



LAND, MANGROVE AND FRESHWATER DECAPOD
CRUSTACEANS OF MAYOTTE REGION
(CRUSTACEA DECAPODA)

*Jean-Marie Bouchard, Joseph Poupin, Regis Cleva,
Jacques Dumas and Vincent Dinhut*



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ATOLL RESEARCH BULLETIN

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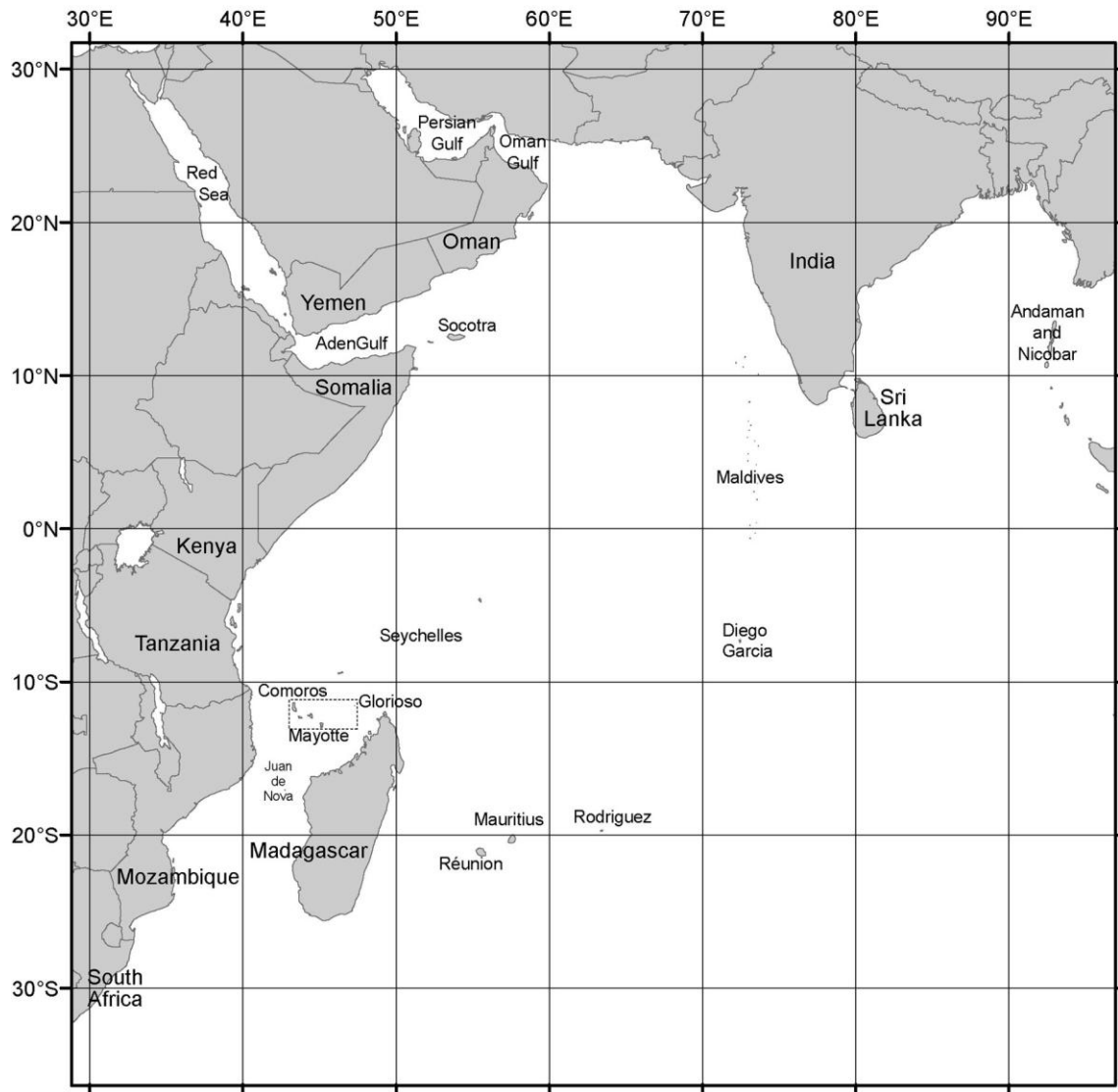


Figure 1. Western Indian Ocean (WIO) with indication of Mayotte region (dotted rectangle)

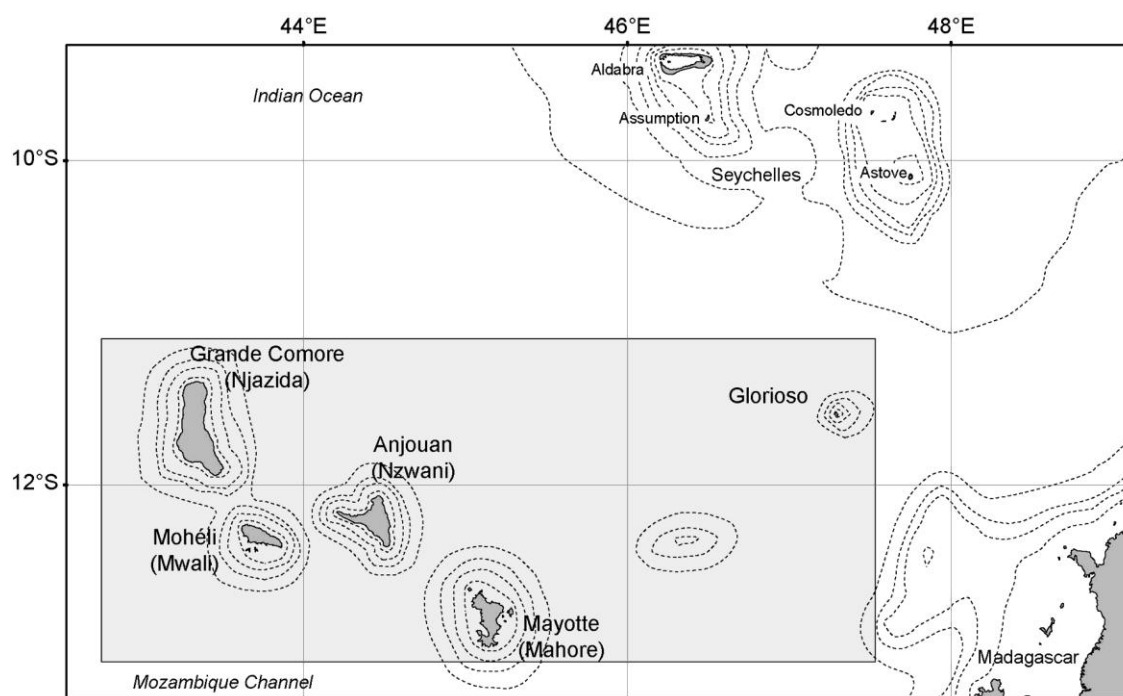


Figure 2. 'Mayotte region' as defined for this study (grey rectangle). It includes Mayotte Island, the Comoros (Grande Comore, Mohéli, Anjouan), and the Glorioso Islands.

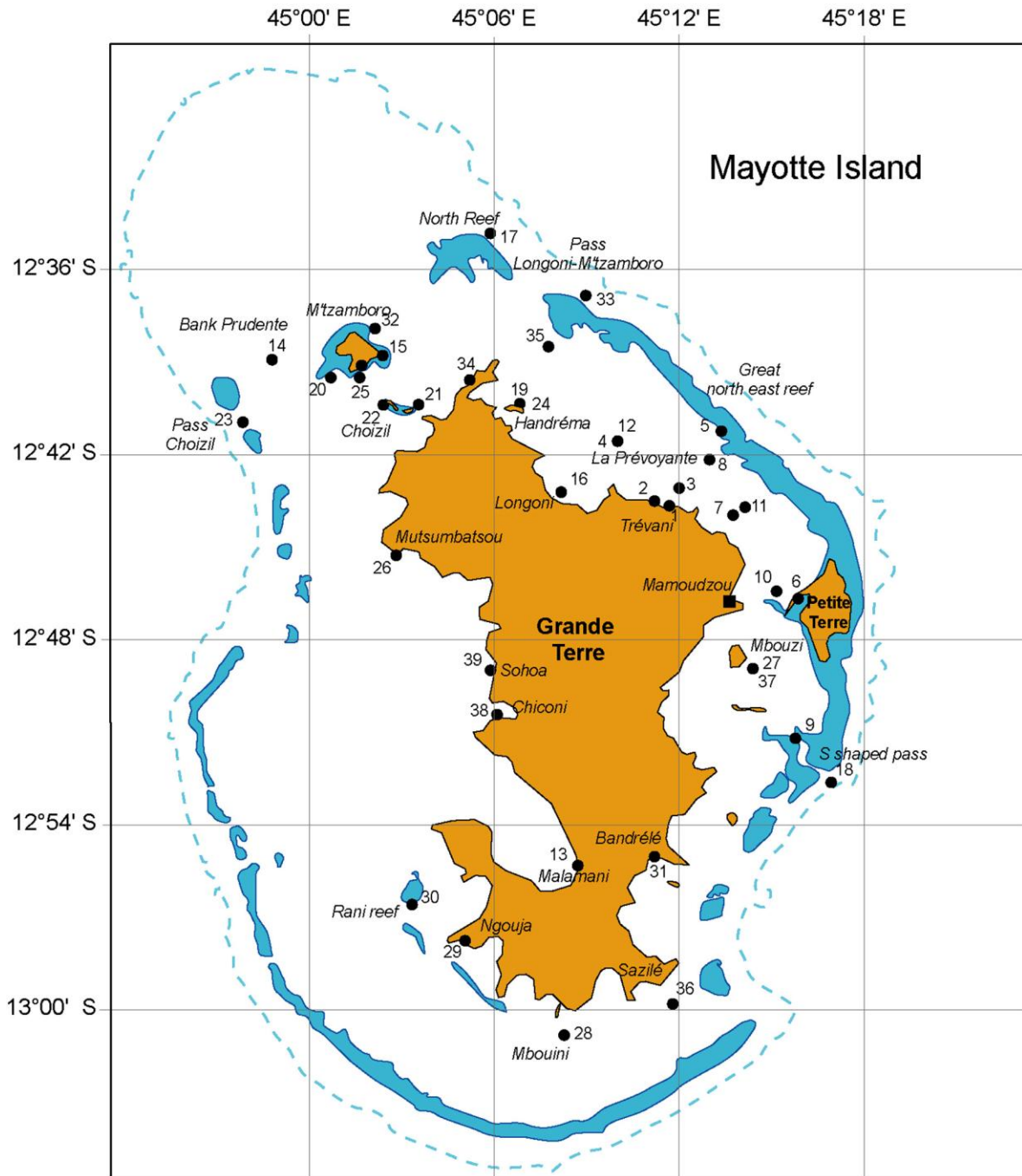


Figure 3. Map of Mayotte Island with places of collection (black dots).
Details for stations 1-39 are in appendix 1.

**LAND, MANGROVE AND FRESHWATER
DECAPOD CRUSTACEANS OF MAYOTTE REGION
(CRUSTACEA DECAPODA)**

BY

**JEAN-MARIE BOUCHARD¹, JOSEPH POUPIN², REGIS CLEVA³,
JACQUES DUMAS⁴, VINCENT DINHUT¹**

ABSTRACT

A documented and illustrated checklist of land, mangrove and rivers Decapoda is proposed for Mayotte region. The study area is situated between longitudes 43-48° E and latitudes 11-13°10' S. It includes Mayotte Island, Comoros Islands, and Glorioso Islands. Records of the species are from a fieldwork at Mayotte in November 2009, complemented by a literature review. 58 species are listed including 24 new records for Mayotte region. The inventory includes 42 crabs, 11 shrimps and 5 coenobitids (*Birgus latro*, *Coenobita* spp.). Crabs Grapsoidea (*Cardisoma*, *Geograpsus*, *Grapsus*, *Metasesarma*, *Metopograpsus*, *Neosarmatium*, *Pachygrapsus*, *Parasesarma*, *Perisesarma*, *Pseudograpsus*, *Pseudohelice*, *Ptychognathus*, *Sesarmops*, *Thalassograpsus*, and *Varuna*) are best represented together with the Ocypodoidea (*Chaenostoma*, *Dotilla*, *Macrophthalmus*, *Ocypode*, and *Uca*). Shrimps belong to the genera *Atyoida*, *Caridina*, *Macrobrachium*, and *Palaemon*. Biotopes investigated include rivers, mangroves, estuaries, land, and coastal areas with a special attention paid to Malamani mangrove in the west coast of Mayotte Island. The fauna of Mayotte region is predominantly indo-west pacific in its composition (45 species). Thirteen species are distributed only in the western Indian Ocean, but only one is perhaps endemic to the region. A comparison with the fauna of the Seychelles Islands shows that at least 6 additional species, widely distributed in the Indo-West Pacific, are potentially also present in Mayotte region.

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RESUME

Une liste documentée et illustrée des crustacés décapodes terrestres, de mangroves et de rivières est proposée pour la région de Mayotte. La zone étudiée est comprise entre les longitudes 43-48° E et les latitudes 11-13°10' S. Elle comprend l'île de Mayotte, l'archipel des Comores et les îles Glorieuses. Les signalements proviennent d'un atelier de terrain, réalisé à Mayotte en 2009, complétés par une recherche bibliographique. Au total 58 espèces sont identifiées dont 24 signalées pour la première fois à Mayotte. L'inventaire comprend 42 crabes, 11 crevettes et 5 cénobites (*Birgus latro*, *Coenobita* spp.). Les crabes Grapsoidea (*Cardisoma*, *Geograpsus*, *Grapsus*, *Metasesarma*, *Metopograpsus*, *Neosarmatium*, *Pachygrapsus*, *Parasesarma*, *Perisesarma*, *Pseudograpsus*, *Pseudohelice*, *Ptychognathus*, *Sesarmops*, *Thalassograpsus* et *Varuna*) sont les plus abondants, avec les Ocypodoidea (*Chaenostoma*, *Dotilla*, *Macrophthalmus*, *Ocypode* et *Uca*). Les crevettes appartiennent aux genres *Atyoida*, *Caridina*, *Macrobrachium* et *Palaemon*. Les biotopes échantillonnés sont les rivières, estuaires, mangroves, milieu terrestre et zone côtière, avec une attention particulière pour la mangrove de Malamani, dans l'ouest de l'île de Mayotte. La faune de Mayotte est majoritairement indo-ouest pacifique (45 espèces). Treize espèces ne sont distribuées que dans l'océan Indien occidental mais seulement une est peut-être endémique de la région. Une comparaison avec la faune des îles Seychelles montre qu'au moins 6 espèces supplémentaires, communes dans l'Indo-Ouest Pacifique, sont potentiellement présentes également dans la région de Mayotte.

INTRODUCTION

This study is the first note of a series that intent to present the faunistic results obtained during the KUW 2009 fieldwork, organized in Mayotte Island, southwest Indian Ocean, November 1-21, 2009. This fieldwork has been prepared by first author with scientific partnership between the Institut de Recherche de l'Ecole Navale (IRENav), Brest, and the Muséum national d'Histoire naturelle (MNHN), Paris. Financial support was obtained through Mayotte Direction de l'Agriculture et de la Forêt (DAF) and Total Foundation. The objective of this KUW 2009 fieldwork was to establish the first documented inventory of the Crustacea Decapoda and Stomatopoda of Mayotte region.

A preliminary report of the results has been published just after the fieldwork but with limited diffusion and several provisional determinations (Bouchard *et al.*, 2009). Additional determinations have been made subsequently at IRENav and MNHN, complemented by a literature search of earlier investigations in Mayotte region, as defined in the 'Study area' section of this work and on figures 1 and 2. These regional records have been progressively integrated into a database posted on the Internet [1] and used as a collaborative tool to update, share and retrieve all the results of this project including stations data, maps, field observations, photographs, and associated literature.

To supplement this Internet portal a first publication is here proposed for the land, mangrove and freshwater species, the marine species being treated separately in forthcoming papers.

A short historical overview is presented before the documented checklist. Information for each species includes: taxonomic classification; list of specimens collected during the fieldwork (with MNHN catalog numbers), previous literature records in Mayotte region, geographic distribution and, if needed, additional comments. To facilitate the identification most of the species are illustrated by macro-photographs. The ecology and biogeography of this fauna is discussed at the end of the study.

Abbreviations used are: IWP, Indo-West Pacific; KUW, Kraken Underwater Works C^{ie}, Mamoudzou, Mayotte; MNHN, Muséum national d'Histoire naturelle, Paris; UF, Florida Museum of Natural History, Gainesville; USNM, Smithsonian Institute, United States National Museum, Washington; WIO, Western Indian Ocean. For the shrimps the size is expressed as Lc, for carapace length, measured from the posterior margin of the orbit to the posterodorsal edge of the carapace, and Lt for total length, measured from tip of rostrum to tip of telson. For the hermit crabs Lc is the length of the shield (anterior part of the cephalothorax). For the crabs the size is expressed as carapace length×width.

METHODS

SAMPLING EVENTS

A total of 35 stations have been sampled in Mayotte and surroundings islets during the KUW 2009 fieldwork; collections made in few stations realized by the first author before this fieldwork (2007-2009) have been also added to the study. Overall 39 stations have been sampled (Fig. 3 and appendix 1), some of them several times, but only 16 were dedicated to land, mangrove, and coastal species (in bold in appendix 1). Photographs of few stations are on figure 4, including sandy-muddy shores (Figure 4A, G-H), rocky shores (Figure 4B, D) and mangroves (Figure 4C, E-F). A particular attention has been paid to Malamani mangrove in the west coast of Mayotte Island (station 13, Fig. 4E-F). On the contrary little attention has been paid to rivers because of a previous fieldwork already made in the Comoros to investigate the freshwater decapods (see Keith *et al.*, 2006).

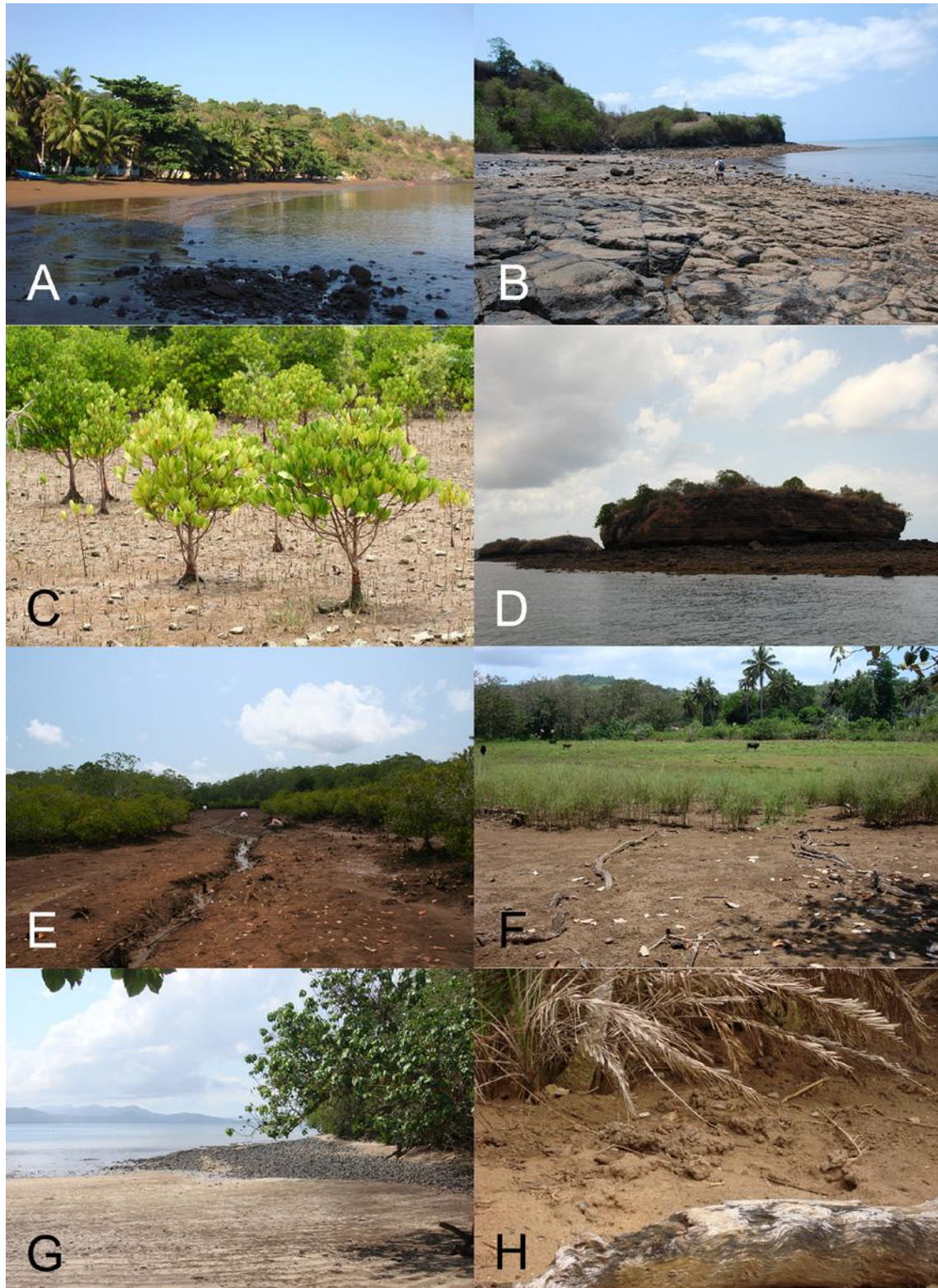


Figure 4. Terrestrial biotopes visited during the K UW 2009 fieldwork: A) station 1, Trévani beach; B) station 2, coastline from Trévani to Kangani; C) station 6, mangrove near Badamiers spillway, Petite Terre; D) station 10, islet Quatre Frères (Vatou); E-F) station 13, Malamani mangrove; G) station 26, Mutsumbatsou upper beach at low tide; H) station 29, Ngouja hotel, Mboianatsa upper beach.

STUDY AREA

The study area includes Mayotte Island, where the fieldwork was realized, plus the Comoros archipelago (Grande Comore or Njazida, Mohéli or Mwali, Anjouan or Nzwani) and the Gloriosos Islands with records obtained from the scientific literature for these additional places.

TAXONOMIC REGISTER

The systematic classification used for this work is that of McLaughlin *et al.* (2010) for the Anomura and Ng *et al.* (2008) for the Brachyura (also available in WoRMS Internet database [2]). Valid names for the Caridea have been verified in a draft checklist of the shrimps of the world transmitted by De Grave & Fransen (in preparation).

HISTORICAL OVERVIEW

Little attention has been paid up to now to terrestrial fauna of the Decapoda of Mayotte. The oldest record found during this research is in Hoffmann (1874). The specimens studied by Hoffmann have been collected by F. P. L. Pollen and D. C. Van Dam, as indicated by Pollen (1868) in his preface of the *‘Recherches sur la faune de Madagascar et de ses dépendances’*. In Pollen’s narration, chapter IV (p. 85) is dedicated to the sojourn in Mayotte Island in April-May 1864 (Figure 5). The major activity during the stay was dedicated to hunting parties in the main Islands, chiefly for collecting lemurs and birds with this indication by the ‘Commandant en chef’ of Mayotte (p. 87): *‘Jamais avant vous aucun naturaliste n’a exploré soigneusement les contrées de l’intérieur’*. The Decapoda are only briefly mentioned (p. 107) for mangrove crabs *Gecarcinus* and *Gelasimus* but obviously they were not collected since they do not appear in the subsequent study made by Hoffmann (1874). Marine decapods of the lagoon (*‘Calappidés, Paguridés et d’autres carabes’*) are also mentioned (p. 140) but these have not been collected too and Pollen complains (p. 139): *‘Hélas ! Le naturaliste ambulante ne peut pas satisfaire toujours à ses désirs de rassembler et d’étudier tout ce qu’il admire. Souvent il n’a que l’agréable souvenir des choses qu’il a observées, quelques lignes qu’il insère dans son journal de voyage, le dédommage du regret, qu’il éprouve de ne pouvoir emporter le fruit de ses recherches, par manque des fonds nécessaires ou à cause de l’embarras de l’emballage et du transport coûteux et difficile. Bien des fois il prend alors congé avec tristesse d’objets curieux, souhaitant revenir un jour chercher ce qu’il n’a pu emporter par des circonstances indépendantes de sa volonté.’* As a result only a few lots of land and mangrove decapods have been collected at Mayotte during Pollen’s expedition including *Coenobita rugosus*

(under *C. clypeatus*), *Macrobrachium lar* (under *Palaemon mayottensis*), and *Scylla serrata*.

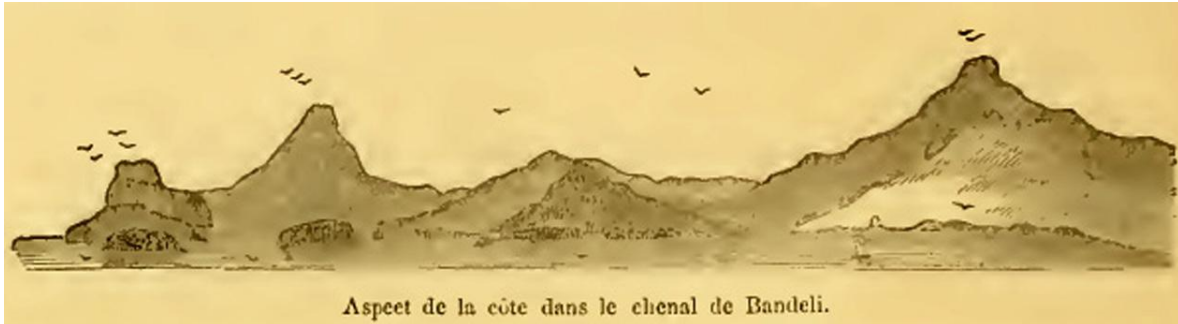


Figure 5. Aspect of Mayotte Island from Bandéli channel (after, Pollen, 1868: 86)

A small collection of crabs from Mayotte is also available in Paris MNHN with specimens collected around 1880 by E. Marie ‘Commissaire’ of the French Navy. However, according to Guinot (1957) this collection contains only one Portunidae and 24 xanthid crabs, but no land or mangrove species.

In 1882 the British H.M.S. *Alert* put in the Glorioso Islands and the surgeon of the expedition, R. W. Coppinger (1884) mentions the presence in these Islands of the coconut crab, *Birgus latro*, a record thereafter confirmed by Miers (1884) in his study of the Crustacea of the expedition (see more comment in the Anomura section of the list). On their way from Glorioso to Mozambique, Coppinger (1884: 240) does mention Mayotte but without stay in the Island: ‘On the morning of the 8th of May we were again under way and sailing for Mozambique Island, which is about five hundred miles from Glorioso. On the evening of the 10th we passed within a few miles of Mayotta, one of the Comoro Islands, and had a fine view of its high volcanic hills,—a sight peculiarly grateful to eyes now for some time accustomed to seeing land only in the shape of low coral islands’.

During his 1903-1905 travel in East Africa, the German zoologist Alfred Voeltzkow has collected a few Crustacea in the Comoros Islands. These have been studied by Lenz (1910) with records of a few freshwater shrimps of the genus *Caridina* and mangrove crabs *Sesarmops impressus* (as *Sesarma nodulifera* de Man, 1892, see in Crosnier, 1965) and *Varuna litterata* (Fabricius, 1798).

In his contribution to the study of the fauna of Madagascar Alain Crosnier (1965) mentions a few species of grapsid and ghost crabs from Grande Comore, Mohéli, Mayotte and Glorioso Islands. Collection data for these records are not clearly indicated but according to a note in the introduction these come from reexamination of specimens collected by Pollen, Van Dam, and Voeltzkow in addition to ‘diverses récoltes faites aux Comores et aux Glorieuses’ deposited in the Muséum national d’Histoire naturelle, Paris (MNHN). It seems also that a few specimens come from Crosnier own sampling effort over

a period of several years while working at the Centre d'Océanographie et des Pêches (ORSTOM.), Nosy Be, Madagascar. For example, A. Crosnier was part of the 1959 ORSTOM Expedition to Mayotte on board the ship ORSTOM II. According to Guilcher *et al.* (1965) this campaign was mostly dedicated to the study of geomorphology, sedimentology, hydrology, and foraminifera but Crustacea samples are also indicated at several stations in the sampling table presented at the end of Guilcher *et al.* (1965) study.

Another marine biologist that has contributed to gather crustacean collections from Mayotte and the Comoros Island is Pierre Fourmanoir, ichthyologist at Nosy Be ORSTOM center for several years. He has published a study on the intertidal crustacean fauna of the Comoros (Fourmanoir, 1955) but with only marine species (lobsters, shrimps, hermit crabs, mantis shrimps) and no record of terrestrial or mangrove species.

Subsequent expeditions that have contributed to the study of the crustacean fauna of Mayotte region have been mostly dedicated to marine fauna. These are for example the ninth cruise of the R.V. “*Anton Bruun*” in 1964, with crustacean collections deposited in the Smithsonian Institution, Washington (see Bruce, 1967, 1971), or the BENTHEDI campaign in 1977 on board the R.V. “*Suroît*” with collections deposited in the MNHN and a brief presentation of this campaign made by Kornicker (1992) for his study on the Ostracoda of the campaign.

More recently, in 2008, two marine biologists Arthur Anker and François Michonneau have realized a short sojourn in Mayotte for the Florida Museum of Natural History (UF) with collections of several Crustacea including two land species: *Coenobita rugosus* H. Milne Edwards, 1837 and *Sesarmops impressus* (H. Milne Edwards, 1837).

LIST OF THE SPECIES

Several records of this list have been already published in December 2009 in a preliminary report issued just after the KUW fieldwork (Bouchard *et al.*, 2009). Some misidentifications in this report are corrected here with this presentation: *Macrophthalmus (Macrophthalmus) grandidieri* A. Milne-Edwards, 1867 ... 1 ovigerous female 9.0×18.6 mm (MNHN B32077), as ‘*Macrophthalmus parvimanus*’ in Bouchard *et al.*, 2009: photo p. 89.

The present list has been also integrated in a more global compilation for the French overseas territories of the tropical Indo-Pacific (Poupin, 2010). It is also included in the Internet WoRMS database [2] under the geographic label ‘Mayotte Exclusive Economic Zone’ with the exception of a few freshwater shrimps pending a revised world checklist by S. De Grave and C. Fransen.

CLASS MALACOSTRACA
 SUBCLASS EUMALACOSTRACA
 ORDER DECAPODA
 INFRAORDER CARIDEA

The freshwater shrimps of the Comoros Islands have been recently inventoried by Keith *et al.* (2006). For that reason river stations were not made during the KUW 2009 fieldwork. Except for a few observations, the list below relies mostly on Keith *et al.* (2006) which can be consulted for more information such as determination keys, ecology, or color photographs of the species.

In addition to this list, Lenz (1910) has two additional records of *Caridina* shrimps from Comoros (Mohéli) with unclear taxonomic status. These are (p. 568) *Caridina nilotica* (Roux) var. *gracilipes* De Man (Mohéli) and (p. 569) *Caridina Weberi* var. *sumatrensis* De Man. These two records probably are *Caridina gracilipes* De Man, 1892, known with certainty from Indonesia, Taiwan, China, and Philippines, and *Caridina sumatrensis* De Man, 1892, known with certainty from Indonesia, Malaysia and Philippines (see Cai & Shokita, 2006 for distributions).

SUPERFAMILY ATYOIDEA
 FAMILY ATYIDAE

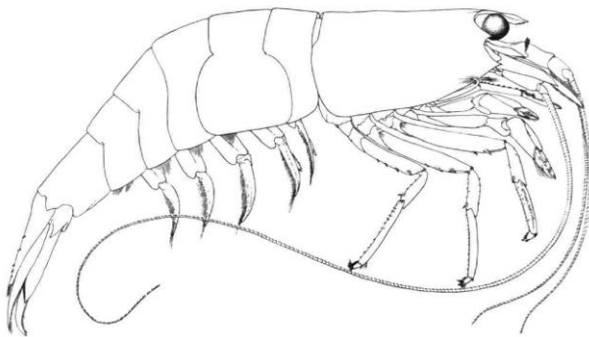


Figure 6. *Atyoida serrata* – Small-sized freshwater shrimp common in Comoros rivers. Drawing of a male specimen from La Réunion, carapace length 5.7 mm (from Chace, 1983: 21, fig. 11a).

***Atyoida serrata* (Bate, 1888).** Figure 6 – *Atyoida serrata* - Keith *et al.*, 2006: 35, 48 (Comoros: Anjouan, Mohéli, Mayotte).

Distribution. – WIO. Madagascar, Comoros, Seychelles, Réunion, Mauritius (see Chace, 1983: 20).

Comment. – Total length between 20-50 mm. Collected in rivers, up to an altitude of 1200 m. A color photograph is given by Keith *et al.* (2006: 49).

***Caridina brachydactyla* De Man, 1908** – *Caridina nilotica* var. *brachydactyla* De Man - Lenz, 1910: 568 (Comoros: Mohéli, Mayotte). - *Caridina brachydactyla* - Richard & Clark (2010: 317, references, distribution).

Distribution. – IWP. South Africa, Tanzania, Madagascar, ?Mayotte, Andaman Malaysia, Indonesia, New Caledonia.

Comment. – It is not clear in Richard & Clark (2010) if Lenz's specimens from Mohéli and Mayotte do belong to this species because Lenz's reference is indicated with the mention 'partim' and Comoros or Mayotte are not indicated in the distribution of the species.

***Caridina longirostris* H. Milne Edwards, 1837**. – *Caridina longirostris* - Keith *et al.*, 2006: 35, 50 (Comoros: Anjouan, Mohéli, Mayotte).

Distribution. – Widespread in the IWP. Eastern Africa, Madagascar, Comoros, Seychelles, Réunion, Mauritius, Indonesia, Philippines, New Caledonia, Fiji.

Comment. – Medium-sized shrimp, total length 35 mm. A color photograph is given by Keith *et al.* (2006: 51) with mention of a distinctive oblique red-carmine band on the cephalothorax.

***Caridina serratiostris* De Man, 1892**. – *Caridina serratiostris* - Keith *et al.*, 2006: 35, 56 (Comoros: Mohéli).

Distribution. – Widespread in the IWP. Madagascar, Comoros, Seychelles, Réunion, Mauritius to Indonesia, Japan, Philippines, northeastern Australia, New Caledonia, Wallis & Futuna, French Polynesia.

Comment. – Small freshwater shrimp with total length between 10-20 mm. It is characterized by numerous spines on the dorsal margin of the rostrum. It occurs in fresh and brackish waters in lower part of rivers or in estuaries. A color photograph is given by Keith *et al.* (2006: 58).

***Caridina typus* H. Milne Edwards, 1837**. – *Caridina typus* - Lenz, 1910: 570 (Mayotte). - Keith *et al.*, 2006: 36, 62 (Comoros: Anjouan, Mohéli, Mayotte).

Distribution. – Widespread in the IWP. Eastern Africa, Madagascar, Comoros, Seychelles, Réunion, Mauritius to Indonesia, Japan, Philippines, Australia, New Caledonia, Wallis & Futuna.

Comment. – Medium-sized shrimp, total length 45 mm. A color photograph is given by Keith *et al.* (2006: 62).

SUPERFAMILY PALAEMONOIDEA

FAMILY PALAEMONIDAE

***Macrobrachium australe* (Guérin-Méneville, 1838)**. – *Macrobrachium australe* - Keith *et al.*, 2006: 36, 58 (Comoros: Anjouan, Mohéli, Mayotte). - KUW fieldwork November 2009, St. 13, Malamani mangrove, 1 female Lc 8.0 mm, det. X. Li (MNHN Na17579).

Distribution. – Widespread in the IWP. Madagascar, Comoros, Seychelles, Réunion, Mauritius to Indonesia, Taiwan, Philippines, Papua New Guinea, New Caledonia, Wallis & Futuna, French Polynesia. Despite its wide distribution it seems that all former records *M. australe* in Australia are not founded and that this shrimp does not occur there (Short, 2004: 18).

Comment. – Medium-sized shrimp with Lt between 60-90 mm. It lives in the lower course of rivers and in brackish waters of estuaries and mangroves. Fresh specimens can be recognized by the presence of 2-3, usually 3, oblique brown bands on the lateral faces of the cephalothorax. A color photograph is given by Keith *et al.* (2006: 69).

***Macrobrachium equidens* (Dana, 1852)**. – *Macrobrachium equidens* - Keith *et al.*, 2006: 36, 70 (Comoros: Mayotte).

Distribution. – Widespread in the IWP. Eastern Africa, Mayotte, Seychelles, India, Indonesia, Malaysia, Singapore, Southern China, Taiwan, Philippines, Australia, Papua New Guinea, Solomon, New Caledonia, Fiji.

Comment. – Medium-sized shrimp with Lt between 70-115 mm. It lives in brackish waters of estuaries and mangroves. On figure 7 the specimen photographed by J.-B. Nicet in a mangrove of Mayotte most probably belongs to this species. A color photograph is also given in Keith *et al.* (2006: 71).



Figure 7. *Macrobrachium ?equidens* – Specimen not examined, collected in a mangrove of Mayotte by J.-B. Nicet after KUW fieldwork. Probably *M. equidens*, based on place of collection and color pattern.

***Macrobrachium lar* (Fabricius, 1798).** – *Palaemon mayottensis* Hoffmann, 1874: 32, pl. IX, fig. 61, 62 (Mayotte; *P. mayottensis* Hoffmann is a synonym of *Macrobrachium lar*). - *Palaemon (Eupalaemon) lar* - Lenz, 1910: 567 (Comoros, Mohéli). - Roux, 1934: 546 (Mayotte, 5 males coll. Humblot, MNHN). - *Macrobrachium lar* - Keith *et al.*, 2006: 36, 76 (Comoros: Anjouan, Mohéli, Mayotte).

Distribution. – Widespread in the IWP. Eastern Africa, Madagascar, Comoros, Seychelles, Réunion, Mauritius, India, Indonesia, Taiwan, Japan, Philippines, Australia, Papua New Guinea, Salomon, New Caledonia, Fiji, Wallis & Futuna, French Polynesia.

Comment. – One of the largest *Macrobrachium* with Lt between 160-200 mm or 300-350 mm if length of the chelae is included. Common in lower course of rivers. A color photograph is given by Keith *et al.* (2006: 77)

***Macrobrachium lepidactylus* (Hilgendorf, 1879).** – *Macrobrachium lepidactylus* - Keith *et al.*, 2006: 36, 78 (Comoros: Mohéli, Mayotte).

Distribution. – WIO. Kenya, Mozambique, South Africa, Madagascar, Comoros, Réunion, Mauritius.

Comment. – Medium-sized shrimp with Lt between 80-100 mm. Collected in median and lower parts of rivers. A color photograph is given by Keith *et al.* (2006: 79).

***Palaemon concinnus* Dana, 1852.** – *Palaemon concinnus* - Keith *et al.*, 2006: 36, 64 (Comoros: Mohéli, Mayotte).

Distribution. – Widespread in the IWP. Red Sea, Eastern Africa, Madagascar, Comoros, Seychelles, Réunion, Mauritius, Indonesia, South China Sea, Japan, Philippines, Australia, New Caledonia, Wallis & Futuna, Marshall Islands, Fiji, French Polynesia.

Comment. – Medium-sized shrimp with Lt between 60-65 mm. Body translucent with a black spot near the tail. Lives in brackish waters of estuaries. A color photograph is given by Keith *et al.* (2006: 65).

***Palaemon debilis* Dana, 1852.** – *Palaemon debilis* - Keith *et al.*, 2006: 36, 66 (Comoros: Mayotte). - Malamani mangrove, coll. J.-M. Bouchard, 16 April 2008, 1 ovigerous female, Lc 5.5 mm (MNHN Na16056), det. X. Li; KUW fieldwork November 2009, St. 13, Malamani mangrove, 1 ovigerous female Lc 5.0 mm (MNHN Na16052), det. X. Li.

Distribution. – Widespread in the IWP. Gulf of Suez to Hawaii and French Polynesia, including Eastern Africa, Mayotte, Seychelles, Indonesia, Japan, Philippines, Australia, New Caledonia, Wallis & Futuna.

Comment. – Small-sized shrimp with Lt between 30-35 mm; lives in brackish to marine waters in estuaries, mangroves and along the coast.

INFRAORDER ANOMURA
SUPERFAMILY PAGUROIDEA

The following list is limited to the coenobitids although a few others coastal hermit crabs collected during the KUW fieldwork, such as *Clibanarius longitarsus* (De Haan, 1849), are sometimes associated with mangroves and could have been therefore listed here. These will be included in a forthcoming list of marine species.

FAMILY COENOBITIDAE

A key of the WIO coenobitids, including the five species presented here, is available in Reay & Haig (1990).



Figure 8. A) *Birgus latro* from Glorioso; photo 2/12/2010 by legionnaire G. Pérez, stationed on the island. B-C) *Coenobita brevimanus*. Specimens photographed at Wallis & Futuna in shell of the giant African snail *Achatina fulica* (see Poupin & Juncker, 2008). The characteristic sub-cylindrical eyestalks of this species are clearly visible on these photographs.

***Birgus latro* (Linnaeus, 1767).** Figure 8 A. – *Birgus latro* - Coppinger, 1884: 237-238 ('Du Lise Island', Glorioso, H.M.S. *Alert* Expedition). – Miers, 1884: 555 (same specimen, Glorioso, coll. H.M.S. *Alert*, one adult female in the British Museum collections). – Jean Hivert and Erwan Lagadec. field observation, April 2011 (Glorioso and also Juan de Nova in the Mozambique channel).

Distribution. – IWP (see Drew *et al.*, 2010: 47, fig. 1). ?Eastern Africa, Juan de Nova, Glorioso, ?Madagascar, Seychelles, Chagos, Christmas, Loyalty, Salomon, Fiji, Wallis & Futuna, French Polynesia.

Comment. – The coconut crab *Birgus latro* has neither been seen nor reported during inquiries made during the K UW fieldwork at Mayotte. However, its presence can be confirmed for this work in the Glorioso Islands, based on a personal communication by Jean Hivert after a short stay on the island in April 2011 and photograph transmitted by G. Pérez (see Fig. 8 A.) The record of *Birgus latro* in eastern Africa (Reay & Haig, 1990: 583, table 3, after Reyne, 1939) is quite old and it is doubtful that this big species still survives in Tanzania. The origin of the Malagasy record in Reay & Haig (1990) has not been identified. It is perhaps a mistake for Glorioso Islands in the North of Madagascar. According to the carcinologist Alain Crosnier (pers. com.), who made two stays (1958-1962 and 1970-1975) in Nosy Be, Madagascar, during his scientific career, the presence of *Birgus latro* was never confirmed at that time and his colleague, the ichthyologist Pierre Fourmanoir, has never found it despite intensive search between 1955-1958 in the islets bordering the northern coast of Madagascar. A confirmed place of extinction in the WIO is Mauritius where the coconut crab was still present in 1836, reported by Darwin (1909: 489) in his '*Voyage of the Beagle*', but already with this comment '*It formerly abounded at Mauritius, but only a few small ones are now found there*'.

***Coenobita brevimanus* Dana, 1852.** Figure 8 B-C. – *Coenobita brevimanus* - Vuillemin, 1970: 235 (East coast of Grande Comore, abundant).

Distribution. – IWP. Tanzania, Madagascar, Comoros, Seychelles, Christmas and Cocos, Taiwan, Japan, Line Islands, Papua New-Guinea, Solomon, New Caledonia, Loyalty, Vanuatu, Wallis & Futuna, Fiji, Samoa, Cook, French Polynesia.

Comment. – *Coenobita brevimanus* can be easily recognized by its eyestalks, sub-circular instead of strongly compressed laterally in all other species of coenobitids (see Fig. 8). It is included here based on Vuillemin (1970) record but it has still not been reported formally from Mayotte. In Grande Comore Vuillemin (1970: 235) states that it is very abundant on West coast with this comment: "*Dans ce dernier biotope, au cours de l'été austral, en décembre notamment, vers 22 heures, des centaines de Cénobites traversent la route de Moroni à Mitsamiouli, les uns allant à la mer, les autres en revenant. Leurs coquilles craquent sous les roues des autos qui circulent ...*" Amazingly, Vuillemin also observes that this cenobite kills the big giant African snail, *Achatina fulica*, to use its shell as a shelter.

***Coenobita cavipes* Stimpson, 1858.** Figure 9 A-B. – K UW fieldwork November 2009, St. 1, Trévani beach, supralittoral zone, in shell of *Achatina* sp., 2 females Lc 11.3-12.0 mm, cephalothorax 22.0-22.4 mm, Lt about 85-102 mm, as '*Coenobita rugosus*' in Bouchard *et al.* 2009: 95, photo (MNHN Pg8453); St. 6, Badamiers spillway, Petite Terre, supralittoral zone, 1 female Lc 5.6 mm, cephalothorax 12 mm, Lt about 34 mm, as '*Coenobita* sp.' in Bouchard *et al.* 2009: 95, photo (MNHN Pg8454).

Distribution. – Widespread in the IWP. Somalia, Kenya, Tanzania, Mozambique, South Africa, Madagascar, Mayotte (first record), Seychelles, India, Vietnam, Malaysia, Japan to French Polynesia.

Comment. – This species has been sometimes considered as a junior synonym of *Coenobita violascens* Heller, 1862, described from Nicobar Islands, Eastern Indian Ocean (see Fize & Serène, 1955). Although both species are now considered valid they are closely related and characters used to distinguish them are in need of revision. Mayotte specimens are tentatively attributed to *C. cavipes* on the basis of key characters given by Nakasone (1988) and previous WIO records: Somalia (Vannini, 1976), Kenya (Reay & Haig, 1990) and Seychelles (Haig, 1984). In *Coenobita cavipes* the upper outer surface of the left chela is without stridulating mechanism (*i.e.* an oblique series of laminar crests), a character that can be used to distinguish it from the two other *Coenobita* collected in Mayotte, *C. perlatus* and *C. rugosus* both with this stridulating mechanism.

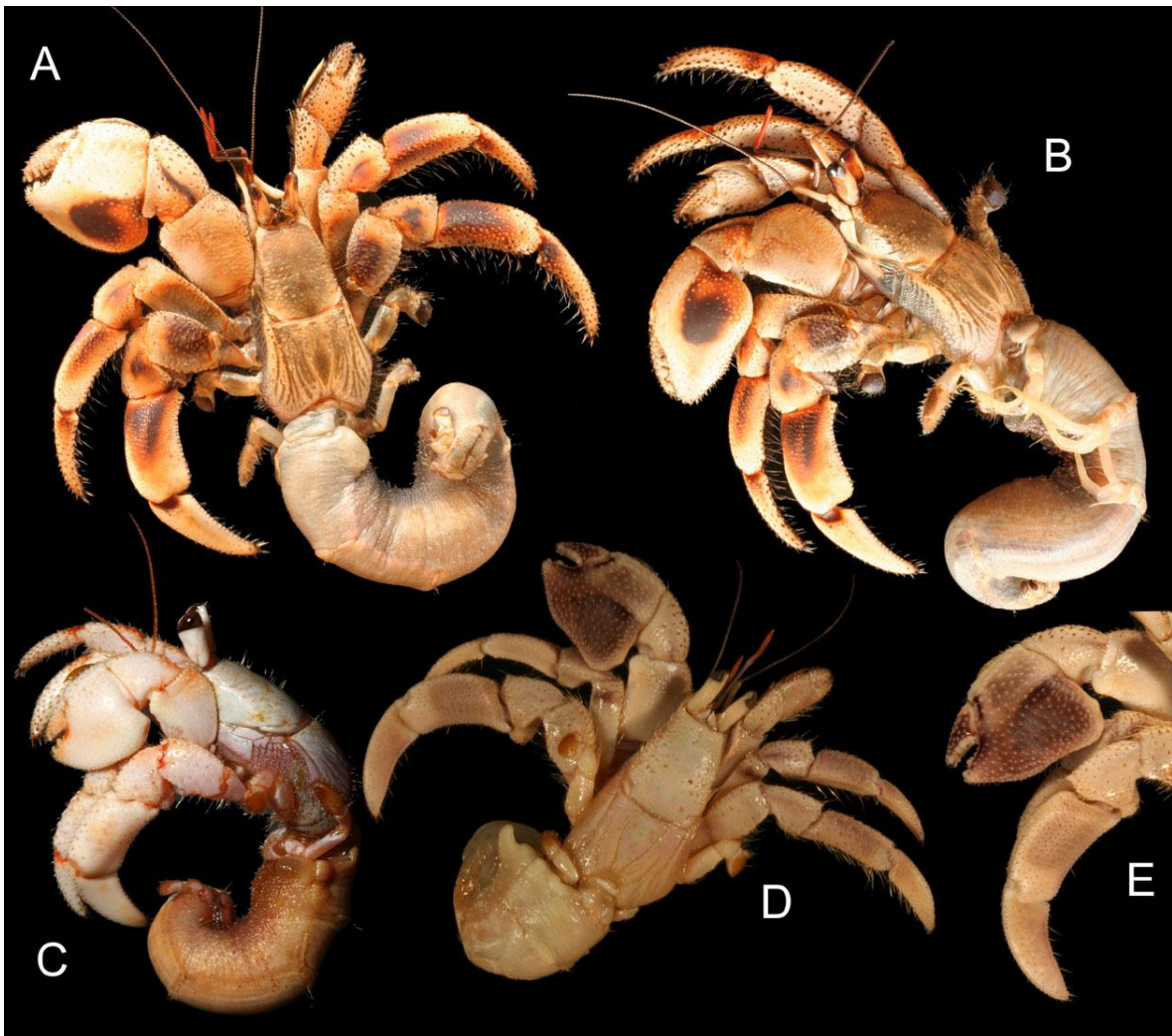


Figure 9. A-B) *Coenobita cavipes*, Mayotte, KUW St. 1, Trévani beach, supralittoral zone, 1 female Lc 12 mm, Lt about 102 mm (MNHN Pg8453); C) *Coenobita perlatus*, KUW St. 10, islet Quatre Frères (Vatou) 1 female juvenile Lc 7.1 mm, cephalothorax 12.6 mm, Lt about 35 mm (MNHN Pg8455); D-E) *Coenobita rugosus*, St. 19, islet Handrema, littoral, 1 male Lc 6.7 mm, Lt about 27 mm. Color slightly altered by preservative (MNHN Pg8457).

Coenobita perlatus **H. Milne Edwards, 1837**. Figure 9 C. – KUW fieldwork November 2009, St. 10, islet Quatre Frères (Vatou) 1 female juvenile Lc 7.1 mm, cephalothorax 12.6 mm, Lt about 35 mm, as ‘*Coenobita* sp.’ in Bouchard *et al.* 2009: 95, photo (MNHN Pg8455); St. 21a, islet Choizil, ?1 ovigerous female Lc 22 mm, Lt about 50 mm, as ‘*Coenobita* aff. *perlatus*’ in Bouchard *et al.* 2009: 95, photo (MNHN Pg8456).

Distribution. – Widespread in the IWP. Tanzania, Madagascar, Mayotte (first record), Seychelles, Mauritius to Great Barrier Reef, Chesterfield, Loyalty, Vanuatu, Salomon, Wallis & Futuna, Fiji, Samoa, Cook, French Polynesia.

Comment. – This species is usually found along coral beaches. In Mayotte it was collected only on the islets surrounding the main Island. Ovigerous female Lt about 50 mm (MNHN Pg8456) is tentatively attributed to this species. It has not the bright red coloration typical of adult specimens of *C. perlatus* and resembles *C. rugosus* for the angular aspect of its big chela, at proximal lower margin. It has been compared with a specimen of *Coenobita rugosus* of the same size, from French Polynesia. Both specimens have in common a stridulating mechanism on the upper outer surface of the left chela. The specimen from Mayotte, tentatively attributed here to *Coenobita perlatus*, is different by: bead-shaped tubercles on outer face of left chela (outer face almost smooth in *C. rugosus*); no dark rounded patch of variable extension on lower half of outer face of left chela (present in *C. rugosus*); propodus of left third pereopod with outer surface convex connected to upper surface by rounded margin (outer surface flat separated from upper surface by a sharp ridge in *C. rugosus*).

***Coenobita rugosus* H. Milne Edwards, 1837.** Figure 9 D-E. – *Coenobita clypeatus* Milne Edwards - Hoffmann, 1874: 29 (Mayotte) non *C. clypeatus* (Fabricius, 1787) an Atlantic species. - *Coenobita rugosus* – Coll. Anker & Michonneau, 2008, St. MAY08-St7, N'Gouja, latitude 12.964231 S, longitude 45.086434 E (UF 13655). - K UW fieldwork November 2009, St. 19, islet Handrema, littoral, coll. Lisa Bouchard, 2 males Lc 6.7-7.3 mm, Lt about 27-31 mm, 3 females Lc 5.6-6.7 mm, Lt about 24-32 mm, 2 specimens in shells (MNHN Pg8457).

Distribution. – Widespread in the IWP. Somalia, Kenya, Tanzania, Mozambique, Madagascar, Mayotte, Seychelles, Réunion, Mauritius to Taiwan, Japan, Loyalty, Vanuatu, Solomon, Wallis & Futuna, Samoa, Tonga, Cook, Line Islands, French Polynesia.

Comment. – A dark, more or less round, patch on proximal lower half of outer face of left chela is characteristic of this species. However, the background color of *C. rugosus* can be variable according to McLaughlin *et al.* (2007), cream, purplish, bluish-gray, dark blue, or mixture of these colors.

INFRAORDER BRACHYURA

SUPERFAMILY ERIPHIOIDEA

FAMILY OZIIDAE

Epixanthus dentatus is the single crab of this family included in this list because it is a common inhabitant of the mangroves reported for example in Kenya (Cannicci *et al.*, 1998) or Papua Indonesia (Rahayu & Setyadi, 2009). Two additional *Epixanthus* crabs, *E. frontalis* (H. Milne Edwards, 1834) and *E. corrosus* A. Milne-Edwards, 1873, were also collected during the K UW fieldwork. They live in the intertidal and will be presented in the forthcoming list of marine species.

***Epixanthus dentatus* (White, 1848).** Figure 10. – K UW fieldwork November 2009, St. 13, Malamani mangrove 1 male 17.8×29 mm as 'Xanthidae indéterminé' in Bouchard *et al.*, 2009, photo p. 83 (MNHN B32465).

Distribution. – IWP. Kenya, Madagascar, Mayotte (first record), Seychelles, Nicobar, Mergui, Andaman, Indonesia, Australia, Singapore, Taiwan, Japan, Philippines, Fiji.

Comment. – A crab commonly reported in mangrove areas. A single specimen has been collected during this fieldwork probably because it is nocturnal and that no visit has been paid at night to the mangroves. The basal tooth, visible on the single chela left on the specimen captured, is adapted to break mollusks' shells.

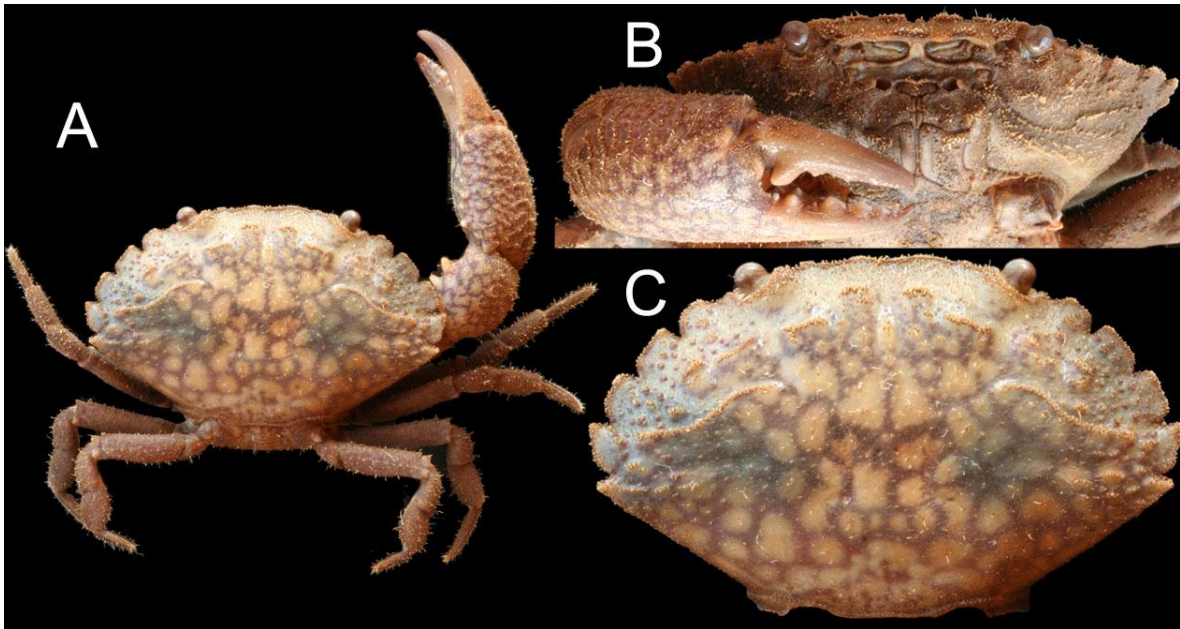


Figure 10. *Epixanthus dentatus*. Mayotte, KUW 2009 fieldwork, St. 13, Malamani mangrove 1 male 17.8×29 mm (MNHN B32465), A) Dorsal view (left chela missing), B) Frontal view, C) Detail of carapace.

SUPERFAMILY PORTUNOIDEA

FAMILY PORTUNIDAE

The large-sized mud-crab, caught at low tide in Malamani mangrove, is the single portunid crab of this list. In addition, several other portunid crabs have been caught during the KUW fieldwork in the intertidal or when using traps in muddy bays of the lagoon. These will be integrated in a list of marine species although some of them are sometimes considered as ‘mangrove species’, such as *Charybdis anisodon* (De Haan, 1850), *C. feriata* (Linnaeus, 1758), *C. hellerii* (A. Milne-Edwards, 1867), *Portunus sanguinolentus* (Herbst, 1783), *Thalamita crenata* Rüppell, 1830, *T. foresti* Crosnier, 1962, and *T. prymna* (Herbst, 1803).

***Scylla serrata* (Forskål, 1775).** Figure 11. – *Scylla serrata* - Hoffmann, 1874: 9 (Mayotte). - Guinot, 1967: 258 (Checklist of WIO species, with mention of Comoros, Mohéli, Anjouan, Mayotte). - Bouchard, 2009: 6, 7, Malamani mangrove, specimens re-examined for KUW fieldwork, St. J.-M. Bouchard n° 3, coll. J.-M. Bouchard 16 June 2008, 12°55.415 S, 44°09.275 E, mudflat between mangrove trees in deep burrow close to a stream, 1 female 70x100 mm (MNHN); coll. J.-M. Bouchard 8 October 2008, 1 male 93.6×140 mm (KUW), 1 smaller specimen not measured (MNHN). - KUW fieldwork November 2009, St. 2, Kangani mangrove, in situ observation only, specimen not collected.

Distribution. – IWP. Red Sea, Kenya, Tanzania, Mozambique, Madagascar, Comoros, Seychelles, Réunion, Mauritius, Indonesia, Taiwan, China, Japan, Philippines, Australia, New Zealand, New-Caledonia, Fiji, Wallis & Futuna, Samoa, Cook, French Polynesia, Hawaii.

Comment. – *Scylla serrata* is the commonest species in a complex that includes four sibling species. These four species are clearly identified in Keenan *et al.* (1998) revision of the genus *Scylla*. Currently, *Scylla serrata* is the only species of the complex reported in the southern part of the WIO (Mozambique channel, Madagascar). It is characterized by sharp frontal lobes and by the presence of two spines (reduced in the biggest specimens) on distal half of outer margin of the carpus of chelipeds. This is a large-sized crab, prized as food and captured in mangroves at low tide.

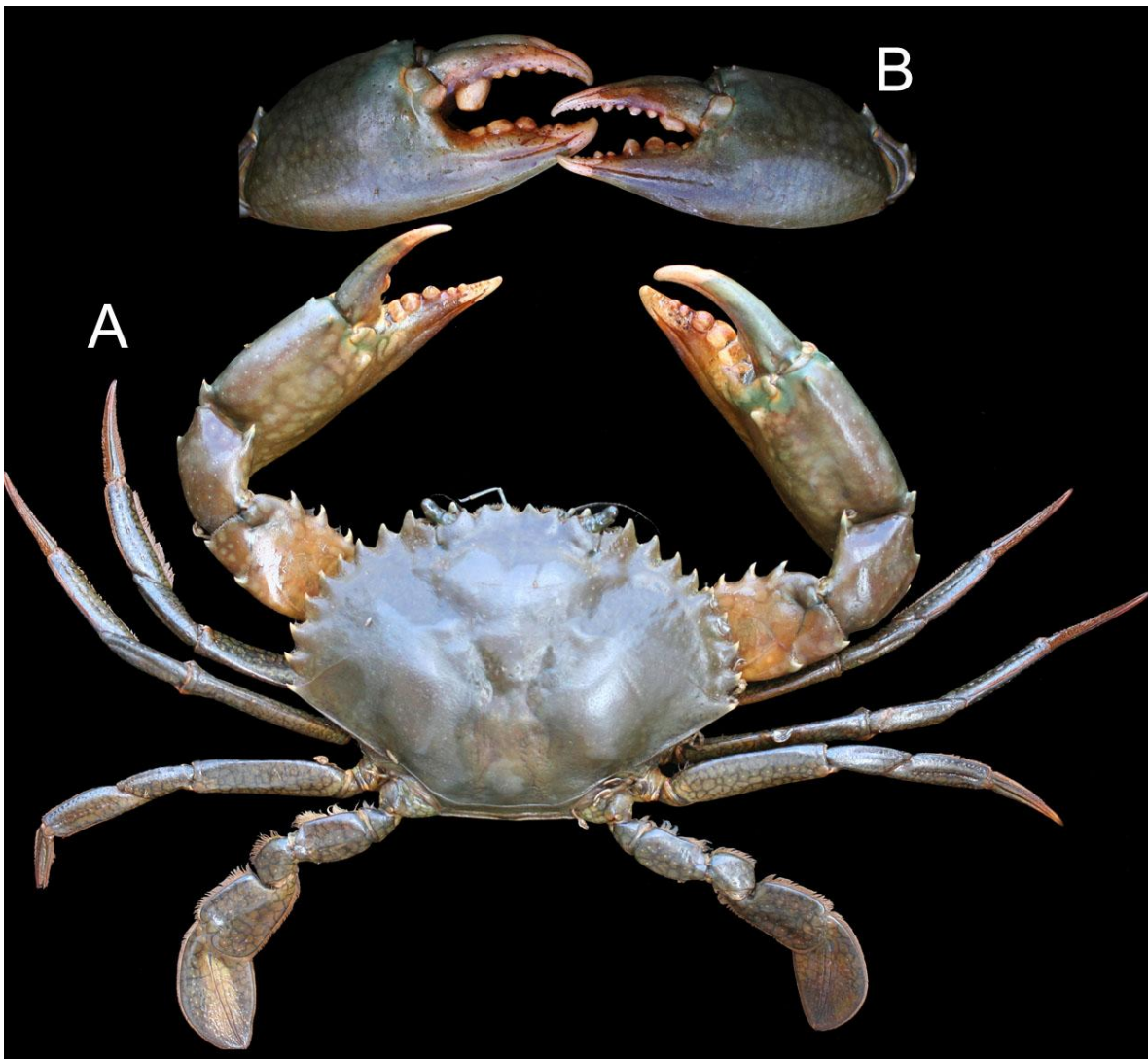


Figure 11. *Scylla serrata*. Mayotte, Malamani mangrove, coll. J.-M. Bouchard, 1 male 93.6×140 mm, color slightly altered by preservative, kept by KUW/Mayotte, not brought back to MNHN because of its large size, A) Dorsal view, B) Aspect of chelae, frontal view.

SUPERFAMILY GRAPSOIDEA

The crabs belonging to the Grapsoidea include a lot of ubiquitous species collected in the mangrove and/or along the coastline. As a result, most of the species listed here under the 'Coastal Rock-rubble' biotope of table 2b could be reasonably listed also with marine species. This is particularly true for the Grapsidae: *Grapsus*, *Pachygrapsus*, *Pseudograpsus*, and *Thalassograpsus*.

FAMILY GECARCINIDAE

***Cardisoma carnifex* (Herbst, 1796)**. Figure 12. – *Cardisoma carnifex* - Guinot, 1967: 289 (Checklist of WIO species, with mention of Grande Comore and Mayotte). - Bouchard, 2009: 6, 8, Mayotte, Malamani mangrove, 16 April 2008, St. 1, 12°55.337 S, 44°09.263 E, upper mangrove in shaded area, burrow, about 1.5 m depth, 1 male 61×74 mm (MNHN B32409). - K UW fieldwork November 2009, St. 6, Petite Terre, Badamiers spillway, upper littoral, 1 female 53×64 mm (MNHN B32410), 1 male 65×75.5 mm (MNHN B32411); St. 29, Ngouja hotel, Mboianatsa beach, in situ photographs only.

Distribution. – Widespread in the IWP. Red Sea, Somalia, Kenya, Tanzania, Mozambique, South Africa, Europa, Madagascar, Comoros, Seychelles, Réunion, Mauritius, India, Taiwan, Japan, Australia, New Caledonia, Fiji, Wallis & Futuna, French Polynesia.

Comment. – Gecarcinid land crabs are of large size and eaten in some places (West Indies, Wallis & Futuna, and French Polynesia). In Mayotte, however, they are not much prized for food and are not eaten.

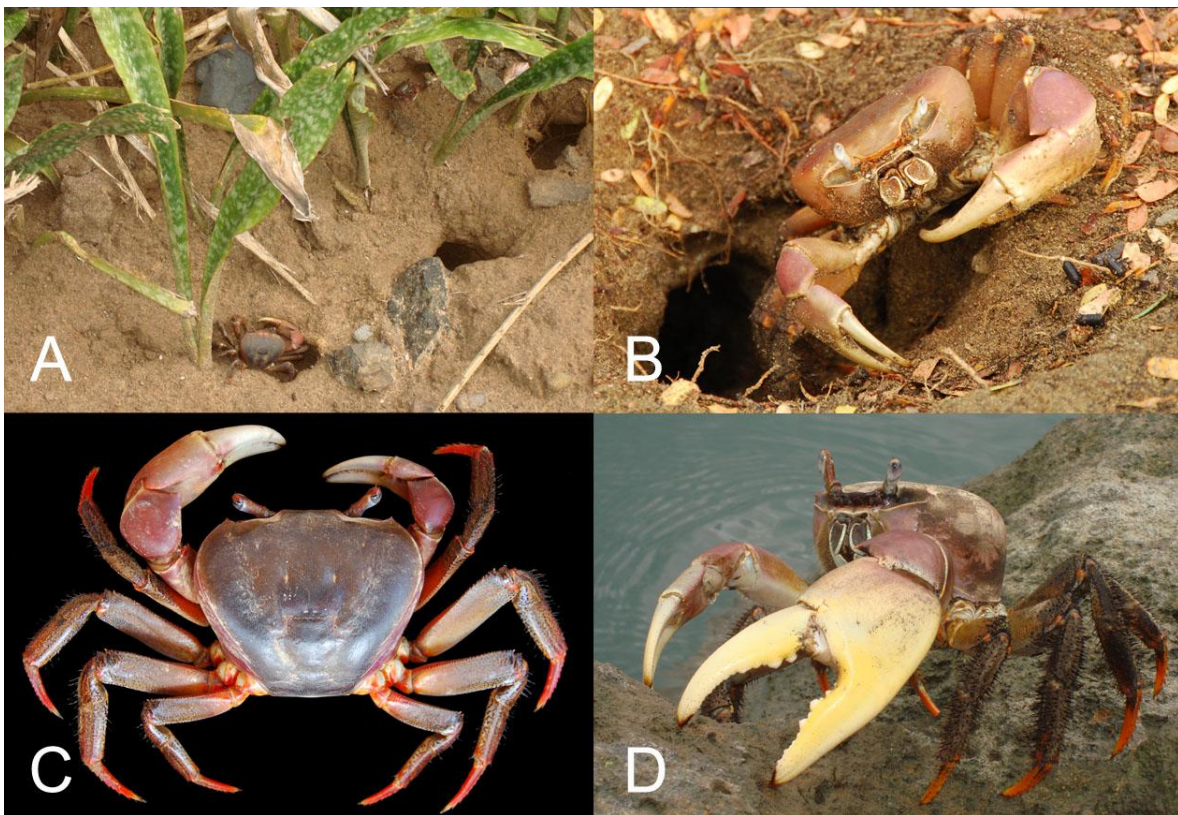


Figure 12. *Cardisoma carnifex*. Mayotte, K UW 2009 fieldwork: A) aspect of station 29, upper littoral Ngouja hotel, Mboianatsa beach; B) same, detail of a crab at the entrance of its burrow; C) St. 6, 1 female 53×64 mm (MNHN B32410); D) probably the same specimen, *in situ* at St. 6.

FAMILY SESARMIDAE

'*Chiromantes*' *ortmanni* (Crosnier, 1965). Figure 13. – Coll. J.-M. Bouchard, 16 April 2008, same as St. 13, Malamani mangrove, 12°55.368 S, 45°09.267 E, burrows between roots of *Rhizophora* trees, mixed with a set of *Neosarmatium meinerti* and a female of *Perisesarma guttatum*, 1 male 11.5×15.0 mm (MNHN B32262).

Distribution. – WIO. Somalia, Tanzania, Madagascar and Mayotte (first record).

Comment. – This species has been described from the western coast of Madagascar (Tuléar, Nosy Be) by Crosnier (1965: 51, under *Sesarma* (*Holometopus*) *ortmanni*. Ng *et al.* (2008: 220, 224) indicate that: '*Sesarma* (*Sesarma*) *eulimene* De Man, 1895, and *Sesarma* (*Holometopus*) *ortmanni* Crosnier, 1965, are currently in *Chiromantes* (sensu Ng & Liu, 1999), but an ongoing revision of this genus by P.K.L. Ng and C.D. Schubart (using morphological and molecular data) shows that they should be transferred to a new genus'. According to P. Ng. (pers. com.), this revision is still in progress. '*Chiromantes*' *ortmanni* is affiliated to '*Chiromantes*' *eulimene* De Man, 1895. Vannini & Valmori (1981: 80) indicate that the aspect of the dactyl of the claw, used to separate '*Chiromantes*' *ortmanni* and '*Chiromantes*' *eulimene*, is obvious in adult males only. The specimen from Mayotte has been compared with other specimens in MNHN. It is identifiable to *C. ortmanni* by the number of tubercles on the upper margin of the dactyl of the claw (25 instead of about 12 in *C. eulimene*) and by a width/length ratio of the carapace of 1.3 (instead of 1.2 in *C. eulimene*).

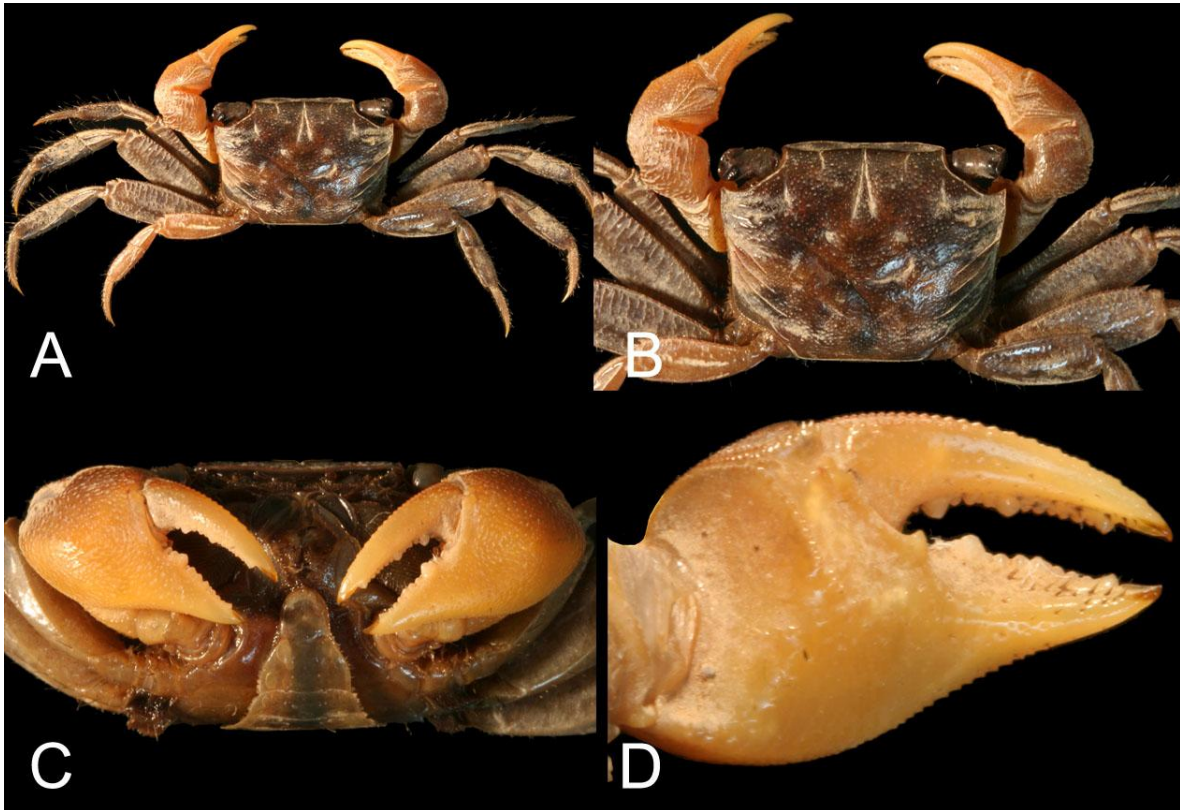


Figure 13. '*Chiromantes*' *ortmanni*. Mayotte, Malamani mangrove coll. J.-M. Bouchard, male 11.5×15.0 mm (MNHN B32262); A-B) dorsal view; C) chelae, frontal view; D) left chela, inner face. Color altered by preservative.

***Metasesarma obesum* (Dana, 1851).** Figure 14. – K UW fieldwork November 2009, St. 21a, islet Choizil, Malandzamiayatsini, upper littoral, 2 male 6.5×7.5 and 11.8×13.0 mm, 3 females 7.4×8.5 to 11.5×12.5 mm (MNHN B32082).

Distribution. – IWP. Zanzibar, Madagascar, Mayotte (first record), Sri Lanka, Laccadive, Indonesia, Philippines, Papua New Guinea, Samoa, French Polynesia. Often recorded under *Metasesarma rousseauxi* H. Milne Edwards, 1853, a junior synonym.

Comment. – A small to medium-sized crab, probably common throughout the IWP but rarely recorded because it is very discrete in the upper littoral zone, hidden under deadwood or leaves with a color camouflage.

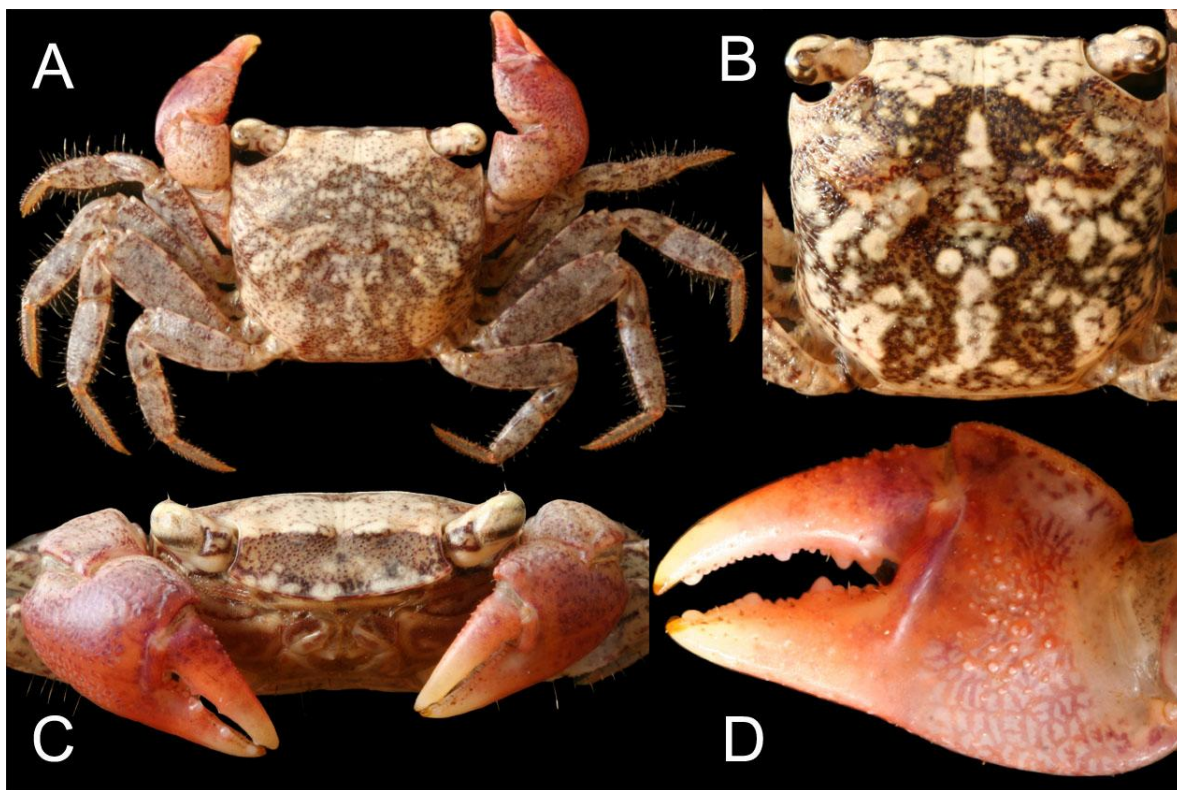


Figure 14. *Metasesarma obesum*. Mayotte, K UW 2009 fieldwork, St. 21, female 11.5×12.5 mm (MNHN B32082), A) dorsal view, C) frontal view, D) right chela, inner face; B) male 11.8×13.0 mm (MNHN B32082), dorsal view of carapace.

***Neosarmatium meinerti* (De Man, 1887).** Figure 15. – *Sesarma* (*Sesarma*) *meinerti* - Guinot, 1967: 288 (WIO crabs checklist, including Mayotte). - *Neosarmatium meinerti* - Bouchard, 2009: 6, 13, Mayotte, Malamani mangrove, 3 males 30.0×35.8 to 33.0×39.0 mm, 3 females 29.5×35.5 to 30.4×37.0 mm (MNHN B32035), 3 males 32.3-38.0 to 34.0×39.8 mm, 1 female 29.0×35.8 mm (MNHN B32036), 1 male 33.0×39.4 mm, 1 female 29.0×35.0 mm (MNHN B32037). - K UW fieldwork November 2009, St. 6, Badamiers spillway, Petite Terre, supralittoral zone, 1 male 22.4×27.3 mm (MNHN B32059); St. 13, Malamani mangrove, mudflats, 3 males 30.0×36.4 to 31.5×38.0 mm (MNHN B32038).

Distribution. – WIO. ?Mayotte (see comment), Seychelles (Aldabra, Mahé), Mauritius, Rodrigues.

Comment. – Very common in Malamani mangrove, in the upper part of the mangrove on mudflats and in vegetation composed of *Avicennia*, *Heritiera*, and *Erythrina* mangrove trees (see Fig. 41). Carapace has a single tooth on anterolateral margin. Chelae are bright red with cream yellow on palms and fingers. At first sight it is very similar to *Neosarmatium fourmanoiri* Serène (1973) described from New Caledonia. The two species can be distinguished by minor morphological details on male chela, as indicated in the key of the genus given by Davie (1994), and by their overall coloration, yellow to red in *N. meinerti* instead of red to dark purple in *N. fourmanoiri*. Photographs transmitted during the redaction of this work by F. Fromard show that this crab can get refuge in the canopy of mangrove trees at high tide (see Fig. 43).

Ragionieri *et al.* (2009) indicate that based on sequences of mitochondrial genes and morphometry *Neosarmatium meinerti* is a species complex composed by ‘four well structured and geographically defined lineages: East African coast (EAC); western Indian Ocean islands; South East Asia; and Australia’. These lineages are treated as separate species in Ragionieri *et al.* (2012). Tentatively Mayotte specimens are attributed in this work to *N. meinerti*, also present in the vicinity (Aldabra Island). However, diagnostic characters between *N. meinerti* and *N. africanum* Ragionieri, Fratini & Schubart, 2012 are very similar and do not allow a positive identification. According to Ragionieri (pers. com.) Mayotte specimens could belong to *N. africanum* (EAC lineage) that seems to be connected to the West of Madagascar, Mayotte Island probably playing the role of a stepping stone island in this connection. This hypothesis should be confirmed by DNA sequencing.

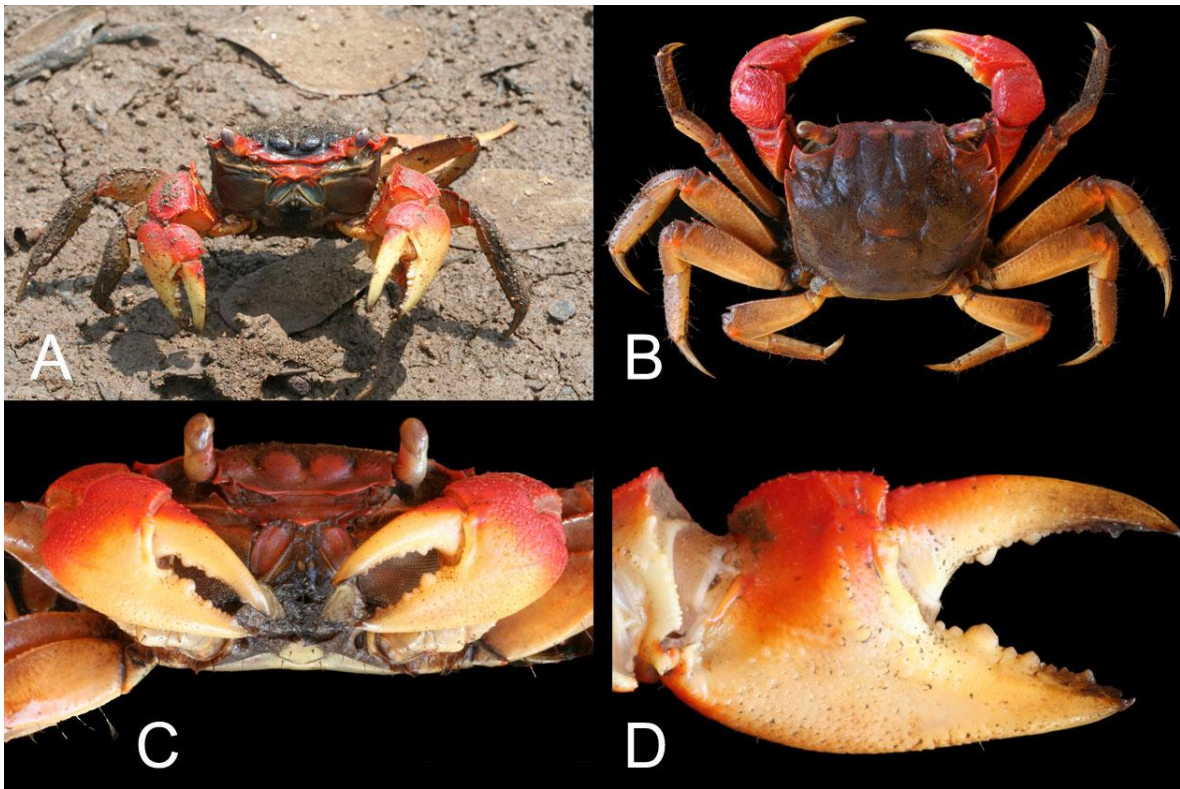


Figure 15. *Neosarmatium meinerti*. Mayotte, KUW 2009 fieldwork, St. 13, Malamani mangrove, A) specimen *in situ*; 1 male 30.0×36.4 mm (MNHN B32038), B) dorsal view, C) frontal view, D) left chela, inner face.

Neosarmatium smithii (H. Milne Edwards, 1853). Figure 16. – *Neosarmatium smithii* - Bouchard, 2009: 6, 11, Mayotte, Malamani mangrove, upper mudflats with trees such as *Ceriops tagal* and *Rhizophora mucronata*, 1 male 37.2×39.4 mm, 2 females 15.4×17.5 and 16.8×18.6 mm (MNHN B32039). - KUW fieldwork November 2009, St. 13, Malamani mangrove, upper mudflats, 1 male 37.0×39.7 mm (MNHN B32040).

Distribution. – Widespread in IWP. Red Sea, Somalia, Kenya, Tanzania, Mozambique, South Africa, Madagascar, Mayotte (first record), Seychelles, Mauritius, India, Malaysia, Indonesia, China, Japan, Philippines, Australia, New Caledonia, Fiji.

Comment. – Collected with *Neosarmatium meinerti*, but less abundant. The two species can be confused at first sight. However, they can be separated with careful examination of the anterolateral margin of the carapace, which has an additional tooth in *N. smithii*, and by the aspect of the chela for upper margin of movable finger and inner face of the palm (compare fig. 15-16, B-D). The color is also different with carapace dark purple and chelae bright red in *N. smithii* (compare fig. 15-16 A).

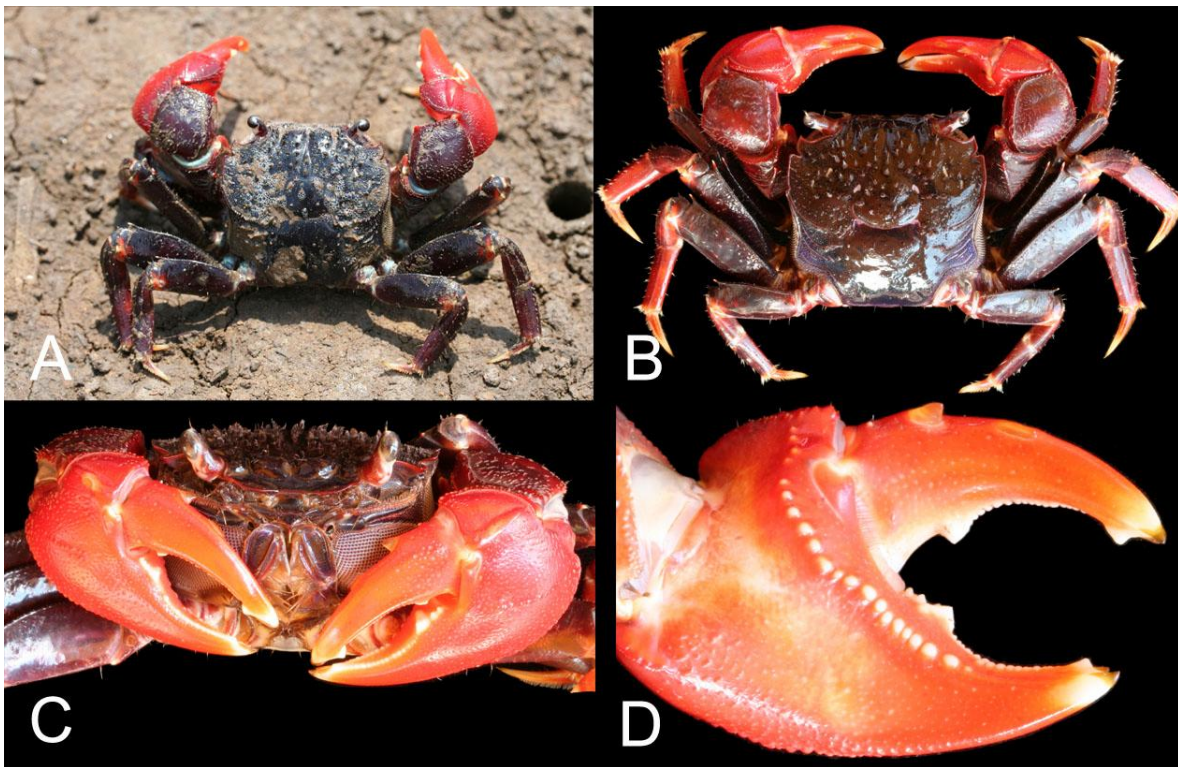


Figure 16. *Neosarmatium smithii*. Mayotte, KUW 2009 fieldwork, St. 13, Malamani mangrove, A) specimen *in situ*; male 37.0×39.7 mm (MNHN B32040), B) dorsal view, C) frontal view, D) left chela, inner face.

***Parasesarma leptosoma* (Hilgendorf, 1869).** Figure 17. – Mayotte, coll. J.-M. Bouchard, 16 April 2008, Malamani mangrove, approximate position 12°55.41 S, 44°09.27 E, close to watercourse, between roots of *Rhizophora* trees, 1 male 12.0×13.6 mm (MNHN B32081).

Distribution. – IWP. Kenya, Tanzania, Mozambique, South Africa, Mayotte (first record) to eastern Australia, New Caledonia, Papua New Guinea, Fiji.

Comment. – This unique specimen was first erroneously attributed to *Parasesarma plicatum*, also recorded in WIO. Careful examination shows that it is distinct by the following characters: carapace more elongated with lateral margins less sinuous; walking legs (pereopods P2-P5) much more elongated, with ratio length/width of the merus greater than 2 and propodus length equal to 3-4 times the length of the dactyl; terminal corneous ‘nail’ of the pleopod is feebly curved whereas it is almost at right angle in *P. plicatum*. With Tesch (1917) key and without comparative specimens in MNHN collections, the best candidate for this unique specimen is *Parasesarma leptosoma*, a species common in Eastern Africa. According to Vannini & Ruwa (1994) and Fratini *et al.* (2005) the elongation of the carapace and walking legs is an evolutionary character that allows the crab to climb more easily in the mangrove trees. At high tide *Parasesarma leptosoma* gets refuge in the canopy of the mangrove trees whereas *Parasesarma plicatum*, with its sturdiest morphology, not adapted to climb to the trees, stays in its burrow in the mudflat.

Rahayu & Ng (2009) have indicated that *Parasesarma leptosoma*, as presently known, is actually a complex of species with differences in the form of the carapace, structure of dactylar tubercles, and aspect of first gonopod observed between populations of Kenya, Malaysia, Papua (Indonesia) and Guam. They conclude that a revision of its status is necessary.



Figure 17. *Parasesarma leptosoma*. Mayotte, coll. J.-M. Bouchard, 16 April 2008, Malamani mangrove, 1 male 12.0×13.6 mm (MNHN B32081); A-B) dorsal view, C) frontal view, D) ventral view. Coloration altered by preservative.

Perisesarma guttatum (A. Milne-Edwards, 1869). Figure 18. – *Sesarma* (*Chiromantes*) *guttata* - Guinot, 1967: 288 (WIO crabs checklist, including Mayotte). - *Perisesarma guttatum* - Bouchard, 2009: 6, 9, Mayotte, coll. J.-M. Bouchard, 16 April 2008, 12°55.368 S, 45°09.267 E, mangrove, burrows in *Rhizophora* mangrove trees, 1 female broken (mixed with 1 male of '*Chiromantes*' *ortmanni*) 10×14 mm (MNHN B32263); coll. J.-M. Bouchard, 2009, Malamani mangrove in roots of *Rhizophora* mangrove trees, 2 males 15.0×18.3 and 16.5×20.5 mm, 3 females 9.5×12.3 to 16.2×20.2 mm, 1 juvenile (MNHN B32030), 17 males 7.3×9.3 to 24.0×29.0 mm, 8 females 8.0×10.0 to 16.5×20.8 mm, 1 juvenile (MNHN B32031), 4 males 8.2×10.2 to 22.8×27.8 mm, 8 females (4 ovigerous) 8.0×10.2 to 17.2×21.2 mm, 1 juvenile (MNHN B32032), 4 males 17.0×21.3 to 20.6×25.3 mm, photo of male 19.0×23.3 mm, 1 female 16.5×21.5 mm (MNHN B32033). - KUW fieldwork November 2009, St. 13, Malamani mangrove, 2 juveniles mixed with *Macrophthalmus* crabs (MNHN B32364).

Distribution. – WIO. Tanzania, Zanzibar, South Africa, Madagascar, Mayotte.

Comment. – Very common species with numerous specimens collected between the roots of *Rhizophora* mangrove trees at Malamani station. The entrance of the burrow is sometimes protected from the flood by a mud tube of variable height. According to Crosnier (1965: 70) *Perisesarma guttatum* is very similar to *P. lividum* (A. Milne-Edwards, 1869) known from Indonesia, eastern Australia and New-Caledonia. It is distinct by the 'chiton-like' shape of the tubercles disposed on upper margin of the finger of the chela (Fig. 18 C).

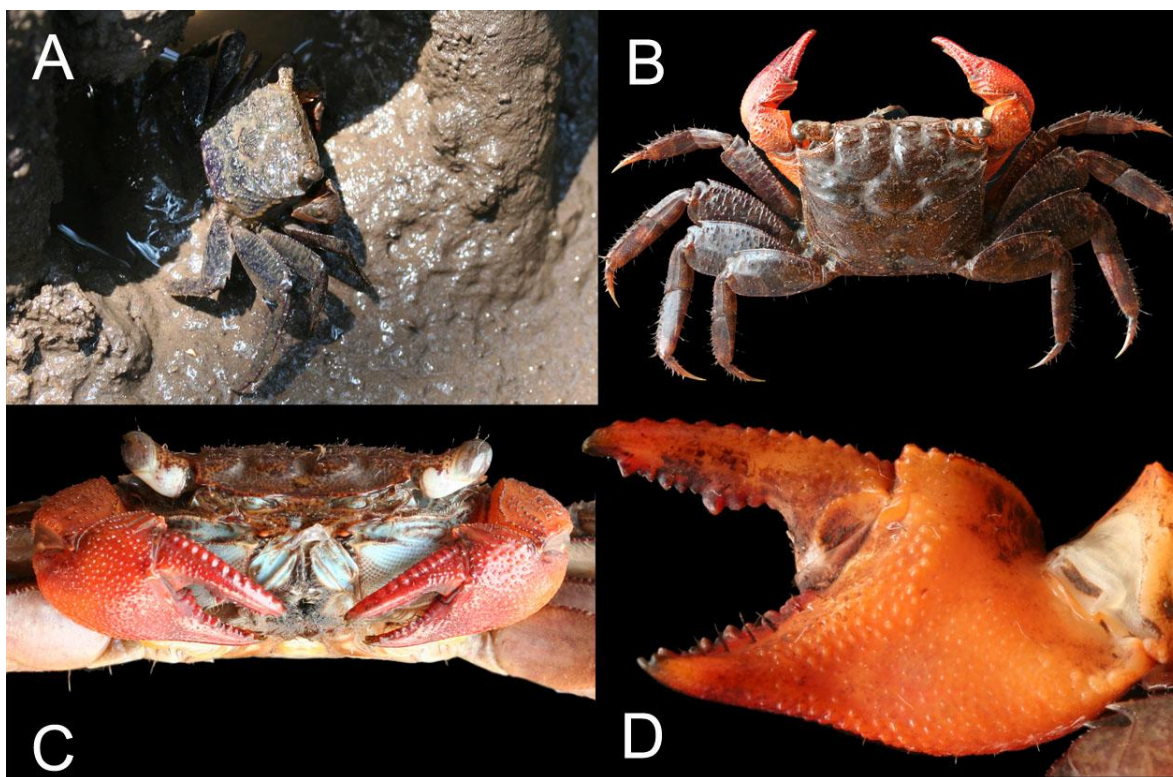


Figure 18. *Perisesarma guttatum*. Mayotte, KUW 2009 fieldwork, St. 13, Malamani mangrove, A) specimen *in situ*; male 19.0×23.3 mm (MNHN B32033), B) dorsal view, C) frontal view, D) right chela, inner face. Coloration of B-D slightly altered by preservative.

***Sesarmops impressus* (H. Milne Edwards, 1837)**. Figure 19. – *Sesarma nodulifera* de Man - Lenz, 1910: 562, two specimens, larger 16x17 mm (Comoros: Mohéli); non *Geosesarma noduliferum* (De Man, 1892) according to re-examination of Lenz's specimens by Crosnier (1965: 63) – *Sesarma (Sesarma) impressa* - Crosnier, 1965: 63, fig. 82, 92, 104 (Comoros: Mohéli). - Guinot, 1967: 287 (WIO crabs checklist, including Comoros). – *Sesarmops impressum* - Keith *et al.*, 2006: 36 (Comoros: Mohéli, Mayotte). – *Sesarmops impressus* - Coll. Anker and Michonneau, 2008, St. MAY08-St3, Hajangoua, path north of old sugar factory, in brushes and under rocks (UF 13657, 13667). - Bouchard, 2009: 6, 15, Mayotte, cultivated field behind Malamani mangrove, 3 males 14.5x16.8 to 36.0x42.0 mm (MNHN B32034). - KUW fieldwork November 2009, St. 13, Malamani mangrove, from J.-M. Bouchard collection, 1 male 25.3x27.0 mm (MNHN B32034). – Photo Matthias Deuss - Mayotte, river side, determination P. Davie and P. Ng from photograph (Fig. 19 A).

Distribution. – IWP. Zanzibar, Dar es Salaam, Madagascar, Comoros (Mohéli, Mayotte), Seychelles, Indonesia, Taiwan, Philippines, Papua New Guinea, Australia, Samoa. According to P. Davie (pers. com.) the record of this species in Fiji (McLay & Ryan, 1990) could be an error for *Sesarmops atrorubens* (Hess, 1865).

Comment. – This crab is discrete and only few specimens have been captured during this study. It lives generally in the upper part of the Mangrove, in cultivated fields and/or in meadows (see Fig. 41). According to P. Ng (pers. com.), who is currently working on the taxonomic status of this crab, *Sesarmops impressus* is part of a species complex with at least two forms in the IWP. The Indian Ocean population generally has white chela and a yellowish-white carapace. This is probably the real *Sesarmops impressus*. The '*Sesarmops impressus*' reported from the East Pacific (e.g. Taiwan, China, Japan, Philippines, New Guinea, and eastern Indonesia) has dark brown carapaces with deep red chela. Their gonopods also differ.

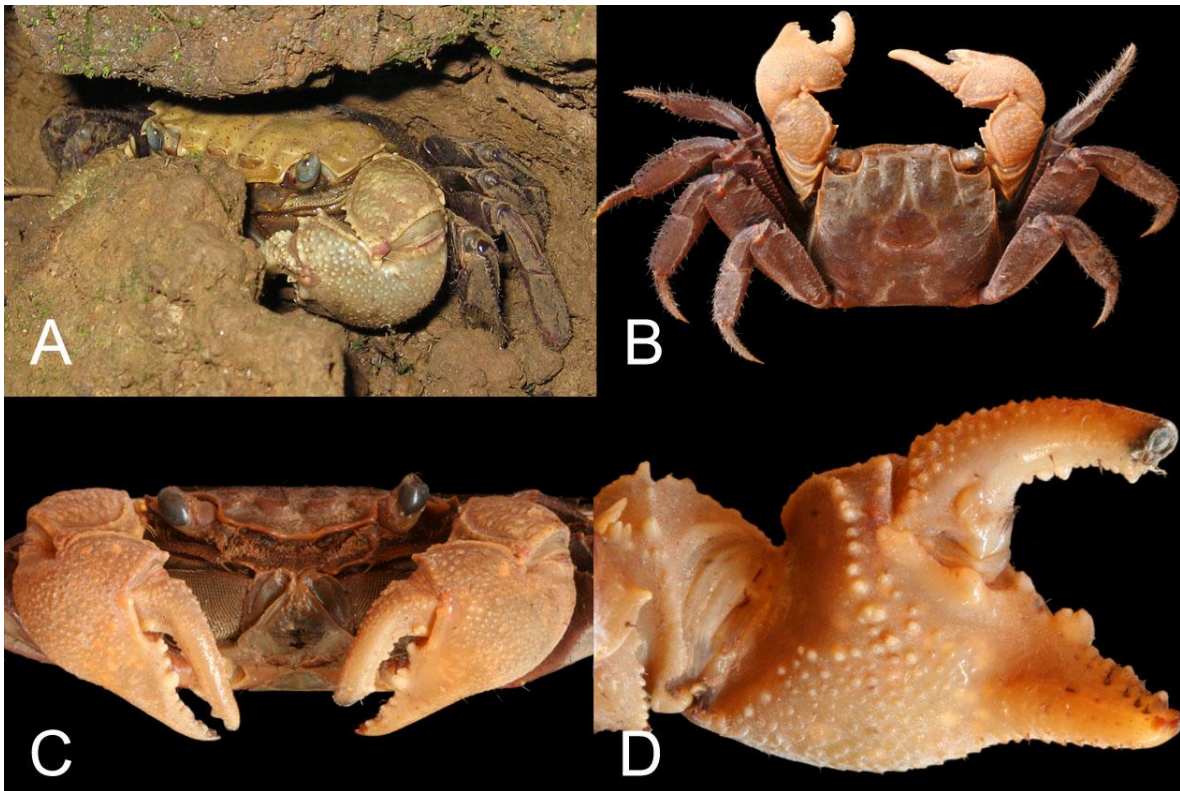


Figure 19. *Sesarmops impressus*. A) Mayotte, river bank, *in situ* photograph by Matthias Deuss, specimen not collected, det. P. Davie and P. Ng from photograph; KUW 2009 fieldwork, St. 13, Malamani mangrove 1 male 25.3x27.0 mm (MNHN B32034), B) dorsal view, C) frontal view, D) left chela, inner face. Coloration of B-D altered by preservative.

FAMILY GRAPSIDAE

***Geograpsus crinipes* (Dana, 1851).** Figure 20 A. – KUW fieldwork November 2009, St. 21a, East of islet Choizil, Malanzamiayatsini, supralittoral zone, 1 male 36×42.5 mm (MNHN B32042).

Distribution. – Widespread in the IWP. Red Sea, Somalia, ?Tanzania, Mayotte (first record), Seychelles, Réunion to Cocos (Keeling), Indonesia, Taiwan, Japan, Papua New Guinea, ?eastern Australia, Loyalty, Vanuatu, Fiji, Wallis & Futuna, Samoa, Cook, French Polynesia, Hawaii, Easter Island.

Comment. – The single specimen captured in Mayotte has an orange-red coloration, instead of often cream to light green in this species. It is attributed to *G. crinipes* based on the aspect of lateral margins of the carapace, slightly diverging posteriorly, and the presence of small striae on the postero-median areas of the carapace (cardiac and intestinal areas).

***Geograpsus grayi* (H. Milne Edwards, 1853).** Figure 20 B. – KUW fieldwork November 2009, St. 1, Trévani beach supralittoral zone, 1 male 38.5×48.0 mm (MNHN B32041).

Distribution. – Widespread in the IWP. Red Sea, Tanzania, Madagascar, Mayotte (first record), Seychelles, Réunion, Mauritius to Indonesia, Taiwan, Japan, Australia, Solomon, New Caledonia, Loyalty, Fiji, Kermadec, Wallis & Futuna, Niue, Cook, French Polynesia, Henderson.

Comment. – A very discrete species but common at night in supralittoral zone or in coastal forests. Its purple color is a good mean to recognize it on the field.

***Grapsus fourmanoiri* Crosnier, 1965.** Figure 20 C-D. – *Grapsus fourmanoiri* - Crosnier, 1965: 12, fig. 4-6, p. III, fig. 1 (Mayotte). - KUW fieldwork November 2009, supralittoral zone, St. 1, Trévani beach 1 female 25.0×28.0 mm (MNHN B32046); St. 2, Trévani beach to Kanganani mangrove, 3 males 17.4×20.4 to 27.2×31.0 mm (MNHN B32045); St. 6, Petite Terre, Badamiers spillway, upper littoral, 1 juvenile 16.3×19.0 mm (MNHN B32063); St. 10, east of islet Quatre Frères (Vatou), rocky shore, 2 males 15.0×17.0 and 18.0×20.7 mm, 2 females 15.8×18.6 and 25.6×30.0 mm, largest ovigerous (MNHN B32044); St. 15, islet Mtsamboro, northeast tip of the beach, 1 male 13.4×15.5 mm, 1 juvenile 7.5×9.0 mm (MNHN B32060); St. 21a, east of islet Choizil, Malanzamiayatsini, rocky shore, 4 males 8.2×9.5 to 24.5×28.0 mm, 4 females 13.5×16.0 to 21.0×24.3 mm, largest ovigerous (MNHN B32043); St. 26, Mutsumbatsou reef flat, 1 male 17.3×19.7 mm, 3 females 11.5×13.0 to 13.0×15.3 mm (MNHN B32061); St. 29, Mboianatsa beach, Ngouja hotel, 1 juvenile 7.0×8.6 mm (MNHN B32062); Coll. J.-M. Bouchard, Malamani mangrove, 1 male 32.7×36.0 mm (MNHN B32047).

Distribution. – WIO. Somalia, Kenya, Tanzania, Mozambique, South Africa, Madagascar, Mayotte, Seychelles, Réunion.

Comment. – Described from Madagascar and Mayotte. This species is very common in supralittoral or intertidal zone, in rocky shores, sometimes near mangrove areas. Its coloration is variable by it is often yellow-maroon or green. The aspect of the front, much more elongated than in *Grapsus tenuicrustatus*, is a good character for telling both species apart (compare Fig. 20 C-D and E-F).

***Grapsus tenuicrustatus* (Herbst, 1783).** Figure 20 E-F. – KUW fieldwork November 2009, rocky shore, St. 21, East of islet Choizil, Malanzamiayatsini, 3 females 18.2×20.2 to 39.5×41.3 mm (MNHN B32049); St. 26, Mutsumbatsou reef flat, 1 male 43.0×45.5 mm (MNHN B32050); St. 26c, Mutsumbatsou reef flat, 1 male 43.5×46.4 mm (MNHN B32051); St. 38, South-East bay of Chiconi/Sada, coll. J.-M. Bouchard, intertidal, 24 July 2008, 2 females 22.0×24.2 mm and 26.0×27.6 mm, largest ovigerous (MNHN B32048).

Distribution. – Widespread in the IWP. Red Sea, Somalia, Kenya, Tanzania, Mozambique, South Africa, Madagascar, Mayotte (first record), Seychelles, Réunion, to Indonesia, Ashmore Reef, Taiwan, Japan, New Caledonia, Loyalty, Wallis & Futuna, Cook, French Polynesia, Hawaii.

Comment. – Although it is common on rocky shores it is less abundant in Mayotte than *G. fourmanoiri*. In *G. tenuicrustatus* the front is distinctly higher than in *G. fourmanoiri* with a ratio length/height of about 2 instead of about 4 in *G. fourmanoiri*.

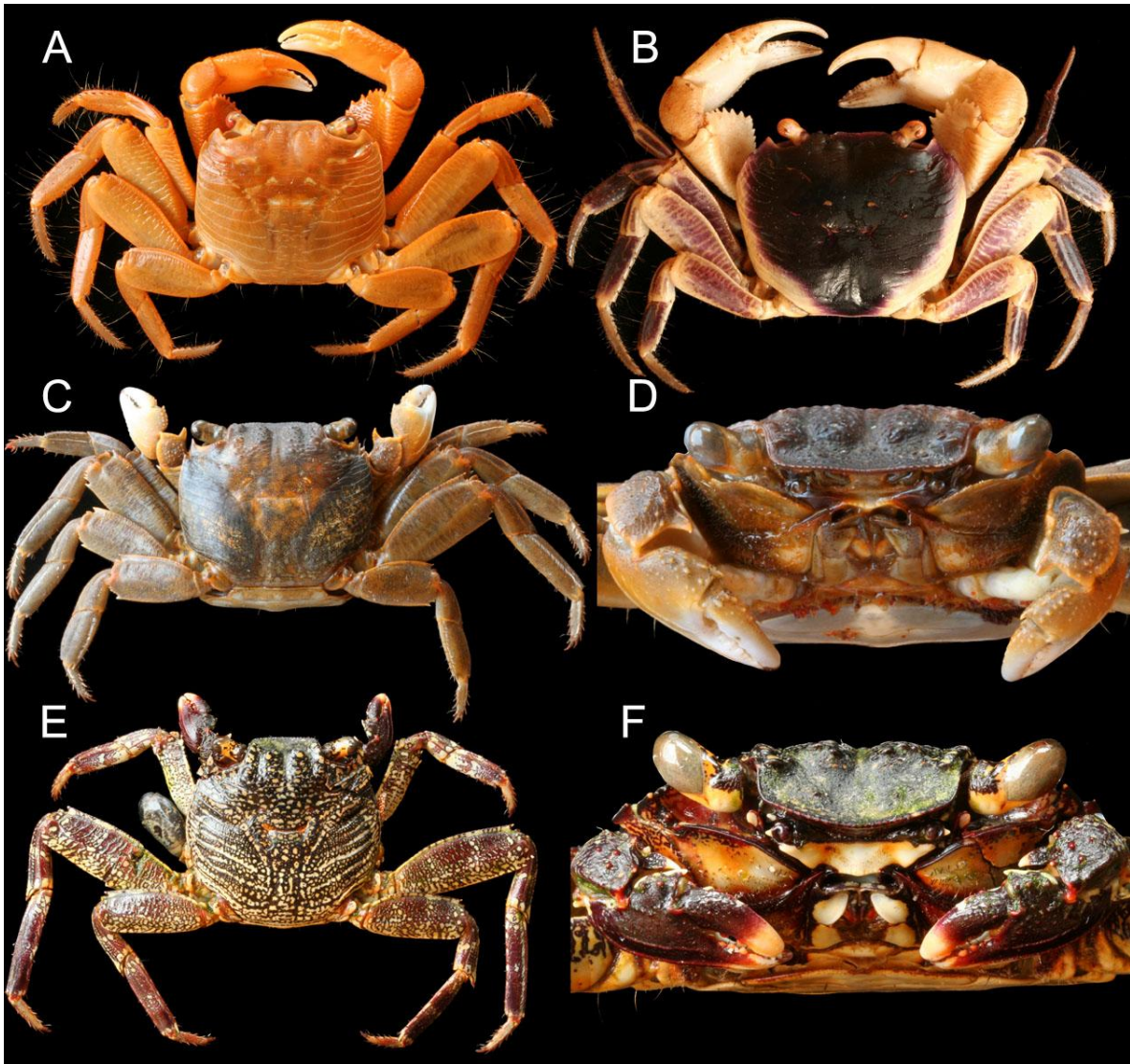


Figure 20. *Geograpsus* and *Grapsus* crabs from KUW 2009 fieldwork, Mayotte. A) *Geograpsus crinipes*, St. 21a, supralittoral of islet Choizil, 1 male 36×42.5 mm (MNHN B32042); B) *Geograpsus grayi*, St. 1, supralittoral of Trévani beach, 1 male 38.5×48.0 mm (MNHN B32041); C-D) *Grapsus fourmanoiri*, St. 10, rocky shore at islet Quatre Frères (Vatou), 1 ovigerous female 25.6×30.0 mm (MNHN B32044); E-F) *Grapsus tenuicrustatus*, St. 21 rocky shore at islet Choizil, 1 female 39.5×41.3 mm (MNHN B32049).

***Metopograpsus messor* (Forskål, 1775).** – K UW fieldwork November 2009, det. R. Cleva, St. 2, Trévani beach to Kangani mangrove, supralittoral zone, 1 male 9.5×13.2 mm, 2 females 7.6×10.3 and 9.0×12.4 mm (MNHN B32067).

Distribution. – IWP. Red Sea, Somalia, Kenya, Tanzania, Mozambique, South Africa, Madagascar, Mayotte (first record), Seychelles, Mauritius, Pakistan, India, Indonesia, Taiwan, Japan, Australia, Samoa, Line Islands, Hawaii, French Polynesia. Presence in French Polynesian Islands should be confirmed by new collections (Poupin, 2005: 39).

Comment. – This species can be confused with *Metopograpsus thukuhar*, also present in Mayotte. As stated by Vannini & Valmori (1981: 73) ‘*The internal orbital tooth varies considerably and does not allow for the easy distinction which Crosnier’s (1965, figs 26, 27) picture would lead one to believe*’. The two best characters to separate these species are: the shape of carapace, less rectangular with lateral margins clearly converging backwards, in *M. messor*; and the chitinous terminal projection of male pleopod (Pl 1), short and curved almost at right angle in *M. messor*, instead of longer and curved at only about 45° in *M. thukuhar*.

***Metopograpsus thukuhar* (Owen, 1839).** Figure 21. – K UW fieldwork November 2009, det. R. Cleva, St. 2, Trévani beach to Kangani mangrove, supralittoral zone, 1 male 14.0×17.8 mm (MNHN B32066), 1 female 6.5×9.0 mm (MNHN B32083); St. 6, Petite Terre, Badamiers spillway, upper littoral, 1 male 11.3×15.3 mm (MNHN B32065), 5 males 8.5×10.5 to 12.8×17.0 mm, 5 females 8.3×11.4 to 10.8×14.6 mm, (MNHN B32064).

Distribution. – Widespread in the IWP. Red sea, Somalia, Mozambique, Tanzania, Kenya, South Africa, Madagascar, Mayotte (first record), Réunion, Indonesia, Taiwan, China, Japan, Australia, Solomon, New Caledonia, Vanuatu, Wallis & Futuna, French Polynesia, Hawaii.

Comment. – Can be confused with *Metopograpsus messor* (see remarks under that species). *Metopograpsus thukuhar* is very common in the IWP and rather ubiquitous. It is collected in brackish waters of estuaries, in mangroves, or in intertidal areas on rocks and mud flats.

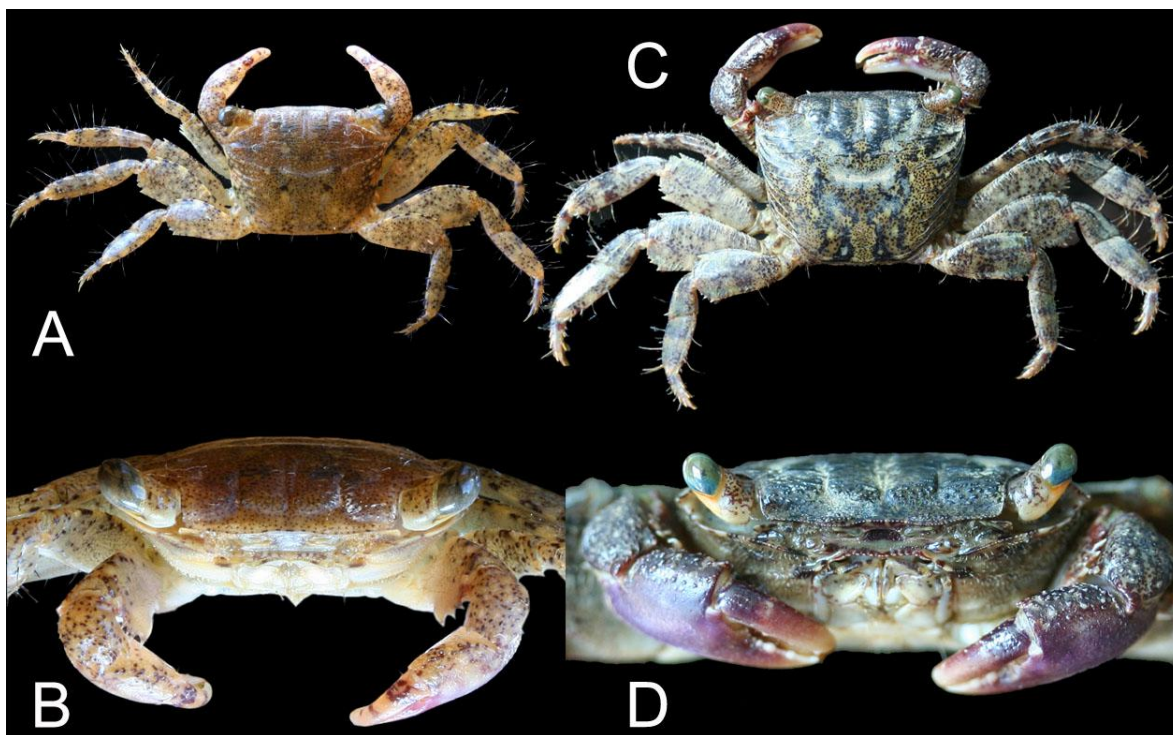


Figure 21. *Metopograpsus thukuhar*. K UW 2009 fieldwork, St. 6, Petite Terre, Badamiers spillway, upper littoral, 1 young male 11.3×15.3 mm (MNHN B32065), A) dorsal view, B) frontal view. C-D) Réunion, larger male 22×22.6 mm with more typical coloration (from Poupin & Massoukou [3]).

***Pachygrapsus minutus* A. Milne-Edwards, 1873.** Fig. 22 A-B – KUW fieldwork November 2009, St. 10, east of islet Quatre Frères (Vatou), 4 females 4.5×6.5 to 5.7×8.3 mm, largest ovigerous (MNHN B32068); St. 26, Mutsumbatsou reef flat, 1 male 4.3×6.5 mm, 1 female 3.8×5.6 mm (MNHN B32069), plus 1 male 3.3×5.2 mm retrieved in a lot of small *Macrophthalmus*; St. 31, Brandélé ‘Musical beach’, 1 male 5.3×7.6 mm, 5 females 3.0×4.5 to 4.8×7.0 mm (MNHN B32070).

Distribution. – Widespread in the Indo-Pacific. Red sea, eastern Africa, Madagascar, Mayotte (first record), Thailand, Indonesia, China, Taiwan, Japan, Caroline, Marianna, Australia, New Caledonia, Fiji, Wallis & Futuna, Niue, Samoa, Kiribati, Hawaii, French Polynesia, Clipperton, Revillagigedo.

Comment. – This *Pachygrapsus* crab is common in the intertidal area although often unnoticed because of its small size. At low tide it grazes the algae film that covers the rocks. A good mean to capture it is to remove quickly a rock and to examine it carefully or to look on the empty place left on the ground. *Pachygrapsus minutus* can be confused with similar small-sized *Pachygrapsus planifrons*. It is distinguished by examination of the tip of fingers of the chelae, smooth, without setae, instead of furnished with a conspicuous row of setae in *P. planifrons* (compare Fig. 22 B-D). In addition to this character, the front of *P. minutus* is more sinuous than in *P. planifrons* and the posterior margin of merus of P5 has a submedian tooth, absent in *P. planifrons*.

***Pachygrapsus planifrons* De Man, 1888.** Figure 22 C-D. – KUW fieldwork November 2009, St. 2, Trévani beach to Kangani mangrove, supralittoral zone, 1 ovigerous female 4.7×5.6 mm (MNHN B32365).

Distribution. – Widespread in the Indo-Pacific. Eastern Africa (Tanzania), Mayotte (first record), Seychelles, Christmas Island, Indonesia, China, Japan, Caroline, Marianas, Kiribati, Funafuti, Hawaii, French Polynesia, Clipperton.

Comment. – Similar to *Pachygrapsus minutus* for its small size and ecology. The two species are separated by characters indicated under *P. minutus*.

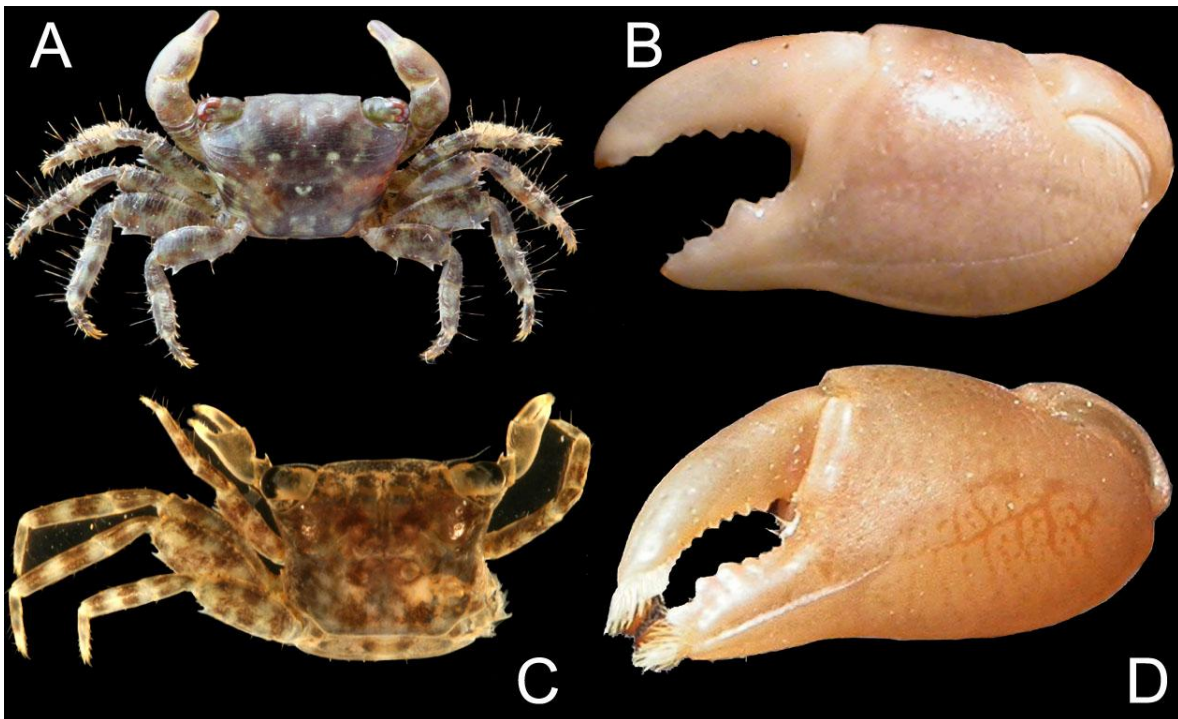


Figure 22. A-B, *Pachygrapsus minutus*. A) KUW 2009 fieldwork, St. 10, islet Quatre Frères, female 5.7×7.6 mm (MNHN B32068), B) Male 4.3×5.9 mm, Moruroa, French Polynesia (MNHN B29273), left chela, outer face. C-D, *Pachygrapsus planifrons*, C) KUW 2009 fieldwork, St. 2, Littoral, from Trévani to Kangani Mangrove, ovigerous female 4.7×5.6 mm, right ambulatory legs missing, color altered by preservative (MNHN B32365), D) Male 7.0×9.0 mm, Rangiroa, French Polynesia (UF 1490), left chela, outer face. B-D from Poupin *et al.* (2005).

***Pachygrapsus plicatus* (H. Milne Edwards, 1837)**. Figure 23. – *Pachygrapsus plicatus* - Crosnier, 1965: 27, fig. 24-25, 31-32 (Glorioso). - Guinot, 1967: 285 (WIO crabs checklist, including Glorioso).

Distribution. – Widespread in the IWP. Mozambique, South Africa, Madagascar, Glorioso, Seychelles, Réunion, Mauritius, Christmas, Cocos, Indonesia, China, Taiwan, Japan, Marianas, Micronesia, Marshall, New Caledonia, Samoa, Niue, Tuvalu, Hawaii, French Polynesia.

Comment. – A medium to small-sized *Pachygrapsus* still not recorded around Mayotte Island although it is common in the IWP. It leaves along rocky intertidal shores exposed to the ocean and therefore could be also listed with marine species. It is characterized by the striated aspect of its carapace and outer faces of chelae (Fig. 23).

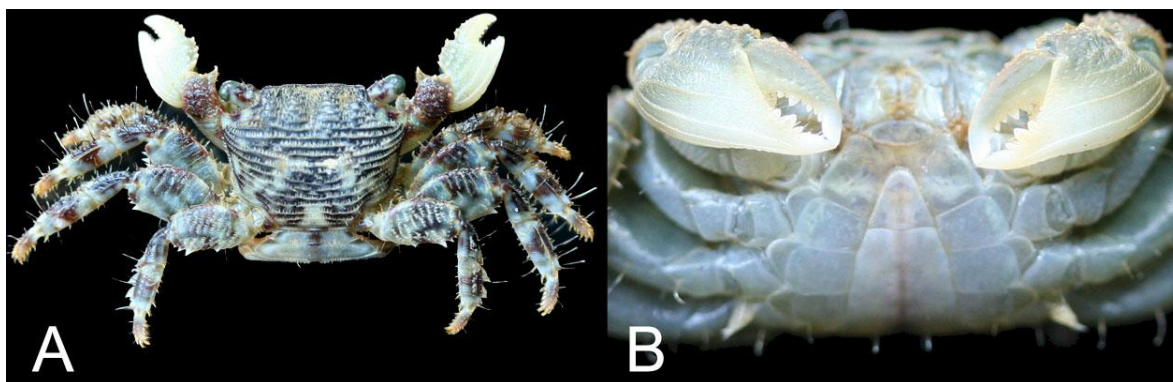


Figure 23. *Pachygrapsus plicatus*. Male 9×11 mm, from Réunion (MNHN), A) dorsal view, B) ventral view with aspect of outer faces of chelae (from Poupin & Massoukou [3]).

FAMILY VARUNIDAE

***Pseudograpsus albus* Stimpson, 1858**. Figure 27 A. – KUW fieldwork November 2009, St. 15, islet Mtsamboro, beach of the north-eastern tip, intertidal under stones, 1 female 5.3×5.9 mm, as '*Pseudograpsus cf. albus*' in Bouchard *et al.*, 2009: 85, photo (MNHN B32084).

Distribution. – IWP. Eastern Africa (Kenya), Madagascar, Mayotte (first record), Mauritius, Réunion, Maldives, Indonesia, Taiwan, Japan, Australia, New Caledonia, Fiji, Line Islands, French Polynesia.

Comment. – A small-sized flat crab that lives on sandy intertidal places, under rocks. It is mimetic and can be easily unnoticed without careful examination of the substrate. *Pseudograpsus elongatus* (A. Milne-Edwards, 1873) is also present in the Indian Ocean, especially in Madagascar and the Seychelles and, therefore, could be also present in Mayotte. In *Pseudograpsus albus* the 3 anterolateral teeth are indistinct and the posterior margins of the carapace are sub-parallel. In *P. elongatus* the 3 anterolateral teeth are well marked and the posterior margins of the carapace converge posteriorly.

***Pseudohelice subquadrata* (Dana, 1851)**. Figure 24. – *Pseudohelice quadrata* - Bouchard, 2009: 6, 28, Malamani mangrove, coll. J.-M. Bouchard, 12/12/2008, 12°55'07" S, 45°09'07" E, 2 males 11.3×13 and 11.7×13.8 mm, 1 female 11.0×13.5 mm (MNHN B32363). – Bouchard *et al.*, 2009: 86, photos (same specimens). - Ng *et al.*, 2008: 227 (Checklist of valid names). - *Pseudohelice subquadrata* – New valid name from P. Davie (WoRMS [2]).

Distribution. – IWP. Red Sea, Somalia, Tanzania, Kenya, Madagascar, Mayotte (first record), Seychelles, Mauritius, Thailand, Indonesia, China, Japan, Philippines, Australia, Caroline, Solomon, New Caledonia, Fiji, Western Samoa, French Polynesia.

Comment. – A medium-sized crab living near brackish waters pools or streams in the mangrove. Only three specimens have been found after ten investigations at Malamani mangrove. The crab has a stridulating apparatus made of a row of long tubercles disposed on the pterygostomian area (Fig. 24 D). It stridulates by rubbing its chela against these tubercles. On fresh specimens (Fig. 24 A') the color is deep violet on dorsal surface of the carapace with chelae and ventral surface being yellowish to orangish. The species has been often recorded in WIO (e.g. Madagascar in Crosnier, 1965) under *Helice leachii* Hess, 1865, a junior synonym. For a complete synonymy and distribution Sakai *et al.* (2006) can be consulted.

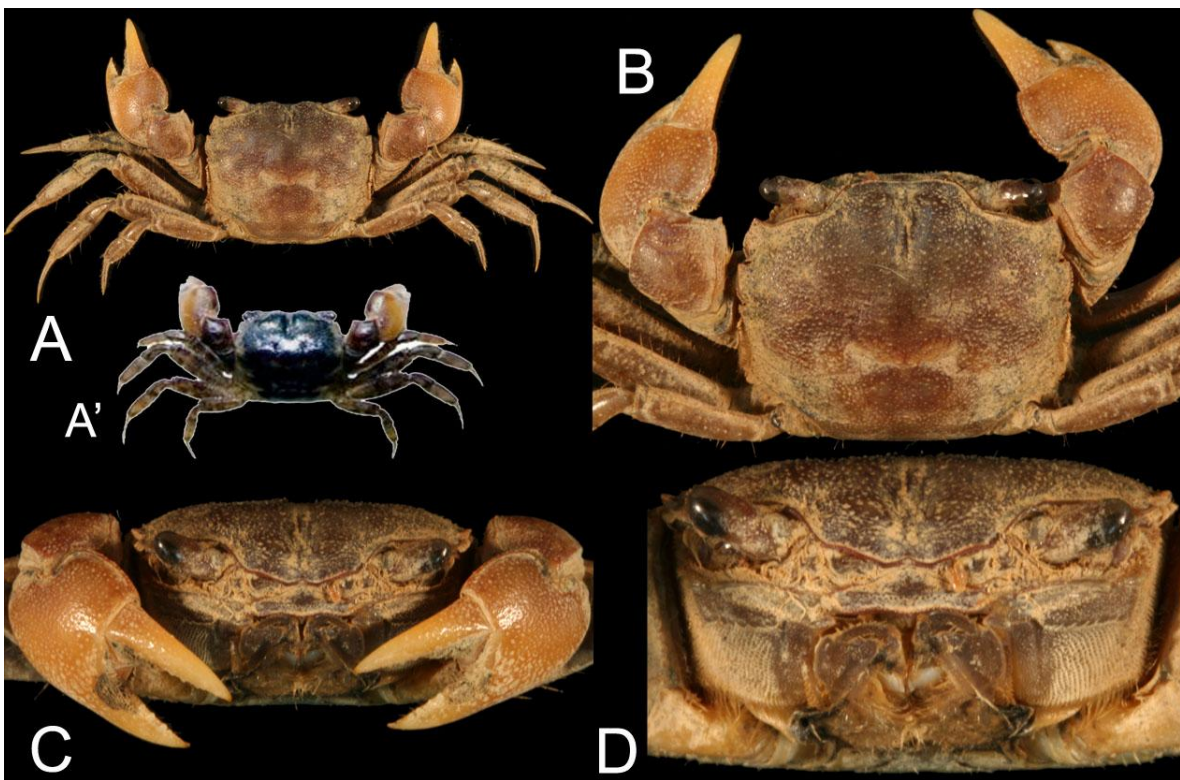


Figure 24. *Pseudohelice subquadrata*. Malamani mangrove, coll. J.-M. Bouchard, 2008, 1 male 11.7×13.8 mm (MNHN B32363), A-B) dorsal view, C-D) frontal view. Except for A' coloration is altered by preservative.

***Ptychognathus barbatus* (A. Milne-Edwards, 1873).** Figure 25 A. – *Ptychognathus barbatus* - Keith *et al.*, 2006: 36, 80 (Comoros: Anjouan, Mohéli).

Distribution. – IWP. Madagascar, Comoros, Indonesia, Taiwan, China, Japan, New Caledonia, Wallis & Futuna.

Comment. – A small-sized crab of fresh and brackish waters. Its maximum carapace size is between 5-15 mm. It is collected in estuaries under stones or among gravels. In the Comoros it may have been confused with *P. johanna*, a poorly documented species described from Anjouan (compare Fig. 25 A and C).

***Ptychognathus johannae* Rathbun, 1914.** Figure 25 C-D – Rathbun, 1914: 354, pl. 30, ‘Johanna Island’, an alternate name used for Anjouan Island in the past, coll. Hildebrandt; received in exchange from the Berlin Museum, 1 male, type Cat. N° 22799 USNM, formerly N° 4598, Berlin Museum. - Guinot, 1967: 286 (WIO crabs checklist, with Comoros).

Distribution. – Comoros only (Anjouan).

Comment. – This species has been described from Anjouan once named ‘Johanna Island’. Date of publication is kept here as 1914, as adopted by Ng *et al.* (2008) and WoRMS [2], despite a note in volume 46 of the *Proceedings of the United States National Museum* (table of content, p. VII) indicating that publication date should be 1913. A photograph of the type specimen in Smithsonian US national Museum, Washington has been obtained through the courtesy of Ng N.-K. currently preparing a revision of the genus. *Ptychognathus johannae* has been rarely reported since its description and it is still known with certainty from the Comoros only, one record from Japan being an error for *Ptychognathus hachijyoensis* Sakai, 1955 (see Osawa & Ng, 2006).

***Ptychognathus pusillus* Heller, 1865.** Figure 25 B – *Ptychognathus pusillus* - Keith *et al.*, 2006: 36, 84 (Comoros: Anjouan, Mohéli).

Distribution. – IWP. Comoros (Anjouan, Mohéli), Andaman, Christmas, Indonesia, Japan, Fiji.

Comment. – This species resembles *Ptychognathus barbatus*. It is distinct by the anterolateral margin of the carapace, with 3 low indentations, instead of deep indentations in *P. barbatus*. Maximum width of carapace reported by Keith *et al.* (2006) is between 10-25 mm.

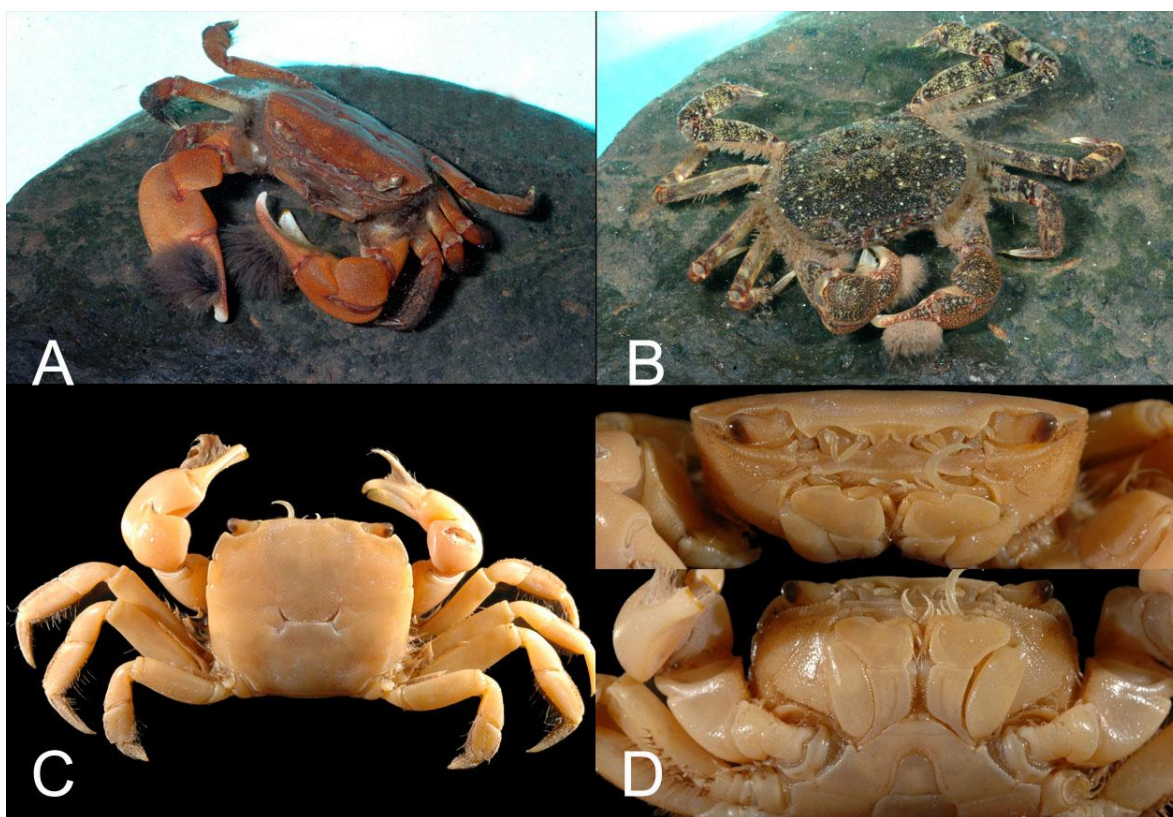


Figure 25. A) *Ptychognathus barbatus*. B) *Ptychognathus pusillus*. A-B, From Keith *et al.* (2006), copyright P. Keith. C-D) *Ptychognathus johannae*. Type specimen, 1 male 16.3x19 mm (USNM 22799), C) Dorsal view, D) Frontal (top) and ventral (bottom) views; photographs Christopher Escano Mendoza, courtesy of Ng Ngan Kee.

Thalassograpsus harpax (Hilgendorf, 1892). Figure 26. – KUW fieldwork November 2009, St. 2, littoral, from Trévani to Kangani Mangrove, 1 male 6.1×7.1 mm, 1 ovigerous female 6.4×7.5 mm (MNHN B32261); St. 31, Brandélé ‘Musical beach’, 5 ovigerous females 5.0×5.4 to 6.6×7.6 mm, 1 female 6.0×6.9 mm (MNHN B32260).

Distribution. – IWP. Red Sea, Gulf of Aden, Persian Gulf, Somalia, Tanzania, Mayotte (first record), Cocos, Malaysia, Taiwan, Japan, Samoa, Wallis & Futuna, French Polynesia.

Comment. – A small-sized crab that lives among rocks and gravels in the intertidal. It is vivacious and disappears quickly under rocks or in tide pools when one try to catch it by searching under stones. For that reason it is rarely reported although it is probably very common in the IWP. In the male there is a brush of setae on inner face of the palm of the chela.

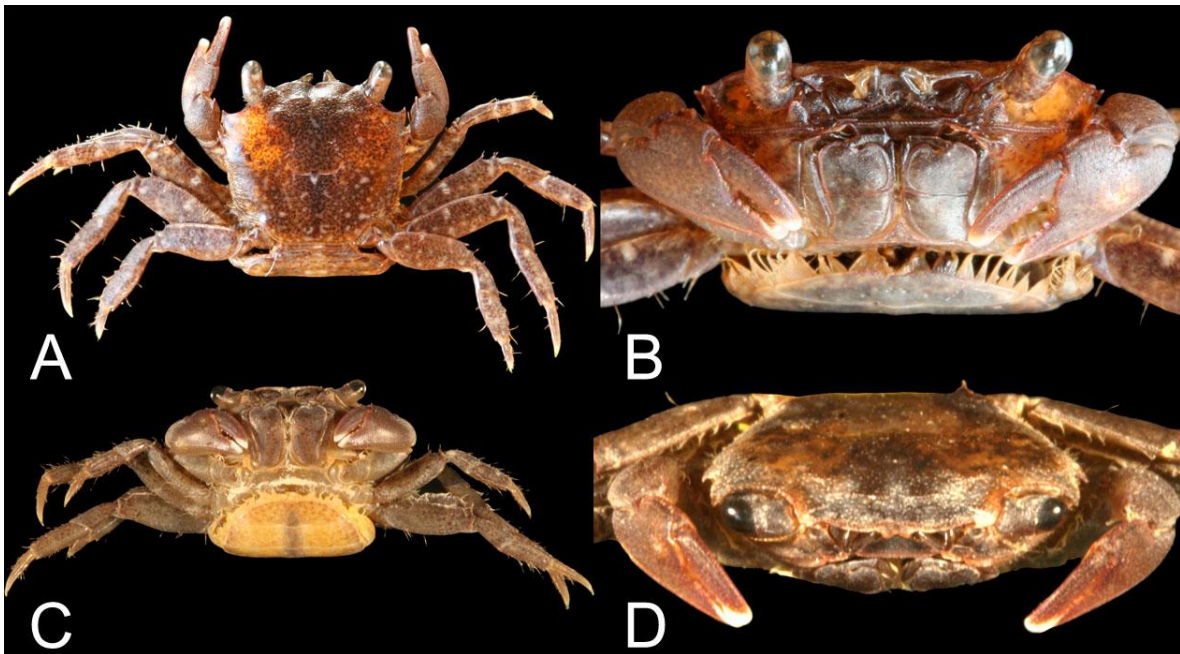


Figure 26. *Thalassograpsus harpax*. KUW 2009 fieldwork, St. 31, Brandélé ‘Musical beach’, 1 ovigerous female 6.6×7.6 mm (MNHN B32260), A) dorsal view, B-D) frontal view, C) ventral view. Coloration of C-D altered by preservative.

Varuna litterata (Fabricius, 1798). Figure 27 B-D. – *Varuna litterata* - Lenz, 1910: 560 (Comoros, Mohéli). - Crosnier, 1965: 34, fig. 40, 41a-b, 46, pl. VI, fig. 1 (Comoros: Grande Comore, Mohéli). - Keith *et al.*, 2006: 36 (Comoros: Anjouan, Mohéli, Mayotte). - KUW fieldwork November 2009, St. 10, islet Quatre Frères (Vatou), 1 male 36.3×41.0 mm (MNHN B32058).

Distribution. – IWP. Somalia, Mozambique, Kenya, Tanzania, South Africa, Madagascar, Comoros, Seychelles, Réunion, Mauritius, India, Indonesia, Taiwan, China, Japan, Philippines, Papua New Guinea, Australia, New Caledonia, Fiji, French Polynesia.

Comment. – This crab is euryhaline and can be found in rivers, brackish waters, or at sea. The specimen collected during the K UW fieldwork is of relatively large size and was captured in marine water, along the coastline. With its legs shaped as paddles and used for swimming, it is sometimes called the ‘Paddler crab’. After a flood it can be washed far away in the sea and observed there drifting with pieces of debris.

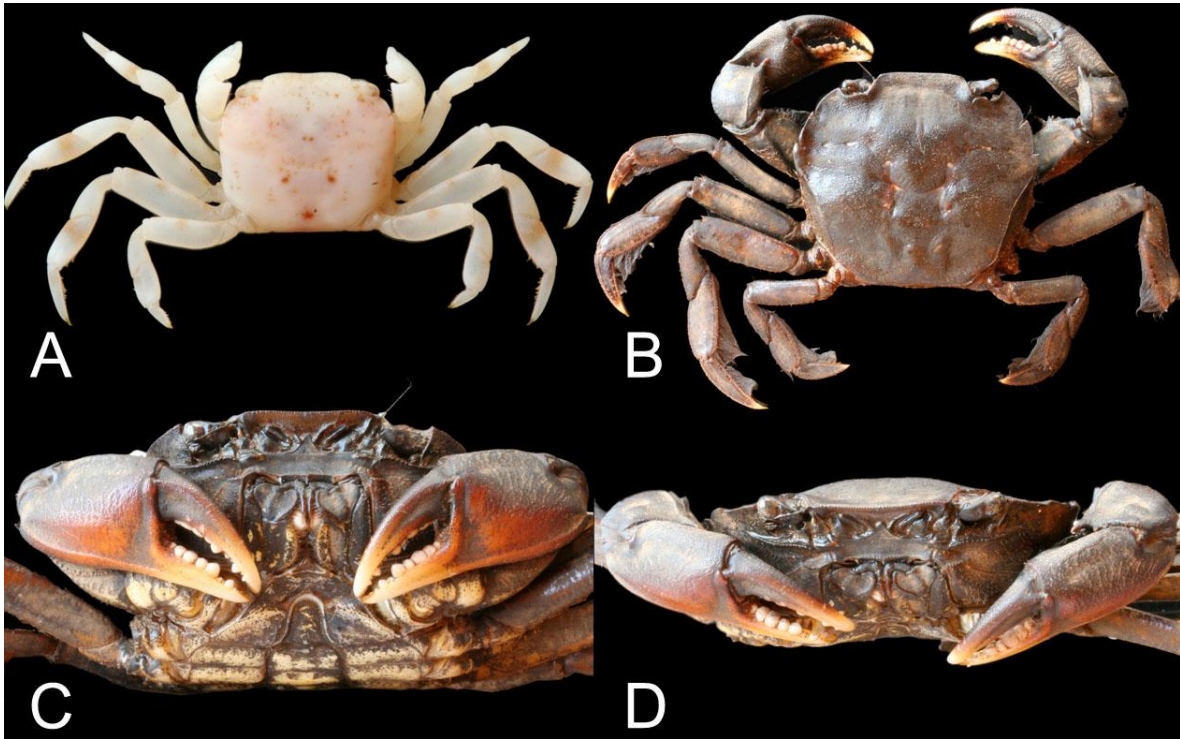


Figure 27. A) *Pseudograpsus albus*. K UW 2009 fieldwork, St. 15, intertidal, islet Mtsamboro, 1 female 5.3×5.9 mm (MNHN B32084). B-D) *Varuna litterata*, K UW 2009 fieldwork, St. 10, intertidal, islet Quatre Frères, 1 male 36.3×41.0 mm (MNHN B32058); B) dorsal view; C) ventral view with aspect of outer faces of chelae; D) frontal view.

SUPERFAMILY OCYPODOIDEA

The Ocypodoidea includes many ubiquitous species. Those living along the coastline are sometimes difficult to classify in term of terrestrial or marine species. For example, the ghost crab *Ocypode cordimanus* live in the upper intertidal and is obviously terrestrial but it is located only at a few meters of colonies of *Ocypode ceratophthalmus*, an intertidal species more adapted to marine life. In this list it has been chosen to keep together all the species of the families Macrophthalmidae and Ocypodidae reported from Mayotte region. For that reason a few species with marine affinities (e.g. *Chaenostoma sinuspersici* and *Macrophthalmus grandidieri*) or marine (*Macrophthalmus telescopicus* and *Venitus latreillei*) are included here.

FAMILY DOTILLIDAE

Dotilla fenestrata Hilgendorf, 1869. Figure 28. – *Dotilla fenestrata* - Crosnier, 1965: 120, fig. 216 (Mayotte). - Guinot, 1967: 282 (WIO crabs checklist, including Mayotte). - KUW fieldwork November 2009, St. 1, Trévani beach, 1 male 4.0×5.4 mm (MNHN B32078); St. 29, Ngouja hotel, Mboianatsa beach, 1 male 3.7×5.6 mm, 1 juvenile (MNHN B32079); St. 31, Brandélé ‘Musical beach’, 1 female 3.2×4.2 mm (MNHN B32080); coll. Lisa, Tom and J.-M. Boucharde, 05/01/2010, Mliha beach, 5 males 2.2×2.6 mm to 4.5×5.8 mm, 2 females 2.7×3.0 mm to 3.3×3.6 mm (MNHN B32257), upper Ambato beach, 3 km far from Mliha beach, 1 male 3.3×4.3 mm (MNHN B32258).

Distribution. – WIO. Somalia, Mozambique, South Africa, Madagascar, Mayotte.

Comment. – Small-sized crab that lives in the medio-intertidal on sandy-muddy beaches where it digs burrows. It is vivacious and disappears very quickly at arrival of an intruder. For that reason and because of its small size it can be easily unnoticed during a sampling event. It feeds on micro organisms of the sediment and makes sand pellets that are disposed in a network of lines around the entrance of its burrow (Fig. 28 A). When sampling on the field, this pellets can be used to distinguish it from other ocyropid crab (e.g. *Chaenostoma lisa*, juveniles of *O. ceratophthalmus* ...) with a different feeding behavior and without these pellets around the burrows. *Dotilla sulcata* (Forskål, 1775) is an affiliated species reported by Vannini & Valmori (1981: 214) in the Red Sea, Gulf of Aden, and Somalia.

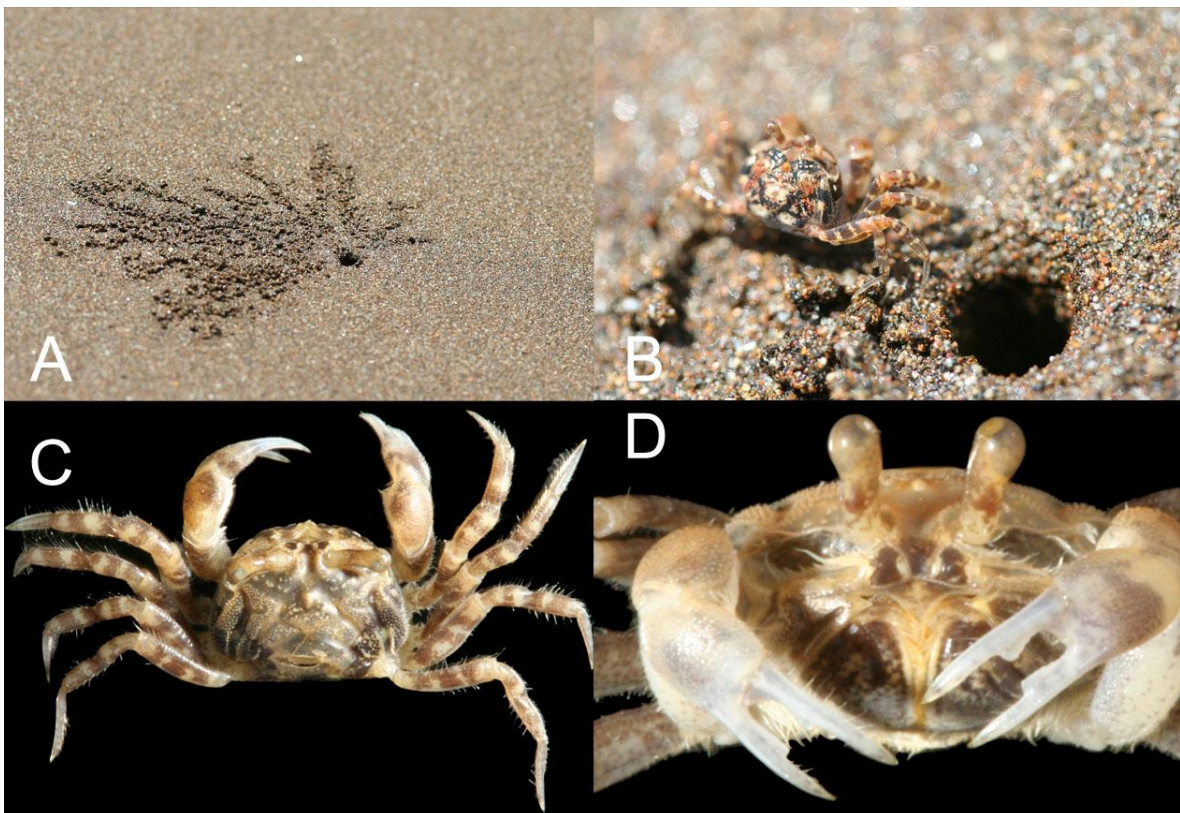


Figure 28. *Dotilla fenestrata*. A) burrow entrance with sand pellets made during feeding activity, at KUW 2009 fieldwork St. 1, Trévani beach. B-D) 1 male 4.0×5.4 mm (MNHN B32078); B) crab at the entrance of its burrow; C) dorsal view; D) frontal view. Color altered by preservative for C-D.

FAMILY MACROPHTHALMIDAE

***Chaenostoma lisae* (Poupin & Bouchard, 2010).** Figure 29, 30 D. – *Macrophthalmus* (*Chaenostoma*) *lisae* Poupin & Bouchard, 2010: 62, fig. 1a-c, 2a-o, Mayotte, KUW fieldwork November 2009, St. 26, Mutsumbatsou mud flat, 1 male 4.1×5.4 mm, 3 ovigerous females 3.1×4.1 to 3.95×5.3 mm, 3 females 2.6×3.3 to 3.7×4.9 mm, 1 female juvenile, broken (paratypes MNHN B32071), 1 male 3.75×4.9 (holotype MNHN B32254), 1 ovigerous female 3.85×5.1 mm, (paratype MNHN B32362), as ‘Ocypodidae sp.’ in Bouchard *et al.*, 2009, photo p. 90; coll. J.-M. Bouchard, 8 October 2008, Malamani mangrove, intertidal, 1 ovigerous female 3.75×5.01 mm (paratype MNHN B32072).

Distribution. – IWP. Mayotte (also Madagascar, New Caledonia, see comment).

Comment. – These small-sized crabs live in burrows in the upper part of sandy-muddy beaches with entrances of burrows that resemble those made by *Dotilla fenestrata*. *Chaenostoma lisae* is smaller but morphologically close to *Chaenostoma sinuspersici* and juveniles or small specimens of this last species can be confused with adults of *C. lisae* (see under *C. sinuspersici*). Just after its description *Chaenostoma lisae* has been recognized again in Madagascar and New Caledonia, from specimens deposited in MNHN attributed to *Macrophthalmus boscii* by Crosnier (coll. A. Crosnier, February 1962, Nosy Bé, 2 males 4.3×5.5 and 4.3×5.5 mm, 1 ovigerous female 5.3×5.9 mm, 1 juvenile 2.78×3.30, MNHN B10717) and Juncker & Poupin (2009: 14, n°164, *M. boscii*, in part, only specimens from St 9 Pindai, 1 male 4.5×5.6 mm, 1 F ov 5.1×6.6 mm, MNHN B32603). This observation has been made by R. Naderloo, Research Institute & Nature Museum of Senckenberg.

Following McLay *et al.* (2010) and Davie (WoRMS [2]), we have raised in this work the subgenus *Chaenostoma* to genus level although other authors such as Naderloo *et al.* (2011: 2) indicate that this is controversial and should be done only when a comprehensive study is undertaken on the subgeneric system of the genus *Macrophthalmus*.

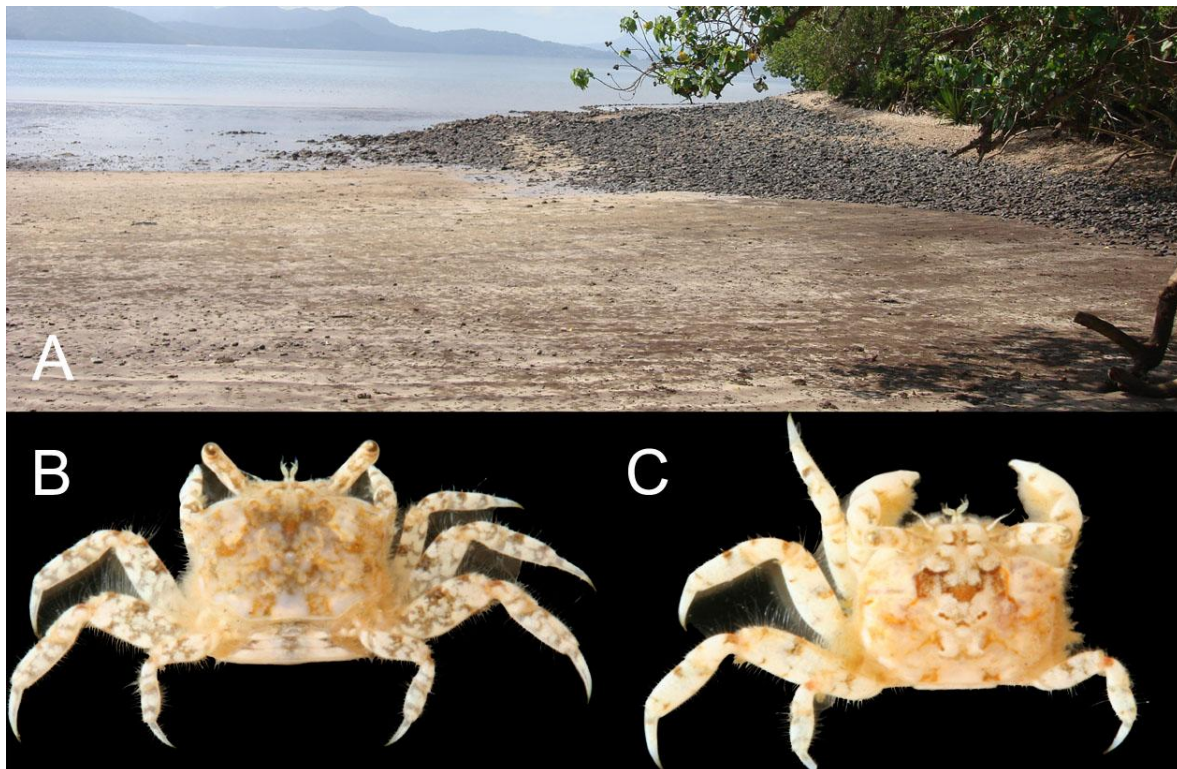


Figure 29. *Chaenostoma lisae*. A) biotope at KUW fieldwork 2009, St. 26, beach of Mliha at low tide. The crabs were collected on the upper part of the beach (foreground of photograph); B) paratype ovigerous female 3.85×5.1 mm (MNHN B32362); C) holotype male 3.75×4.9 mm (MNHN B32254). Adapted from Poupin & Bouchard (2010, fig. 1).

Chaenostoma sinuspersici (Naderloo & Türkay, 2010). Figure 30 A-C. – Recorded in MNHN as *Macrophthalmus* (*Chaenostoma*) *boscii* - KUW fieldwork November 2009, St. 1, Trévani Beach, 1 female 7.5×9.1 mm (MNHN B32073); St. 31, Brandélé ‘Musical beach’, 1 male juvenile 3.6×4.9 mm, 1 juvenile (MNHN B32074).

Distribution. – IWP, where it has been reported in the past as *Macrophthalmus boscii*. Probably not Red Sea where it is ‘replaced’ by typical *M. boscii* (see Naderloo & Türkay, 2010). Somalia, Kenya, Zanzibar, Mozambique, South Africa, Europa, Madagascar, Mayotte (first record), Seychelles, Indonesia, Malaysia, Taiwan, Japan, Philippines, Australia, Papua New-Guinea, New Caledonia, Salomon, Fiji, Wallis & Futuna.

Comment. – A small-sized crab, common in the intertidal area under rocks or in tide pools, without noticeable burrow entrances (although the species may perhaps live in burrows). The adults have a deep indentation on the anterolateral margin of the carapace, between the first and the second anterolateral tooth. In juveniles it is reduced to a feeble slit and confusion can be made with adults of the *Chaenostoma lisae*, a species much smaller than *C. sinuspersici*. A careful comparison between a young male of *C. sinuspersici* (3.6×4.6 mm, St. 31, MNHN B32074) and the male holotype of *C. lisae* of similar size (3.75×4.9 mm, St. 26, B32254) shows that it is still possible to recognize them by the granulation and pilosity of the dorsal surface of the carapace, more pronounced in *C. sinuspersici*, and by the aspect of the chela, with a juvenile or female aspect in the small male of *C. sinuspersici* (no setae on the inner face of the palm), instead of larger and with a brush of setae on the inner face of the palm in *C. lisae*.

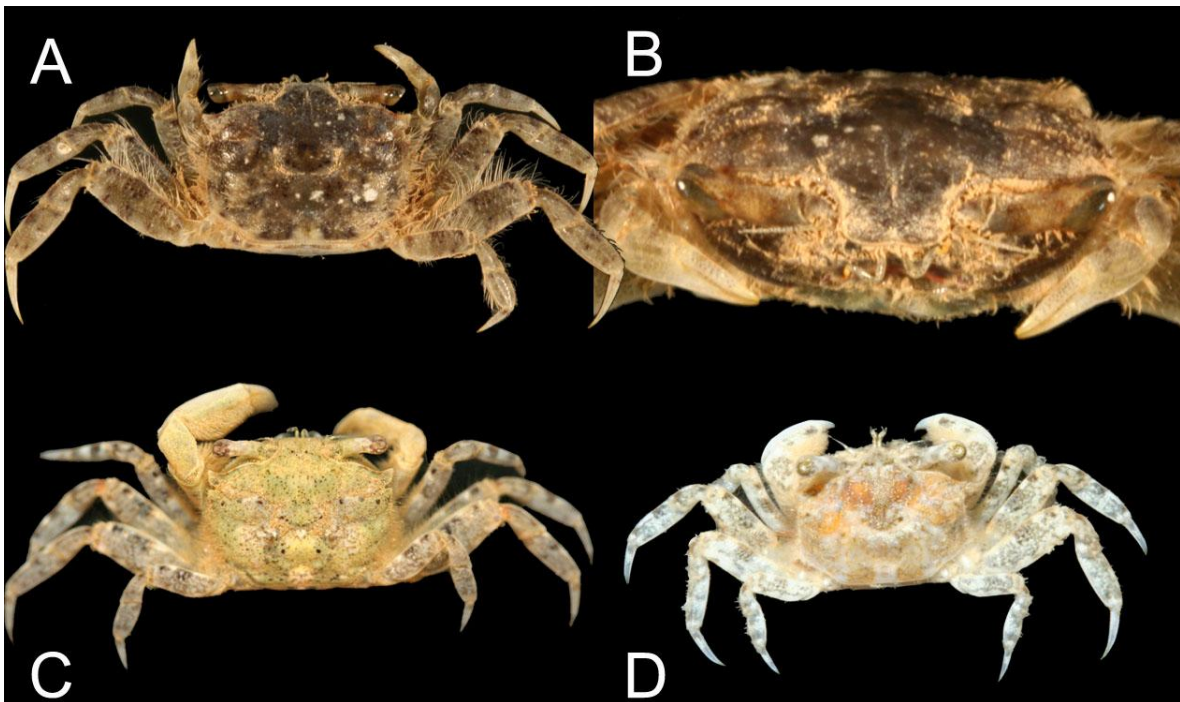


Figure 30. *Chaenostoma sinuspersici*. A-B) KUW fieldwork 2009, St. 1, Trévani beach, 1 female 7.5×9.1 mm (MNHN B32073); A) dorsal view, B) frontal view; color altered by preservative. C) Specimen from New Caledonia with live coloration, from Juncker & Poupin (2009: 14, n°164, as *M. boscii*, in part, only specimen from St 2, Nouville, intertidal, 1 male 8.1×14.1 mm, MNHN). D) *Chaenostoma lisae*, see text. New Caledonia, det. R. Naderloo, from Juncker & Poupin (2009: 14, n°164, as *M. boscii*, in part, from St 9 Pindai, 1 male 4.5×5.6 mm, MNHN).

***Macrophthalmus (Macrophthalmus) grandidieri* A. Milne-Edwards, 1867.** Figure 31. – KUW fieldwork November 2009, St. 1, Trévani Beach, 7 males 6.2×13.3 to 8.0×16.5 mm, 1 female 6.1×12.0 mm, 1 ovigerous female 9.0×18.6 mm (MNHN B32077), as ‘*Macrophthalmus parvimanus*’ in Bouchard *et al.*, 2009: photo p. 89.

Distribution. – WIO. Red Sea, Somalia, Kenya, Tanzania, Mozambique, Madagascar, Mayotte (first record).

Comment. – Medium-sized sentinel crabs living in burrows in sandy-muddy beaches of the low intertidal (Fig. 31 A). The crabs are prompt to hide in their burrows and can be easily overlooked during a sampling event. In a first step they were erroneously attributed to *Macrophthalmus (Macrophthalmus) parvimanus* Guérin, 1834, an IWP species common in WIO. However, after careful re-examination there is no doubt that they belong in fact to *M. grandidieri* described from Zanzibar that can be easily recognized by the shape and length of the anterolateral teeth of the carapace, the first tooth being much shorter than the second (see fig. 31 B).



Figure 31. *Macrophthalmus (Macrophthalmus) grandidieri*. A) biotope at KUW fieldwork 2009, St. 1, Trévani beach at ebb tide; crabs were collected near the pebbles, on the background, when sea level was about 1 m lower. B-D) 1 male 7.6×16.6 mm (MNHN B32077), B-C) dorsal view, C) frontal view with aspect of chelae.

***Macrophthalmus (Macrophthalmus) telescopicus* Owen, 1839.** – *Macrophthalmus telescopicus* – Crosnier, 1975: 737 (Comoros Islands: Grande Comore, ‘Trou du Prophète’, 1 m, coral sand, coll. R. Plante, 13 October 1969, 1 sp. 15.7×25.4 mm; Mayotte, Boéni Bay, 55 m, dredge, muddy sand, coll. R. Plante, 21 January 1970, 1 sp. 9.6×16.0 mm; Mayotte, 26 m, dredge, sand-shell bed, coll. R. Plante, 29 January 1970, 1 ovigerous female 7.9×13.0 mm; all specimens in MNHN).

Distribution. – IWP. Red Sea, Somalia, Kenya, Tanzania, Madagascar, Comoros (Grande Comore, Mayotte), India, Mergui archipelago, Singapore, Japan, Australia, Caroline, Fiji, Hawaii.

Comment. – This is a marine species collected by dredges in the Comoros Islands at depths of 1-55 m. It is included here only to give a complete list of all the *Macrophthalmus* species that are reported from Mayotte region. *Macrophthalmus telescopicus* is characterized by its long ocular peduncles, greatly exceeding the margin of carapace. It has been reported in Eastern Africa as *Macrophthalmus verreauxi* H. Milne Edwards, 1848, a junior synonym (Vannini & Valmori, 1981).

***Macrophthalmus (Mareotis) depressus* Rüppel, 1830.** Figure 32. – *Macrophthalmus (Mareotis) depressus* - Bouchard, 2009: 6, 28 (Malamani mangrove) - K UW fieldwork November 2009, St. 13, 1 male 7.0×11.4 mm, 3 females 7.4×11.9 to 9.4×15.1 mm (MNHN B32075), plus additional specimens from Bouchard (2009, St. P11), 4 males 8.9×13.9 to 9.5×15.6 mm, 4 females 8.0×12.6 to 8.5×13.5 mm (MNHN B32076).
Distribution. – WIO. Red Sea, Somalia, Kenya, Tanzania, Mozambique, South Africa, Madagascar, Mayotte (first record), Persian Gulf.

Comment. – This medium-sized crab lives in a burrow with its entrance visible only at low tide, on mudflats near brackish water stream of the mangrove (Fig. 32 A); openings of the burrows are rarely circular, usually more or less oval, and they are always filled with water (Fig. 32 B). The two sub-parallel longitudinal granular ridges of the branchial areas of carapace that are characteristic of this species are distinct only on large specimens (MNHN B32076) but not on the smaller specimens examined (MNHN B32075).

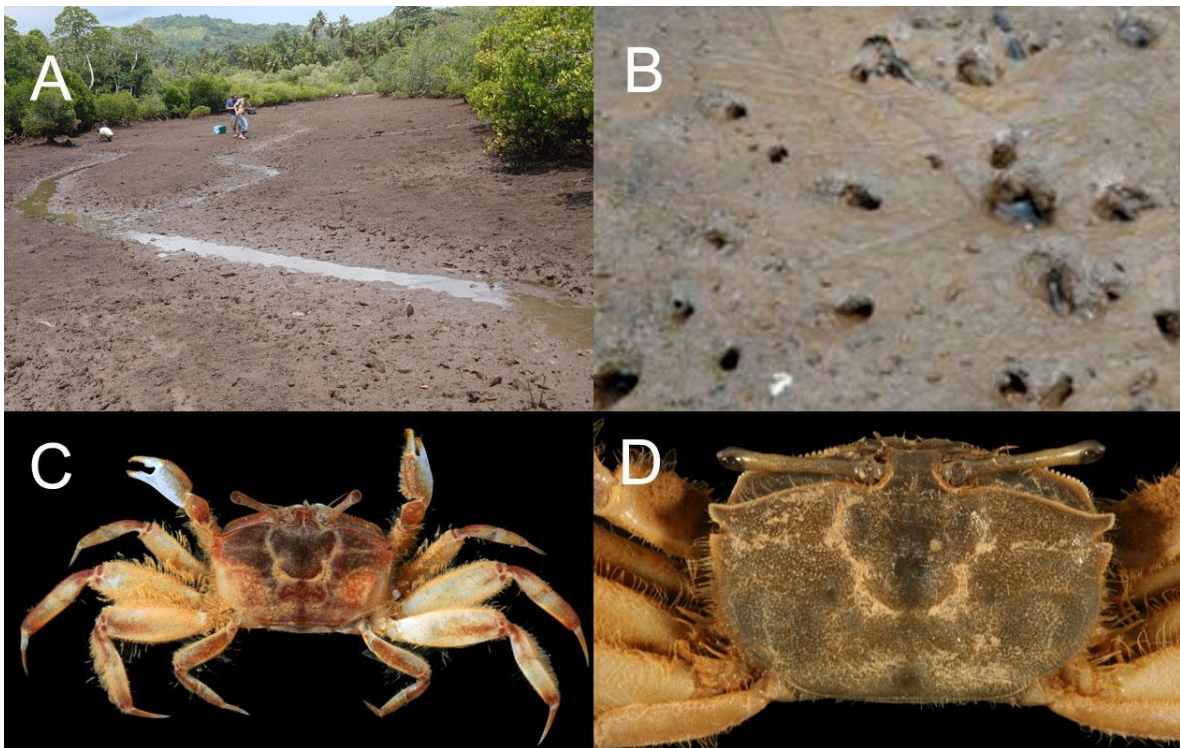


Figure 32. *Macrophthalmus (Mareotis) depressus*. A) biotope at K UW fieldwork 2009, St. 13, Malamani mangrove; B) aspect of burrows at low tide, adapted from Bouchard (2009: 27, fig. 48); C) dorsal view, 1 male 7.0×11.4 mm (MNHN B32075); D) detail of dorsal view, 1 male 9.5×15.6 mm (MNHN B32076).

***Venitus latreillei* (Desmarest, 1822).** – *Macrophthalmus latreillei* - Crosnier, 1965: 131, fig. 239-242 (Mayotte, muddy bottoms at depths of 5-15 m for the adults, down to 50 m for juveniles). - Guinot, 1967: 282 (WIO crabs checklist, with Comoros). – *Venitus latreillei* - Davie (WoRMS [2]) *Macrophthalmus (Venitus) latreillei* (Desmarest, 1822) is accepted as *Venitus latreillei* (Desmarest, 1822).

Distribution. – IWP. Red Sea, Mozambique, South Africa, Madagascar, Mayotte, India, Thailand, Malaysia, Indonesia, China, Japan, Philippines, Papua New-Guinea, Australia, New Caledonia.

Comment. – Marine species collected in the Comoros Islands on muddy bottoms of the lagoon, between 5-50 m. It is included here only to give a full list of crabs Macrophthalmidae from Mayotte region. *Venitus latreillei* is distinct from *M. telescopicus* by shorter ocular peduncles, not exceeding anterolateral margin of carapace, and by four teeth on anterolateral margin of the carapace, instead of three in *M. telescopicus*. Crosnier (1965: 132, fig. 241-242) gives two drawings of the carapace.

FAMILY OCYPODIDAE

Ocypode ceratophthalmus (Pallas, 1772). Figure 33. – KUW fieldwork November 2009, St. 1, Trévani beach, 3 males 19.5×22.5 to 26.8×31.0 mm, 2 females 27.0×31.5 and 33.0×38.4mm, 1 juvenile 10.5×12.5 mm (MNHN B32086); St. 2, littoral, from Trévani to Kangani Mangrove, ?1 juvenile 14×16.8 mm (photograph but specimen not retrieved, see fig. 33 D); St. 21, islet Choizil, east, Malandzamiayatsini, field observation only, no sample; St. 26, sand beach near Mutsumbatsou reef flat, field notes, 2 juveniles, probably lost; St. 29, Ngouja hotel, Mboianatsa beach, 2 males 31.8×37.7 and 34.0×38.6 mm (MNHN B32085); St. 31, Brandélé ‘Musical beach’, 1 juvenile (?MNHN); coll. Lisa, Tom and J.-M. Bouchard, 05 January 2010, Mliha beach, 5 juveniles (MNHN B32255), upper Ambato beach, 3 km far from Mliha beach, 2 males 13.6×16.0 and 17.6×20.6 mm, 2 juveniles (MNHN B32256).

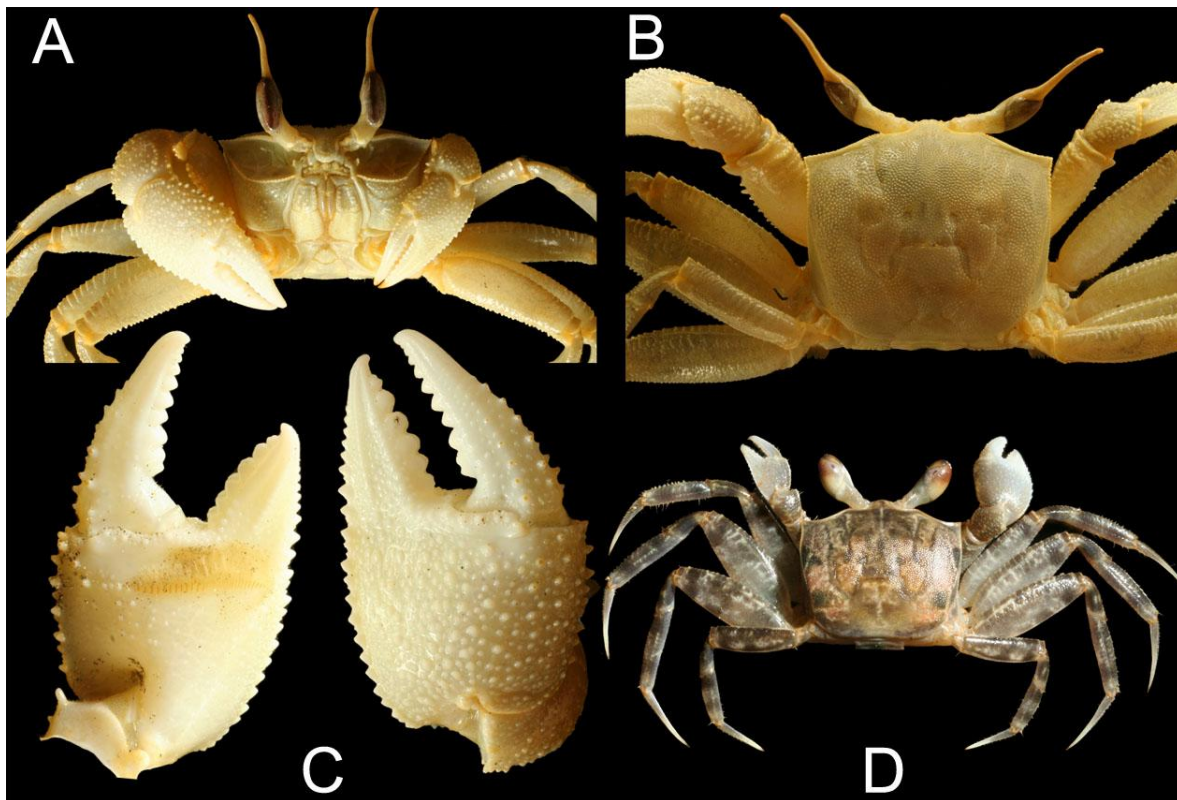


Figure 33. *Ocypode ceratophthalmus*. KUW fieldwork 2009. A-C) St. 29, 1 male 34.0×38.6 mm (MNHN B32085) A) frontal view, B) dorsal view, C) aspect of right chela, inner view, with stridulating ridge on the palm, at base of fingers (left) and outer view (right). D) St. 2, ?1 juvenile 14×16.8 mm (specimen not retrieved).

Distribution. – Widespread in the IWP and reaching Clipperton atoll in the eastern Pacific. Kenya, Somalia, Mozambique, Tanzania, South Africa, Madagascar, Mayotte (first record), Seychelles, Mauritius, Réunion, India, Maldives, Burma, Indonesia, China, Taiwan, Japan, Philippines, Australia, Papua New-Guinea, Vanuatu, Fiji, Wallis & Futuna, French Polynesia, Hawaii, Clipperton. *Ocypode ceratophthalmus* has been recorded from the Red Sea, but all these records refer to juvenile *O. saratan* (see Türkay *et al.*, 1996)

Comment. – This large-sized ghost crab is common on sandy beaches but is seen at night only, when it goes out of its burrow. During the day the entrance of its burrow is usually obstructed by sand and unnoticeable. The crab can be recognized easily by its long ocular horns (Fig. 33 A-B). *Ocypode saratan*

(Forskål, 1775) is another ghost crab of the region that has such ocular horns but they are shorter and curved backwards. Additionally, the anterolateral angles of the carapace are rounded in *O. saratan* (see photographs in Crosnier, 1965, pl. VIII 1-2; Vannini & Valmori, 1981: 201, fig. 1 a-b) instead of acute in *O. ceratophthalmus* (Fig. 33 D). In *Ocypode ceratophthalmus* the ocular horns can be reduced or even totally absent in females and/or juveniles. As a result, these can be confounded with adults of *Ocypode pallidula* Jacquinot, in Hombron & Jacquinot, 1846, a small-sized ghost crab, still not recognized in Mayotte region but present in Madagascar, Réunion, and Mauritius. Both species have a stridulating ridge on inner faces of the chelae (Fig. 33 C) but specimens of same size can be tell apart by the aspect of the anterolateral angle of the carapace, slightly directed outwards in *O. ceratophthalmus* (Fig. 33 B-D), instead of straight or directed inwards in *O. pallidula*. Specimen of figure 33 D is here tentatively attributed to a juvenile of *O. ceratophthalmus*, based on this character.

***Ocypode cordimanus* Latreille, 1818.** Figure 34. – KUW fieldwork November 2009, St. 1, Trévani beach, 2 males 30.7×34.0 and 32.5×36.4 mm, 1 female 28.4×31.5 mm (MNHN B32087).

Distribution. – Widespread in the IWP. Red Sea, eastern Africa (Somalia, Kenya, Mozambique), Madagascar, Mayotte (first record), Seychelles, Réunion, Mauritius, India, Laccadive, Andaman, Nicobar, Burma, Indonesia, Taiwan, China, Japan, Philippines, Australia, Papua New-Guinea, New Caledonia, Wallis & Futuna, Hawaii, French Polynesia.

Comment. – This medium to large-sized ghost crab is much more terrestrial than *O. ceratophthalmus*. It is discrete but can be observed at night in the upper littoral in herbaceous places (Fig. 34 A). Contrary to *O. ceratophthalmus* the ocular peduncles do not have horns (Fig. 34 B-C) and the inner face of the chela is smooth, without stridulating ridge (Fig. 34 D).

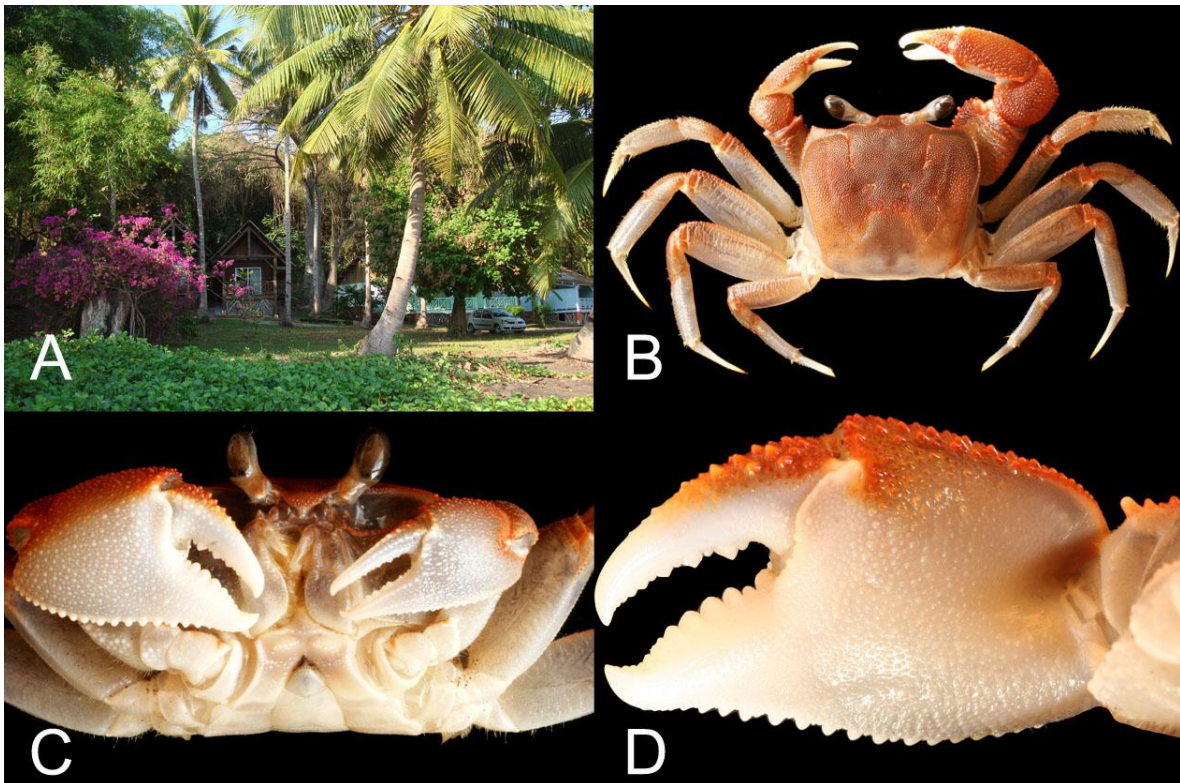


Figure 34. *Ocypode cordimanus*. A) biotope at KUW fieldwork 2009, St. 1 upper littoral of Trévani beach with herbaceous area where *O. cordimanus* was collected. B-D) 1 male 32.5×36.4 mm (MNHN B32087); B) dorsal view; C) frontal view; D) aspect of right chela, inner face (without stridulating ridge on the palm).

Ocypode pauliani Crosnier, 1965. – *Ocypode pauliani* Crosnier, 1965: 102, fig. 158, 165, 178-179, pl. IX, fig. 2, pl. XI, fig. 1 (Comoros: Grande Comore). – Guinot, 1967: 281 (WIO checklist, with Comoros).

Distribution. – WIO. Madagascar and Mayotte.

Comment. – It seems that this species has never been recorded since its description. According to Crosnier (1965), it can be recognized by its stridulating ridge, on inner face of the palm, made of rounded tubercles instead of striae. By this character it is affiliated to *Ocypode kuhlii* De Haan, 1835 but distinct by the presence of a brush of setae on propodus of second and third ambulatory legs (P2, P3).

Uca (Austruca) annulipes (H. Milne Edwards, 1837). Figure 35. – *Uca annulipes* - Guinot, 1967: 281 (WIO crabs checklist, with Mayotte). - *Uca (Paraleptuca) annulipes*. - Bouchard, 2009: 6, 20, Mayotte, Malamani mangrove, specimens re-examined for K UW fieldwork, St. J.-M. Bouchard n° 1-2, 8 males 3.5×5.5 to 7.7×13.4 mm, 4 females 5.0×8.5 to 7.3×11.8 mm (MNHN B32094); St. J.-M. Bouchard P3, sample 11, 10 males 5.0×8.0 to 8.5×14.7 mm, 1 male 8.8×15.0 mm (MNHN B32093). - K UW fieldwork November 2009, St. 2, Kangani mangrove, 1 male 6.3×11.4 mm (MNHN B32095), as '*Uca sp.*' in Bouchard *et al.*, 2009, photo p. 93, 1 male 6.2×10.3 mm (MNHN B32096), 9 males 4.5×7.8 to 7.5×12.8 mm, 8 females (1 ovigerous) 4.2×6.5 to 6.5×10.3 mm (MNHN B32097); St. 6, Petite Terre, Badamiers spillway, 2 males 5.5×9.2 and 6.4×10.5 mm, 2 females 5.2×8.8 and 6.5×11.0 mm (MNHN B32098); St. 13, Malamani mangrove (mixed with *U. chlorophthalmus* and *U. inversa*), 11 males 5.0×8.3 to 8.5×14.0 mm (MNHN B32099).

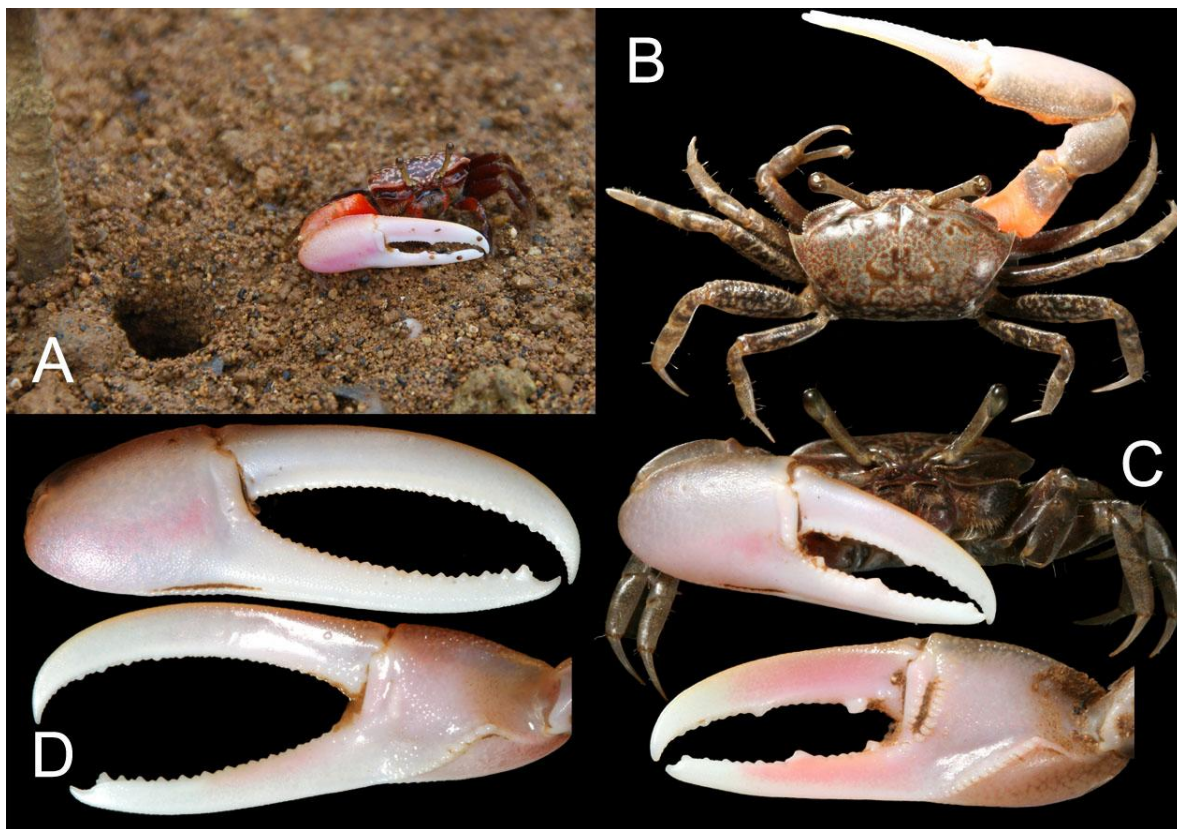


Figure 35. *Uca (Austruca) annulipes*. A) K UW St. 6, Petite Terre, Badamiers spillway, specimen near entrance of its burrow. B-C) K UW St. 2, Kangani Mangrove, 1 male 6.2×10.3 mm (MNHN B32096); B) dorsal view, C) frontal view with aspect of inner face of big chela (bottom). D) K UW St. 2, Kangani mangrove, 1 male 6.3×11.4 mm (MNHN B32095), big chela outer (top) and inner (bottom) faces.

Distribution. – IWP. Mozambique, Tanzania, South Africa, Madagascar, Mayotte, Seychelles, Mauritius, Thailand, Indonesia, China, Japan, Philippines, Samoa. The species does not occur in the Red Sea where it is replaced by *Uca (Austruca) albimana* (Kossmann, 1877) (see Naderloo *et al.*, 2010).

Comment. – A small to medium-sized fiddler crab that can be confused with *U. inversa* (see comparison under that species). *Uca annulipes* was very abundant at KUW St. 6. Variation of the shape of male big chela is illustrated in Fig. 35 A, C-D.

***Uca (Cranuca) inversa* (Hoffmann 1874).** Figure 36 – *Uca (Cranuca) inversa* - Bouchard, 2009: 6, 18, Mayotte, Malamani mangrove, specimens re-examined for KUW fieldwork, St. J.-M. Bouchard n° 1, 1 male 11.6×20.2 mm, 1 female 6.8×10.7 mm, 1 juvenile (MNHN B32100); St. J.-M. Bouchard n° 1-2, 5 males 6.5×11.6 to 10.8×18.2 mm, 1 juvenile (MNHN B32101); St. J.-M. Bouchard n° P13, P15, sample 13, 9 males 6.5×11.0 to 13.2×22.9 mm, 6 females 5.2×8.5 to 10.7×17.0 mm (MNHN B32104). - KUW fieldwork November 2009, St. 6, Petite Terre, Badamiers spillway, 3 males 7.8×14.0, 7.8×13.4 mm and 7.4×12.2 mm (MNHN B32102); St. 13, 2 males 6.3×10.3 and 8.3×14.7 mm (MNHN B32103).

Distribution. – WIO. Red Sea and Yemen, Somalia, Kenya, Tanzania, Mozambique, South Africa, Europa, Madagascar, Mayotte (first record).

Comment. – A small to medium-sized fiddler crab that resembles *U. annulipes* collected at same stations. The aspect of the tips of fingers of chelae can be used to tell them apart: the movable finger in *U. inversa* has the same shape at tip than the fixed finger in *U. annulipes* (compare C-D, fig. 35 and 36). Variations in the shape of the big chela are illustrated on Fig. 36 C-D.

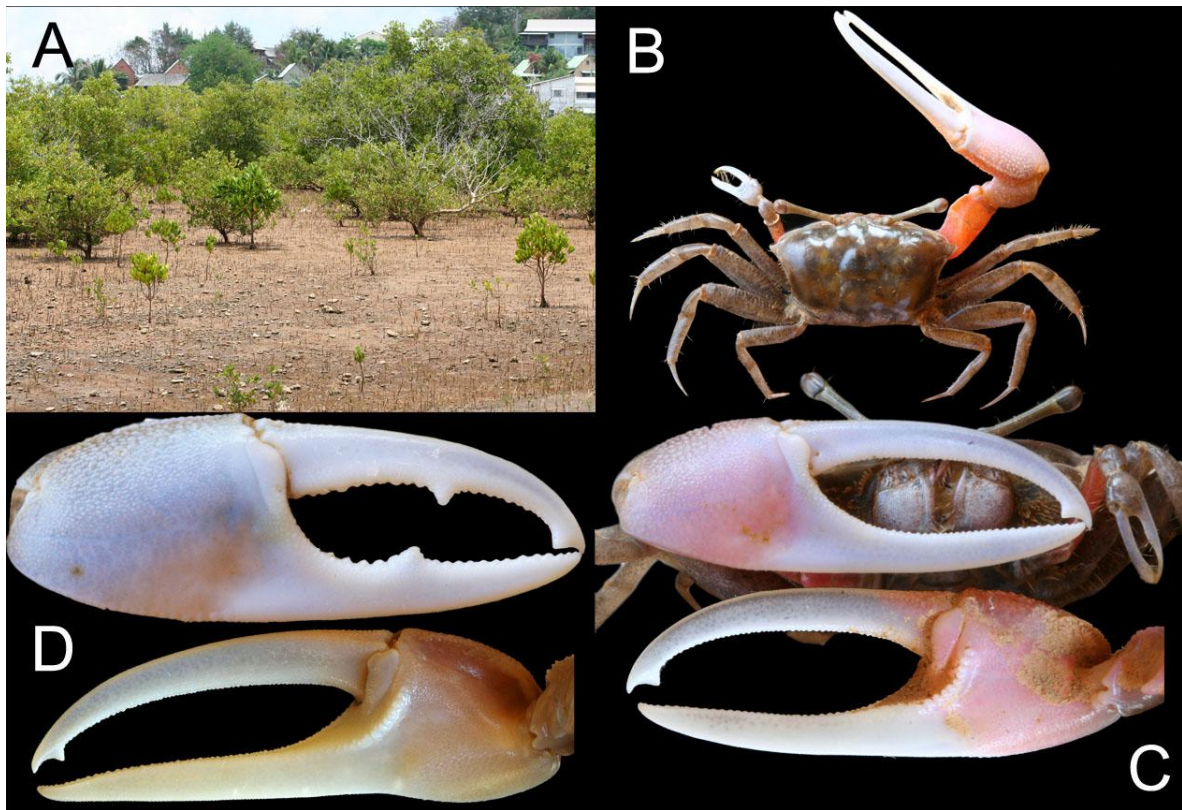


Figure 36. *Uca (Cranuca) inversa*. A) biotope at KUW fieldwork 2009, St. 6, Petite Terre, Badamiers spillway (Station also colonized by *U. annulipes*). B-C) 1 male 7.8×14 mm (MNHN B32102); B) dorsal view, C) aspect of larger right chela, outer and inner faces. D) variation of shape of big chela: top, 1 male about 7×14 mm at St. 6 (MNHN B32102), bottom, 1 male 13.2×22.9 mm at St. 13, Malamani mangrove (MNHN B32104).

Uca (Gelasimus) hesperiae Crane, 1975. Figure 37. – *Uca marioni marioni* (Desmaret, 1823) - Guinot, 1967: 281 (WIO crabs checklist, with Mayotte; in the WIO, *U. marioni* is usually accepted as a junior synonym of *U. hesperiae*). - *Uca (Gelasimus) vocans* - Bouchard, 2009: 6, 24, Mayotte, Malamani mangrove, specimens re-examined for K UW fieldwork, St. J.-M. Bouchard P11, sample 12, 1 male 12.2×19.2 mm (MNHN B32105), not *U. vocans* (Linnaeus, 1758), see comment. - K UW fieldwork November 2009, St. 2 Kangani mangrove, 1 male 11.0×16.8 mm, 1 female 12.5×18.3 mm (MNHN B32106), 1 male 11.0×17.3 mm (MNHN B32107), as '*Uca (Gelasimus) aff. vocans*' in Bouchard *et al.*, 2009, photo p. 92.

Distribution. – WIO to Thailand and Malaysia. Red Sea, Mozambique, Kenya, Tanzania, Madagascar, Comoros (Grande Comore, Mayotte), Mauritius, Rodriguez, India, Nicobar, Burma, Thailand, Malaysia and Singapore. Others Indo-Malaysian records must be checked as this species is part of the '*U. vocans* species complex' with six species that can be confounded: *U. borealis* Crane, 1975, *U. dampieri* Crane, 1975, *U. jocelynae* Shih, Naruse & Ng, 2010, *U. neocultrimana* (Bott, 1973), *U. vocans* (Linnaeus, 1758), and *U. vomeris* McNeill, 1920 (see Shih *et al.*, 2010).

Comment. – *Uca hesperiae* is a narrow-fronted fiddler crab with some resemblance with *U. urvillei*, also in Mayotte region. The two can be separated with live coloration and the shape of the big male chela (compare Fig. 37 and 40). *Uca hesperiae* seems to be more tolerant to marine water as it was collected near the coastline at K UW St. 2 while *U. urvillei* was found in mangrove only.

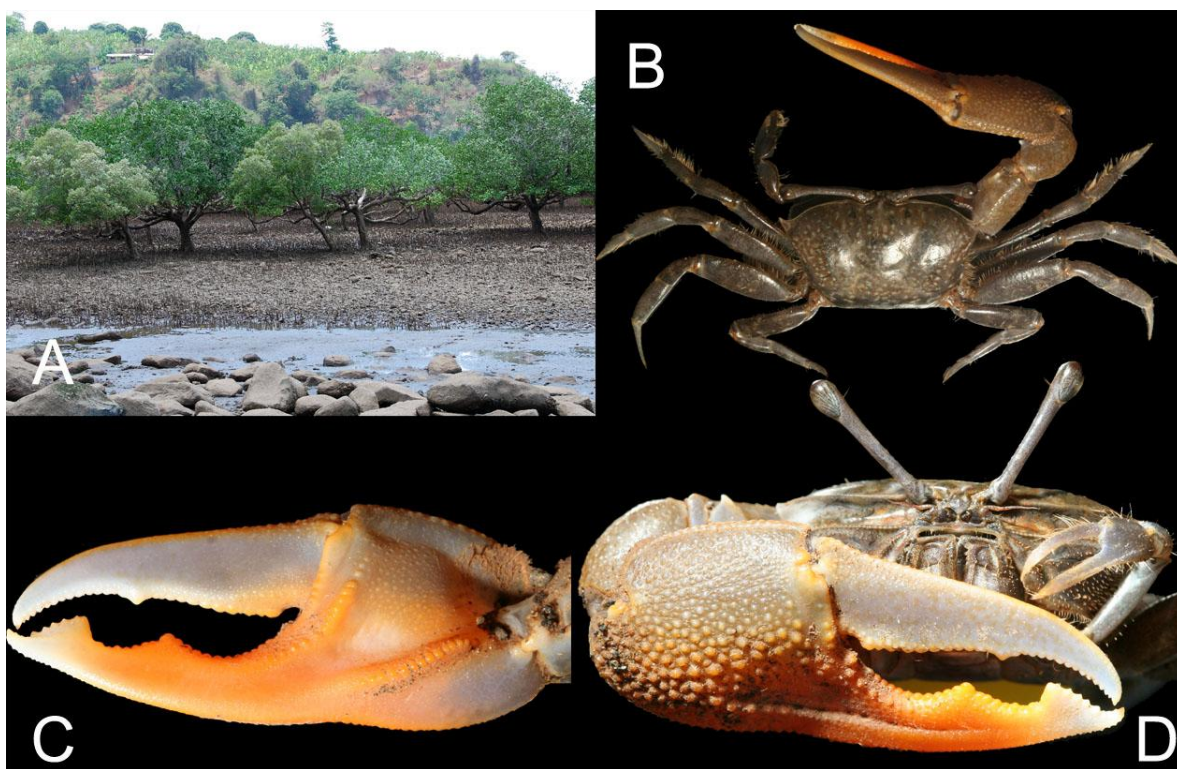


Figure 37. *Uca hesperiae*. A) biotope at K UW fieldwork 2009, St. 2, Kangani Mangrove; 1 male 11.0×17.3 mm (MNHN B32107), B) dorsal view, C) inner face of larger chela, D) same, outer face.

Uca (Gelasimus) tetragonon (Herbst, 1790). Figure 38. – KUW fieldwork November 2009, St. 2, Kangani mangrove, 1 male 13.8×20.8 mm, as '*Uca (Gelasimus) cf. tetragonon*' in Bouchard *et al.*, 2009, photo p. 92, 1 female 11.4×17.2, 1 ovigerous female 18.8×26.2 mm (MNHN B32108).

Distribution. – Widespread in the IWP. Red Sea, Iran, Somalia, Tanzania, Madagascar, Mayotte (first record), Seychelles, Réunion, Mauritius, Thailand, Malaysia, Indonesia, Australia, Taiwan, Japan, Philippines, Micronesia, Melanesia, Papua New-Guinea, New Caledonia, Vanuatu, Fiji, Wallis & Futuna, Tonga, Samoa, Cook, French Polynesia.

Comment. – Medium-sized fiddler crab with a narrow front at base like in *U. urvillei* or *U. hesperiae*. In *Uca tetragonon* the carpus of larger cheliped of the male is rather smooth (Fig. 38 A) while it is granulated in *U. urvillei* and *U. hesperiae*. These three species can be also recognized based on live coloration and shape of the big chela of the male (see Fig. 37, 38 and 40). *Uca tetragonon* can be collected with *U. hesperiae* as in KUW St. 2. It is always located at the vicinity of the coastline and is clearly more 'marine' than *U. urvillei* adapted to brackish water and collected only in the mangrove during this study.



Figure 38. *Uca tetragonon*. St. 2, Kangani Mangrove, 1 male 13.8×20.8 mm (MNHN B32108), A) dorsal view, B) aspect of right chela, outer (top) and inner (bottom) faces.

Uca (Paraleptuca) chlorophthalmus (H. Milne Edwards, 1837). Figure 39. – *Uca chlorophthalmus* - Guinot, 1967: 281 (WIO crabs checklist, with Mayotte, Anjouan and Grande Comore). - *Uca (Tubuca) chlorophthalmus* - Bouchard, 2009: 6, 22 Mayotte, Malamani mangrove, specimens re-examined for KUW fieldwork, St. J.-M. Bouchard n° 2, 4 males 8.2×14.0 to 10.8×18.3 mm, 1 female 10.5×17.3 mm (MNHN B32109); St. J.-M. Bouchard n° 3, 1 male 8.5×14.0 mm, 1 female 8.0×13.0 mm (MNHN B32110); St. J.-M. Bouchard n° P35vdi, 1 male 7.4×12.4 mm, 1 ovigerous female 9.3×15.3 mm (MNHN B32111); ?Malamani, 6 females 7.8×13.0 to 9.0×14.7 mm (MNHN B32112); St. J.-M. Bouchard P3, sample 11, 1 male 6.0×10.4 mm (MNHN B32113); St. J.-M. Bouchard n° 1-2, 4 males 6.8×11.3 to 10.8×18.7 mm, 2 females 6.2×10.4 and 9.2×15.0 mm (MNHN B32114); St. J.-M. Bouchard P2, P3, sample 9, 19 males 7.0×11.9 to 11.0×19.2 mm, 4 female 10.3×16.9 to 11.4×18.7 mm (MNHN B32115) - KUW fieldwork November 2009, St. 13, Malamani mangrove, 15 males 6.7×11.0 to 10.4×17.7 mm, 15 females 5.3×8.8 to 10.0×16.9 mm (MNHN B32116).

Distribution. – WIO. Somalia, Kenya, Tanzania, Mozambique, Europa, Madagascar, Comoros (Mayotte, Anjouan, Grande Comore), Réunion, Mauritius.

Comment. – A small-sized fiddler crab, collected in abundance at KUW St. 13, Malamani mangrove. On the field the larger males have a remarkable sky blue carapace and bright red ambulatory legs and chelae while juveniles and females are less colorful. The big chela of the male has often a characteristic triangular depression on outer face of palm, at base of the fixed finger (but it is not obvious on Fig. 39 B, top) and a double row of granules on inner face of palm at base of fingers (see Fig. 39 B, bottom). In males the relative length of the fingers of the big chela is variable: fingers are shorter than palm in small specimens but much longer in large specimens. *Uca chlorophthalmus* is closely related to *Uca crassipes* (White, 1847) from Indo-Malaysia and western and central Pacific, a species once considered as a subspecies of *U. chlorophthalmus*. Distinction between the two can be difficult. Based on the geographic distribution all specimens examined for this work have been attributed to *U. chlorophthalmus*. *Uca chlorophthalmus* and *U. crassipes* have a preference for brackish waters and are usually collected in mangroves or rivers mouths, sometimes near colonies of *U. tetragonon* but a little farther from the coastline.

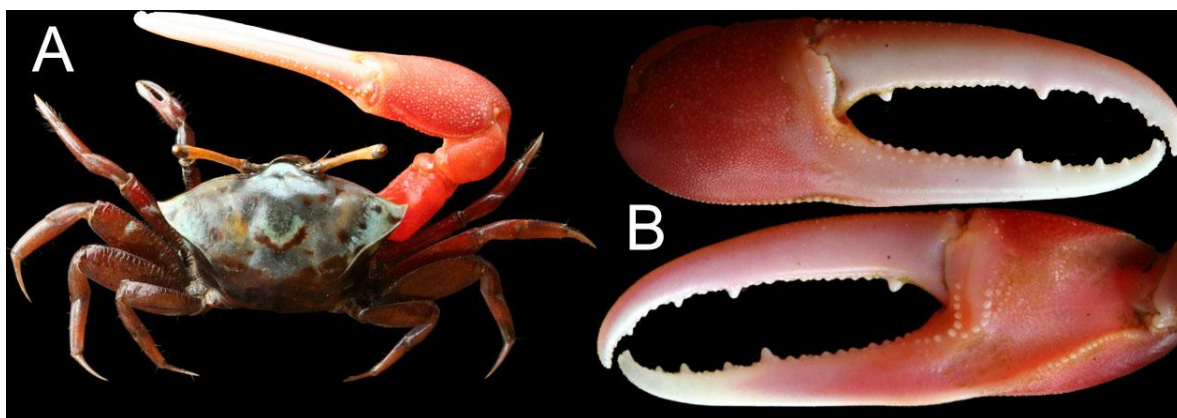


Figure 39. *Uca (Paraleptuca) chlorophthalmus*. KUW St. 13, Malamani mangrove, 1 male 10.4×17.7 mm (MNHN B32116); A) dorsal view; B) aspect of right chela, outer (top) and inner (bottom) faces. Coloration slightly altered by preservation; in fresh specimens carapace can be sky blue and ambulatory legs bright red.

Uca (Tubuca) urvillei (H. Milne Edwards, 1852). Figure 40. – *Uca (Tubuca) urvillei* - Bouchard, 2009: 6, 16 Mayotte, Malamani mangrove, specimens re-examined for KUW fieldwork, St. J.-M. Bouchard 16 April 2008 n° 3, 12°55.415 S, 45°09.275 E, burrow entrances near the stream, 10 males 12.5×22 to 16×28 mm, 2 females 13×22.5 to 13×23.5 mm (MNHN B32089); St. J.-M. Bouchard P11, sample 7, 12 males 9.8×17.0 to 17.5×30.0 mm, 10 females (1 ovigerous) 10.0×17.0 to 17.5×29.0 mm (MNHN B32088); St. J.-M. Bouchard n° 1-2, 1 male 15.2×27.2 mm, 1 female 14.0×23.5 mm (MNHN B32090), 1 female 8.3×13.8 mm (MNHN B32091) - KUW fieldwork November 2009, St. 13, 15 males 12.8×22.0 to 18.8×33.7 mm, 3 females 12.2×20.7 to 14.8×25.0 mm (MNHN B32092).

Distribution. – WIO. Red Sea, Somalia, Kenya, Tanzania, Mozambique, South Africa, Madagascar, Mayotte (first record), India, Pakistan, Malaysia.

Comment. – A medium-sized narrow-fronted fiddler crab. Males are remarkable by the bright blue coloration of the carapace and the red-yellow coloration of the big chela (Fig. 40 C). Females are duller, overall brown to black. *Uca urvillei* was very abundant in Malamani mangrove with its burrows located near brackish water streams (Fig. 40 A, B). By its coloration and shape of the male big chela, *Uca urvillei* is morphologically related to *Uca (Tubuca) dussumieri* (H. Milne Edwards, 1852) from Indo-Malaysia and western Pacific.



Figure 40. *Uca (Tubuca) urvillei*. A) biotope at KUW fieldwork 2009, St. 13, Malamani mangrove, brackish water stream at low tide; B) Burrow at low tide with entrance protected from flood by a mud-tube; C) Live coloration of 1 male; D) 1 male 18.8×33.3 mm (MNHN B32092), big chela outer (top) and inner face (bottom), coloration slightly altered by preservative.

DISCUSSION

STATISTICS

The distribution by families for the 58 species of this inventory is given in Table 1. The crabs alone account for 42 species (72 %) with predominance of the Grapsoidea (24 species). The 11 shrimps of table 1 are mostly from the inventory made previously in the Comoros by Keith *et al.* (2006) with one record added from Lenz (1910) and *Palaemon debilis* collected again in Malamani mangrove (KUW St. 13). The hermit crabs are limited to coenobitids, including the coconut crab (*Birgus latro*) whose presence is confirmed in the Glorioso. In terms of abundance, the most obvious and ubiquitous species observed during this study are the grapsoid crabs of the genera *Cardisoma* and *Grapsus* and the ocypodoid crabs of the genera *Ocyopode* and *Uca*. In table 2, 25 species (identified in bold) are new records for Mayotte region, some of them being very common in the IWP (e.g. *Coenobita perlatus*, *Geograpsus crinipes*, *Grapsus tenuicrustatus*, *Ocyopode ceratophthalmus*) but not formerly reported from this area before this work.

Table 1 – Land, mangrove and freshwater decapods of Mayotte region
Number of species (n) by main taxa.

Group	Superfamily	Family	n
Shrimps (19 %)			11
	Atyoidea	Atyidae	5
	Palaemonoidea	Palaemonidae	6
Hermit crabs (9 %)			5
	Paguroidea	Coenobitidae	5
Crabs (72 %)			42
	Portunoidea	Portunidae	1
	Eriphioidea	Oziidae	1
	Grapsoidea		24
		Gecarcinidae	1
		Sesamidae	7
		Grapsidae	9
		Varunidae	7
	Ocyopodoidea		16
		Dotillidae	1
		Macrophthalmidae	6
		Ocypodidae	9
Total (100 %)			58

DISTRIBUTION BY BIOTOPES

Table 2 indicates the distribution by biotopes for the 58 species of this inventory, with distinction of six environments: freshwater and estuary; land; mangrove; coastal area with rocks and rubbles; coastal area with sand and mud; and marine for 3 ubiquitous species and 2 marine species included here for taxonomic reasons. ‘Land’ species are sometimes collected not far from the seashore but have an obvious terrestrial affinity, for example, *Cardisoma carnifex*, *Geograpsus crinipes*, *G. grayi* and *Ocypode cordimanus*. Some ubiquitous species are indicated in several biotopes such as ‘Land’ and ‘Mangrove’ (*Neosarmatium meinerti*, *Pseudohelice subquadrata*, *Sesarmops impressus*...) or ‘Land’ and ‘Coastal’ (*Coenobita perlatus*, *C. rugosus*...). Potential biotopes are suggested from data in the literature, such as ‘Marine’ for the paddler crab *Varuna litterata* often reported at sea. In total the species of this inventory are distributed almost equally between ‘Freshwater and estuary’ (16), ‘Land’ (13), ‘Coastal Rock-rubble’ (15) and ‘Coastal sand-mud’ (14), with a slight preeminence for ‘Mangrove’ (22).

Table 2a – Land, mangrove, and freshwater shrimps and hermit crabs from Mayotte region with indication of their biotopes (X = observed; x potential). Species in bold are first records for Mayotte region. Species highlighted in grey are recorded only in WIO; other species have an IWP distribution.

	Species	Freshwater Estuary	Land	Mangrove	Coastal Rock-rubble	Coastal Sand-mud	Marine
Shrimps	<i>Atyoida serrata</i>	X					
	<i>Caridina brachydactyla</i>	X					
	<i>Caridina longirostris</i>	X					
	<i>Caridina serratiostris</i>	X					
	<i>Caridina typus</i>	X					
	<i>Macrobrachium australe</i>	X		X			
	<i>Macrobrachium equidens</i>	X		X			
	<i>Macrobrachium lar</i>	X					
	<i>Macrobrachium lepidactylus</i>	X					
	<i>Palaemon concinnus</i>	X					
	<i>Palaemon debilis</i>	X		X	x	x	x
Hermit crabs	<i>Birgus latro</i>		X				
	<i>Coenobita cavipes</i>		X				
	<i>Coenobita brevimanus</i>		X				
	<i>Coenobita perlatus</i>		X		X	X	
	<i>Coenobita rugosus</i>		X		X	X	

Table 2b – Same as 2a (Crabs).

	Species	Freshwater Estuaries	Land	Mangrove	Coastal Rock-rubble	Coastal Sand-mud	Marine	
Crabs	<i>Cardisoma carnifex</i>		X	X				
	<i>Chaenostoma sinuspersici</i>				X			
	<i>Chaenostoma lisae</i>					X		
	<i>Chiromantes ortmanni</i>			X				
	<i>Dotilla fenestrata</i>					X		
	<i>Epixanthus dentatus</i>			X		x		
	<i>Geograpsus crinipes</i>		X					
	<i>Geograpsus grayi</i>		X					
	<i>Grapsus fourmanoiri</i>			X	X			
	<i>Grapsus tenuicrustatus</i>					X		
	<i>Macrophthalmus depressus</i>			X				
	<i>Macrophthalmus grandieri</i>						X	
	<i>Macrophthalmus telescopicus</i>						X	
	<i>Metasesarma obesum</i>		X		X			
	<i>Metopograpsus messor</i>				x	X		
	<i>Metopograpsus thukuhar</i>	x			x	X	x	
	<i>Neosarmatium meinerti</i>		X	X				
	<i>Neosarmatium smithii</i>			X				
	<i>Ocypode ceratophthalmus</i>						X	
	<i>Ocypode cordimanus</i>		X					
	<i>Ocypode pauliani</i>						X	
	<i>Pachygrapsus minutus</i>					X		
	<i>Pachygrapsus planifrons</i>					X		
	<i>Pachygrapsus plicatus</i>					X		
	<i>Parasesarma leptosoma</i>				X			
	<i>Perisesarma guttatum</i>				X			
	<i>Pseudograpsus albus</i>					X	X	
	<i>Pseudohelice subquadrata</i>		X	X				
	<i>Ptychognathus barbatus</i>	X						
	<i>Ptychognathus johannae</i>	X						
	<i>Ptychognathus pusillus</i>	X						
	<i>Scylla serrata</i>				X		x	x
	<i>Sesarmops impressus</i>		X	X				
	<i>Thalassograpsus harpax</i>					X		
	<i>Uca annulipes</i>				X			
	<i>Uca chlorophthalmus</i>				X			
	<i>Uca hesperiae</i>				X		X	
	<i>Uca inversa</i>				X			
	<i>Uca tetragonon</i>						X	
	<i>Uca urvillei</i>				X			
<i>Varuna litterata</i>	X				X		x	
<i>Venitus latreillei</i>							X	

This dominance of mangrove species in table 2 can be explained by two visits made at Malamani mangrove, one during KUW fieldwork (St. 13) and one during a previous sampling event made in 2008-2009 by the first author of this study with his results (Bouchard, 2009) included in this study. Figure 41 gives a schematic spatial distribution of the crabs species collected in Malamani mangrove. Crabs such as *Cardisoma carnifex*, *Neosarmatium meinerti*, *Pseudohelice subquadrata*, and *Sesarmops impressus* are found on the land side in cultivated areas and/or muddy soils planted with trees like *Erythrina fusca*, *Heritiera littoralis* and *Avicennia marina*. *Chiromantes ortmanni*, *Neosarmatium smithii*, *Parasesarma leptosoma*, *Perisesarma guttatum*, and *Scylla serrata* are found in the middle of the mangrove, associated with trees like *Ceriops tagal* and *Rhizophora mucronata*. Two bare mudflats were colonized by *Uca spp.* and *Macrophthalmus depressus*. Three *Uca* species, *U. annulipes*, *U. chlorophthalmus*, and *U. inversa* were also collected in the upper part of the mangrove, associated with *Avicennia marina*, *Ceriops tagal*, or *Heritiera littoralis* trees. In her thesis on bioremediation ability of Malamani mangrove for pre-treated domestic wastewaters, Herteman (2010) indicates a maximum density of the crabs in the mangrove of 13.9 individuals/m² under *Ceriops tagal* trees and 16.5 individuals/m² on open mudflats. She also indicates that they play a major ecological role in biogeochemical processes.

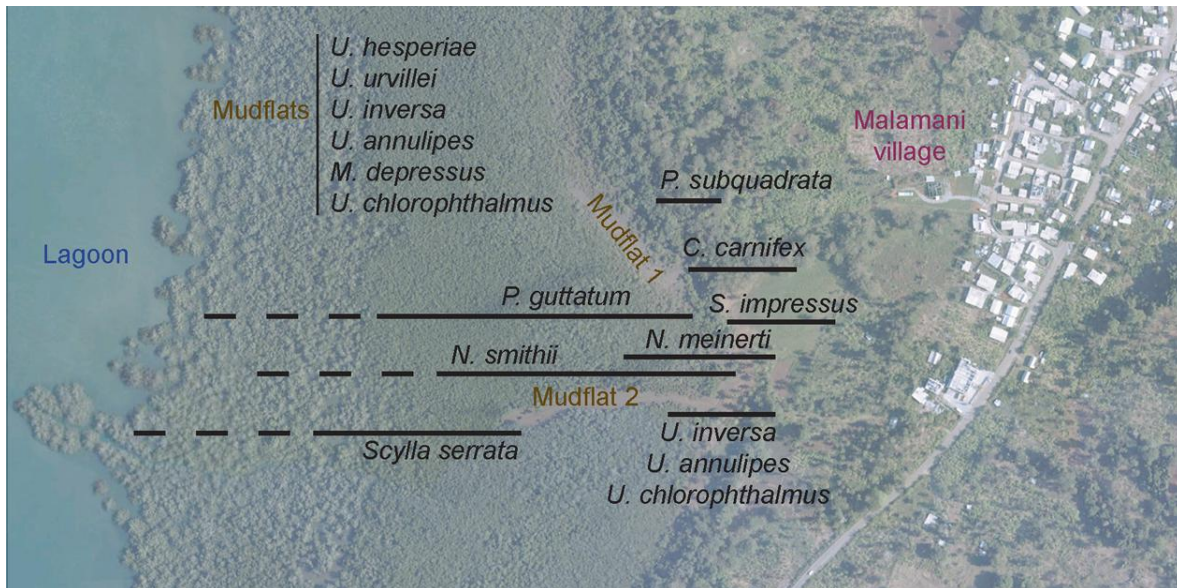


Figure 41. Schematic distribution of the crabs collected at Malamani mangrove. Adapted from Bouchard (2009) and KUW fieldwork data (St. 13). Dashed lines indicate places that were not sampled.

BIOGEOGRAPHY

All the species reported in this work are widespread in the IWP although several of them are rarely reported because of discrete nocturnal behavior. Nonetheless, this first inventory of Mayotte region reports 25 new records for the area, indicated in bold in table 2.

A total of 44 species (78 %) have an IWP distribution and are reported between the eastern coast of Africa to French Polynesia and Hawaii. Although none of them reach the American coasts, three are reported in the eastern Pacific in Clipperton atoll and/or Revillagigedo Islands (*Ocypode ceratophthalmus*, *Pachygrapsus minutus*, *P. planifrons*). The 14 remaining species, highlighted in grey in Table 2, are only reported in the WIO. There is perhaps one endemic species for Mayotte region, *Ptychognathus johannae*, but this must be confirmed with an upcoming taxonomic revision for this genus by Ng. N.-K. The small-sized sentinel crab *Chaenostoma lisae* (Poupin & Bouchard, 2010) described from specimens collected during this fieldwork has been recently recognized in New-Caledonia (R. Naderloo pers. com. with forthcoming publication; see under *C. lisae* and Fig. 29 D).

It is particularly interesting to compare this inventory for Mayotte region with inventories made previously in the Seychelles. The western islands of this archipelago (Aldabra, Assumption, Cosmoledo, and Astove Islands; see Fig. 2) are situated at about 350 km in the North East of Mayotte, and the distance between the Glorioso and Astove Island is only 160 km. Comparative data for the Seychelles have been obtained in Fransen (1994), Marquet & Keith (2008), and Keith *et al.* (2006) for freshwater shrimps, and Haig (1984) for land hermit crabs and crabs, supplemented by a few additional studies for intertidal species such as *Metopograpsus* and *Pachygrapsus*.

The number of species for combined Comoros Is., Mayotte, Glorioso, and Seychelles is 66. Thirty four (52 %) are common between the two regions, 22 (33 %) are reported only in Mayotte region, and 10 (15 %) are reported only in the Seychelles (Fig. 42). Detailed comparison between the two regions is presented in appendix 2, table 3, with a short synthesis here.

Out of 12 shrimps, 8 are common between the two regions (Appendix 2, table 3.1). *Macrobrachium idae* (Heller, 1862) is still not recorded in Mayotte region. Because of its IWP distribution and records already reported in Madagascar and the Seychelles it could perhaps be found in the rivers of Mayotte region in the future. *Macrobrachium lepidactylus* (Hilgendorf, 1879) is confined to WIO with eastern limit to Mayotte, Madagascar, Réunion and Mauritius and, apparently, has not colonized the Seychelles. One species, *Caridina similis* Bouvier, 1904, is considered as endemic to the Seychelles (see Marquet & Keith, 2008).

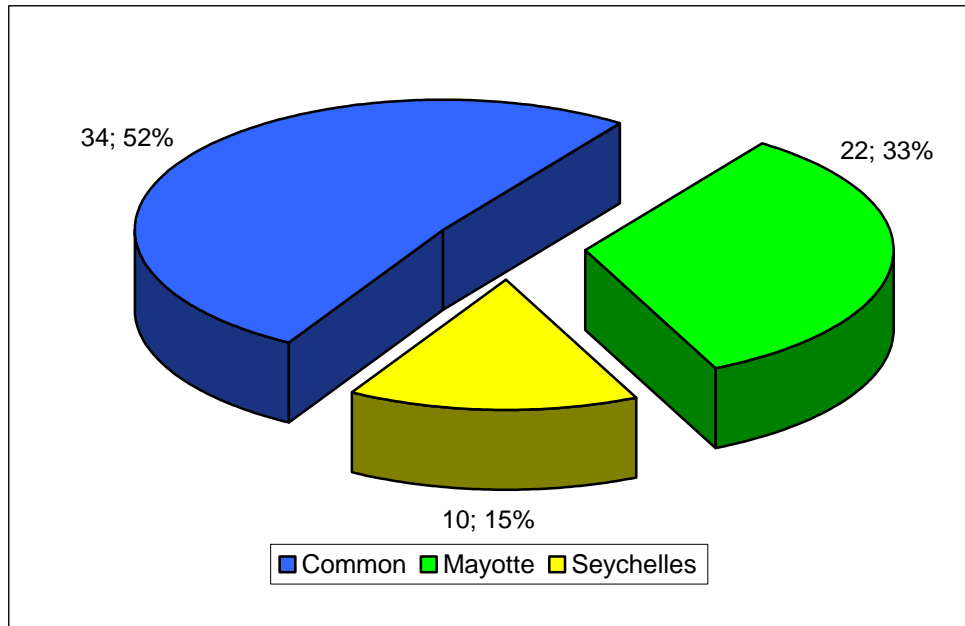


Figure 42. Comparison between land, freshwater and mangrove decapods in Mayotte region (Mayotte) and the Seychelles. The total number of species is 66. In blue, species common between the two regions (34); in green, species reported only in Mayotte region (22); in yellow, species from Seychelles only (10).

The coenobitids of this inventory are widespread in the IWP and are therefore logically present in both regions (Appendix 2, table 3.2). The present of the coconut crab is confirmed for this study in the Glorioso Islands and also in the Mozambique channel at Juan de Nova (see under *Birgus latro*) but this species is probably extinct in eastern Africa and perhaps also in Madagascar.

On a total of 31 grapsoid crabs (Appendix 2, table 3.3), 14 are widespread in the IWP and found in both regions. Four still recorded only in the Seychelles have a wide IWP geographic distribution and could therefore be potentially present in Mayotte region: *Discoplax rotunda* (Quoy & Gaimard, 1824), *Geograpsus stormi* De Man, 1895, *Parasesarma plicatum* (Latreille, 1803), and *Sesarmoides longipes* (Krauss, 1843). In contrast, seven IWP species from Mayotte region still not reported in the Seychelles could be potentially present there (see in table 3.3 as ‘Potential for Seychelles’). The freshwater crab *Ptychognathus johanna*e Rathbun, 1914 is perhaps endemic to the Comoros Islands while *Seychellum alluaudi* (A. Milne-Edwards & Bouvier, 1893) is endemic to the Seychelles (see Ng *et al.*, 1995).

For the crabs Ocypodoidea comparison between the two regions (Appendix 2, table 3.4) shows that *Macrophthalmus (Macrophthalmus) parvimanus* Guérin, 1834, widely distributed in the IWP, including eastern Africa, Madagascar, Réunion, Seychelles, is potentially also present in Mayotte region. On the opposite, 8 additional species could be reported in the Seychelles in the future (see in table 3.4 as ‘Potential for Seychelles’).

In conclusion this comparison with the Seychelles Islands shows that at least 6 additional IWP species, probably still not reported in Mayotte region because of the vagaries of collections, could be added to the regional fauna in the future: *Discoplax rotunda*, *Geograpsus stormi*, *Macrobrachium idae*, *Macrophthalmus parvimanus*, *Parasesarma plicatum*, and *Sesarmoides longipes*.

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APPENDIXES

1. STATION LIST

A total of 35 stations, some of them visited several times, have been made during the KUW 2009 fieldwork. Only 16 were dedicated to land, coastal or mangrove fauna, indicated by bold numbers in this list. The other stations are for the marine fauna that will be published separately. For each stations the following sequence is used: Station number; Date; Time; Place; Latitude (S); Longitude (E); Depth (m); Collector(s); Technique; Remarks. A map of these stations is given in figure 3 with a 'Google Map' also available on Internet [1].

- 1; 01/11/2009; 21h-22h; Trévani Beach; 12°43'50.45"S; 45°11'39.66"E; 0 m; J. Dumas, J. Poupin, R. Cleva; Littoral investigation; Low tide, sandy-muddy bottoms.
- 2; 02/11/2009; 09h-11h; Littoral, from Trévani to Kangani Mangrove; 12°43'40.97"S; 45°11'19.93"E; 0 m; J. Poupin, R. Cleva; Littoral investigation; Low tide, sandy-muddy coast, mangrove, river mouth.
- 3a; 02/11/2009; 09h-11h; Trévani fringing reef; 12°43'43.19"S; 45°11'43.97"E; 1-8 m; J.-M. Bouchard, J. Dumas, V. Dinhut; Snorkeling and scuba diving; Coral grounds with sandy-muddy flats.
- 3b; 02/11/2009; 19h-21h; Trévani fringing reef at night; 12°43'43.19"S; 45°11'43.97"E; 1-8 m; J. Dumas; Snorkeling and scuba diving; Coral grounds at night.
- 4; 02/11/2009; 14h-16h; La Prévoyante reef; 12°41'33.84"S; 45°10'0.24"E; 6-10 m; J.-M. Bouchard, J. Dumas, V. Dinhut; Scuba diving; Corals and blocks of dead corals.
- 5; 03/11/2009; 10h-13h; Great north east reef, seagrass bed; 12°41'58.01"S; 45°14'4.31"E; 1 m; J.-M. Bouchard, R. Cleva, J. Dumas, V. Dinhut, J. Poupin; Snorkeling and small dredge; Seagrass beds, small coral blocks.
- 6**; 04/11/2009; 11h-14h; Petite Terre, Badamiers spillway; 12°46'58.65"S; 45°15'44.67"E; 0-3 m; J.-M. Bouchard, R. Cleva, J. Dumas, V. Dinhut, J. Poupin; Snorkeling and littoral; Mangrove area, with mudflats and coral slabs.
- 7; 3-4/11/09; 0-24h; Kongo cardinal buoy; 12°43'57.33"S; 45°13'44.62"E; 32 m; J.-M. Bouchard, J. Dumas, V. Dinhut; Traps; Bottom under the buoy, coral boulders and mudflats.
- 8; 04/11/2009; 15h30-17h30; Lagoon close to Great north-eastern reef; 12°41'58.41"S; 45°13'11.47"E; 6-8 m; J.-M. Bouchard, V. Dinhut, J. Dumas; Scuba diving; Sandy bottom, coral boulders.
- 9; 05/11/2009; 10h30-13h; S shaped pass; 12°51'14.06"S; 45°15'56.05"E; 0-20 m; J.-M. Bouchard, R. Cleva, J. Dumas, V. Dinhut, J. Poupin; Snorkeling and littoral; submerged seagrass beds.

- 10**; 05/11/2009; 14H30-15H30; islet Quatre Frères (Vatou), east; 12°46'25.71"S; 45°15'36.35"E; 0 m; J.-M. Bouchard, R. Cleva, J. Dumas, V. Dinhut, J. Poupin; Littoral investigation at rising tide.
- 11; 05/11/2009; 16h-16h30; Kongo portside buoy, east; 12°43'42.12"S; 45°14'8.07"E; 1-4 m; J.-M. Bouchard, J. Dumas; Scuba diving; Brushing on the chain under the buoy.
- 12a; 06/11/2009; 10h-12h30; La Prévoyante reef; 12°41'34.70"S; 45° 9'59.99"E; 6-11 m; J.-M. Bouchard, V. Dinhut, J. Dumas; Scuba diving, sediment suction pump; *Acropora* coral grounds
- 12b; 06/11/2009; 19h-22h; La Prévoyante reef at night; 12°41'34.70"S; 45° 9'59.99"E; 6-12 m; J.-M. Bouchard, V. Dinhut, J. Dumas; Scuba diving; Coral grounds at night
- 12c; 10/11/2009; 20h30-22h30; La Prévoyante reef at night; 12°41'34.70"S; 45° 9'59.99"E; 6-12 m; J.-M. Bouchard, V. Dinhut, J. Dumas; Scuba diving; Coral grounds at night.
- 13**; 07/11/2009; 11-14h30; Malamani mangrove; 12°55'22.08"S; 45° 9'22.08"E; 0 m; J.-M. Bouchard, J. Poupin, R. Cleva, J. Dumas; Mangrove investigation, hand and nets; Mangrove mudflats
- 14; 09/11/2009; 10h-12h; La Prudente bank; 12°38'50.68"S; 44°58'41.93"E; 15-17 m; J.-M. Bouchard, V. Dinhut, J. Dumas; Scuba diving, sediment suction pump; Sandy bottom, coral boulders.
- 15; 09/11/2009; 10h-12h; islet Mtsamboro, beach of the north-eastern tip; 12°38'47.34"S; 45° 2'23.70"E; 0-3 m; J. Poupin, R. Cleva; Snorkeling and littoral; Reef flat and shallow waters with sand bottoms.
- 16**; 8-9/11/09; 0-24h; Longoni Bay; 12°43'12.85"S; 45° 8'10.42"E; 2 m; J.-M. Bouchard, J. Dumas, V. Dinhut; Traps; Muddy grounds in front of Mangrove.
- 17; 10/11/2009; 11h-14h; North reef; 12°34'49.93"S; 45° 5'52.62"E; 22 m; J.-M. Bouchard, V. Dinhut, J. Dumas; Scuba diving, sediment suction pump; Outer reef, sandy bottoms, coral boulders.
- 18; 11/11/2009; 10h-12h; Off S shaped pass, 50 m terrace; 12°52'37.08"S; 45°16'55.26"E; 62 m; J.-M. Bouchard, J. Dumas; Scuba diving; Edge of 50/60 m terrace, with gorgonians.
- 19; 11/11/2009; 15h-17h; islet Handrema, north; 12°40'21.00"S; 45° 6'49.92"E; 6-10 m; J.-M. Bouchard, V. Dinhut, J. Dumas; Scuba diving, sediment suction pump; Fringing reef and outer slope, coral grounds.
- 20a**; 12/11/2009; 9h-12h; islet M'tzamboro, north-eastern beach; 12°39'6.76"S; 45°1'45.87"E; 0-1 m; J. Poupin, R. Cleva, Brice; Littoral investigation; Low tide, fringing reef and shallow waters.
- 20b; 12/11/2009; 9h-12h; islet M'tzamboro, west reef flat; 12°39'30.18"S; 45° 0'42.76"E; 10-15 m; J.-M. Bouchard, V. Dinhut, J. Dumas; Scuba diving; Collapsed edge reef, sandy slope pronounced.

- 21a**; 12/11/2009; 14h-15h30; islet Choizil, east, Malandzamiayatsini; 12°40'34.46"S; 45°3'34.91"E; 0 m; J. Poupin, R. Cleva, Brice; Littoral investigation; Littoral at high tide.
- 21b; 12/11/2009; 14h-15h30; islet Choizil, east, Malandzamiayatsini; 12°40'22.74"S; 45°3'47.46"E; 15-20 m; J.-M. Bouchard, V. Dinhut, J. Dumas; Scuba diving; Fringing reef and outer slope.
- 22; 12-13/11/2009; 0-24h; islet Choizil, west, Malandzamiayajou; 12°40'14.34"S; 45° 2'42.66"E; 30-35 m; J.-M. Bouchard, J. Dumas, V. Dinhut; Traps; 300 m far from Choizil islet, sand and coral boulders.
- 23; 13/11/09; 11h-13h; Choizil pass "Patate à Teddy"; 12°40'56.91"S; 44°57'51.63"E; 15-30 m; J.-M. Bouchard, V. Dinhut, J. Dumas; Scuba diving; Collapsed edge reef.
- 24; 13/11/09; 21h-22h30; islet Handrema, north; 12°40'18.93"S; 45° 6'47.22"E; 6-12 m; J.-M. Bouchard, V. Dinhut, J. Dumas; Scuba diving; Fringing reef and coral slope along channel.
- 25; 14/11/09; 10h-11h30; islet M'tzamboro, southern tip; 12°39'30.18"S; 45° 1'38.65"E; 15-20 m; J.-M. Bouchard, V. Dinhut, J. Dumas; Scuba diving; Coral slope with boulders.
- 26**; 16/11/09; 10h-11h30; Mutsumbatsou reef flat; 12°45'15.60"S; 45° 2'49.86"E; 0 m; J.-M. Bouchard, R. Cleva, J. Dumas, V. Dinhut, J. Poupin; Littoral investigation; Low tide, reef flat and seagrass beds
- 27; 17/11/09; 10h-12h; islet Mbouzi, coral boulder, south-eastern; 12°48'55.86"S; 45°14'23.21"E; 4-20 m; J.-M. Bouchard, V. Dinhut, J. Dumas; Scuba diving; Silted coral pinnacles.
- 28; 17/11/09; 14h-15h30; islet Mbouini, east; 13° 0'27.42"S; 45° 8'16.96"E; 3-20 m; J.-M. Bouchard, V. Dinhut, J. Dumas; Scuba diving; High tide, fringing reef and slope.
- 29**; 18/11/09; 11h-12h30; Ngouja hotel, Mboianatsa beach; 12°57'42.60"S; 45° 5'1.30"E; 0 m; J.-M. Bouchard, J. Dumas; Littoral investigation; Low tide, beach and rocky shores.
- 30; 18/11/09; 14h30-16h; Rani reef, double barrier; 12°56'34.23"S; 45° 3'20.75"E; 3-15 m; J.-M. Bouchard, V. Dinhut, J. Dumas; Scuba diving, traps; Outer slope of reef.
- 31**; 19/11/09; 11h-13h; Brandélé 'Musical beach'; 12°55'1.60"S; 45°11'12.43"E; 0 m; J. Poupin, R. Cleva; Littoral investigation; Littoral at low tide.
- 32; 19/11/09; 10h30-12h00; islet M'tzamboro, north-eastern; 12°38'9.54"S; 45° 2'27.12"E; 6-21 m; J.-M. Bouchard, V. Dinhut, J. Dumas; Scuba diving; *Acropora* coral boulders.
- 33; 19/11/09; 14H30-16H30; Seaside of Longoni pass; 12°36'50.76"S; 45° 8'58.25"E; 25 m; J.-M. Bouchard, V. Dinhut, J. Dumas; Scuba diving; Outer reef, gentle slope.
- 34; 20/11/09; 14h-15h30; "Préfet" beach; 12°39'47.28"S; 45° 5'25.02"E; 2-8 m; J.-M. Bouchard, V. Dinhut, J. Dumas; Scuba diving; Reef flat.

35; 20/11/09; 10h-12h; Surprise reef, Longoni pass; 12°38'29.95"S; 45° 7'45.99"E; 4-25 m; J.-M. Bouchard, V. Dinhut, J. Dumas; Scuba diving; Outer reef slope.

Few additional stations, listed below, were sampled before the KUW 2009 fieldwork, most of them by first author of this paper in 2007-2009.

1b; 01/07/09; Daytime; Trévani Beach; 12°43'50.45"S; 45°11'39.66"E; 1 m; J.-M. Bouchard; Littoral investigation; Sandy-muddy bottom.

9b; 01/07/09; Daytime; S shaped pass; 12°51'14.06"S; 45°15'56.05"E; 1 m; J.-M. Bouchard; Littoral investigation; Reef flat.

13b; 08/10/08; 8h00/15h00; Malamani mangrove; 12°55'22.08"S; 45° 9'22.08"E; 0 m; J.-M. Bouchard; Mangrove investigation; under mangrove trees and on mudflats.

13c; 01/07/09; Daytime; Malamani mangrove; 12°55'22.08"S; 45° 9'22.08"E; 0 m; J.-M. Bouchard; Mangrove investigation; Mudflats.

26b; 01/07/09; Daytime; Mutsumbatsou reef flat; 12°45'15.60"S; 45° 2'49.86"E; 0 m; V. Dinhut; Littoral investigation, snorkeling; Seagrass bed.

26c; 03/08/08; 10h00-12h30; Mutsumbatsou reef flat; 12°45'15.60"S; 45° 2'49.86"E; 0 m; J.-M. Bouchard; Littoral investigation; Reef flat.

36; 11/11/08; 14h; Salizé south buoy; 12°59'54.60"; 45°11'49.20"E; 2 m; J.-M. Bouchard, V. Dinhut; Scuba diving; Under a buoy, on its chain.

37; 10/09/07; 10h30; islet Mbouzi, south-eastern boulder; 12°49'9.57"S; 45°14'32.54"E; 3 m; J.-M. Bouchard; Scuba diving; On coral *Antipathes dicotoma*.

38; 24/07/08; 10h00-11h30; Chiconi/Sada bay, south-western; 12°50'25.62"S; 45° 6'39.87"E; 0 m; J.-M. Bouchard, V. Dinhut; Littoral investigation; Low tide, beach and rocky tip.

39; 01/07/09; Daytime; Sohoa beach; 12°49'1.84"S; 45° 6'18.26"E; 0-1 m; V. Dinhut; Littoral investigation; Sandy-muddy beach.

2. COMPARISON WITH THE SEYCHELLES

Table 3.1 – Comparison of land, mangrove and freshwater decapods in Mayotte region (Mayotte, Comoros, Glorioso) and the Seychelles. Shrimps and hermit crabs species. Presence of the species is indicated by a 'X'. Species in both region are in the first column (Common). WIO, Western Indian Ocean; IWP, Indo-West Pacific. Data for Mayotte region are from this study; those from Seychelles are from Fransen (1994), Marquet & Keith (2008) and Keith *et al.* (2006).

Shrimps species	Common	Mayotte	Seychelles	Total	Distribution - Remarks
<i>Atyoida serrata</i> (Bate, 1888)	X				WIO
<i>Caridina brachydactyla</i> De Man, 1908		X			IWP
<i>Caridina longirostris</i> H. Milne Edwards, 1837	X				IWP
<i>Caridina serratiostris</i> De Man, 1892	X				IWP
<i>Caridina similis</i> Bouvier, 1904			X		Seychelles endemic (cf. Marquet & Keith, 2008)
<i>Caridina typus</i> H. Milne Edwards, 1837	X				IWP
<i>Macrobrachium australe</i> (Guérin-Méneville, 1838)		X			IWP. Potential for Seychelles
<i>Macrobrachium equidens</i> (Dana, 1852)	X				IWP
<i>Macrobrachium idae</i> (Heller, 1862)			X		IWP, including Madagascar but not Africa. Potential for Mayotte
<i>Macrobrachium lar</i> (Fabricius, 1798)	X				IWP
<i>Macrobrachium lepidactylus</i> (Hilgendorf, 1879)		X			WIO but not Seychelles
<i>Palaemon concinnus</i> Dana, 1852	X				IWP
<i>Palaemon debilis</i> Dana, 1852	X				IWP
Total Shrimps	8	3	2	13	

Table 3.2 – Same. Hermit crabs. Seychelles records are from Haig (1984).

Hermit crabs species	Common	Mayotte	Seychelles	Total	Distribution - Remarks
<i>Birgus latro</i> (Linnaeus, 1767)	X				IWP
<i>Coenobita brevipennis</i> Dana, 1852	X				IWP
<i>Coenobita cavipes</i> Stimpson, 1858	X				IWP
<i>Coenobita perlatus</i> H. Milne Edwards, 1837	X				IWP
<i>Coenobita rugosus</i> H. Milne Edwards, 1837	X				IWP
Total Hermit crabs	5			5	

Table 3.3 – Same. Crabs Grapsoidea. Seychelles records mostly from Haig (1984).

Crab species (Grapsoidea)	Common	Mayotte	Seychelles	Total	Distribution - Remarks
<i>Cardisoma carnifex</i> (Herbst, 1796)	X				IWP
<i>Chiromantes ortmanni</i> (Crosnier, 1965)		X			WIO - Eastern limit Mayotte and Madagascar.
<i>Discoplax rotunda</i> (Quoy & Gaimard, 1824)			X		IWP. Potential for Mayotte
<i>Geograpsus crinipes</i> (Dana, 1851)	X				IWP
<i>Geograpsus grayi</i> (H. Milne Edwards, 1853)	X				IWP
<i>Geograpsus stormi</i> De Man, 1895			X		IWP. Potential for Mayotte.
<i>Grapsus (Pachysoma) intermedius</i> De Haan, 1835			X		IWP but only Seychelles in Indian Ocean
<i>Grapsus fourmanoiri</i> Crosnier, 1965	X				WIO.
<i>Grapsus tenuicrustatus</i> (Herbst, 1783)	X				IWP
<i>Metasesarma obesum</i> (Dana, 1851)		X			IWP. Potential for Seychelles
<i>Metopograpsus messor</i> (Forskål, 1775)	X				IWP
<i>Metopograpsus thukuhar</i> (Owen, 1839)	X				IWP
<i>Neosarmatium laeve</i> (A. Milne-Edwards, 1869)			X		Indonesia, Philippines. Only Seychelles in WIO
<i>Neosarmatium meinerti</i> (De Man, 1887)	X				WIO, see footnote (5)
<i>Neosarmatium smithii</i> (H. Milne Edwards, 1853)	X				IWP
<i>Pachygrapsus minutus</i> A. Milne-Edwards, 1873		X			IWP. Potential for Seychelles
<i>Pachygrapsus planifrons</i> De Man, 1888	X				IWP
<i>Pachygrapsus plicatus</i> (H. Milne Edwards, 1837)	X				IWP
<i>Parasesarma leptosoma</i> (Hilgendorf, 1869)		X			IWP. Potential for Seychelles
<i>Parasesarma plicatum</i> (Latreille, 1803)			X		IWP. Potential for Mayotte
<i>Perisesarma guttatum</i> (A. Milne-Edwards, 1869)		X			WIO. Eastern limit Madagascar, Mayotte.
<i>Pseudohelice subquadrata</i> (Dana, 1851)	X				IWP
<i>Pseudograpsus albus</i> Stimpson, 1858		X			IWP. Potential for Seychelles
<i>Ptychognathus barbatus</i> (A. M.-Edwards, 1873)		X			IWP. Potential for Seychelles
<i>Ptychognathus johannae</i> Rathbun, 1914		X			Taxonomic status in review (Ng N.-K.). ?Endemic of Comoros
<i>Ptychognathus pusillus</i> Heller, 1865		X			IWP. Potential for Seychelles
<i>Sesarmops impressus</i> (H. Milne Edwards, 1837)	X				IWP
<i>Sesarmoides longipes</i> (Krauss, 1843)			X		WIO. Potential for Mayotte
<i>Seychellum alluaudi</i> (A. Milne-Edwards & Bouvier, 1893)			X		Seychelles endemic (rivers)
<i>Thalassograpsus harpax</i> (Hilgendorf, 1892)		X			IWP. Potential for Seychelles
<i>Varuna litterata</i> (Fabricius, 1798)	X				IWP
Total Grapsoidea	14	10	7	31	

⁵ Seychelles population of *Neosarmatium meinerti* is genetically distinct from African mainland; see Ragioneri *et al.* (2010), and previous comment under *Neosarmatium meinerti*.

Table 3.4 – Same. Crabs Ocypodoidea and others groups. Seychelles records mostly from Haig (1984).

Crab species (Ocypodoidea)	Common	Mayotte	Seychelles	Total	Distribution - Remarks
<i>Chaenostoma sinuspersici</i> (Naderloo & Türkay, 2010)		X			IWP - as <i>Macrophthalmus boscii</i> Audouin, 1826
<i>Chaenostoma lisae</i> (Poupin & Bouchard, 2010)		X			Mayotte and New Caledonia. Potential for Seychelles
<i>Dotilla fenestrata</i> Hilgendorf, 1869		X			WIO. Potential for Seychelles
<i>Macrophthalmus (Macrophthalmus) parvimanus</i> Guérin, 1834			X		IWP. Potential for Mayotte
<i>Macrophthalmus (Macrophthalmus) grandidieri</i> A. Milne-Edwards, 1867		X			WIO. Potential for Seychelles
<i>Macrophthalmus (Mareotis) depressus</i> Rüppel, 1830		X			WIO. Potential for Seychelles
<i>Ocypode ceratophthalmus</i> (Pallas, 1772)	X				IWP
<i>Ocypode cordimanus</i> Latreille, 1818	X				IWP
<i>Ocypode pauliani</i> Crosnier, 1965		X			Mayotte, Madagascar. Potential for Seychelles
<i>Uca (Cranuca) inversa</i> (Hoffmann, 1874)		X			WIO. Potential for Seychelles
<i>Uca (Gelasimus) tetragonon</i> (Herbst, 1790)	X				IWP
<i>Uca (Gelasimus) hesperiae</i> Crane, 1975		X			IWP. Potential for Seychelles
<i>Uca (Austruca) annulipes</i> (H. Milne Edwards, 1837)	X				IWP
<i>Uca (Paraleptuca) chlorophthalmus</i> (H. Milne Edwards, 1837)	X				WIO
<i>Uca (Tubuca) urvillei</i> (H. Milne Edwards, 1852)		X			WIO. Potential for Seychelles
Total Ocypodoidea	5	9	1	15	
Crab species (others)	Common	Mayotte	Seychelles	Total	Distribution - Remarks
<i>Epixanthus dentatus</i> (White, 1847)	X				IWP
<i>Scylla serrata</i> (Forskål, 1775)	X				IWP
Total others crabs	2	0	0	2	

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<i>annulipes</i>	41	<i>verreauxi</i> , <i>Macrophthalmus</i>	37
<i>borealis</i>	43	<i>vocans</i> , <i>Uca</i>	43
<i>chlorophthalmus</i>	45	<i>vomeris</i> , <i>Uca</i>	43



Figure 43. *Neosarmatium meinerti*. Mayotte, KUW 2009 fieldwork, Malamani mangrove at high tide, *in situ* photographs of the crabs in mangrove trees *Avicennia marina*. Copyright F. Fromard.