**Supplementary material 2.** Decapoda identification key adapted for deep-sea images.

# Shrimps, prawns and lobsters in the Mozambique Channel: image-based identification key.

**(0a)** Body laterally compressed. Antennal flagella thin and thread-like. Telson posteriorly pointed. Mostly swimming in the water column, pleopods very long and extending laterally. Antennal scale very broad and elongate, often extended laterally (i.e., "V" shape quite visible).

**Dendrobranchiata* (1)**

*Third pereiopod with chela, second abdominal pleuron overlapping first abdominal pleuron, never carrying eggs.

**(0b)** Body generally laterally compressed. Antennal flagella thin and thread-like. Telson posteriorly pointed. Mostly walk near or on the bottom. Antennal scale and pleopods not extending laterally.

**Pleocyemata (Caridea) (10)**

*Third pereiopod without chela, second abdominal pleuron not overlapping first abdominal pleuron, carrying eggs after spawning.

**(0c)** Body dorsoventrally compressed. Antennae thick and whip-like. Telson posteriorly truncated. Mostly walk near or on the bottom. Thick, strong cylindrical carapace covered with many spines/granules. Moderate to large body size. Absence of prominent rostrum. Pereiopods simple, without claws (end with a simple curved dactyl). Eyes protected by two strong frontal horns (frontal projections of the carapace).

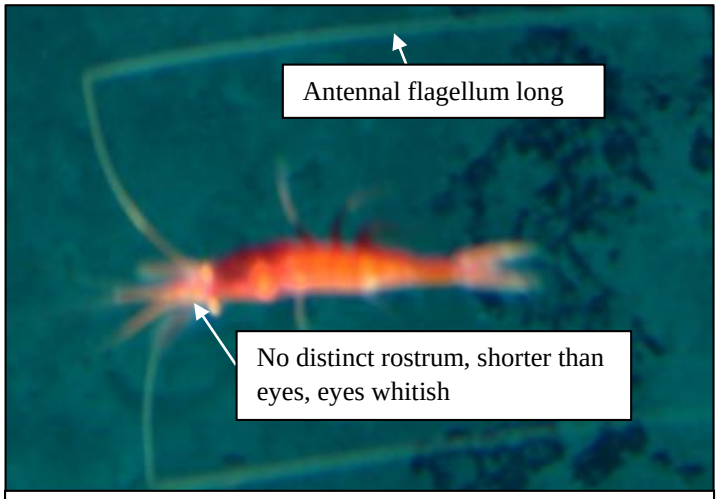
**Achelata (Palinuridae) (21)**

**(1a)** Always black eyes (be careful, sometimes with golden reflection from underwater lighting for photography), rostrum long.

**2**

**(1b)** Eyes black or white, rostrum short (shorter than eyes, with only one or two, occasionally three, rostral/postrostral teeth), shell soft, thin. Body orange to red and with no distinct banding, upper antennular flagella long.

**Benthesycimidae (*Benthesycimus*)**




*Benthesycimus* indeterminabilis

**(2a)** Upper antennular flagella short, cervical groove often not to upper carapace. Body and antennal flagella always red/orange.

**Aristeidae (3)**

**(3b)** Upper antennular flagella long, cervical groove (can be difficult to see from images) long and extending to or near to upper carapace. Body pink to pale orange, antennal flagella white.

**8**

**(3a)** Body yellow/light orange. Presence of one elongated overhanging spine on third abdominal somite.

***Hemipenaeus***

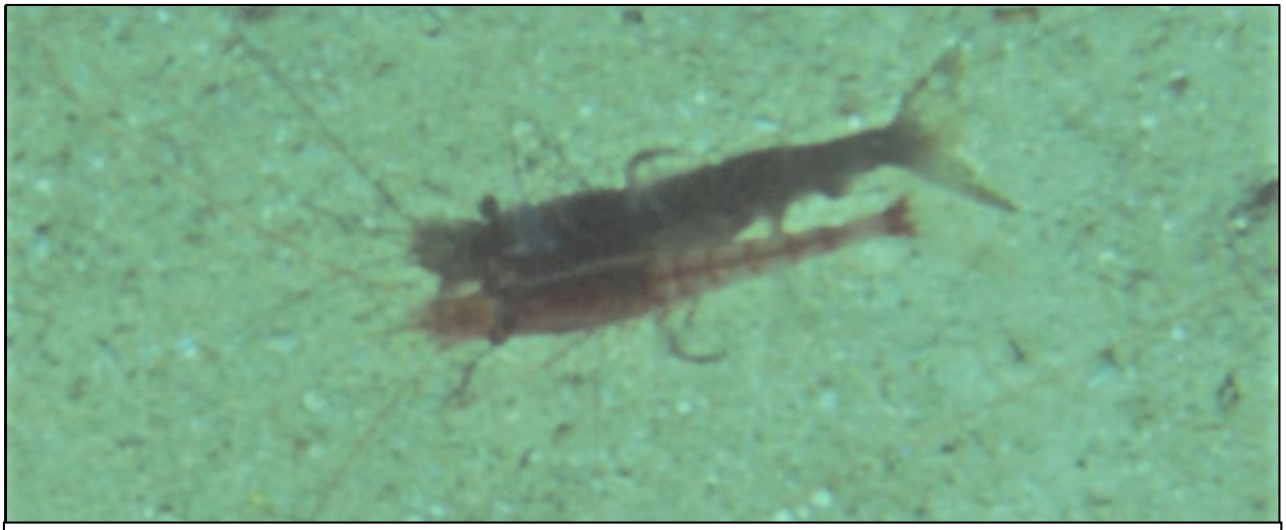
*Hemipenaeus* indeterminabilis

**(3b)** Body red to orange, abdominal somites with posterior spines but never with elongated overhanging spine on third somite.

**4**

**(4a)** Body moderately robust, red to pale pink and often banded, sometimes with distinct purple color. Occurred in 300-1200 m depth.

***Aristeus* (6)**



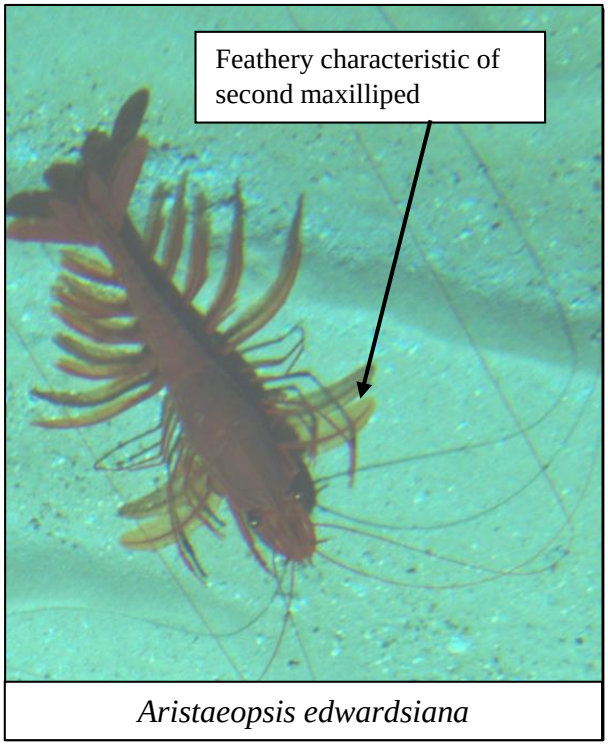
*Aristeus* indeterminabilis

**(4b)** Body very robust, dark red and deep red color, no banding on the abdomen.

**5**

**(5a)** Carinae and grooves on carapace long and very distinct. Abdomen only with small posterior spines. Exopod of second maxilliped fringed by double row of long setae which give it a feathery characteristic.

***Aristaeopsis edwardsiana***




*Aristaeopsis edwardsiana*

***** Only species of the genus *Aristaeopsis*, depth range 500m-1500m.

**(5b)** Carapace without long distinct grooves and carinae. Abdomen with three large posterior spines.

***Cerataspis monstrosus***

**(6a)** Purple/pink bands color pattern, unique character of the species.

***Aristeus mabahissae***

*Aristeus mabahissae*

**(6b)** Body red to orange, sometimes with banding but never with purple color.

**7**

**(7a)** Body hairy with rough-looking cuticle.

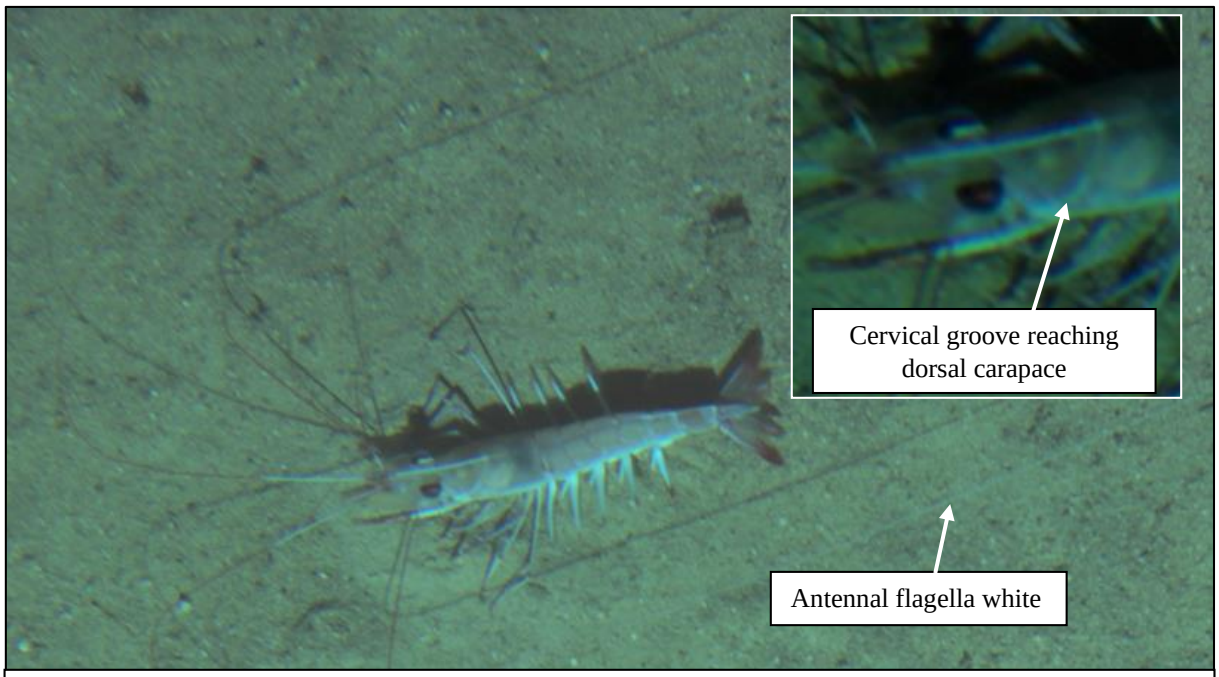
***Aristeus virilis***

**(7b)** Body smooth and shiny.

***Aristeus antennatus***

**(8a)** Cervical groove reaching dorsal carapace. Rostrum broad and crest-like.

**Solenoceridae (*Haliporoides*) (9)**



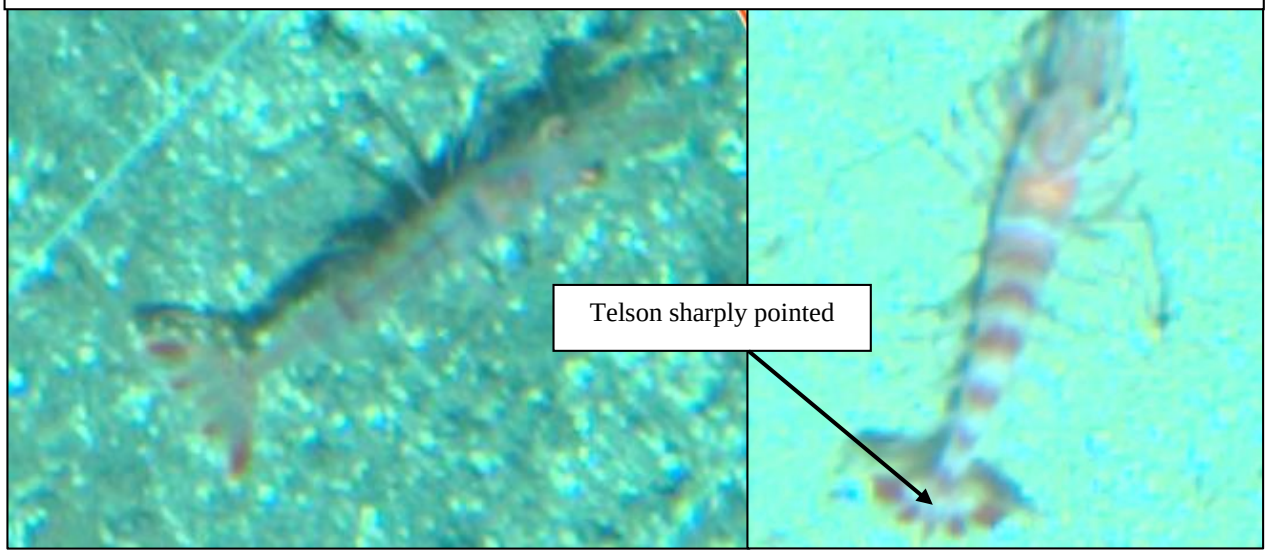

*Haliporoides* indeterminabilis

*Four species in the *Haliporoides* genus that correspond to subspecies with specific geographic range, and only two are restrictive to the Mozambique Channel/Madagascar area.

**(8b)** Cervical groove not reaching dorsal carapace. Rostrum thin and not crest-like.

**Penaeidae (*Penaeopsis*)**

*Penaeopsis* indeterminabilis



*Penaeopsis balssi*

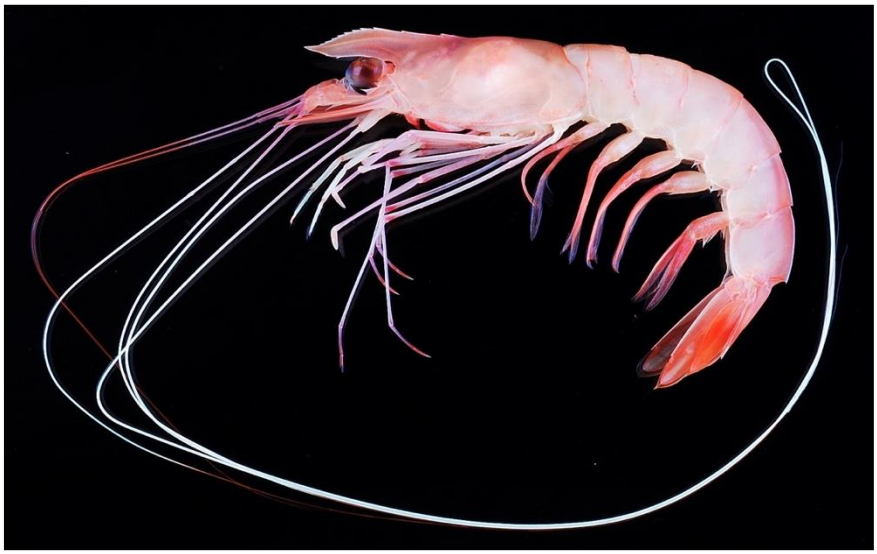
Four species of *Penaeopsis* in this area: *P. balssi*, *P. eduardoi*, *P. jerryi* and *P. rectacuta*. These species are very similar (mainly differences in the petasma and thelycum) and only *P. balssi* differs from the other three in the rostrum distinctly convex and curving downwards, others more or less straight.

**(9a)** Curved and thinner rostrum (lateral view needed). White dot at tip of uropods.

***Haliporoides sibogae***

**(9b)** Rostrum thicker and less curved, no white dots at tip of uropods.

***Haliporoides trihartrus***



**(10a)** Body dorsoventrally depressed, abdomen sculptured. Postantennal spines large and expanded. Rostrum thick on top view.

**Glyphocrangonidae (*Glyphocrangon*)* (11)**

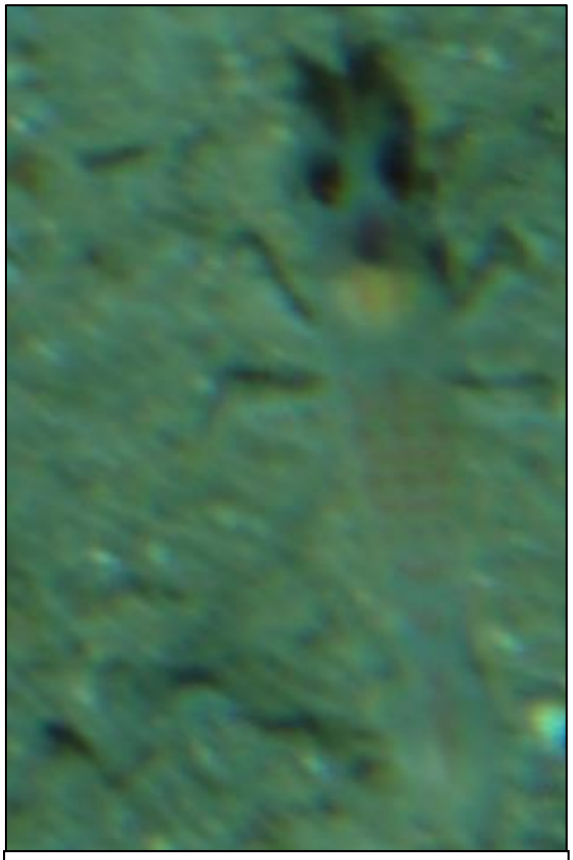
*Potentially two groups: large black eyes one (potentially yellow eyes resulting from reflection effect of the underwater image but high light reflection effect can indicate presence of big black eyes) and small white eyes one. Various color pattern, band abdomen or not. Only one genus: *Glyphocrangon*.

**(10b)** Body more laterally compressed, abdomen not sculptured. Postantennal spines absent or minute.

**12**

**(11a)** Postantennal spines more or less parallel, not distinctly directly outwards.

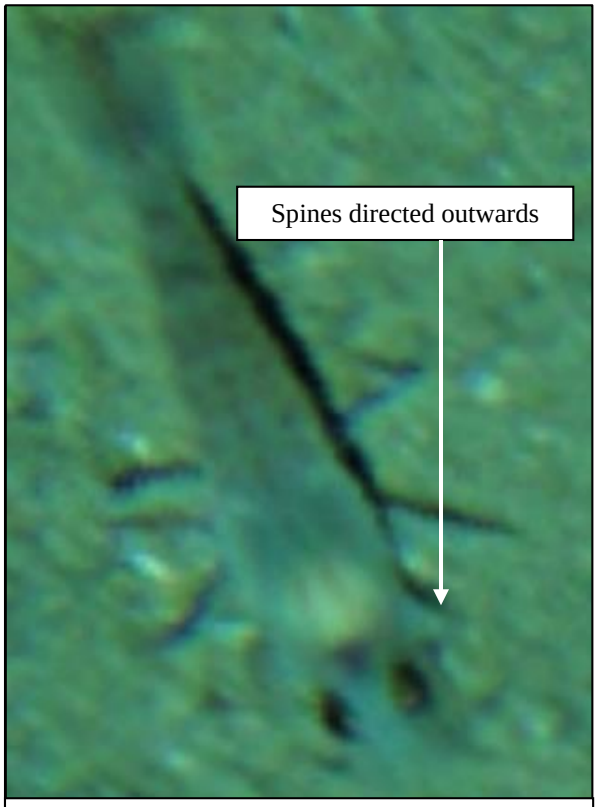
***Glyphocrangon crosnieri****



*Glyphocrangon crosnieri*

**(11b)** Postantennal spines widely directed outwards (extended spine quite visible on each side of the carapace frontal part).

***Glyphocrangon amblytes****




*Glyphocrangon amblytes*

***** Orange band pattern on the abdomen for both species.

**(12a)** Body strongly laterally compressed, all red body color pattern, no banding, potentially white eyes or black eyes, often swimming (pleopods not so long and distinct, do not confuse with dendrobranchiata red shrimp families).

**Acanthephyridae (13)**

**(12b)** Body not strongly laterally compressed, various color pattern and sometimes banding, eyes always black. Walking on the bottom.

**15**

**(13a)** Always black eyes.

***Acanthephyra* (14)**

**(13b)** White eyes, very short rostrum, no long pleopods, red body, bentho-pelagic, similar to Benthesycimidae. No clear image of this photo-taxon.

***Hymenodora***

**(14a)** Only one ventral rostral tooth.

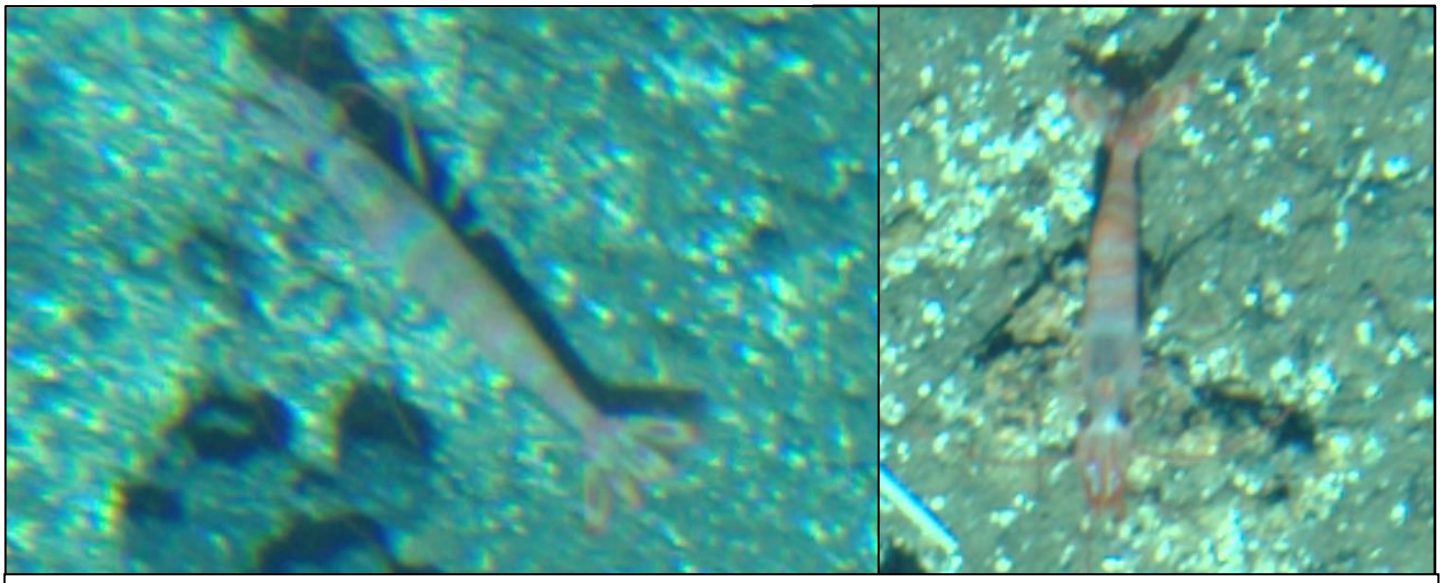
***Acanthephyra armata***

**(14b)** Three to eight ventral rostral teeth.

***Acanthephyra eximia***

**(15a)** Pereiopods not extremely long, rostrum often very long, well developed (but sometimes short), often sabre-like, slightly to strongly curved upwards, with ventral and dorsal rostral teeth.

**Pandalidae* (16)**



Pandalidae indeterminabilis

***Blue eggs sometimes visible, characteristic of the family. Observed sometimes with red rostrum tip.

**(15b)** Pereiopods extremely long and extending from both sides, spider-like, rostrum usually short (more or less as long as antennular peduncle).

**Nematocarcinidae (*Nematocarcinus**) (20)**

*Nematocarcinus* indeterminabilis

*Only single genus *Nematocarcinus* distributed in 500-2000 m depth. Band pattern, some are pink, some are red. Potentially five species in the area of the Mozambique Channel with grey/orange/light purple body color pattern (discriminant species character). Presence of band or not. Rostrum short or long (discriminant species pattern). Image observation show them with the sixth abdominal segment very compressed, and uropods with a rectangular shape.

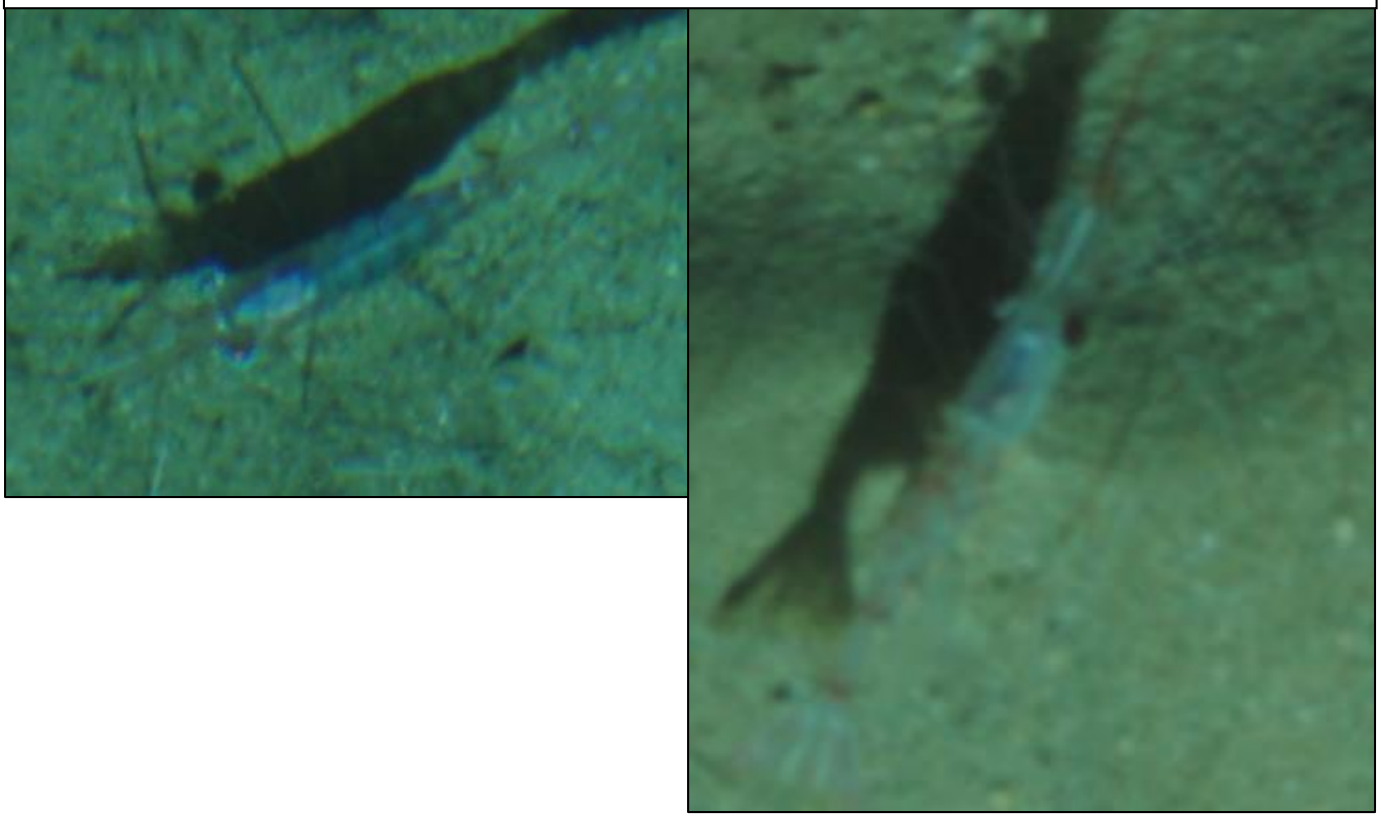
**(16a)** Body robust, eyes always rounded, carapace with distinct lateral carinae (varies from two-three), some species with large spines on the abdomen. Body never with distinct white dots.

***Heterocarpus*** **(17)**

**(16b)** Body often elongate, eye sometimes elongate (kidney-shaped) and extended laterally, carapace without lateral carina, abdomen never with large spines. Body sometimes with distinct white dots/lines. Large to small specimens.

***Plesionika*** **(19)**

*Plesionika* indeterminabilis



**(17a)** Body pink to light orange

***Heterocarpus Lepidus****

*Heterocarpus lepidus*

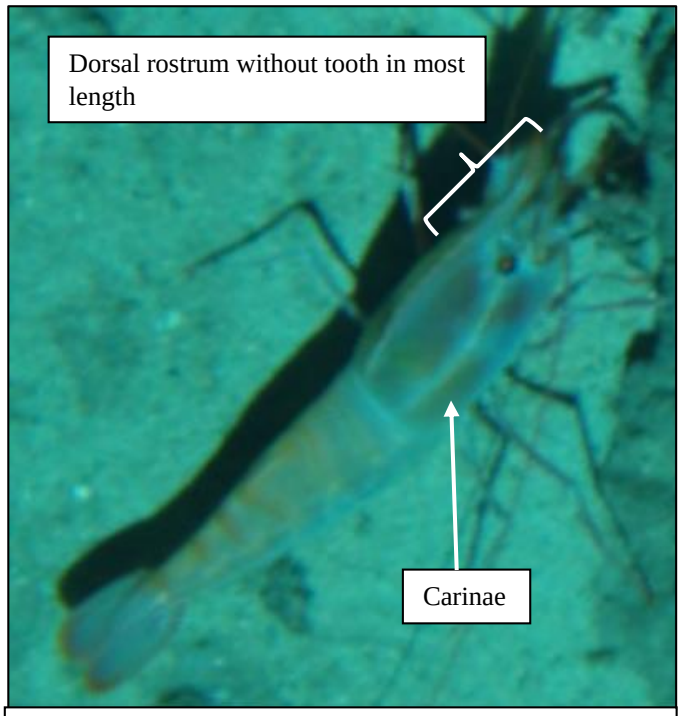
* With dorsal rostral teeth throughout, shallower species (Depth: 300-700m).

**(17b)** Body red to light orange.

**18**

**(18a)** Dorsal margin of rostrum toothed at base only. Body red to orange, with red vertical stripes on the abdomen between somites. Occur in 500-1000 m depth.

***Heterocarpus laevigatus***




*Heterocarpus laevigatus*

**(18b)** With dorsal teeth on rostrum. Body reddish. Occur from more than 1000 m depth (deeper species).
Photo-taxon not identified

***Heterocarpus tricarinatus***

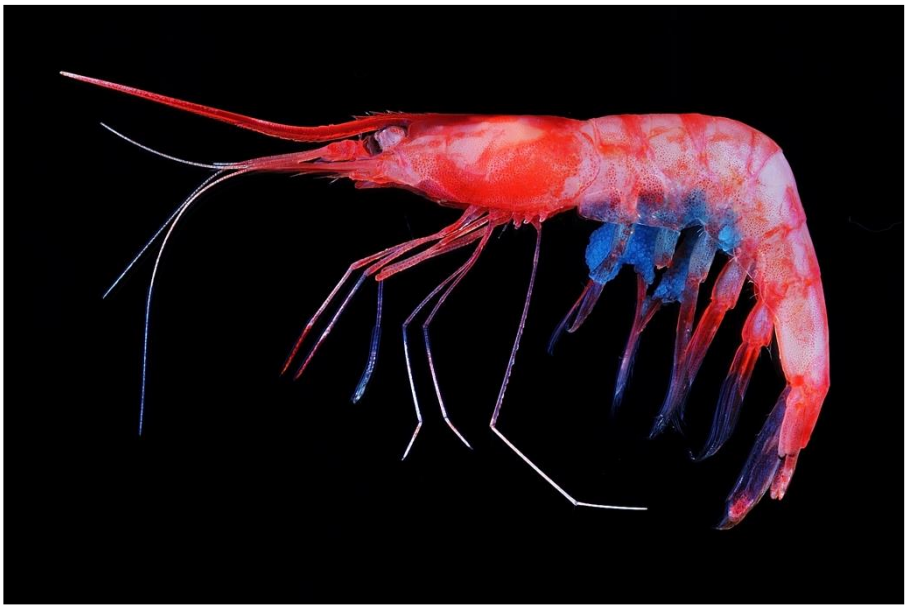
**(19a)** Body more or less banded.

***Plesionika semilaevis****

*Eyes kidney-shaped. Depth range: 100-700m.

**(19b)** Body not banded.

***Plesionika martia****



*Eyes kidney-shaped. Depth range: 100-700m.

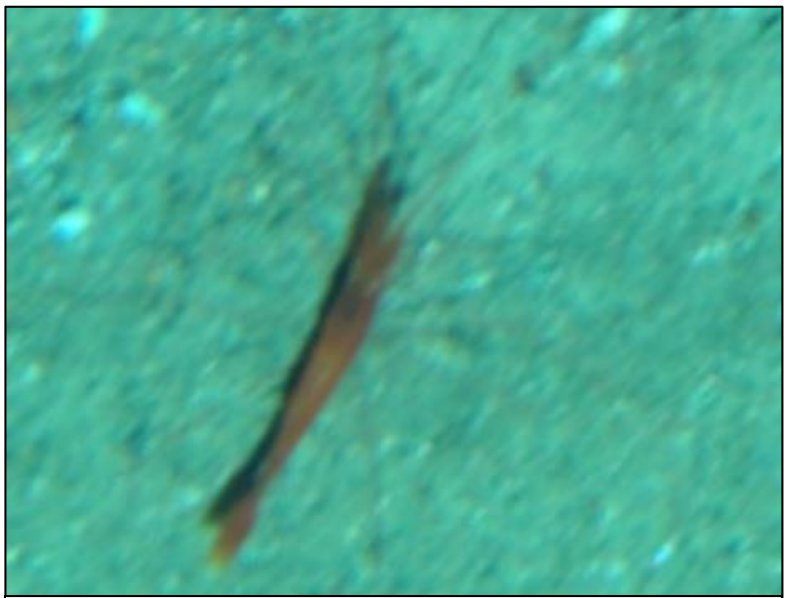
**(20a)** Five white/red band color pattern on the abdomen.

***Nematocarcinus* sp1**

*Nematocarcinus* sp1

**(20b)** Abdomen not banded. Orange body color pattern.

***Nematocarcinus* sp2**



*Nematocarcinus* sp2

****All the above are soft bottom species.**

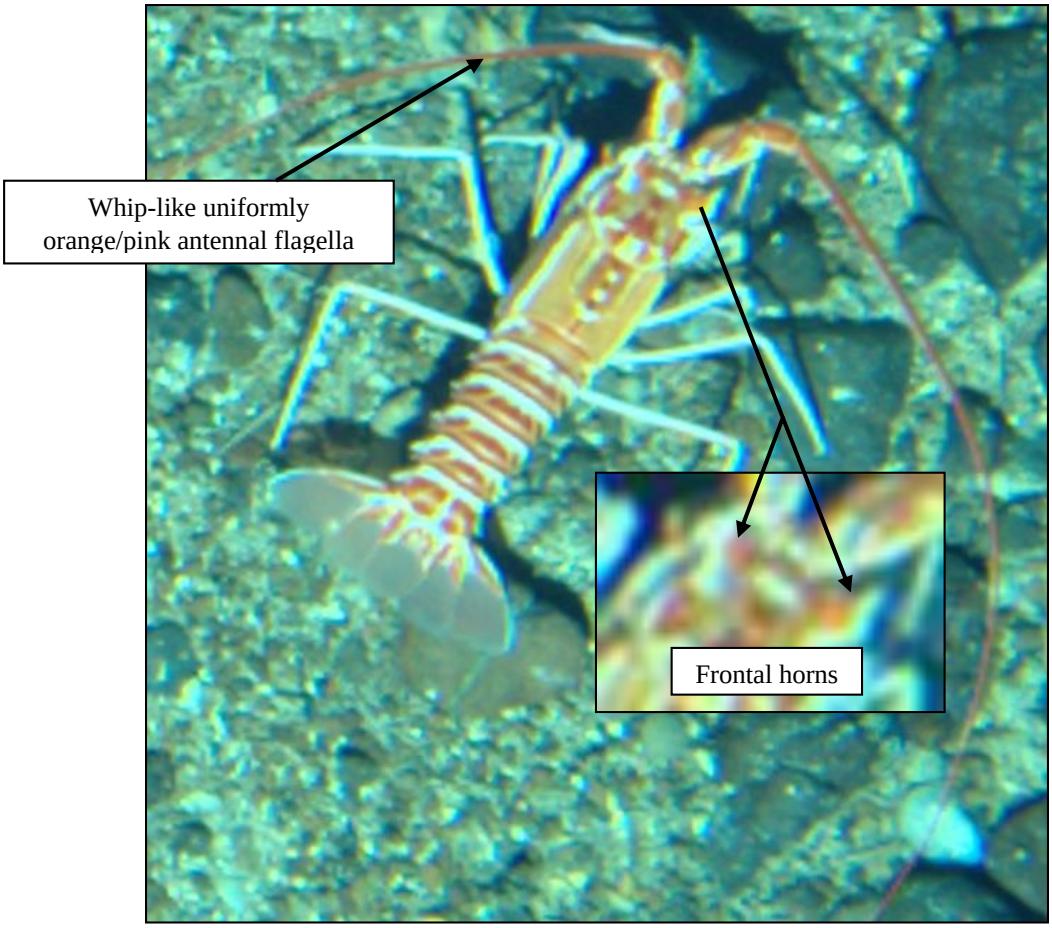
**(21)** Carapace with median ridge bearing large spines behind cervical groove. Abdomen with complex sculpture. Pleura terminating ventrally in two strong teeth (observable from images, giving laterally on the abdomen white spiny appearance at the end of each abdomen segment). Posterior half of the tail fan soft and flexible.

***Puerulus**** **(22)**

*Occurs mainly from 200 to 700 m deep in the Indo-West Pacific: Western Indian Ocean: Zanzibar, Mozambique, Natal (South Africa), Madagascar, Saya de Malha Bank.

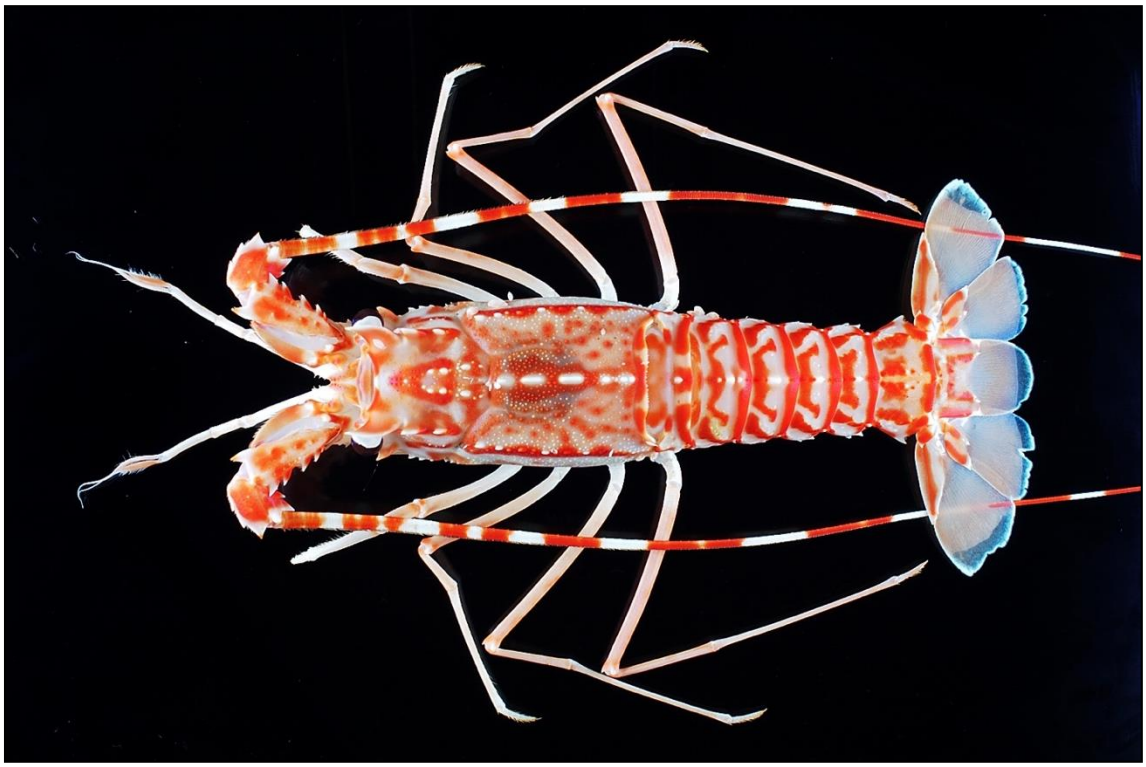
**(22a)** Sparsely pubescent and with some darker surface granules. Pereiopods whitish. Abdomen mostly orange-pink with sunken areas pale pink/whitish. Eyes black/brown and antennal flagella uniformly orange/pink. Base of antennular peduncle with distinct white spots. Two large and sharp supraorbital horns (frontal horns) distant far apart from each other (followed by two small teeth difficult to observe from images). Tips, posterior bases of frontal horns as well as median area between frontal horns are whitish. Three distinct white dots on median ridge behind cervical groove.

***Puerulus carinatus****



**(22b)** Moderately pubescent with distinct granules. Pereiopods, antennular flagella and the soft part of tail fan are pale pink to light orange. Body with a red/white mosaic color pattern. Eyes black/brown and antennal flagella banded red/white. Frontal horns short followed by three teeth (difficult to observe from images).

***Puerulus gibbosus****



* Only *P. carinatus* and *P. gibbosus* are found in the southwestern Indian Ocean. *P.carinatus* is less common. Both species can be distinguished from their coloration: *P. carinatus* is mainly with reddish/orange body color and homogeneous antennal flagella while *P. gibbosus* has a red/white mosaic color pattern and the antennal flagella banded.