Mogadiscio, rocky tide pools; 3 spec. n. 438 M.F., XI.1976.  
 cl. 5.0-11.0 mm.

*Remarks:* ORTMANN (1894) synonymized *P. rufescens* with *P. lamarckii*, while BORRADAILE (1898) and MIYAKE (1943) indicated the present form as *P. lamarckii* var. *rufescens*, it was considered a «*P. lamarckii* without epibranchial spine». HAIG (1964), however, recognized *P. rufescens* as a good species and selected a lectotype for it (deposited at the Wien Museum). Furthermore, HAIG (1964) was of the opinion that *P. rufescens* probably is restricted to the Indian Ocean, and that specimens without epibranchial spines from the western Pacific probably belong to a species different from *P. rufescens*.

The original description of *P. rufescens* by HELLER (1861) is reasonable but his figure is insufficient. HILGENDORF (1879) provided a good outline drawing of the species. A new illustrated description of *P. rufescens* was published by LEWINSOHN (1969); LEWINSOHN's reference to a figure of this species by PAULSON (1875, pl. 11 fig. 3) is erroneous, PAULSON's figure shows *P. ornatus*.

The specimens from Somalia agree in all details with material from the Red Sea (type locality).

*Geographical distribution:* according to HAIG (1964) the species is restricted to the Indian Ocean.

Mozambique (HILGENDORF, 1879). Zanzibar, Tanzania (LENZ, 1905). Obock and Aden, Gulf of Aden (NOBILI, 1906b). Comoro islands and Madagascar (HAIG, 1964, 1966a). Mauritius (BOUVIER, 1915; MICHEL, 1974). Persian Gulf (HELLER, 1861; NOBILI, 1906a; HAIG, 1966c). (For Red Sea references see LEWINSOHN, 1969).

#### *Petrolisthes moluccensis* (De Man, 1888).

*Porcellana* (*Petrolisthes*) *moluccensis* DE MAN, 1888, pp. 411-413, pl. 12 fig. 5.

*Petrolisthes boscii*; NOBILI, 1906a, p. 66; NOBILI, 1906b, pp. 129, 130 (part).

*Petrolisthes moluccensis*; HAIG, 1965, p. 99; HAIG, 1966c, p. 51; LEWINSOHN, 1969, pp. 136-138, fig. 28 (Red Sea).

#### *Material examined:*

- Sar Uanle; 1 ovig. ♀ R.N.H., 1971;  
 Sar Uanle, reef flat; 1 ovig. ♀ n. 446 M.F., X.1971;

Sar Uanle, reef flat; 1 juv. ♂ n. 447 M.F., X.1972;  
 Sar Uanle, reef, between scleractinians; 1 ♂ n. 448 M.F., XII.1976.  
 cl. 4.0-7.0 mm.

*Remarks:* this species, which is still relatively poorly known, seems to have a wide range; according to HAIG (1964) it inhabits the area between the Red Sea and the Ryukyu islands and Palau. As *P. moluccensis* shows a strong resemblance to *P. boscii* and even more to *P. lamarckii*, it is quite well possible that material of this species has been reported under incorrect names. HAIG (1965, p. 99), for example, found that part of the specimens that were described by NOBILI (1906a, 1906b) as *P. boscii* from the Red Sea and the Persian Gulf actually belong to *P. moluccensis*.

In the original description of *P. moluccensis*, DE MAN (1888) compared the species with *P. dentatus* H. Milne Edwards (= *P. lamarckii*). Other extensive description of the species are those by MIYAKE (1942, pp. 337-339, figs 3,4) and LEWINSOHN (1969, pp. 136 138, fig. 28).

The present Somalian specimens agree well with the published descriptions of the species. In two of the females examined the spines on the upper margin of the merus of the walking legs could not be found; it is possible that they were broken. In one of the males the inner margin of the carpus of one of the chelipeds shows two supernumerary teeth, so that there are seven teeth in all.

*Geographical distribution:* although the species is widely distributed in the Indo-West Pacific region, the present record, as far as I know, is the first for the western Indian Ocean south of the Gulf of Aden. It is not clear from HAIG's (1965) account whether there were some of the present species among the specimens from the Gulf of Aden (Obock and Jibouti) that NOBILI (1906b) reported as *P. boscii*.

*Petrolisthes leptocheles* (Heller, 1861).

*Porcellana leptocheles* HELLER, 1861, pp. 258, 259, pl. 2 fig. 6.

*Petrolisthes leptocheles*; NOBILI, 1906b, pp. 131-133, pl. 8 fig. 2; HAIG, 1966c, p. 52; LEWINSOHN, 1969, pp. 141-144, fig. 30 (Red Sea).

*Material examined:*

Sar Uanle, reef flat; 1 ♂ n. 449 M.F., IX.1971.  
 cl. 6.0 mm.

*Remarks:* this species is not well known. To my knowledge only three descriptions of it have been published: the original description by HELLER (1861) is good but the illustration is very small and strongly schematized. NOBILI (1906b) provided a description and a good outline

drawing of the carapace and the cheliped. A third description, with extensive illustrations, was published by LEWINSOHN (1969).

The single male specimen from Somalia was directly compared with material from the Red Sea (type locality of the species). No differences were noticed. LEWINSOHN (1969) figured the process of the second (first free) basal segment of the antenna. In the figure the process is shown as carrying a distinct spine. In the male from Somalia as well as in the re-examined specimens from the Red Sea the process is rounded; only very young specimens show a small spine on this process.

*Geographical distribution:* the species is known only from the Red Sea (see LEWINSOHN, 1969, for references), the Gulf of Aden (NOBILI, 1906b) and the Persian Gulf (HELLER, 1861; HAIG, 1966c). The single, rather casual, record of the species from the Persian Gulf is based on a remark by HELLER: « Wurde von Kotschy auch im persischen Meerbusen gesammelt. Die Exemplare aus dem rothen Meer erscheinen etwas kleiner ». HAIG's (1966c) mention of the species as occurring in the Persian Gulf is based on HELLER's above record. In the Red Sea the species is very common. The single specimen from Somalia forms an interesting extension of the known range of the species.

*Petrolisthes penicillatus* (Heller, 1862) (Fig. 1).

*Porcellana penicillata* HELLER, 1862, p. 523; HELLER, 1865, pp. 79, 80.

*Porcellana villosa* RICHTERS, 1880, p. 160, pl. 17 figs 11, 12.

*Petrolisthes penicillatus*; LENZ, 1910, p. 566; HAIG, 1964, p. 368; HAIG, 1966a, p. 42.

*Petrolisthes villosus*; WARD, 1942, p. 63; MICHEL, 1964, p. 257 (list).

? *Petrolisthes villosus*; MIERS, 1884, p. 559.

*Material examined:*

Sar Uanle, reef flat; 1 ovig. ♀ Z.M.T.-A.U., 3.XI.1971;

Sar Uanle, reef flat; 1 ♂ n. 451 M.F., X.1971;

Sar Uanle, reef flat; 1 ♀ n. 452 M.F., XI.1976;

Gesira, reef flat, 1 ovig. ♀ n. 450 M.F., XI.1976.

cl. 5.0-7.0 mm.

*Remarks:* the present specimens show the characteristic pubescence described by HELLER (1862, 1865) for the type specimens of the species. However, they do have several spines, which are not mentioned by previous authors, and in this respect they agree better with descriptions of *P. pubescens* Stimpson.

A problem is offered by the presence or absence of the epibranchial spine. In the original description HELLER stated emphatically that the species lacks the epibranchial spine. RICHTERS (1880) in the original description of *P. villosus* (a junior synonym of *P. penicillatus*) did not mention this spine at all, neither in a positive nor in a negative sense.

In his key to the species of *Petrolisthes* ORTMANN (1892, p. 259) stated that no epibranchial spine is present in *P. villosus*, and later the same author (ORTMANN, 1897, p. 287) in a key to the species of the « Gruppe des *Petrolisthes tomentosus* » ranged *P. penicillatus* among the species without an epibranchial spine. In contradistinction to all this, MIYAKE (1942, p. 334; 1943, p. 55), in his key to several species of *Petrolisthes*, placed *P. penicillatus* with those species possessing an epibranchial spine, even though he did not mention the presence or absence of this spine in his description of the species (MIYAKE, 1942). All our specimens do have an epibranchial spine.

To solve this problem I was anxious to examine the types of HELLER's species which are in the Naturhistorisches Museum in Wien. My request for them was graciously complied with by Dr G. Pretzmann, to whom I should like to express my sincere gratitude. The two type specimens, a male and an ovigerous female, are accompanied by a label, probably in O. Pesta's handwriting, reading as follows: « *Petrolisthes penicillatus* (Heller), Karnicobaren, 2, "Novara" — exp. coll. 1857/9, Heller determ., Pesta revid. 1916 ». Karnicobaren probably stands for Car Nicobar Island, the northernmost of the Nicobar Archipelago. In the original description the locality is given simply as « Nicobaren ».

The following description is based on the two types, which are in relatively good condition (each has only one cheliped): the carapace is covered with a dense velvety pubescence. The characteristic tufts of hair described by HELLER are still visible, although some have been rubbed off during the various examination of the specimens. The frontal margin bears closely placed plumose setae, and therefore is not clearly visible. The median frontal lobe is well developed and narrow, it reaches distinctly forward. Laterally the front merges with the orbit at slightly less than a right angle. The inner orbital angle is rounded. The outer orbital angle is somewhat more acute, but not sharply pointed. In contrast to HELLER's original description, an epibranchial spine is present on either side. The process of the second (first free) segment of the antennal peduncle bears plumose setae and a proximal spine. The third segment shows only a weak ridge. The upper margin of the basal segment of the antennula carries plumose setae and irregularly arranged spines. The entire upper surface of the cheliped is covered with a velvety pubescence. The external margins of the various segments, especially those of the palm and of the fixed finger, bear long plumose setae. The inner margins, including the teeth of the carpus, have shorter plumose setae. The inner margin of the merus ends in a distinct sharp point. The distal margin of the merus bears two dorsal and one ventral spine. The inner margin of the carpus is provided with three large, acute teeth, in its distal part there is a very



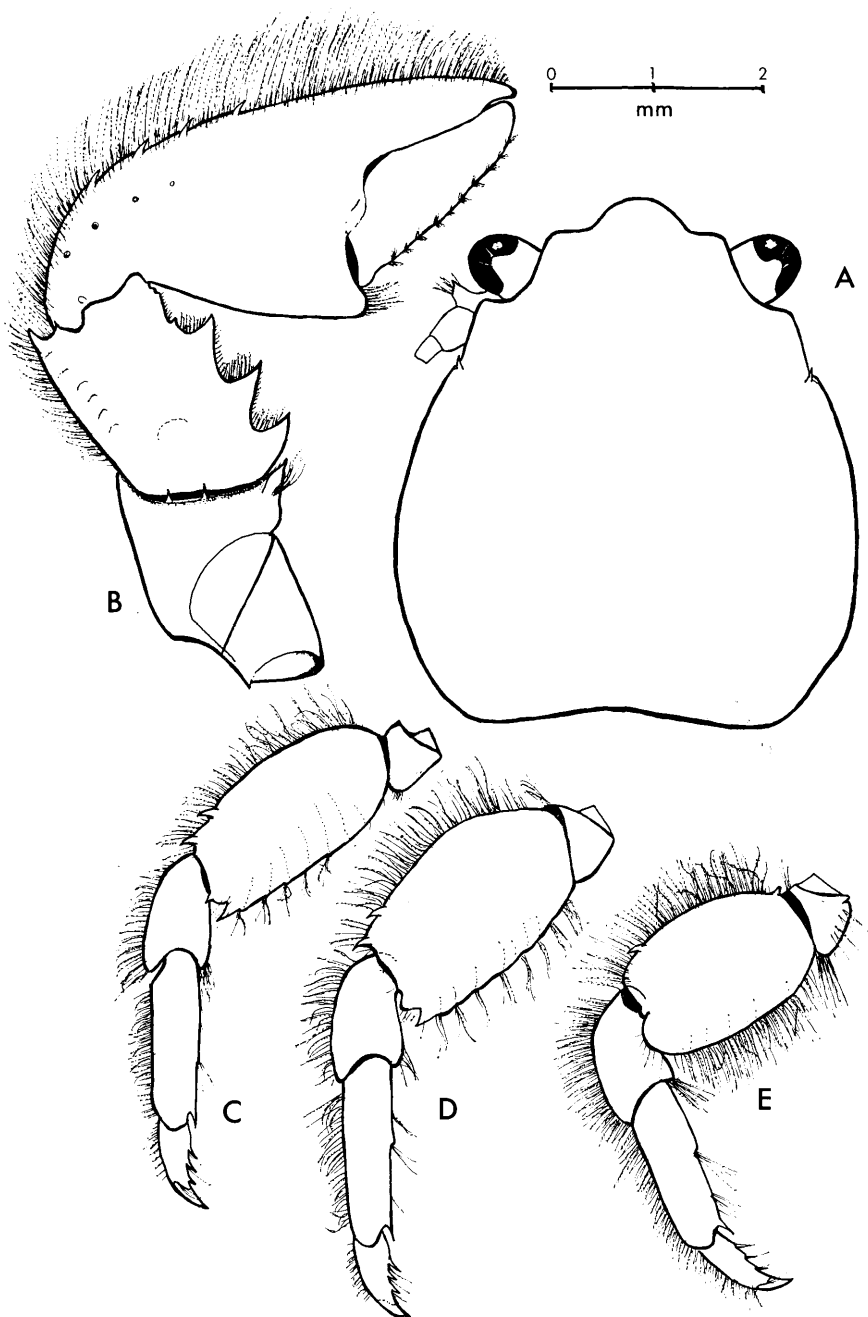


Fig. 1. — *Petrolisthes penicillatus* (Heller), syntype. A, outline of carapace; B, cheliped; C, second pereopod; D, third pereopod; E, fourth pereopod; (setae inserted along the margins of pereopods only).

small fourth tooth. The outer margin of the carpus ends in a distal spine; behind this spine and somewhat inside the outer margin there are a few sharp tubercles. Another distinct spine is placed on the distal margin of the carpus between the outer distal spine and the median incision of the margin. The outer margin of the palm bears four spines which are placed in the middle of the margin, leaving the proximal and a distal part of the margin unarmed. The upper surface of the palm shows a row of indistinct tubercles near the outer margin and parallel with it. The inner margin of the palm is smooth, except for a slight distal serration; the distal end of the margin is rounded. The outer margin of the dactylus bears tufts of very short plumose setae. The walking legs are covered with plumose setae. The lower margins of the meri of the first and second walking legs have one or two distal spines. The merus of the third walking leg lacks such a spine. The upper margins of the meri of the first and second walking legs show two spines, one of these is placed distally, the other at some distance behind the first. The merus of the third walking leg has only a single dorsal spine, which is not completely distal. All these spines are placed between the plumose setae, which obscure them from view. The lower margins of the propodi of the first and second walking leg bear a distal spine. The lower margin of the dactylus of the walking legs is provided with three small spines.

The present Somalian specimens agree well with the type specimens of the species. Some variation was noted: the number of teeth on the inner margin of the carpus of the chelipeds varies between three and six. Usually there are three or four teeth which diminish in size distally. In one specimen there is a small fourth tooth, placed between the second and third; in another there are three large and three small teeth on the margin with large and small teeth occupying alternate positions. The outer margin of the carpus usually has three spines; in the type specimens there is only a single distal spine behind which there are tubercles only. The outer margin of the palm has three spines; in one of the chelae, however, there are only two.

LEWINSOHN (1969) expressed doubt as to the correctness of the action of authors to synonymize *P. pubescens* Stimpson, 1858, with *P. tomentosus* (Dana, 1852). The first author to do so was probably ORTMANN (1897, p. 288) and this synonymy was accepted by most later authors, e.g., by MIYAKE (1942, 1943) and HAIG (1964). It seems much more likely, however, that *P. pubescens* Stimpson is a good species, and that *P. tomentosus* is not synonymous with it but with *P. penicillatus*. If this is true, then the present species should be known as *P. tomentosus* (Dana, 1852). DANA's (1852, p. 420; 1855, pl. 26 fig. 10) description and figure of the species are not sufficiently detailed to enable a definite

identification of *P. tomentosus* with either of the other species; the type material of *P. tomentosus* is evidently lost. There are, however, a few indications, additional to the description and figure, pointing in the direction of a synonymy of *P. tomentosus* and *P. penicillatus*. The shape of the front as shown in DANA's figure, as well as the pronounced regions of the carapace resemble those of *P. penicillatus* more than those of *P. pubescens*. Also significant is the fact that STIMPSON (1907, p. 183) in the description of *P. pubescens* stressed its differences from *P. tomentosus*, using characters not mentioned in DANA's description. It seems likely therefore that STIMPSON directly compared material of the two species, and as STIMPSON had material from the U.S. Exploring Expedition for comparison when he studied his material from the North Pacific Expedition, the possibility that he compared his type of *P. pubescens* with DANA's types of *P. tomentosus* is far from remote. Indeed, the differences that STIMPSON mentioned to distinguish the two species include some that distinguish *P. pubescens* from *P. penicillatus*. The best solution to this problem would be to select a neotype for DANA's *P. tomentosus* and so definitely fix the identity of the species. As no well preserved Polynesian material of either species is available to me, I refrain from taking this step, and for the time being indicate my Somalian material with the name *P. penicillatus*. My specimens certainly belong to that species, of which I examined the types, but it may be that ultimately the name *P. penicillatus* will fall as a junior synonym of *P. tomentosus* (Dana).

*Geographical distribution:* widely distributed throughout the Indo-West Pacific region from the western Indian Ocean to Fiji and Ryukyu islands. Records from the western Indian Ocean: Madagascar (LENZ, 1910). Comoro islands and Madagascar (HAIG, 1966a). Mauritius (RICHTERS, 1880; WARD, 1942; MICHEL, 1964, all as *P. villosus*; HAIG, 1964). ? Amirante islands (MIERS, 1884). This is the first record of the species from the East African coast.

*Petrolisthes virgatus* Paulson, 1875.

*Petrolisthes virgatus* PAULSON, 1875, p. 87 (1961, p. 93), pl. 11 fig. 4; NOBILI, 1906b, pp. 134, 135; TARAMELLI, 1955, p. 42; BARNARD, 1955, pp. 41, 42, fig. 21a-d; MACNAE & KALK, 1958, pp. 73, 83, 127; LEWINSOHN, 1969, pp. 149, 150, fig. 32 (Red Sea); KENSLEY, 1970, p. 105.  
*Petrolisthes trivirgatus* ORTMANN, 1894, p. 28, pl. 2 fig. 5; LENZ, 1905, p. 375.

*Material examined:*

Sar Uanle, reef flat; 1 ♀ n. 445 M.F., XII.1976;  
Sar Uanle, reef flat; 1 ♂ n. 444 M.F., 1 ♂ R.N.H., X.1971.  
cl. 5.0-10.0 mm.

*Remarks:* the original description of the present species by PAULSON (1875) characterizes it quite well; the English translation (PAULSON,

1961) makes the description more easily accessible. NOBILI (1906b) gave additional details of the species, and correctly synonymized *P. trivirgatus* Ortmann, with it. Additional remarks and illustrations were provided by LEWINSOHN (1969).

The specimens from Somalia agree in all details with the published accounts of the species.

*Geographical distribution:* the species has repeatedly been reported from the East African coast: Mozambique (BARNARD, 1955; MACNAE & KALK, 1958; KENSLEY, 1970). Dar es Salaam, Tanzania (ORTMANN, 1894, as *P. trivirgatus*). Zanzibar, Tanzania (LENZ, 1905, as *P. trivirgatus*; TARAMELLI, 1955). Obock, Gulf of Aden (NOBILI, 1906b). (For Red Sea references see LEWINSOHN, 1969).

*Pachycheles natalensis* (Krauss, 1843).

*Porcellana natalensis* KRAUSS, 1843, pp. 58, 59, pl. 4 fig. 1.

*Pachycheles sculptus*; ORTMANN, 1894, p. 29; NOBILI, 1906a, p. 69; NOBILI, 1906b, p. 136 [not *Pachycheles sculptus* (H. Milne Edwards)].

*Pisosoma sculpta*; GRAVELY, 1927, p. 140, pl. 20 fig. 8 [not *P. sculptus* (H. Milne Edwards)].

*Pachycheles natalensis*; BARNARD, 1950, pp. 472, 473, fig. 87a-f; BARNARD, 1955, p. 4; MACNAE & KALK, 1958, pp. 73, 83, 126; HAIG, 1964, p. 371; HAIG, 1966a, p. 43; HAIG, 1966b., pp. 289, 290; HAIG, 1966c, p. 53; LEWINSOHN, 1969, pp. 151-153, fig. 33 (Red Sea); KENSLEY, 1970, p. 104.

*Material examined:*

Sar Uanle, reef flat; 1 ♀ R.N.H., X.1971;

Sar Uanle, tide pools; 1 ovig. ♀ R.N.H., 1971;

Sar Uanle, reef; 4 spec. (2 ovig. ♀♀) n. 431 M.F., 2 spec. Z.M.T.-A.U., XI.1976;

Sar Uanle, reef flat; 2 spec. (1 ovig ♀) n. 428 M.F., XI.1976;

Gesira, reef; 6 spec. (3 ovig. ♀♀) n. 429 M.F., 21.XI.1976;

Gesira, reef, from scleractinians; 5 spec. (2 ovig. ♀♀) n. 430 M.F., XII.1976.

cl. 3.5-5.0 mm.

*Remarks:* the original description and figure of the species provided by KRAUSS (1843) are quite good, but at present they are insufficient to permit a reliable distinction of *P. natalensis* from related species. HAIG (1966b) gave a review of the Indo-West Pacific species of the genus *Pachycheles* and dealt more extensively with the present species.

Former authors often confused *P. natalensis* with *P. sculptus* (H. Milne Edwards), a species that shows a considerable resemblance to *P. natalensis*. HAIG (1966b) showed that the males of *P. sculptus* lack the pleopods, while these are present in *P. natalensis*. According to HAIG *P. sculptus* does not occur in the western Indian Ocean.

WARD (1942, p. 64) described from Diego Garcia, Chagos Archipel-

ago, a new species of *Pachycheles* under the name *Pisosoma garciaensis*. The original description is altogether insufficient and no figure is provided. HAIG (1966b) stated that WARD's species can be distinguished from *P. natalensis* by having a broader front with a small median notch, and by the fact that the walking legs are covered with plumose setae. LEWINSOHN (1969) remarked that in three specimens of *P. natalensis* from the Red Sea examined by him, plumose setae are present on the walking legs. Until more data on *P. garciaensis* become available, it will be difficult to distinguish the two species.

The present specimens from Somalia agree fully with the published descriptions of *P. natalensis*.

*Geographical distribution*: so far the species is only known from the western Indian Ocean: Natal, South Africa (KRAUSS, 1843, type locality; BARNARD, 1950). Mozambique (BARNARD, 1950, 1955; MACNAE & KALK, 1958; KENSLEY, 1970). Dar es Salaam, Tanzania (ORTMANN, 1894, as *P. sculptus*). Jibouti; Obock, Gulf of Aden (NOBILI, 1906b, as *P. sculptus*). Madagascar (HAIG, 1966a). Persian Gulf (NOBILI, 1906a, as *P. sculptus*; HAIG, 1966c). Gulf of Mannar (GRAVELY, 1927, as *Pisosoma sculpta*). Panbam, India (HAIG, 1964). (For Red Sea references see LEWINSOHN, 1969).

*Pachycheles tomentosus* Henderson, 1893.

*Pachycheles tomentosus* HENDERSON, 1893, pp. 428, 429, pl. 39 figs 16-18; HAIG, 1966b, p. 292.

*Material examined*:

- Sar Uanle, reef flat; 2 ♂♂, 1 ovig. ♀, R.N.H., X.1971;
  - Sar Uanle, dead reef; 1 ♂, 2 ovig. ♀♀, n. 433 M.F., XI.1976;
  - Sar Uanle, reef; 1 ♀ n. 434 M.F., XI.1976;
  - Sar Uanle, stones at cliff base; 1 ♂, 1 ovig. ♀, Z.M.T.-A.U., XII.1976;
  - Gesira, reef; 9 ♂♂, 9 ♀♀ (7 ovig., 1 juv.), n. 432 M.F., XI.1976;
  - Gesira, reef, from scleractinian; 1 ♂, 1 ovig. ♀, XII.1976.
- cl. 6.0-8.0 mm.

*Remarks*: so far *P. tomentosus* was known only from Karachi, Pakistan, the type locality. As indicated by HENDERSON (1893) and HAIG (1966b), the type material has been deposited in the British Museum (Natural History). Miss J. Haig was so kind to send me two specimens of *P. tomentosus* from Pakistan to enable a comparison between this topotypic material and my animals from Somalia. Miss Haig also examined two specimens of the present series from Somalia and suggested that the present form might perhaps represent a species distinct from *P. tomentosus*. Examination of my entire series, however, induces me, for

the time being at least, to assign this material to *P. tomentosus*. The only differences between the Somalian and Pakistan specimens are found in the pubescence of the various parts of the body, while in all other morphological details there is the closest resemblance between the two forms. The present specimens fully agree with HENDERSON's (1893) original description, but there the pubescence is described in rather general terms, the various types of setae are not discussed.

The differences between the present Somalian specimens and the two from Karachi are the following: in the specimens from Karachi the plumose setae on the front are much more distinct and the stiff setae are more concentrated. In the specimens from Somalia the upper surface of the carapace shows small groups of short stiff setae while in the specimens from Karachi the carapace shows no setae except those of the front. In the Somalian specimens the outer margin of the chelae bears long stiff setae, while the Karachi specimens have only a fringe of plumose setae. A similar difference is found in the pubescence of the walking legs. In the Somalian specimens the upper surface of the chelipeds (especially the chela and the carpus) bears numerous tufts of stiff setae, with only a few plumose setae in between. In the Karachi specimens the dorsal surface of the chelipeds shows only relatively few tufts of stiff setae, but numerous plumose setae which practically hide the entire dorsal structure of the chelipeds from view.

So far little is known about the variability of the various forms of setae and their density in the various species of Porcellanidae. In some species these characters seem to be reasonably constant, while others are variable in this respect. Only additional material from more localities may decide whether the specimens from Somalia and Karachi belong to two different species or are just forms of a single one.

*Geographical distribution:* the species was only known from Karachi, Pakistan (HENDERSON, 1893, type locality; HAIG, 1966b).

*Pisidia dehaanii* (Krauss, 1843).

*Porcellana dehaanii* KRAUSS, 1843, pp. 59, 60, pl. 4 fig. 2; BARNARD, 1947, p. 378; BARNARD, 1950, pp. 476, 477, fig. 88e-h; MACNAE & KALK, 1958, pp. 83, 126; DAY, 1969, p. 105 (in key); KENSLEY, 1969, p. 153; KENSLEY, 1970, p. 105.

*Pisidia dehaanii*; HAIG, 1966a, p. 48 (in key).

*Material examined:*

- Sar Uanle, reef flat; 4 spec. n. 463 M.F., IX.1971;
- Sar Uanle, reef flat; 16 spec. (1 ovig. ♀) n. 462 M.F., X.1971;
- Sar Uanle, reef; 2 spec. (1 ovig. ♀) n. 464 M.F., 3.XI.1971;
- Sar Uanle, tide pool; 1 spec. Z.M.T.-A.U., XI.1971;

Sar Uanle, reef flat; 3 spec. n. 465 M.F., X.1972;  
 Sar Uanle, reef; 5 spec. (1 ovig. ♀) n. 466 M.F., 1 spec. Z.M.T.-  
 A.U., XII.1976;

Gesira, reef; 1 spec, n. 467 M.F., XII.1976.  
 cl. 3.5-6.0 mm.

*Remarks:* to my knowledge there are just two descriptions of this species, viz., the original by KRAUSS (1843) and the one by BARNARD (1950). The original description is fairly extensive and the accompanying figure also is good. BARNARD (1950) in his description stressed the differences between this species and the related *Pisidia streptocheles* (Stimpson).

Very little can be added to the existing descriptions. The Somalian specimens show only two spines on the lateral margin of the carapace, as described by KRAUSS; BARNARD however, mentioned 3 or 4 of such spines. In the large (= old) males these spines are just indicated as tubercles. As already noted by BARNARD, the left and the right chelipeds of the male especially in the old males, differ more than in the female. In the males a velvety pubescence is present on the inner surface of the fingers of the smaller chela; no such pubescence is seen in the female. Often in old specimens the pubescence of the upper surface of the carapace is reduced or absent.

*Geographical distribution:* so far the species had only been reported from South Africa and Mozambique: Natal (KRAUSS, 1843, type locality; BARNARD, 1947, 1950; KENSLEY, 1969). Mozambique (BARNARD, 1947, 1950; MACNAE & KALK, 1958; KENSLEY, 1970).

*Pisidia delagoae* (Barnard, 1955).

*Porcellana delagoae* BARNARD, 1955, p. 40, fig. 20; MACNAE & KALK, 1958, pp. 73, 126.  
*Pisidia delagoae*; HAIG, 1966a, p. 43, fig. 1.

*Material examined:*

Sar Uanle, reef, from scleractinian; 3 ♂♂ R.N.H., 2 ♀♀ (1 ovig.)  
 n. 458 M.F., 29.XI.1976;

Sar Uanle, reef, submerged during low water; 1 ♂ n. 460 M.F.,  
 XII.1976;

Sar Uanle, sand under carpet of *Cymodocea*; 1 ♂ n. 459 M.F.,  
 XII.1976;

Gesira, reef, from scleractinian; 3 ♂♂, 5 ovig. ♀♀, 2 juv., n. 457  
 M.F., XII.1976;

Gesira, reef; 2 ♂♂, 3 ovig. ♀♀, Z.M.T.-A.U., XII.1976.  
 cl. 2.0-4.5 mm.

*Remarks:* little has been published to date about this small species. BARNARD's (1955) original description was based on a single ovigerous female. MACNAE & KALK's (1958) record of the species is probably based on this single specimen. HAIG (1966a) dealt with eight specimens (two males and six females) from the area of Madagascar. BARNARD's original description and his figure are fully sufficient for a definite identification of the species. HAIG (1966a) gave additional details dealing with the different shape of the chelipeds in males and females, which was the more valuable as BARNARD had only a female at his disposal. The chelipeds show a strong sexual dimorphism. The left and right chelipeds of the male are very different in shape; both have been well illustrated by HAIG (1966a).

The present relatively extensive series of the species agrees in all points with the published descriptions.

*Geographical distribution:* so far the species is only known from Delagoa Bay, Mozambique (BARNARD, 1955; MACNAE & KALK, 1958) and from the area of Madagascar (HAIG, 1966a).

#### SUMMARY

A collection of 153 Porcellanidae (Crustacea Decapoda Anomura) from central and southern Somalia has been studied. Three of the species: *Petrolisthes lamarckii* (Leach, 1820), *P. moluccensis* (De Man, 1888) and *P. penicillatus* (Heller, 1862) have a wide range within the Indo-West Pacific region. The other seven species have only been reported from the Indian Ocean. Five of the 10 species are also found in the Red Sea.

#### RIASSUNTO

È stata studiata una collezione composta da 153 Porcellanidae (Crustacea Decapoda Anomura) provenienti dalla Somalia centrale e meridionale. La collezione comprende 10 specie di cui tre: *Petrolisthes lamarckii* (Leach, 1820), *P. moluccensis* (De Man, 1888) e *P. penicillatus* (Heller, 1862) hanno una grande distribuzione nella regione Indo-Pacifica occidentale. Le altre sette specie erano conosciute solo dell'Oceano Indiano mentre cinque delle 10 specie erano già state segnalate per il Mar Rosso.

#### REFERENCES

- BARNARD, K. H. 1947. Descriptions of new species of South African Decapod Crustacea, with notes on synonymy and new records. *Ann. Mag. nat. Hist.* (11) 13: 361-392.



- BARNARD, K. H. 1950. Descriptive catalogue of South African Decapod Crustacea. *Ann. S. Afr. Mus.* 38: 1-837, figs 1-154.
- BARNARD, K. H. 1955. Additions to the fauna list of South African Crustacea and Pycnogonida. *Ann. S. Afr. Mus.* 43 (1): 1-107, figs 1-53.
- BORRADAILE, L. A. 1898. On some Crustaceans from the South Pacific. Part II. *Macrura anomala*. *Proc. zool. Soc. Lond.*: 457-468.
- BOUVIER, E. L. 1915. Décapodes marcheurs (Reptantia) et Stomatopodes recueillis à l'île Maurice par M. Paul Carié. *Bull. scient. Fr. Belg.* (7) 48 (3): 178-318, figs 1-42, pls 12-17.
- DANA, J. D. 1852. Crustacea. In: United States Exploring Expedition ... 1838-1842. Under the command of C. Wilkes. Vol. 13. Philadelphia: C. Sherman. VIII+1618 pp.
- DANA, J. D. 1855. Crustacea. In: United States Exploring Expedition ... 1838-1842. Under the command of C. Wilkes. Vol. 13. Philadelphia: C. Sherman. 27 pp., 96 pls (atlas).
- DAY, J. H. 1969. A guide to marine life on South African shores. Cape Town: A. A. Balkema, III+300 pp., pls 1-8.
- DERIJARD, R. 1966. Note préliminaire sur les Crustacés Stomatopodes et Décapodes récoltés à l'île Europa du 6 au 24 Avril 1964. *Mém. Mus. natn. Hist. nat., Paris (A)* 41: 159-180, figs 1-23.
- GRAVELY, F. H. 1927. Orders Decapoda (except Paguridea) and Stomatopoda. In: The littoral fauna of Krusadai Island in the Gulf of Manaar. *Bull. Madras Govt Mus. new Ser. (Nat. Hist.)* 1 (1): 135-155, pls 19-26.
- HAIG, J. 1964. Porcellanid crabs from the Indo-West-Pacific, part I. Papers from Dr. Th. Mortensen's Pacific Expedition 1914-1916. 81. *Vidensk. Meddr dansk naturh. Foren.* 126: 355-386, figs 1-4.
- HAIG, J. 1965. The Porcellanidae (Crustacea Anomura) of Western Australia, with descriptions of four new Australian species. *J. Proc. R. Soc. West. Aust.* 48 (4): 97-118, figs 1-3.
- HAIG, J. 1966a. Sur une collection de Crustacés Porcellanes (Anomura, Porcellanidae) de Madagascar et des Comores. *Cah. Orstom, Océanogr.* 3 (4): 39-50, 1 fig.
- HAIG, J. 1966b. A review of the Indo-West-Pacific species of the genus *Pachycheles* (Porcellanidae, Anomura). *Proc. Symp. Crust. India* 1: 285-294.
- HAIG, J. 1966c. The Porcellanidae (Crustacea Anomura) of the Iranian Gulf and the Gulf of Oman. *Vidensk. Meddr dansk naturh. Foren.* 129: 49-65, figs 1-7, 1 map.
- HELLER, C. 1861. Beiträge zur Crustaceen-Fauna des Rothen Meeres, II. Theil. *Sber. Akad. Wiss. Wien (Math.-nat. Kl., Abt. II)* 44: 241-295, pls 1-3.
- HELLER, C. 1862. Neue Crustaceen gesammelt während der Weltumseglung der K.K. Fregatte « Novara ». Zweiter vorläufiger Bericht. *Verh. zool.-bot. Ges. Wien* 28: 519-528.
- HELLER, C. 1865. Crustaceen. In: Reise der Österreichischen Fregatte « Novara » um die Erde, in den Jahren 1857, 1858, 1859, unter den Befehlen des Commodors B. von Wüllerstorff-Urbair. (Zoologischer Theil) Band 2, Abt. 8. Wien: Kaiserlich-königliche Hof- und Staatsdruckerei. 280 pp., pls 1-25.
- HENDERSON, J. R. 1893. A contribution to Indian carcinology. *Trans. Linn. Soc. Lond. (Zool.)* (2) 5 (10): 325-458, pls 36-40.
- HILGENDORF, F. 1879. Die von Hrn. W. Peters in Mocambique gesammelten Crustaceen. *Mber. dt. Akad. Wiss. Berl.* 1878: 782-850, pls 1-4.
- JOHNSON, D. S. 1970. The Galatheidea (Crustacea: Decapoda) of Singapore and adjacent Waters. *Bull. natn. Mus. St. Singapore* 35 (1): 1-44, figs 1-6.

- KENSLEY, B. 1969. Decapod Crustacea from the South-West Indian Ocean. *Ann. S. Afr. Mus.* 52 (7): 149-181, figs 1-16.
- KENSLEY, B. 1970. A small collection of Decapod Crustacea from Mocambique. *Ann. S. Afr. Mus.* 57 (5): 103-122, figs 1-14.
- KRAUSS, F. 1843. Die Südafrikanischen Crustaceen. Eine Zusammenstellung aller bekannten Malacostraca. Bemerkungen über deren Lebensweise und geographische Verbreitung, nebst Beschreibung und Abbildung mehrerer neuen Arten. Stuttgart: E. Schweizerbart'sche Verlagsbuchhandlung. 68 pp., pls 1-4.
- LAURIE, R. D. 1926. Anomura collected by Mr J. Stanley Gardiner in the western Indian Ocean in H.M.S. « Sealark ». *Trans. Linn. Soc. Lond. (Zool.)* (2) 19 (1): 121-167, pls 8, 9.
- LEACH, W. E. 1820. Galatéadées, pp. 49-56. In: F. Cuvier, Edit. *Dictionnaire des Sciences Naturelles ...* Vol. 18. Paris & Strasbourg: F. G. Levrault. 60 vols.
- LENZ, H. 1905. Ostafrikanische Dekapoden und Stomatopoden, gesammelt von Herrn Prof. Dr. A. Voeltzkow. *Abh. senckenb. naturf. Ges.* 27: 341-392, pls 47, 48.
- LENZ, H. 1910. Crustaceen von Madagaskar, Ostafrika und Ceylon, pp. 539-576, figs 1-4. In: A. Voeltzkow, Edit. *Reise in Ostafrika in den Jahren 1903-1905 mit Mitteln der Hermann und Elise geb. Heckmann Wentzel-Stiftung ausgeführt.* Stuttgart: E. Schweizerbartsche Verlagsbuchhandlung, Nägele & Dr. Sprosser. Vol. 2.
- LEWINSOHN, CH. 1969. Die Anomuren des Roten Meeres (Crustacea Decapoda: Paguridea, Galatheidea, Hippidea). *Zool. Verh., Leiden* 104: 1-213, figs 1-37, pls 1, 2.
- MACNAE, W. & M. KALK 1958. A natural history of Inhaca Island, Moçambique. Johannesburg: Witwatersrand University Press. X+163 pp., 30 figs, 11 pls.
- MAN, J. G., DE 1888. Bericht über die im indischen Archipel von Dr. J. Brock gesammelten Decapoden und Stomatopoden. *Arch. Naturgesch.* 35: 215-600, pls 7-22a.
- MICHEL, C. 1964. Check-list of the Crustacea Brachyura (crabs) recorded from Mauritius. *Bull. Maur. Inst.* 6: 1-48.
- MICHEL, C. 1974. Notes on marine biology studies made in Mauritius. *Bull. Maur. Inst.* 7 (2): 1-287.
- MIERS, E. J. 1884. Crustacea, pp. 178-322, 513-569; pls 18-32, 36-51. In: *British Museum (Nat. Hist.). Report of the zoological collections made in the Indo-Pacific Ocean during the voyage of H.M.S. « Alert » 1881-82.* London: British Museum (Nat. Hist.). XXV+684 pp., 54 pls.
- MIYAKE, S. 1942. Porcellanidae. Studies on the Decapod Crustaceans of Micronesia. III. *Palao trop. biol. Stn. Stud.* 2 (3): 329-379, figs 1-35, 1 pl.
- MIYAKE, S. 1943. Studies on the crab-shaped Anomura of Nippon and adjacent Waters. *J. Fac. Agric. Kyushu Univ.* 7 (3): 49-158, figs 1-61.
- NOBILL, G. 1906a. Crustacés Décapodes et Stomatopodes. Mission J. Bonnier et Ch. Pérez (Golfe Persique, 1901). *Bull. scient. Fr. Belg.* 40: 13-159, figs 1-3, pls 2-7.
- NOBILL, G. 1906b. Faune carcinologique de la Mer Rouge. Décapodes et Stomatopodes. *Annls Sci. nat. (Zool.)* (9) 4: 1-347, figs 1-12, pls 1-11.
- ORTMANN, A. 1892. Die Abtheilungen Galatheidea und Paguridea. Die Decapoden-Krebse des Strassburger Museums. *Zool. Jb. (Syst.)* 6: 241-326, pls 11, 12.
- ORTMANN, A. 1894. Crustaceen. In: R. Semon, Edit. *Zoologische Forschungsreisen in Australien und dem Malayischen Archipel.* *Denkschr. med.-naturw. Ges. Jena* 8: 1-80, pls 1-3.
- ORTMANN, A. 1897. Carcinologische Studien. *Zool. Jb. (Syst.)* 10: 258-372, pl. 17.

- PARDI, L. 1976. Researches on the coast of Somalia. The shore and the dune of Sar Uanle. Introduction. *Monitore zool. ital. (N.S.) Suppl.* 8: 179-193.
- PAULSON, O. 1875. *Izsledovaniya rakoobraznykh krasnago morya s zametkami odnosil'no rakoobraznykh drugikh morei.* Kiev: Tipografia S. V. Kulzhenko. XIV+144 pp., pls 1-21. [English translation: 1961. *Studies on Crustacea of the Red Sea with notes regarding other seas. Part I. Podophthalmata and Edriophthalmata (Cumacea).* Published by the Israel Program for Scientific Translations. Jerusalem: S. Monson. 4 (unnumbered)+164 pp., pls 1-21].
- RICHTERS, F. 1880. Decapoda, pp. 137-139, pls 15-18. In: K. Moebius, Edit. *Beiträge zur Meeres-Fauna der Insel Mauritius und der Seychellen. Part 3.* Berlin: Verlag der Gutmann'schen Buchhandlung (Otto Enslin). 352 pp., 22 pls, 1 map.
- STIMPSON, W. 1858. *Prodromus descriptiones animalium evertibratorum, quae in expeditione ad oceanum pacificum septentrionalem, a republica federata missa, Cadwaladaro Ringgold et Johanne Rodgers ducibus, observavit et descripsit.* Proc. Acad. nat. Sci. Philad.: 225-252.
- STIMPSON, W. 1907. Report on the Crustacea (Brachyura and Anomura) collected by the North Pacific Exploring Expedition, 1853-1856. *Smithson. misc. Collns* 49: 1-240, pls 1-26.
- TARAMELLI, E. 1955. Crostacei di Zanzibar (Decapodi e Stomatopodi). *Riv. Biol. colon.* 15: 29-47.
- WARD, M. 1942. Notes on the Crustacea of the Desjardins Museum, Mauritius Institute, with descriptions of new genera and species. *Bull. Maurit. Inst.* 2 (2): 49-109, pls 5, 6.

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