



Monograph

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New sibling species and new occurrences of squat lobsters (Crustacea, Decapoda) from the western Indian Ocean

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Abstract. Numerous specimens of squat lobsters belonging to the families Munididae, Munidopsidae and Eumunididae were collected during several cruises along the eastern coasts of Africa. The study of these specimens revealed the presence of 10 new species (one *Eumunida* Smith, 1883, eight *Munida* Leach, 1820 and one *Munidopsis* Whiteaves, 1874). We describe and illustrate these new species, providing some new data on occurrences and colour patterns for previously described taxa. We have also included molecular data from two mitochondrial markers (16S rRNA and COI) to support the taxonomic status of different species. Some deep-sea species show a clear increase in their geographic range distribution. Finally, a key to known species of the genus *Munida* from the western and central Indian Ocean is also presented.

Keywords. Eumunididae, Munididae, Munidopsidae, COI, 16S.

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Introduction

The western Indian Ocean is considered one of the “hot spots” in marine biodiversity of the world (Myers *et al.* 2000). Numerous authors, from the Red Sea to South Africa and Madagascar, have studied the crustacean decapods of the area demonstrating the existence of a very rich fauna (Barnard 1950; Crosnier 1978; Ng & Kumar 2015), with a high proportion of endemic species (Spiridonov & Apel 2007; DiBattista *et al.* 2016). Among these decapods, the squat lobsters (Chirostyloidea and Galattheoidea) are

considered one of the most diverse groups and they have received an increasing attention in the last decades (Baba *et al.* 2008; Poore & Andreakis 2014; Macpherson & Robainas-Barcia 2015).

The different families of squat lobsters are well represented in the western Indian Ocean (Schnabel *et al.* 2011). Among these families, Eumunididae A. Milne-Edwards & Bouvier, 1900, Munididae Ah Yong *et al.*, 2010 and Munidopsidae Ortmann, 1898, are represented by more than 150 species, mostly belonging to the genera *Eumunida* Smith, 1883, *Munida* Leach, 1820 and *Munidopsis* Whiteaves, 1874, respectively (e.g., Macpherson 2007; Baba *et al.* 2008). In this area the studies on this group of organisms have been numerous since Alcock (1894, 1901) and Alcock & Anderson (1899) published their reports from the expeditions carried out by the R/V “Investigator”. Balss (1913) and Doflein & Balss (1913) described and reported several species from the east coast of Somalia and the Red Sea, whereas Laurie (1926) and Barnard (1950) reported species from Providence and Mauritius, and South Africa and Mozambique, respectively. Tirmizi (1966) studied the material collected during the John Murray Expedition along the eastern coast of Africa, and Lewinsohn (1969) cited numerous species from the Red Sea. More recently, studies carried out along different zones of the eastern coast of Africa, e.g., Baba (1990), Tirmizi & Javed (1993), Macpherson & de Saint Laurent (2002) and Ah Yong (2014), have confirmed the existence of a rich squat lobster fauna.

In this paper, we studied numerous representatives of the families Eumunididae, Munididae and Munidopsidae collected during several expeditions carried out in Madagascar and Mozambique by the Muséum national d’Histoire naturelle, Paris (MNHN), and along the eastern coast of Africa by the P.P. Shirshov Institute of Oceanology of the Russian Academy of Sciences (IOR) between 1960 and 2010. Some of these specimens have been considered as belonging to new species. Here we describe and illustrate these new species and provide some new occurrences for previously described taxa. We have also included molecular data from two mitochondrial markers (16S rRNA and COI) to support the taxonomic status of the species. Finally, a key to known species of the genus *Munida* from the western and central Indian Ocean is also presented.

Material and methods

Sampling and identification

Specimens were collected using beam trawls or Warén dredges in expeditions to the southwestern Indian Ocean in MNHN cruises: 1976 (MD08), 1977 (BENTHEDI), 2009 (MIRIKY and MAINBAZA) and 2010 (ATIMO VATAE), and the western Indian Ocean in Shirshov cruises: 1960, 1967, 1988 and 1989 (R/V Vitiaz) and 1983 (R/V Akademik Kurchatov). The types of the new species and all other specimens are deposited in the collections of MNHN and the Zoological Museum, Moscow State University, Moscow (ZMM). The terminology and measurements used follow Baba *et al.* (2009). The size of the specimens is indicated by the postorbital carapace length, measured along the midline from the base of the rostrum to the posterior margin of the carapace. The rostrum is measured from its base (situated at the level of the orbit) to the distal tip. Measurements of appendages are taken in dorsal (pereopod 1), lateral (antennule, pereopods 2–4) and ventral (antenna) midlines. Ranges of morphological and meristic variations are included in the description. Abbreviations used are: Mxp3 = maxilliped 3; P1, pereopod 1; P2–4, pereopods 2–4; M = male; F = female; ov. = ovigerous.

Molecular analysis

Tissue usually from one pereopod was used to extract genomic DNA with the DNeasy (Qiagen) kit following the manufacturer’s protocol, but digesting the sample during 18–24 hours and employing RNase. Partial sequences from the mitochondrial cytochrome oxidase subunit I (COI) and 16S rRNA (16S) were amplified by polymerase chain reaction (PCR) using the following primers: LCO1490 (Folmer *et al.* 1994), COI-H (Machordom *et al.* 2003), and 16SAR and 16SBR (Palumbi *et al.* 2002),

Table 1. Specimens studied for mitochondrial DNA sequences (COI and 16S), including MNHN registration codes, expedition, station, and GenBank accession numbers.

MNHN Code	Species	COI	16S	Expedition	Station	GenBank accession no.
IU-2014-13478	<i>Munida austrina</i> sp. nov.	X		Mainbaza	CC3175	KY230448
IU-2008-10231	<i>Munida benguela</i>	X		Mainbaza	CP3138	KY230449
IU-2008-10232	<i>Munida benguela</i>	X		Mainbaza	CC3165	KY230450
IU-2008-10220	<i>Munida benguela</i>	X		Mainbaza	CP3135	KY230451
IU-2014-10800	<i>Munida benguela</i>	X	X	Benguela 5	55	KY230452-KY230467
IU-2014-10801	<i>Munida benguela</i>	X	X	Benguela 5	55	KY230453-KY230468
IU-2014-13698	<i>Munida euripa</i> sp. nov.	X	X	Atimo Vatae	CP3584	KY230454-KY230469
IU-2008-10216	<i>Munida hoda</i> sp. nov.	X		Mainbaza	CC3166	KY230455
IU-2008-10214	<i>Munida mesembria</i> sp. nov.	X		Mainbaza	CP3130	KY230456-KY230470
IU-2008-10218	<i>Munida mesembria</i> sp. nov.	X		Mainbaza	CP3131	KY230458
IU-2008-10225	<i>Munida mesembria</i> sp. nov.	X		Mainbaza	CP3144	KY230459
IU-2008-10219	<i>Munida mesembria</i> sp. nov.	X	X	Mainbaza	CC3151	KY230457-KY230471
IU-2008-10224	<i>Munida nesiotes</i>	X		Mainbaza	CP3143	KY230460
IU-2014-13699	<i>Munida remota</i>		X	Atimo Vatae	CP3595	KY230472
IU-2008-10217	<i>Munida shaula</i>	X	X	Mainbaza	CC3151	KY230461
IU-2008-10215	<i>Munida shaula</i>	X		Mainbaza	CC3152	KY230462
IU-2014-13615	<i>Munida shaula</i>	X	X	Miriky	CP3241	KY230463-KY230473
IU-2014-13545	<i>Munida shaula</i>	X	X	Miriky	CP3248	KY230464-KY230474
IU-2014-13473	<i>Munida stomifera</i> sp. nov.		X	Atimo Vatae	DW3525	KY230475
IU-2008-10221	<i>Munida tetracantha</i> sp. nov.	X		Mainbaza	CP3131	KY230465
IU-2014-13816	<i>Eumunida minor</i>	X		Atimo Vatae	DW3553	KY230466

respectively. The amplified fragments were purified using ExoSAP-IT (Affymetrix) prior to sequencing both strands using BigDye Terminator in an ABI 3730 genetic analyzer in the SECUGEN service. Forward and reverse DNA sequences obtained for each specimen were checked and assembled using the program Sequencher 4.8 (Gene Code Corporation) and aligned using MAFFT (Katoh *et al.* 2002) with a posterior correction in the Se-Al alignment editor (<http://tree.bio.ed.ac.uk/software/seal/>).

To compare different pairs of species, uncorrected divergences (p) were calculated in PAUP (Swofford 2002).

Results

The new species can be identified on the basis of constant morphological differences. We provide molecular data for most new species, although we failed in the amplification of several species, e.g., *Eumunida spiridonovi* sp. nov. and *Munida cristulata* sp. nov., since material was preserved in formalin. We have also provided molecular data (16S rRNA and/or COI) for some known species from the area included in Table 1 (e.g., *M. benguela* de Saint Laurent & Macpherson, 1988, *M. nesiotes* Macpherson, 1999, *M. remota* Baba, 1990, *M. shaula* Macpherson & de Saint Laurent, 2002, *Eumunida minor* de Saint Laurent & Macpherson, 1990).

We have not provided the divergence values among all pairs of closely related species because in the genus *Munida* the amount of molecular data is still scarce (excluding the present paper, the sequences of only 65 species are available). Nevertheless, when the molecular data from a new species and its morphological closest relative are available, we have included the divergence values in the Remarks.

Systematic account

Superfamily Chirostyloidea Ortmann, 1892
Family Eumunidae A. Milne-Edwards & Bouvier, 1900
Genus *Eumunida* Smith, 1883

Eumunida spiridonovi sp. nov.

urn:lsid:zoobank.org:act:F35484E7-1218-4FF5-AACE-8E2085E35C85

Fig. 1

Etymology

Named for Vassily Spiridonov, for his friendship and for making available this interesting material for study.

Type material

Holotype

WEST INDIAN OCEAN: ♀, 11.0 mm, E of Somalia, R/V Akademik Karchatov, Cruise 36, Stn 3781, 1°01.9' N, 56°33.6' E, 1170–1300 m, 5 May 1983 (MNHN-IU-2016-8715).

Paratypes

WEST INDIAN OCEAN: 1 ♂, 15.2 mm, E of Somalia, R/V Akademik Karchatov, Cruise 36, Stn 3779, 1°06.5' N, 56°28.7' E, 1280–1380 m, 4 May 1983 (MNHN-IU-2016-8714); 3 ♂♂, 8.5–11.9 mm, same data as for holotype (ZMM).

Description

CARAPACE. Slightly wider than long, exclusive of rostrum. Gastric region well defined, moderately convex; 3 small hepatic spines on each side, first spine near base of outer supraocular spine, larger than other two. Cervical groove and its posterior branch distinctly marked; without grooves separating cardiac and branchial areas. Dorsal surface as illustrated; anterior half without ridges, with weak and minute setose scales; posterior half (cardiac and posterior branchial areas) without transverse ridges, with some setose scales and numerous short setae. Lateral margins convex, armed with 9 spines, one strong anterolateral spine, followed by 1 minute spine at base, 2 spines anterior to posterior branch of cervical groove, and 5 spines decreasing in size posteriorly; greatest width measured between penultimate lateral spines; first spine well developed, subequal to third spine, and reaching sinus between supraocular spines. Distal spine in pterygostomian area. Rostrum sharply spiniform, about one-half of remaining carapace; inner supraocular spine terminating in two-thirds of length of rostrum, longer than outer supraocular.

STERNUM. Sternal plastron medially concave; anterior margin of sternite 3 with 2 median blunt processes; sternite 4 unarmed, granulated, with setiferous transverse ridges.

ABDOMEN. Second abdominal segment as illustrated; with 3 transverse ridges, and some short striae.

EYES. Short, cornea moderately dilated, exceeding end of outer supraocular spine.

ANTENNA. Article 1 with one short distolateral spine, distolateral spine of article 2 strong, not reaching mid-length of scaphocerite, article 3 with long distal spine, nearly reaching end of article 5; article 4 with strong dorsomesial spine reaching midlength of article 5, one short distolateral spine; article 5 with 3 strong spines distally (dorsal, mesial and lateral); scaphocerite spiniform, slender, exceeding base of article 5. Article 4 1.5 times length of article 2, and more than twice as long as broad.

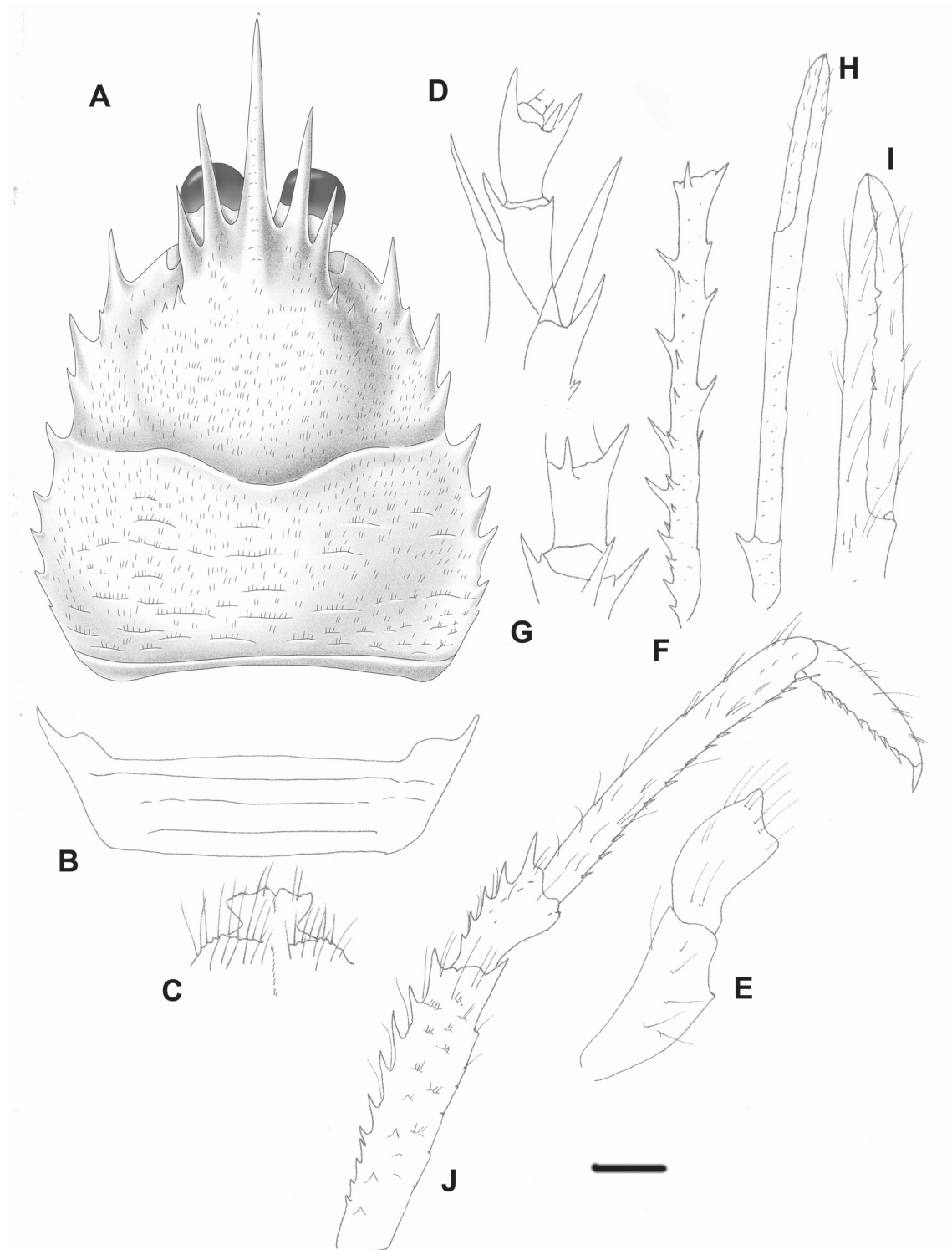


Fig. 1. *Eumunida spiridonovi* sp. nov., holotype, ♀, 11.0 mm (MNHN-IU-2016-8715), East of Somalia. **A.** Carapace, dorsal view. **B.** Abdomen, dorsal view. **C.** Sternal plastron, sternites 3 and 4. **D.** Left antenna and antennula, ventral view. **E.** Right Mxp3. **F.** Right P1 merus, dorsal view. **G.** Right P1 carpus and distal part of merus, ventral view. **H.** Right P1 palm and fingers, dorsal view. **I.** Right P1 distal part of palm and fingers, ventral view. **J.** Right P2. Scale bar: A–C, G, I–J = 2.0 mm; D–E = 1 mm; F, H = 0.5 mm.

Mxp3. Merus of third maxilliped with minute spine on extensor and flexor margin; ischium with crista dentata with 8–9 denticles.

P1. Subcylindrical, 4.6–4.8 times as long as carapace, excluding rostrum. Ischium with moderate-sized ventral spine; merus squamate, slightly more than twice carapace length, armed with 3 rows of spines (dorsolateral, dorsal, and dorsomesial, 1 additional ventral row of small spines in largest specimen); dorsomesial row composed of large and small spines regularly alternated. Carpus squamate, with 2 distal spines (3 spines in left P1 of holotype). Palm 1.5–1.7 times length of finger, slender, with few long uniramous setae, unarmed; without pad on ventral surface of palm. Fingers not gapping, furnished with relatively long coarse setae; opposable margins as illustrated.

P2–4. Similar, squamate, sparsely furnished with long coarse setae. P2 merus 1.1–1.2 times as long as propodus, with spines of different size on extensor margin, one strong distal spine on extensor and flexor borders; carpus with some acute spines on extensor border, ultimate largest; propodus smooth on extensor margin, armed with 10–12 spinelets along flexor border, and one distal fixed spine; dactylus half propodus length, with 8–10 movable spinules along flexor border. P3 similar to P2, but merus slightly shorter, and propodus similar in length. P4 merus 4.5 times as long as high, slightly shorter than propodus, armed with some spines in middle of dorsolateral face; propodus 9 times as long as high, with 12 spinules along flexor margin; dactylus 0.5 propodus length, with 8–9 spinules along flexor margin.

GENETIC DATA. Not available.

Remarks

The closest relative is *E. debilistriata* Baba, 1977, from the Midway Islands. Both species have the dorsal carapace surface feebly striated, the anterior margin of the thoracic sternite 4 unarmed, and without a ventral pad on the P1 palm. However, the new species is readily distinguishable from *E. debilistriata* by the armature of the P1 carpus (with numerous spines in *E. debilistriata* and only 2–3 in the new species) and palm (with numerous mesial spines in *E. debilistriata* and unarmed in the new species). Furthermore, the extensor margin of the P2 propodus has some spines in *E. debilistriata*, whereas these spines are absent in *E. spiridonovi* sp. nov.

Distribution

Western Indian Ocean, east of Somalia, between 1170 and 1380 m.

Family Munididae Ah Yong, Baba, Macpherson & Poore, 2010

Genus *Munida* Leach, 1820

Munida austrina sp. nov.

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Fig. 2

Etymology

From the Latin, *auster*, south, in relation to area of species distribution.

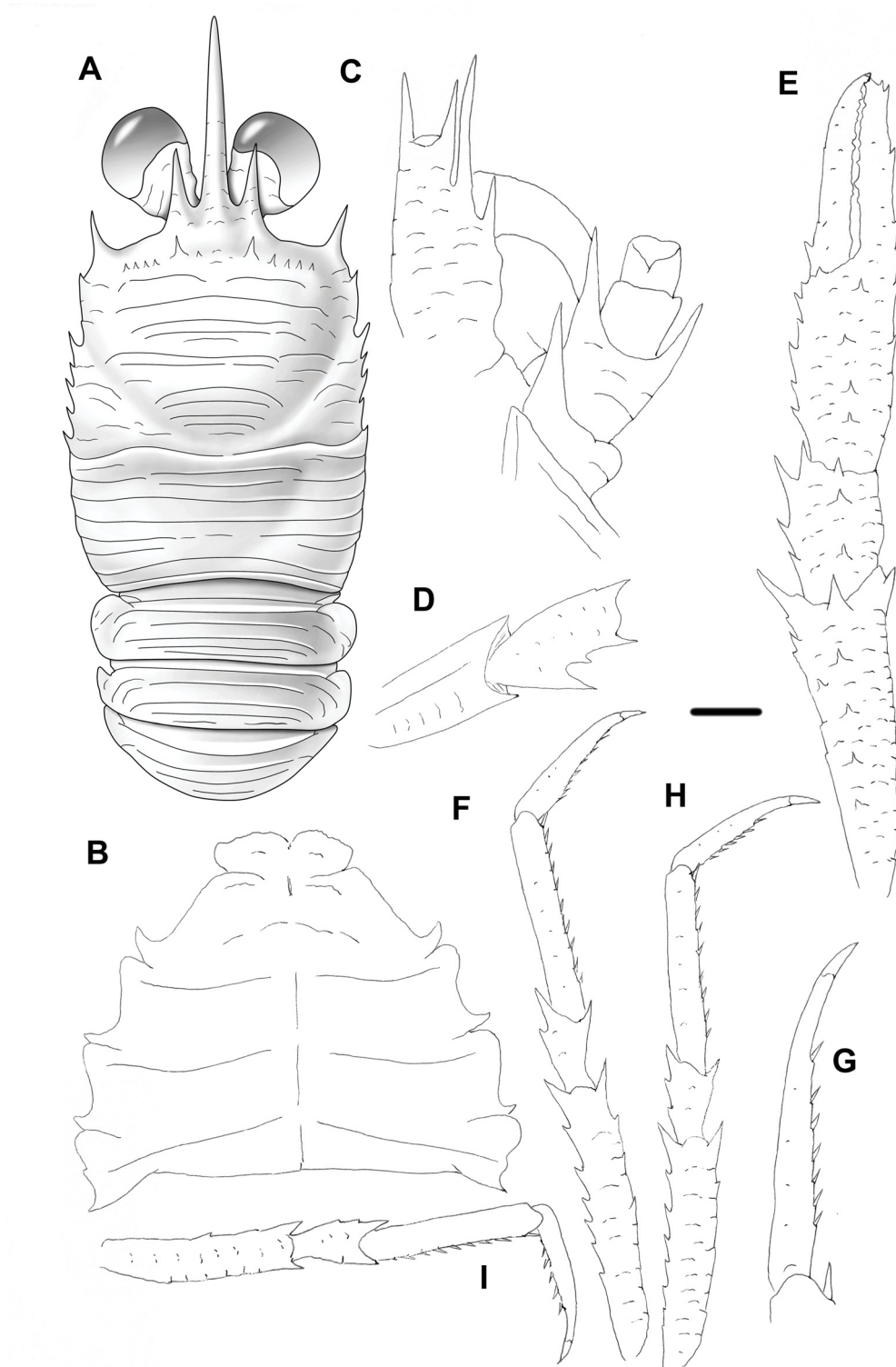


Fig. 2. *Munida austrina* sp. nov., holotype, ♀, 4.6 mm (MNHN-IU-2014-13478), Mozambique. **A.** Carapace and abdomen, dorsal view. **B.** Sternal plastron. **C.** Cephalic region, showing antennular and antennal peduncles, ventral view. **D.** Right Mxp3, lateral view. **E.** Right P1, dorsal view. **F.** Right P2, lateral view. **G.** Dactylus of right P2, lateral view. **H.** Right P3, lateral view. **I.** Right P4, lateral view. Scale bar: A, E–F, H–I = 1.0 mm; B–D, G = 0.5 mm.

Type material

Holotype

MOZAMBIQUE: ♀, 4.6 mm, MAINBAZA, Stn CC3175, 25°32.70' S, 33°12.09' E, 155–165 m, 17 Apr. 2009 (MNHN-IU-2014-13478).

Paratype

MOZAMBIQUE: 1 ♂, 7.0 mm, 7 ♀♀ 3.0–8.1 mm, MAINBAZA, Stn CC3175, 25°32.70' S, 33°12.09' E, 155–165 m, 17 Apr. 2009 (MNHN-IU-2014-13504).

Description

CARAPACE. 1.2 times as long as broad, with some secondary ridges between main transverse ridges. Dorsal ridges with dense short non-iridescent setae and few scattered long iridescent and non-plumose setae. Gastric region with 5–6 pairs of epigastric spines, longest pair behind supraocular spines. One small parahepatic, one postcervical and one branchial dorsal spines on each side. Frontal margins transverse. Lateral margins slightly convex. First lateral spine at anterolateral angle, long, barely reaching level of sinus between rostrum and supraocular spines; one small spine in front of anterior branch of cervical groove; end of anterior branch of cervical groove with tuft of iridescent setae. Branchial margins with five spines. Rostrum spiniform, about 0.6 times length of remaining carapace, horizontal, dorsally carinated. Supraocular spines reaching midlength of rostrum and not reaching end of corneae, subparallel and slightly upwards directed.

STERNUM. Surface of thoracic sternites smooth, with a few short striae on sternites 3 and 4; distal margin of sternite 4 transverse, broadly contiguous to sternite 3.

ABDOMEN. Anterior ridge of somite 2 unarmed; somites 2–5 each with 3–4 transverse ridges on tergite behind anterior ridge; posteromedian margin of somite 6 straight.

EYES. Ocular peduncles as long as broad, maximum corneal diameter 0.5 distance between bases of anterolateral spines.

ANTENNULE. Article 1 with 2 well-developed distal spines, distomesial spine slightly longer than distolateral; two lateral spines, distal much longer than proximal and exceeding distomesial spine.

ANTENNA. Article 1 with strong distomesial spine barely exceeding distal margin of article 2. Article 2 with distomesial spine reaching end of antennal peduncle; distolateral spine reaching end of article 3, minute spine at mid-length mesially. Article 3 unarmed.

MXP3. Ischium with small distal spine on flexor margin. Merus shorter than ischium; flexor margin with 2–3 spines, proximal spine stronger than others; extensor margin with distal spine. Carpus unarmed.

P1. 2.3 times carapace length, with some long iridescent and plumose setae along mesial margins of articles. Merus 0.9 length of carapace, 2.2 times as long as carpus, with some dorsal spines; distal spines strong, distomesial spine not reaching proximal third of carpus. Carpus 0.7–0.8 length of palm, 1.5 times as long as broad, with spines along mesial and dorsal sides. Palm 1.9 times as long as broad, with row of small dorsal spines; few spines along lateral margin continuing with 4–5 spines along lateral margin of fixed finger; one mesial row of spines. Movable finger with proximal spine only. Fingers slightly longer than palm.

P2–4. Moderately long and slender, with numerous plumose and iridescent setae along extensor margin of articles. P2 2.0–2.1 times carapace length. Meri shorter posteriorly (P3 merus 0.8 length of P2 merus, P4 merus 0.8 length of P3 merus); P2 merus 0.7 length of carapace, 6 times as long as broad, 1.5 times

as long as P2 propodus; P3 merus 5 times as long as broad, 1.2 times as long as P3 propodus; P4 merus 4.5 times as long as broad, 1.2 times length of P4 propodus. Extensor margins of P2–3 meri with row of 7–8 proximally diminishing spines, and 1–2 spines on P4; flexor margins distally with some spines followed proximally by several eminences; lateral sides unarmed. Carpi with 2–3 spines on extensor margin of P2–4; lateral surface with several granules sub-parallel to extensor margin on P2–4; flexor margin with distal spine. Propodi 6.0–6.5 (P2–3)–5.5 (P4) times as long as broad; extensor margin unarmed; flexor margin with 9–10 slender movable spines on P2–4. Dactyli slender, length 0.8–0.9 that of propodi; flexor margin with 5–7 movable spinules, distal third unarmed, without a spinule at the base of the unguis; P2 dactylus 8 times as long as wide.

GENETIC DATA. COI, see Table 1.

Remarks

Munida austrina sp. nov. belongs to the group of species having five spines on the branchial lateral margins of the carapace, thoracic sternites without granules, large eyes, and the anterior ridge of the second abdominal somite unarmed. The new species is closely related to *M. mesembria* sp. nov. (see below under the remarks of that species). However, the minimum divergence for COI found was in respect to *M. notata* Macpherson, 1994, from New Caledonia and adjacent waters (9.1%). *Munida austrina* sp. nov. and *M. notata* differ in the following aspects:

- The distomesial spine of the antennal article 1 barely exceeds the antennal article 2 in *M. austrina* sp. nov., whereas this spine clearly overreaches the antennal article 3 in *M. notata*. The distomesial spine of the antennal article 2 clearly exceeds the antennal peduncle in *M. notata*, whereas this spine reaches the end of the antennal peduncle in the new species.
- The movable finger of P1 has a proximal spine only in *M. austrina* sp. nov., instead of a row of spines along the mesial margin in *M. notata*.

Distribution

Mozambique, between 155 and 165 m.

Munida cristulata sp. nov.

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Fig. 3

Etymology

From the Latin, *crista*, comb, in relation to the lateral carinae on the sternites.

Type material

Holotype

FRANCE: ♂, 6.1 mm, Glorieuses Islands, N of Mayotte Island, BENTHEDI, Stn F68, 12°29.7' S, 45°02.3' E, 400–460 m, 30 Mar. 1977 (MNHN-IU-2014-13480).

Paratypes

FRANCE: 2 ♂♂, 4.3–5.2 mm, Glorieuses Islands, N of Mayotte Island, BENTHEDI, Stn F49, 12°54.6' S, 44°56.8' E, 300–450 m, 28 Mar. 1977 (MNHN-IU-2014-13481).

Description

CARAPACE. 1.3 times as long as broad, without secondary ridges between main transverse ridges. Dorsal ridges with dense short non-iridescent setae and few scattered long iridescent and non-plumose setae.

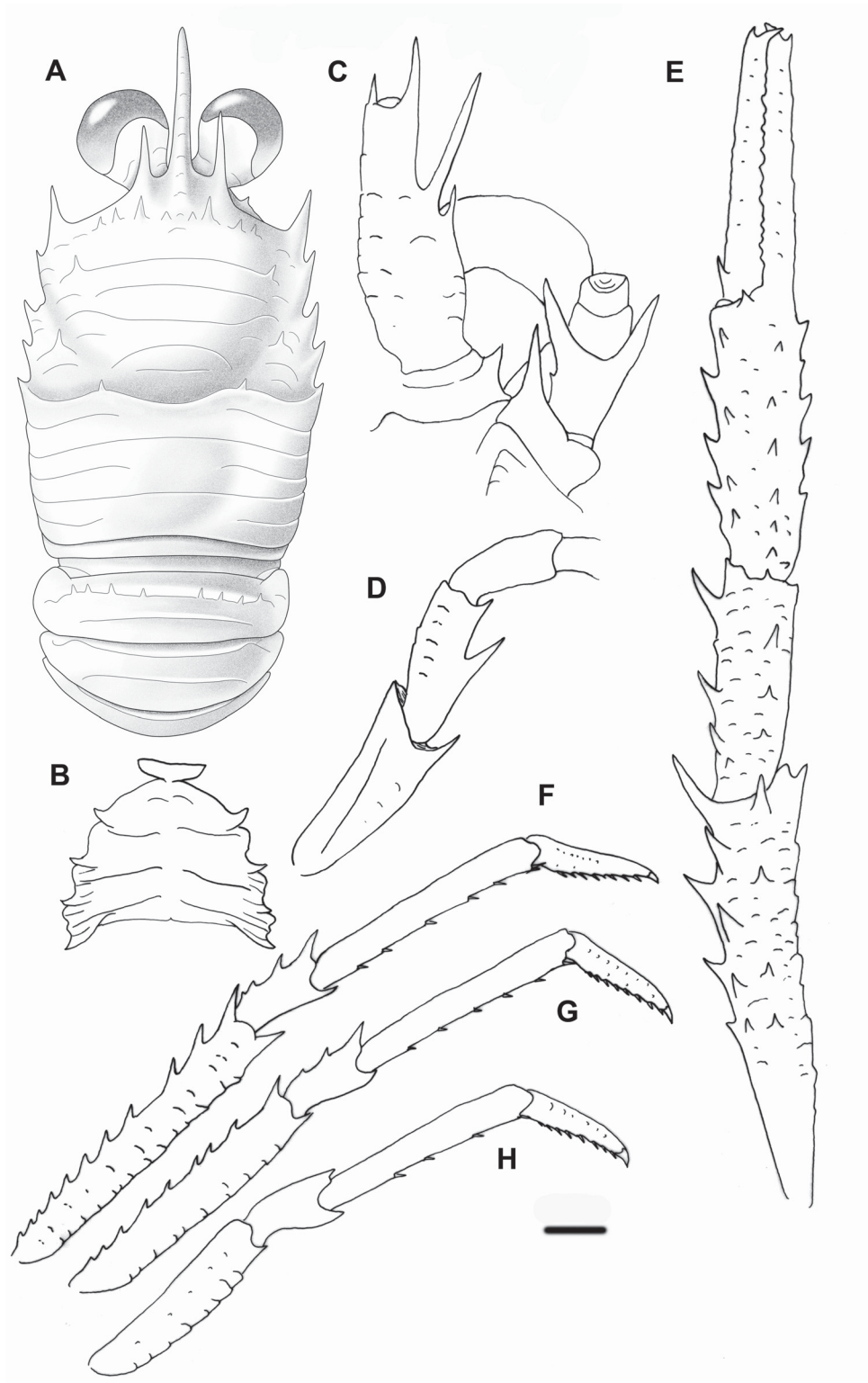


Fig. 3. *Munida cristulata* sp. nov., holotype, ♂, 6.1 mm (MNHN-IU-2014-13480), Glorieuses Islands, N of Mayotte Island. **A.** Carapace and abdomen, dorsal view. **B.** Sternal plastron. **C.** Cephalic region, showing antennular and antennal peduncles, ventral view. **D.** Right Mxp3, lateral view. **E.** Right P1, dorsal view. **F.** Right P2, lateral view. **G.** Right P3, lateral view. **H.** Right P4, lateral view. Scale bar: A–B, E–H = 1.0 mm; C–D = 0.5 mm.

Gastric region with 4 pairs of epigastric spines, longest pair behind supraocular spines. One parahepatic, one postcervical and one branchial dorsal spine on each side. Frontal margins slightly oblique. Lateral margins slightly convex. First lateral spine at anterolateral angle, long, not reaching level of sinus between rostrum and supraocular spines; one small spine in front of anterior branch of cervical groove. Branchial margins with three spines. Rostrum spiniform, about 0.5 times length of remaining carapace, horizontal. Supraocular spines reaching midlength of rostrum and not reaching end of corneae, subparallel and slightly upwards directed.

STERNUM. Distinct carinae on lateral portion of sternites 6–7. Few short striae on sternite 4; distal margin of sternite 4 moderately transverse, narrowly contiguous to sternite 3.

ABDOMEN. Anterior ridge of somite 2 with 8 spines; somites 2–3 each with one transverse ridge on tergite behind anterior ridge, somites 4–5 smooth; posteromedian margin of somite 6 straight.

EYES. Ocular peduncles as long as broad, maximum corneal diameter 0.5 distance between bases of anterolateral spines.

ANTENNULE. Article 1 with 2 well-developed distal spines, distomesial spine clearly shorter than distolateral; two lateral spines, distal much longer than proximal and not exceeding distomesial spine.

ANTENNA. Article 1 with strong distomesial spine reaching distal margin of article 2. Article 2 with subequal distomesial and distolateral spines overreaching end of article 3. Article 3 unarmed.

Mxp3. Ischium with small distal spine on flexor margin. Merus shorter than ischium; flexor margin with 2 spines, proximal spine stronger than distal; extensor margin unarmed. Carpus unarmed.

P1. 2.8 times carapace length, with some long iridescent and plumose setae along mesial margins of articles. Merus 1.0–1.1 length of carapace, 1.8 times as long as carpus, with some dorsal spines; distal spines strong, distomesial spine not reaching proximal third of carpus. Carpus 0.9 length of palm, 3.3 times as long as broad, with spines along mesial and dorsal sides. Palm 2.9 times as long as broad, with row of dorsal and ventral spines; few spines along lateral margin not continuing along lateral margin of fixed finger; one mesial row of spines. Movable finger with proximal and subdistal spines. Fingers slightly longer than palm.

P2–4. Moderately long and slender, with numerous plumose and iridescent setae along extensor margin of articles. P2 2.0–2.1 times carapace length. Meri shorter posteriorly (P3 merus 0.9 length of P2 merus, P4 merus 0.7 length of P3 merus); P2 merus 0.9 length of carapace, 6.5 times as long as broad, 1.4 times as long as P2 propodus; P3 merus 6 times as long as broad, 1.2 times as long as P3 propodus; P4 merus 4.5 times as long as broad, 0.9 times length of P4 propodus. Extensor margins of P2–3 meri with row of 9–10 proximally diminishing spines, and unarmed on P4; flexor margins distally with one spine followed proximally by several eminences; lateral sides unarmed. Carpi with 3–4 spines on extensor margin of P2–3, unarmed on P4; lateral surface with few granules sub-parallel to extensor margin on P2–4; flexor margin with distal spine. Propodi 8–9 (P2–3)–7 (P4) times as long as broad; extensor margin unarmed; flexor margin with 4–6 slender movable spines on P2–4. Dactyli slender, length 0.5 that of propodi; flexor margin with 8 movable spinules along entire border, without a spinule at base of unguis; P2 dactylus 4.5 times as long as wide.

GENETIC DATA. Not available.

Remarks

Munida cristulata sp. nov. is characterized by the presence of 3 spines on the branchial lateral margins of the carapace, lateral parts of posterior thoracic sternites with distinct carinae, large eyes, and spines on the anterior ridge of the second abdominal somite. The new species is closely related to *M. kapala* Ah Yong & Poore, 2004, from Queensland, New South Wales and New Zealand (Ah Yong & Poore 2004; Yaldwyn & Webber 2011).

Munida cristulata sp. nov. is easily distinguished from *M. kapala* by several characters:

- The P1 fixed finger has several spines along the proximal half of the lateral margin in *M. kapala*, whereas this margin is unarmed (except terminal spine) in *M. cristulata* sp. nov.
- The P2–4 dactyli are longer and more slender in *M. kapala* than in *M. cristulata* sp. nov. The P2 dactylus length is 0.5 that of the propodus in *M. cristulata*, whereas this length is ca 0.7 in *M. kapala*.

Distribution

Glorieuses Islands, between 300 and 460 m.

Munida euripa sp. nov.

urn:lsid:zoobank.org:act:386746FC-3E5F-4901-9727-938B3160B145

Fig. 4

Etymology

From the Greek, *euripos*, strait, channel, in relation to the Mozambique Channel.

Type material

Holotype

MADAGASCAR: ♂, 11.4 mm, MIRIKY, Stn CP3241, 14°30' S, 47°27' E, 6 Jul. 2009, 274–325 m (MNHN-IU-2014-13475).

Paratypes

MADAGASCAR: 4 ♂♂, 9.5–11.4 mm, 1 ov. ♀, 10.8 mm, 4 ♀♀, 7.6–9.5 mm, same data as for holotype (MNHN-IU-2010-793); 1 ♂, 7.5 mm, 1 ♀, 12.0 mm, MIRIKY, Stn CP3248, 14°50' S, 46°57' E, 340–446 m, 7 Jul. 2009 (MNHN-IU-2014-13603); 3 ♂♂, 9.6–12.4 mm, 1 ♀, 11.4 mm, MIRIKY, Stn CP3263, 15°34' S, 45°44' E, 287–450 m, 10 Jul. 2009 (MNHN-IU-2010-803); 22 ♂♂, 5.3–10.6 mm, 2 ov. ♀♀, 7.2–7.5 mm, 5 ♀♀, 5.6–8.7 mm, ATIMO VATAE, Stn CP3584, 25°29.80' S, 44°15.64' E, 203–210 m, 10 May 2010 (MNHN-IU-2014-19217); 1 ♀, 5.0 mm, ATIMO VATAE, Stn CP3614, 26°12.74' S, 45°07.37' E, 250–300 m, 14 May 2010 (MNHN-IU-2014-13604).

Description

CARAPACE. 1.2 times as long as broad, with numerous secondary striae between main transverse ridges. Dorsal ridges with dense short non-iridescent setae and numerous scattered long iridescent and non-plumose setae. Gastric region with 4 pairs of epigastric spines, longest pair behind supraocular spines. One parahepatic and one postcervical spine on each side. Frontal margins oblique. Lateral margins slightly convex. First lateral spine at anterolateral angle, moderately long, not reaching level of sinus between rostrum and supraocular spines; one small spine in front of anterior branch of cervical groove. Branchial margins with five spines. Rostrum spiniform, about 0.5 times length of remaining carapace, horizontal. Supraocular spines barely reaching midlength of rostrum and not reaching end of corneae, slightly convergent, directed slightly upwards.

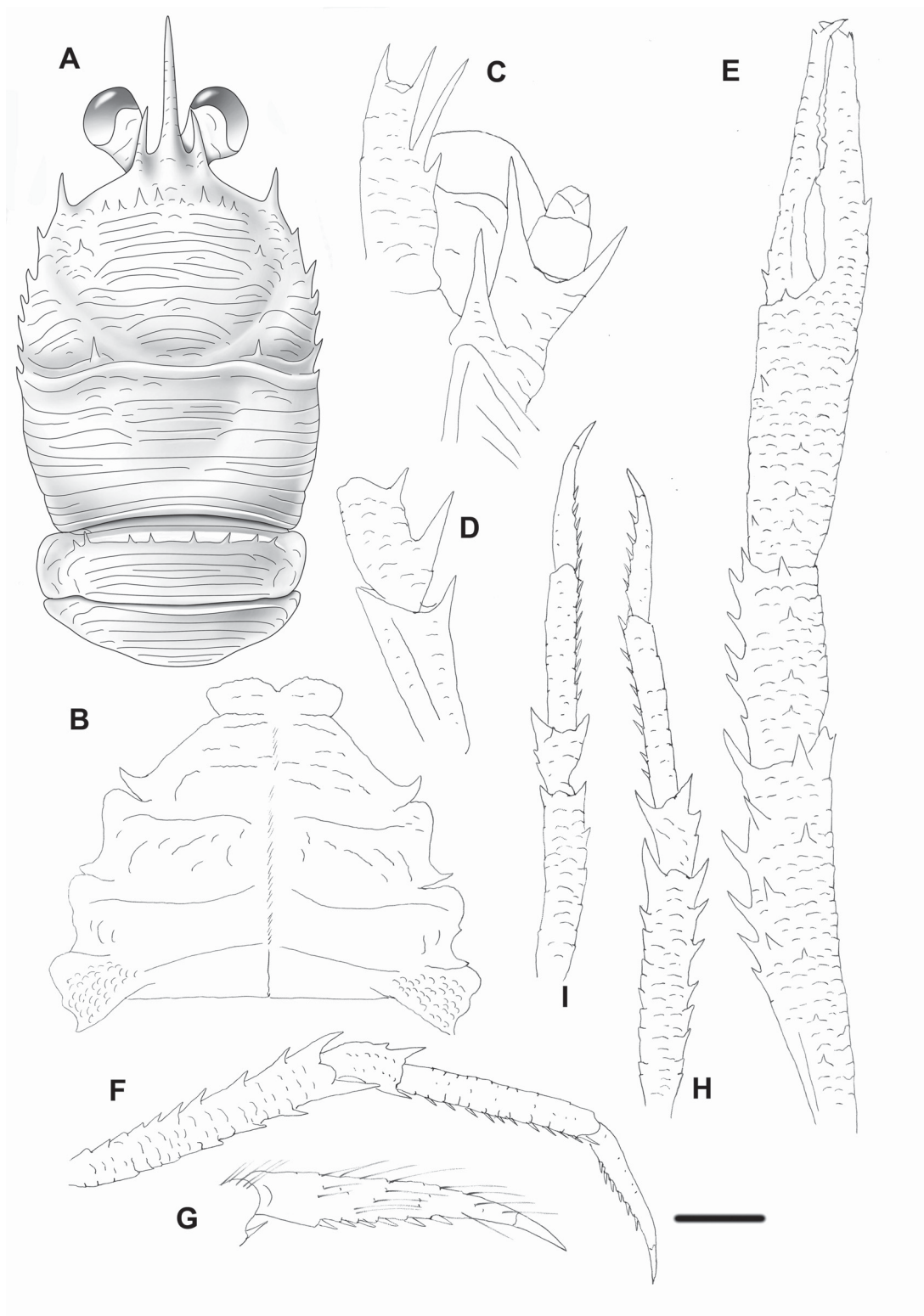


Fig. 4. *Munida euripa* sp. nov., holotype, ♂, 11.4 mm (MNHN-IU-2014-13475), Madagascar. **A.** Carapace and abdomen, dorsal view. **B.** Sternal plastron. **C.** Cephalic region, showing antennular and antennal peduncles, ventral view. **D.** Right Mxp3, lateral view. **E.** Right P1, dorsal view. **F.** Right P2, lateral view. **G.** Dactylus of right P2, lateral view. **H.** Left P3, lateral view. **I.** Right P4, lateral view. Scale bar: A, E–F, H–I = 3.0 mm; B–D, G = 1.5 mm.

STERNUM. Surface of thoracic sternites 4–5 numerous short striae; sternite 7 with granules on each lateral portion.

ABDOMEN. Anterior ridge of somite 2 with 8 spines; somites 2–4 each with 6 uninterrupted transverse ridges on tergite behind anterior ridge; somite 5 with short ridges; posteromedian margin of somite 6 straight.

EYES. Ocular peduncles as long as broad, maximum corneal diameter 0.4 distance between bases of anterolateral spines.

ANTENNULE. Article 1 with 2 well-developed subequal distal spines; two lateral spines, distal much longer than proximal and not exceeding distomesial spine.

ANTENNA. Article 1 with strong distomesial spine exceeding distal margin of article 2. Article 2 with distomesial spine exceeding antennal peduncle; distolateral spine slightly exceeding article 3. Article 3 unarmed.

Mxp3. Ischium with strong distal spine on flexor margin. Merus shorter than ischium; flexor margin with 2 spines, proximal stronger than distal; extensor margin unarmed. Carpus unarmed.

P1. 3 times carapace length, with numerous long iridescent and plumose setae along mesial margins of articles. Merus 1.2 length of carapace, 2.0 times as long as carpus, with some dorsal spines; distal spines strong, distomesial spine not reaching proximal third of carpus. Carpus 0.7–0.8 length of palm, 2.5 times as long as broad, with spines along mesial and dorsal sides. Palm 2.5 times as long as broad, with row of small dorsal spines; few spines along lateral and mesial margins. Fingers slightly longer than palm; fixed and movable fingers each with one proximal and one distal spine.

P2–4. Moderately long and slender, with numerous plumose and iridescent setae along extensor margin of articles. P2 2.0–2.1 times carapace length. Meri shorter posteriorly (P3 merus 0.9 length of P2 merus, P4 merus 0.8 length of P3 merus); P2 merus 0.8 length of carapace, 6 times as long as broad, 1.4–1.5 times as long as P2 propodus; P3 merus 5.5 times as long as broad, 1.4–1.5 times as long as P3 propodus; P4 merus 4.5 times as long as broad, 1.2 times length of P4 propodus. Extensor margins of P2–3 meri with row of 8–10 proximally diminishing spines, and 1–2 distal spines on P4; flexor margins distally with some spines followed proximally by several eminences; lateral sides unarmed. Carpi with 2–3 spines on extensor margin of P2–4; lateral surface with several granules sub-parallel to extensor margin on P2–4; flexor margin with distal spine. Propodi 6.0–6.5 (P2–3)–5.5 (P4) times as long as broad; extensor margin unarmed; flexor margin with 8–10 slender movable spines on P2–4. Dactyli slender, length 0.8–0.9 that of propodi; flexor margin with 5–6 movable spinules, distal third unarmed, without a spinule at base of unguis; P2 dactylus 7.5 times as long as wide.

GENETIC DATA. COI, 16S, see Table 1.

Remarks

Munida euripa sp. nov. belongs to the group of species having five spines on the branchial lateral margins of the carapace, the lateral parts of the thoracic sternite 7 with granules, and spines on the anterior ridge of the second abdominal somite. The new species is closely related to *M. limula* Macpherson & Baba, 1993 from Madagascar. These species differ in several features:

- The abdominal somites 2–3 have more transverse ridges (8) in the new species than in *M. limula* (4).
- The distal spines of the antennular article 1 are subequal in *M. euripa* sp. nov., whereas the distomesial spine is clearly longer than the distolateral in *M. limula*.

- The Mxp3 merus has a distal spine in the extensor margin in *M. limula*, whereas this spine is absent in the new species.
- The dorsal side of the P1 palm has numerous spines in *M. limula*, whereas there is a few spines only in *M. euripa* sp. nov. The P1 movable finger has some spines along the proximal half in *M. limula*, whereas there is a basal and terminal spine only in *M. euripa* sp. nov.

Munida euripa sp. nov. showed high divergence values with respect to the rest of the species analysed here, although genetic data of *M. limula* were unfortunately not available. The minimum values found for 16S were around 4% (with respect to *M. tirsias* Macpherson, 1994, *M. taenia* Macpherson, 1994 or *M. armilla* Macpherson, 1994, from New Caledonia and adjacent waters), and 5 or 6% when other species of the western Indian Ocean were compared, such as *M. mesembria* sp. nov., *M. benguela*, and *M. shaula*. These values rise to figures around or higher than 10% when data from COI sequences were taken into account: 11% with respect to *M. mesembria* sp. nov., and 15–16% for *M. nesiotes* and *M. shaula*, while the minimum found was with respect to *M. armilla* (9.1%). Among these species only *M. taenia* and *M. armilla* belong to the group of species having 5 spines on the branchial lateral margins of the carapace and the lateral parts of the thoracic sternites with granules. However, the new species can be easily distinguished from *M. taenia* and *M. armilla* by the following aspects:

- The front margin is transverse in *M. taenia* and *M. armilla*, instead of oblique in *M. euripa* sp. nov.
- *M. taenia* has numerous minute granules on the lateral parts of the thoracic sternites 6 and 7, whereas these granules are only present on sternite 7 of *M. euripa* sp. nov.
- The antennular article 1 has 2 subequal distal spines in *M. euripa* sp. nov., whereas the distomesial spine is longer than the distolateral in *M. taenia* and the distomesial spine is shorter than the distolateral in *M. armilla*.
- The movable finger of P1 has a row of spines along the mesial margin in *M. taenia*, whereas there is only a basal spine in *M. euripa* sp. nov.
- The P2–4 dactyli are more slender in *M. euripa* sp. nov. than in *M. taenia* and *M. armilla*. Furthermore, the flexor margin has the distal third unarmed in *M. euripa* sp. nov., whereas there are spines along the entire flexor margin in *M. taenia* and *M. armilla*.

Distribution

Madagascar, between 203 and 446 m.

Munida hoda sp. nov.

urn:lsid:zoobank.org:act:615627E4-CB69-45FA-AF2F-E0DECE77E2A4

Figs 5, 11D

Etymology

From the Greek, *hodos*, way, in relation to the Mozambique Channel.

Type material

Holotype

MOZAMBIQUE: ♂, 5.3 mm, MAINBAZA, Stn CC3172, 25°58.86' S, 34°36.51' E, 630–638 m, 16 Apr. 2009 (MNHN-IU-2014-13479).

Paratypes

MOZAMBIQUE: 1 ♀, 17.6 mm, MAINBAZA, Stn CP3141, 23°31.95' S, 035°55.74' E, 684–698 m, 11 Apr. 2009 (MNHN-IU-2008-10213); 1 ov. ♀, 11.4 mm, MAINBAZA, Stn CC3166, 24°21.22' S, 35°42.35' E, 708–715 m, 15 Apr. 2009 (MNHN-IU-2008-10216); 1 ♂, 4.4 mm, 4 ♀♀, 3.5–5.6 mm, same data as for holotype (MNHN-IU-2014-13505).

Description

CARAPACE. 1.3 times as long as broad, with few secondary striae between main transverse ridges. Dorsal ridges with some very short non-iridescent setae and few scattered long iridescent and non-plumose setae. Gastric region with 4 pairs of epigastric spines, longest pair behind supraocular spines. One parahepatic and one postcervical spine on each side. Frontal margins slightly oblique. Lateral margins slightly convergent posteriorly. First lateral spine at anterolateral angle, moderately long, not reaching level of sinus between rostrum and supraocular spines; one small spine in front of anterior branch of cervical groove. Branchial margins with five spines. Rostrum spiniform, about 0.6 times length of remaining carapace, horizontal. Supraocular spines barely reaching midlength of rostrum and not reaching end of corneae, slightly convergent, directed slightly upwards.

STERNUM. Surface of thoracic sternites smooth; sternite 4 with narrow anterior margin.

ABDOMEN. Anterior ridge of somite 2 with 8 spines; somites 2–3 each with uninterrupted transverse ridge on tergite behind anterior ridge; somites 4–5 smooth; posteromedian margin of somite 6 straight.

EYES. Ocular peduncles as long as broad, maximum corneal diameter 0.5 distance between bases of anterolateral spines.

ANTENNULE. Article 1 with 2 well-developed distal spines, distomesial shorter than distolateral spine; two lateral spines, distal much longer than proximal and not exceeding distomesial spine.

ANTENNA. Article 1 with strong distomesial spine not reaching distal margin of article 2. Article 2 with distomesial spine exceeding article 3; distolateral spine reaching midlength of article 3. Article 3 unarmed.

Mxp3. Ischium with small spine on flexor distal margin. Merus shorter than ischium; flexor margin with 2 spines, proximal stronger than distal; extensor margin unarmed. Carpus unarmed.

P1. 2.6 times carapace length, with numerous long iridescent and plumose setae along mesial margins of articles. Merus 1.1 length of carapace, 2.7 times as long as carpus, with some dorsal spines; distal spines strong, distomesial spine not reaching midlength of carpus. Carpus 0.7 length of palm, 2.3 times as long as broad, with spines along mesial and dorsal sides. Palm 3.3 times as long as broad, with row of small dorsal spines; one row of spines along mesial and lateral margins. Fingers as long as palm; fixed finger with row of 3–4 spines along lateral margin; movable finger with row of 5–7 spines along mesial border.

P2–4. Long and slender, with some plumose setae and few long iridescent setae along extensor margin of articles. P2 2.4 times carapace length. Meri shorter posteriorly (P3 merus 0.8 length of P2 merus, P4 merus 0.6 length of P3 merus); P2 merus as long as carapace, 9.5 times as long as broad, 1.6 times as long as P2 propodus; P3 merus 7.5 times as long as broad, 1.4 times as long as P3 propodus; P4 merus 4.3 times as long as broad, 1.2 times length of P4 propodus. Extensor margins of P2 merus with row of 8 proximally diminishing spines, 5 spines on P3 merus and unarmed on P4; flexor margins distally with some spines followed proximally by several eminences; lateral sides unarmed. Carpi with 2–3 spines on extensor margin of P2–3, unarmed on P4; lateral surface with several granules sub-parallel to extensor margin on P2–4; flexor margin with small distal spine. Propodi 7.7–8.2 (P2–3)–6.0 (P4) times as long as broad; extensor margin unarmed; flexor margin with 5–8 slender movable spines on P2–4. Dactyli slender, length 0.9–1.1 that of propodi; flexor margin with 4 movable spinules, distal third unarmed, without a spinule at the base of the unguis; P2 dactylus 9.5 times as long as wide.

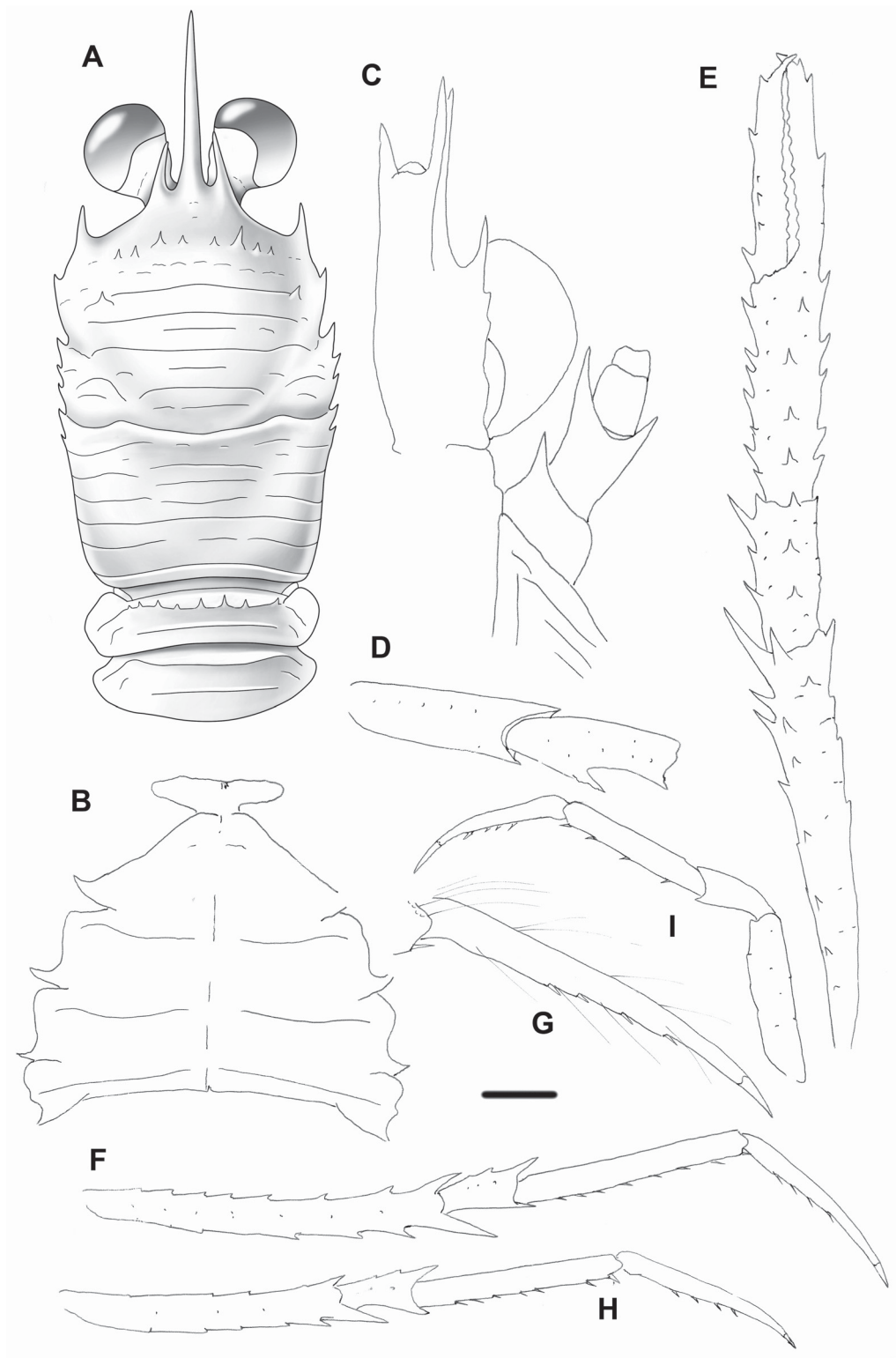


Fig. 5. *Munida hoda* sp. nov., holotype, ♂, 5.3 mm (MNHN-IU-2014-13479), Mozambique. **A.** Carapace and abdomen, dorsal view. **B.** Sternal plastron. **C.** Cephalic region, showing antennular and antennal peduncles, ventral view. **D.** Right Mxp3, lateral view. **E.** Right P1, dorsal view. **F.** Right P2, lateral view. **G.** Dactylus of right P2, lateral view. **H.** Left P3, lateral view. **I.** Left P4, lateral view. Scale bar: A, E–F, H–I = 1.0 mm; B–D, G = 0.5 mm.

COLOUR. Ground colour of carapace and abdominal somites 2–3 reddish or pinkish; abdominal somites 4–6 and tailfan whitish. Rostrum and supraocular spines reddish. P1 pinkish or reddish, fingers whitish. P2–4 pinkish, distal part of propodi and dactyli whitish.

GENETIC DATA. COI, see Table 1.

Remarks

Munida hoda sp. nov. resembles *M. africana* Balss, 1913, from the east coast of Africa (Macpherson 1991), by the presence of 5 spines on the branchial lateral margins of the carapace, spines along the anterior ridge of the second abdominal somite, large eyes and distomesial spine of the antennular article 1 shorter than the distolateral spine. They differ in several aspects:

- The supraocular spines do not reach the end of the corneae in *M. hoda* sp. nov., whereas they exceed the corneae in *M. africana*.
- The P2–4 dactyli have 4 spines on the median portion of the flexor margin in *M. hoda* sp. nov., whereas they have 9 spines along the entire flexor margin in *M. africana*.

Only a short fragment of 320 base pairs could be sequenced for COI. Based on this fragment, the most similar species was *M. benguela* from the SW Indian Ocean and SE Atlantic Ocean (3.2%), while values with respect to other species such as *M. congesta* Macpherson, 1999, *M. rosula* Macpherson, 1994 or *M. ecleipsis* Macpherson, 1994, from New Caledonia and adjacent waters (Macpherson 1994, 1999), were between 3.8 and 5.5%.

Munida hoda sp. nov. and *M. benguela* also belong to the group of species with 5 spines on the branchial lateral margins of the carapace, spines along the anterior ridge of the second abdominal somite, large eyes and the distomesial spine of the antennular article 1 shorter than the distolateral spine. The two species are easily distinguished by some aspects:

- The anterior ridge of the somite 2 with one uninterrupted transverse ridge on the tergite behind the anterior ridge in *M. hoda* sp. nov., whereas there are 3–4 uninterrupted transverse ridges in *M. benguela*.
- The P2–4 dactyli have spines on the median portion of the flexor margin in *M. hoda* sp. nov., whereas they have spines along the entire flexor margin in *M. benguela*. Furthermore, the dactyli are longer and more slender in *M. hoda* sp. nov. than in *M. benguela*.

Distribution

Mozambique, between 630 and 715 m.

Munida mesembria sp. nov.

urn:lsid:zoobank.org:act:61452888-4764-40BB-8946-69DC998BC123

Figs 6, 12B

Etymology

From the Greek, *mesembria*, south, in relation to the area of collection of the species.

Type material

Holotype

MOZAMBIQUE: ♂, 7.7 mm, MAINBAZA, Stn CP3144, 23°32.14' S, 35°41.66' E, 171–180 m, 11 Apr. 2009 (MNHN-IU-2014-13477).

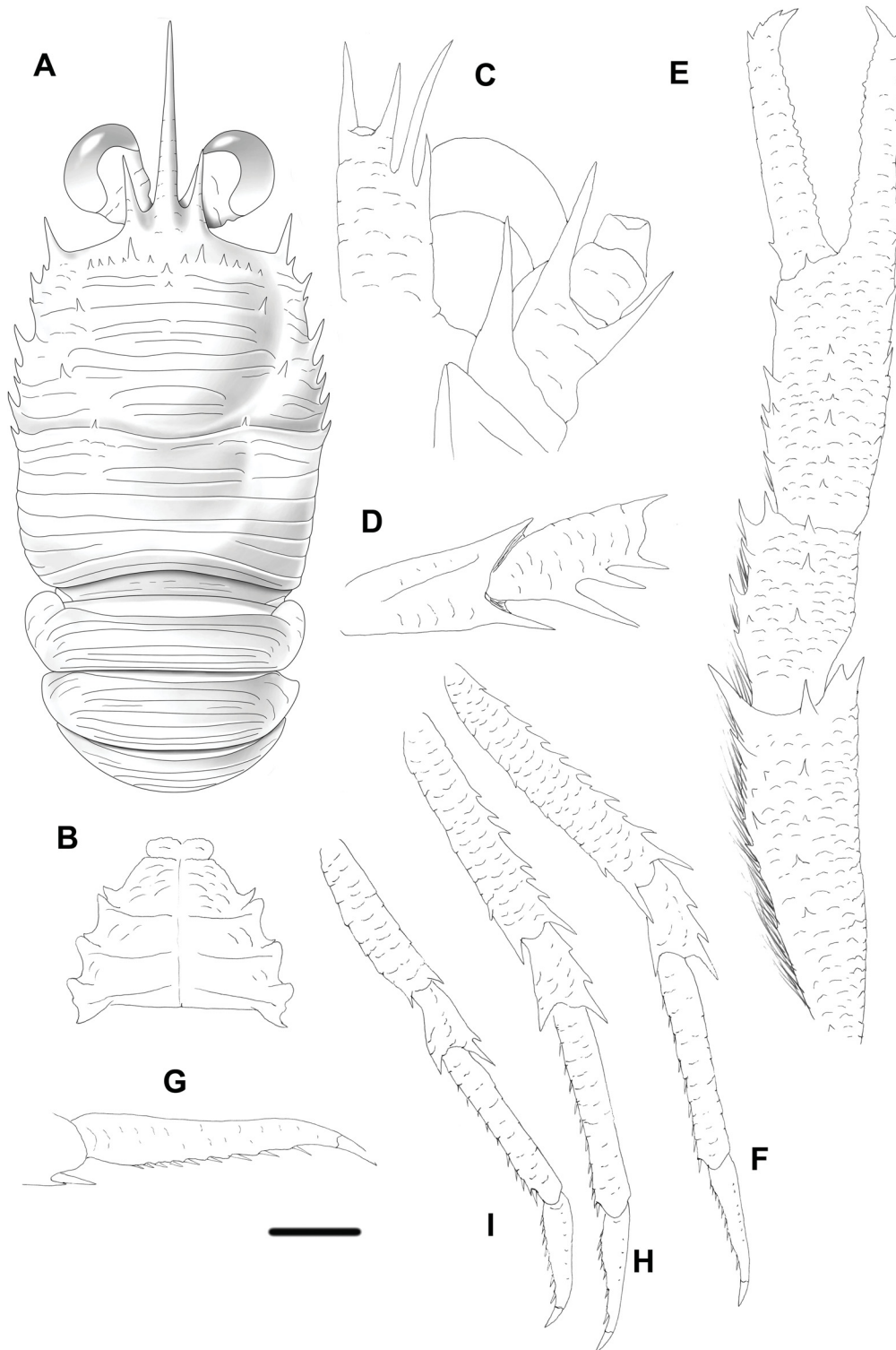


Fig. 6. *Munida mesembria* sp. nov., holotype, ♂, 7.7 mm (MNHN-IU-2014-13477), Mozambique. **A.** Carapace and abdomen, dorsal view. **B.** Sternal plastron. **C.** Cephalic region, showing antennular and antennal peduncles, ventral view. **D.** Right Mxp3, lateral view. **E.** Right P1, dorsal view. **F.** Right P2, lateral view. **G.** Dactylus of right P2, lateral view. **H.** Left P3, lateral view. **I.** Right P4, lateral view. Scale bar: A, E–F, H–I = 2.0 mm; B–D, G = 1.0 mm.

Paratypes

MOZAMBIQUE: 27 ♂♂, 4.6–9.7 mm, 22 ov. ♀♀, 5.5–8.2 mm, 5 ♀♀, 5.2–7.5 mm, MAINBAZA, Stn CP3130, 25°52.00' S, 33°07.05' E, 112–127 m, 9 Apr. 2009 (MNHN-IU-2014-19214, MNHN-IU-2008-10219); 1 ov. ♀, 6.4 mm, MAINBAZA, Stn CP3131, 25°54.62' S, 33°06.91' E, 193–194 m, 9 Apr. 2009 (MNHN-IU-2014-13523); 1 ov. ♀, 7.4 mm, same data as previous (MNHN-IU-2008-10218); 10 ♂♂, 3.6–9.0 mm, 2 ♀♀, 5.6–6.4 mm, same data as for holotype (MNHN-IU-2014-19215), 1 ♂, 8.0 mm, same data as for holotype (MNHN-IU-2008-10225); 20 ♂♂, 6.7–11.0 mm, 17 ov. ♀♀, 7.0–8.4 mm, 3 ♀♀, 6.4–6.5 mm, MAINBAZA, Stn CC3151, 19°32.80' S, 36°45.96' E, 352–357 m, 13 Apr. 2009 (MNHN-IU-2014-19258); 1 ♂, 4.6 mm, 11 ♀♀, 2.7–5.0 mm, MAINBAZA, Stn CC3159, 23°53.80' S, 35°37.58' E, 148–152 m, 15 Apr. 2009 (MNHN-IU-2014-13522).

Description

CARAPACE. Slightly longer than broad, with some secondary striae between main transverse ridges. Dorsal ridges with very short non-iridescent setae and few scattered long iridescent and non-plumose setae. Gastric region with 5–6 pairs of epigastric spines, longest pair behind supraocular spines; row of 2–3 small median epigastric spines behind rostral spine. One parahepatic, one branchial dorsal and one postcervical spine on each side. Frontal margins transverse. Lateral margins slightly convex. First lateral spine at anterolateral angle, moderately long, nearly reaching level of sinus between rostrum and supraocular spines; 2–3 small spines in front of anterior branch of cervical groove; end of anterior branch of cervical groove with tuft of iridescent setae. Branchial margins with five spines. Rostrum spiniform, about 0.5–0.6 times length of remaining carapace, horizontal. Supraocular spines barely reaching midlength of rostrum and not reaching end of corneae, slightly divergent, directed slightly upwards.

STERNUM. Surface of thoracic sternite 4 with numerous striae; sternites 5 and 6 with some short striae on each lateral side; distal margin of sternite 4 nearly transverse, broadly contiguous to sternite 3.

ABDOMEN. Anterior ridge of somite 2 unarmed; somites 2–4 each with 5–6 uninterrupted transverse ridges on tergite behind anterior ridge; somite 4 smooth or with minute setose scales on tergite; somites 5 and 6 with few transverse ridges, posteromedian margin of somite 6 straight.

EYES. Ocular peduncles as long as broad, maximum corneal diameter 0.4 distance between bases of anterolateral spines.

ANTENNULE. Article 1 with 2 well-developed distal spines, distomesial longer than distolateral spine; two lateral spines, distal much longer than proximal and exceeding distomesial spine.

ANTENNA. Article 1 with strong distomesial spine barely reaching distal margin of article 3; surface with some short striae. Article 2 with distomesial spine strong, exceeding antennal peduncle; distolateral spine slightly exceeding article 3. Article 3 unarmed.

Mxp3. Ischium with long distal spine on flexor and extensor margins. Merus slightly shorter than ischium; flexor margin with 3 well developed spines, proximal stronger than others; extensor margin with distal spine. Carpus unarmed.

P1. 2.1–2.5 (females), 2.6–3.4 (males) times carapace length, with few finely setiferous scales, with very dense long iridescent and plumose setae along mesial margins of merus and carpus; some scattered long setae on dorsal surfaces of articles. Merus 0.9–1.0 length of carapace, 1.7 times as long as carpus, with some dorsal spines; distal spines strong, distomesial spine clearly not reaching midlength of carpus. Carpus 0.8 length of palm, 1.7 times as long as broad, with spines along mesial and dorsal sides. Palm

1.9–2.0 times as long as broad, with row of small dorsal spines; one row of spines along mesial and lateral margins. Fingers 1.1–1.2 length of palm; fixed finger with row of 4–5 spines along lateral margin; movable finger with one basal spine and 2–3 subdistal spines.

P2–4. Moderately long and slender, with dense plumose setae and few long iridescent setae along extensor margin of articles, with finely setiferous scales on surface. P2 2.1 times carapace length. Meri shorter posteriorly (P3 merus 0.9 length of P2 merus, P4 merus 0.7 length of P3 merus); P2 merus 0.8 carapace length, 5.5 times as long as broad, 1.4–1.5 times as long as P2 propodus; P3 merus 5.0 times as long as broad, 1.2–1.3 times as long as P3 propodus; P4 merus 4 times as long as broad, as long as P4 propodus. Extensor margins of meri with row of 8–11 proximally diminishing spines on P2–3, unarmed on P4, except distal spine; flexor margins distally with 1–3 spines followed proximally by several eminences; lateral sides unarmed. Carpi with 2–3 spines on extensor margin; lateral surface with several granules sub-parallel to extensor margin on P2–4; flexor margin with distal spine. P2–4 propodi 4.5–5.0 (P2–3)–4.5 (P4) times as long as broad; extensor margin unarmed; flexor margin with 9–10 slender movable spines on P2–4. Dactyli slender, length 0.7–0.8 that of propodi; flexor margin with 7–9 movable spinules along entire border, without a spinule at base of unguis; P2 dactylus 6 times as long as wide.

COLOUR. Ground colour orange, with some red patches. Rostrum and supraocular spines orange. P1 orange, with reddish bands; fingers orange, with some white and red spots. P2–4 orange, with reddish transverse bands.

GENETIC DATA. COI, 16S see Table 1.

Remarks

Munida mesembria sp. nov. belongs to the group of species having five spines on the branchial lateral margins of the carapace, thoracic sternites with short striae, well developed eyes, the anterior ridge of the second abdominal somite unarmed and the distomesial spine of the antennal article 1 longer than the distolateral. The new species is closely related to *M. austrina* sp. nov. (see above).

M. mesembria sp. nov. is easily distinguished from *M. austrina* sp. nov. by several characters:

- The surface of the thoracic sternite 4 has numerous striae in *M. mesembria* sp. nov. These striae are scarce in *M. austrina* sp. nov.
- The distomesial spine of the article 2 of the antennal peduncle clearly overreaches the end of the antennal peduncle in *M. mesembria* sp. nov., whereas this spine ends at the distal border of article 4 in *M. austrina* sp. nov.
- The P1 has dense long thick iridescent and plumose setae along the mesial margins of the merus and carpus in *M. mesembria* sp. nov., whereas scarcely so in *M. austrina* sp. nov.

Munida mesembria sp. nov. and *M. austrina* sp. nov. showed a COI divergence of around 9%, but values in the range of 6.5–8.2% were found with respect to species such as *M. armilla*, *M. proto* Macpherson, 1994, *M. spilota* Macpherson, 1994, *M. notata* Macpherson, 1994 and *M. tyche* Macpherson, 1994 from the SW Pacific (Macpherson 1994). Lower values were found for 16S, only 1.8–3% with respect to *M. notata*.

Munida mesembria sp. nov. and *M. notata* are easily distinguished by several characters:

- The surface of the thoracic sternite 4 has numerous striae in *M. mesembria* sp. nov. These striae are scarce in *M. notata*.
- The P1 has very dense long iridescent and plumose setae along the mesial margins of the merus and carpus in *M. mesembria* sp. nov., whereas these setae are clearly less dense in *M. notata*.

- The P1 movable finger has one basal spine and 2–3 subdistal spines along the mesial margin in *M. mesembria* sp. nov., whereas this margin has a row of numerous spines in *M. notata*.

Distribution

Mozambique, at 112–357 m.

Munida micra sp. nov.

urn:lsid:zoobank.org:act:B9620615-3637-4576-B3C1-374F6D016C39

Figs 7, 12C

Etymology

From the Greek, *mikros*, in relation to the small size of the species.

Type material

Holotype

MOZAMBIQUE: ♂, 3.7 mm, MAINBAZA, Stn CC3165, 24°15.70' S, 35°42.12' E, 605–612 m, 15 Apr. 2009 (MNHN-IU-2008-10229).

Paratype

MOZAMBIQUE: 1 ♀, 3.5 mm, MAINBAZA, Stn CC3165, 24°15.70' S, 35°42.12' E, 605–612 m, 15 Apr. 2009 (MNHN-IU-2008-13503).

Description

CARAPACE. 1.3 times as long as broad, without secondary striae between main transverse ridges. Ridges with very short non-iridescent setae and few scattered long iridescent and non-plumose setae. Intestinal region smooth. Gastric region with 3 pairs of epigastric spines, longest pair behind supraocular spines. One parahepatic and one postcervical spine on each side. Frontal margins slightly oblique. Lateral margins straight and slightly convergent posteriorly. First lateral spine at anterolateral angle, moderately long, clearly not reaching level of sinus between rostrum and supraocular spines; second spine small, in front of anterior branch of cervical groove, less than half length of first spine. Branchial margins with five spines. Rostrum spiniform, about 0.6 times length of remaining carapace, not dorsally carinated, horizontal, distal part upwards directed. Supraocular spines not reaching midlength of rostrum and clearly not reaching end of corneae, subparallel, directed slightly upwards.

STERNUM. Surfaces of thoracic sternites smooth. Sternite 4 with anterior margin nearly transverse, broadly contiguous to sternite 3.

ABDOMEN. Anterior ridge of somite 2 with 2 median spines, 0–1 additional spines on each side; somites 2–3 each with uninterrupted or medially interrupted transverse ridge on tergite behind anterior ridge; somites 4 and 6 smooth, posteromedian margin of somite 6 straight.

EYES. Ocular peduncles as long as broad, maximum corneal diameter 0.4 distance between bases of anterolateral spines.

ANTENNULE. Article 1 with 2 well-developed distal spines, distolateral longer than distomesial spine; two lateral spines, distal much longer than proximal and reaching end of distomesial spine, surface with a few striae.

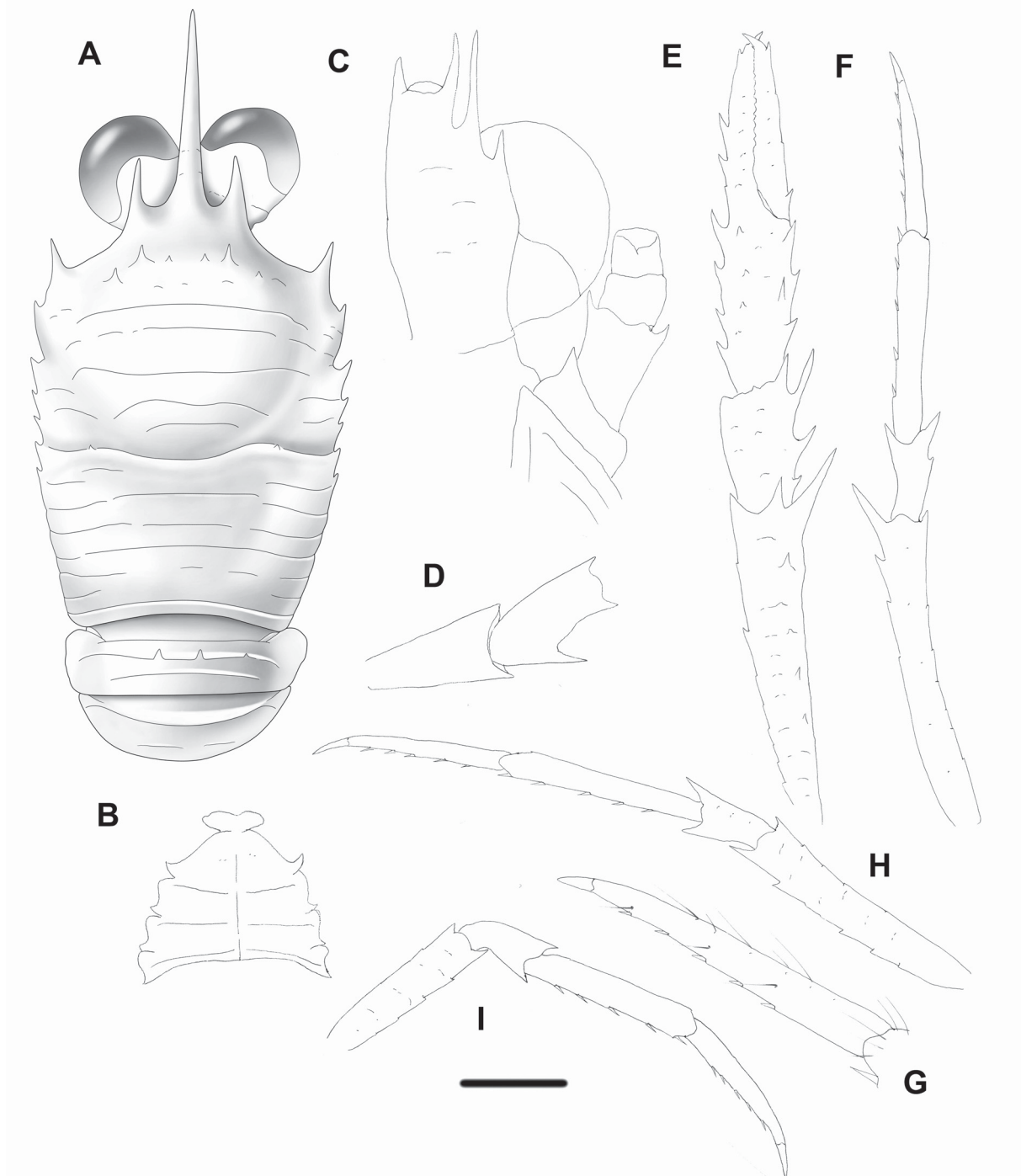


Fig. 7. *Munida micra* sp. nov., holotype, ♂, 3.7 mm (MNHN-IU-2008-10229), Mozambique. **A.** Carapace and abdomen, dorsal view. **B.** Sternal plastron. **C.** Cephalic region, showing antennular and antennal peduncles, ventral view. **D.** Right Mxp3, lateral view. **E.** Left P1, dorsal view. **F.** Left P2, lateral view. **G.** Dactylus of left P2, lateral view. **H.** Left P3, lateral view. **I.** Right P4, lateral view. Scale bar: A–B, E–F, H–I = 1.0 mm; C–D, G = 0.5 mm.

ANTENNA. Article 1 with small distomesial spine not reaching midlength of article 2. Article 2 with short distomesial and distolateral spines, subequal, not exceeding article 3. Articles 3–4 unarmed.

Mxp3. Ischium with small spine on flexor distal margin. Merus shorter than ischium; flexor margin with 2 spines, median stronger than distal spine; extensor margin with distal spine. Carpus unarmed.

P1. 1.9 times carapace length, with few finely setiferous scales, with few long iridescent and plumose setae along mesial margin. Merus 0.8 length of carapace, 1.9–2.1 times as long as carpus, with some dorsal spines; distal spines strong, distomesial spine barely reaching midlength of carpus. Carpus 0.9 length of palm, 1.8 times as long as broad; with spines along mesial border. Palm twice as long as broad, with row of small dorsal spines; one row of spines along mesial and lateral margins. Fingers 1.3 length of palm; fixed finger with row of 4–5 spines along lateral margin; movable finger with basal and subdistal spines.

P2–4. Long and slender, with few long iridescent and plumose setae along extensor margins of articles. P2 twice carapace length. Meri shorter posteriorly (P3 merus 0.8 length of P2 merus, P4 merus 0.7 length of P3 merus); P2 merus 0.8 carapace length, 7 times as long as broad, 1.6 times as long as P2 propodus; P3 merus 6 times as long as broad, 1.3 times as long as P3 propodus; P4 merus 4.5 times as long as broad, as long as P4 propodus. Extensor margins of meri with row of small, proximally diminishing spines on P2–3, unarmed on P4, except small distal spine; flexor margins distally with 2–3 spines followed proximally by several eminences; lateral sides unarmed. Carpi with 1–2 spines on extensor margin; lateral surface with several granules sub-parallel to extensor margin on P2–4; flexor margin with small distal spine. Propodi 6.2–7.0 (P2–3)–5.5 (P4) times as long as broad; extensor margin unarmed; flexor margin with 5 slender movable spines on P2–4. Dactyli slender, length 0.9–1.0 that of propodi; flexor margin with 5 movable spinules along entire border, without a spinule at base of unguis; P2 dactylus 7.5 times as long as wide.

COLOUR. Ground colour pinkish, with some red patches. Rostrum and supraocular spines reddish, tip of rostrum whitish. P1 whitish, with 3 reddish bands; fingers whitish. P2–4 whitish, without reddish transverse bands.

GENETIC DATA. Not available.

Remarks

Munida micra sp. nov. belongs to the group of species having five spines on the branchial lateral margins of the carapace, smooth thoracic sternites, large eyes, spines on the anterior ridge of the second abdominal somite, and the distomesial spine of antennular article 1 smaller than the distolateral spine. The new species is closely related to *M. stomifera* sp. nov. from Madagascar (see below under the Remarks of that species), and to *M. parile* Macpherson & Machordom, 2005, from New Caledonia.

However, *M. micra* sp. nov. is easily distinguished from *M. parile* by several characters:

- The rostrum has a median dorsal carina in *M. parile*, whereas this carina is absent in the new species.
- The distomesial spine of antennal article 1 does not reach the midlength of antennal article 2 in the new species, whereas this spine reaches the end of this article in *M. parile*.
- The flexor margin of the Mxp3 merus has a distal spine in *M. micra* sp. nov., but it is unarmed in *M. parile*.
- The walking legs (P2–4) are clearly longer and more slender in *M. micra* sp. nov. than in *M. parile*. The P2 merus is 7 times as long as broad in the new species, whereas it is 5 times in *M. parile*; the propodus is 6.2–7.0 times as long as broad in *M. micra* sp. nov., whereas it is 4 times in *M. parile*.

Distribution

Mozambique, between 605 and 612 m.

Munida stomifera sp. nov.

urn:lsid:zoobank.org:act:866271CF-0FA5-4EFF-9B5B-DB24A91DCD4E

Fig. 8

Etymology

From the Greek, *atomos*, small particle, in relation to the small size of the species.

Type material

Holotype

MADAGASCAR: ♀, 2.8 mm, ATIMO VATAE, Stn DW3525, 24°23.61' S, 47°32.84' E, 395–407 m, 1 May 2010 (MNHN-IU-2014-13473).

Paratypes

MADAGASCAR: 1 ov. ♀, 4.3 mm, ATIMO VATAE, Stn DW3564, 25°36.79' S, 46°20.89' E, 433–456 m, 6 May 2010 (MNHN-IU-2014-13543); 1 ♀, 3.5 mm, ATIMO VATAE, Stn CP3585, 25°33.10' S, 44°16.40' E, 549–576 m, 10 May 2010 (MNHN-IU-2014-13613).

Description

CARAPACE. As long broad, with few secondary striae between main transverse ridges. Ridges with very short non-iridescent setae and few scattered long iridescent and non-plumose setae. Intestinal region smooth. Gastric region with 4–5 pairs of epigastric spines, longest pair behind supraocular spines. Without parahepatic, branchial dorsal and postcervical spines. Frontal margins transverse. Lateral margins slightly convex. First lateral spine at anterolateral angle, moderately long, clearly not reaching level of sinus between rostrum and supraocular spines; 1–2 minute spines in front of anterior branch of cervical groove. Branchial margins with five spines. Rostrum narrowly triangular, about 0.4–0.5 times length of remaining carapace, horizontal, with median dorsal longitudinal carina. Supraocular spines barely reaching midlength of rostrum and clearly not reaching end of corneae, subparallel, directed slightly upwards.

STERNUM. Surfaces of thoracic sternites smooth. Sternite 4 with anterior margin nearly transverse, broadly rounded and contiguous to sternite 3.

ABDOMEN. Anterior ridge of somite 2 with 2 median spines; somites 2–3 each with uninterrupted transverse ridge on tergite behind anterior ridge; somite 4 smooth or with minute setose scales on tergite; somites 5 and 6 smooth, posteromedian margin of somite 6 straight.

EYES. Ocular peduncles as long as broad, maximum corneal diameter 0.4 distance between bases of anterolateral spines.

ANTENNULE. Article 1 with 2 distal spines, distolateral longer than distomesial spine; two lateral spines, distal much longer than proximal and barely exceeding distomesial spine.

ANTENNA. Article 1 with strong distomesial spine barely reaching distal margin of article 2. Article 2 with distomesial spine short, not exceeding article 3; distolateral spine as long as distomesial. Article 3 with short distomesial spine.

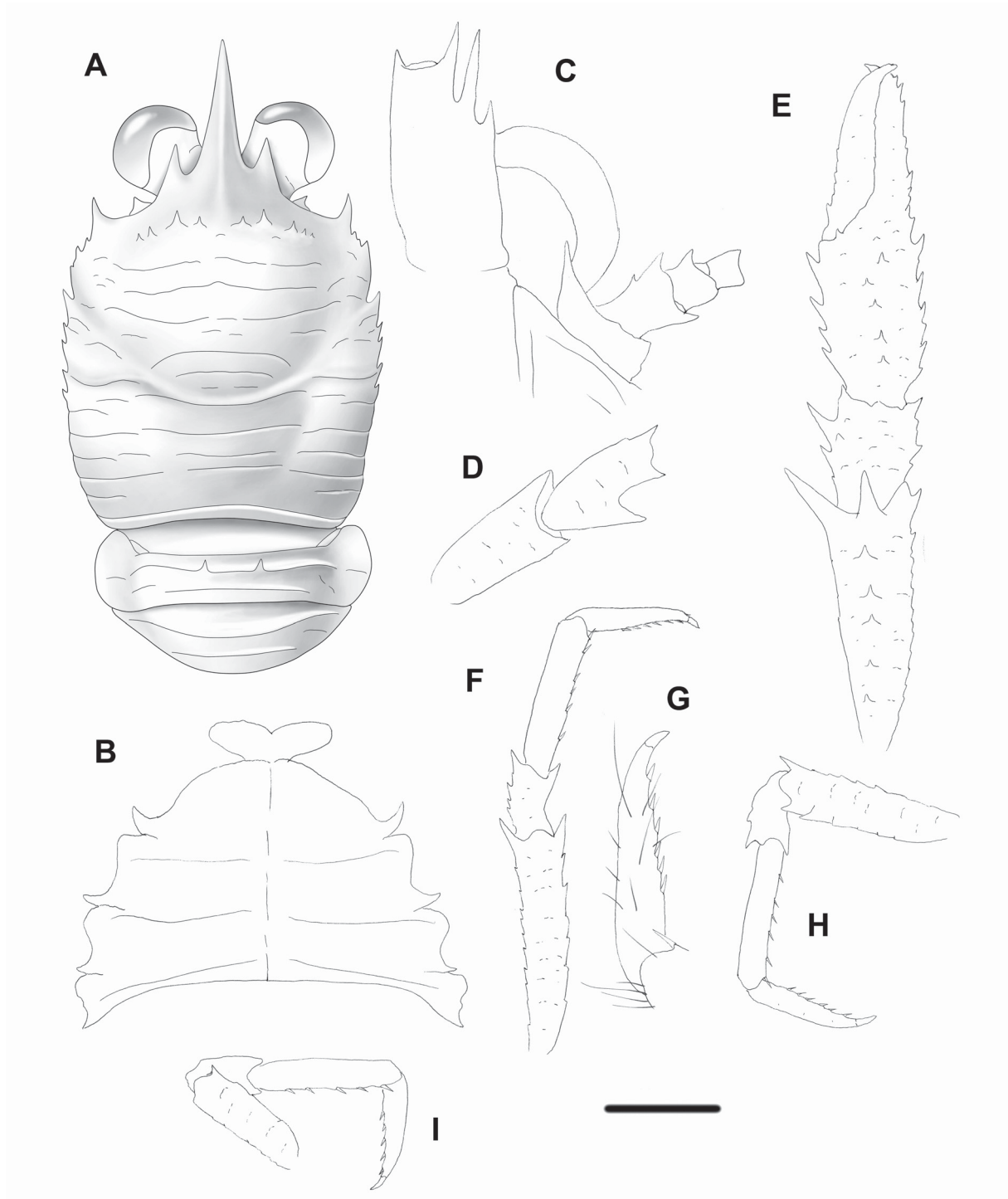


Fig. 8. *Munida stomifera* sp. nov., holotype, ♀, 2.8 mm (MNHN-IU-2014-13473), Madagascar. **A.** Carapace and abdomen, dorsal view. **B.** Sternal plastron. **C.** Cephalic region, showing antennular and antennal peduncles, ventral view. **D.** Right Mxp3, lateral view. **E.** Right P1, dorsal view. **F.** Right P2, lateral view. **G.** Dactylus of right P2, lateral view. **H.** Left P3, lateral view. **I.** Right P4, lateral view. Scale bar: A, E–F, H–I = 1.0 mm; B–D, G = 0.5 mm.

Mxp3. Ischium with small spine on flexor distal margin. Merus shorter than ischium; flexor margin with 2 spines, median stronger than distal spine; extensor margin with distal spine. Carpus unarmed.

P1. 2.0 times carapace length, with few finely setiferous scales, with some long thick iridescent and plumose setae along mesial margin. Merus 0.7–0.8 length of carapace, 1.9–2.1 times as long as carpus, with some dorsal spines; distal spines strong, distomesial spine barely reaching midlength of carpus. Carpus 0.8 length of palm, 1.3–1.4 times as long as broad; with spines along mesial and lateral borders. Palm 1.5 times as long as broad, with row of small dorsal spines; one row of spines along mesial and lateral margins. Fingers 1.1–1.2 length of palm; fixed finger with row of small spines along entire lateral margin; movable finger with small basal spine.

P2–4. Moderately long and slender, with few long iridescent and plumose setae along extensor margin. P2 1.7–1.8 times carapace length. Meri shorter posteriorly (P3 merus 0.8 length of P2 merus, P4 merus 0.7 length of P3 merus); P2 merus 0.7 carapace length, 5 times as long as broad, 1.5 times as long as P2 propodus; P3 merus 4.0 times as long as broad, 1.3 times as long as P3 propodus; P4 merus 3 times as long as broad, as long as P4 propodus. Extensor margins of meri with row of 10–11 small proximally diminishing spines on P2–3, unarmed on P4, except small distal spine; flexor margins distally with 2–3 spines followed proximally by several eminences; lateral sides unarmed. Carpi with 3–5 spines on extensor margin; lateral surface with several granules sub-parallel to extensor margin on P2–4; flexor margin with small distal spine. Propodi 4.5–5.0 (P2–3)–4.5 (P4) times as long as broad; extensor margin unarmed; flexor margin with 6 slender movable spines on P2–4. Dactyli slender, length 0.8–0.9 that of propodi; flexor margin with 6 movable spinules along entire border, without a spinule at the base of the unguis; P2 dactylus 10 times as long as wide.

GENETIC DATA. 16S, see Table 1.

Remarks

The new species is closely related to *M. micra* sp. nov. from Mozambique (see above). Both species have 5 spines along the branchial lateral margin of the carapace, spines along the anterior ridge of abdominal somite 2, eyes large, and the distomesial spine of antennular article 1 smaller than the distolateral spine. However, they can be distinguished by several characters:

- The rostrum has a median dorsal longitudinal carina in *M. stomifera* sp. nov., whereas this carina is absent in *M. micra* sp. nov.
- The carapace is more elongate in *M. micra* sp. nov. (1.3 times as long as broad) than in *M. stomifera* sp. nov. (as long as broad).
- The distomesial spine of antennal article 1 not reaching the midlength of the antennal article 2 in *M. micra* sp. nov., whereas this spine reaches the end of this article in *M. stomifera* sp. nov.
- The walking legs (P2–4) are longer and more slender in *M. micra* sp. nov. than in *M. stomifera* sp. nov. The P2 merus is twice the carapace length in *M. micra* sp. nov., whereas it is 1.7–1.8 in *M. stomifera* sp. nov. The P2 merus is twice the carapace length in *M. micra* sp. nov., whereas it is 1.7–1.8 times in *M. stomifera* sp. nov. The P2 propodus is 6.2–7.0 times as long as broad in *M. micra* sp. nov., whereas it is 4.5–5.0 times in *M. stomifera* sp. nov.

The new species is also closely related to *M. leptitis* Macpherson, 1994, from New Caledonia, Indonesia, Vanuatu, Wallis and Futuna, and French Polynesia. They differ by the presence (*M. stomifera* sp. nov.) or absence (*M. leptitis*) of spines on the second abdominal somite.

Only part of the 16S was available for *M. stomifera* sp. nov. Divergence between other species of the area, such as *M. shaula* (9.9%) were high (> 10%). The closest species found was *M. tuberculata* Henderson, 1885, from the southwestern Pacific (see Macpherson 1994), with values around 6.3–6.8%.

The new species and *M. tuberculata* have 5 spines along the branchial lateral margin of the carapace, spines along the anterior ridge of abdominal somite 2, eyes large, and the distomesial spine of antennular article 1 smaller than the distolateral spine. However, the two species can be easily distinguished by the size of the antennal peduncle, with small articles in *M. tuberculata* and well developed ones in *M. stomifera* sp. nov.; the epigastric spines are acute in *M. stomifera* sp. nov., instead of minute and granulated in *M. tuberculata*. Furthermore, the P1 palm has well developed spines in *M. stomifera* sp. nov., whereas the palm is armed with granules in *M. tuberculata*.

Distribution

Madagascar, at 395–576 m.

Munida tetracantha sp. nov.

urn:lsid:zoobank.org:act:DE739D23-1F10-4C44-B75E-3CA111098F20

Figs 9, 13C

Etymology

From the Greek, *tetra*, four and *acantha*, spine, in relation to the four lateral branchial spines of the carapace.

Type material

Holotype

MADAGASCAR: ♂, 6.6 mm, ATIMO VATAE, Stn DW3522, 24°23.85' S, 47°32.12' E, 154–168 m, 1 May 2010 (MNHN-IU-2014-13474).

Paratypes

MADAGASCAR: 2 ov. ♀♀, 4.0–5.8 mm, MIRIKY, Stn CP3260, 15°35' S, 45°45' E, 179–193 m, 10 Jul. 2009 (MNHN-IU-2014-13601); 1 ♂, 3.0 mm, ATIMO VATAE, Stn CP3546, 25°23.21' S, 46°42.57' E, 84–85 m, 4 May 2010 (MNHN-IU-2010-2726); 1 ov. ♀, 3.7 mm, ATIMO VATAE, Stn CP3549, 25°16.87' S, 46°31.80' E, 53–54 m, 4 May 2010 (MNHN-IU-2014-13602).

MOZAMBIQUE: 1 ♂, 7.4 mm, MAINBAZA, Stn CP3131, 25°54.62' S, 33°06.91' E, 193–194 m, 9 Apr. 2009 (MNHN-IU-2008-10221); 2 ♂♂, 6.3–7.5 mm, 1 ov. ♀, 5.6 mm, MAINBAZA, Stn CC3151, 19°32.80' S, 36°45.96' E, 352–357 m, 13 Apr. 2009 (MNHN-IU-2014-13598); 2 ♂♂, 4.0–4.2 mm, MAINBAZA, Stn CC3159, 23°53.80' S, 35°37.58' E, 148–152 m, 15 Apr. 2009 (MNHN-IU-2014-13599).

FRANCE: 1 ov. ♀, 5.2 mm, La Réunion Island, MD32, Stn HY75, 21°21.6' S, 55°26.7' E, 380–465 m, 24 Aug. 1982 (MNHN-IU-2014-13600).

Description

CARAPACE. 1.2–1.3 times as long as broad, with few secondary striae between main transverse ridges. Ridges with very short non-iridescent setae and few scattered long non-plumose setae. Few small scales on intestinal region. Gastric region with 4–5 pairs of epigastric spines, longest pair behind supraocular spines. One parahepatic, one branchial dorsal and one postcervical spine on each side. Frontal margins slightly oblique. Lateral margins slightly convex. First lateral spine at anterolateral angle, long, not reaching level of sinus between rostrum and supraocular spines; second spine in front of anterior branch of cervical groove and less than half length of preceding one. Branchial margins with four spines. Rostrum spiniform, about 0.5–0.6 times length of remaining carapace, horizontal. Supraocular spines

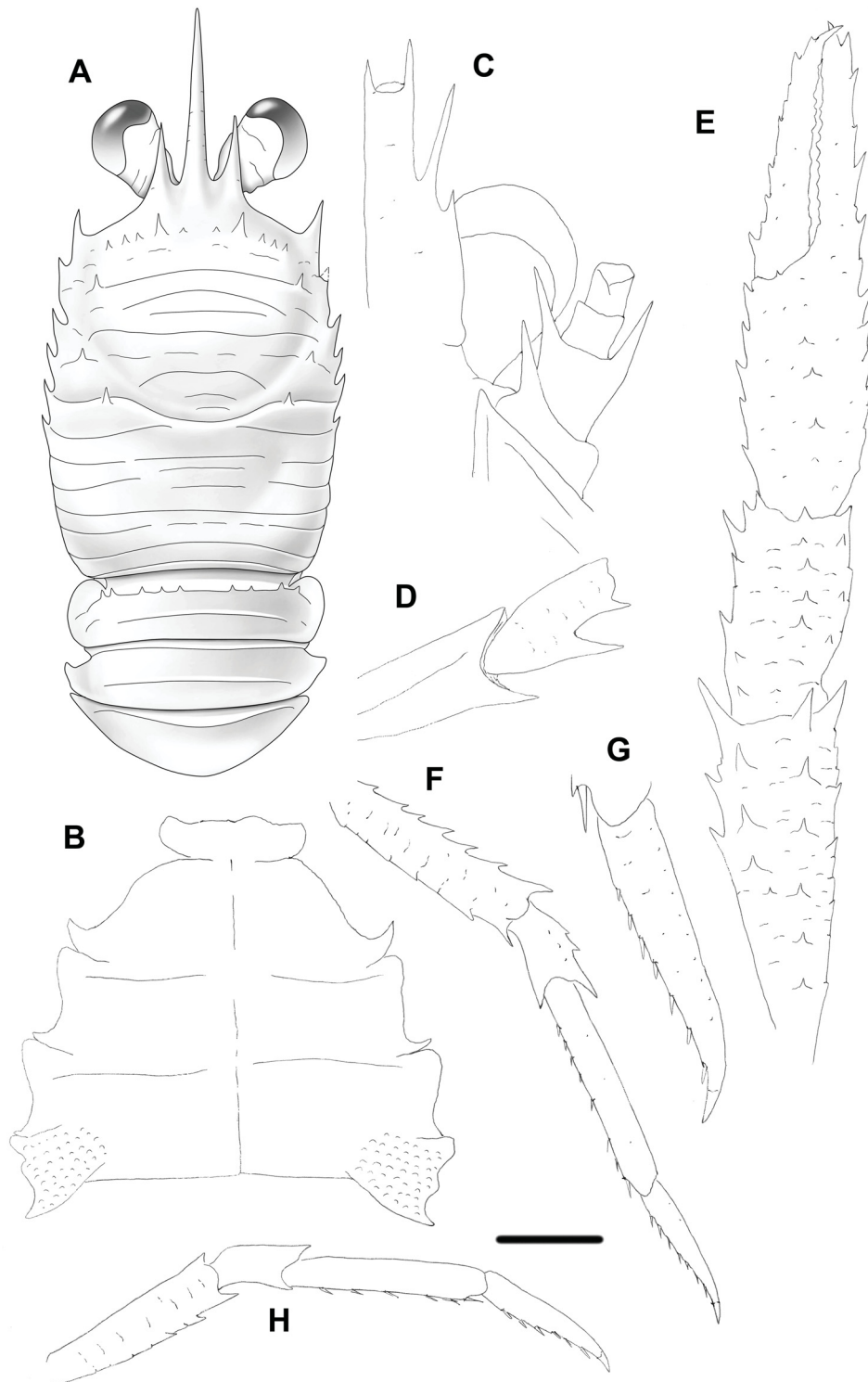


Fig. 9. *Munida tetracantha* sp. nov., holotype, ♂, 6.6 mm (MNHN-IU-2014-13474), Madagascar. **A.** Carapace and abdomen, dorsal view. **B.** Sternal plastron. **C.** Cephalic region, showing antennular and antennal peduncles, ventral view. **D.** Right Mxp3, lateral view. **E.** Right P1, dorsal view. **F.** Right P2, lateral view. **G.** Dactylus of right P2, lateral view. **H.** Right P4, lateral view. Scale bar: A, E–F, H = 2.0 mm; B–D, G = 1.0 mm.

barely reaching midlength of rostrum and not reaching end of corneae, subparallel, directed slightly upwards (Fig. 2A).

STERNUM. Granules on each posterolateral part of sternite 7. Surfaces of thoracic sternites smooth. Sternite 4 with anterior margin nearly transverse, broadly contiguous to sternite 3.

ABDOMEN. Anterior ridge of somite 2 with 9–10 spines; somites 2–3 each with uninterrupted transverse ridge on tergite behind anterior ridge; somite 4 smooth or with minute setose scales on tergite; somites 5 and 6 smooth, posteromedian margin of somite 6 straight.

EYES. Ocular peduncles as long as broad, maximum corneal diameter 0.3–0.4 distance between bases of anterolateral spines.

ANTENNULE. Article 1 with 2 well-developed distal spines, distolateral longer than distomesial spine; two lateral spines, distal much longer than proximal and clearly not exceeding distomesial spine.

ANTENNA. Article 1 with strong distomesial spine reaching distal margin of article 2. Article 2 with distomesial spine exceeding article 3, and not overreaching antennal peduncle; distolateral spine as long as distomesial. Article 3 unarmed.

MXP3. Ischium with spine on flexor distal margin. Merus shorter than ischium; flexor margin with 2 spines, median stronger than distal spine; extensor margin unarmed. Carpus unarmed.

P1. 2.5–2.8 times carapace length, with some finely setiferous scales, with long thick iridescent and non-plumose setae scattered on dorsal side and more numerous along mesial margin. Merus 0.9–1.0 length of carapace, 1.7 times as long as carpus, with some dorsal, mesial and a few distolateral spines. Carpus 1.0–1.1 length of palm, 1.7–1.8 times as long as broad; with rows of spines along mesial, dorsal and lateral sides. Palm 1.8 times as long as broad, with row of small dorsal spines; one row of spines along mesial and lateral spines. Fingers 1.2–1.3 length of palm; one row of spines along the lateral margin; one row of small spines along mesial margin.

P2–4. Moderately long and slender, with some long iridescent setae along extensor margins of articles. P2 1.8–1.9 times carapace length. Meri shorter posteriorly (P3 merus 0.9 length of P2 merus, P4 merus 0.9 length of P3 merus); P2 merus 0.5–0.6 carapace length, 4.2–4.4 times as long as broad, as long as or slightly longer than P2 propodus; P3 merus 3.0 times as long as broad, as long as P3 propodus; P4 merus 3.8 times as long as broad, as long as P4 propodus. Extensor margins of meri with row of 6–8 proximally diminishing spines on P2–3, unarmed on P4, except distal spine; flexor margins distally with 1–2 spines followed proximally by several eminences; lateral sides unarmed. Carpi with 3–4 spines on extensor margin; lateral surface with several acute granules sub-parallel to extensor margin on P2–4; flexor distal margin with small spine. Propodi 4.4 (P2–3)–3.8 (P4) times as long as broad; extensor margin unarmed; flexor margin with 8–9 slender movable spines on P2–4. Dactyli slender, length 0.7–0.8 that of propodi; flexor margin with 7 movable spinules along entire border, without a spinule at base of unguis; P2 dactylus 6 times as long as wide.

COLOUR. Carapace with pinkish-orange and yellow stripes, spines red; rostral and supraocular spines reddish, dorsally whitish. P1 with reddish and whitish bands, tip of fingers whitish; spines reddish. P2–4 mostly lost in photographed specimen, P4 merus with reddish and whitish bands.

GENETIC DATA. COI, see Table 1.

Remarks

Munida tetracantha sp. nov. belongs to the group of species having three or four spines on the branchial lateral margins of the carapace, the lateral parts of the posterior thoracic sternites with granules, and spines on the anterior ridge of the second abdominal somite. The new species is closely related to *M. barbeti* Galil, 1999 from Mauritius (Galil 1999), La Réunion, Madagascar and Aldabra (Macpherson & de Saint Laurent 2002).

However, *M. tetracantha* sp. nov. is easily distinguished from *M. barbeti* by several characters:

- The distomesial spine of antennular article 1 is longer than the distolateral in *M. barbeti*, whereas it is shorter in the new species.
- The distomesial and distolateral spines of antennal article 2 overreach article 3 in the new species, whereas these spines fall short of the end of the third segment in *M. barbeti*.
- The first and second anterolateral spines of the carapace are subequal in *M. barbeti*, whereas the first spine is more than twice as long as the second spine in *M. tetracantha* sp. nov.

The new species is also close to *M. gordoae* Macpherson, 1994, from New Caledonia, Vanuatu and adjacent waters (Macpherson 1994, 2004). Both species have 4 spines on each branchial margin of the carapace and granules on each posterolateral part of sternite 7. However, this species can be distinguished from *M. tetracantha* sp. nov. by the following characters:

- The P1 fixed and movable fingers have spines along the entire lateral and mesial margins, in *M. tetracantha* sp. nov., whereas these spines are on the proximal half of each margin in *M. gordoae*.
- The P2–4 meri are longer and more slender in *M. gordoae* than in the new species. The P2 merus is nearly 6 times as long as high in *M. gordoae*, but ca 4 times in *M. tetracantha* sp. nov.

Molecular data showed that *Munida tetracantha* sp. nov. greatly differed with respect to other species of the area, like *M. nesioties*, *M. mesembria* sp. nov. or *M. austrina* sp. nov. (p COI > 16%). In fact, the closest species was *M. gordoae* from the SW Pacific, with a high COI divergence of 9%, suggesting that the morphological characters shared by both species (e.g., 4 spines on each branchial margin of the carapace and granules on each posterolateral part of sternite 7) can have a phylogenetic value.

Distribution

Mozambique, Madagascar, La Réunion Island, between 53 and 465 m.

Key to the species of *Munida* from the Western and Central Indian Ocean

Note: we have included all species of the genus occurring in the Western Indo-Pacific region as defined by Spalding *et al.* (2007).

1. Three or four spines on lateral margins of carapace behind cervical groove 2
 - Five spines on lateral margins of carapace behind cervical groove 7
2. Lateral parts of fifth to seventh thoracic sternites with distinct carinae 3
 - Lateral parts of fifth to seventh thoracic sternites without distinct carinae 4
3. Second abdominal somite with spines on anterior border *M. cristulata* sp. nov.
 - Abdominal somites unarmed *M. muscae* Macpherson & de Saint Laurent, 2002
4. Lateral parts of posterior thoracic sternites with granules 5
 - Lateral parts of posterior thoracic sternites without granules 6

5. Distomesial spine of antennular article 1 longer than distolateral *M. barbeti* Galil, 1999
 – Distomesial spine of antennular article 1 shorter than distolateral *M. tetracantha* sp. nov.
6. Abdominal somites unarmed or with spines on each lateral extremity of anterior ridge on second somite *M. sentai* Baba, 1986
 – Second abdominal somite with median pair of spines or with spines along anterior ridge of second somite *M. nesiotes* Macpherson, 1999
7. Lateral parts of seventh thoracic sternites with small granules 8
 – Lateral parts of seventh thoracic sternites without small granules 9
8. Extensor margin of merus of Mxp3 with distal spine. Distomesial spine of antennular article 1 longer than distolateral *M. limula* Macpherson & Baba, 1993
 – Extensor margin of merus of Mxp3 unarmed. Distomesial spine of antennular article 1 slightly shorter than distolateral *M. euripa* sp. nov.
9. Abdominal somites unarmed or with spines on each side of anterior ridge on second tergite 10
 – Second abdominal somite with median pair of spines or with spines along anterior ridge of second tergite 17
10. Eyes small, corneas barely wider than eyestalk. Maximum corneal diameter less than $\frac{1}{4}$ distance between bases of anterolateral spines *M. comorina* Alcock & Anderson, 1899
 – Eyes large, corneas dilated. Maximum corneal diameter equal to or greater than $\frac{1}{4}$ distance between bases of anterolateral spines 11
11. Distal spines of antennular article 1 of different sizes 12
 – Distal spines of antennular article 1 subequal 15
12. Distomesial spine of antennular article 1 shorter than distolateral spine
 *M. antonbruuni* (Tirmizi & Javed, 1980)
 – Distomesial spine of antennular article 1 longer than distolateral 13
13. Frontal margin oblique. First anterolateral spine of carapace small, slightly larger than first lateral branchial spine *M. foresti* Macpherson & de Saint Laurent, 2002
 – Frontal margin transverse. First anterolateral spine of carapace small, more than twice size of first lateral branchial spine 14
14. Dactylus of walking legs with spines along entire flexor margin *M. mesembria* sp. nov.
 – Dactylus of walking legs unarmed on distal third of flexor margin *M. austrina* sp. nov.
15. Third segment of antennal peduncle unarmed *M. roshanei* Tirmizi, 1966
 – Third segment of antennal peduncle with distolateral spine 16
16. P1 fingers shorter than palm *M. arabica* Tirmizi & Javed, 1992
 – P1 fingers longer than palm *M. janetae* Tirmizi & Javed, 1992
17. Eyes small, corneas barely wider than eyestalk. Maximum corneal diameter less than $\frac{1}{4}$ distance between bases of anterolateral spines *M. typhle* Macpherson, 1994
 – Eyes large, corneas dilated. Maximum corneal diameter equal to or greater than $\frac{1}{4}$ distance between bases of anterolateral spines 18
18. Fourth abdominal somite with spines on anterior border *M. babai* Tirmizi & Javed, 1976

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– Fourth abdominal somite unarmed	19
19. Abdominal somites 2 and 3 with spines on anterior border	20
– Spines only on abdominal somite 2	21
20. Parahepatic spine present on each side. Abdominal somite 3 with 3–4 spines. P2–4 dactyli with easily recognizable, movable spines on flexor margin	<i>M. shaula</i> Macpherson & de Saint Laurent, 2002
– No parahepatic spines. Abdominal somite 3 with 2 spines. P2–4 dactyli with very fine, movable spines on flexor margin	<i>M. vigiliarum</i> Alcock, 1901
21. Extensor margin of 3 Mxp merus with distal spine	22
– Extensor margin of 3 Mxp merus unarmed	27
22. Distomesial spine of antennular article 1 clearly shorter than distolateral	23
– Distal spines of antennular article 1 subequal or distomesial spine longer than distolateral	25
23. Distomesial spine on antennal article 2 clearly overreaching antennal peduncle	<i>M. dispar</i> Macpherson & Baba, 1993
– Distomesial spine on antennal article 2 clearly not reaching distal end of antennal peduncle	24
24. Rostrum with longitudinal dorsal carina	<i>M. stomifera</i> sp. nov.
– Rostrum smooth, without longitudinal dorsal carina	<i>M. micra</i> sp. nov.
25. Distomesial spine of antennular article 1 longer than distolateral	<i>M. latior</i> Baba, 2005
– Distal spines of antennular article 1 subequal	26
26. Fourth to seventh thoracic sternites with numerous striae. Distomesial spine of antennular article 1 overreaching antennal peduncle	<i>M. eudora</i> Macpherson & Baba, 1993
– Fourth to seventh thoracic sternites with few striae. Distomesial spine of antennular article 1 not reaching end of antennal peduncle	<i>M. sphinx</i> Macpherson & Baba, 1993
27. Frontal margins oblique	28
– Frontal margins transverse	30
28. Dactylus of walking legs unarmed on distal part of flexor margin	<i>M. hoda</i> sp. nov.
– Dactylus of walking legs with spines along entire flexor margin	29
29. Distomesial spine on antennal article 2 overreaching antennal peduncle. Lateral margins of carapace straight	<i>M. africana</i> Balss, 1913
– Distomesial spine on antennal article 2 not overreaching antennal peduncle. Lateral margins of carapace moderately convex	<i>M. spicae</i> Macpherson & de Saint Laurent, 2002
30. Dactylus of walking legs short and stout, about half propodus length	<i>M. insularis</i> Macpherson, 1999
– Dactylus of walking legs long and slender, as long as or slightly shorter than propodus length	31
31. Distomesial spine of antennal article 1 reaching end of article 2. Eyes moderately large, corneas wider than eyestalk. Maximum corneal diameter about $\frac{1}{3}$ distance between bases of anterolateral spines	32

- Distomesial spine of antennal article 1 not reaching end of article 2. Eyes small, corneas barely wider than eyestalk. Maximum corneal diameter less than $\frac{1}{4}$ distance between bases of anterolateral spines 35
- 32. Distal spines of antennular article 1 subequal *M. andamanica* Alcock, 1894
 - Distomesial spine of antennular article 1 smaller than distolateral 33
- 33. Carapace with some protogastric spines. P1 movable finger with only one basal spine on lateral border. P2 merus 5 times carpus length *M. rubiesi* Macpherson, 1991
 - Carapace without protogastric spines. P1 movable finger with several spines along lateral border. P2 merus 3 times carpus length 34
- 34. Dorsal surface of carapace with numerous scale-like ridges between main transverse ridges *M. dissita* Macpherson, 1999
 - Dorsal surface of carapace with few scale-like ridges between main transverse ridges *M. benguela* de Saint Laurent & Macpherson, 1988
- 35. P1 fixed finger unarmed on proximal half of mesial border *M. remota* Baba, 1990
 - P1 fixed finger with strong spine on proximal half of mesial border *M. microps* Alcock, 1894

Family Munidopsidae Ortmann, 1898

Genus *Munidopsis* Whiteaves, 1874

Munidopsis columbae sp. nov.

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Fig. 10

Etymology

Columba (the Dove) is one of the southern constellations.

Type material

Holotype

MADAGASCAR: ♂, 8.7 mm, ATIMO VATAE, Stn CP3585, 25°33.10' S, 44°16.40' E, 549–576 m, 10 May 2010 (MNHN-IU-2014-13472).

Paratype

MADAGASCAR: 1 ov. ♀, 12.2 mm, ATIMO VATAE, Stn CP3592, 25°02.60' S, 43°57.89' E, 450–455 m, 11 May 2010 (MNHN-IU-2014-13524).

Description

CARAPACE. Slightly longer than broad; dorsal surface moderately convex from side to side, smooth, with some short striae, more numerous on branchial regions, numerous scattered short uniramous setae. Gastric region with two well-developed epigastric spines, and longitudinal row of 3 median spines; two pairs of cardiac spines. Regions well delineated by furrows including distinct anterior and posterior cervical grooves. Posterior cardiac region weakly triangular, preceded by deep transverse depression. Posterior margin preceded by elevated ridge, with 6 spines. Rostrum broad, 0.4 carapace length; trifid distally; apex slightly upwards directed; carinate dorsally; lateral margin slightly convex. Frontal margin transverse behind ocular peduncle, leading to small antennal (outer orbital) spine, then convex toward anterolateral corner of carapace. Antennal spine small, directed straight forward; distinct spine ventral

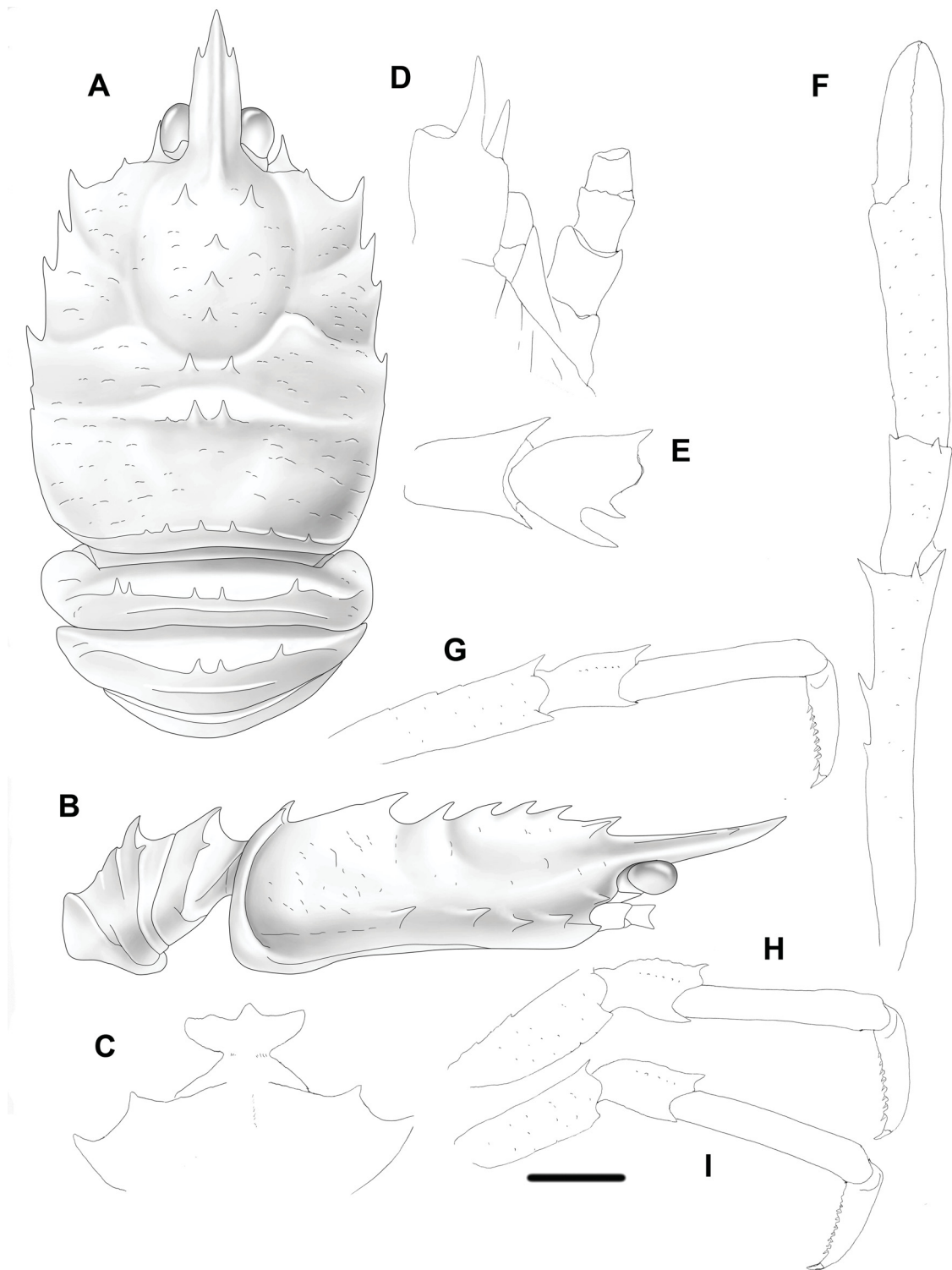


Fig. 10. *Munidopsis columbae* sp. nov., holotype, ♂, 8.7 mm (MNHN-IU-2014-13472), Madagascar. **A.** Carapace and abdomen, dorsal view. **B.** Carapace and abdomen, lateral view. **C.** Sternal plastron, sternites 3 and 4. **D.** Cephalic region, showing antennular and antennal peduncles, ventral view. **E.** Right Mxp3, lateral view. **F.** Right P1, dorsal view. **G.** Right P2, lateral view. **H.** Right P3, lateral view. **I.** Right P4, lateral view. Scale bar: A–B, F–I = 2.0 mm; C–E = 1.0 mm.

to front margin between ocular and antennal peduncles. Lateral margins weakly convex and subparallel; anterolateral spine well developed, larger than antennal spine; anterior end of anterior branch of cervical groove with distinct notch followed by two distinct spines; posterior end of cervical groove with notch, followed by distinct spine (same as other lateral spines) posterior to it. Pterygostomian flap smooth, with small striae, anteriorly unarmed.

STERNUM. Longer than broad, maximum width at sternites 6 and 7. Sternite 3 moderately broad, 3 times as wide as long, anterior margin with shallow median notch flanked by 2 low lobes, lateral margin somewhat angular. Sternite 4 narrowly elongate anteriorly; surface depressed in midline, smooth; greatest width twice that of sternite 3, and twice as wide as long.

ABDOMEN. Anterior ridge of somite 2 with 2 median spines, and 1 or 2 spines on each side; anterior ridge of tergite 3 with 4 spines; tergites 2–3 each with one additional elevated transverse ridge, but tergites 4–6 lacking such ridges; tergite 6 with weakly produced posterolateral lobes and nearly transverse posteromedian margin. Telson composed of 10 plates; posterior plates combined, 1.8 times as wide as long.

EYE. Ocular peduncle mobile; cornea subglobular, unarmed, as wide as eyestalk.

ANTENNULE. Basal article of antennular peduncle with strong distolateral and distodorsal spines, distomesial angle unarmed, minutely serrated; lateral margin swollen, unarmed.

ANTENNA. Antennal peduncle not reaching end of rostrum; article 1 with strong distomesial spine, clearly reaching end of article 2; articles 2–4 unarmed.

MXP3. Ischium as long as merus measured on extensor margin; extensor and flexor margins terminating in well-developed spine; crista dentata finely denticulate; merus having flexor margin with 2 distinct spines, proximal spine larger than distal, extensor margin with distal spine; carpus, propodus and dactylus unarmed.

P1. 2.3 times as long as carapace, covered with short striae and some small granules, and uniramous setae scattered on merus to dactylus. Merus with 3 distal spines (ventral, lateral and dorsal), and 3–4 dorsomesial spines. Carpus 2.3 times as long as wide, with 2 distal spines (mesial and dorsal). Palm slender, nearly twice as long as carpus, 3.5 times as long as wide, and 0.7 times as long as fingers. Fingers not gaping; prehensile edges each with row of subtriangular teeth, proximal teeth obsolete; fixed finger without denticulate carina on distolateral margin.

P2–4. Moderately slender, with few small granules and short striae on dorsal surface, somewhat compressed laterally, dense plumose setae along extensor margin of articles. P2 longer than P3 and P4, not exceeding end of P1. P2 merus elongate, 0.6 times carapace length, 3.7 times length of P2 carpus and 1.3 times length of P2 propodus. P2–3 meri with distal spine on extensor and flexor margin; carpi with prominent distal spine, lateral side smooth or with minute granules; P2–3 propodi 5 times as long as high, unarmed except for 1–2 distal spinules on flexor margin; dactyli 0.6–0.7 length of propodi; distal claw short, moderately curved; flexor margin nearly straight, with 8 small teeth decreasing in size proximally, each with slender corneous spine, ultimate tooth closer to penultimate tooth than to dactylar tip. Epipods absent from pereopods.

GENETIC DATA. Not available.

Remarks

Munidopsis columbae sp. nov. resembles *M. plumasetigera* Baba, 1988, from NE of Kayoa Island, off the SW coast of Halmahera, and the Kei Islands (Baba 1988, 2005).

The new species can easily be distinguished from *M. plumasetigera* by the following features:

- The gastric region has one median mesogastric spine in *M. plumasetigera*, whereas there is a longitudinal row of 3 spines in *M. columbae* sp. nov.
- The cardiac region has one median spine in *M. plumasetigera*, whereas this region has two pairs of spines in the new species.

Distribution

Madagascar, between 450 and 576 m.

Remarks on the colour patterns of other species

The material obtained in the different cruises also provides the colour patterns of some known species not (or scarcely) described in previous papers. These colour patterns are the following (Figs 11–14):

Bathymunida polae Balss, 1914

Fig. 14B

Carapace and abdomen orange-red, with median gastric and cardiac spines whitish, some dorsal granules and lateral spines of carapace and abdomen whitish; abdominal somites 4–5 with median part whitish; somite 6 and telson whitish or transparent. P1–4 with reddish and whitish bands; P1 fingers distally red.

Munida africana Balss, 1913

Fig. 11A

Ground colour of carapace and abdominal somites 2–3 reddish or pinkish; abdominal somites 4–6 and tailfan whitish. Rostrum and supraocular spines reddish. P1 pinkish, fingers whitish. P2–4 pinkish, distal part of dactyli reddish.

Munida benguela de Saint-Laurent & Macpherson, 1988

Fig. 11B, C

Ground colour of carapace and abdominal somites 2–3 reddish or pinkish; abdominal somites 4–6 and tailfan whitish. Rostrum and supraocular spines whitish or reddish. P1 pinkish or reddish, fingers reddish. P2–4 pinkish or reddish, distal part of propodi whitish; dactyli reddish or whitish.

Munida limula Macpherson & Baba, 1993

Fig. 12A

Ground colour orange, with numerous red patches. Rostrum and supraocular spines orange, tips reddish. P1 orange, with reddish bands; fingers orange, with some white spots. P2–4 with reddish and whitish transverse bands.

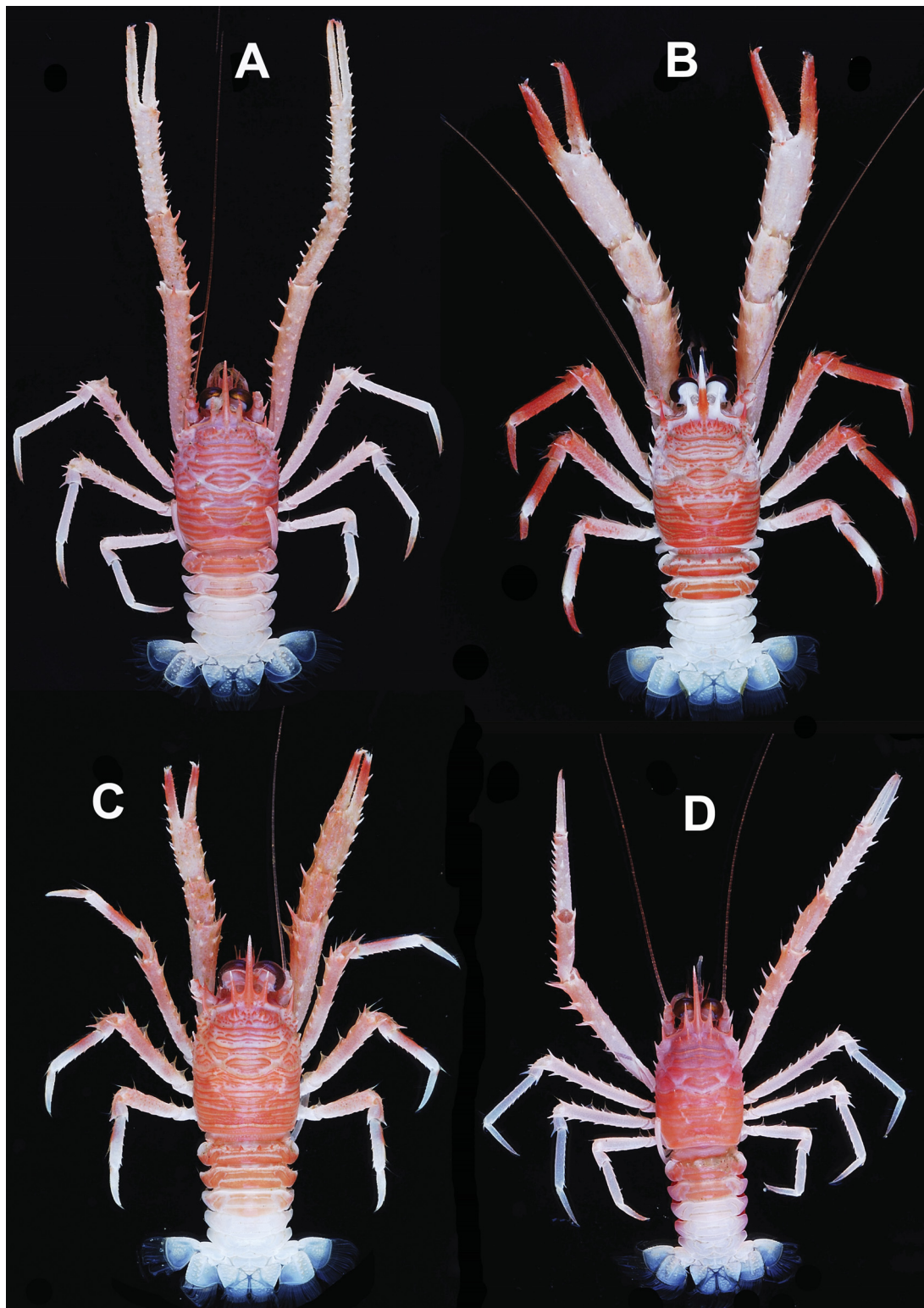


Fig. 11. Dorsal view. Colours in life. **A.** *Munida africana* Balss, 1913, ♀, 10.9 mm, Mozambique, MAINBAZA, Stn CP3141. **B.** *Munida benguela* de Saint-Laurent & Macpherson, 1988, ♂, 20.0 mm, Mozambique, MAINBAZA, Stn CP3138. **C.** *Munida benguela* de Saint-Laurent & Macpherson, 1988, ♀, 13.7 mm, Mozambique, MAINBAZA, Stn CP3135. **D.** *Munida hoda* sp. nov., paratype, ov. ♀, 11.4 mm, Mozambique, MAINBAZA, Stn CC3166.

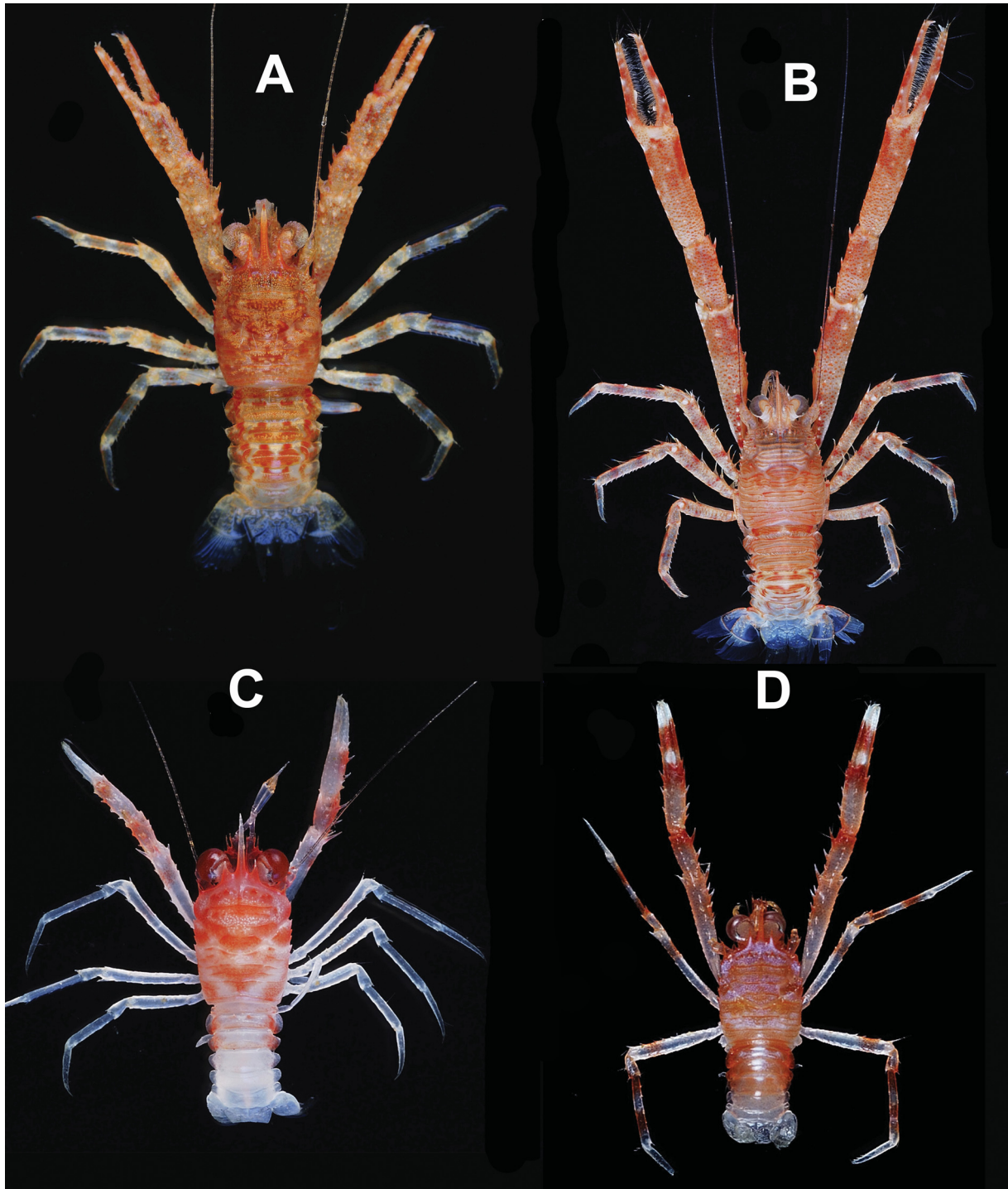


Fig. 12. Dorsal view. Colours in life. **A.** *Munida limula* Macpherson & Baba, 1993, ♂, 3.4 mm, Madagascar, ATIMO VATAE, Stn TP12. **B.** *Munida mesembria* sp. nov., paratype, ♀, 6.5 mm, Mozambique, MAINBAZA, Stn CP3130. **C.** *Munida micra* sp. nov., holotype, ♂, 3.7 mm, Mozambique, MAINBAZA, Stn CC3165. **D.** *Munida muscae* Macpherson & de Saint Laurent, 2002, ♂, 3.2 mm, Madagascar, MIRIKY, Stn DW3179.

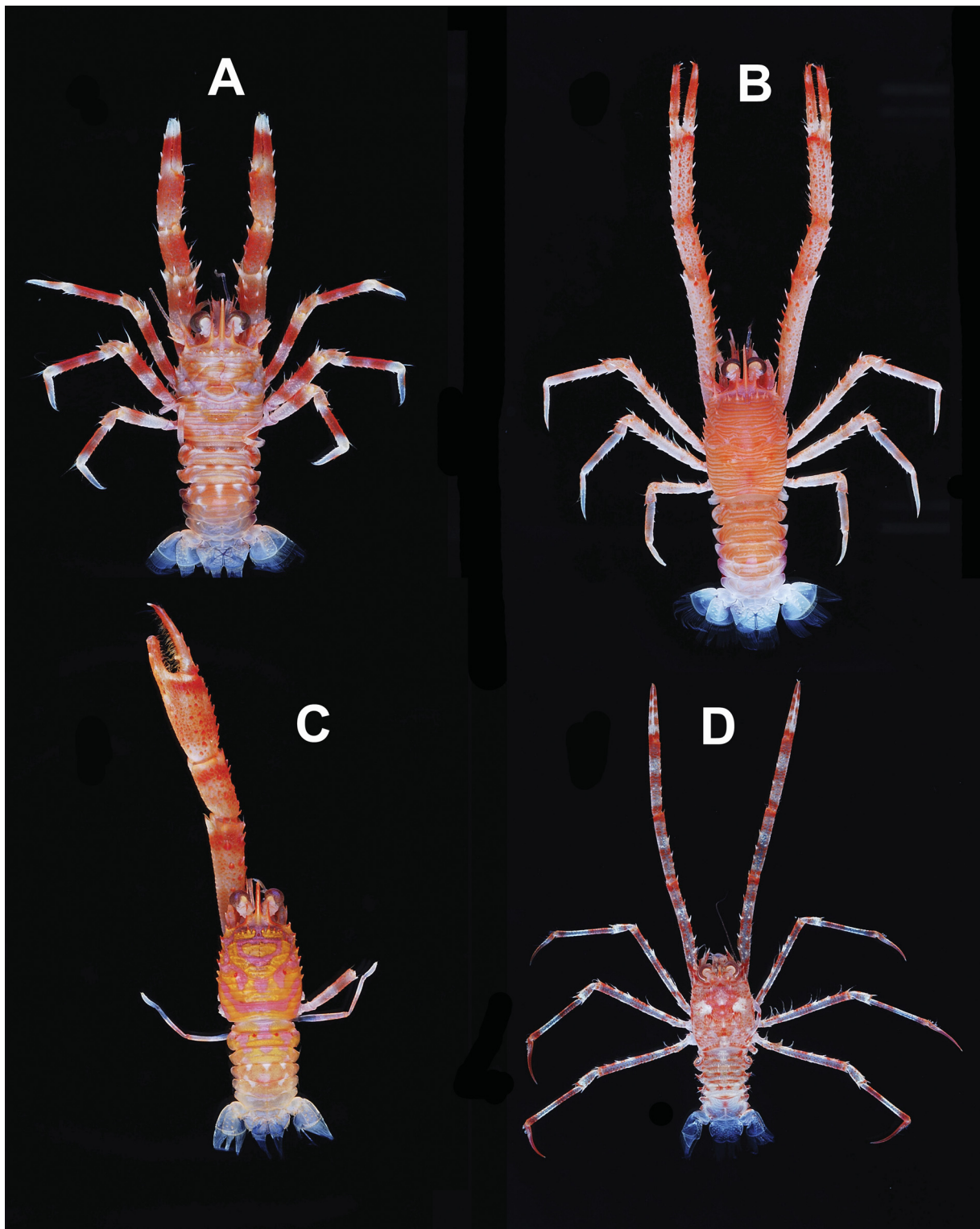


Fig. 13. Dorsal view. Colours in life. **A.** *Munida nesiotes* Macpherson, 1999, ov. ♀, 8.5 mm, Mozambique, MAINBAZA, Stn CP3143. **B.** *Munida shaula* Macpherson & de Saint Laurent, 2002, ov. ♀, 12.4 mm, Mozambique, MAINBAZA, Stn CC3151. **C.** *Munida tetracantha* sp. nov., paratype, ♂, 7.4 mm, Mozambique, MAINBAZA, Stn CP3131. **D.** *Paramunida marionis* Cabezas *et al.*, 2011, ♀, 6.0 mm, Mozambique, MAINBAZA, Stn CP3143.

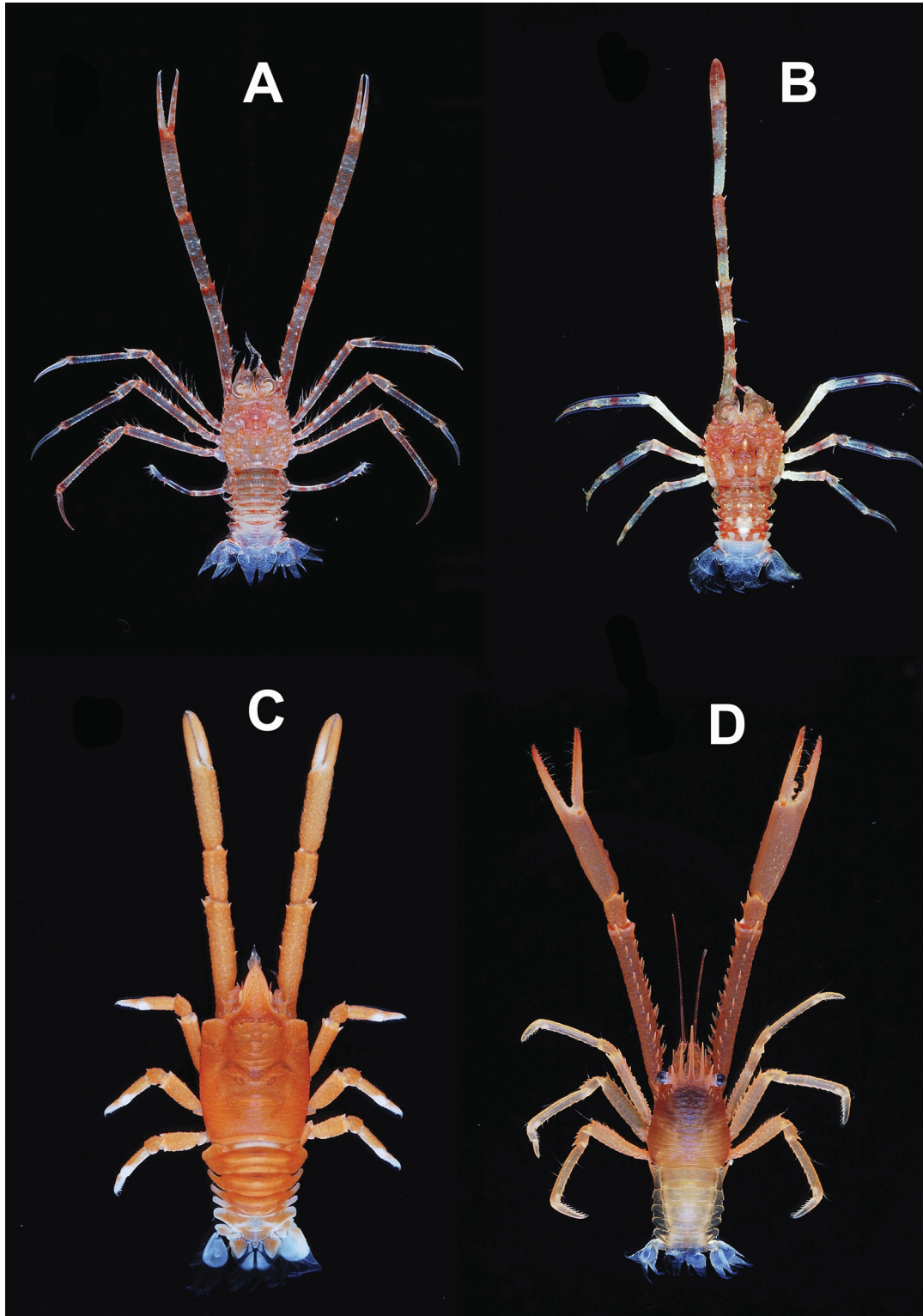


Fig. 14. Dorsal view. Colours in life. **A.** *Paramunida mozambica* Cabezas *et al.*, 2011, ♀, 6.0 mm, Mozambique, MAINBAZA, Stn CP3161. **B.** *Bathymunida polae* Balss, 1914, ♂, 3.8 mm, Mozambique, MAINBAZA, Stn DW3133. **C.** *Munidopsis africana* Balss, 1913, ♂, 7.4 mm, Mozambique, MAINBAZA, Stn CP3142. **D.** *Eumunida minor* de Saint Laurent & Macpherson, 1990, ♂, 5.3 mm, Mozambique, MAINBAZA, Stn DW3167.

Munida muscae Macpherson & de Saint Laurent, 2002

Fig. 12D

Ground colour of carapace and abdomen orange, with some whitish patches. Rostral spine orange, base of supraocular and rostral spines whitish. P1 with whitish and reddish bands, fingers with proximal white patch, distal part white. P2–4 with reddish and whitish transverse bands, dactyli whitish.

Munida nesiotes Macpherson, 1999

Fig. 13A

Ground colour of carapace and abdomen pinkish, ridges orange; large orange patches on gastric, cardiac and branchial areas; abdominal somites 2–4 with some orange and whitish patches, somites 5–6 orange. Rostrum and supraocular spines orange. P1 with large red and pink transverse bands, distal portion of fingers whitish. P2–4 with reddish and whitish transverse bands, dactyli whitish, with proximal red spot.

Munida shaula Macpherson & de Saint Laurent, 2002

Fig. 13B

Ground colour of carapace and abdomen orange to orange red; rostrum and supraocular spines orange-reddish; abdominal somites 5–6 whitish with orange ridges; telson whitish. P1 pink-whitish, with red bands on distal part of carpus, palm and fingers; numerous dorsal spines reddish. P2–4 whitish with red bands.

Paramunida marionis Cabezas *et al.*, 2011

Fig. 13D

Carapace and abdomen reddish, with numerous white patches; ridges reddish; dorsal spines whitish. P1–4 whitish with red bands; distal portion of P1 palm red, fingers with red and whitish bands.

Paramunida mozambica Cabezas *et al.*, 2011

Fig. 14A

Ground colour of carapace and abdomen pale pink; gastric region reddish; lateral branchial ridges reddish; most dorsal spines whitish. Ground colour of P1–4 whitish, with red bands and small red spots; P1 fixed finger whitish with some red stripes.

Munidopsis africana Balss, 1913

Fig. 14C

Body orange-red; abdominal somites 5–6 and telson with whitish and orange portions; rostrum light orange. P1–4 orange; base of P1 movable finger whitish; distal part of P2–4 propodi and dactyli whitish.

Eumunida minor de Saint Laurent & Macpherson, 1990

Fig. 14D

Overall orange-reddish. Posterior abdominal somites translucent. P1 orange, distal margin of merus deep orange, small orange spot on distal margin of palm, near movable finger. P2–4 light orange, dactyli nearly translucent.

Discussion

About 200 species of squat lobsters (Chirostyloidea and Galatheoidea) are known from the western Indian Ocean. After the present study, 4 species of *Eumunida*, 2 species of *Agononida*, 36 species of *Munida*, 2 species of *Paramunida*, 4 species of *Galacantha* and 40 species of *Munidopsis* are known (see also Table 2). Nevertheless, the sampling effort has been concentrated in the northern (e.g., Red Sea, Arabian Sea) and southern areas (e.g., Madagascar, South Africa) (e.g., Baba *et al.* 2008; Schnabel *et al.* 2011; Macpherson & Robainas-Barcia 2015). This suggests that information on the geographic distribution of these genera is still limited and incomplete, and additional species will be discovered as explorations continue.

There are many taxonomic problems in some species complexes, and although some recent works (e.g., Ah Yong 2014; Macpherson *et al.* 2014; Poore & Andreakis 2014) have clarified the status of numerous species, a revision of the Indian Ocean species is desirable. The recent description of new species closely related to *Munida microps* Alcock, 1894, e.g., *M. pollioculus* Komai & Higashiji, 2016 (Komai & Higashiji 2016), or to *Munidopsis centrina* Alcock & Anderson, 1894, e.g., *M. militaris* Henderson, 1885 (Dong *et al.* 2016), exemplifies the complexity of the genera. Other species with a cosmopolitan distribution, e.g., *Munidopsis nitida* (A. Milne-Edwards, 1880), *Galacantha rostrata* A. Milne Edwards, 1880, *G. bellis* Henderson, 1885 (Table 3), need complementary studies in order to clarify their taxonomic status.

The most common species of *Munida* collected in this study, i.e., *M. benguela*, *M. limula*, *M. mesembria* sp. nov., and *M. shaula*, are sexually dimorphic, with males larger than females. Sexual dimorphism in size has been observed in other galatheids (Baba 1988, 2005; Macpherson 1994), and is attributed to differential growth rates between sexes (Creasey *et al.* 2000). The overall sex ratios for males and females of these species are biased towards larger males (Table 2).

The number of species of squat lobsters collected per station is very low (mostly 1–2 species), probably related to their low densities (Table 2). This pattern is observed on the continental shelf and along the slope and abyssal plain, and contrasts with the higher diversity observed in other areas, i.e., New Caledonia (Macpherson 1994). In several samples, as many as 4 species were found, indicating that they coexist in the same zone/habitat.

Table 2 shows the occurrence of the known species (Eumunididae, Munididae and Munidopsidae) collected during the different cruises carried out along the western Indian Ocean. Table 3 provides a summary of the previous information on the geographic and depth distribution of the species, as well as the data collected in the present study. Some deep-sea species show a clear increase in their geographic range distribution (see Baba *et al.* 2008 for geographic range comparisons), i.e., *Pseudomunida fragilis* Haig, 1979. This species was described from one ovigerous female collected in the Hawaiian Islands, at 969–1280 m. The species was also cited from the Bonin Islands [Ogasawara Islands], 1370 m (Baba 2005), New Caledonia, 1098–1480 m (Macpherson 2006), and French Polynesia (unpublished record). These new occurrences extend the range of the species to the western Indian Ocean. The present specimens are similar to those collected in other areas. The branchial lateral spines of the carapace are slightly larger in the Indian Ocean material than in the types and material from French Polynesia. The broad geographic distribution of this species is still difficult to explain satisfactorily, and additional studies on molecular data and larval dispersal processes are desirable.

Munidopsis subsquamosa Henderson 1885, known from many localities in the Pacific and Atlantic Oceans is cited in the western Indian Ocean for the first time. *Munidopsis arietina* Alcock & Anderson, 1894, known from the Bay of Bengal, Philippines and Taiwan, is also cited from the Arabian Sea. *Munidopsis sinclairi* McArdle, 1901, from the western Pacific and *Munida typhle* Macpherson, 1994,

Table 2 (page 1 of 10). List of stations, species and number, gender and size of specimens. M = male; F = female; ov = ovigerous.

Region/expedition	Cruise, station, geographical coordinates, date, depth	Species	Specimen(s) gender and size
Zoological Museum, Moscow State University, Moscow (ZMM)			
Red Sea	Cruise 14, Stn 67, 15°05.7' N, 41°14' E, Dec. 1983, 55 m	<i>Munida janetae</i>	3 M, 3.7–5.2 mm; 3 ov. F, 3.2–4.3 mm
Arabian Sea (R/V Vitiáz)	Cruise 31, Stn 4714, 17°22.6' N, 71°04' E, 3 Apr. 1960, 1430–1470 m	<i>Munidopsis stylrostris</i>	2 M broken
Arabian Sea (R/V Vitiáz)	Cruise 2, Stn KUR22, 12°27.4' N, 61°16.3' E, 20 Apr. 1967, 2880–2920 m	<i>Galacantha bellis</i>	2 M, 7.6–13.3 mm; 2 F, 6.7–9.1 mm
Arabian Sea (R/V Vitiáz)	Cruise 2, Stn KUR22, 12°27.4' N, 61°16.3' E, 20 Apr. 1967, 2880–2920 m	<i>Munidopsis subsquamosa</i>	1 M, 12.8 mm
Arabian Sea (R/V Vitiáz)	Cruise 17, Stn 2610, 14°53.7' S, 43°19' E, 10 Nov. 1988, 3300 m	<i>Munidopsis centrina</i>	1 M, 18.4 mm.
Arabian Sea (R/V Vitiáz)	Cruise 17, Stn 2610, 14°53.7' S, 43°19' E, 10 Nov. 1988, 3300 m	<i>Munidopsis spissata</i>	1 M, 30.7 mm
Arabian Sea (R/V Vitiáz)	Cruise 17, Stn 2832, 12°43' N, 52°44.3' E, 16 Jan. 1989, 2315–2325 m	<i>Galacantha rostrata</i>	3 M, 22.8–28.1 mm
Arabian Sea (R/V Vitiáz)	Cruise 17, Stn 2832, 12°43' N, 52°44.3' E, 16 Jan. 1989, 2315–2325 m	<i>Munidopsis arietina</i>	2 M, 8.6–11.9 mm
Somalian Coast (R/V Akademik Karchatov)	Cruise 36, Stn 3776, 01°08' N, 56°34.8' E, 3 May 1983, 950–1120 m	<i>Munida typhle</i>	1 F, 8.1 mm
Somalian Coast (R/V Akademik Karchatov)	Cruise 36, Stn 3776, 01°08' N, 56°34.8' E, 3 May 1983, 950–1120 m	<i>Munidopsis trifida</i>	3 M, 4.1–7.0 mm
Somalian Coast (R/V Akademik Karchatov)	Cruise 36, Stn 3779, 01°06.5' N, 56°28.7' E, 4 May 1983, 1280–1380 m	<i>Pseudomunida fragilis</i>	3 M, 15.1–20.6 mm; 1 ov. F, 18.6 mm
Somalian Coast (R/V Akademik Karchatov)	Cruise 36, Stn 3785, 04°20.3' N, 52°55.5' E, 14 May 1983, 1760–1920 m	<i>Galacantha rostrata</i>	1 M, 23.6 mm
Somalian Coast (R/V Akademik Karchatov)	Cruise 17, Stn 2585, 0°26.2' N, 56°04.9' E, 2 Nov. 1988, 900 m	<i>Eumunida bispinata</i>	1 ov. F, 9.6 mm
Seychelles Area (R/V Akademik Karchatov)	Cruise 36, Stn 3724, 06°13.2' S, 54°24' E, 27 Mar. 1983, 1410–1500 m	<i>Munida typhle</i>	1 M, 7.4 mm; 7 ov. F, 5.8–9.5 mm; 1 F, 4.1 mm
Seychelles Area (R/V Akademik Karchatov)	Cruise 36, Stn 3724, 06°13.2' S, 54°24' E, 27 Mar. 1983, 1410–1500 m	<i>Munidopsis sinclairi</i>	1 M, 5.7 mm; 2 ov. F, 7.2–7.3 mm; 2 F, 4.8–4.9 mm
Seychelles Area (R/V Akademik Karchatov)	Cruise 36, Stn 3730, 06°12.2' S, 54°20.3' E, 28 Mar. 1983, 960–1260 m	<i>Munida typhle</i>	1 M, 5.7 mm; 1 F, 7.7 mm
Seychelles Area (R/V Akademik Karchatov)	Cruise 36, Stn 3731, 06°11.5' S, 54°21.3' E, 28 Mar. 1983, 560–640 m	<i>Eumunida similior</i>	1 M, 5.3 mm
Northeast Madagascar (R/V Vitiáz)	Cruise 17, Stn 2814, 09°38' S, 60°50' E, 9 Jan. 1989, 1650–1700 m	<i>Galacantha bellis</i>	1 M, 16.5 mm
Northeast Madagascar (R/V Vitiáz)	Cruise 17, Stn 2815, 09°40' S, 60°31' E, 9 Jan. 1989, 1520–1720 m	<i>Galacantha bellis</i>	1 M, 17.0 mm
Northeast Madagascar (R/V Vitiáz)	Cruise 17, Stn 2815, 09°40' S, 60°31' E, 9 Jan. 1989, 1520–1720 m	<i>Galacantha trachynotus</i>	1 M, 16.8 mm
Northeast Madagascar (R/V Vitiáz)	Cruise 17, Stn 2795, 11°45' S, 60°56' E, 6 Jan. 1989, 250–260 m	<i>Paramunida mozambica</i>	2 M, 12.3–13.7 mm; 3 ov. F, 10.7–11.8 mm; 1 F, 8.4 mm
East Madagascar (R/V Akademik Karchatov)	Cruise 36, Stn 3765, 19°22.9' S, 61°33.1' E, 25 Apr. 1983, 410–420 m	<i>Paramunida marionis</i>	2 M, 9.1–9.6 mm; 2 ov. F, 8.3–8.8 mm; 3 F, 8.9–9.5 mm
South Madagascar (R/V Vitiáz)	Cruise 17, Stn 2666, 27°49.7' S, 44°34.4' E, 6 Dec. 1988, 1800–1940 m	<i>Munida typhle</i>	1 M, 12.9 mm
South Madagascar (R/V Vitiáz)	Cruise 17, Stn 2666, 27°49.7' S, 44°34.4' E, 6 Dec. 1988, 1800–1940 m	<i>Galacantha rostrata</i>	1 M, 24.5 mm
South Madagascar (R/V Vitiáz)	Cruise 17, Stn 2666, 27°49.7' S, 44°34.4' E, 6 Dec. 1988, 1800–1940 m	<i>Munidopsis nitida</i>	1 ov. F, 24.5 mm
South Madagascar (R/V Vitiáz)	Cruise 17, Stn 2722, 32°25.3' S, 43°37.5' E, 17 Dec. 1988, 680–720 m	<i>Paramunida marionis</i>	1 M, 11.1 mm; 1 ov. F, 10.2 mm
South Madagascar (R/V Vitiáz)	Cruise 17, Stn 2753, 33°17.4' S, 43°52' E, 22 Dec. 1988, 410–480 m	<i>Paramunida marionis</i>	2 ov. F, 11.1–11.4 mm

Table 2 (page 2 of 10). List of stations, species and number, gender and size of specimens. M = male; F = female; ov = ovigerous.

Region/expedition	Cruise, station, geographical coordinates, date, depth	Species	Specimen(s) gender and size
Zoological Museum, Moscow State University, Moscow (ZMM)			
Mozambique (R/V Vitiáz)	Cruise 17, Stn 2610, 14°53.7' S, 43°19' E, 10 Nov. 1988, 3300 m	<i>Munidopsis spissata</i>	1 M, 30.7 mm
Mozambique (R/V Vitiáz)	Cruise 17, Stn 2614, 15°07.3' S, 42°06.5' E, 17 Nov. 1988, 3000 m	<i>Munidopsis granosa</i>	1 ov. F, 17.6 mm
Mozambique (R/V Vitiáz)	Cruise 17, Stn 2653, 22°17.4' S, 42°50.5' E, 3 Jan. 1988, 1500 m	<i>Galacantha valdiviae</i>	2 M, 9.5–14.0 mm; 2 ov. F, 15.3–18.5 mm; 1 F, 16.4 mm
Mozambique (R/V Vitiáz)	Cruise 17, Stn 2645, 22°20.5' S, 43°03.6' E, 2 Dec. 1988, 490 m	<i>Munidopsis sinclairi</i>	1 ov. F, 9.9 mm
Mozambique (R/V Vitiáz)	Cruise 17, Stn 2636, 25°06.3' S, 35°24' E, 25 Nov. 1988, 600–680 m	<i>Munida benguela</i>	1 M, 26.2 mm
Mozambique (R/V Vitiáz)	Cruise 17, Stn 2636, 25°06.3' S, 35°24' E, 25 Nov. 1988, 600–680 m	<i>Pseudomunida fragilis</i>	1 F, 13.7 mm
Mozambique (R/V Vitiáz)	Cruise 17, Stn 2630, 25°26.5' S, 35°12' E, 23 Nov. 1988, 660–715 m	<i>Munida benguela</i>	5 M, 12.8–20.5 mm; 2 F, 13.6–19.8 mm
Mozambique (R/V Vitiáz)	Cruise 17, Stn 2629, 25°28.3' S, 35°28.7' E, 23 Nov. 1988, 1200–1520 m	<i>Galacantha valdiviae</i>	1 M, 16.6 mm
Mozambique (R/V Vitiáz)	Cruise 17, Stn 2631, 25°30.4' S, 35°08.2' E, 23 Nov. 1988, 490–535 m	<i>Munida benguela</i>	3 M
Muséum national d'Histoire naturelle de Paris (MNHN)			
South Madagascar	Cruise ATIMO VATAE, Stn CP3511, 25°14.82' S, 47°14.08' E, 29 Apr. 2010, 97–98 m	<i>Munida limula</i>	9 M, 3.6–5.4 mm; 7 ov. F, 4.0–5.5 mm; 1 F, 4.3 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3512, 25°15.82' S, 47°16.95' E, 29 Apr. 2010, 140–144 m	<i>Munida limula</i>	2 M, 3.8–5.4 mm; 7 ov. F, 3.6–5.6 mm; 1 F, 4.4 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3520, 24°51.82' S, 47°28.29' E, 30 Apr. 2010, 80–86 m	<i>Munida limula</i>	4 M, 3.3–5.4 mm; 3 F, 2.4–3.0 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3527, 24°23.56' S, 47°32.28' E, 1 May 2010, 305–313 m	<i>Eumunida bispinata</i>	1 M, 6.5 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3527, 24°23.56' S, 47°32.28' E, 1 May 2010, 305–313 m	<i>Munida latior</i>	1 M, 12.4 mm; 1 ov. F, 9.3 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3543, 25°27.94' S, 46°58.61' E, 3 May 2010, 148–155 m	<i>Eumunida minor</i>	1 M, 4.0 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3543, 25°27.94' S, 46°58.61' E, 3 May 2010, 148–155 m	<i>Munida latior</i>	1 M, 10.4 mm; 2 ov. F, 10.0–10.8 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3543, 25°27.94' S, 46°58.61' E, 3 May 2010, 148–155 m	<i>Munida limula</i>	2 M, 6.4–6.5 mm; 1 ov. F, 5.5 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3544, 25°34.90' S, 46°43.49' E, 4 May 2010, 662–680 m	<i>Munida benguela</i>	1 F, 17.6 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3546, 25°23.21' S, 46°42.57' E, 4 May 2010, 84–85 m	<i>Munida limula</i>	4 M, 3.0–3.4 mm; 2 ov. F, 3.5–4.3 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3549, 25°16.87' S, 46°31.80' E, 4 May 2010, 53–54 m	<i>Munida limula</i>	2 M, 3.5–5.5 mm

Table 2 (page 3 of 10). List of stations, species and number, gender and size of specimens. M = male; F = female; ov = ovigerous.

Region/expedition	Cruise, station, geographical coordinates, date, depth	Species	Specimen(s) gender and size
Muséum national d'Histoire naturelle de Paris (MNHN)			
South Madagascar	Cruise ATIMO VATAE, Stn CP3572, 25°11.63' S, 47°11.61' E, 8 May 2010, 75–77 m	<i>Munida limula</i>	1 M, 7.2 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3573, 25°13.39' S, 47°13.48' E, 8 May 2010, 87–88 m	<i>Munida limula</i>	1 M, 7.0 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3583, 25°32.22' S, 44°17.03' E, 10 May 2010, 296–302 m	<i>Munida shaula</i>	6 M, 6.4–11.5 mm; 4 F, 8.3–11.8 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3584, 25°29.80' S, 44°15.64' E, 10 May 2010, 203–210 m	<i>Munida babai</i>	2 M, 4.5–5.0 mm; 1 ov. F, 4.2 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3585, 25°33.10' S, 44°16.40' E, 10 May 2010, 549–576 m	<i>Munida benguela</i>	5 M, 13.1–17.8 mm; 3 F, 14.2–22.0 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3585, 25°33.10' S, 44°16.40' E, 10 May 2010, 549–576 m	<i>Munidopsis calvata</i>	1 M, 17.2 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3589, 25°03.90' S, 44°00.04' E, 11 May 2010, 132–153 m	<i>Munida latior</i>	11 M, 7.4–11.2 mm; 3 ov. F, 8.9–9.7 mm, 4 F, 4.2–9.0 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3589, 25°03.90' S, 44°00.04' E, 11 May 2010, 132–153 m	<i>Munida limula</i>	1 M, 4.4 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3590, 25°01.79' S, 43°58.67' E, 11 May 2010, 300–309 m	<i>Munida shaula</i>	2 M, 13.5–16.0 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3591, 25°02.08' S, 43°58.17' E, 11 May 2010, 400–402 m	<i>Munida shaula</i>	4 M, 11.8–16.3 mm; 1 F, 10.8 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3595, 25°36.04' S, 44°16.59' E, 12 May 2010, 821–910 m	<i>Munida remota</i>	2 M, 13.2–14.0 mm; 1 ov. F, 14.7 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3596, 25°09.81' S, 44°16.76' E, 12 May 2010, 986–991 m	<i>Munida remota</i>	1 F, 7.8 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3597, 25°43.38' S, 44°23.91' E, 12 May 2010, 729–732 m	<i>Munida benguela</i>	1 ov. F, 17.7 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3615, 26°13.00' S, 45°07.96' E, 14 May 2010, 284–286 m	<i>Eumunida minor</i>	1 M, 5.0 mm; 1 F, 5.2 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3615, 26°13.00' S, 45°07.96' E, 14 May 2010, 284–286 m	<i>Paramunida marionis</i>	1 M, 8.4 mm; 1 F, 5.8 mm
South Madagascar	Cruise ATIMO VATAE, Stn CP3620, 25°46.52' S, 46°01.26' E, 15 May 2010, 133–178 m	<i>Munida limula</i>	4 ov. F, 4.3–5.2 mm; 1 F, 5.4 mm
South Madagascar	Cruise ATIMO VATAE, Stn DW3515, 24°53.33' S, 47°28.02' E, 30 Apr. 2010, 184–203 m	<i>Munida latior</i>	1 M, 9.2 mm
South Madagascar	Cruise ATIMO VATAE, Stn DW3516, 24°52.70' S, 47°28.23' E, 30 Apr. 2010, 160–161 m	<i>Munida sphinx</i>	1 ov. F, 9.7 mm

MACPHERSON E. *et al.*, Squat lobsters from Indian Ocean**Table 2** (page 4 of 10). List of stations, species and number, gender and size of specimens. M = male; F = female; ov = ovigerous.

Region/expedition	Cruise, station, geographical coordinates, date, depth	Species	Specimen(s) gender and size
Muséum national d'Histoire naturelle de Paris (MNHN)			
South Madagascar	Cruise ATIMO VATAE, Stn DW3518, 24°51.46' S, 47°28.47' E, 30 Apr. 2010, 99–101 m	<i>Munida limula</i>	2 ov. F, 5.8–6.0 mm
South Madagascar	Cruise ATIMO VATAE, Stn DW3519, 24°52.81' S, 47°27.69' E, 30 Apr. 2010, 80–83 m	<i>Munida limula</i>	4 M, 3.6–5.0 mm; 2 F, 3.6–4.3 mm
South Madagascar	Cruise ATIMO VATAE, Stn DW3522, 24°23.85' S, 47°32.12' E, 1 May 2010, 154–168 m	<i>Munida latior</i>	5 M, 4.5–9.6 mm; 2 ov. F, 6.4–8.3 mm
South Madagascar	Cruise ATIMO VATAE, Stn DW3522, 24°23.85' S, 47°32.12' E, 1 May 2010, 154–168 m	<i>Munida limula</i>	1 ov. F, 4.0 mm
South Madagascar	Cruise ATIMO VATAE, Stn DW3532, 24°40.24' S, 47°31.59' E, 2 May 2010, 86–87 m	<i>Munida limula</i>	3 M, 3.7–5.0 mm
South Madagascar	Cruise ATIMO VATAE, Stn DW3533, 24°42.50' S, 47°31.52' E, 2 May 2010, 187–209 m	<i>Munida latior</i>	1 ov. F, 8.8 mm
South Madagascar	Cruise ATIMO VATAE, Stn DW3533, 24°42.50' S, 47°31.52' E, 2 May 2010, 187–209 m	<i>Munida limula</i>	1 F, 3.7 mm
South Madagascar	Cruise ATIMO VATAE, Stn DW3550, 26°03.79' S, 45°31.38' E, 5 May 2010, 98 m	<i>Munida limula</i>	1 F, 3.7 mm
South Madagascar	Cruise ATIMO VATAE, Stn DW3551, 26°05.85' S, 45°33.56' E, 5 May 2010, 111–115 m	<i>Eumunida bispinata</i>	2 M, 4.0–6.1 mm; 2 F, 4.2–4.3 mm
South Madagascar	Cruise ATIMO VATAE, Stn DW3551, 26°05.85' S, 45°33.56' E, 5 May 2010, 111–115 m	<i>Munida limula</i>	2 M, 7.2–7.7 mm; 3 ov. F, 5.4–7.1 mm
South Madagascar	Cruise ATIMO VATAE, Stn DW3553, 26°07.88' S, 45°39.78' E, 5 May 2010, 280–333 m	<i>Eumunida minor</i>	28 M, 4.5–6.0 mm; 6 ov. F, 4.2–4.8 mm; 18 F, 3.6–5.8 mm
South Madagascar	Cruise ATIMO VATAE, Stn DW3557, 26°07.89' S, 45°40.01' E, 5 May 2010, 282–333 m	<i>Eumunida minor</i>	14 M, 5.0–5.5 mm; 6 F, 4.0–4.8 mm
South Madagascar	Cruise ATIMO VATAE, Stn DW3564, 25°36.79' S, 46°20.89' E, 6 May 2010, 433–456 m	<i>Munida babai</i>	1 ov. F, 4.6 mm
South Madagascar	Cruise ATIMO VATAE, Stn DW3564, 25°36.79' S, 46°20.89' E, 6 May 2010, 433–456 m	<i>Paramunida marionis</i>	1 M, 9.7 mm; 1 ov. F, 9.8 mm; 1 F, 9.6 mm
South Madagascar	Cruise ATIMO VATAE, Stn DW3600, 25°58.42' S, 44°40.99' E, 13 May 2010, 143 m	<i>Munida latior</i>	1 M, 9.2 mm; 1 ov. F, 7.1 mm; 1 F, 6.5 mm
South Madagascar	Cruise ATIMO VATAE, Stn DW3600, 25°58.42' S, 44°40.99' E, 13 May 2010, 143 m	<i>Munida limula</i>	2 M, 4.6–5.5 mm; 1 F, 5.6 mm
South Madagascar	Cruise ATIMO VATAE, Stn DW3601, 25°58.26' S, 44°42.62' E, 13 May 2010, 97–98 m	<i>Munida limula</i>	1 ov. F, 3.7 mm

Table 2 (page 5 of 10). List of stations, species and number, gender and size of specimens. M = male; F = female; ov = ovigerous.

Region/expedition	Cruise, station, geographical coordinates, date, depth	Species	Specimen(s) gender and size
Muséum national d'Histoire naturelle de Paris (MNHN)			
South Madagascar	Cruise ATIMO VATAE, Stn TB05, 25°02.2' S, 47°00.4' E, 7 May 2010, 23 m	<i>Munida limula</i>	1 F, 4.5 mm
South Madagascar	Cruise ATIMO VATAE, Stn TP12, 25°02.6' S, 47°01.0' E, 6 May 2010, 29–41 m	<i>Munida limula</i>	1 M, 3.5 mm
North Madagascar	Cruise MIRIKY, Stn CP3178, 12°59' S, 48°09' E, 25 Jun. 2009, 378–380 m	<i>Paramunida marionis</i>	2 ov. F, 9.7–11.3 mm
North Madagascar	Cruise MIRIKY, Stn CP3188, 12°31' S, 48°22' E, 27 Jun. 2009, 298–301 m	<i>Paramunida marionis</i>	1 M, 9.8 mm; 7 ov. F, 8.5–10.6 mm
North Madagascar	Cruise MIRIKY, Stn CP3189, 12°30' S, 48°18' E, 27 Jun. 2009, 346–376 m	<i>Paramunida marionis</i>	2 M, 10.0–10.7 mm; 3 ov. F, 8.1–9.2 mm; 1 F, 8.8 mm
North Madagascar	Cruise MIRIKY, Stn CP3208, 12°41' S, 48°17' E, 29 Jun. 2009, 231–237 m	<i>Paramunida marionis</i>	1 M, 9.3 mm; 3 ov. F, 7.5–9.0 mm
North Madagascar	Cruise MIRIKY, Stn CP3209, 12°43' S, 48°14' E, 29 Jun. 2009, 291–353 m	<i>Paramunida marionis</i>	1 M, 8.6 mm; 5 ov. F, 9.0–9.3 mm
North Madagascar	Cruise MIRIKY, Stn CP3240, 14°30' S, 47°27' E, 6 Jul. 2009, 251–257 m	<i>Munida latior</i>	6 M, 8.5–12.3 mm; 2 ov. F, 9.2–11.8 mm; 4 F, 9.0–11.2 mm
North Madagascar	Cruise MIRIKY, Stn CP3241, 14°30' S, 47°27' E, 6 Jul. 2009, 274–325 m	<i>Munida shaula</i>	4 M, 8.6–14.7 mm; 1 ov. F, 9.5 mm
North Madagascar	Cruise MIRIKY, Stn CP3241, 14°30' S, 47°27' E, 6 Jul. 2009, 274–325 m	<i>Munida sphinx</i>	4 M, 11.3–13.0 mm; 6 ov. F, 9.7–10.9 mm; 2 F, 9.8–12.7 mm
North Madagascar	Cruise MIRIKY, Stn CP3247, 14°50' S, 47°00' E, 7 Jul. 2009, 349–442 m	<i>Munidopsis bispinoculata</i>	2 M, 2.0–3.2 mm
North Madagascar	Cruise MIRIKY, Stn CP3248, 14°50' S, 46°57' E, 7 Jul. 2009, 340–446 m	<i>Munida shaula</i>	1 M, 13.8 mm; 1 ov. F, 8.5 mm
North Madagascar	Cruise MIRIKY, Stn CP3248, 14°50' S, 46°57' E, 7 Jul. 2009, 340–446 m	<i>Munidopsis calvata</i>	1 F, 7.8 mm
North Madagascar	Cruise MIRIKY, Stn CP3250, 15°22' S, 46°00' E, 8 Jul. 2009, 750 m	<i>Munidopsis calvata</i>	4 M, 12.0–14.4 mm; 4 ov. F, 12.0–14.4 mm
North Madagascar	Cruise MIRIKY, Stn CP3252, 15°22' S, 45°58' E, 8 Jul. 2009, 850–900 m	<i>Munidopsis calvata</i>	1 M, 11.5 mm
North Madagascar	Cruise MIRIKY, Stn CP3252, 15°22' S, 45°58' E, 8 Jul. 2009, 850–900 m	<i>Munidopsis levis</i>	1 F, 16.0 mm
North Madagascar	Cruise MIRIKY, Stn CP3252, 15°22' S, 45°58' E, 8 Jul. 2009, 850–900 m	<i>Munidopsis trifida</i>	1 F, 10.7 mm
North Madagascar	Cruise MIRIKY, Stn CP3253, 15°25' S, 45°55' E, 8 Jul. 2009, 243–950 m	<i>Munidopsis bispinoculata</i>	1 ov. F, 9.8 mm

Table 2 (page 6 of 10). List of stations, species and number, gender and size of specimens. M = male; F = female; ov = ovigerous.

Region/expedition	Cruise, station, geographical coordinates, date, depth	Species	Specimen(s) gender and size
Muséum national d'Histoire naturelle de Paris (MNHN)			
North Madagascar	Cruise MIRIKY, Stn CP3253, 15°25' S, 45°55' E, 8 Jul. 2009, 243–950 m	<i>Munidopsis levis</i>	1 F, 12.4 mm
North Madagascar	Cruise MIRIKY, Stn CP3253, 15°25' S, 45°55' E, 8 Jul. 2009, 243–950 m	<i>Munidopsis trifida</i>	3 ov. F, 11.1–12.8 mm
North Madagascar	Cruise MIRIKY, Stn CP3260, 15°35' S, 45°45' E, 10 Jul. 2009, 179–193 m	<i>Munida babai</i>	1 M, 4.8 mm
North Madagascar	Cruise MIRIKY, Stn CP3260, 15°35' S, 45°45' E, 10 Jul. 2009, 179–193 m	<i>Munida sphinx</i>	1 F, 9.0 mm
North Madagascar	Cruise MIRIKY, Stn CP3262, 15°34' S, 45°44' E, 10 Jul. 2009, 227–283 m	<i>Munida sphinx</i>	1 F, 9.0 mm
North Madagascar	Cruise MIRIKY, Stn CP3263, 15°34' S, 45°44' E, 10 Jul. 2009, 287–450 m	<i>Munida shaula</i>	1 M, 12.8 mm; 3 ov. F, 12.2–13.2 mm
North Madagascar	Cruise MIRIKY, Stn CP3264, 15°33' S, 45°44' E, 10 Jul. 2009, 325–560 m	<i>Munida shaula</i>	3 M, 11.7–19.3 mm
North Madagascar	Cruise MIRIKY, Stn CP3264, 15°33' S, 45°44' E, 10 Jul. 2009, 325–560 m	<i>Munidopsis calvata</i>	1 M, 16.5 mm
North Madagascar	Cruise MIRIKY, Stn CP3265, 15°32' S, 45°45' E, 10 Jul. 2009, 327–730 m	<i>Munida shaula</i>	1 M, 17.5 mm
North Madagascar	Cruise MIRIKY, Stn CP3267, 15°32' S, 45°43' E, 11 Jul. 2009, 350–580 m	<i>Munida shaula</i>	5 M, 12.4–15.5 mm; 1 F, 11.0 mm
North Madagascar	Cruise MIRIKY, Stn CP3268, 15°31' S, 45°45' E, 11 Jul. 2009, 640–800 m	<i>Munidopsis bispinoculata</i>	1 ov. F, 10.1 mm
North Madagascar	Cruise MIRIKY, Stn CP3269, 15°31' S, 45°46' E, 11 Jul. 2009, 760–1000 m	<i>Munidopsis calvata</i>	1 M, 11.8 mm; 1 F, 5.3 mm
North Madagascar	Cruise MIRIKY, Stn CP3269, 15°31' S, 45°46' E, 11 Jul. 2009, 760–1000 m	<i>Munidopsis levis</i>	1 M, 16.3 mm
North Madagascar	Cruise MIRIKY, Stn CP3270, 15°31' S, 45°42' E, 11 Jul. 2009, 777–800 m	<i>Munidopsis bispinoculata</i>	1 ov. F, 10.1 mm
North Madagascar	Cruise MIRIKY, Stn CP3271, 15°31' S, 45°45' E, 11 Jul. 2009, 780–800 m	<i>Munidopsis levis</i>	1 ov. F, 18.4 mm
North Madagascar	Cruise MIRIKY, Stn CP3278, 15°24' S, 45°56' E, 12 Jul. 2009, 750–780 m	<i>Munidopsis calvata</i>	1 M, 9.3 mm
North Madagascar	Cruise MIRIKY, Stn CP3284, 14°51' S, 46°59' E, 13 Jul. 2009, 236–297 m	<i>Munida sphinx</i>	1 M, 16.3 mm
North Madagascar	Cruise MIRIKY, Stn CP3285, 14°47' S, 46°58' E, 13 Jul. 2009, 512–680 m	<i>Munida benguela</i>	1 M, 20.5 mm; 1 ov. F, 18.0 mm; 1 F, 18.6 mm
North Madagascar	Cruise MIRIKY, Stn CP3285, 14°47' S, 46°58' E, 13 Jul. 2009, 512–680 m	<i>Munidopsis calvata</i>	1 M, 12.3 mm
North Madagascar	Cruise MIRIKY, Stn CP3289, 14°29' S, 47°26' E, 14 Jul. 2009, 332–379 m	<i>Munidopsis calvata</i>	8 M, 6.7–16.0 mm; 4 ov. F, 9.1–12.4 mm; 5 F, 8.1–10.2 mm
North Madagascar	Cruise MIRIKY, Stn CP3290, 14°29' S, 47°26' E, 14 Jul. 2009, 409–425 m	<i>Munidopsis bispinoculata</i>	1 M, 8.7 mm; 1 F, 3.2 mm
North Madagascar	Cruise MIRIKY, Stn CP3290, 14°29' S, 47°26' E, 14 Jul. 2009, 409–425 m	<i>Munidopsis calvata</i>	1 M, 9.5 mm
North Madagascar	Cruise MIRIKY, Stn CP3293, 14°30' S, 47°26' E, 14 Jul. 2009, 268–408 m	<i>Munidopsis calvata</i>	1 M, 16.4 mm; 2 ov. F, 11.6–12.4 mm

Table 2 (page 7 of 10). List of stations, species and number, gender and size of specimens. M = male; F = female; ov = ovigerous.

Region/expedition	Cruise, station, geographical coordinates, date, depth	Species	Specimen(s) gender and size
Muséum national d'Histoire naturelle de Paris (MNHN)			
North Madagascar	Cruise MIRIKY, Stn CP3293, 14°30' S, 47°26' E, 14 Jul. 2009, 268–408 m	<i>Munidopsis similior</i>	2 ov. F, 6.6–8.5 mm
North Madagascar	Cruise MIRIKY, Stn CP3294, 14°29' S, 47°27' E, 14 Jul. 2009, 263–331 m	<i>Munida shaula</i>	3 M, 11.3–14.1 mm; 1 ov. F, 14.6 mm
North Madagascar	Cruise MIRIKY, Stn CP3294, 14°29' S, 47°27' E, 14 Jul. 2009, 263–331 m	<i>Munida sphinx</i>	2 M, 7.3–8.5 mm; 1 ov. F, 10.2 mm
North Madagascar	Cruise MIRIKY, Stn CP3294, 14°29' S, 47°27' E, 14 Jul. 2009, 263–331 m	<i>Munidopsis calvata</i>	1 M, 10.8 mm
North Madagascar	Cruise MIRIKY, Stn DW3179, 12°59' S, 48°09' E, 25 Jun. 2009, 220–362 m	<i>Munida muscae</i>	1 M, 3.2 mm
North Madagascar	Cruise MIRIKY, Stn DW3215, 12°32' S, 47°54' E, 30 Jun. 2009, 316–433 m	<i>Paramunida marionis</i>	1 M, 8.1 mm; 1 ov. F, 8.2 mm
Mozambique	Cruise MAINBAZA, Stn CC3150, 19°30.58' S, 36°46.72' E, 13 Apr. 2009, 261–264 m	<i>Munidopsis kensleyi</i>	1 F, 14.7 mm
Mozambique	Cruise MAINBAZA, Stn CC3150, 19°30.58' S, 36°46.72' E, 13 Apr. 2009, 261–264 m	<i>Paramunida mozambica</i>	2 M, 5.6–5.8 mm; 3 F, 4.0–4.5 mm
Mozambique	Cruise MAINBAZA, Stn CC3151, 19°32.80' S, 36°45.96' E, 13 Apr. 2009, 352–357 m	<i>Munida benguela</i>	1 M, 6.5 mm
Mozambique	Cruise MAINBAZA, Stn CC3151, 19°32.80' S, 36°45.96' E, 13 Apr. 2009, 352–357 m	<i>Munida shaula</i>	10 M, 6.1–14.4 mm; 2 ov. F, 9.5–10.0 mm; 7 F, 5.7–9.6 mm
Mozambique	Cruise MAINBAZA, Stn CC3152, 19°33.44' S, 36°46.24' E, 13 Apr. 2009, 443–445 m	<i>Munida shaula</i>	11 M, 7.2–13.5 mm; 1 ov. F, 9.8 mm; 3 F, 8.3–8.9 mm
Mozambique	Cruise MAINBAZA, Stn CC3153, 19°34.31' S, 36°46.53' E, 13 Apr. 2009, 518–524 m	<i>Munidopsis bruta</i>	1 M, 4.4 mm
Mozambique	Cruise MAINBAZA, Stn CC3154, 19°34.98' S, 36°47.71' E, 13 Apr. 2009, 636 m	<i>Munidopsis bruta</i>	1 M, 5.3 mm, 1 F, 6.3 mm
Mozambique	Cruise MAINBAZA, Stn CC3156, 21°44.42' S, 36°36.48' E, 14 Apr. 2009, 1810–1820 m	<i>Munidopsis nitida</i>	1 M, 21.2 mm
Mozambique	Cruise MAINBAZA, Stn CC3159, 23°53.80' S, 35°37.58' E, 15 Apr. 2009, 148–152 m	<i>Bathymunida polae</i>	1 M, 4.0 mm; 1 ov. F, 4.1 mm
Mozambique	Cruise MAINBAZA, Stn CC3160, 23°57.70' S, 35°39.59' E, 15 Apr. 2009, 206–210 m	<i>Paramunida mozambica</i>	4 M, 7.5–8.7 mm; 2 ov. F, 8.0–8.1 mm

Table 2 (page 8 of 10). List of stations, species and number, gender and size of specimens. M = male; F = female; ov = ovigerous.

Region/expedition	Cruise, station, geographical coordinates, date, depth	Species	Specimen(s) gender and size
Muséum national d'Histoire naturelle de Paris (MNHN)			
Mozambique	Cruise MAINBAZA, Stn CC3161, 24°00.76' S, 35°41.07' E, 15 Apr. 2009, 266–267 m	<i>Paramunida mozambica</i>	19 M, 6.8–9.0 mm; 9 ov. F, 7.4–7.8 mm; 10 F, 7.0–9.4 mm
Mozambique	Cruise MAINBAZA, Stn CC3162, 24°04.10' S, 35°42.07' E, 15 Apr. 2009, 344 m	<i>Paramunida mozambica</i>	9 M, 5.4–8.0 mm; 8 ov. F, 7.3–8.1 mm; 6 F, 5.3–7.8 mm
Mozambique	Cruise MAINBAZA, Stn CC3163, 24°08.21' S, 35°42.04' E, 15 Apr. 2009, 406–410 m	<i>Paramunida mozambica</i>	5 M, 7.3–10.0 mm; 2 ov. F, 7.3–7.7 mm; 8 F, 5.0–9.0 mm
Mozambique	Cruise MAINBAZA, Stn CC3165, 24°15.70' S, 35°42.12' E, 15 Apr. 2009, 605–612 m	<i>Munida benguela</i>	14 M, 18.0–25.5 mm; 2 ov. F, 23.0–23.4 mm; 4 F, 8.4–23.3 mm
Mozambique	Cruise MAINBAZA, Stn CC3166, 24°21.22' S, 35°42.35' E, 15 Apr. 2009, 708–715 m	<i>Munida benguela</i>	5 M, 15.4–18.5 mm; 3 ov. F, 15.5–21.8 mm; 3 F, 5.6–21.0 mm
Mozambique	Cruise MAINBAZA, Stn CC3171, 25°58.37' S, 34°43.52' E, 16 Apr. 2009, 771–776 m	<i>Munidopsis kensleyi</i>	1 M, 7.4 mm
Mozambique	Cruise MAINBAZA, Stn CC3172, 25°58.86' S, 34°36.51' E, 16 Apr. 2009, 630–638 m	<i>Munida benguela</i>	16 M, 6.2–27.2 mm; 8 ov. F, 9.5–24.0 mm; 15 F, 6.5–22.2 mm
Mozambique	Cruise MAINBAZA, Stn CC3172, 25°58.86' S, 34°36.51' E, 16 Apr. 2009, 630–638 m	<i>Munidopsis kensleyi</i>	1 M, 11.2 mm
Mozambique	Cruise MAINBAZA, Stn CC3174, 25°34.17' S, 33°13.01' E, 17 Apr. 2009, 253–262 m	<i>Munida babai</i>	1 M, 4.1 mm; 1 ov. F, 5.0 mm
Mozambique	Cruise MAINBAZA, Stn CC3175, 25°32.70' S, 33°12.09' E, 17 Apr. 2009, 155–165 m	<i>Bathymunida polae</i>	1 M, 3.2 mm; 1 F, 2.5 mm
Mozambique	Cruise MAINBAZA, Stn CC3175, 25°32.70' S, 33°12.09' E, 17 Apr. 2009, 155–165 m	<i>Munida babai</i>	1 M, 4.0 mm
Mozambique	Cruise MAINBAZA, Stn CP3130, 25°52.00' S, 33°07.05' E, 9 Apr. 2009, 112–127 m	<i>Bathymunida polae</i>	1 M, 3.2 mm; 1 F, 2.5 mm
Mozambique	Cruise MAINBAZA, Stn CP3130, 25°52.00' S, 33°07.05' E, 9 Apr. 2009, 112–127 m	<i>Munida lator</i>	3 M, 5.5–9.2 mm; 4 ov. F, 6.8–7.3 mm; 4 F, 6.6–7.3 mm
Mozambique	Cruise MAINBAZA, Stn CP3132, 25°11.24' S, 35°01.51' E, 10 Apr. 2009, 101–102 m	<i>Bathymunida polae</i>	3 M, 4.6–5.3 mm
Mozambique	Cruise MAINBAZA, Stn CP3133, 25°10.07' S, 35°10.56' E, 10 Apr. 2009, 200–201 m	<i>Bathymunida polae</i>	1 M, 3.8 mm

Table 2 (page 9 of 10). List of stations, species and number, gender and size of specimens. M = male; F = female; ov = ovigerous.

Region/expedition	Cruise, station, geographical coordinates, date, depth	Species	Specimen(s) gender and size
Muséum national d'Histoire naturelle de Paris (MNHN)			
Mozambique	Cruise MAINBAZA, Stn CP3133, 25°10.07' S, 35°10.56' E, 10 Apr. 2009, 200–201 m	<i>Paramunida mozambica</i>	1 M, 6.3 mm
Mozambique	Cruise MAINBAZA, Stn CP3134, 25°10.14' S, 35°14.78' E, 10 Apr. 2009, 303–403 m	<i>Paramunida mozambica</i>	6 M, 7.2–7.4 mm; 12 ov. F, 7.3–10.6 mm; 20 F, 6.4–8.6 mm
Mozambique	Cruise MAINBAZA, Stn CP3135, 25°10.57' S, 35°16.59' E, 10 Apr. 2009, 480–503 m	<i>Munida benguela</i>	1 F, 13.7 mm
Mozambique	Cruise MAINBAZA, Stn CP3135, 25°10.57' S, 35°16.59' E, 10 Apr. 2009, 480–503 m	<i>Paramunida mozambica</i>	17 M, 5.8–11.7 mm; 7 ov. F, 8.0–12.2 mm; 25 F, 4.4–10.5 mm
Mozambique	Cruise MAINBAZA, Stn CP3136, 25°11.60' S, 35°17.19' E, 10 Apr. 2009, 503–505 m	<i>Paramunida mozambica</i>	1 F, 9.4 mm
Mozambique	Cruise MAINBAZA, Stn CP3138, 25°12.80' S, 35°21.04' E, 10 Apr. 2009, 700–707 m	<i>Munida benguela</i>	1 M, 20.0 mm
Mozambique	Cruise MAINBAZA, Stn CP3140, 23°33' S, 36°02' E, 11 Apr. 2009, 886–898 m	<i>Munidopsis kensleyi</i>	1 M, 13.6 mm
Mozambique	Cruise MAINBAZA, Stn CP3141, 23°31.95' S, 35°55.74' E, 11 Apr. 2009, 684–698 m	<i>Munida africana</i>	1 F, 10.9 mm
Mozambique	Cruise MAINBAZA, Stn CP3141, 23°31.95' S, 35°55.74' E, 11 Apr. 2009, 684–698 m	<i>Munida benguela</i>	12 M, 10.0–21.3 mm; 7 ov. F, 14.1–22.2 mm; 10 F, 8.8–20.5 mm
Mozambique	Cruise MAINBAZA, Stn CP3141, 23°31.95' S, 35°55.74' E, 11 Apr. 2009, 684–698 m	<i>Munida shaula</i>	7 M, 9.7–15.4 mm; 4 ov. F, 9.7–15.4 mm, 2 F, 10.0–13.5 mm
Mozambique	Cruise MAINBAZA, Stn CP3141, 23°31.95' S, 35°55.74' E, 11 Apr. 2009, 684–698 m	<i>Munidopsis kensleyi</i>	1 M, 11.5 mm
Mozambique	Cruise MAINBAZA, Stn CP3142, 23°30.80' S, 35°51.01'E', 11 Apr. 2009, 446–475 m	<i>Munidopsis africana</i>	1 M, 7.4 mm
Mozambique	Cruise MAINBAZA, Stn CP3143, 23°30.94' S, 35°46.30' E, 11 Apr. 2009, 264–277 m	<i>Munida nesioties</i>	3 M, 8.2–11.5 mm; 2 ov. F, 8.5–8.6 mm
Mozambique	Cruise MAINBAZA, Stn CP3143, 23°30.94' S, 35°46.30' E, 11 Apr. 2009, 264–277 m	<i>Paramunida marionis</i>	14 M, 4.8–9.0 mm; 17 ov. F, 7.0–9.2 mm, 12 F, 5.3–6.8 mm
Mozambique	Cruise MAINBAZA, Stn CP3147, 21°36.54' S, 35°57.96' E, 12 Apr. 2009, 990–996 m	<i>Munidopsis bispinoculata</i>	1 M, 11.0 mm

Table 2 (page 10 of 10). List of stations, species and number, gender and size of specimens. M = male; F = female; ov = ovigerous.

Region/expedition	Cruise, station, geographical coordinates, date, depth	Species	Specimen(s) gender and size
Muséum national d'Histoire naturelle de Paris (MNHN)			
South Madagascar	Cruise MD08, Stn 6, 33°11.4' S, 44°04' E, 17 Mar. 1976, 620–635 m	<i>Paramunida marionis</i>	3 M, 7.2–11.0 mm
South Madagascar	Cruise MD08, Stn CP47, 33°11' S, 44°00' E, 16 Mar. 1976, 620–637 m	<i>Paramunida marionis</i>	7 M, 8.6–11.4 mm
Northern Mozambique Channel	Cruise BENTHEDI, Stn DR5, 12°32' S, 47°40.2' E, 18 Mar. 1977, 35–150 m	<i>Munida foresti</i>	1 M, 3.7 mm
Northern Mozambique Channel	Cruise BENTHEDI, Stn DR8, 11°29.2' S, 47°18.2' E, 19 Mar. 1977, 250 m	<i>Paramunida mozambica</i>	1 F, 5.0 mm
Northern Mozambique Channel	Cruise BENTHEDI, Stn F49, 12°54.6' S, 44°56.8' E, 28 Mar. 1977, 300–450 m	<i>Bathymunida polae</i>	1 M broken
Northern Mozambique Channel	Cruise BENTHEDI, Stn F49, 12°54.6' S, 44°56.8' E, 28 Mar. 1977, 300–450 m	<i>Paramunida mozambica</i>	2 F, 4.3–5.6 mm
Northern Mozambique Channel	Cruise BENTHEDI, Stn F61, 12°46' S, 44°58' E, 29 Mar. 1977, 475–510 m	<i>Eumunida bispinata</i>	1 M, 9.0 mm; 1 F, 3.7 mm
Northern Mozambique Channel	Cruise BENTHEDI, Stn F68, 12°29.7' S, 45°02.3' E, 30 Mar. 1977, 400–460 m	<i>Paramunida mozambica</i>	1 F, 5.2 mm
Northern Mozambique Channel	Cruise BENTHEDI, Stn F103, 11°25' S, 47°22.6' E, 3 Apr. 1977, 150–670 m	<i>Munida muscae</i>	1 M, 4.1 mm

Table 3 (page 1 of 3). Geographic distribution and depth range (previous and present data) of the different species considered in the study.

Species	Previous studies		Present study	
	Geographic distribution	Depth range (m)	Geographic distribution	Depth range (m)
Family Eumunidiidae				
A. Milne-Edwards & Bouvier, 1900				
<i>Eumunida bispinata</i> Baba, 1990	Madagascar	450	Somalian coast, South Madagascar, Northern Mozambique Channel	111–900
<i>Eumunida minor</i> de Saint Laurent & Macpherson, 1990	Madagascar, New Caledonia, Loyalty Islands, Vanuatu and Bikini Atoll,	230–315	South Madagascar	148–333
<i>Eumunida similior</i> Baba, 1990	Madagascar	580–585	Seychelles area	560–640
<i>Pseudomunida fragilis</i> Haig, 1979	Bonin Islands, New Caledonia, Hawaii, French Polynesia	969–1480	Somalian coast, Mozambique	600–1380
Family Munidiidae Ahyong et al., 2010				
<i>Bathymunida polae</i> Balss, 1914	Red Sea, Madagascar, Mauritius, La Réunion, and Ambon	76–255	Mozambique, Northern Mozambique Channel	101–450
<i>Munida africana</i> Balss, 1913	E coast of Africa	421–863	Mozambique	684–698
<i>Munida babai</i> Tirmizi & Javed, 1976	Red Sea, Madagascar, South Africa, West Malay Peninsula, W Australia	70–341	Madagascar	155–456
<i>Munida benguela</i> de Saint Laurent & Macpherson, 1988	Namibia, South Africa, Madagascar	450–825	Mozambique, Madagascar	352–732
<i>Munida foresti</i> Macpherson & de Saint Laurent, 2002	La Réunion	58–70	Northern Mozambique Channel	35–150
<i>Munida janetae</i> Tirmizi & Javed, 1992	off Somali Republic and off Durban	78–118 m	Red Sea	55
<i>Munida latior</i> Baba, 2005	Mauritius	238	Mozambique, Madagascar	112–313
<i>Munida limula</i> Macpherson & Baba, 1993	Madagascar	42–115	South Madagascar	23–209
<i>Munida muscae</i> Macpherson & de Saint Laurent, 2002	La Réunion and NW Madagascar	250–620	Northern Mozambique Channel, North Madagascar	220–362
<i>Munida nestotes</i> Macpherson, 1999	Seychelles Islands	200	Mozambique	264–277
<i>Munida remota</i> Baba, 1990	Madagascar	1250–1300	South Madagascar	821–991
<i>Munida shaula</i> Macpherson & de Saint Laurent, 2002	Zanzibar, Madagascar, La Réunion	280–510	Mozambique, Madagascar	263–450
<i>Munida sphinx</i> Macpherson & Baba, 1993	Madagascar, Zanzibar, Mauritius, La Réunion, Indonesia, Bali Sea	50–366	Madagascar	179–331
<i>Munida typhle</i> Macpherson, 1994	Taiwan, New Caledonia, Vanuatu, French Polynesia	500–1470	Somalian coast, Seychelles area, South Madagascar	950–1940
<i>Paramunida marionis</i> Cabezas et al., 2010	South of Madagascar	620–637	Mozambique, Madagascar	231–720
<i>Paramunida mozambica</i> Cabezas et al., 2010	Mozambique	344	Mozambique	200–505

Table 3 (page 2 of 3). Geographic distribution and depth range (previous and present data) of the different species considered in the study.

Species	Previous studies		Present study	
	Geographic distribution	Depth range (m)	Geographic distribution	Depth range (m)
Family Munidopsidae Ortman, 1898				
<i>Galacantha bellis</i> Henderson, 1885	Chile, Arabian Sea, Zanzibar, Madagascar, Laccadive Sea, Sri Lanka, central Indian Ocean, Bay of Bengal, Japan, Philippines, Indonesia, Solomon Islands, New Caledonia, Wallis and Futuna	1035–3800	Arabian Sea, Northeast Madagascar	1520–2920
<i>Galacantha rostrata</i> A. Milne Edwards, 1880	numerous localities from the Atlantic, Indian and Pacific Oceans	1517–3294	Arabian Sea, Somali coast, South Madagascar	1760–2325
<i>Galacantha trachynotus</i> Anderson, 1896	Arabian Sea, Gulf of Aden, Madagascar, Sulawesi, Queensland, Solomon Islands, Fiji	1068–2000	Northeast Madagascar	1520–1720
<i>Galacantha valdiviae</i> Balss, 1913	E coast of Africa, Madagascar, Japan, Taiwan, Philippines, Sulawesi, Solomon Islands, Queensland, New Zealand	1000–2307	Mozambique	1200–1520
<i>Munidopsis africana</i> Balss, 1913	Zanzibar	463	Mozambique	446–475
<i>Munidopsis arietina</i> Alcock & Anderson, 1894	Bay of Bengal, Taiwan, Philippines	2216–2935	Arabian Sea	2315–2325
<i>Munidopsis bispinoculata</i> Baba, 1988	Madagascar, Japan (Tosa Bay), Taiwan, Philippines, Mindanao Sea, Sulawesi, Indonesia, New South Wales, Solomon Islands, Vanuatu and Fiji	443–1775	Mozambique, North Madagascar	349–996
<i>Munidopsis bruta</i> Macpherson, 2007	Taiwan, Philippines, Indonesia (Kei Islands), Solomon Islands	329–1203	Mozambique	518–636
<i>Munidopsis calvata</i> Macpherson, 2007	Madagascar	250–720	Madagascar	263–900
<i>Munidopsis centrina</i> Alcock & Anderson, 1894	Mozambique Channel, SW Indian Ocean, Bay of Bengal, Japan (Tosa Bay), Taiwan, Tasman Sea, New Caledonia	1301–3450	Arabian Sea	3300
<i>Munidopsis granosa</i> Alcock, 1901	Mozambique Channel, Bay of Bengal, Taiwan	2610–3485	Mozambique	3000
<i>Munidopsis kensleyi</i> Ah Yong & Poore, 2004	South Africa, Taiwan, W Australia, New South Wales, Solomon Islands, Vanuatu, Chesterfield Islands, New Caledonia, Wallis and Futuna	296–1313	Mozambique	261–898
<i>Munidopsis levis</i> (Alcock & Anderson, 1894)	Arabian Sea, Zanzibar, Madagascar, Maldives, Laccadive Sea, Andaman Sea, South China Sea, Philippines, Indonesia (Kei Islands), Solomon Islands, W Australia	454–1295	North Madagascar	760–1000

Table 3 (page 3 of 3). Geographic distribution and depth range (previous and present data) of the different species considered in the study.

Species	Previous studies		Present study	
	Geographic distribution	Depth range (m)	Geographic distribution	Depth range (m)
Family Munidopsidae Ortmann, 1898				
<i>Munidopsis nitida</i> (A. Milne Edwards, 1880)	Gulf of California, Gulf of Panama, Gulf of Mexico, Caribbean Sea, Gulf of Guinea, Gulf of Aden, Mozambique, Madagascar, SW Indian Ocean, Taiwan, Philippines, Indonesia, E Australia, New Caledonia, Vanuatu, Solomon Islands	933–2875	Mozambique	1810–1820
<i>Munidopsis similior</i> Baba, 1988	Madagascar, Taiwan, Philippines, Indonesia, Solomon Islands, Vanuatu, Fiji	267–1775	North Madagascar	268–408
<i>Munidopsis sinclairi</i> McArdle, 1901	Madagascar, Indonesia, Taiwan, Philippines, New Caledonia, Vanuatu, Solomon Islands	527–2217	Seychelles area	1410–1500
<i>Munidopsis spissata</i> Macpherson, 2007	Madagascar, Sri Lanka, Central Indian Ocean	3344–3760	Mozambique	3300
<i>Munidopsis stylirostris</i> Wood-Mason, 1891	Arabian Sea, Gulf of Aden, SE Indian Ocean, Laccadive Sea	1035–2282	Arabian Sea	1430–1470
<i>Munidopsis subsquamosa</i> Henderson, 1885	Chile, Namibia, South Africa, Marion Island, Crozet Islands, Japan, Australia	1000–3960	Arabian Sea	2880–2920
<i>Munidopsis trifida</i> Henderson, 1885	Chile, Arabian Sea, Madagascar, Laccadive Sea, Bay of Bengal, Andaman Sea, Japan, Taiwan, China Sea, Indonesia, New Caledonia, Solomon Islands	280–1164	North Madagascar	850–900

from New Caledonia, Vanuatu, Taiwan and French Polynesia, are cited from the Seychelles area and Madagascar (Table 3).

The results obtained in the present paper indicate the existence of a rich squat lobster fauna in the western Indian Ocean and emphasize the necessity of further studies to describe the communities of this interesting area.

The molecular data indicate that some morphological characters can have a phylogenetic value. For instance, the granules on the lateral parts of the seventh thoracic sternites cluster *Munida gordoae* from the SW Pacific and *M. tetracantha* sp. nov. from the SW Indian Ocean. The group of species having 5 spines on the branchial lateral margins of the carapace and the anterior ridge of the second abdominal somite unarmed also cluster together, e.g., *M. austrina* sp. nov. and *M. mesembria* sp. nov. from the SW Indian Ocean, with *M. notata*, *M. moliae* Macpherson, 1994 and *M. leagora* Macpherson, 1994 from the SW Pacific, suggesting a common origin. A similar pattern can be observed in some species having 5 spines on the branchial lateral margins of the carapace and spines along the anterior ridge of the second abdominal somite, e.g., *M. benguela* and *M. hoda* sp. nov. from the SW Indian Ocean, and *M. rhodonia* Macpherson, 1994, *M. congesta* Macpherson, 1999 and *M. rosula* Macpherson, 1994 from the SW Pacific. However, the evolutionary value of the different morphological characters must be determined in a wide study on the phylogeny of the family Munididae. This study (actually in progress) would solve the extreme morphological convergence and heterogeneity in the divergence values within genera and species (Ahyong *et al.* 2011; Cabezas *et al.* 2012).

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