Special Issue for Prof. Jacques Forest

ON THE GENUS *MUNIDA* LEACH, 1820 (DECAPODA, GALATHEIDAE) FROM THE WESTERN AND SOUTHERN INDIAN OCEAN, WITH THE DESCRIPTION OF FOUR NEW SPECIES

BY

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ABSTRACT

We studied species of the genus *Munida* Leach collected during several cruises carried out off the Reunion and Aldabra Islands (western Indian Ocean) and Crozet, Saint Paul and New Amsterdam Islands (southern Indian Ocean). Four new species (*M. foresti*, *M. muscae*, *M. shaula*, and *M. spicae*) are described and illustrated and the taxonomic position of additional material from the John Murray Expedition is also discussed. A key to the species of the genus *Munida* from the western and southern Indian Ocean is also included.

RÉSUMÉ

Quatre nouvelles espèces du genre *Munida* Leach (*M. foresti*, *M. muscae*, *M. shaula* et *M. spicae*) sont décrites et illustrées à partir de spécimens récoltés au large des îles Réunion et Aldabra (océan Indien occidental) et Crozet, Saint Paul et New Amsterdam (océan Indien sud). Quelques spécimens récoltés lors de la campagne John Murray sont aussi étudiés. Une clé pour les espèces du genre *Munida* de l'océan Indien sud et occidentale est presentée.

INTRODUCTION

The genus *Munida* Leach is represented in the western and southern Indian Ocean by more than 20 species. Numerous authors have described or cited species in the area since Alcock & Anderson (1899) and Alcock (1901) described *M. comorina* from the Arabian Sea, off Travancore, in 787-840 m. Subsequently, Alcock (1901) recorded *M. andamanica* Alcock, 1894 in the neigbourhood of the Laccadive and Maldive islands and *M. microps* Alcock, 1894 from the Travancore coast. Balss (1913) and Doflein & Balss (1913) described *M. africana* from the east coast of Somalia in 863 m, and reported *M. andamanica* from the

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east coast of Somalia. Balss (1915) recorded *M. japonica* Stimpson, 1858 from the Red Sea and Laurie (1926) reported *M. comorina* and *M. japonica* from Providence and Mauritius. Barnard (1950) in his important work on South African decapods, mentioned *M. sanctipauli* Henderson, 1885 and *M. semoni* Ortmann, 1894 from the coast of South Africa and Mozambique. Tirmizi (1966), studying the material collected during the John Murray Expedition, identified numerous species, and reported *M. vigiliarum* Alcock, 1901, *M. japonica*, *M. microps*, and *M. andamanica*, and described *M. roshanei.* Lewinsohn (1969) collected *M. japonica* and *M. roshanei* from the Red Sea, and Tirmizi & Javed (1976) described *Munida babai* from off Natal; see also Balss (1915) and Lewinsohn (1969), who cited this species from the Red Sea as *M. gracilis* Henderson, 1885.

More recently, Baba (1974) described *M. brucei*, Türkay (1986) cited *M. roshanei* and *M. japonica*, and de Saint Laurent & Macpherson (1988) described *M. benguela* [= *M. sanctipauli* from Barnard (1950)]. Baba (1990), in his revison of the galatheid fauna of Madagascar, recorded *M. babai*, *M. benguela*, *M. japonica*, and *M. kuboi* and described *M. remota*, and Macpherson (1991) described *M. rubiesi* from the Gulf of Aden and redescribed *M. africana*.

In recent years, Tirmizi & Javed (1992) described *Munida arabica* and *M. janetae* from Somalia and South Africa. Macpherson & Baba (1993), revising the *M. japonica* group of species, described *M. dispar* [= *M. japonica* from Türkay (1986)], *M. eudora*, *M. limula* [= *M. japonica* from Baba (1990)], and *M. sphynx.* Recently, Galil (1999) described *M. barbeti* from Mauritius and Macpherson (1999b) found three new species in the Seychelles Islands, *M. insularis*, *M. dissita*, and *M. nesiotes*.

On the other hand, other species, originally included in the genus *Munida* have recently been transferred to the new genera *Paramunida* Baba, 1988 [*P. tricarinata* (Alcock, 1894)], *Agonodida* Baba & de Saint Laurent, 1996 [*A. incerta* (Henderson, 1888) and *A. squamosa* (Henderson, 1885)] and *Raymunida* Macpherson & Machordom, 2000 [*R. elegantissima* (De Man, 1902)] (Baba, 1988; Baba & de Saint Laurent, 1996; Macpherson & Machordom, 2000). Their taxonomic position will not be considered in the present paper.

The studies mentioned above show the existence of a rich representation of the genus *Munida* in the western and southern Indian Ocean (see also Tirmizi & Javed, 1993). However, as several authors have pointed out (e.g., Baba, 1988, 1990; Macpherson & Baba, 1993; Macpherson, 1997) the identity of several reported occurrences should be revised, e.g., specimens of *M. andamanica* (= *M. curvirostris* Henderson, 1885) cited by Alcock (1901), *M. semoni* cited by Barnard (1950; but

see Macpherson & Baba, 1993), in order to clarify the taxonomic status of these data.

For this paper, we studied numerous representatives of the genus *Munida* collected during several expeditions carried out to the Reunion and Aldabra Islands (western Indian Ocean) and the Crozet, Saint Paul and New Amsterdam Islands (southern Indian Ocean). Some of these specimens have been considered as belonging to four new species. The present paper serves to describe and illustrate these new species and provides some new records of known species. Additionally, some specimens from the John Murray Expedition (The Natural History Museum, London, BM) have been studied for comparison with the present material (see Tirmizi, 1966), and also in order to have a more complete view of the status of the genus *Munida* in the zone. Finally, a key to the known species of the genus, excluding dubious species (i.e., *M. andamanica*, *M. japonica*, and *M. semoni*), from the western and southern Indian Ocean is also presented.

The types of the new species and other specimens are deposited in the collections of the Muséum national d'Histoire naturelle de Paris (MNHN). The measurements given are the carapace length, excluding rostrum. The terminology used follows previous papers (see Zariquiey-Alvarez, 1952; Macpherson & de Saint Laurent, 1991; Baba & de Saint Laurent, 1996).

SYSTEMATICS

Munida africana Doflein & Balss, 1913

Munida africana Doflein & Balss, 1913: 145, figs. 13, 14, pl. 14 fig. 1. — Balss, 1913: 221. — Macpherson, 1991: 555, fig. 2.
Munida andamanica Tirmizi, 1966: 201, fig. 20 (not Alcock, 1894).

Material examined. — Zanzibar: John Murray Expedition stn 107, 421-457 m: 1 male, 9.7 mm (BM 1966.2.4.80).

Remarks. — The specimen examined agrees quite well with the type material from the south of Somalia, collected in 863 m (see Macpherson, 1991).

Tirmizi (1966) identified the specimen from Zanzibar as *Munida andamanica* Alcock (a junior synonym of *M. curvirostris* Henderson, 1885, cf. Baba, pers. comm., see also Macpherson, 1997). A comparison of the present specimen with abundant material from the Philippines and Indonesia (Macpherson, 1997), shows numerous differences, and they can be easily distinguished by the front margins, general shape of the carapace, spines of antennular segments, and armature of chelipeds and walking legs, among other characters.

Munida barbeti Galil, 1999

Munida barbeti Galil, 1999: 59, fig. 1.

Material examined. — Reunion Island: Cruise MD32, stn DR 91, 28.viii.1982, 19°45.5′S 54°07′E, 95-115 m: 1 male, 4.0 mm.

NW Madagascar: Cruise BENTHEDI, stn 109R, 10.iv.1977, 12°25.6′S 46°16.2′E, 50 m: 1 ovigerous female, 3.8 mm.

Aldabra Island: Johny Channel, 15.v.1954, 28-41 m: 1 male, 2.0 mm; 1 ovigerous female, 3.2 mm. — Johny Channel, 23.v.1954, 42 m: 3 males, 4.3-5.3 mm; 1 ovigerous female, 3.0 mm; 1 female, 4.8 mm.

Remarks. — The specimens examined agree quite well with the original description and illustrations provided by Galil (1999). This species has previously been reported from Mauritius, in 55 m depth.

Munida foresti n. sp. (fig. 1)

Material examined. — Reunion Island: Cruise MD32, stn DR 85, 27.viii.1982, 20°59.5′S 55°15.1′E, 58-70 m: 1 male, holotype, 4.1 mm (MNHN-Ga 4570); 4 males, 2.4-4.0 mm; 1 ovigerous female, 4.0 mm; 1 female, 3.4 mm.

Etymology. — The species is dedicated to Jacques Forest for his valuable contribution to carcinological taxonomy.

Distribution. — Reunion Island, 58-70 m.

Description. — Carapace longer than wide. Transverse ridges mostly interrupted, with dense short, non-iridescent setae. Intestinal region without striae or scales. Gastric region with a row of 10-11 epigastric spines, often bearing 1 spine centred on stria directly behind this row. One parahepatic, 1 branchial anterior, and 1 postcervical spine on each side.

Frontal margins oblique. Lateral margins feebly convex. Anterolateral spine short, clearly not reaching level of sinus between rostrum and supraocular spines. Second marginal spine before cervical groove small, 1/3 size of preceding one. Branchial margins with 5 spines decreasing in size posteriorly.

Rostrum spiniform, half as long as remaining carapace, slightly sinuous and horizontal. Supraocular spines not reaching midlength of rostrum, clearly not exceeding end of corneas, subparallel, upwardly directed.

Fourth thoracic sternite with some short granulated small scales; lateral surface of fifth to seventh sternites smooth. Anterior part of fourth sternite as long as third, slightly concave medially.

Abdominal tergites unarmed. Second to fourth tergites each with 2 uninterrupted striae, anterior one longer.

Eyes moderately large, maximum corneal width more than 1/3 the distance between bases of anterolateral spines.

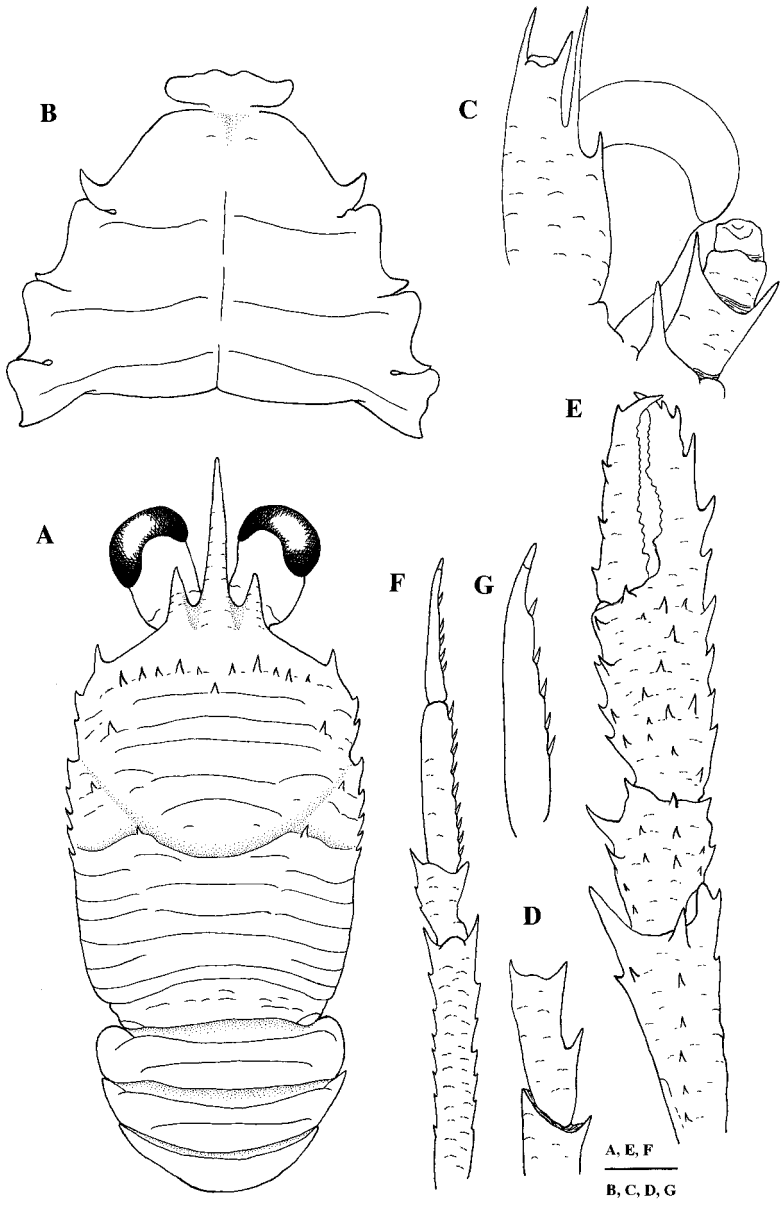

Fig. 1. *Munida foresti* n. sp., holotype, male, 4.1 mm. A, carapace and abdomen, dorsal view; B, sternal plastron; C, ventral view of cephalic region, showing antennular and antennal peduncles; D, merus of right third maxilliped, lateral view; E, right cheliped, dorsal view; F, right first walking leg, lateral view; G, dactylus of right first walking leg, lateral view. Scale bars: A, E, F, 1 mm; B, C, D, G, 0.5 mm. Setae of carapace, abdomen, and pereiopods not illustrated.

Basal segment of antennule (distal spines excluded), about 1/4 carapace length, elongate, slightly exceeding corneas, with 2 distal spines, mesial spine longer than lateral spine; 2 spines on lateral margin, proximal one short, located at midlength of segment, distal one long, slightly overreaching distolateral spine.

First segment of antennal peduncle with distomesial spine reaching end of second segment; second segment with 2 distal spines, mesial spine slightly longer than lateral spine, overreaching end of third segment, although not overreaching antennal peduncle; third segment unarmed.

Ischium of third maxilliped about 1.5 times length of merus measured along dorsal margin, distoventrally bearing spine. Merus of third maxilliped bearing 2 well developed spines on flexor margin, distal smaller; extensor margin with distal spine.

Chelipeds squamous. Palm as long as fingers. Merus armed with some spines longer on distal border, distomesial spine overreaching proximal third of carpus. Carpus with several spines on dorsal side and several spines scattered on mesial and ventral sides. Palm with spines scattered on mesial and dorsal sides and one row of well developed dorsolateral spines, continuing onto fixed finger. Fingers distally curving and crossing, ending in a sharp spine; movable finger with several spines along mesial border, distal one subapical.

Second pereiopod about twice carapace length; merus slightly shorter than carapace, about six times as long as high, 5.5 times carpus length and 1.7 times as long as propodus; propodus about 4 times as long as high, slightly longer than dactylus. Merus with some small spines on dorsal border, ventral margin distally ending in long spine preceded by several spines and some projecting scales on distal half. Carpus with 3 dorsal spines and 1 distoventral spine. Propodus with 9-10 movable ventral spines. Dactylus long and slender, with dorsal margin slightly convex on proximal half, slightly curving distally, with 5-6 movable spinules along ventral margin. Third pereiopod similar to second; fourth pereiopod shorter than second and third. Merus of fourth pereiopod half length of second pereiopod.

Remarks. — The new species resembles *M. arabica* Tirmizi & Javed, 1992 and *M. janetae* Tirmizi & Javed, 1992, both from Somalia and *M. roshanei* Tirmizi, 1966 from the Red Sea, Gulf of Aden, and Oman (Tirmizi, 1966; Türkay, 1986; Tirmizi & Javed, 1992) in having 5 spines on the lateral margins of the carapace behind cervical groove, eyes moderately large, the second abdominal somite unarmed, the lateral parts of the posterior thoracic sternites without granules, and rostrum spiniform. However, the new species can be easily distinguished from these species by the following differences: The frontal margins are oblique in *M. foresti*, clearly more transverse in the other species. The distomesial spine of the basal segment of the antennular peduncle is longer than the distolateral in *M. foresti*, whereas both spines are subequal in the other species.

Munida microps Alcock, 1894

Munida microps Baba, 1988: 84 (key), 122 (references and synonymies). — Macpherson, 1994: 496, fig. 32; 1995: 397; 1997: 608; 1999a: 421.

Material examined. — Saint Paul and New Amsterdam Islands: Cruise MD50, stn CP 113, 18.vii.1986, 38°55′52″S 77°38′12″E, 1065-1125 m: 1 ovigerous female, 15.0 mm.

Maldives area, John Murray Expedition, stn 138, 686-1170 m: 1 male, 12.3 mm (BM 1966.2.4.52).

Remarks. — The two specimens examined are quite similar, however, some minor differences are found (e.g., the antennal spines are longer in the specimen from Saint Paul and New Amsterdam Islands). The specimens examined also show several small differences with the material collected in other areas, e.g., the western Pacific, see Macpherson (1994). As was pointed out in this paper (see above), the comparison of the type material from the Andaman Sea with the specimens previously reported from different localities is strongly recommended in order to clarify the status of the various occurrences of this species (see also Macpherson, 1999a). The species is known from the Andaman Sea, Arabian Sea, Maldives Islands, Zanzibar, Sulawesi, southeastern Australia, the Philippines, New Caledonia, Chesterfield Islands, Wallis and Futuna Islands, and Vanuatu, between 495 and 1260 m.

Munida muscae n. sp. (fig. 2)

Material examined. — Reunion Island: Cruise MD32, stn CP 144, 04.ix.1982, 20°50.3′S 55°35.4′E, 605-620 m: 1 male, holotype, 5.0 mm (MNHN-Ga 4571) (with bopyrid parasite).

NW Madagascar: Cruise BENTHEDI, stn DR 08, 19.iii.1977, 11°29.2′S 47°18.2′E, 250 m: 1 male, 3.1 mm.

Etymology. — The name *muscae* refers to one of the southern hemisphere constellations (the Fly).

Distribution. — NW Madagascar, Reunion Island, 250-620 m.

Description. — Carapace slightly longer than wide. Transverse ridges mostly interrupted, with dense short, non-iridescent setae and few long iridiscent setae. Secondary striae almost absent in branchial regions. Intestinal region without scales. A row of 4 pairs of epigastric spines. One parahepatic, 1 branchial anterior, and 1 postcervical spine on each side.

Frontal margins slightly oblique. Lateral margins feebly convex. Anterolateral spine well developed not reaching level of sinus between rostrum and supraocular spines. Second marginal spine before cervical groove 1/5 size of preceding one. Branchial margins with 3 small spines.

Rostrum spiniform, half as long as remaining carapace, slightly sinuous and horizontal. Supraocular spines reaching midlength of rostrum and end of corneas, nearly subparallel, upwardly directed.

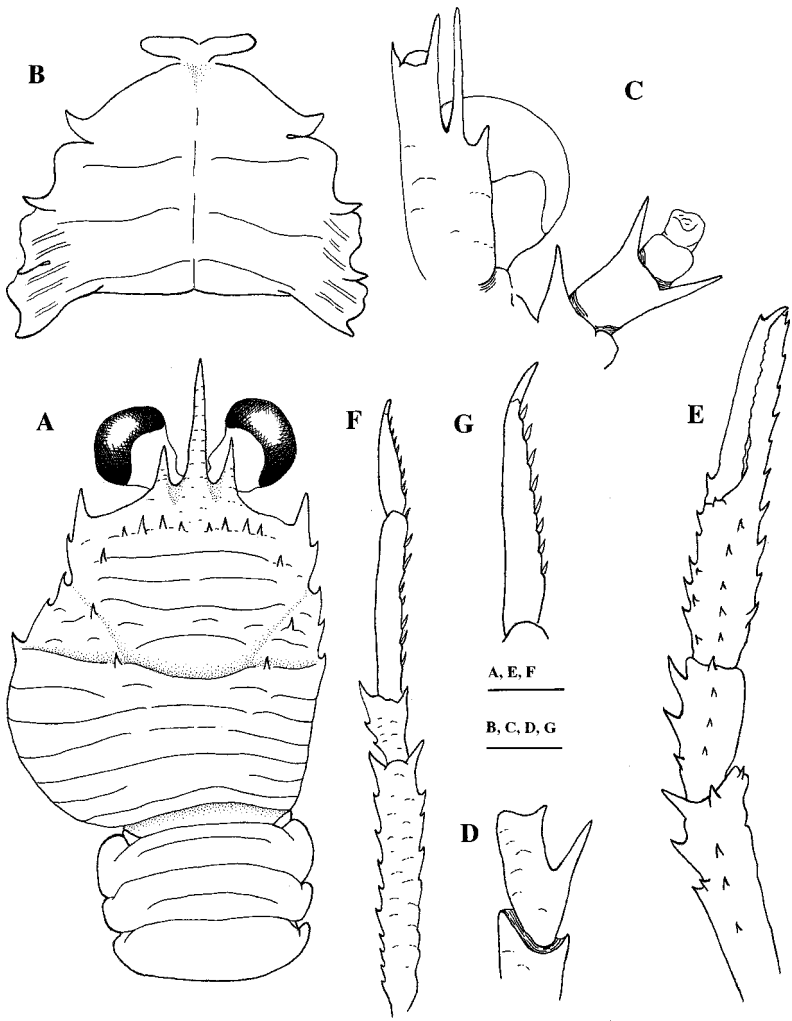

Fig. 2. *Munida muscae* n. sp., holotype, male, 5.0 mm. A, carapace and abdomen, dorsal view; B, sternal plastron; C, ventral view of cephalic region, showing antennular and antennal peduncles; D, merus of right third maxilliped, lateral view; E, right cheliped, dorsal view; F, right first walking leg, lateral view; G, dactylus of right first walking leg, lateral view. Scale bars: A, E, F, 2 mm; B, C, D, G, 1 mm. Setae of carapace, abdomen, and pereiopods not illustrated.

Thoracic sternites without striae; fifth to seventh sternites with distinct, short carinae on lateral surfaces. Anterior part of fourth sternite slightly narrower than third.

Abdominal tergites unarmed. Second and third tergites with 1 uninterrupted transverse stria, posterior one shorter.

Eyes large, maximum corneal width about 1/2 the distance between bases of anterolateral spines.

Basal segment of antennule (distal spines excluded) about 1/4 quarter carapace length, elongate, slightly exceeding corneas, with 2 distal spines, mesial spine shorter than lateral spine; 2 spines on lateral margin, proximal one short, located at midlength of segment, distal one long, slightly overreaching distolateral spine.

First segment of antennal peduncle with distomesial spine reaching end of second segment; second segment with 2 distal spines, mesial spine slightly longer than lateral spine, reaching end of antennal peduncle; third segment unarmed.

Ischium of third maxilliped about 1.5 times length of merus measured along dorsal margin, distoventrally bearing spine. Merus bearing 2 well developed spines on flexor margin, distal smaller; extensor margin unarmed.

Chelipeds feebly squamous. Palm slightly shorter than fingers. Merus armed with some spines, strongest spine on distal border, not overreaching proximal fourth of carpus. Carpus with several spines on dorsal side and several small spines scattered on mesial and ventral sides. Palm with several spines scattered on mesial and dorsal sides and one row of dorsolateral spines, continued onto fixed finger. Fingers distally curving and crossing when closed, ending in a sharp spine; movable finger with 1 spine near base and 1 spine near tip; fixed finger with additional spine distal to level of subterminal spine.

Second pereiopod twice carapace length; merus shorter than carapace, about 6.5 times as long as high, 3.5 times carpus length and 1.5 times as long as propodus; propodus 6.5 times as long as high, about 1.5 times dactylus length. Merus with 10-11 spines on dorsal border, increasing in size distally, ventral margin with 4 spines on distal half, terminal one strong. Carpus with 3 dorsal spines and 1 distoventral spine. Propodus with 7-8 movable ventral spines. Dactylus with dorsal margin slightly convex in proximal half, slightly curving distally, with 8-9 movable spinules along entire ventral margin. Third pereiopod similar to second; fourth pereiopod shorter than second and third. Merus of fourth pereiopod 2/3 length of second pereiopod.

Remarks. — *Munida muscae* belongs to the group of species having at most 4 spines on the lateral margins of the carapace behind the cervical groove, the lateral parts of the posterior thoracic sternites with carinae, the distolateral spine of the basal antennular segment longer than the distomesial spine, and the dactylus of the walking legs with movable spinules along the entire ventral border. The closest similar species is *Munida rufiantennulata* Baba, 1969, from Japan, the Philippines, Indonesia, Loyalty Islands, Mattew and Hunter Islands, Chesterfield Islands, and New Caledonia (Baba, 1969, 1988; Macpherson, 1994, 1997). However, they are easily distinguishable from each other by the armature of the second abdominal somite; it is unarmed in the new species but armed with 6-8 spines on the anterior transverse ridge in *M. rufiantennulata.*

Munida shaula n. sp. (fig. 3A-C, E-H)

Munida vigiliarum Tirmizi, 1966: 201, fig. 20 (not Alcock, 1901).
Munida kuboi Baba, 1990: 925 (key), 964 (not Yanagita, 1943).

Material examined. — Reunion Island: Cruise MD 32, stn FA 30, 16.viii.1982, 21°22.2′S 55°46′E, 460-470 m: 1 male, 9.5 mm. — Stn DC 58, 22.viii.1982, 21°03.3′S 55°09.7′E, 450 m: 1 female, 4.0 mm. — Stn CP 60, 22.viii.1982, 21°03.3′S 55°09.5′E, 460-490 m: 4 males, 6.8-11.5 mm; 2 ovigerous females, 8.6-9.8 mm; 1 female, 8.5 mm. — Stn DC 121, 01.ix.1982, 20°52.9′S 55°13.9′E, 290-340 m: 4 males, 4.5-9.7 mm; 3 females, 5.0-7.3 mm. — Stn DC 128, 02.ix.1982, 20°51.1′S 55°36.3′E, 280-340 m: 1 male, 9.2 mm. — Stn CP 130, 02.ix.1982, 20°51.2′S 55°36.8′E, 300-380 m: 1 male, 9.4 mm. — Stn DS 131, 02.ix.1982, 20°51.2′S 55°36.6′E, 345-375 m: 3 males, 7.4-9.4 mm; 1 female, 6.6 mm. — Stn DC 132, 02.ix.1982, 20°51.1′S 55°37.5′E, 510 m: 1 female, 11.0 mm. — Stn DS 178, 08.ix.1982, 412-460 m: 4 males, 5.4-9.2 mm; Stn DS 179, 08.ix.1982, 460-480 m: 3 males, 12.3-12.5 mm. — Stn CP 181, 09.ix.1982, 410 m: 1 male, holotype, 9.8 mm (MNHN-Ga 4573); 10 males, 6.7-12.6 mm; 8 ovigerous females, 6.2-9.5 mm; 1 female, 5.3 mm.

Zanzibar: John Murray Expedition, stn 107, 421-457 m, 1 male, 9.7 mm (BM 1966.2.4.80).

Etymology. — The name *shaula* refers to one of the stars from the southern hemisphere constellation Scorpius.

Distribution. — Reunion Island, Madagascar, and Zanzibar, 280-510 m.

Description. — Carapace longer than wide. Transverse ridges mostly interrupted, with dense very short, non-iridescent setae. Some secondary striae between main transverse striae. Intestinal region without striae. A row of 4 pairs of epigastric spines. One parahepatic and 1 postcervical spine on each side.

Frontal margins moderately oblique. Anterolateral spine well developed not reaching level of sinus between rostrum and supraocular spines. Second marginal spine before cervical groove about half size of preceding one. Branchial margins with 5 spines decreasing in size posteriorly.

Rostrum spiniform, half as long as remaining carapace, slightly sinuous and horizontal. Supraocular spines reaching midlength of rostrum and not overreaching end of corneas, slightly divergent, upwardly directed.

Fourth thoracic sternite with few short granulated striae; lateral surface of fifth to seventh sternites smooth. Anterior part of fourth sternite distinctly narrower than third. Transverse ridges on fifth, sixth, and seventh sternites obtuse, feebly granulated.

Second to third abdominal tergites each with uninterrupted anterior stria, those of second and third tergites with row of 7-9 and 3-4 spines, respectively.

Eyes large, maximum corneal diameter about 1/2 distance between bases of anterolateral spines.

Basal segment of antennule (distal spines excluded), about 1/4 carapace length, elongate, clearly overreaching corneas, with 2 distal spines, mesial spine shorter than lateral spine; 2 spines on lateral margin, proximal one short, located at midlength of segment, distal one long, not overreaching distolateral spine.

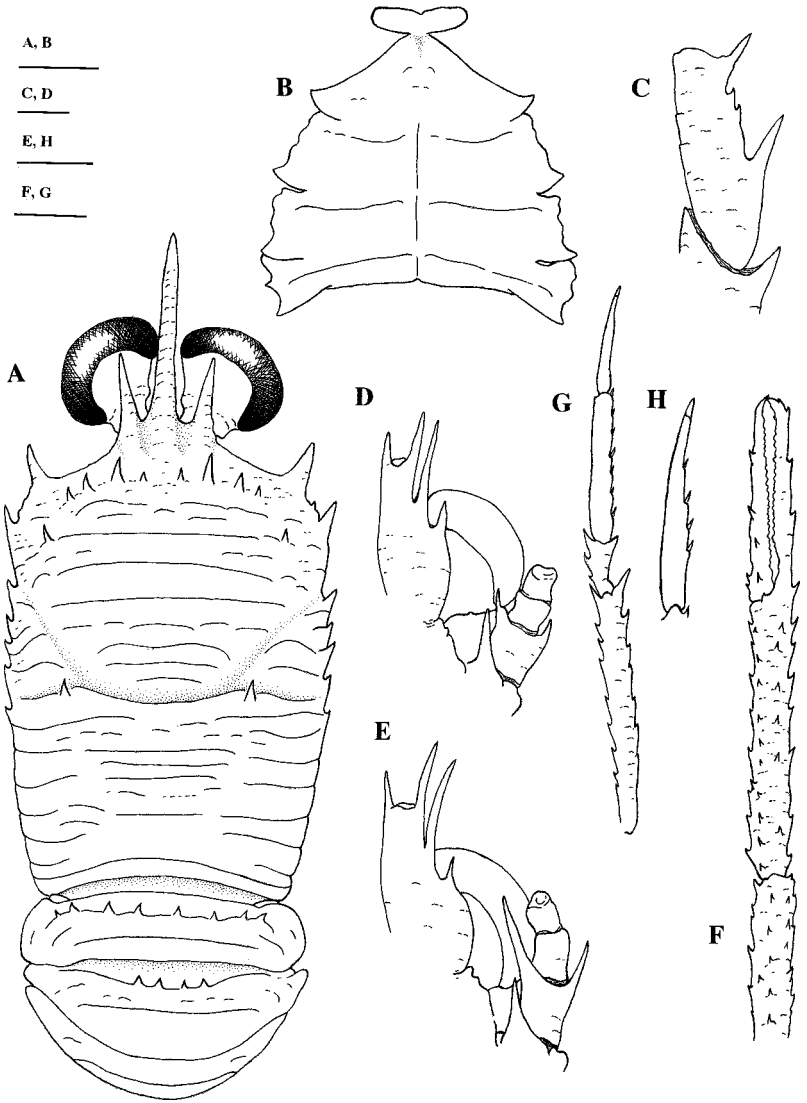

Fig. 3. A-C, E-H, *Munida shaula* n. sp., holotype, male, 9.8 mm. A, carapace and abdomen, dorsal view; B, sternal plastron; C, merus of right third maxilliped; E, ventral view of cephalic region, showing antennular and antennal peduncles; F, right cheliped, dorsal view of the palm and fingers; G, right first walking leg, lateral view; H, dactylus of right first walking leg, lateral view. D, *Munida kuboi* Yanagita, 1943, Philippines, MUSORSTOM 3 Cruise, stn 103, male, 9.6 mm, ventral view of cephalic region, showing antennular and antennal peduncles. Scale bars: A, B, 2 mm; C, D, 1 mm; E, H, 1 mm; F, G, 5 mm. Setae of carapace, abdomen, and pereiopods not illustrated.

First segment of antennal peduncle with distomesial spine reaching end of second segment; second segment with 2 distal spines, mesial spine clearly longer than lateral spine, reaching end of antennal peduncle.

Ischium of third maxilliped about 1.5 times length of merus measured along dorsal margin, distoventrally bearing spine. Merus bearing 2 well developed spines, interspersed with 2 spinules on flexor margin, distal smaller; extensor margin unarmed.

Chelipeds squamous. Palm 1.4 times as long as fingers. Merus armed with numerous small spines, strongest spine on distal border, not overreaching proximal quarter of carpus. Carpus with small spines on dorsal, mesial, and ventral sides. Palm with spines moderate in number, arranged roughly in 4 rows: 1 mesial, 2 dorsal, and 1 lateral, continuing onto fixed finger. Fingers distally curving and crossing, ending in sharp point; movable finger with 1-2 spines at base and a one row of dorsomesial spines; fixed finger with 2 subterminal spines.

Second pereiopod twice carapace length; merus shorter than carapace, about 9 times as long as high, about 4.5 times carpus length and 1.6 times as long as propodus; propodus 6.5 times as long as high, about 1.4 times dactylus length. Merus with 9-11 spines on dorsal border, increasing in size distally, ventral margin distally ending in strong spine preceded by some proximally diminishing spines. Carpus with 3-4 dorsal spines and 1 distoventral spine. Propodus with 7-9 movable ventral spines. Dactylus with dorsal margin slightly convex in proximal half, slightly curving distally, with 4-5 movable spinules along ventral margin, distal fourth unarmed. Third pereiopod similar to second; fourth pereiopod shorter than second and third. Merus of fourth pereiopod 2/3 length of second pereiopod.

Remarks. — *Munida shaula* belongs to the group of species having 5 spines on the lateral margins of the carapace behind the cervical groove, front margins moderately oblique, eyes large, second and third abdominal somites armed with spines along anterior ridge, lateral parts of posterior thoracic sternites without granules or carinae, rostrum spiniform, and the distomesial spine of the basal antennular segment shorter than the distolateral one.

Examination of the material reported under *M. kuboi* (cf. Baba, 1990) from Madagascar, discloses that it belongs to this new species. The specimen from the John Murray Expedition, identified as *M. vigiliarum* Alcock (originally described from the Bay of Bengal) by Tirmizi (1966) is similar to the material collected at Reunion Island and Madagascar. Although these species are relatively close to each other, *M. vigiliarum* is characterized by a subequal size of the two distal spines of the basal antennular segment (see Baba, 1988), whereas in the new species the distomesial spine is clearly shorter than the distolateral one. The new species is closely similar to *M. kuboi* Yanagita, 1943 from Japan and the Philippines (Baba, 1988; Macpherson, 1993). However, these species can be distinguished by the

distomesial spine of the second segment of the antennal peduncle: it is long and reaches the end of the antennal peduncle in *M. shaula*, whereas in *M. kuboi* this spine is clearly shorter, only reaching the end of the third segment (fig. 3D).

The new species is also close to *M. africana* Doflein & Balss, 1913 from Somalia and Zanzibar (Tirmizi, 1966; Macpherson, 1991). A comparison of the two species shows that they differ in several aspects: The front margins are clearly more oblique in *M. africana* than in the new species. The anterior border of the third abdominal tergite is unarmed in *M. africana*, whereas in *M. shaula* there are 3-4 spines. The eyes are larger in the new species than in *M. africana*. The maximum corneal diameter is about 1/2 the distance between the bases of the anterolateral spines in *M. shaula*, whereas in *M. africana* this ratio is 1/3.

Munida sphynx Macpherson & Baba, 1993

Munida japonica Tirmizi, 1966: 195, figs. 15-16. — Baba, 1990: 925 (key), 964 (part) (not Stimpson, 1858).

Munida sphynx Macpherson & Baba, 1993: 414, figs. 18-19.

Material examined. — Reunion Island: Cruise MD32, stn CP 57, 22.viii.1982, 21°04.5′S 55°11.0′E, 210-227 m: 12 males, 4.7-11.5 mm; 7 ovigerous females, 6.6-10.5 mm. — Stn CP 129, 02.ix.1982, 20°50.8′S 55°36.0′E, 290-300 m: 1 male, broken.

Zanzibar: John Murray Expedition, stn 106, 183-194 m, 2 males, 4.6-8.1 mm; 1 female, 6.4 mm (BM 1966.2.4.56/58).

Remarks. — The specimens examined agree quite well with the material from Madagascar (Macpherson & Baba, 1993). However, in some specimens the distal spines of the antennular basal segment are broken, lack of which character does not allow an easy identification. Additional material from Reunion and Zanzibar would be desirable in order to clarify the correct identification of these specimens.

Munida spicae n. sp. (fig. 4)

Material examined. — Crozet Islands: Cruise MD30, stn CP 128, 15.ii.1982, 46°23′S 49°09′E, 1025 m: 1 male, holotype, 15.0 mm (MNHN-Ga 4572); 12 males, 9.3-15.5 mm; 5 ovigerous females, 12.4-17.1 mm; 6 females, 13.0-17.0 mm.

Cruise MD08, stn CP 270, 18.iv.1976, 46°15′S 49°13′E, 500-562 m: 2 males, 14.2-19.4 mm.

Saint Paul and New Amsterdam Islands: Cruise MD50, stn CP 7, 09.vii.1986, 37°47.20′S 77°39.98′E, 940-1680 m: 2 ovigerous females, 6.6-8.0 mm. — Stn DC 49, 14.vii.1986, 37°45.52′S 77°28.58′E, 975-1250 m: 1 male, 10.9 mm; 2 ovigerous females, 9.6-10.4 mm. — Stn CP 50, 14.vii.1986, 37°45.67′S 77°29.03′E, 750-1050 m: 1 ovigerous female, 6.7 mm. — Stn DC 147, 20.vii.1986, 37°41′72″S 77°18′21″E, 1340-1430 m: 3 males, 3.2-5.7 mm; 1 ovigerous female, 6.2 mm. — Stn CP 178, 25.vii.1986, 37°56′52″S 77°34′23″E, 880-1275 m: 1 male, 6.8 mm.

Etymology. — The name *spicae* refers to one of the stars (Spica) from the southern hemisphere constellation Virgo.

Distribution. — Crozet and Saint Paul and New Amsterdam Islands, 500-1680 m.

Description. — Carapace longer than wide. Transverse ridges mostly interrupted, with dense very short, non-iridescent setae. Few scales or secondary striae between main transverse striae. Intestinal region without scales. A row of 3 pairs of epigastric spines. One or 2 small parahepatic and 1 branchial anterior spines on each side.

Frontal margins oblique. Lateral margins moderately convex. First spine well developed, clearly not exceeding level of sinus between rostrum and supraocular spines. Second marginal spine before cervical groove about 1/3 size of preceding one. Branchial margins with 5 spines decreasing in size posteriorly.

Rostrum spiniform, half as long as remaining carapace, slightly sinuous and horizontal. Supraocular spines reaching midlength of rostrum and overreaching end of corneas, slightly divergent, upwardly directed.

Fourth thoracic sternite without or with very few short granulated striae; lateral surface of fifth to seventh sternites smooth, without striae, granules, or carinae. Anterior part of fourth sternite clearly narrower than third.

Second abdominal tergite with one row of 6 spines on anterior border and 1 uninterrupted stria.

Eyes moderately large, maximum corneal width about 1/3 the distance between bases of anterolateral spines.

Basal segment of antennule (distal spines excluded), about 1/4 carapace length, elongate, clearly overreaching corneas, with 2 distal spines, mesial spine shorter than lateral spine; 2 spines on lateral margin, proximal one short, located at midlength of segment, distal one long, not overreaching distolateral spine; one small ventral spine at base of lateral spines.

First segment of antennal peduncle with distomesial spine reaching end of second segment; second segment with 2 distal spines, mesial spine slightly longer than lateral spine, not exceeding end of third segment; third segment with small distolateral spine.

Ischium of third maxilliped about 1.5 times length of merus measured along dorsal margin, bearing spine distoventrally. Merus bearing 2 well developed spines on flexor margin, distal smaller; extensor margin unarmed.

Chelipeds squamous. Palm as long as fingers. Merus armed with spines as figured, strongest spine on distal border, not overreaching proximal quarter of carpus. Carpus with spines visible in dorsal view, arranged roughly in 4 rows continued onto palm: 1 mesial, 1 lateral, 1 mid-dorsal, and 1 dorsal near mesial margin; ventrally with few spines. Palm with dorsolateral spines, continuing onto proximal half of fixed finger. Fingers distally curving and crossing, ending in a sharp point; movable finger with 1 row of dorsomesial spines along first half; fixed finger with 2 subterminal spines.

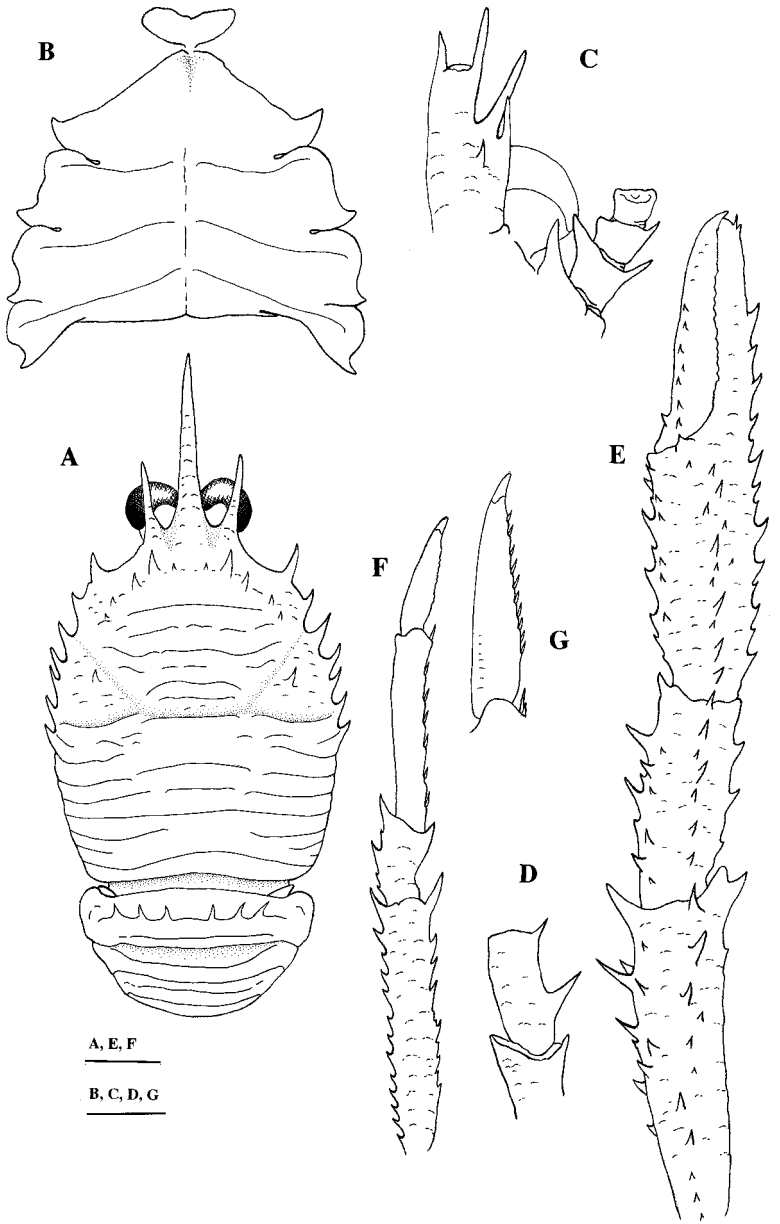

Fig. 4. *Munida spicae* n. sp., holotype, male, 15.0 mm. A, carapace and abdomen, dorsal view; B, sternal plastron; C, ventral view of cephalic region, showing antennular and antennal peduncles; D, right third maxilliped, lateral view; E, right cheliped, dorsal view of the palm and fingers; F, right first walking leg, lateral view; G, dactylus of right first walking leg, lateral view. Scale bars: A, E, F, 5 mm; B, C, D, G, 2 mm. Setae of carapace, abdomen, and pereiopods not illustrated.

Second pereiopod twice carapace length; merus shorter than carapace, about 5 times as long as high, about 3 times carpus length and 1.4 times as long as propodus; propodus 5 times as long as high, about 1.5 times dactylus length. Merus with 10-14 spines on dorsal border, increasing in size distally, ventral margin with row of spines on distal 2/3, distalmost 4 strong. Carpus with 4-5 dorsal spines and 1 distoventral spine. Propodus with 7-10 movable ventral spines. Dactylus with dorsal margin slightly convex on proximal half, slightly curving distally, with 9-10 movable spinules along entire ventral margin. Third pereiopod similar to second; fourth pereiopod shorter than second and third. Merus of fourth pereiopod 2/3 length of second pereiopod.

Variation. — In several specimens the spines of the cheliped fixed finger are present along the whole length of the lateral border, whereas in the holotype these spines are restricted to the proximal 2/3. These spines are acute tubercles in the small specimens. Furthermore, the specimens from Saint Paul and New Amsterdam have the chelipeds longer and more slender than the specimens from Crozet Islands. These differences are considered here as variation.

Remarks. — *Munida spicae* belongs to the group of species having 5 spines on the lateral margins of the carapace behind the cervical groove, front margins oblique, eyes moderately large, second abdominal somites armed with spines along anterior ridge, lateral parts of posterior thoracic sternites without granules or carinae, the rostrum spiniform, the distolateral spine of the basal antennular segment longer than the distomesial, and the dactyli of the walking legs bearing movable spinules along their entire ventral border. The new species is closely similar to *M. africana* Balss, 1913, from southern Somalia and Zanzibar (Doflein & Balss, 1913; Tirmizi, 1966; Macpherson, 1991). However, these species can be distinguished by the following differences: The lateral borders of the carapace are clearly more convex in the new species than in *M. africana.* The distomesial spine of the second segment of the antennal peduncle is long and overreaches the antennal peduncle in *M. africana*, whereas in the new species this spine is very short, only reaching the end of the second segment. The walking legs are clearly more slender in *M. africana* than in *M. spicae.* The merus and propodus are about 10 and 7.5 times as long as high, respectively, in *M. africana* (cf. Macpherson, 1991), whereas in the new species this is 5 and 5 times, respectively.

KEY TO THE SPECIES OF *MUNIDA* FROM THE WESTERN AND SOUTHERN INDIAN OCEAN

1. Three or four spines on lateral margins of carapace behind cervical groove 2
– Five spines on lateral margins of carapace behind cervical groove 5
2. Lateral parts of fifth to seventh thoracic sternites with distinct carinae ..... *M. muscae* n. sp.
– Lateral parts of fifth to seventh thoracic sternites without distinct carinae 3

3. Lateral parts of posterior thoracic sternites with granules ..... *M. barbeti*
– Lateral parts of posterior thoracic sternites without granules 4
4. Abdominal tergites unarmed ..... *M. brucei*
– Second abdominal tergite with spines on anterior border ..... *M. nesiotes*
5. Lateral parts of seventh thoracic sternites with small granules ..... *M. limula*
– Lateral parts of seventh thoracic sternites without small granules 6
6. Abdominal tergites unarmed 7
– Second abdominal tergite with spines 11
7. Eyes small, corneas barely wider than eyestalk. Maximum corneal diameter less than 1/4 distance between bases of anterolateral spines ..... *M. comorina*
– Eyes large, corneas dilated. Maximum corneal diameter equal to or greater than 1/4 distance between bases of anterolateral spines 8
8. Distomesial spine of basal antennular segment longer than distolateral ..... *M. foresti* n. sp.
– Distal spines of basal antennular segment subequal 9
9. Third segment of antennal peduncle unarmed ..... *M. roshanei*
– Third segment of antennal peduncle with distolateral spine 10
10. Fingers of chelipeds shorter than palm ..... *M. arabica*
– Fingers of chelipeds longer than palm ..... *M. janetae*
11. Fourth abdominal tergite with spines on anterior border ..... *M. babai*
– Fourth abdominal tergite unarmed 12
12. Second and third abdominal tergites with spines on anterior border ..... *M. shaula* n. sp.
– Spines only on second abdominal tergite 13
13. Extensor margin of merus of third maxilliped with distal spine 14
– Extensor margin of merus of third maxilliped unarmed 16
14. Distomesial spine of basal antennular segment clearly shorter than distolateral ..... *M. dispar*
– Distal spines of basal antennular segment subequal 15
15. Fourth to seventh thoracic sternites with numerous striae. Distomesial spine of basal antennal segment overreaching antennal peduncle ..... *M. eudora*
– Fourth to seventh thoracic sternites with few striae. Distomesial spine of basal antennal segment not reaching end of antennal peduncle ..... *M. sphynx*
16. Front margins oblique 17
– Front margins transverse 18
17. Distomesial spine on second antennal segment overreaching antennal peduncle. Lateral margins of carapace straight ..... *M. africana*
– Distomesial spine on second antennal segment not overreaching antennal peduncle. Lateral margins of carapace moderately convex ..... *M. spicae* n. sp.
18. Dactylus of walking legs short and stout, about half propodus length ..... *M. insularis*
– Dactylus of walking legs long and slender, as long as or slightly shorter than propodus 19
19. Distomesial spine of basal antennal segment reaching end of second segment. Eyes moderately large, corneas wider than eyestalk. Maximum corneal diameter about 1/3 distance between bases of anterolateral spines 20
– Distomesial spine of basal antennal segment not reaching end of second segment. Eyes small, corneas barely wider than eyestalk. Maximum corneal diameter less than 1/4 distance between bases of anterolateral spines 22
20. Dactylus of walking legs unarmed on distal part of ventral margin ..... *M. dissita*
– Dactylus of walking legs with spines along entire ventral margin 21
21. Movable finger of chelipeds with several spines along lateral border. Merus of first walking leg 3 times carpus length ..... *M. benguela*
– Movable finger of chelipeds with only one basal spine on lateral border. Merus of first walking leg 5 times carpus length ..... *M. rubiesi*
22. Fixed finger of chelipeds unarmed on proximal half of mesial border ..... *M. remota*
– Fixed finger of chelipeds with strong spine on proximal half of mesial border ..... *M. microps*

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