Universität Rostock

Traditio et Innovatio

BRACHYURAN CRABS OF THE YEMENI COASTAL WATERS

(RED SEA, GULF OF ADEN, ARABIAN SEA AND SOCOTRA ISLANDS)

Dissertation

zur

Erlangung des akademischen Grades

doctor rerum naturalium (Dr. rer. nat.)

der Mathematisch-Naturwissenschaftlichen Fakultät

der Universität Rostock

vorgelegt von

Abdullah Nasser Al-Hindi, geb. am 23.12.1975 in Abian

aus Jemen

Rostock, 22.02.2019

https://doi.org/10.18453/rosdok_id00002444

Universität Rostock

Traditio et Innovatio

BRACHYURAN CRABS OF THE YEMENI COASTAL WATERS

(RED SEA, GULF OF ADEN, ARABIAN SEA AND SOCOTRA ISLANDS)

Presented by
Abdullah Nasser Al-Hindi, born. on 23.12.1975 in Abian
from Yemen
Rostock, 22.02.2019

Referees:

1st Reviewer:
PD Dr. Stefan Forster
Institut für Biowissenschaften – Meeresbiologie
Albert-Einstein Str. 3
D-18059 Rostock.

2nd Reviewer: Prof. Dr. Roland Melzer
Zoologische Staatssammlung München
Münchhausenstr. 21
D-81247 München.

Date of submission: 22.02.2019
Date of defense: 18.03.2019


IN THE NAME OF ALLAH, THE ENTIRELY MERCIFUL, THE ESPECIALLY MERCIFUL.

Dedication

To my mother Naifa, my wife Sina, my daughter Amal, and my sons Salem and Saleh, who supported me during the study period 2016 up to this time despite the difficult conditions and crises that have plagued Yemen since 2015 until today. To the spirit of my teacher, Dr.Najat Ali Mqbil, Dean of the Faculty of Science - Aden University, who was killed last year, and was waiting to complete my thesis impatiently.
To all Yemeni and non-Yemeni researchers interested in studying marine biodiversity on the coasts of Yemen.

Abdullah Al-Hindi

abalhindi2007@yahoo.com

الاهداء

الى والدتي نائفة، زوجتي سيناء، ابنتي امال و ولدي سالم وصالح ، الذين دعموني طوال فترة الدراسة و تحملوا بعدي عنهم خلال فترة الدراسة الممتدة منذ العام 2016 حتى يومنا هذا، رغم الظروف الصعبة و الازمات التي تمر بها بلادنا اليمن منذ العام 2015 حتى اليوم.

الى روح استاذتي الفاضلة د/ نجاة علي مقبل عميدة كلية العلوم (رحمها الله) التي قتلت في العام الماضي و التي كانت تنتظر اتمام اطروحتي بفارغ الصبر.

الى كل الباحثين اليمنيين و غير اليمنيين المهتمين بدراسة التنوع الحيوي البحري في سواحل اليمن.

عبد الله الهندي

abalhindi2007@yahoo.com

Table of Contents

List of Figures

List of Plates

List of table

List of abbreviations Abbreviations

Term	Meaning
Fig	Figure
CL	Carapace Length
CW	Carapace width
♂	Male
♀	Female
Juv	Juvenile
G1	First male gonopods
G2	Second male gonopods
mm	Millimeter
CESS	Centre for Environmental Studies and Sciences, University of Aden
RUWW	Rostock University, Wolfgang Wranik
SMF	Senckenberg Museum Frankfurt
AUAA	Aden University, Abdullah Al-Hindi
ZSM	Zoologische Staatssammlung München
MMSBRA	Museum of Marine Science and Biological Research Authority, Aden, Yemen
EPA-Y	Environment Protection Authority- Yemen
PERSGA	Program for Environment of the Red Sea and the Gulf of Aden
AWCP	Aden Wetlands Conservation Project
MPA	Marine Protected Areas
IUCN	International Union for Conservation of Nature
SAP	Strategic Action Program
GEF	Global Environmental Facility
IsDB	Islamic Development Bank
UNDP	United Nations Development Programme
FAO	Food and Agriculture Organization/UN
GPS	Geographical Position search
GIS	Geographical information system
CO1	Mitochondrial gene cytochrome c oxidase 1
DNA	Deoxyribonucleic acid

Summary

The waters of the Republic of Yemen, located on the southern tip of the Arabian Peninsula include parts of the Red Sea, Gulf of Aden, Arabian Sea and Socotra Islands. Knowledge on the marine fauna of brachyuran decapod crabs is limited in this region, though it harbors diverse habitats. This study summarizes the information on specimen collected in Yemen and material from previous collections partially stored in museums. Including literature data, it thus provides the most comprehensive study to date on the current knowledge on brachyuran crabs for Yemini waters. It may form a base for future investigations and necessary monitoring of the marine coastal environment.

The present study examined 2287 brachyuran crab specimens. The specimens were collected from 58 sites along the Yemeni coastal waters at Red Sea, Gulf of Aden, Arabian Sea and Socotra Islands represented with 12, 35, 5 and 6 sites, respectively. The samples were collected from different habitats ranging from sandy shore to mangrove flats and rocky habitats, including different depth zones from the supralittoral zone to 300 m water depth. The hand collected crab specimens obtained by various methods varying from hand nets, SCUBA diving to net trawls. The dominant family in most Yemeni coastal waters was Xanthidae with 38 species. The most common species found were *Leptodius exaratus* in sandy shores with rocks, *Grapsus albolineatus* from the rocky intertidal zone, *Ocypode saratan* from sand in the supralittoral and *Austruca albimana* from mud flats in the intertidal zone.

Species identification followed morphological characteristics, specifically those of the gonopods, was combined with molecular taxonomy (DNA Barcoding, CO1) and reveal 184 species. Of the 184 species, 65 species represent the first record for Yemeni coastal waters. Moreover, 10 species are first records in the Arabian Peninsula.

The present study obtained the first CO1 sequences in the region for 95 brachyuran specimens that were collected from Gulf of Aden. The molecular phylogeny confirms current taxonomic classification in most cases, however, species such as *Leptodius exaratus*, *Epixanthus frontalis*, *Grapsus granulosus*, *Austruca albimana* and *Ocypode saratan* need further investigation for different reasons.

Zusammenfassung

Die Küstengewässer der Republik Jemen an der Südspitze der Arabischen Halbinsel umfassen Teile des Roten Meers, des Arabischen Meers, des Golf von Aden und die Inselgruppe Sokotra. Trotz der Vielfalt an Lebensräumen ist die marine Fauna der Krabben (Dekapoda: Brachyura) in der Region nur wenig erforscht. Die vorliegende Arbeit umfasst Material aus eigenen Aufsammlungen sowie aus Museumsmaterial früherer Erhebungen und kombiniert dies mit Literaturdaten. Im Ergebnis liegt die bisher umfangreichste Studie zur Krabbenfauna dieser Meeresregion vor. Sie kann Grundlage für zukünftige Studien und ein Monitoring der Küstengewässer werden.

Es wurden 2287 Tiere untersucht, wobei insgesamt 58 Probenorte sich mit 12 am Roten Meer, 35 im Golf von Aden, nur 5 am Arabischen Meer und 6 im Sokotra-Archipel unterschiedlich auf die Region verteilten. Proben wurden aus Tiefenzonen vom Supralitoral bis in 300 m Wassertiefe und in Habitaten, die von Sandstränden über Mangroven bis zu Felsküsten reichten, gewonnen. Die von Hand gesammelten Exemplare wurden mit Handnetzen, tauchend und mit Netztrawls vom Schiff aus gesammelt. In den jemenitischen Gewässern dominieren die Xanthidae mit 38 Arten. Häufige Arten sind *Leptodius exaratus* an Sandstränden mit kleineren Felsen, *Grapsus albolineatus* im felsigen Intertidal, *Ocypode saratan* aus supralitoralen Sanden und *Austruca albimana* aus Schlickflächen des Intertidals

Die Bestimmung der Arten folgte klassischen morphologischen Merkmalen, vor allem den Gonopoden, und wurde durch molekulare taxonomie ergänzt (DNA Barcoding, CO1). Es wurden 184 Arten bestimmt, von denen 65 Erstfunde im Jemen und 10 Arten Erstnachweise für die Arabische Halbinsel sind.

An 95 Tieren aus der Region Aden wurden erstmals CO1 Sequenzen erstellt. In vielen Fällen bestätigte die molekulare Phylogenie klassische taxonomische Befunde, jedoch sind weitere Untersuchungen an Arten wie *Leptodius exaratus*, *Epixanthus frontalis*, *Grapsus granulosus*, *Austruca albimana* and *Ocypode saratan* notwenig.

1. Introduction

1.1: Geography

The Republic of Yemen situated on the southern tip of the Arabian Peninsula covers 531000 square kilometers, it shares 1458 km of borderlines with Saudi Arabia and 288 km with Oman (Fig. 1) (PERSGA, 2003; Hadden, 2012).
The Yemeni coastline covers 2350 kilometers and has high tourist and economical potentials. The living marine resources are diverse, rich and have high economic value (UNEP, 2010). The coast along the Gulf of Aden with 1690 km includes both 1200 km of mainland coast and 490 km in the Socotra Archipelago (Wilson & Klaus, 2000).

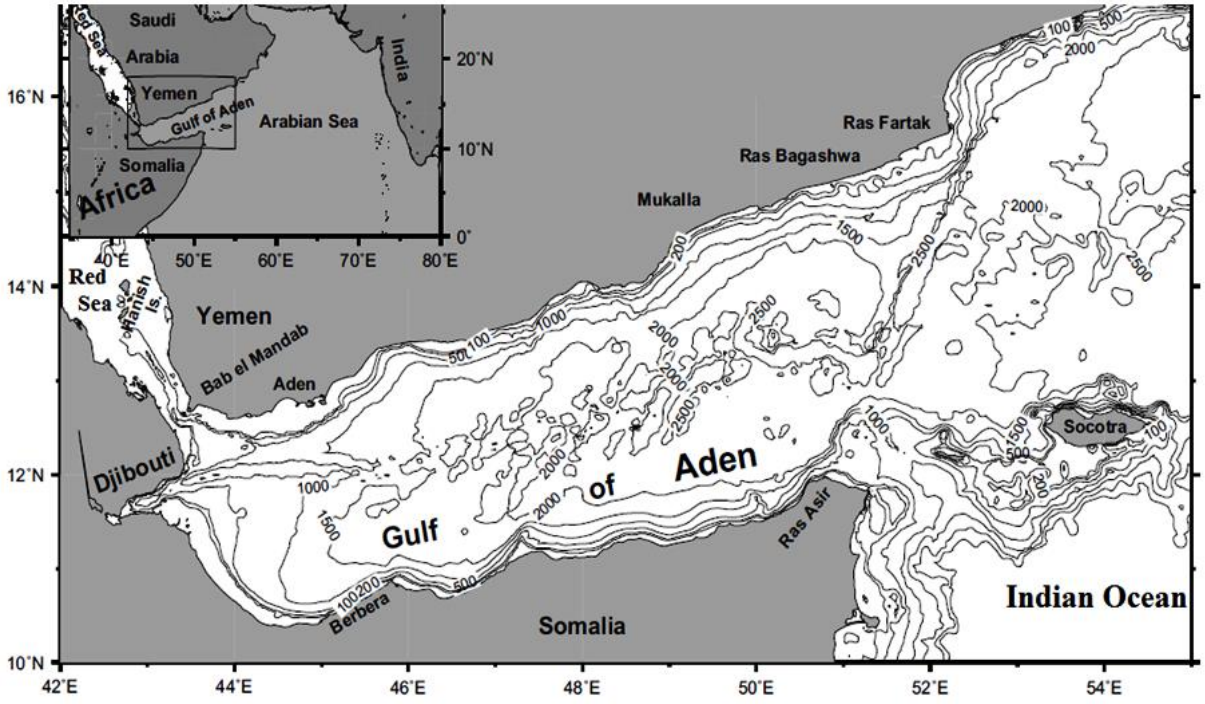

Fig. 1: Map of Yemen location. (Al Saafani, 2008).

Yemen has a number of islands on the Red Sea, including Kamaran, Uqban, Hanish Archipelago Islands, Mayun (older name: Perim), and many islands at the Gulf of Aden (17 islands in Aden city and 4 island in Bir Ali and others). At the Indian Ocean this also includes the Socotra Archipelago located some 240 km east of the Horn of Africa and 380 km south of the Arabian Peninsula. Socotra Archipelago has four islands. The largest island, called Socotra (130 km long and 40 km wide), and three smaller islands of Abd al-Kuri, Samhah and Darsa (PERSGA, 2002; Gladstone *et al*., 2003; Damme & Banfield, 2011; Bawazir, 2017).
Many of the Yemeni islands are volcanic in origin, for example Jabal al-Tair at the Red Sea had a volcanic eruption in 2007 and before that in 1883 (Hadden, 2012). Six strato-volcanoes of Miocene to Pliocene age lie along the south coast of Arabia between the town of Aden and the southern entrance to the Red Sea. These extinct volcanoes, which rise as rocky eminences from the otherwise featureless expanse of the South Arabian coastal plain, are characterized by the formation of cones produced by central vent (Cox *et al*., 1970).

1.2: General information of the Red Sea and Gulf of Aden

During the early Miocene (~25 Ma), the Arabian plate separated from Africa by the rifts. This separation resulted in the formation of the Red Sea and the Gulf of Aden (ArRajehi *et al.,* 2010).

The Red Sea extends for 2100 km from Suez to the Strait of Bab al-Mandab, which connects it with the Gulf of Aden and the Indian Ocean. The Red Sea is 180 km wide in the North and widens to 350 km in the south, before narrowing to 28 km in the strait of Bab al-Mandab (Behairy, 1992). It has three distinct depth zones: shallow shelves less than 50 m in depth, deep shelves ranging between 500 and 1000 m depth and a central axis with depth ranging between 1000 and 2900 m (Rasul & Stewart, 2015).
Approximately 40% of the Red Sea is shallow with < 100 m in depth and about 25% is < 50 m deep. The shallow water comprises fringing reef a few km width and barrier reefs, whereas the deeper water slopes are irregularly marked by coral reefs (Rasul & Stewart, 2015).

The Gulf of Aden is an elongated stretch of sea water separating the African continent from the Asian continent at approximately 10° - 15° N and 43° - 52° E (Fig. 1). It lies between the Horn of Africa and Arabian Peninsula and connects the Red Sea to the Indian Ocean. It‘s boundary with the Red Sea is the narrow Strait of Bab-al Mandeb. To the east the boundary is the rhumb line between Ras Asir at the tip of Horn of Africa to the 300 m high sea cliffs of Ras Fartk at the Yemeni coast east of Mukalla (Wilson & Klaus, 2000; PERSGA, 2002; Al Saafani, 2008). It extends 1400 km long and 350 km wide from north to south, with maximum depths of up to 3000 m (PERSGA, 2002; Al Saafani, 2008).

1.2. 1: Monsoon winds

The winds over the Gulf of Aden are southwesterly during the summer monsoon (June-September) and northeasterly during the winter monsoon (November-March). During spring (April-May) and fall (October) inter-monsoon winds are weak and unstable in their directions (FAO, 2004; Al Saafani *et al*., 2007). The exchange of water between the Red Sea, the Gulf of Aden and the Arabian Sea, the strong evaporation and the monsoon winds that blow over the region all assist in the formation of a complex vertical structure in the water column of the Gulf of Aden (Al Saafani, 2008) (Fig. 2A, B).

1.2. 2: Water temperature and Salinity

The Red Sea is among the warmest of the world‘s seas. The average water temperature is 18-21°C in winter and 21-26°C in summer. Whiles surface water temperatures remain relatively constant at 21- 25°C and temperature and visibility remains good to around 200 m, surface water temperature in the Gulf of Aden varies considerably. Maximum temperatures occur in May-June and September-October. The minimum temperatures in July and August, during the peak of the upwelling, are 7-10ºC lower than the highest in May because the adjacent waters of the northwest Indian Ocean are several degrees cooler (Mistafa, 2005; FAO, 2004) (Fig 3A, B).
The Red Sea is among the most saline water bodies of the world. The surface salinity decreases from 40 - 41 ‰ at the northern part to less than 36.5 ‰ near Mayun Island. The northward increase in salinity is attributed to the evaporation in the north and low saline Gulf of Aden surface inflow in the south. The average annual salinity of the surface water (upper 50m) in the Gulf of Aden and Arab Sea is about 36.5 ‰ (Abubakr, 2004).

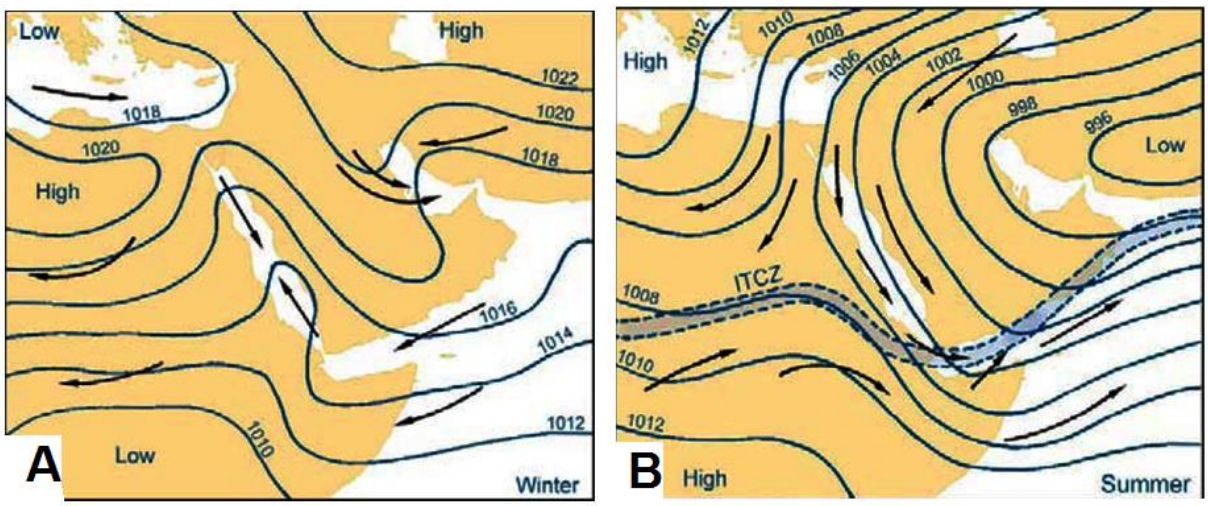

Fig. 2: Atmospheric pressure (hPa) and wind (arrows) in the Red Sea and Gulf of Aden (Bonfil & Abdallah, 2004); **A.** in winter, November-March; **B.** in summer, June-September.

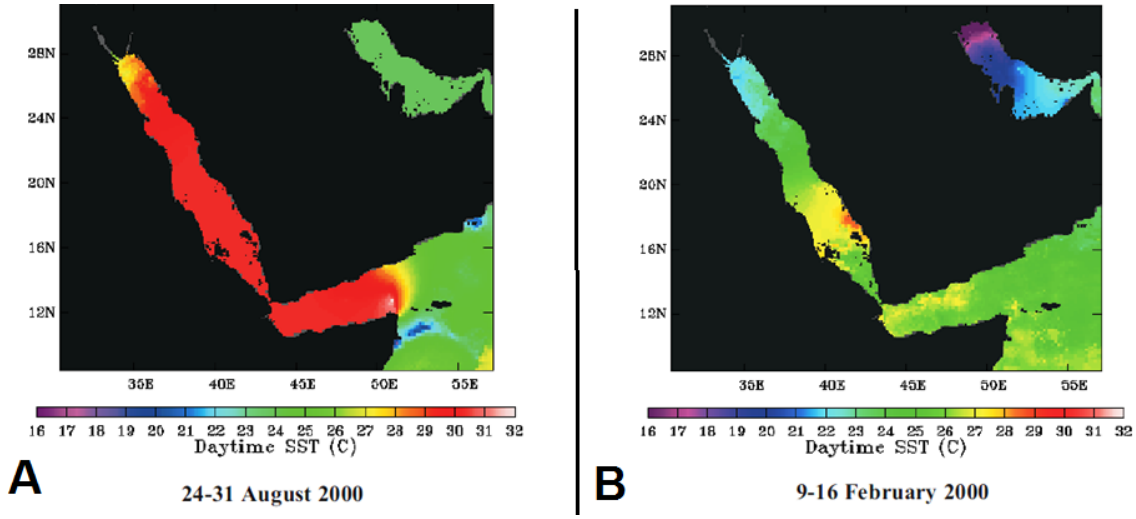

Fig. 3: Average sea surface temperature of the Red Sea and Gulf of Aden calculated with AVHRR data using NASA‘s Distributed Active Archive Center (Bonfil & Abdallah, 2004); **A.** in summer; **B.** in winter.

1.2. 3: Upwelling

The Arabian upwelling is one of the world‘s five major upwelling systems. It occurs during the southwest monsoon (April-September) when warm surface water is blown offshore and replaced by colder nutrient-rich oceanic water (Wilson *et al*., 2003).

The upwelling stimulates primary production of phytoplankton and ultimately creates an increase in the abundance of pelagic fish. The northeastern part of the Gulf of Aden and the area south of

Socotra are among the most productive marine areas in the world, with productivity levels comparable to those off the coasts of Peru and West Africa (PERSGA, 2002).

1.2. 4: Habitats

Marine and coastal ecosystems of the Red Sea include subtidal soft bottoms, sandy shores, muddy shores, rocky shores, mangroves, seagrass, coral reefs, coral communities and salt marshes (PERSGA, 2002). Typical features of the western coast of the Red Sea are coastal lagoons and sheltered bays. Several of these lagoons are fringed by mangrove (PERSGA, 2002) while the coastline along in the Gulf of Aden consists of rocky cliffs which alternate with long stretches of littoral and sublittoral sand dunes (Sheppard *et al*., 1992) with some wetlands, mangroves, muddy shores, lagoons and coral communities (Bawazir, 2003; Gladstone *et al*., 2003; Al-Hindi, 2010; Bawazir, 2017).

Mangroves are considered an important coastal habitat in the region. There are extensive mangrove stands in the Red Sea and Gulf of Aden, especially in the southern Red Sea. Three species have been reported from the Red Sea coast of Yemen. *Avicennia marina, Rhizophora mucronata,* and *Bruguiera gymnorrhiza* were surveyed in 29 localities along the Red Sea coast and the near and offshore islands of Yemen. This represents well above 95% of the mangrove areas in the country (UNEP, 1997; PERSGA, 1996, 2002, 2004). The area of Kharif Shoran, Belhaf, and Bir Ali, fringed by *Avicennia marina*, is the only mangrove stand on the 1400 km Gulf of Aden coast (PERSGA, 2004). While Wilson *et al*. (2003) mentioned that there is no mangrove on the southern coast of Yemen between Bab al Mendab and Oman, we found another site with the mangrove species *Avicennia marina* at the southern coastline located in Dabout (15° 54,845 N, 52° 09,576 E). This was recorded in a survey study conducted by the team of the biodiversity department, Centre for Environmental Studies and Sciences, University of Aden (CESS) during 2005 and 2011.

Mangrove trees in Socotra Island covered an area of 2.94 km^2. These trees consisted of *Avicennia marina* together with other species of halophytic plants, but no other species of mangrove tree was found. The mangrove trees themselves were more than 4 m high with a contorted growth form. Five areas of mangroves were found around Socotra Island: on the north coast, at the seaward end, on the north coast and the west of Khawr Ghirmah and near Shu‘ub Bay on the west coast (Klaus & Turner, 2004).

Coral reefs and corals communities are also considered an important Yemeni coastal habitat. Most are situated along the coast and surrounding offshore islands and are in relatively good condition (PERSGA, 2002). The diverse and spectacular coral reefs for which the Red Sea is renowned are found only in its central and northern half. North of 20° N, reefs are typically well developed and drop steeply into deep water. South of 20° N, reefs occur in a shallow, turbid environment and are less developed. Greatest development occurs in offshore barrier reefs and in fringing reefs. Thinner reefs cover the Gulf of Aqaba and other northern shores. Well-developed reefs occur around Farasan Island in Saudi Arabia and Dahlak Archipelago in Eritrea, which also support extensive mangroves (PERSGA, 2004). In the Gulf of Aden region high cover of scleractinian coral communities were present in all areas visited along the northern shore of the Gulf of Aden (Ras Imran and Bir Ali). These communities included extensive areas with high cover of hard and soft corals, widespread communities dominated to varying degrees by colonies of massive Porites, and numerous entirely or nearly monospecific areas of hard corals. Coral communities with high coverage were found at depths ranging from less than 1 m to over 20 m (Kemp & Benzoni, 2000). There are extensive areas of coral reefs in the Gulf of Aden coastline of Somalia around Saad ad-Din Island in the extreme northwest of the coast near the border with Djibouti, which may be the largest coral reefs in the Gulf of Aden (PERSGA, 2002). The cold and nutrient-rich waters driven by the upwelling have been

thought to similarly affect coral communities along the Yemen coasts, which have been long considered deprived of significant coral cover. However, the northwestern Gulf of Aden has recently been shown to harbor high cover coral communities (Benzoni *et al*., 2003).
Around the Socotra archipelago, only minor development of coral reefs are found existing mostly as small reef flats at a few locations on the northern sides of islands in the Archipelago (Gladstone *et al*., 2003; Mistafa, 2005).
Areas of large marine algae (kelps and weeds) and flowering plants (sea grass), highly productive ecosystems with many marine species (e.g. sea urchins, gastropods, dugongs, and turtles), exist in at the Red Sea and Gulf of Aden. These areas lie between the west of Al-Mahrah Hadramout including Khor Umaira Lagoon and Babel-Mandeb at Gulf of Aden and between Dhubab-Yakhtul and Al Salif-Al Urj at the Red Sea (PERSGA, 2002; Wilson *et al*., 2003; Abubakr, 2004).

1.2. 5: Biodiversity and previous studies

The Red Sea and Gulf of Aden region are globally renowned for their unique and beautiful marine and coastal environments, the diversity of species inhabiting them, the high degree of endemism (Vine, 1986; UNEP, 1997; PERSGA, 2002, 2003; Wilson *et al*., 2003; AWCP, 2009; DiBattista *et al*., 2016). Early studies on the region‘s living marine resources can be dated back to the collections of flora and fauna, particularly fish, made by the Swedish naturalist Peter Forskål in 1761-1762 (PERSGA, 2002). Studies continued in the Red Sea after Forskål (1775), including Rüppell (1830), then H. Milne Edwards 1834-1838, Heller 1861-1862, Paul‘son (1875) and Nobili (1906).
–During a cruise in 1897-1898, members of the Austrian expedition on board the research vessel –Pola" conducted the first oceanographic studies in the southern Red Sea. The expedition focused on the Eritrean coast and the deep central part of the Red Sea, but visited al-Mukha and the islands Kamaran, Zuqar, Zubair and Mayun briefly. Between 1900 and 1910, scientists on board the Italian ship –Scilla" carried out hydrographic studies in the southern Red Sea. On its way to the Indian Ocean, the –John-Murray Expedition" (1933-1934), on board the Egyptian research vessel –Mabahith", collected marine fauna at a few sampling stations in the southern Red Sea (Krupp *et al.,* 2006)". Modern efforts to understand biogeographical processes began with Ekman (1953) and Briggs (1974), both of whom recognized the Red Sea as an endemism hotspot (DiBattista *et al*., 2016). For these reasons the Program for Environment of the Red Sea and the Gulf of Aden (PERSGA) selected 12 sites in this region as marine protected areas (MPAs) which represent critical habitats and populations of globally important species (Fig. 4). These sites are Iles des Sept Frères and Ras Siyan (Djibouti), Ras Mohammed National Park, Straits of Gubal (Egypt), Aqaba coral reefs (Jordan), Straits of Tiran, Wajh Bank, Sharm Habban and Sharm Munaybirah, Farasan Islands (Saudi Arabia), Aibat and Saad ad-Din Islands, Saba Wanak (Somalia), Sanganeb Marine National Park, Mukkawar Island and Dungonab Bay (Sudan), Socotra Islands and Belhaf- Bir Ali area (Yemen) (Gladstone *et al*., 2003).

Socotra Islands, too, have high diversity and endemism of significance at the international level. The island has more than 850 species of plants of which 30% are endemic and 8 species have been listed as endangered species by the International Union for Conservation of Nature (IUCN). 120 bird species have been recorded in the island of which 30 species breed on the island and 7 bird species are endemic (UNEP, 2010). On this basis Socotra Islands were designated a UNESCO World Heritage Site in 2008 (Damme & Banfield, 2011).

Many biodiversity studies have been conducted in the Yemeni coastal waters at Red Sea and Socotra Islands by the Strategic Action Program (SAP) and PERSGA in Marine Protected Areas (MPA).

The Global Environmental Facility (GEF) and other donors such as the Islamic Development Bank (IsDB) and UNEP funded these initiatives. Still, these studies are rare and lack in the Gulf of Aden. Studies indicate that too few published studies exist which additionally concentrate on the extreme west with southern shores of the Gulf of Aden in the area of Djibouti and western Somalia (Kemp & Benzoni, 2000; Kemp, 2000).

Among species with high marine biodiversity in the Red Sea and the Gulf of Aden are crustaceans, especially brachyuran crabs. Scientists have conducted many studies in this field in the Red Sea. For example, Forskål (1775) recorded 17 species from the crustaceans, Rùppell (1830) recorded 24 species from brachyuran crabs. Milne Edwards H 1834-1838 recognized and described many species, Alphonse Milne Edwards and Heller 1861-1862 recorded 117 species of crustaceans in the north of the Red Sea, Paul'son (1875) studied crustacean fauna and recorded 111 species while Nobili (1906) recorded 451 species from decapods, 109 species of these were brachyuran crabs.

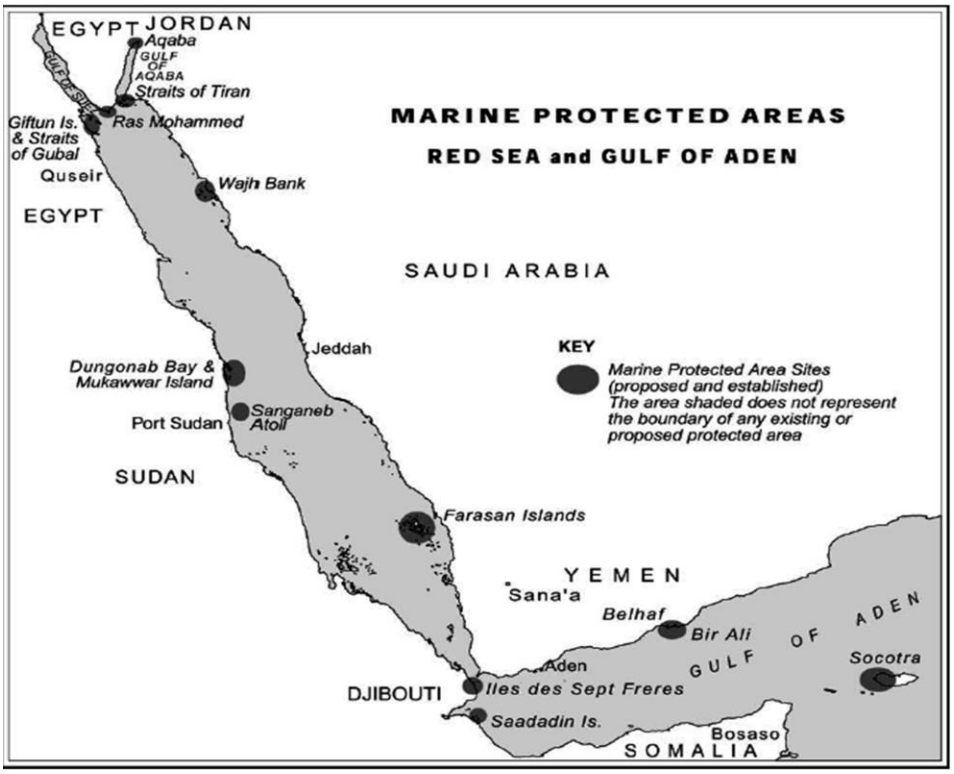

Fig. 4: 12 sites at the Red Sea and Gulf of Aden Regional Network of MPAs. (Gladstone *et al*., 2003).

Brachyuran crab studies continued in the Red Sea after Nobili (1906) until now. These studies focused on important sites which have abundant coral reefs, as in Gulf of Aqaba, Sinai Peninsula, Ras Muhamad, Mersa Wadi Lehama, Suez Bay, Jeddah, Khor Dongonab, Suakin Harbour, Eritrea**,** Dahlak Archipelago, Kamaran Islands, and Mayun Island. Among these studies are Klunzinger (1906, 1913), Laurie (1915), Balss (1919), Balss (1922, 1924, 1929, 1933), Maccagno (1936), Fishelson (1971), Griffin & Tranter (1974), Lewinsohn (1977), Holthuis (1977), Serène (1984), Türkay (1986), Vine (1986), Galil & Clark (1990, 1994), Tűrkay *et al.* (1996), Galil (1997), Apel & Spiridonov (1998), Zajonz *et al.* (1998), Neumann & Spiridonov (1999), Galil (2000, 2001, 2009), Komatsu & Takeda (2003), Krupp *et al.* (2006), Türkay & Spiridonov (2006), Spiridonov & Türkay (2007), Spiridonov & Neumann (2007), Mendoza & Guinot (2011), Sakai & Türkay (2013) and Al-Aidaroos *et al.* (2017).

These studies recorded 33 brachyuran crabs species in Mayun Island (Nobili, 1906), 8 species in Mayun and Kamaran Islands (Balss, 1916), 30 brachyuran crabs species in four Yemeni islands (Mayun, Kamaran, Zebejir and Zuckur) (Balss, 1922), 32 species (Balss, 1924), and 4 species from the family Majidae in the islands Mayun, Kamaran, and Zebejir (Balss, 1929). In 1933, Balss recorded a new genus and species *Pseudactumnus pesta* (1 ♀) in Mayun Island. This species was not recorded in other place and no other sample has been collected until now.

The first extensive study of coastal and marine habitats, ecosystems and biota covering the entire Red Sea coast of Yemen was carried out in 1985 by the World Conservation Union (IUCN) on behalf of the PERSGA. In 1993 and 1994, Sana'a University conducted an ecological survey of two sectors of the Red Sea coast of Yemen, al-Urj to as-Salif and Dhubab to Yakhtul. Although some of the earliest biological studies in the Arabian Peninsula were carried out in the Red Sea coastal zone of Yemen, our knowledge about the biodiversity of this area remains fragmentary (Krupp *et al.,* 2006).

The study of Zajonz *et al.* (1998) is considered the second extensive study of coastal and marine habitats, ecosystems and biota. This study covered 22 sites, 4 sites of them in Aden and 18 sites at the Red Sea including Uqban and Kamaran Islands. Various samples of different marine species (fishes, corals, sponge, crustacean and molluscs) were collected and 21 brachyuran crabs species recorded belong to 8 families and 18 genera. Unfortunately, however, the study has not been completed or published. In the present study we continue their work.

Krupp *et al*. (2006) conducted the third and last extensive study of coastal and marine habitats, ecosystems and biota covering the entire Red Sea coast of Yemen. This study covered 31 sites along the Red Sea coast, at near shore and offshore islands (Kamaran Islands, Hanish al-Kabir Islands and Addar Ali Island) and in the Tihamah coastal plain. It recorded 49 brachyuran crab species belonging to 11 superfamilies, 18 families, and 35 genera.

There is no other extensive study in the Yemeni coasts at the Red Sea after Zajonz *et al.* (1998) and Krupp *et al.* (2006) until now except for this present study. However, there are some scattered studies that recorded some brachyuran crabs in some Yemeni islands at the Red Sea or found samples collected from international museums worldwide during previous times. Among these studies are Komatsu & Takeda (2003) who recorded a new leucosiid crab genus, *Nobiliella* n. gen in Mayun Island. They examined specimens originally collected by Dr Jousseaume in 1892 and put in the Muséum National d'Histoire Naturelle, Paris (MNHN). Serène (1984) recorded 3 species in Mayun Island, which had been collected by F. Jousseaume in 1897. Sakai & Tűrkay (2013) recorded *Ocypode saratan* (Forskål, 1775) in Kamaran Island and in Zebayir Island. These specimens came from Naturhistorisches Museum Wien (NHMW). Castro (1999) recorded 1 species of Trapezioidea from Mayun Island in 1897, collected by F. Jousseaum (MNHN-B25688). Clark & Galil (1993) recorded 1 species in Mayun and Obock, Djibouti, originally collected by F. P. Jousseaume in 1897 and detected by E. L. Bouvier in the Australian Museum (AM P.5402). Apel (2001) recorded 5 brachyuran crabs species in Mayun Island, Mokka (equivalent: al-Makka) and Bab al-Mandab from international museums, such as MNHN, Senckenberg Museum Frankfurt (SMF), Museo Zoologico „La Specola", and Università degli Studi di Firenze (MF).

Socotra Island has also been in the focus of interest for many studies in this field for a long time. The early study first mentioning a freshwater crab from Socotra was by Hilgendorf (in: Taschenberg, 1883), who described *Telphusa socotrensis* from material collected in 1881 by E. Riebeck and G. Schweinfurth. According to Pocock (1903), however, B. Balfour and A. Scott,

carrying out zoological and botanical studies on the island in 1880, were actually the first collectors to bring Socotran freshwater crabs to Europe. However, this material was never systematically worked up. Further collections of freshwater crabs from the island were carried out by H. Forbes and W.R. Ogilvie-Grant in 1898 and were identified as *Potamon socotrensis* by Pocock (1903), *Thelphusa* (Latreille, 1819; or *Telphusa* as it was spelled by several authors) being a junior synonym of *Potamon* Savigny, 1816 " (Apel & Brandis, 2000).

Some material was collected by Balfour in 1880 and Forbes in 1898 on Socotra and Abd al-Kuri. Since both expeditions focused on the terrestrial flora and fauna, the collections contain only few common estuarine and littoral species. Thus, the number of decapod species known from the archipelago by then was only 11 and the marine crustacean fauna of the archipelago remained basically unknown until very recently. Apart from information on the occurrence of economically important lobsters by Saad (1996b), the only lists of crustaceans species are by Wranik (1998) and Mac Alister *et al.* (1996), who was the first to describe both the sublittoral and littoral environments of Socotra including biological and physical characteristics (Simões *et al.,* 2001). The last study of coastal and marine habitats in Socotra Island was the most extensive one by Simões *et al.* (2001) covering 185 sites and recording 77 brachyuran crab's species.

There are some scattered studies that recorded some brachyuran crab species in Socotra Islands. Among these MacAlister *et al*. (1996) recorded 29 brachyuran crab species, Tűrkay *et al.* (1996) and Sakai & Tűrkay (2013) recorded 3 species from the genus Ocypode. Neumann & Spiridonov (1999) recorded 23 brachyuran crab species were taken from internationals museums (The Natural History Museum, London (NHML), MNHN, Museo Civico di Storia Naturale Giacomo Doria, Genova (MCSNG), NHMW, Zoologisches Museum der Humboldt-Universitat, Berlin (ZMB), Museo Civico di Storia Naturale, Milano (MCSNM), Nationaal Natuurhistorisch Museum, Leiden (NNHM) and United States National Museum, Washington (USNM). Castro (1999) recorded 2 species from Trapezioidea. Apel & Brandis (2000) recorded a new species, *Socotrapotamon nojidensis*, and Cumberlidge & Wranik (2002) recorded a new genus and new species, *Socotra pseudocardiosoma* (Cumberlidge & Wranik, 2002) from Potamidae. Apel (2001) recorded 78 brachyuran crabs species in Socotra Archipelago were taken from international museums BMNH, SMF, ZMMU and Institute of Zoology, Russian Academy of Science, Sankt Petersburg (IZRAS).

The report on –Conservation and Sustainable Use of Biodiversity of Socotra Archipelago. Marine Habitat, Biodiversity and Fisheries Surveys and Management" by Apel *et al.* (2000) was funded by UNOPS (no: YEM/96/G32; Contract no. C- 972248). This report is considered the latest report on the situation in Socotra, a subtidal rapid assessment of almost 400 sites around all islands of the Socotra Archipelago was conducted in the period from March to May 1999. In this report 207 decapod fauna species identified to species level were recorded, but unfortunately this report was not published until now.

As for biodiversity, information on the northern shore of the Gulf of Aden is even more limited and almost completely unknown. The coasts in the south of the Arabian Peninsula from the Strait of Hormuz to the Gulf of Aden have not received much attention, with few studies in the field of marine biodiversity in general and brachyuran crabs in particular. There is a large gap in knowledge on the fauna of brachyuran crabs inhabiting the coastline in this region (Sheppard *et al*., 1992; Saad, 1992; Apel & Spiridonov, 1998; Neumann & Spiridonov, 1999; Bawazir, 2003; Al-Hindi, 2010; Khvorov *et al.* 2012; Bawazir, 2017), but some scattered studies that recorded some brachyuran crabs in the Gulf of Aden are available.

The early studies in these coastal waters at Gulf of Aden recorded 1 species from Grapsidae (Ortmann, 1894), while Nobili (1906) recorded 26 brachyuran crabs species belong to 9 families.

Among the scattered studies that recorded some brachyuran crab species in the Gulf of Aden are Guinot (1969) who recorded 1 species (MNHN), and Griffin (1974) who recorded 5 species from Majoidea, collected from the mouth of the Gulf of Aden (11°24' N, 51°35' E; 75-175 m depth). Serène (1984) recorded 1 species (NHML), Clark & Galil (1993) recorded 1 species (MNHN), Galil & Clark (1994) recorded 3 species from Matutidae De Haan, Tűrkay *et al.* (1996) and Sakai & Tűrkay (2013) recorded 3 species from the genus Ocypode from internationals museums (NHML, MNHN, MCSNG, NHMW, ZMB, NNHM and USNM).
Apel & Spiridonov (1998) recorded 19 species from Portunidae in Gulf of Aden, Djibouti and Somalia, Castro (1999) recorded 2 species from Trapezioidea in Aden and Sikh Island, Bir Ali, (MNHN and Akademic Petrovsky, Zoological Museum of M.V. Lomonosov Moscow State University; ZMMU), Apel (2001) recorded 25 brachyuran crab species Aden, Mukalla and Sikha Island (BMNH, SMF, ZMMU, MNHN NNHM), Türkay & Spiridonov (2006) record a new subspecies from the genus *Charybdis* in the Gulf of Aden (13° 27,5 'N, 47° 20,5 'E, 13° 27,9 'N, 47° 21,8 'E), and Spiridonov & Apel (2007) recorded 2 species from the Calappidae.

There are some studies that recorded the brachyuran crabs in the southern shores of the Gulf of Aden at Djibouti and Somalia. Among these studies are Nobili (1906), Serène (1984), Galil & Vannini (1990), Galil & Clark (1994), Tűrkay *et al.* (1996), Galil (1997), Neumann & Spiridonov (1999), Galil (2001, 2009), Apel (2001), and Sakai & Türkay (2013). Galil & Clark (1988) and Galil & Vannini (1990) also recorded the brachyuran crabs in Somalia, Sar Uanle and Gesira on the Indian Ocean.

All these scattered studies, which recorded some brachyuran crabs in Yemeni coastal waters, are revisited in some detail in the chapter of results and discussion in this present study.
It is clear from previous studies in northern coasts in Gulf of Aden that these studies were concentrated only in the major and important cities in the south of the Arabian Peninsula: Aden, Mukalla at Gulf of Aden and Muscat in Oman. These studies are from the period of British colonization of southern Yemen, which lasted from 1838-1967 in Aden and 1937-1967 in Mukalla.

The British were present mainly in these major cities, while Yemeni tribes governed the rest of the vast areas in southern Yemen. Thus, these were dangerous areas for foreigners, including scientists in the marine biodiversity. This is one of the reasons for the lack of studies in this part of the Arabian Peninsula. This fact is clearly reflected in the list of crustaceans in the British Museum (White, 1847). There are no specimens of crustaceans collected from southern Arabian Peninsula coasts at Gulf of Aden until 1847.

After 1967 the South Yemen the Yemini Socialist Party ruled during the period 1970-1990 and was supported by the Soviet Union. This government cut all the relationships with European countries and the United States of America leading to semi-isolation of this part of the southern Arabian Peninsula. The Socialist Party government did not allow any studies except for Russian missions and other European socialist countries, including East Germany.

This clearly adds to the reasons for the gap in data on marine biodiversity in this part of the Arabian Peninsula.

The first extensive study of fauna of the brachyuran crabs in shallow waters at the Gulf of Aden, Sikha Island and Bir Ali was conducted in 1999 by Neumann & Spiridonov. This study was based on three cruises of the former Soviet research vessels RN "Akademik Petrovsky" (Cruise AP-14)

and RN "Odissey" (Cruises 0-33, 0-34) between 1980-1984 to the Western Indian Ocean including Yemeni coastal waters. Here the study included some fauna of the brachyuran crabs and recorded 28 species.
The second extensive study of coastal and marine habitats in Gulf of Aden, Hadramout and Shabwa Governorates was in 2005 by a SMF team (Krupp *et al.,* 2005). This study covered 35 sites between coordinates 14° 01,838' - 14° 49,351' N and 48° 22,947' - 50° 00,970' E and recorded 45 brachyuran crabs, belonging to 15 families. Unfortunately, however, it has not been completed or published yet. The data of Krupp *et al.,* (2005) therefore became part of this present study.
The only Yemeni study in field of brachyuran crabs in any Yemeni coastal waters is the MSc study by the author of this present dissertation conducted during the period of May 2008 to May 2010 in the coasts at Gulf of Aden only. It was the first Yemeni study that recorded the brachyuran crabs in Aden. In this study 15 different habitats were visited and 60 brachyuran crabs recorded belonging to 32 genera and 14 families.

Also the team of biodiversity at CESS has done a number of survey studies in 8 sites during 2003-2011 to cover the lack of data in the Yemeni southern coastline from Bab al-Mandab on the west to Haof (boundary with Oman). These sites are Bab al-Mandab, Khor Umeira, Ras Imran, Shuqra, Sharma and Jethmun, Dabout, Sayhut and Haof. Unfortunately these data studies were unpublished and have been lost during the Yemeni war in March 2015 in Aden city.

It is clear from the above that Yemeni coastal waters at Gulf of Aden and Arab Sea harbors unique and diverse marine biota, especially crustaceans, decapods, brachyuran crabs. It lacks studies in this field, which help to fill the gap in the data in this part of the Arabian Peninsula. This area has diverse habitats from sandy and rocky shores to mangroves and coral communities. All these habitats needs further studies, especially those in the Dabout area, with its mangrove trees that have not been studied, and the site of Aden city, which has 17 islands and abundant coral communities,.

1.3: Phylogeny of the brachyuran crabs

Within the Decapoda, the brachyuran crabs are a particularly diverse group, estimated to contain over 6500 species (Hultgren & Stachowicz, 2008). For most of the 20th century, the brachyuran classification and its implied phylogeny reflected a scheme initiated by Milne Edwards (1834) and refined by Balss (1957), based largely on the carapace form and the buccal frame (Ahyong *etal*., 2007). For many years groupings of the brachyuran families relied on divisions based on overall body shape and shape of the mouth-field but beginning in the late 1970s, new ideas were proposed by Guinot (1977) in Paris (Poore, 2004). Guinot (1977) was the first one to introduce a suite of new and important diagnostic characters, permitting a much better distinction and accurate description of the taxa than had been possible before. Instead of the unnatural groups of previous authors, Cyclometopa, Catometopa, Oxyrhyncha and Brachyrhyncha, she established a major new classification based on the position of sexual openings and she classified crabs into Podotremata, Heterotremata and Thoracotremata (Ahyong *et al*., 2007), but Spears *et al*. (1992) found no molecular sequence data support for these divisions, especially in dromiids crabs, because this is not a monophyletic group (Martin & Davis, 2001). For this reason Martin & Davis (2001) established a new classification based on the position of sexual openings and molecular data (at this time), they classified crabs into two sections, Dromiacea and Eubrachyura, which has three sub sections (Raninoida, Heterotremata and Thoracotremata).

After this time morphological and molecular studies of brachyuran crabs classification followed, there are many new approaches to brachyuran classification using various methods and novel data from sperm morphology and larval morphology or molecular studies (Števčić, 2005; Ahyong *et al*., 2007).
Study of Ahyong *et al*. (2007) propose that the three major podotreme clades be each recognised as separate sections, Dromiacea, Raninoida and Cyclodorippoida, alongside section Eubrachyura, while Ng *et al.* (2008) classified crabs into two sections (Podotremata and Eubrachyura) but without taking results by Ahyong *et al*. (2007)into consideration. In the next year De Grave *et al*. (2009) made a new brachyuran crabs classification in order to accommodate new findings and to better reflect evolutionary relationships with taking into account morphological and molecular studies, such as Martin & Davis (2001), Ahyong *et al*. (2007), Ng *et al.* (2008) and other studies. This study classified crabs into four sections: Dromiacea, Raninoida, Cyclodorippoida and Eubrachyura with two sub sections (Heterotremata, Thoracotremata). In this present study we use the classification of De Grave *et al*. (2009).

Through this introduction and the reasons explained above, we define the main objectives of this study as follows.

1.4: Objectives of the study:

- Extension of knowledge on brachyuran crab species that exist in Yemeni coastal waters and creation of a first data base in this field.
- Provision of an overview on brachyuran crabs from Yemeni coastal waters recorded during previous studies.
- Provide knowledge on the environments appropriate for the presence of these brachyuran crabs in the different marine habitats.
- Using the data for a better knowledge on crabs in the western part of the Indian Ocean and on possible biogeographical boundaries in Arabian Peninsula.
- Compilation of knowledge on the population size, distribution and habitat affinities of crab species.
- Support of future measures of risk assessment, environmental monitoring and measures for protection in coastal waters.
- Creating the conditions and development of proposals for further studies in Yemen coastal waters.
- Compare a molecular phylogenic study of these brachyuran crabs with classical morphological methods in order to determine the compatibility of results.
- Make molecular results from the Gulf of Aden available for studies on brachyuran crabs in other regions.

2. Materials and Methods

2.1: Samples

In the present study, 2287 brachyuran crab specimens were examined. The specimens were collected from 58 sites along the Yemeni coastal waters at Red Sea, Gulf of Aden, Arabian Sea and Socotra Islands. 12 sites were located on the Red Sea, 35 sites on the Gulf of Aden, 5 sites on the Arabian Sea and 6 sites on the coasts of Socotra Islands (Indian Ocean). Fig. 5 shows the locations on a map of the Yemeni coast. See also table 1 which provides the names of the sites, the geographic regions of the Yemeni coastal waters, the coordinates and habitat descriptions of these sites.
These samples were collected from different habitats such as sand, rock (sandy shore with small and medium rocks in the intertidal zone up to the subtidal zone); sand; rock; rock, algae (rocky shore covering by algae in the intertidal zone); mud flat; mud, rock (mud flat with small and medium rocks in the intertidal zone); mangrove; fresh water; subtidal rock, corals (rocky shore with corals in the subtidal zone); corals; sponge and subtidal sand (Plate. 1) including different depth zones such as the supralittoral, intertidal and sublittoral zone up to 300 meters depth (Fig. 6).

The 2287 brachyuran crab specimens for this study were obtained from five different sources:
(i): 811 specimens from Rostock University collected by Wolfgang Wranik (RUWW) between 1983 and 2010. Among these are 75 specimens from the Red Sea, site 5 (24-28 March 2009), 623 specimens from Gulf of Aden sites (December 1983-October 2010), 12 specimens from Arabian Sea sites (March 1984-May 1985) and 101 specimens from Socotra Islands sites (March 1984-March 2000).

(ii): 770 specimens from Senckenberg Museum Frankfurt (SMF) collected by Zajonz *et al.* (1998), Krupp *et al.* (2004) and Krupp *et al.* (2005). 256 of these specimens were collected from sites on the Red Sea by Zajonz *et al.* (1998) (24 March-15 April 1998, 4 specimens of them collected from Aden coasts) and by Krupp *et al.* (2004) (1-12 April 2004). 514 specimens were collected from the sites on the coasts of Hadramout and Shabwa Governorates at the Gulf of Aden by Krupp *et al.* (2005) (14-28 May 2005).

(iii): 660 specimens from Aden University collected by Abdullah Al-Hindi (AUAA) during the period 2008-2017. Among these are 608 specimens from Gulf of Aden sites (May 2008-May 2016) and 52 specimens from Arabian Sea sites (15-17 March 2011).

(iv) 41 specimens from Zoologische Staatssammlung München (ZSM), of which 37 specimens were collected by Pola Expedition during the period time 1897-1907 from the Red Sea sites (Kamaran Island, Mayun Island and Mukha), and 4 specimens from Socotra Island sites collected by Michael Apel (15 March-12 April 1999).

(v) 5 specimens from Museum of Marine Science and Biological Research Authority-Aden-Yemen (MMSBRA) collected between 1984 and 2008.

The majority of the collected specimens originate from the Gulf of Aden (1750 specimens, 76% of all samples), followed by the Red Sea (368 specimens) and Socotra Islands (105 specimens). The lowest amount of samples came from the Arabian Sea (64 specimens) due to the lack of studies and access to these sites in the region extending from Ras Fartak to Haof at the boundary with Oman.

Figs 7 and 8 show the number of specimens and their percentage in the four distinguished Yemeni coastal regions: Red Sea, Gulf of Aden, Arabian Sea and Socotra Islands.

Plate 1: Selected habitats of the coast of Yemen: **A.** Sandy shore at site 30 with sand pyramids constructed by *Ocypode saratan* (Forskål, 1775); **B.** Habitat of the sand, rock at site 19; **C.** Mud flat at site 24; **D.** Rocky shore at site 21; **E.** Rocky shore at site 52 with algae, *Plagusia squamosa* (Herbst, 1790) found in this habitat; **F.** Bahra Island at site 18 (Photo: Gamal Bawazir); **G.** Mangrove trees at site 51; this site of mangrove trees has not been recorded by PERSGA until now; **H.** Coral communities (*Porites lobata*; Dana, 1846 and *Porites harrisoni*; Veron, 2000) at site 23 (Photo: Gamal Bawazir); **I.** *Pocillopora damicornis* (Linnaeus, 1758), a common coral species at site 18; most crabs of the genus *Trapezia* were found in this habitat; **J.** Sponges in subtidal zone at site 24 with some individuals of *Portunus (Portunus) segnis* (Forskål, 1775) that prefer this habitat to sandy rocky shore with algae (Photo: Gamal Bawazir); **K.** Subtidal rock and corals at site 23; some individuals of *Carpilius convexus* (Forskål, 1775) were found in this habitat (Photo: Gamal Bawazir);**L.** Rocky shore at site 52.

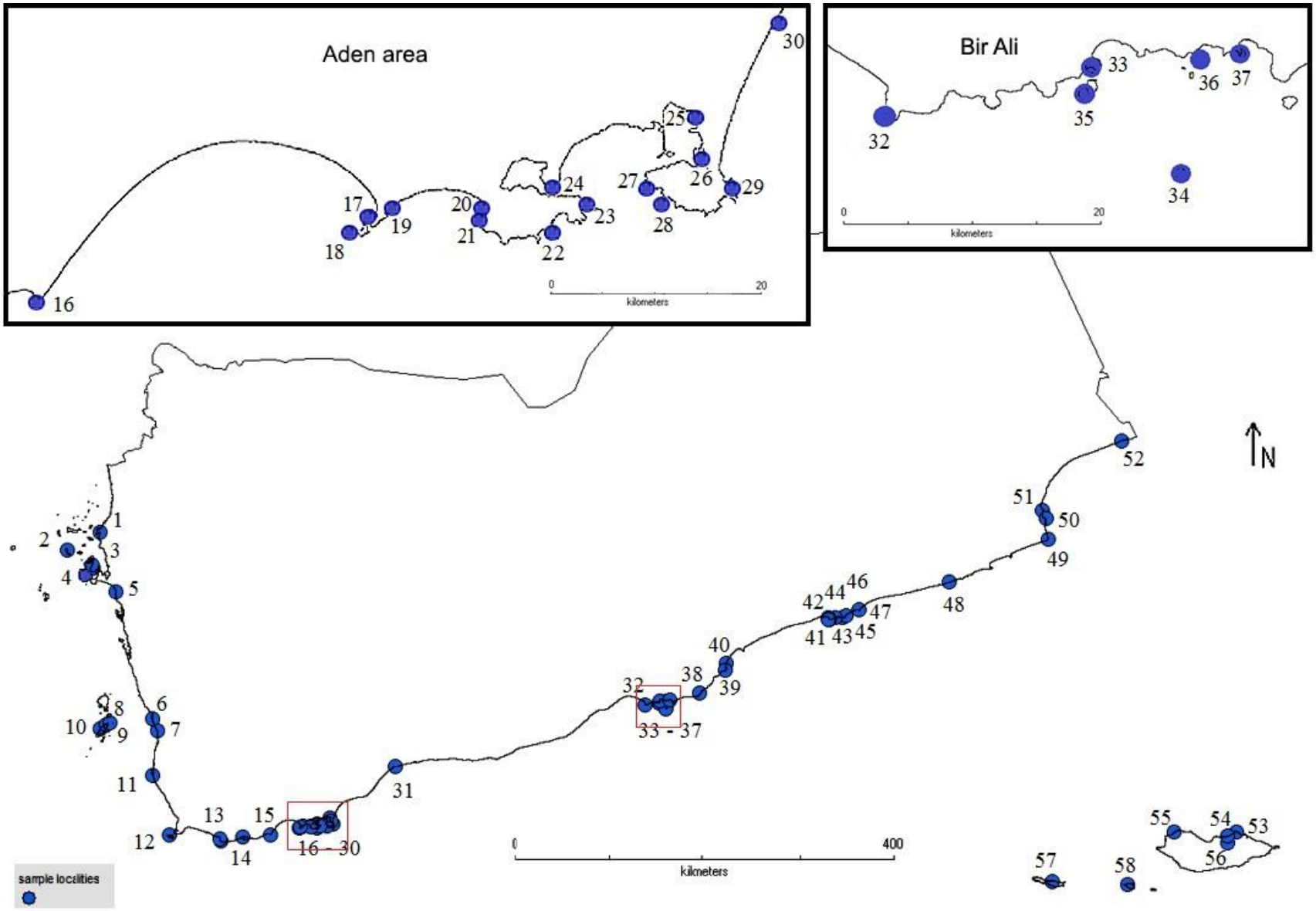

Fig. 5: Collecting sites at the Yemeni coastal waters at the Red Sea, Gulf of Aden, Arabian Sea and Socotra Islands.

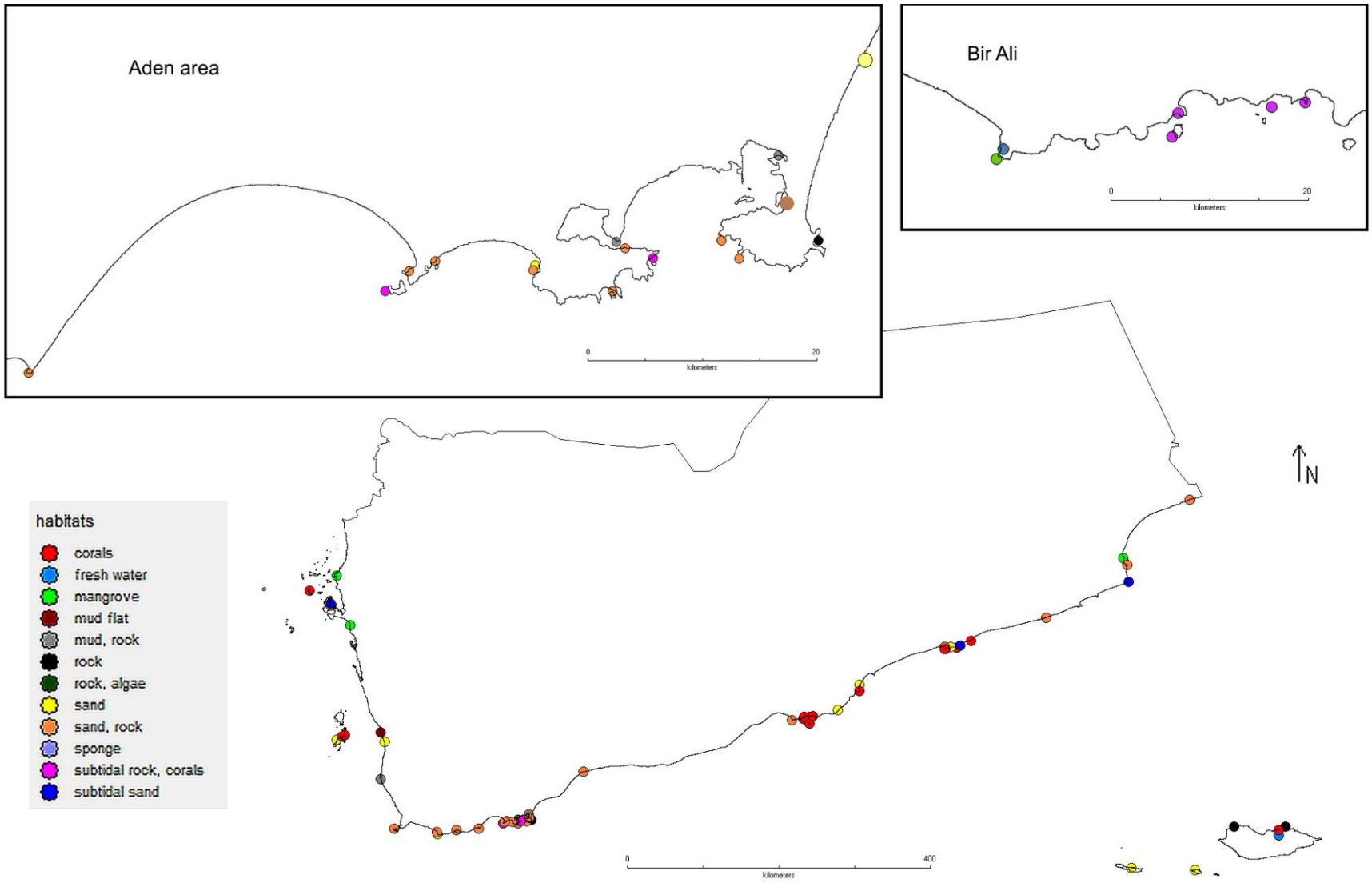

Fig. 6: Studied habitats in the Yemeni coastal waters at the Red Sea, Gulf of Aden, Arabian Sea and Socotra Islands.

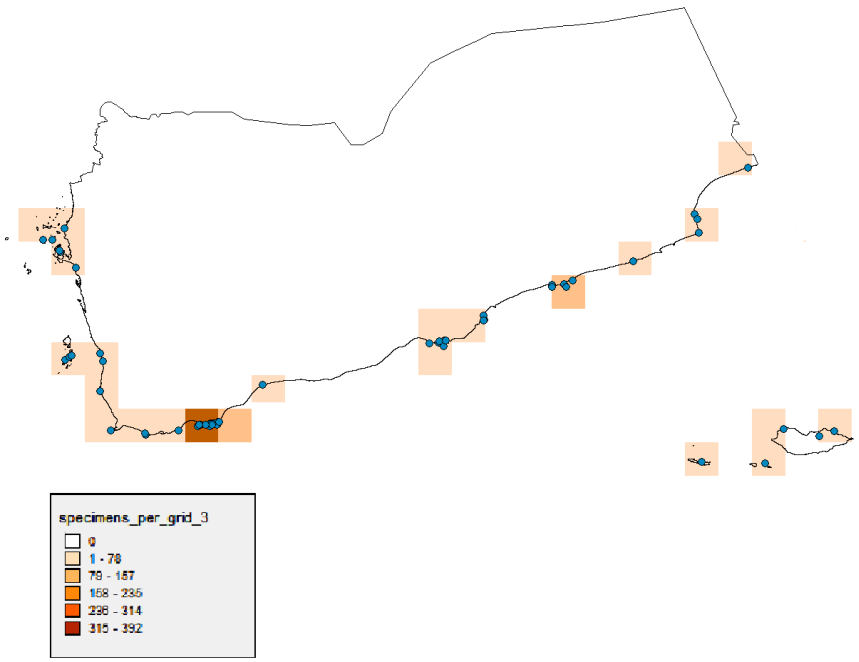

Fig. 7: Number of collected specimens per grid as a measure of sampling intensity. Grids measure 40 x 40 km².

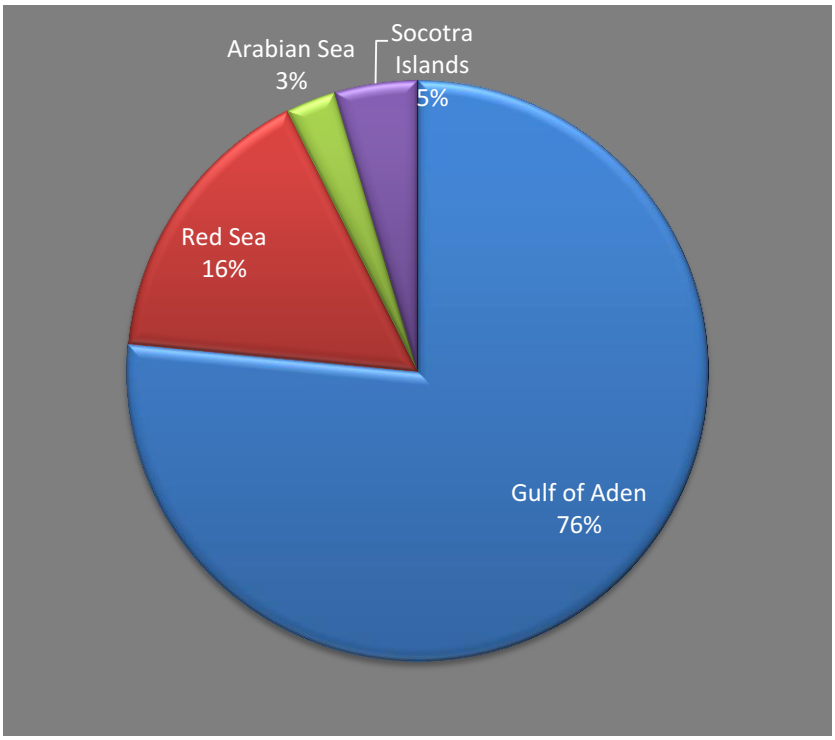

Fig. 8: Percentage of specimens collected from the different regions studied in Yemeni coastal waters.

2.2: Methods

In the present study 2287 specimens of brachyuran were examined which had been collected by different teams. Each team used different collection methods. In the following, the methods used by each team are summarized:

- RUWW collected the specimens by hand and hand nets and snorkelling up to 2 m depth. Moreover, trawl nets were used up to 300 meters depth, either by RV Nauka (Russian Scientific), or by RV Ibn Majid (MSBRA). All the specimens were sent to Rostock University, Germany, and kept there until the present study started.
- SMF material had been collected by SCUBA diving using hand nets and small fish traps. At selected soft-bottom sites, a small experimental trawl was used up to 30 m. Near-shore areas, lagoons and wadis were sampled by beach seine, cast nets, hand nets and mosquito-mesh fly nets.
- AUAA collected the specimens by hand, hand nets, while snorkeling up to 2 m depth, and the help of local fishermen. In addition, searches were done under rocks and by digging with a shovel at the sandy and muddy coasts. A mesh was used to collect the specimens present in these environments. Local fishing boats were rented to visit surrounding islands of Aden city and collect there. The specimens from the intertidal zone were collected during low tide in all the different habitats. The live specimens collected were placed in the refrigerator to kill them. Afterwards they were photographed with a digital camera (DMC FX12) to document the live color from different directions before they were put into ethanol for preservation. All the specimens were preserved in 70% Ethanol and kept in labeled plastic containers with parameters such as location, date of collection and scientific name. Geographical coordinates were recorded with a hand-held Global Positioning System (GPS). All these specimens were transferred to Rostock University for identification and taking the necessary measurements. Carapace Length (CL) and carapace width (CW) were measured with a digital caliper.
- ZSM specimens had been collected by the Pola expedition 1897-1907. In this historical material sampling methods are not indicated. There are also four samples collected in 1999 from Socotra Island by Michael Apel.
- MMSBRA specimens, altogether four specimens were collected by RV Ibn Majid 30 m depth in 1984 and one specimen was collected by hand in 2008 at 0.5 m depth.

All specimens of RUWW, SMF and AUAA were transferred to ZSM for identification and putting together all information such as sex, measurements, locations, collection dates, habitats, collectors of the specimens and compared with ZSM specimens.
Part of the material was reclassified with the help of scientists specialized in this field such as Dr. Michael Apel from Museum Mensch und Natur (Munich). Curatorial handling of the specimens was done by Stefan Friedrich and Roland Melzer (ZMS).
All these specimen data were combined in a data base (Excel file) and analysed with different programs such as Diva GIS, cluster analyses and molecular (DNA) analyses (see below).

2.3: Specimen identification

Three methods were used in the present study to identify brachyuran crab species:

2.3. 1: Morphological characteristics

Taxonomic characters of carapace, chelipeds, walking legs, pleon segments and eyestalks (fig. 9) were used as follows:

- Carapace characters such as shape of dorsal surface (quadrate, quadrangular, triangular, longitudinally circular, longitudinally rectangular, oval, transversely oval, hexagonal, pentagonal), curvature (flat, curved, convex), granularity, calcification, covered with hair, smooth, rough, shape of the orbits of the eyes and of the anterolateral margin (with teeth, without teeth, number of these teeth, teeth very acute and sharp with lobes, without lobes), shape and size of frontal margin (triangular, forked or spiniform, lobes separated, narrow or wide).
- Cheliped characters such as size of the chela (major, small, equal), shape, size and number of spines in other parts of the cheliped, or without spines, shape, size and number of the teeth on cutting edge of immovable finger with or without teeth, outer and inner surfaces of chela densely setose, fingers distinctly spoon-shaped or not spoon-shaped, acute, large smooth or finely granulate.
- Walking leg characters such as short or longer appendage, flattened, with spines, without spines, hairy, not hairy, slender, finely granulated transverse ridges on anterior margin. In addition it was checked whether walking leg 4 similar to others or thin, oval, narrow, not marked, or if the dactylus was paddle-shaped with sharpened tip.
- Male abdominal somite characters such as the segment numbers of the moveable segments with telson and segments shapes (Triangular or narrowly triangular).
- Eyestalk characters such as; normal, short, long, extremely long.

From all specimens photos were taken either with a digital cameras DMC FX12 or Nikon D7000. At ZSM a photomacroscope M400 was used, in the laboratory of Rostock University a photomacroscope Olympus SZ-CTV.

Some species have a carapace completely covered by hairs, and hence it is difficult to identify them with conventional morphological analyses, for example: *Lewindromia unidentata* (Rüppell, 1830), *Pilumnus vespertilio* (Fabricius, 1793), *Pilumnus incanus* and *Camposcia retusa* (Latreille, 1829). In those cases, analyses with the µCT device at ZSM, a Phoenix Nanotom m (GE Measurement & Control, Wunstorf, Germany) cone beam CT scanner at a voltage of 100 kV and a current of 80-120 mA, were done. Isosurface rendering of the volumes were created VGStudio MAX 2.2 software (Volume Graphics, Heidelberg, Germany) hat allowed to ~~r~~remove ~~th~~e setation from the specimens in order to show the carapace surface (Plate 2).

We used many references in this present study for the identification, but here some basic references such as: Griffin (1974) for Majidae; Serène (1984) for Xanthoidea (Xanthidae, Eriphiidae, Menippidae, Oziidae) and Trapeziidae; Tirmizi & Ghani (1996) Crabs of Pakistan (Xanthidae, Goneplacidae, Pinnotheridae, Ocypodidae, Grapsidae); Apel & Spiridonov (1998) for Portunidae; Galil (2001, 2003) for Leucosiidae; Sakai & Türkay (2013) for Ocypode; Naderloo (2017) Atlas Crabs of the Persian Gulf, Poore (2004) Marine Decapod Crustacea of Southern Australia, A Guide to Identification and De Grave et al. (2009) for the general classification in this study.

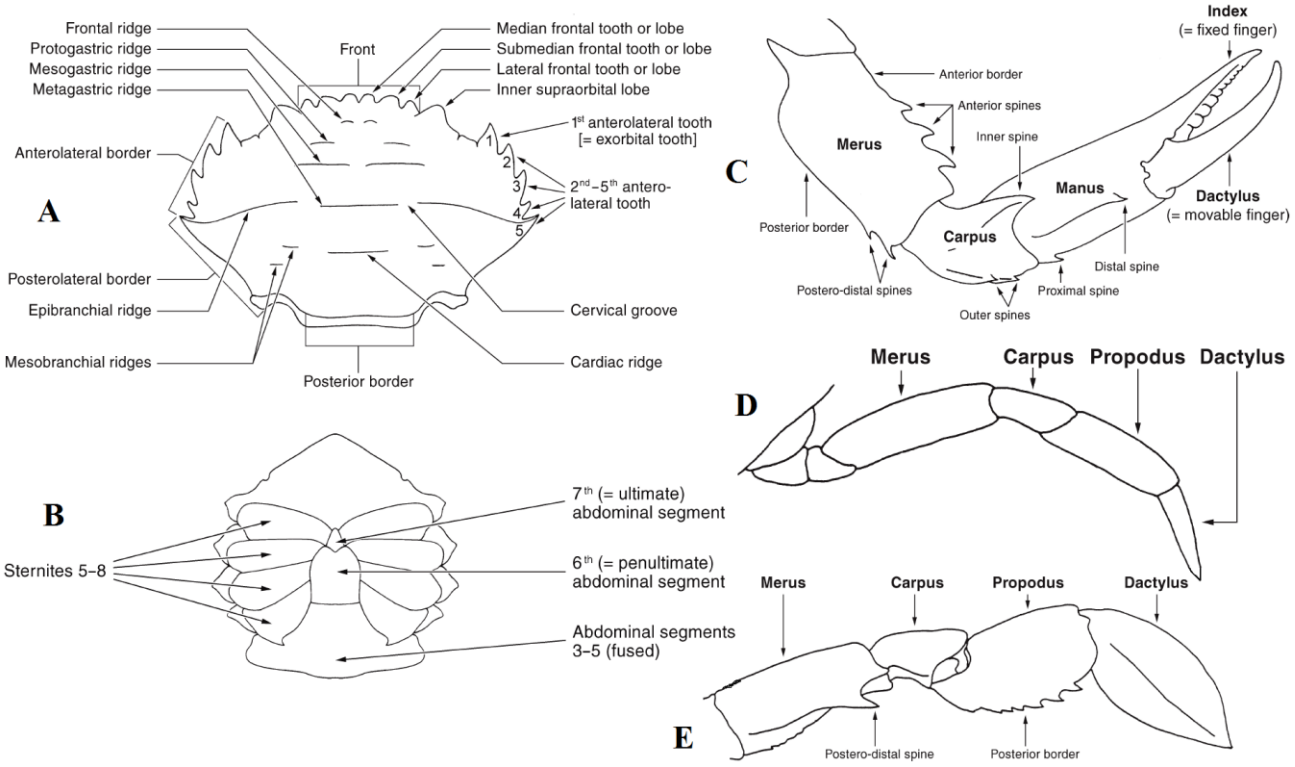

Fig. 9: Morphological characters used for identification (from Apel & Spiridonov, 1998): **A.** shows the morphological parts of the carapace in dorsal view; **B.** Ventral view with pleon segments; **C.** Cheliped; **D.** Ambulatory leg; **E.** Natatory leg.

2.3. 2: Morphological characteristics of the gonopods

In the present study, male gonopods (G1 & G2) of 94 species were examined. Some species were only available as females, other only as dry samples in which it is difficult to open the abdomen and excise the gonopods.

These gonopods samples (G1 & G2) were kept in 70% ethanol solution in small plastic jars. Photos were taken at the Institut für Biowissenschaften Meeresbiologie in Rostock University with the photomacroscope Olympus SZ-CTV to identify and classify species by gonopods‘ characteristics such as shapes and sizes. G1can be very slender, S-shaped, comma-shaped, stout, sinuous. G2 can be short, more than quarter length of G1, or elongate, as long as or longer than G1, or comma-shaped or not comma-shaped. In addition, tips of G1 and G1 appendices (hairs & lobes) were studied.

The gonopods photos are found in appendix I (Plates 44-51). Plate 3 shows some of them and their morphological characteristics.

2.3. 3: DNA analysis

The molecular taxonomy of the brachyuran crabs was made in this present study especially in some genera which are most confusing and problematic such as *Leptodus*, *Macromedaus*, *Lydia*, *Ocypode*, *Uca*, *Grapsus*, *Metopograpsus*, *Thalamita* and *Portunus*.

Thus, for molecular taxonomy 175 fresh brachyuran crabs‘ specimens were collected from Aden coasts only in sites 16, 19, 21, 24, 25, 26, 30 from different habitats, between periods time between 15 October to 5 November 2016. The tissues of the legs and the chelae were taken of these 175 specimens in the Laboratory of biodiversity department in CESS, put in 96% ethanol solution in small plastic containers and transferred to ZSM.

For 95 specimens DNA analysis of the mitochondrial gene cytochrome c oxidase 1 (CO1) were done by AIM (Advanced Identification Methods, AIM GmbH, Munich) providing fasta files of the sequences AIMSEQ08112016-A01 to AIMSEQ08112016-H12.

Yemen is not yet member of the Nagoya Protocol on Access and Benefit-sharing, but a permission for sampling and DNA analyses was granted by the EPA-Y (Environment Protection Authority-Yemen) prepared by Prof. Mohamed Said El-Mashjary, Sana‘a at 14.12.2014.

Resulting data for the brachyuran crabs treated here are taken from the respective tools included in Barcode of Life Data Systems (BOLD; http://www.boldsystems.org) and the tree statistics were calculated using the preliminary ABGD analysis (based on Kimura K80) of the major genus‘ by Mr. Siddhanth Rao.

Literature sources relating to the synonyms of species in the appendix is not listed in a bibliography. These sources are taken from the World Register of Marine Species (WoRMS) Editorial Board, available from http://www.marinespecies.org. And from Marine Species Identification Portal, available from http://species-identification.org/index.php.

All the photos in this work were taken by AUAA except for 4 photos taken by Gamal Bawazir explained in plate 1.

2.3. 4: Biogeographic analyses

The georeferenced collection data, species, habitats etc. were uploaded from the spred sheet to Diva GIS version 7.0 to generate maps of sites, habitats, widespread species, rare species and first records for Arabian Peninsula. In addition 40 km grid maps were created showing number of specimens and species richness.
Cluster analyses of species at the 58 sites, as well as of species occurring at habitats, were performed using the statistical software package PRIMER (v6) (Clarke & Gorley, 2006).

In the first analyses, presence/absence data of each species were compared based on the Sørensen Index (which in this case gives equal results as the Bray-Curtis similarity index). The latter analysis was based on the Bray-Curtis similarity index. Overall group averaging was chosen as the cluster mode. Additionally SIMPROF permutation tests were applied, which gave additional information on significant differences of cluster groups (black lines in dendrograms depict significance).

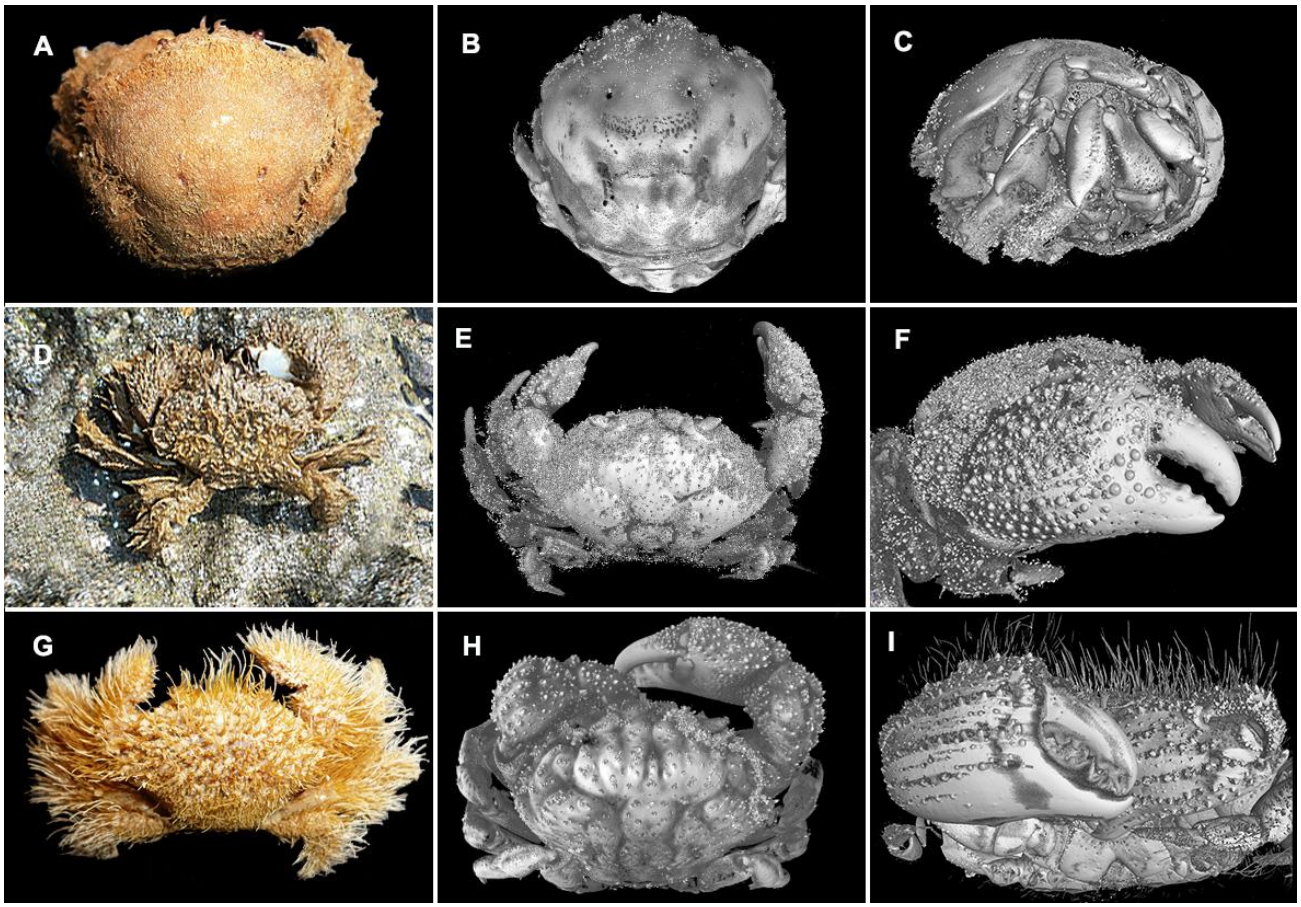

Plate 2: A. Dorsal view of *Lewindromia unidentata* (Rüppell, 1830), the carapace covered completely by hairs; **B, C.** Dorsal and lateral views of the *Lewindromia unidentata* of the µCT volume; **D.** Dorsal view of *Pilumnus vespertilio* (Fabricius, 1793), the carapace covered completely by hairs; **E, F.** Dorsal and lateral views of *Pilumnus vespertilio* of the µCT volume; **G.** Dorsal view of *Pilumnus incanus* (Forskål, 1775), the carapace covered completely by hairs; **H, I.** Dorsal and ventral views of *Pilumnus incanus* after isosurface rendering of the µCT volume.

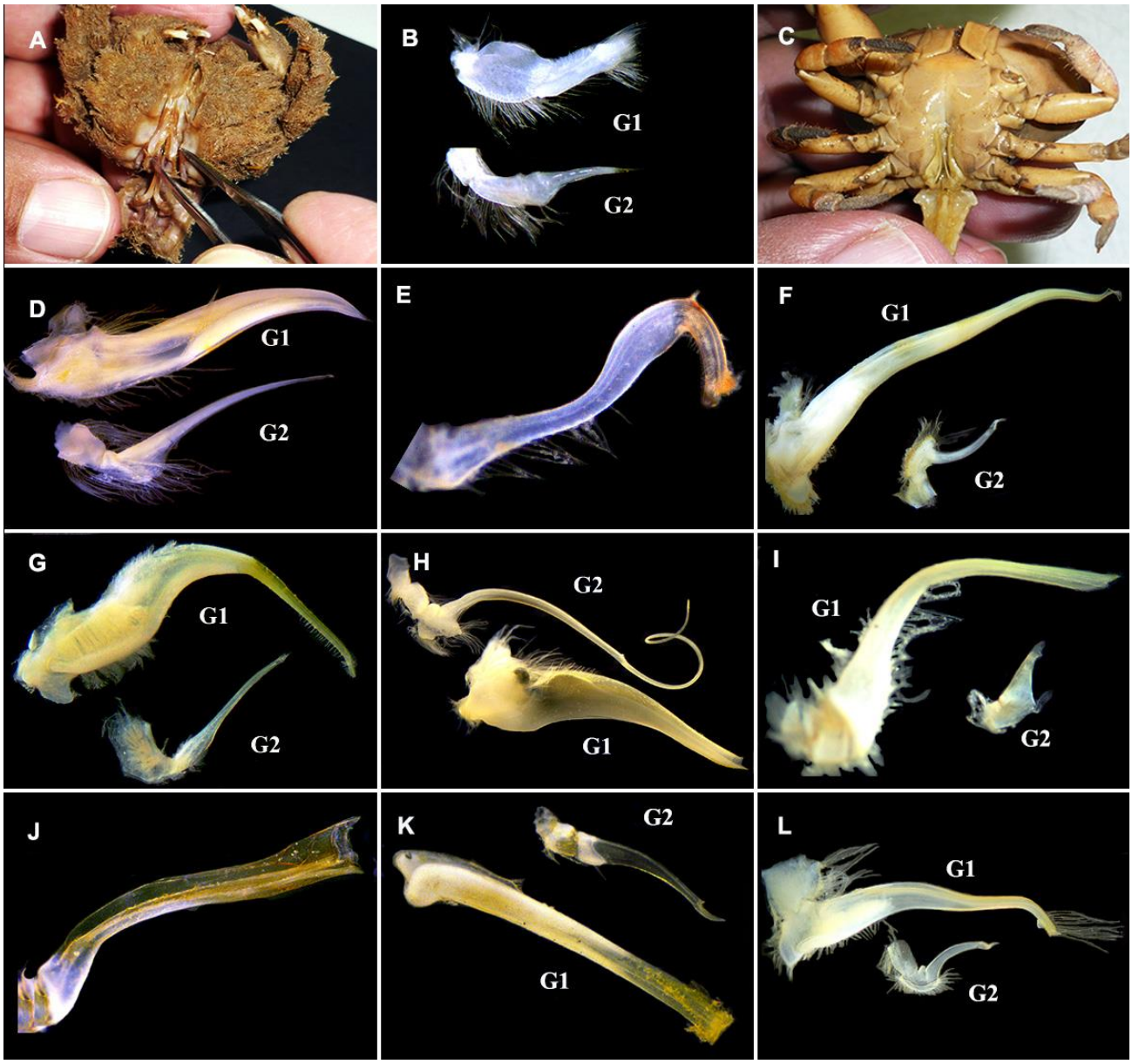

Plate 3: Gonopods: A. Ventral view of *Lewindromia unidentata* (Rüppell, 1830), showing the G1 & G2 position; **B.** G1 & G2 of *Cryptodromia fallax* (Latreille in Milbert, 1812), **C.** Ventral view of *Epixanthus frontalis* (H. Milne Edwards, 1834), showing the G1 & G2 position; **D.** G1 & G2 of *Calappa hepatica* (Linnaeus, 1758); **E.** G1 & G2 of *Dotilla sulcata* (Forskål, 1775)**, F.** G1 & G2 of *Etisus laevimanus* Randall, 1840; **G.** G1 & G2 of *Charybdis (Goniohellenus) longicollis* Leene, 1938; **H.** G1 & G2 of *Lydia tenax* (Rüppell, 1830)**, I.** G1 & G2 of *Micippa platipes* Rüppell, 1830; **J.** G1 of *Sunipea indicus* (Alcock, 1895); **K.** G1 & G2 of *Aulacolambrus granulosus* (Miers, 1879)**, L.** G1 & G2 of *Pilodius areolatus* (H. Milne Edwards, 1834).

Table 1: Names of the 58 sites on the Yemeni coastal water region, coordinates and description the habitats in these sites:

No	Name of site	The region	Coordinates	Habitats	Description
1	Al-Luhayyah ②	Red Sea	15°41.97' N 42°42.34' E	Mud, rock; mud flat; mangrove; sand.	Wide intertidal mudflat and tidal channels with extensive mangrove area.
2	Uqban ①	Red Sea	15°31.245' N 42°23.004' E	Sand, rock; corals subtidal sand.	Island has coral reefs and sandy shore.
3	Kamaran ①②⑤	Red Sea	15°20.35' N 42°38.16' E	Sand; mud flat; sand, rock.	Island has coral reefs and rocky eulittoral shore.
4	Kamaran ①②④	Red Sea	15°22.02' N 42°37.78' E	Sand, rock; subtidal sand.	Island has coral reefs and rocky eulittoral shore.
5	Al-Urj ②④	Red Sea	15°06.29' N 42°52.31'E	Mud, rock; mud flat; mangrove; sand, rock; sand.	Large, shallow lagoon with wide intertidal area; substrate: mud and silt in the intertidal zone with mangrove trees.
6	Abu Zahir ②	Red Sea	13°49.50' N 43°14.14' E	Mud, rock; mud flat; sand.	Lagoon with extensive intertidal flats with sand and muddy sand in the eulittoral zone, freshwater seepage.
7	Al-Maushij ②	Red Sea	13°42.44' N 43°16.85' E	Sand	Small brackish water pool in dune area near the coast.
8	Addar Ali ②	Red Sea	13°47.55' N 42°48.43' E	Rock; sand, rock; corals; subtidal sand.	Island has reef flat with up to 40 % live coral coverage.
9	Hanish al-Kabir ②	Red Sea	13°43.85' N 42°42.41' E	Rock; sand; sand, rock.	Island has bay on western with white sand interspersed with black volcanic rock and boulders.
10	Hanish al-Kabir ②	Red Sea	13°46.30' N 42°46.34' E	Sand; sand, rock; subtidal rock, corals; corals.	Island has shallow coral assemblage at NW coast.
11	Mukha ⑤	Red Sea	13°15.512 N 43°14.161 E	Mud, rock	Sandy shore in the north and lagoon area in the south.
12	Mayun(Perim)⑤	Red Sea	12°40.017 N 43°24.034 E	Sand, rock; mud, rock.	Island has sandy rocky shore.
13	Sukaia ④	Gulf of Aden	12°37.554 N 43°54.546 E	Sand, rock; sponge.	Exposed shore with shallow rocks and sand.
14	Ras al- Ara ④	Gulf of Aden	12°36.132 N 43°55.106 E	Sand; sand, rock; subtidal sand.	Exposed shore with shallow rocks and sand.
15	Khor Umeira ④	Gulf of Aden	12°39.085 N 44°08.577 E	Sand; sand, rock; rock; sponge.	Sheltered shore with sandy rocky shore and mud.
16	Qa'wah ⑥	Gulf of	12°40.186 N	Sand; sand, rock;	Exposed shore with sandy shore and sandy rocky shore.

		Aden	44°25.002 E	subtidal sand.	
17	Ras Imran ①④⑥	Gulf of Aden	12°44.967 N 44°43.313 E	Sand, rock; corals; subtidal sand; sponge.	Rocky headland with sandy shore and sandy rocky shore.
18	Bahra ⑥	Gulf of Aden	12°44.011 N 44°42.158 E	subtidal rock, corals; corals; sponge.	Island has rocky shore and coral communities.
19	Imran ④⑥	Gulf of Aden	12°45.404 N 44°44.569 E	Sand; sand, rock; rock; subtidal sand; corals.	Exposed shore with sandy shore and sheltered shore with sandy rocky shore.
20	Salahadeen ⑥	Gulf of Aden	12°45.233 N 44°49.390 E	Sand	Exposed shore with sandy shore.
21	Faqum ④⑥	Gulf of Aden	12°44.996 N 44°49.301 E	Sand; sand, rock; rock; subtidal sand; subtidal rock, corals; corals; sponge.	Semi sheltered with two rocky headlands and sandy rocky shore.
22	Little Aden ④⑥	Gulf of Aden	12°44.027 N 44°53,095 E	Sand; sand, rock; rock; subtidal sand; subtidal rock, corals; corals; sponge; rock, algae.	Semi sheltered with two rocky headlands and sandy rocky shore.
23	Mabtoha ⑥	Gulf of Aden	12°45.560 N 44°55.048 E	Rock; subtidal rock, corals; corals.	Island has rocky shore and coral communities.
24	Khor bir Ahmed ④⑥	Gulf of Aden	12°46.324 N 44°53.281 E	Mud flat; mud, rock; rock; sand; sponge; subtidal sand.	Sheltered site with wide intertidal mud flat up to 3 km in the east side and rocky sandy shore in the west side.
25	Mansora Bridge⑥	Gulf of Aden	12°50.371 N 45°01.079 E	Mud, rock	Sheltered muddy shore with rocks.
26	Labour Island④⑥	Gulf of Aden	12°48.117 N 45°01.474 E	Mud flat; mud, rock; sand, rock; sand; subtidal sand; corals.	Sheltered island has wide intertidal mud flat and rocky sandy shore.
27	Al arossah ④	Gulf of Aden	12°46.387N 44°58.329 E	Rock; sand, rock; subtidal rock, corals; subtidal sand.	Semi sheltered with two rocky headlands and sandy rocky shore.
28	Gold Mohur ④⑥	Gulf of Aden	12°45.552N 44°59.185 E	Sand; sand, rock; rock; subtidal sand; corals.	Semi sheltered with two rocky headlands and sandy rocky shore.
29	Sirah ④	Gulf of	12°46.403N	Rock.	Rocky shore.

		Aden	45°03.006 E		
30	Abyan coast ④⑥	Gulf of Aden	12°48.485 N 45°02.381 E	Sand; sand, rock; rock; subtidal sand; corals.	Exposed shore with sandy shore and rocks.
31	Shuqra ④	Gulf of Aden	13°21.185N 45°40.412 E	Sand; mud flat; sand, rock; subtidal sand.	Sandy shore interspersed with some valleys.
32	Belhaf ③	Gulf of Aden	13°58.622' N 48°10.746' E	Rock; sand, rock.	Rocky shore with sand.
33	Bay E of Bir Ali ④③	Gulf of Aden	14°00.368' N 48°19.324' E	Rock; sand; sand, rock; subtidal sand; corals; sponge.	Sandy shore with rocky areas and coral communities.
34	Sikha ③	Gulf of Aden	13°55.822' N 48°23.147' E	Sand, rock; subtidal sand; corals.	Island has rocky shore and coral communities.
35	Hallaniya ③	Gulf of Aden	13°59.225' N 48°19.050' E	Sand, rock; subtidal sand; subtidal rock, corals; corals.	Island has rocky shore and coral communities.
36	Ghadda Rayan ③	Gulf of Aden	14°00.656' N 48°23.911' E	Rock; subtidal sand; corals.	Island has rocky shore and coral communities.
37	Ras Majdaha ③	Gulf of Aden	14°00.868' N 48°25.572' E	Sand, rock; subtidal sand; subtidal rock, corals; sponge.	Rocky headland with sandy shore and sandy rocky shore.
38	Wadi Hager ③	Gulf of Aden	14°05.344' N 48°43.490' E	Sand.	Coastal wetland with pool of saline water (39 ‰ salinity), 1 m deep, bordered on one side by a dune with dense vegetation.
39	Ras Burum ③	Gulf of Aden	14°19.692' N 48°59.755' E	Sand, rock; corals.	Rocky headland with sand and coral rubble.
40	Mukalla ④③	Gulf of Aden	14°30.535 N 49°05.078 E	Sand; rock; sand, rock.	Exposed shore with sandy shore and rocks.
41	Maqrugha ③	Gulf of Aden	14°49.229' N 50°00.952' E	Rock; subtidal sand; subtidal rock, corals; corals; sponge	Island has rocky shore and coral communities.
42	Ras Sharma ③	Gulf of Aden	14°49.382' N 50°01.392' E	Sand, rock; subtidal sand; corals; sponge.	Rocky headland with sandy shore and sandy rocky shore.
43	Al-Quran ③	Gulf of Aden	14°50.872' N 50°00.818' E	Sand, rock; rock; subtidal sand.	Intertidal zone at low tide: rocky area with low tide pools.
44	Wadi Jethmun ④③	Gulf of Aden	14°50.622' N, 50°05.281' E	Sand; sand, rock.	Estuary separated from the sea by sandy barrier; water turbid and saline (21 ‰ to 35 ‰ salinity).

45	Between Ras Bin Ramdan and Ras Baghashawa ③	Gulf of Aden	14°50.474' N 50°09.505' E	Corals.	Rocky slope down to 13 m depth; between 13 m and 18 m depth small encrusting coral colonies.
46	Ras Baghashawa ③	Gulf of Aden	14°51.828' N 50°11.911' E	Rock; subtidal sand; sponge.	Shallow area with soft coral assemblages and some encrusting stony corals; fine sandy substrate
47	Ras Qusair ③	Gulf of Aden	14°55.120' N 50°19.592' E	Corals.	Rocky headland with sandy rocky shore.
48	Sayhut ④⑥	Gulf of Aden	15°11.912 N 51°14.014 E	Sand; rock; sand, rock.	Exposed shore with sandy shore and rocks.
49	Ras Fartak ④	Arabian Sea	15°37.589 N 52°13.298 E	Subtidal sand; sponge.	Rocky headland with rocky shore.
50	Nishtun ④	Arabian Sea	15°49.131 N 52°11.49 E	Sand, rock; subtidal sand.	Sandy rocky shore.
51	Dabout ④⑥	Arabian Sea	15°54.845 N 52°09.576 E	Sand; sand, rock; rock; mangrove.	Lagoon with Mangrove and sandy shore with rocks.
52	Haof ⑥	Arabian Sea	16°31.145 N 53°02.890 E	Sand, rock; rock; rock, algae.	Rocky sandy shore with seaweed and alga (Yemen's border with Oman).
53	Dilicia ④	Socotra Islands	12°41.488 N 54° 06.576 E	Rock.	Rocky shore.
54	Hadibo ④	Socotra Islands	12°39.148 N 54°01.518 E	Sand, rock; rock; mud flat; subtidal rock, corals; corals.	Sandy rocky shore with gravel and pebble, sublittoral mixed coral.
55	Qualansya ⑤④	Socotra Islands	12°41.569N 53°29.240 E	Sand; rock; sand, rock; subtidal rock, corals.	Sandy rocky shore.
56	Homhil ④	Socotra Islands	12°33.594 N 54°16.558 E	Fresh water.	Valley in the highlands of Socotra Island has fresh water.
57	Abd al-Kuri ④	Socotra Islands	12°12.014 N 52°15.503 E	Sand; rock; mud, rock.	Island has mixed shallow rocks and sand.
58	Samha ④	Socotra Islands	12°10.400 N 53°01.312 E	Sand; rock.	Island has sandy rocky shore.

The teams which studied and collected the specimens in this site: ① SMF 1998, ② SMF 2004, ③ SMF 2005, ④ RUWW, ⑤ ZSM, ⑥ AUAA.

3. The results

3.1: Systematic account

In the present study, 2287 specimens of brachyuran crabs were examined. Of these, 959 were females, 1166 males, 158 juveniles and 4 identifiable carapaces. Their analyses revealed 184 species belonging to 118 genera, 31 families and 18 superfamilies recorded for Yemeni coastal and fresh waters (see table 2 in the appendix). Five species remain unidentified up to now (one of them until genus level, one species belongs to the family of Majidae and three species belong to the family of Xanthidae).

The study area comprises the Red Sea, Gulf of Aden, Arabian Sea and Socotra Islands. Fig. 10 shows the comparison between the number of families, genera and species in all brachyuran crabs' superfamilies.

Of the 184 species, 65 species represent the first record for Yemeni coastal waters (3 species in the Red Sea, 53 species in the Gulf of Aden, 6 species in the Arabian Sea and 8 species on Socotra Islands in the Indian Ocean. Some of these were recorded in two regions. Moreover, for 10 species the first record in the marine waters of the Arabian Peninsula is given.

All these species and families were summarized in table 3 indicating their distribution in Yemeni fresh and coastal waters.

All of these 31 families live in sea water, except for one family living in fresh water. This is Potamidae Ortmann, 1896. Potamids live in fresh water ponds and valleys caused by rain in the mountainous highlands of Socotra Island (sample site 56).

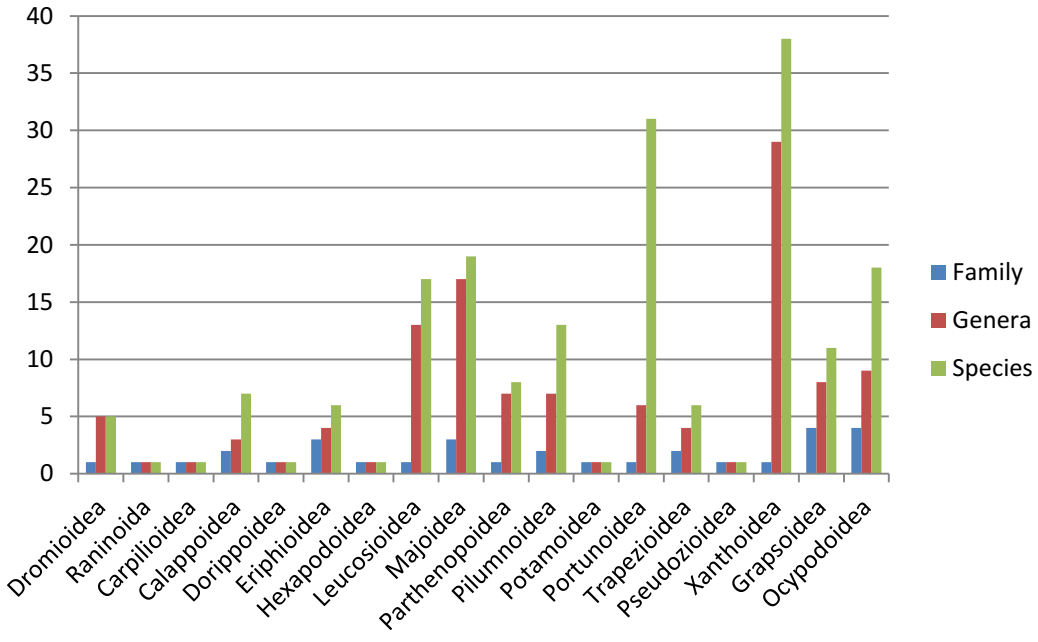

Fig. 10: Comparison between the number of families, genera and species recorded for Yemeni coastal and fresh waters in the brachyuran crab superfamilies.

At 35 sites in the Gulf of Aden region, 163 species of brachyuran crabs were recorded, i.e 62 % of all crabs found in this study. They belong to 17 superfamilies, 28 families and 110 genera. In the Red Sea region, 50 species were found (18 %) belonging to 12 superfamilies, 19 families, and 39 genera. The islands of Socotra samples yielded 32 species (12 %) belonging to 11 superfamilies, 14 families and 29 genera. In the Arabian Sea, only 21 species (8 %) were found, belonging to 10 superfamilies, 14 families and 19 genera. (figs. 11 & 12).

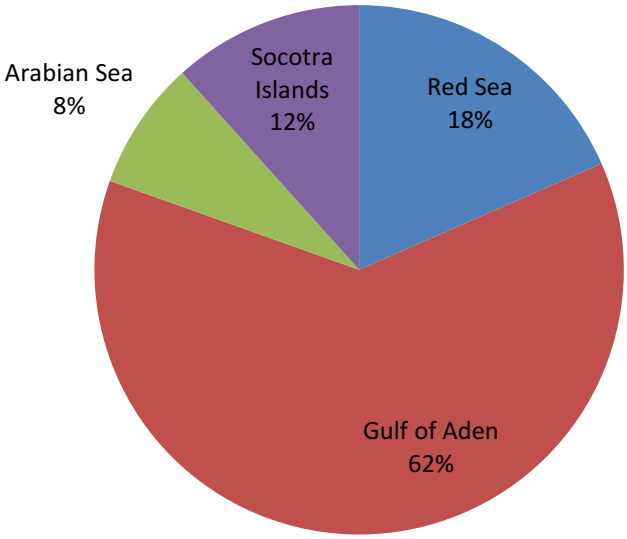

Fig. 11: Percentages of Brachyuran crab species in the Yemeni fresh and coastal waters.

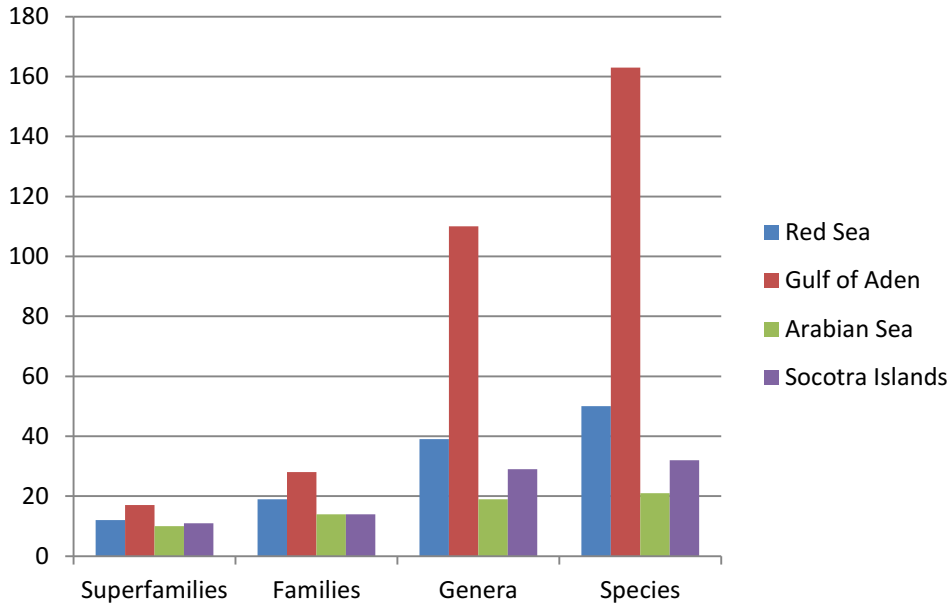

Fig. 12: Comparison between the numbers of superfamilies, families, genera and species in Yemeni coastal waters.

Table 3: Brachyuran crab families and species with their distributions in the four studied regions. **RS** Red Sea, **GA** Gulf of Aden, **AR** Arabian Sea and **SI** Socotra Islands; Present (+), first record in Yemeni fresh and coastal waters (▲) and first record in marine waters of the Arabian Peninsula (●).

Family	Species name	RS	GA	AS	SI
Dromiidae	*Lauridromia dehaani* (Rathbun, 1923)		+		
	Epigodromia granulata (Kossman, 1878)		+		+
	Lewindromia unidentata (Rüppell, 1830)		▲		▲
	Ascidiophilus caphyraeformis Richters, 1880		▲		▲
	Cryptodromia fallax (Latreille in Milbert, 1812)		+		+
Raninidae	*Notosceles serratifrons* (Henderson, 1893)		●		
Carpiliidae	*Carpilius convexus* (Forskål, 1775)	+	+		+
Calappidae	*Calappa philargius* (Linnaeus, 1758)		▲		
	Calappa hepatica (Linnaeus, 1758)	+	+		
	Calappa capellonis Laurie, 1906		+		
	Calappa gallus (Herbst, 1803)		+		
	Mursia bicristimana Alcock & Anderson, 1894		+		
Matutidae	*Ashtoret lunaris* (Forskål, 1775)		+		
	Ashtoret picta (Hess, 1865)		+		
Dorippidae	*Dorippe frascone* (Herbst, 1785)		+		
Eriphiidae	*Eriphia smithii* MacLeay, 1838		+	+	+
	Eriphia sebana (Shaw & Nodder, 1803)		+		
Menippidae	*Menippe rumphii* (Fabricius, 1798)		+		
Oziidae	*Epixanthus frontalis* (H. Milne Edwards, 1834)	+	+	+	
	Epixanthus corrosus A. Milne-Edwards, 1873	+	+		
	Lydia tenax (Rüppell, 1830)	+	+	+	
Hexapodidae	*Hexapinus simplex* Rahayu & Ng, 2014		●	●	
Leucosiidae	*Coleusia biannulata* Tyndale-Biscoe & George, 1962		▲		
	Leucosia anatum (Herbst, 1783)		+		
	Ebalia abdominalis Nobili, 1906		+		
	Ryphila cancellus (Herbst, 1783)		+		
	Philyra granigera Nobili, 1906		+		
	Hiplyra variegata (Rüppell, 1830)	+	+		
	Philyra cf. globus (Fabricius, 1775)		+		
	Nobiliella jousseaumei (Nobili, 1906)		+	▲	
	Nobiliella cornigera (Nobili, 1906)	+			
	Ixa holthuisi Tirmizi, 1970		▲		
	Arcania undecimspinosa de Haan, 1841		+		
	Arcania cf. tuberculata Bell, 1855		+		
	Myra subgranulata Kossmann, 1877		▲		
	Arcania gracilis Henderson, 1893		▲		
	Cryptocnemus cf. pentagonus Stimpson, 1858		▲		
	Leucisca rubifera (Müller, 1887)		▲		
	Nursilia dentata Bell, 1855		▲		
Majidae	*Schizophrys aspera* H. Milne Edwards, 1834	+	+		
	Micippa platipes Rüppell, 1830		+		+

	Cyclax spinicinctus Heller, 1861		+		
	Majidae.gen. sp. 1		+		
	Seiitaoides cf. stimpsonii (Miers, 1884)		+		
Epialtidae	*Stilbognathus cervicornis* (Herbst, 1803)		+	+	
	Hyastenus hilgendorfi De Man, 1887		▲	▲	
	Hyastenus brockii de Man, 1887		▲		
	Huenia heraldica (De Haan, 1837)		+		
	Acanthonyx limbatus A. Milne-Edwards, 1862		▲		
	Simocarcinus simplex (Dana, 1851)		+		
	Tylocarcinus styx (Herbst, 1803)	+	+		
	Menaethius monoceros (Latreille, 1825)		+		
Inachidae	*Macropodia formosa* Rathbun, 1911		+		
	Cyrtomaia cf. goodridgei McArdle, 1900		●		
	Sunipea indicus (Alcock, 1895)		+		
	Camposcia retusa (Latreille, 1829)		▲		
	Inachus dorsettensis (Pennant, 1777)		+		
Parthenopidae	*Daldorfia horrida* (Linnaeus, 1758)		+		
	Aethra scruposa (Linnaeus, 1764)		●		
	Daldorfia spinosissima (A. Milne-Edwards, 1862)		▲		
	Parthenope longimanus (Linnaeus, 1758)	+	▲		
	Rhinolambrus longispinus (Miers, 1879)		●		
	Furtipodia petrosa (Klunzinger, 1906)		▲		
	Aulacolambrus granulosus (Miers, 1879)		●		
	Aulacolambrus hoplonotus (Adams & White, 1849)		▲		
Pilumnidae	*Eurycarcinus orientalis* A. Milne-Edwards, 1867	+	+		
	Eurycarcinus integrifrons de Man, 1879		+		
	Pilumnus vespertilio (Fabricius, 1793)		+		
	Pilumnus cf. minutus De Haan, 1835		+		
	Glabropilumnus levimanus (Dana, 1852)		▲		
	Pilumnus savignyi Heller, 1861	+	▲		
	Echinoecus pentagonus (A. Milne-Edwards, 1879)		▲		
	Pilumnus incanus (Forskål, 1775)		+	▲	
	Pilumnus propinquus Nobili, 1906				▲
	Actumnus tesselatus Alcock, 1898	+	▲		
	Actumnus asper (Rüppell, 1830)		+		
	Pilumnopeus convexus (Maccagno, 1936)		+		
Galenidae	*Halimede tyche* (Herbst, 1801)	+	▲		
Potamidae	*Socotrapotamon socotrensis* (Hilgendorf, 1883)				+
Portunidae	*Charybdis (Goniohellenus) smithii* MacLeay, 1838		+		
	Charybdis (Charybdis) feriata (Linnaeus, 1758)		+		
	Charybdis (Charybdis) natator (Herbst, 1794)		+		
	Charybdis (Charybdis) orientalis Dana, 1852		+		
	Charybdis (Charybdis) annulata (Fabricius, 1798)		+	+	
	Charybdis (Charybdis) hellerii (A. Milne-Edwards, 1867)		+	+	
	Charybdis (Goniohellenus) longicollis Leene, 1938		+		
	Scylla serrata (Forskål, 1775)	+	+		
	Carupa tenuipes Dana, 1852	+	+		
	Portunus (Portunus) segnis (Forskål, 1775)	+	+		

	Portunus (Xiphonectes) arabicus (Nobili, 1906)		+		
	Cycloachelous granulatus (H. Milne Edwards, 1834)			+	
	Cycloachelous orbitosinus (Rathbun, 1911)		+		
	Portunus (Xiphonectes) longispinosus (Dana, 1852)		+		
	Portunus (Xiphonectes) guinotae Stephenson & Rees, 1961		▲		
	Portunus (Portunus) sanguinolentus (Herbst, 1783)		+		
	Thalamita crenata Rüppell, 1830	+	+		
	Thalamita prymna (Herbst, 1803)		+		
	Thalamita admete (Herbst, 1803)		▲		
	Thalamita poissonii (Audouin, 1826)	+	+		
	Thalamita savignyi A. Milne-Edwards, 1861	+			
	Thalamita mitsiensis Crosnier, 1962		●		
	Thalamita sexlobata Miers, 1886		+		
	Thalamita woodmasoni Alcock, 1899	●			
	Thalamita chaptalii (Audouin, 1826)	+			
	Thalamita bandusia Nobili, 1906		+		
	Thalamita gatavakensis Nobili, 1906		●		
	Thalamita quadrilobata Miers, 1884		+		
	Thalamita sp.		+		
	Thalamita cf. crosnieri Vannini 1983		+		
	Thalamita cf. stephensoni Crosnier 1962		+		
Tetraliidae	*Tetralia cavimana* Heller, 1861		+		
	Tetraloides nigrifrons (Dana, 1852)		▲		▲
Trapeziidae	*Trapezia cymodoce* (Herbst, 1801)	+	+		+
	Trapezia tigrina Eydoux & Souleyet, 1842	+	+		
	Trapezia lutea Castro, 1997	▲			
	Quadrella coronata Dana, 1852		▲		
Pseudoziidae	*Pseudozius caystrus* (Adams & White, 1849)		+	+	+
Xanthidae	*Atergatis integerrimus* (Lamarck, 1818)		+		
	Atergatis latissimus (H. Milne Edwards, 1834)				▲
	Xanthias sinensis (A. Milne-Edwards, 1867)		+		+
	Leptodius exaratus (H. Milne Edwards, 1834)	+	+	+	+
	Platypodia cf. pseudogranulosa Serène, 1984		+		
	Macromedaeus voeltzkowi (Lenz, 1905)		▲		
	Zosimus aeneus (Linnaeus, 1758)		▲		
	Cymo quadrilobatus Miers, 1884	+	▲		+
	Cymo andreossyi (Audouin, 1826)		▲		+
	Cymo melanodactylus Dana, 1852	+			
	Lophozozymus anaglyptus (Heller, 1861)		+	+	
	Luniella spinipes (Heller, 1861)	+	+		+
	Lybia plumosa Barnard, 1946		▲		
	Cyclodius granulatus (Targioni-Tozzetti, 1877)	+	▲		+
	Neoliomera sabaea (Nobili, 1906)		▲		
	Actaea savignii (H. Milne Edwards, 1834)	+			+
	Glyptoxanthus meandrinus (Klunzinger, 1913)	+	▲		
	Actaea jacquelinae Guinot, 1976	+			
	Actaeodes hirsutissimus (Rüppell, 1830)	+	+		▲

	Actaeodes tomentosus (H. Milne Edwards, 1834)		+		
	Paractaea rufopunctata (H. Milne Edwards, 1834)		+		
	Chlorodiella nigra (Forskål, 1775)	+	+		
	Chlorodiella laevissima (Dana, 1852)		▲		
	Chlorodiella cytherea (Dana, 1852)	+			
	Pilodius areolatus (H. Milne Edwards, 1834)		▲		
	Demania mortenseni (Odhner, 1925)		▲		
	Forestiana depressa (White, 1848)		▲		
	Etisus laevimanus Randall, 1840		+		
	Hypocolpus cf. guinotae Vannini, 1982	●			
	Liomera rubra (A. Milne-Edwards, 1865)		▲		
	Neoxanthops lineatus (A. Milne-Edwards, 1867)		+		
	Atergatopsis granulata A. Milne-Edwards, 1865				▲
	Epiactaea margaritifera (Odhner, 1925)		+		▲
	Actaea cf. bocki Odhner, 1925		+		
	Xanthias cf. canaliculatus Rathbun, 1906		+		
	gen. sp. 1		+		
	gen. sp. 2		+		
	gen. sp. 3		+		
Grapsidae	*Grapsus albolineatus* Latreille in Milbert, 1812	+	+	+	+
	Grapsus tenuicrustatus (Herbst, 1783)		+	▲	+
	Metopograpsus messor (Forskål, 1775)	+	+		+
	Metopograpsus thukuhar (Owen, 1839)		+		
	Grapsus granulosus H. Milne Edwards, 1853	+	+		+
	Geograpsus crinipes (Dana, 1851)		▲		+
Varunidae	*Pseudohelice subquadrata* (Dana, 1851)	+			
	Thalassograpsus harpax (Hilgendorf, 1892)	+	+		+
Sesarmidae	*Perisesarma guttatum* (A. Milne-Edwards, 1869)	+			
Plagusiidae	*Plagusia squamosa* (Herbst, 1790)			+	
	Percnon planissimum (Herbst, 1804)		▲		
Camptandriidae	*Serenella leachii* (Audouin, 1826)	+			
Dotillidae	*Dotilla sulcata* (Forskål, 1775)	+	+	+	
Macrophthalmidae	*Ilyograpsus paludicola* (Rathbun, 1909)	+			
	Macrophthalmus (Macrophthalmus) grandidieri A. Milne-Edwards, 1867		▲		
	Macrophthalmus (Macrophthalmus) sulcatus H. Milne Edwards, 1852		+		
	Macrophthalmus (Mareotis) depressus Rüppell, 1830	+	+		
	Chaenostoma boscii (Audouin, 1826)		+		+
	Macrophthalmus (Macrophthalmus) serenei Takeda & Komai, 1991		+		
	Macrophthalmus (Macrophthalmus) graeffei A. Milne-Edwards, 1873		▲		
	Chaenostoma sinuspersici (Naderloo & Türkay, 2011)		+		
	Macrophthalmus (Mareotis) laevis A. Milne-Edwards, 1867		▲		
	Macrophthalmus (Macrophthalmus) indicus Davie, 2012			▲	

Ocypodidae	*Ocypode jousseaumei* (Nobili, 1906)		+		
	Ocypode saratan (Forskål, 1775)	+	+	+	+
	Ocypode cordimana Latreille, 1818		+		
	Austruca albimana (Kossmann, 1877)	+	+	+	+
	Cranuca inversa (Hoffmann, 1874)	+	+		
	Gelasimus hesperiae (Crane, 1975)		▲		

In the present study, the updated classification of brachyuran crabs (De Grave *et al*., 2009) is used, in which brachyuran crabs are divided into 4 sections. And in this present study we have 3 sections only as follows:

Section: Dromiacea De Haan, 1833, this section includes superfamily Dromioidea De Haan, 1833 with family Dromiidae De Haan, 1833.
Section: Raninoida De Haan, 1839, this section includes family Raninidae De Haan, 1839.
Section: Eubrachyura de Saint Laurent, 1980, this section includes two subsections: Heterotremata Guinot, 1977 and Thoracotremata Guinot, 1977.
Subsection Heterotremata comprises 13 superfamilies; superfamily Calappoidea De Haan, 1833 with 2 families Calappidae De Haan, 1833 and Matutidae De Haan, 1835, superfamily Carpilioidea Ortmann, 1893 with family Carpiliidae Ortmann, 1893, superfamily Dorippoidea MacLeay, 1838 with family Dorippidae MacLeay, 1838, superfamily Eriphioidea MacLeay, 1838 with 3 families; Eriphiidae MacLeay, 1838, Menippidae Ortmann, 1893 and Oziidae Dana, 1851, superfamily Hexapodoidea Miers, 1886 with family Hexapodidae Miers, 1886, superfamily Leucosioidea Samouelle, 1819 with family Leucosiidae Samouelle, 1819, superfamily Majoidea Samouelle, 1819 with 3 families; Epialtidae MacLeay, 1838, Inachidae MacLeay, 1838 and Majidae Samouelle, 1819, superfamily Parthenopoidea MacLeay,1838 with family Parthenopidae MacLeay, 1838, superfamily Pilumnoidea Samouelle, 1819 with 2 families; Pilumnidae Samouelle, 1819 and Galenidae Alcock, 1898, superfamily Portunoidea Rafinesque, 1815 with family Portunidae Rafinesque, 1815, superfamily Potamoidea Ortmann, 1896 with family Potamidae Ortmann, 1896, superfamily Pseudozioidea Alcock, 1898 with family Pseudoziidae Alcock, 1898, superfamily Trapezioidea Miers, 1886 with 2 families; Tetraliidae Castro, Ng & Ahyong, 2004 and Trapeziidae Miers, 1886 and superfamily Xanthoidea MacLeay, 1838 with family Xanthidae MacLeay, 1838.

Subsection Thoracotremata comprises two superfamilies; Grapsoidea MacLeay, 1838 and Ocypodoidea Rafinesque, 1815.

Superfamily Grapsoidea MacLeay, 1838 with 4 families; Grapsidae MacLeay, 1838, Plagusiidae Dana, 1851, Sesarmidae Dana, 1851 and Varunidae H. Milne Edwards, 1853.

Superfamily Ocypodoidea Rafinesque, 1815 with 4 families; Camptandriidae Stimpson, 1858, Dotillidae Stimpson, 1858, Macrophthalmidae Dana, 1851 and Ocypodidae Rafinesque, 1815.

In the following, all the brachyuran crabs recorded in this study are presented including species name, sex of the specimens, collection sites, collectors, local distribution of the species, DNA barcoding results, and some remarks.

All synonyms, type localities and regional distribution of the species are given in the appendix and also some material examined which have large numbers of specimens were also put in the appendix.

Section: Dromiacea De Haan, 1833
Superfamily Dromioidea De Haan, 1833

Family Dromiidae De Haan, 1833

Lauridromia dehaani (Rathbun, 1923)

Plate 4 A

State: Recorded in Yemen, Gulf of Aden, sample localities 13, 15, 17, 21, 24 from subtidal sand and sponge, 1-23 m depth.

Earlier records: Red Sea: Eritrea (Lewinsohn, 1977), Vine (1986) without a specific location. Gulf of Aden: Djibouti and Aden (White, 1847; Apel, 2001; Al-Hindi, 2010). Socotra Island: Apel (2001). Gulf of Oman: Naderloo *et al.* (2015). Arabian Gulf: Stephensen (1946), Apel (2001), Naderloo & Sari (2007).

Materials examined: ♀ CL 8.5 mm, CW 9.9 mm Site 15, leg. RUWW 01.12.83. ♂ CL 9.4 mm, CW 11.4 mm Site 13, leg. RUWW 01.12.83. ♀ CL 26.3 mm, CW 28.6 mm Site 17, leg. RUWW 20.01.85. ♂ CL 19.9 mm ,CW 21 mm Site 21, leg. RUWW 08.10.84. ♂ CL 27.7 mm, CW 31.7 mm Site 24 leg. RUWW 04.11.84. 3♀♀ CL 21.5-26.5 mm, CW 22-27.5 mm Site 24, leg. RUWW 04.11.84. ♀ CL 40 mm, CW 45 mm Site 21, leg. MMSBRA 01.0184.

Lewindromia unidentata (Rüppell, 1830)

Plate 4 B

State: First record in Yemen, Gulf of Aden and Socotra Island, at sample localities 22, 24, 33, 37, 46, 54 from subtidal sand and sponge, 1-30 m depth. Not recorded in Gulf of Oman and the Arabian Sea.

Earlier records: Red Sea: Coasts of Sudan under the synonym *Dromidia unidentata* Rüppell, 1830 by Laurie (1915); Gulf of Aqaba, Sinai and Dahlak Archipel, Eritrea (Lewinsohn, 1977; Vine, 1986). Arabian Gulf: under the synonym *Cryptodromiopsis unidentata* Rüppell, 1830 by Apel (2001), *Dromidia unidentata* Kossmann, 1880 by Stephensen (1946), Nobili (1906), *Lewindromia unidentata* Rüppell, 1830 by Naderloo (2017).

Materials examined: ♀ CL 8.5 mm, CW 9.2 mm Site 22 leg. RUWW 01.03.84. ♀ CL 30.4 mm, CW 30.1 mm Site 24 leg. AUAA 2008. ♂ CL 11.1 mm, CW 12.4 mm Site 54 leg. RUWW 01.03.84. ♀ CL 20.7 mm, CW 26.2 mm Site 46 leg. FSM 27.05.05. ♀ CL 7.7 mm, CW 8.1 mm Site 37 leg. FSM 18.05.05. ♀ CL 4.5 mm, CW 5 mm & ♂ CL 6.3 mm, CW 6.4 mm Site 33 leg. FSM 16.05.05.

Epigodromia granulata (Kossman, 1878)

Plate 4 C

State: Recorded in Yemen, Gulf of Aden and Socotra Island, at sample localities 15, 22, 41, 54 from subtidal sand and sponge, 1-30 m depth. Not recorded in the Gulf of Oman.

Earlier records: Red Sea: Mayun Island (Nobili, 1906) under the synonym *Cryptodromia granulata* Kossmann, 1877; Kamaran Island (Balss, 1916); Gulf of Aqaba, Sinai, Dahlak Archipel,

Eritrea under the synonym *Cryptodromia granulata* Kossmann, 1878 by Lewinsohn (1977), Vine (1986) without a specific location. Gulf of Aden: Aden (Lewinsohn, 1977). Socotra Island: Simões *et al.* (2001). Muscat: Lewinsohn (1977). Arabian Gulf: Two animals in the Leiden Museum that originate from the island of Juraid off the Saudi Arabian coast (Lewinsohn, 1977; Apel, 2001).

Materials examined: ♂ CL 11.8 mm, CW 13.1 mm Site 15 leg. RUWW 01.12.83. 2♀♀ CL 5.2 - 5.9 mm, CW 6 - 6.3 mm Site 22 leg. RUWW 01.03.07. ♂ CL 9.5 mm, CW 11 mm Site 22 leg. RUWW 15.01.85. ♀ CL 6.9 mm, CW 7.4 mm Site 54 leg. RUWW 01.03.96. ♂ CL 5 mm, CW 5.1 mm Site 41 leg. SMF 26.05.05.

Ascidiophilus caphyraeformis Richters, 1880
Plate 4 D

State: First record in Yemen, Gulf of Aden and Socotra Island, at sample localities 13 (only 1♀ specimen) and 54 (only 1♀ specimen) from subtidal sand and sponge, 1-2 m depth. Not recorded in Gulf of Oman, Arabian Sea and the Arabian Gulf.

Earlier records: Red Sea: Gulf of Aqaba, Sinai, Dahlak Archipel, Eritrea under the synonym *Pseudodromia caphyraeformis* Richters, 1880 by Lewinsohn (1977) and Vine (1986) without a specific location.

Materials examined: ♀ CL 11.7 mm, CW 8.5 mm Site 13 leg. RUWW 01.12.83. ♀ CL 8 mm, CW 6.1 mm Site 54 leg. RUWW 01.03.84.

Cryptodromia fallax (Latreille in Milbert, 1812)
Plate 4 E, F

State: Recorded in Yemen, Gulf of Aden, sample locality 19 (only 1 specimen). from sand, rock inthe intertidal zone), and from Socotra Island at site 54 (3 specimens, 1-2 m depth) from subtidal sand and sponge. Not recorded in the Gulf of Oman and the Arabian Sea.

Earlier records: Red Sea: Mayun Island (Nobili, 1906) under the synonym *Cryptodromia canaliculata* Stimpson, 1858; Gulf of Aqaba, Sinai, Dahlak Archipel, Eritrea under the synonym *Cryptodromia canaliculata* Stimpson, 1858 by Lewinsohn (1977).
Gulf of Aden: Aden (Nobili, 1906); Sikha Island (Apel, 2001). Socotra Island: Simões *et al.* (2001), Apel (2001). Arabian Gulf: under the synonym *Cryptodromia canaliculata* Stimpson 1858 by Apel (2001), Naderloo & Türkay (2012, Naderloo *et al*. (2013).

Materials examined: 2♀♀ ovi CL 7.9-10.5 mm, CW 9.8-12.7 mm Site 54, leg. RUWW 01.03.85. ♀ CL 7.9 mm, CW 8.2 mm Site 54, leg. RUWW 01.07.84. ♀ CL 11.4 mm, CW 12.7 mm Site 54, leg. RUWW 01.03.84. ♂ CL 7 mm, CW 7.5 mm site 19, leg. AUAA 07.09.17.

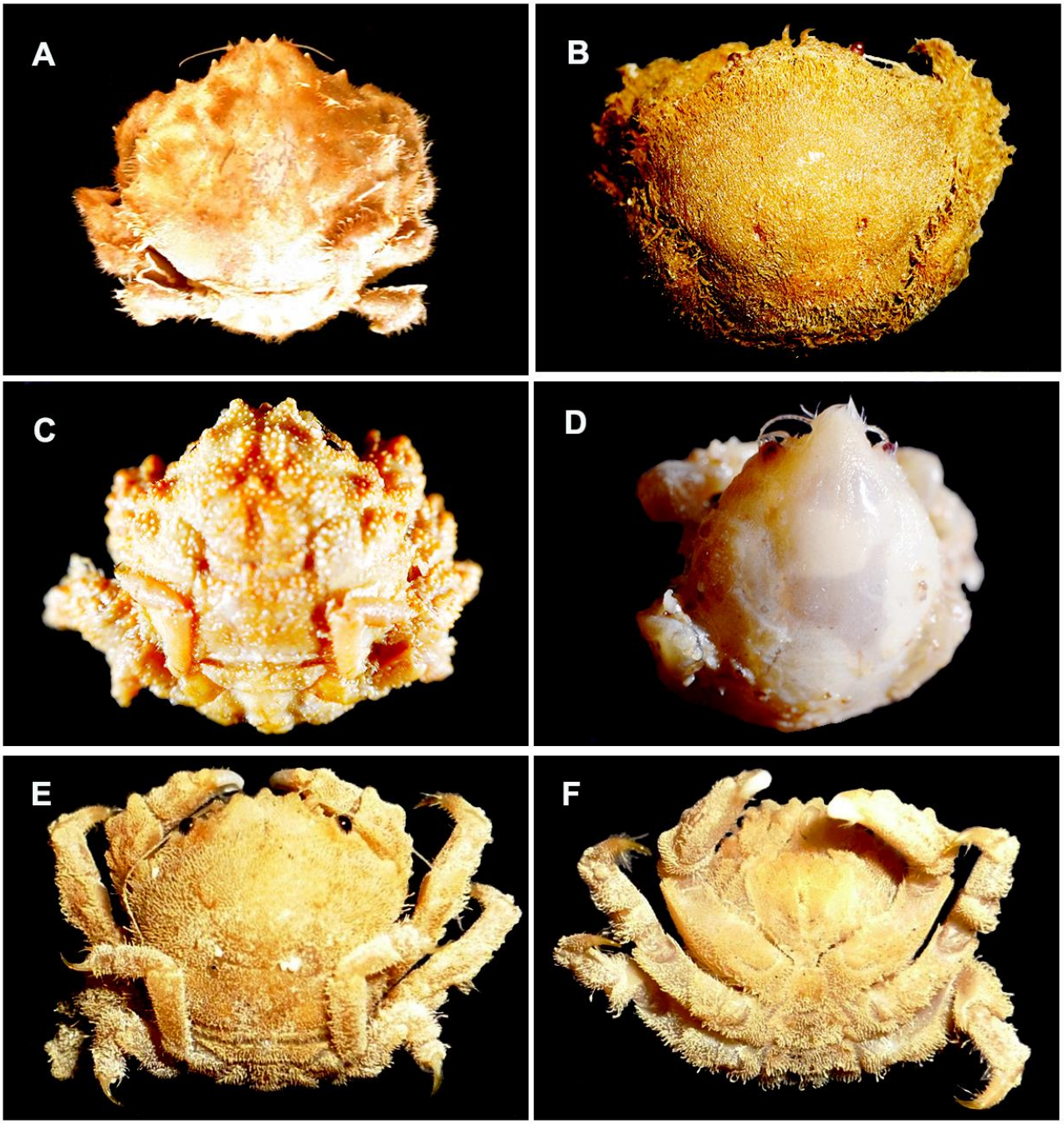

Plate 4: A. *Lauridromia dehaani*, ♀ CL 30.4 mm, CW 30.1 mm; **B.** *Lewindromia unidentata,* ♀ CL 20.7 mm, CW 26.2 mm; **C.** *Epigodromia granulata*, ♂ CL 11.8 mm, CW 13.1 mm; **D.** *Ascidiophilus caphyraeformis*, ♀ CL 11.7 mm, CW 8.5 mm; **E.** *Cryptodromia fallax* ♂ CL 7 mm, CW 7.5 mm (dorsal view); **F.** *Cryptodromia fallax* (ventral view).

Section: Raninoida De Haan, 1839

Family Raninidae De Haan, 1839

Notosceles serratifrons (Henderson, 1893)
Plate 5 A, B, C, D

State: First record in Yemen, Gulf of Aden, sample locality 19 from subtidal sand, 50 m depth, a single male specimen.

Not recorded in the Red Sea, Arabian Sea, Gulf of Oman, and the Arabian Gulf. Hence, this is considered the first record in the marine waters of the Arabian Peninsula.

Earlier records of this family: Red Sea: For the first time from Sudan coasts (Laurie 1914). He recorded *Notopus dorsipes* (Fabricius, 1793). Also, another species *Cosmonotus grayii* White, 1848, was recorded in the Red Sea without a specific location by Vine (1986).

Materials examined: ♂ CL 14.6 mm, CW 8 mm Site 19 leg. RUWW 12.02.84.

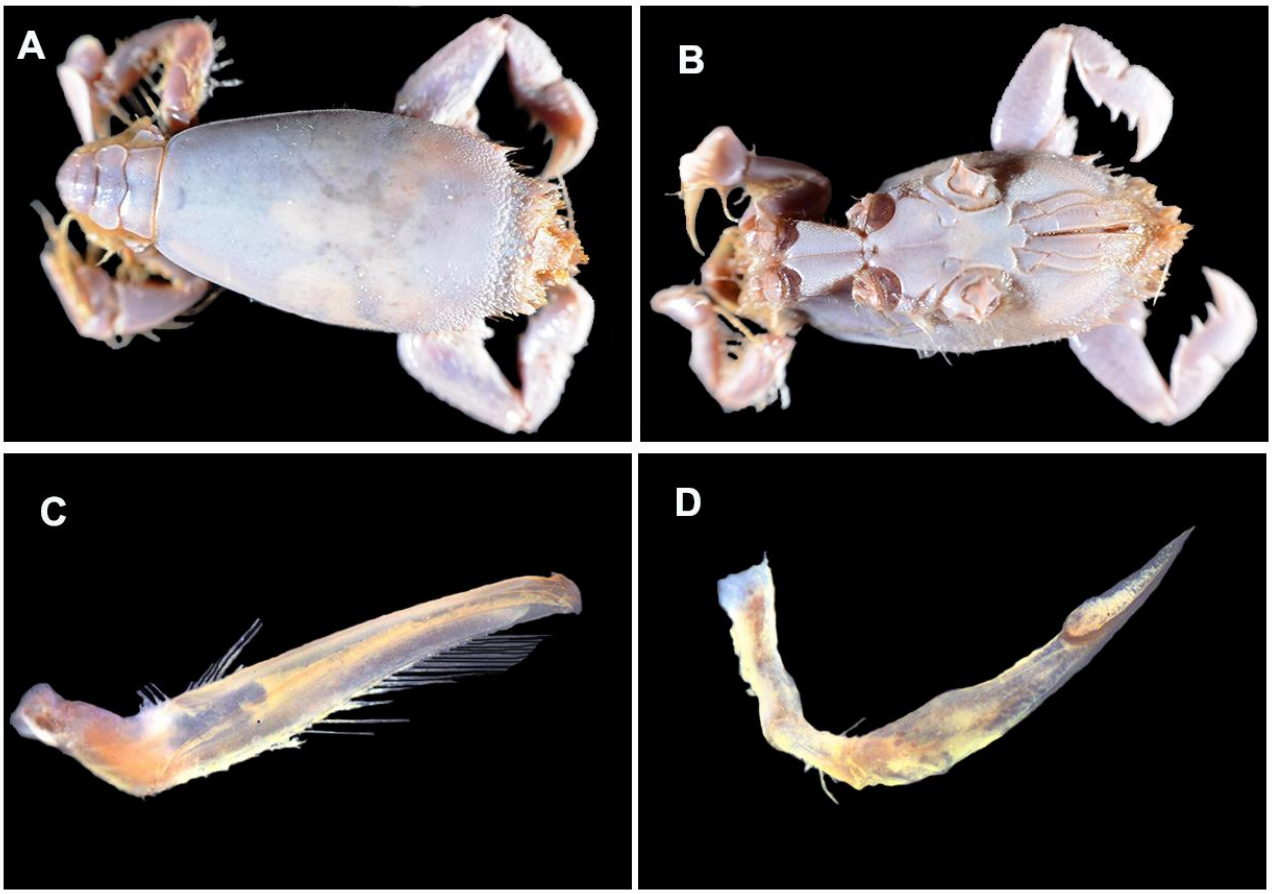

Plate 5: A. *Notosceles serratifrons* (dorsal view), ♂ CL 14.6 mm, CW 8 mm; **B.** *Notosceles serratifrons* (ventral view); **C.** *Notosceles serratifrons*, male G1, 4 mm; **D.** *Notosceles serratifrons,* male G2.

Section: Eubrachyura de Saint Laurent, 1980
Subsections: Heterotremata Guinot, 1977
Superfamily: Carpilioidea Ortmann, 1893
Family: Carpiliidae Ortmann, 1893

Carpilius convexus (Forskål, 1775)
Plate 6 A

State: Recorded in Yemen, Gulf of Aden and Socotra Island, sample localities 22, 23, 27, 37, 41, 55, in subtidal rock, corals, 2-15 m depth. Also recorded in the Red Sea, sample locality 10, from subtidal rock, corals, 2-3 m depth. Not recorded in the Arabian Sea.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915), Vine (1986) without a specific location; Yemeni coasts (Krupp *et al.,* 2006). Gulf of Aden: Aden (Nobili, 1906). Socotra Island: Apel (2001). Arabian Gulf: Stephensen (1946), Apel (2001), Naderloo (2017). Gulf of Oman: Apel (2001). Somalia: Sar Uanle and Gesira (Galil & Vannini, 1990).

Remarks: Widespread in Yemeni coastal waters, except the Arabian Sea (need for further survey activities).

Materials examined: ♂ CL 23.1 mm, CW 31.2 mm Site 22, leg. RUWW 12.02.84. ♂ CL 62.1mm, CW 81.9 mm Site 24, leg. AUAA 05.04.14. 2♀♀ CL 38.5-52.9 mm, CW 51.2-69.6 mm Site 27, leg. RUWW 01.03.84. ♂ CL 41.2 mm, CW 55.6 mm Site 27, leg. RUWW 01.03.84. ♂ CL 63.3 mm, CW 84.8 mm Site 55, leg. ZSM 13.04.99. Carapace only CL 67.6 mm, CW 89.9 mm Site 10, leg. SMF 08.04.04. Carapace only CL 73.2 mm, CW 95.4 mm Site 41, leg. SMF 28.05.05. ♂ CL 78.2 mm, CW 100.5 mm Site 37, leg. SMF 18.05.05. Juv CL 13.6 mm, CW 18.9 mm Site 41, leg. SMF 28.05.05.

Superfamily: Calappoidea De Haan, 1833
Family: Calappidae De Haan, 1833

Calappa philargius (Linnaeus, 1758)
Plate 6 B

State: First record for Yemen, Gulf of Aden, sample localities 21, 22, 36, sandy bottoms in the subtidal zone, 0.5-30 m depth. Not recorded in the Arabian Sea.

Earlier records: Red Sea: Nobili (1906), Laurie (1915), Vine (1986), Galil (1997). Gulf of Oman: Khvorov *et al.* (2012). Arabian Gulf: Here, the only unverified evidence to date comes from Alcock (1896). The occurrence of this species in the Gulf is therefore rather questionable (Apel, 2001).

Materials examined: ♀ CL 26.6 mm, CW 33.8 mm Site 21, leg. RUWW 25.03.84. 2♂♂ CL 12 - 27.7 mm, CW 15 - 33.6 mm Site 21, leg. RUWW 25.03.84. ♂ CL 55.1 mm, CW 73.1 mm Site 21, leg. MMSBRA 01.01.08. ♀ CL 16.2 mm, CW 18.6 mm Site 36, leg. SMF 18.05.05. Carapace only CL 12.7 mm, CW 15.3 mm Site 36, leg. SMF 18.05.05. ♂ CL 56.2 mm, CW 73.1 mm Site 22, leg. RUWW 30.03.84.

Calappa hepatica (Linnaeus, 1758)
Plate 6 C

State: Recorded in Yemen, Red Sea and Gulf of Aden, sample localities 2, 4, 17, 22, 27, 30, 36, 37, 42, from subtidal sand, 1-187 m depth.

Earlier records: Red Sea: Mayun Island (Balss, 1916); coasts of Hudaydah (Zajonz *et al.,* 1998; Krupp *et al.,* 2006); Egyptian and Sudanese coasts (Laurie, 1915; Vine, 1986; Galil, 1997). Gulf of Aden: Djibouti (Galil, 1997); Aden (Zajonz *et al.,* 1998). Socotra Island: Galil (1997). Arabian Gulf: Galil (1997), Apel (2001). Gulf of Oman: Apel (2001).

Materials examined: Data, see appendix.

Calappa capellonis Laurie, 1906
Plate 6 D

State: Recorded in Yemen, Gulf of Aden, sample localities 21, 30, 31, from subtidal sand, 18-60 m depth. Not recorded in the Red Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Gulf of Aden: Djibouti (Galil, 1997).

Materials examined: 3♀♀ CL 23.4 - 25.9 mm, CW 23.9 - 26.8 mm Site 30, leg. RUWW 30.05.84. ♀ CL 12.5 mm, CW 12.6 mm Site 31, leg. RUWW 24.11.84. 2♂♂ CL 11.4 - 13.6 mm, CW 11.5 - 13.9 mm Site 31, leg. RUWW 24.11.84. ♀ CL 17.9 mm, CW 18.9 mm Site ?, leg. RUWW 13.06.85. ♀ CL 16.5 mm, CW 16.6 mm Site 21, leg. RUWW 08.10.84.

Calappa gallus (Herbst, 1803)
Plate 6 E

State: Recorded in Yemen, Gulf of Aden, sample locality 22, from subtidal sand, 0.5 m depth, only a single female specimen.

Earlier records: Red Sea: Laurie (1915), Vine (1986), Galil (1997). Gulf of Aden: Djibouti (Galil 1997). Socotra Island: Simões *et al.* (2001), Apel (2001). Arabian Sea: Oman, Al-Wusta (Khvorov *et al.,* 2012).
The only previous record for the Arabian Gulf comes from Alcock (1896) but without exact locality. It has not been possible to verify this record. The occurrence of this species in the Gulf is therefore rather questionable (Apel, 2001).

Materials examined: ♀ CL 28.2 mm, CW 34.8 mm Site 22, leg. RUWW 01.01.85.

Mursia bicristimana Alcock & Anderson, 1894
Plate 6 F

State: Recorded in Yemen, Gulf of Aden, sample locality 21, subtidal sand, 30 m depth, only a single male specimen.

Earlier records: Socotra Island: Spiridonov & Apel (2007). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994; Khvorov *et al.*, 2012).

The recently described species *Mursia arabica* Kumar, Kumar & Galil 2013, is very similar to this species. The holotype comes from the Gulf of Aden, ~~–J~~ohn Murray" Expedition; 13°14'24"N 46°14'12"E, 16 Nov. 1933, 441 m depth, 1 ♂ CW 59.3 mm (Kumar *et al*., 2013).

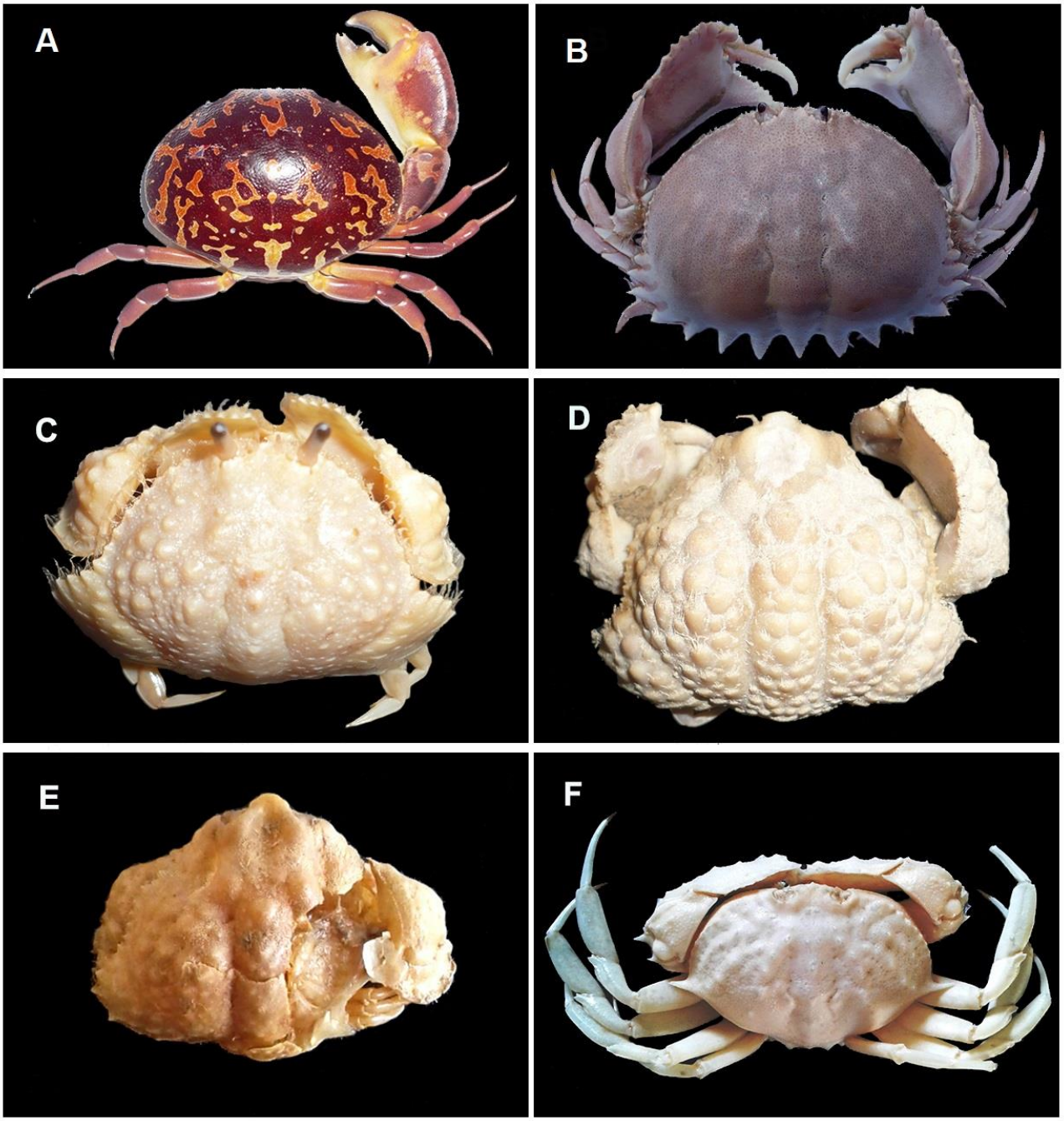

Plate 6: A. *Carpilius convexus*, ♂ CL 78.2 mm, CW 100.5 mm; **B.** *Calappa philargius*, ♂ CL 55.1 mm, CW 73.1 mm; **C.** *Calappa hepatica*, ♂ CL 23.02 mm, CW 33.9 mm; **D.** *Calappa capellonis*, ♂ CL 28.2 mm, CW 34.8 mm; **E.** *Calappa gallus*, ♀ CL 25.9 mm, CW 26.8 mm; **F.** *Mursia bicristimana*, ♂ CL 50 mm, CW 72.2 mm.

Remarks: The genus suffered from taxonomic confusion due to the relative rarity and superficial resemblances of its species, especially between the two species *Mursia bicristimana* Alcock & Anderson, 1894 and *Mursia arabica* Kumar, Kumar & Galil, 2013.

Materials examined: ♂ CL 50 mm, CW 72.2 mm Site 21, leg. MMSBRA 01.01.84.

Family Matutidae De Haan, 1835

Ashtoret lunaris (Forskål, 1775)

Plate 7 A

State: Recorded in Yemen, Gulf of Aden, sample localities 19, 22, 28, 30, from subtidal sand, 0-0.5 m depth. Not recorded in Arabian Sea and the Arabian Gulf.

Earlier records: Red Sea: Mayun Island by Balss (1916) under the synonym *Matuta banksii* Leach, 1817; Hudaydah coasts by Zajonz *et al.* (1998); northern Red Sea coasts (Forskål, 1775; Laurie, 1915; Vine, 1986; Galil & Clark, 1994). Gulf of Aden: Aden (Nobili, 1906; Galil & Clark, 1994; Al-Hindi, 2010). Socotra Island: Simões *et al.* (2001), Apel (2001). Gulf of Oman: Muscat (Khvorov *et al.*, 2012).

Materials examined: ♂ CL 27.1 mm, CW 28 mm Site 22, leg. RUWW 29.03.07. 3♂♂ CL 19.4-39.9 mm, CW 20.2 - 36.3 mm Site 22, leg. RUWW 29.03.07. 2♂♂ CL 31.6-38.1 mm, CW 32.4-40.1 mm Site 19, leg. AUAA 01.04.14. ♀ CL 15 mm, CW 15.5 mm Site 30, leg. RUWW 01.10.88. ♂ CL 36.2 mm, CW 37.8 mm Site 30, leg. RUWW 01.10.88. 2♂♂ CL 24.6-25.4 mm, CW 25.7-26.6 mm Site 28, leg. RUWW 23.03.84.

Ashtoret picta (Hess, 1865)

Plate 7 B

State: Recorded in Yemen, Gulf of Aden, sample localities 16, 22, 27, 28, 42, from subtidal sand, 0-6 m depth. Not recorded in Gulf of Oman, Arabian Sea and the Arabian Gulf.

Earlier records: Red Sea: Gulf of Suez by Galil & Clark (1994). Gulf of Aden: Aden (Galil & Clark, 1994; Al-Hindi, 2010).

Materials examined: ♂ CL 29.3 mm, CW 30.7 mm Site 22, leg. RUWW 07.10.10. ♂ CL 33.32 mm, CW 34.5 mm Site 16, leg. AUAA 2008. ♂ CL 26.2 mm, CW 27.1 mm Site 28, leg. RUWW 23.03.84. ♂ CL 22 mm, CW 22.6 mm Site 22 leg. RUWW 01.03.84. 3♀♀ CL 18 - 21.3 mm, CW 18.8 - 22.2 mm Site 27, leg. RUWW 01.10.83. ♀ CL 17.1 mm, CW 17.4 mm Site 22, leg. RUWW 01.02.84. 2 Juv CL 7.6 - 8.4 mm, CW 8.3 - 9.1 mm Site 22, leg. RUWW 01.12.88. 4♀♀ CL 21.3 - 23.8 mm, CW 21.9 - 25 mm Site 42, leg. SMF 27.05.05. 6♂♂ CL 16.5 - 22.5 mm, CW 16.9 - 22.6 mm Site 42, leg. SMF 27.05.05. 3Juv CL 9.1- 12.3 mm, CW 9.8- 12.98 mm Site 42, leg. SMF 27.05.05.

Superfamily Dorippoidea MacLeay, 1838
Family Dorippidae MacLeay, 1838

Dorippe frascone (Herbst, 1785)

Plate 7 C, D

State: Recorded in Yemen, Gulf of Aden, sample localities 16, 17, 19, 30, 36, from subtidal sand, 2-25 m depth. Not recorded in the Arabian Sea, Gulf of Oman, and the Arabian Gulf.

Earlier records: Red Sea: Vine (1986) without a specific location. Gulf of Aden: Aden, first records by Al-Hindi (2010). Two other species were added to this family; *Dorippe dorsipeh* **(**Linnaeus, 1764) recorded in the Red Sea, Suez by Laurie (1915) and *Dorippe quadridens* (Fabricius, 1793) recorded in the Arabian Gulf and Gulf of Oman (Stephensen, 1946; Apel, 2001; Naderloo & Sari, 2007; Naderloo *et al.,* 2015).

Materials examined: ♂ CL 21.8 mm, CW 21.7 mm Site 16 leg. AUAA 2008. 2♀♀ CL 20.4-24.4 mm, CW 21.6-26.3 mm Site 19, leg. RUWW 30.05.84. 2♂♂ CL 13.8-19.3.4 mm, CW 13.76-19.4 mm Site 30, leg. RUWW 09.10.84. 3♂♂ CL 10.3-15.8 mm, CW 8.4-14.4 mm Site 36, leg. SMF 18.05.05. ♀ CL 8 mm, CW 7.8 mm Site 17, leg. SMF 25.03.98.

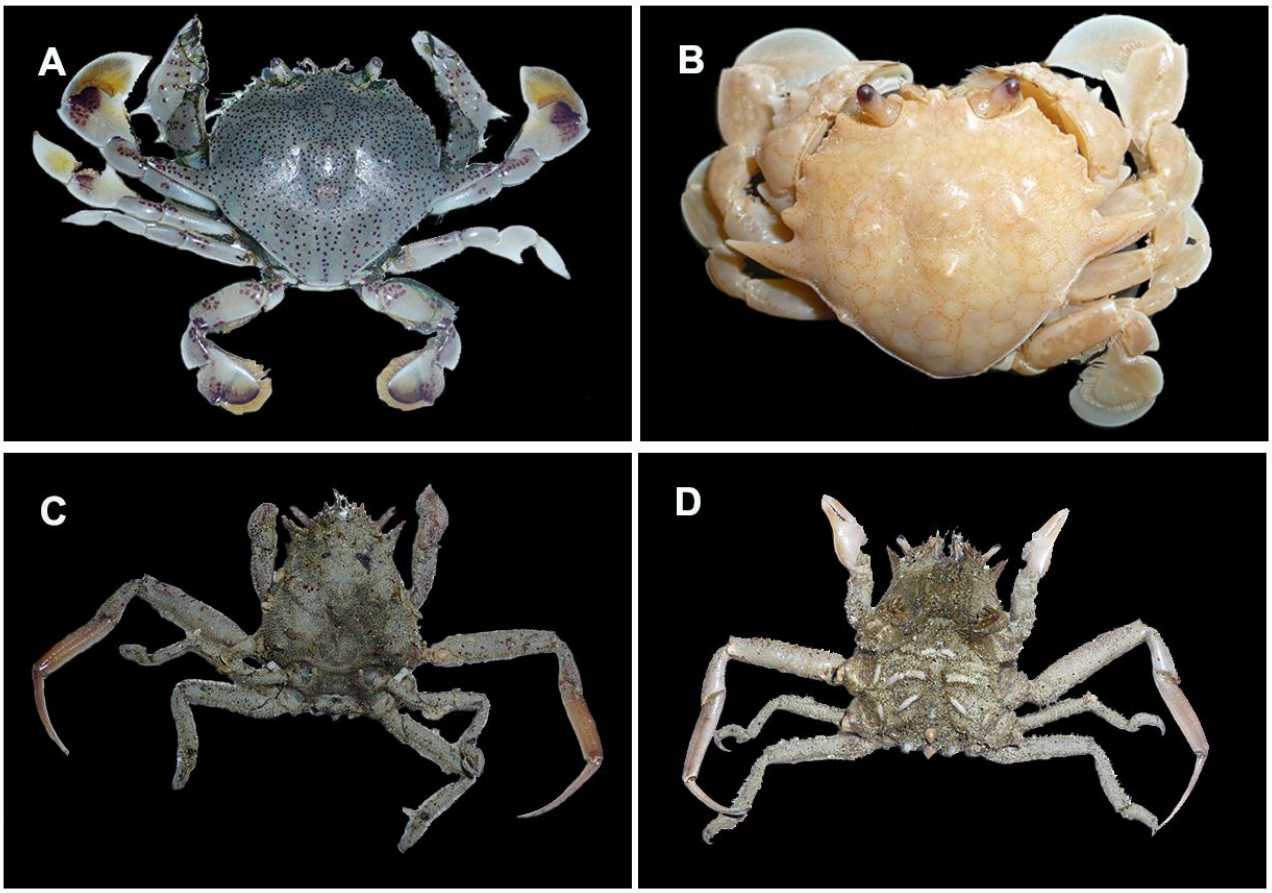

Plate 7: A. *Ashtoret lunaris,* ♂ CL 39.9 mm, CW 36.3 mm; **B.** *Ashtoret picta* ♂ CL 33.32 mm, CW 34.05 mm; **C.** *Dorippe frascone* (dorsal view), ♂ CL 21.8 mm, CW 21.7 mm; **D.** *Dorippe frascone* (ventral view).

Superfamily Eriphioidea MacLeay, 1838
Family Eriphiidae MacLeay, 1838

Eriphia smithii MacLeay, 1838
Plate 8 A

State: Recorded in Yemen, Gulf of Aden, Arabian Sea and Socotra Island, sample localities 15, 18, 19, 21, 22, 23, 29, 33, 40, 43, 48, 51, 52, 53 from rock.

Earlier records: Red Sea: Laurie (1915), Balss (1922). Gulf of Aden: Aden (Al-Hindi, 2010), Sikh Island (Neumann & Spiridonov, 1999). Socotra Island: Wranik (1998), Simões *et al.* (2001), Apel (2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994). Gulf of Oman: Naderloo *et al* (2015). Arabian Gulf: Stephensen (1946), Apel (2001), Naderloo & Türkay (2012). Somalia: Galil & Vannini (1990).

Remarks: Commen and widespread species in Yemeni coastal waters at Gulf of Aden, Arabian Sea and Socotra Islands, except the Red Sea. We did not find this species in our samples which were collected from the Red Sea.

Materials examined: Data, see appendix. CO1; AIMSEQ08112016-C03.

Eriphia sebana (Shaw & Nodder, 1803)
Plate 8 B

State: Recorded in Yemen, Gulf of Aden, sample locality 21, from rock. Not recorded in the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts by Laurie (1915). Gulf of Aden: Aden, first records by Al-Hindi (2010). Arabian Sea: Oman, Dhofar Province, Mughsail, Taquah, Mirbat (Khvorov *et al.*, 2012). Gulf of Oman: Sharqiya (Khvorov *et al.*, 2012). Somalia (Indian Ocean) by Galil & Vannini (1990).

Materials examined: ♀ CL 37.7 mm, CW 46.5 mm Site 21, leg. AUAA 02.04.14.

Family Menippidae Ortmann, 1893

Menippe rumphii (Fabricius, 1798)
Plate 8 C

State: Recorded in Yemen, Gulf of Aden, sample locality 30, from sand, rock, 0 – 0.5 m depth.

Earlier records: Red Sea: Egyptian and Sudanese coasts by Laurie (1915). Socotra Island: Simões *et al.* (2001), Apel (2001). Arabian Gulf: Naderloo & Türkay (2012). Gulf of Oman: Naderloo *et al.* (2015).

Materials examined: 2♂♂ CL 16-29 mm, CW 22-36 mm Site 30 leg. AUAA 02.11.16, CO1; AIMSEQ 08112016-H04.

Family Oziidae Dana, 1851

Epixanthus frontalis (H. Milne Edwards, 1834)
Plate 8 D

State: Recorded in Yemen, Gulf of Aden, sample localities 18, 19, 21, 22, 24, 26, 32, 48, from sand, rock in the intertidal zone. Also recorded in the Red Sea, sample locality 9 and Arabian Sea, sample locality 51 from sand, rock from the intertidal zone.

Earlier records: Red Sea: Egyptian and Sudanese coasts by Laurie (1915); Hudaydah coasts by Krupp *et al.* (2006). Gulf of Aden: Aden, first records by Al-Hindi (2010). Socotra Island: Simões *et al.*(2001), Apel (2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994). Arabian Gulf: Stephensen (1946), Apel (2001), Naderloo & Türkay (2012). Somalia: Galil & Vannini (1990).

Materials examined: Data, see appendix. CO1; AIMSEQ08112016-A05, CO1; AIMSEQ08112016-B07, CO1; AIMSEQ08112016-C05, CO1; AIMSEQ08112016-D05, CO1; AIMSEQ08112016-E05, CO1; AIMSEQ08112016-F05.

Epixanthus corrosus A. Milne-Edwards, 1873
Plate 8 E

State: Recorded in Yemen, Gulf of Aden, sample localities 21, 32, from sand, rock in the intertidal zone, and also recorded in the Red Sea, sample locality 9.

Earlier records: Red Sea: Egyptian and Sudanese coasts by Laurie (1915); Yemeni coasts by Krupp *et al.* (2006). Gulf of Aden: Aden, first records by Al-Hindi (2010). Socotra Island: Simões *et al.*(2001), Apel (2001). Arabian Gulf: Apel (2001), Naderloo (2017). Gulf of Oman: Naderloo *et al*. (2015).

Materials examined: ♀ CL 20.8 mm, CW 35.5 mm Site 21 leg. AUAA 01.03.13. 5♀♀ CL 17-21 mm, CW 23-35 mm Site 21 leg. AUAA 02.11.16. 4♂♂ CL 13-23 mm, CW 23-39 mm Site 21 leg. AUAA 03.11.16. ♂ CL 7.4 mm, CW 12.2 mm Site 32, leg. SMF 23.05.05. ♂ CL 9.2 mm, CW 15.6 mm Site 9, leg. SMF 06.04.04.

Lydia tenax (Rüppell, 1830)
Plate 8 F

State: Recorded in Yemen, Gulf of Aden, the Red Sea and Arabian Sea, sample localities 8, 19, 21, 32, 40, 48, from rock, 0-0.5 m depth.

Earlier records: Red Sea: Egyptian and Sudanese coasts by Laurie (1915), Vine (1986) without a specific location; Hudaydah coasts by Krupp *et al.* (2006). Socotra Island: Simões *et al*. (2001), Apel (2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994). Gulf of Oman: Apel (2001). Arabian Gulf: Stephensen (1946), Apel (2001), Naderloo & Türkay (2012), Naderloo (2017).

Remarks: Widespread in Yemeni coastal waters in Red Sea, Gulf of Aden and Arabian Sea.

Materials examined: ♂ CL 37.6 mm, CW 55.6 mm Site 21 leg. AUAA 01.03.13. 2♀♀ CL 19.8 - 25.8mm, CW 29.8 - 39.1 mm Site 19 leg. AUAA 01.0413. ♂ CL 32.7 mm, CW 46.5 mm Site 48 leg. AUAA 17.03.11. ♀ CL 28 mm, CW 43 mm Site 21 leg. AUAA 27.10.16. 2♂♂ CL 28-32 mm, CW 41-45 mm Site 21 leg. AUAA 27.10.16, CO1; AIMSEQ08112016-D03. 2♂♂ CL 24.8 – 25 mm, CW 36.1 - 36.2 mm Site 19 leg. AUAA 27.10.16. ♂ CL 33.2 mm, CW 49.7 mm Site 40, leg. RUWW 01.03.84. ♀ CL 35.5 mm, CW 53.4 mm Site 8, leg. SMF 08.04.04. ♂ CL 20.1 mm, CW 30.6 mm Site 8 leg. SMF 08.04.04. 2♀♀ CL 30.9 - 35.2 mm, CW 45 - 54.6 mm Site 32 leg. SMF 23.05.05.

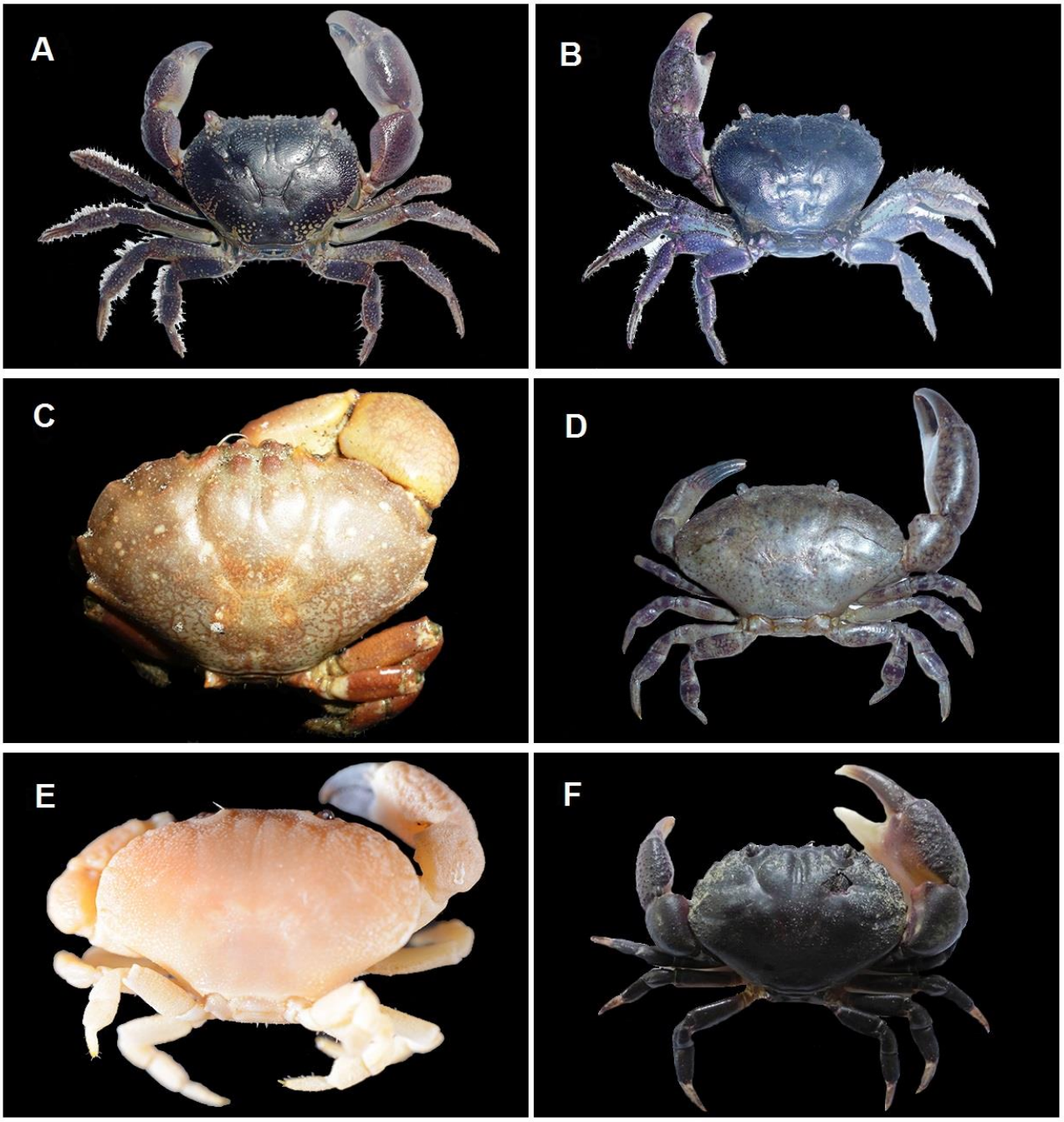

Plate 8: A. *Eriphia smithii,* ♂ CL 40.9 mm, CW 53.1 mm; **B.** *Eriphia sebana,* ♀ CL 36.7 mm, CW 46.5 mm; **C.** *Menippe rumphii*, ♂ CL 29 mm, CW 36 mm; **D.** *Epixanthus frontalis,* ♂ CL 22 mm, CW 36 mm; **E.** *Epixanthus corrosus*, ♂ CL 9.2 mm, CW 15.6 mm; **F.** *Lydia tenax*, ♂ CL 55.6 mm, CW 72.2 mm.

Superfamily Hexapodoidea Miers, 1886
Family Hexapodidae Miers, 1886
Hexapinus simplex Rahayu & Ng, 2014
Plate 9 A, B

State: First record in Yemen, Gulf of Aden and Arabian Sea, sample localities 19 and 49, from subtidal sand, 20-50 m depth. Not recorded in the Red Sea, Arabian Sea, Gulf of Oman and Arabian Gulf. Therefore, this recorded is considered the first record in the marine waters of the Arabian Peninsula.

This family has not been not recorded in the Red Sea and the Gulf of Oman until now but. However, another species, *Hexapus sexpes* (Fabricius, 1798), was recorded in the Arabian Gulf by Apel (2001) and Naderloo (2017).

Materials examined: ♂ CL 4.9 mm, CW 6.6 mm Site 49 leg. RUWW 01.01.84. 1♀ovi. CL 5.3 mm, CW 6.3 mm Site 49 leg. RUWW 01.01.84. ♂ CL 4.5 mm, CW 6.9 mm Site 19 leg. RUWW 12.02.84.

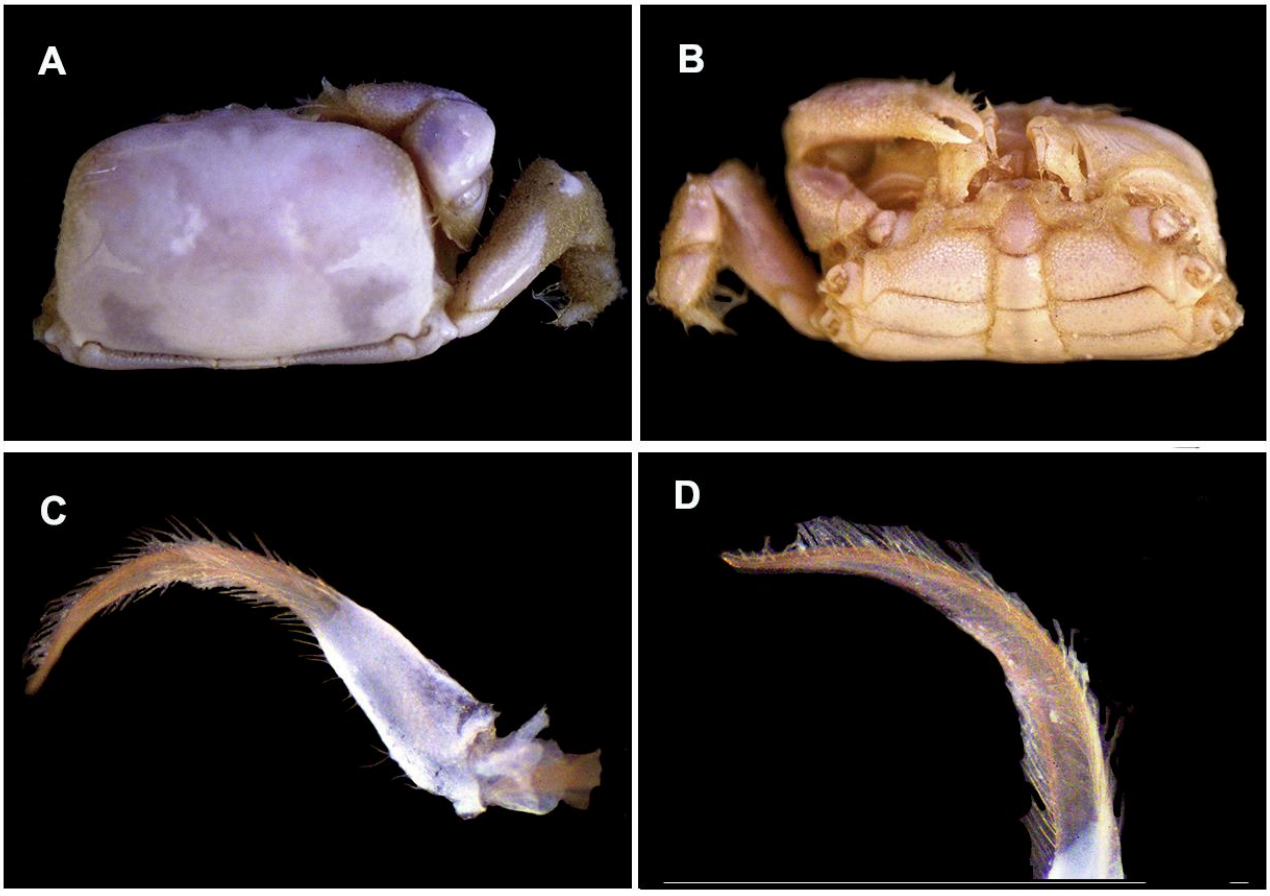

Plate 9: A. *Hexapinus simplex* (dorsal view), ♂ CL 4.5 mm, CW 6.6 mm; **B.** *Hexapinus simplex* (ventral view); **C.** *Hexapinus simplex*, Male G1; **D.** *Hexapinus simplex*, Male G1, 3 mm.

Superfamily Leucosioidea Samouelle, 1819
Family Leucosiidae Samouelle, 1819

Coleusia biannulata Tyndale-Biscoe & George, 1962
Plate 10 A

State: First record in Yemen, Gulf of Aden, sample localities 17 and 21 from subtidal sand, 0-7 m depth. Not recorded in the Arabian Sea and Gulf of Oman.

Earlier records: Red Sea: Eritrea, south Massawa channel; this was the first record in the Red Sea by Galil (2006). A new genus is established for *Leucosia* species having the male abdomen with segments 3-5 fused, the shaft of the first male pleopod coiled thrice on its axis (Galil, 2006).
An occurrence mentioned for the Arabian Gulf is considered by Apel (2001) as doubtful.

Materials examined: ♂ CL 16.7 mm, CW 14.4 mm Site 21 leg. AUAA 11.04.14. 2♂♂ CL 15.1-19.5 mm, CW 12.8-16.2 mm Site 17 leg. FSM 25.03.98.

Leucosia anatum (Herbst, 1783)
Plate 10 B

State: Recorded in Yemen, Gulf of Aden, sample localities 17, 22, 33, from subtidal sand, 20-50 m depth. Not recorded in the Arabian Sea.

Earlier records: Red Sea: Vine (1986). Gulf of Aden: Aden (Apel, 2001). Gulf of Oman: Naderloo *et al.* (2015), Naderloo (2017). Arabian Gulf: Naderloo *et al.* (2015), Naderloo (2017).

Materials examined: ♂ CL 11.9 mm, CW 10.2 mm Site 22 leg. RUWW 01.05.84. 2♀♀ CL 16.4-24.3 mm, CW 13.2-20.2 mm Site 33 leg. RUWW 05.06.85. ♀ CL 24.2 mm, CW 20.9 mm Site 17 leg. RUWW 09.10.84. ♂ CL 22.9 mm, CW 19.2 mm Site 17 leg. RUWW 09.10.84.

Ebalia abdominalis Nobili, 1906
Plate 10 C

State: Recorded in Yemen, Gulf of Aden, sample localities 22 and 42, from subtidal sand, corals, 1-6 m depth. Not recorded in Gulf of Oman.

Earlier records: Red Sea: Egyptian and Sudanese coasts by Laurie (1915), Vine (1986) without a specific location; Mayun Island by Nobili (1906). Gulf of Aden: Aden and Djibouti (Apel, 2001). Arabian Gulf: Apel (2001), Naderloo & Türkay (2012), Naderloo *et al*. (2013).

Materials examined: ♂ CL 11.4 mm, CW 11.8 mm Site 22 leg. RUWW 15.02.84. ♂ CL 5.7 mm, CW 5.2 mm Site 22 leg. RUWW 07.10.10. ♂ CL 8 mm, CW 7.7 mm Site 42 leg. FSM 27.05.05.

Ryphila cancellus (Herbst, 1783)
Plate 10 D

State: Recorded in Yemen, Gulf of Aden, sample localities 22, 30, 42 from subtidal sand, corals, 4-36 m depth.

Earlier records: Gulf of Aden: Djibouti (Apel, 2001; Galil, 2009). Socotra Island: Simões *et al.* (2001). Gulf of Oman: Galil (2009), Naderloo *et al.*(2015). Arabian Gulf: Apel (2001), Galil (2009), Naderloo & Türkay (2012), Naderloo *et al.* (2013).

Materials examined: 4♀♀(1 ovi) CL 7.7-9.9 mm, CW 7.6 - 9.3 mm Site 42 leg. FSM 27.05.05. 3♂♂ CL 8.9 - 9.6 mm, CW 9 - 9.7mm Site 42 leg. FSM 27.05.05. ♀ CL 9.5 mm, CW 9.6 mm Site 42 leg. FSM 26.05.05. ♂ CL 8.9 mm, CW 9 mm Site 42 leg. FSM 26.05.05. ♂ CL 10.7 mm, CW 10.8 mm Site 42 leg. FSM 26.05.05. ♀ CL 8.1 mm, CW 8.3 mm Site 30 leg. RUWW 09.03.84. ♂ CL 7.1 mm, CW 6.9 mm Site 22 leg. RUWW 12.03.84. ♂ CL 7.3 mm, CW 7.6 mm Site 30 leg. RUWW 28.10.84. ♂ CL 11.3 mm, CW 11.7 mm Site 22 leg. RUWW 12.03.83. ♀ CL 7 mm, CW 6.6 mm Site 22 leg. RUWW 15.02.84. ♂ CL 11.4 mm, CW 11.8 mm Site 22 leg. RUWW 15.02.84.

Philyra granigera Nobili, 1906
Plate 10 E

State: Recorded in Yemen, Gulf of Aden, sample locality 19, from corals, 10 m depth.

Earlier records: Red Sea: Mayun Island by Balss (1916), Vine (1986) without a specific location. Arabian Gulf and Gulf of Oman by Apel (2001).

Materials examined: ♀ CL 2.8 mm, CW 2.7 mm Site 19. leg. RUWW 01.02.85. 2♂♂ CL 4-4.1 mm, CW 3.9-4.1 mm Site 19 leg. RUWW 01.02.85.

Hiplyra variegata (Rüppell, 1830)
Plate 10 F

State: Recorded in Yemen, the Red Sea and the Gulf of Aden, sample localities 2, 17, 37, from subtidal sand and coral reefs, 2-7 m depth.

Earlier records: Red Sea: Egyptian coasts, Gulf of Suez, Eilat, Sinai, Ras Muhamad (Laurie, 1915; Galil, 2009); Eritrea**,** Dahlak Archipelago (Galil, 2009); Mayun Island (Nobili, 1906; Balls, 1916; Galil, 2009). Gulf of Aden: Aden and Djibouti (Nobili, 1906; Galil, 2009). Gulf of Oman: Apel (2001). Arabian Gulf: Apel (2001), Naderloo & Türkay (2012), Naderloo & Apel (2012).

Materials examined: 1 ovi.♀ CL 6.2 mm, CW 6 mm Site 17. leg. SMF 25.03.98. 7♂♂ CL 7.6 - 8.9 mm, CW 7.2 - 8.5 mm Site 17. leg. SMF 25.03.98. ♂ CL 8.7 mm, CW 8.6 mm Site 2. leg. SMF 13.04.98. .♀ CL 7.7 mm, CW 7.8 mm Site 37. leg. SMF 18.05.05. 2♂♂ CL 9 - 9.2 mm, CW 9.1 - 9.2 mm Site 37. leg. SMF 18.05.05.

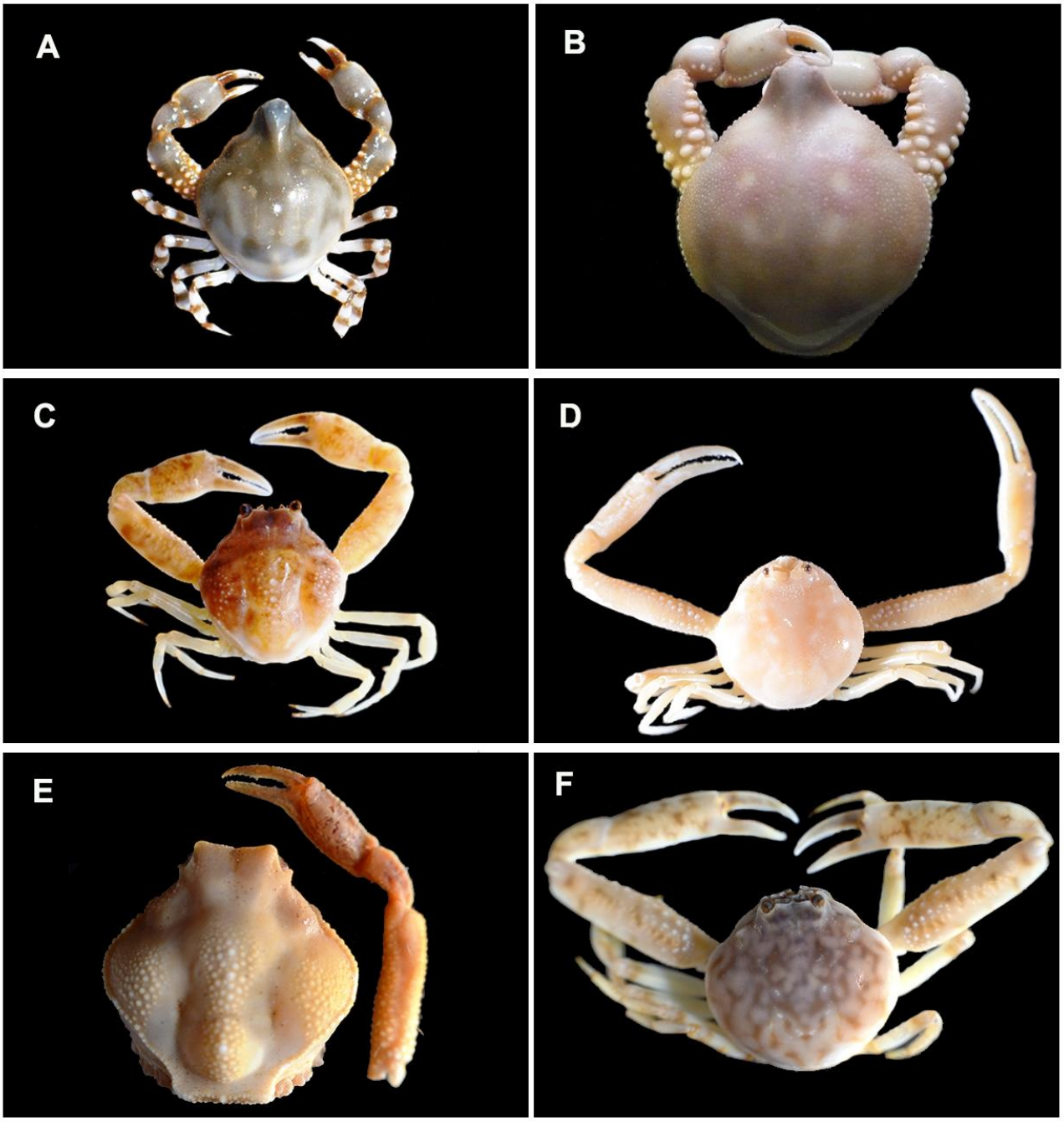

Plate 10: A. *Coleusia biannulata*, ♂ CL 16.7 mm, CW 14.4 mm; **B.** *Leucosia anatum*, ♂ CL 22.9 mm, CW 19.2 mm; **C.** *Ebalia abdominalis*, ♂ CL 11.4 mm, CW 11.8 mm; **D.** *Ryphila cancellus*, ♂ CL 11.3 mm, CW 11.7 mm; **E.** *Philyra granigera*, ♀ CL 4.1 mm, CW 4.1 mm; **F.** *Hiplyra variegata*, ♂ CL 9.2 mm, CW 9.2 mm.

Philyra cf. globus (Fabricius, 1775)
Plate 11 A

State: Recorded in Yemen, Gulf of Aden, sample locality 36 from corals, subtidal sand, 13-17 m depth. Not recorded in the Red Sea and the Arabian Sea.

Earlier records: Socotra Island: Apel (2001). Arabian Gulf: Apel (2001), Naderloo & Sari (2005). Gulf of Oman: Apel (2001), Naderloo & Sari (2005).

Remarks: A sample of gonopods is not available, so we have not identified the species sufficiently clearly.

Materials examined: ♀ CL 13.3 mm, CW 12.7 mm Site 17. leg. SMF 18.05.05. ♂ CL 13.3 mm, CW 12.7 mm Site 17. leg. SMF 18.05.05.

Nobiliella jousseaumei (Nobili, 1906)
Plate 11 B

State: First record in Yemen, Arabian Sea, sample locality 49 from subtidal sand, 20 m depth, and recorded in Gulf of Aden, sample localities 24, 42, 45 from subtidal sand and corals, 1-16 m depth. Not recorded in Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts by Laurie (1915); Mayun Island by Nobili (1906) under the synonym *Nursia jousseaumei* Nobili, 1906. Gulf of Aden: Djibouti, Obock by Nobili (1906).
Komatsu & Takeda (2003) have proposed a new leucosiid crab genus, *Nobiliella* n. gen., for *Nursia jousseaumei* Nobili, 1906 (type species) and *N. jousseaumei var. cornigera* Nobili, 1906, the latter of which should be raised to specific rank as *Nobiliella cornigera* n. comb. *Nobiliella* n. gen. 13♀♀, 3♂♂ samples were collected from the Red Sea: Mayun Island (site 12 in the present study) collected by Jousseaume, 1892 and put in MNHN.

Materials examined: ♂ CL 6.6 mm, CW 6.8 mm Site 49 leg. RUWW 21.04.85. ♀ CL 7.5 mm, CW 8.7 mm Site 24 leg. RUWW 16.01.84. 2♂♂ CL 7.1-7.5mm, CW 8.1-8.2 mm Site 24 leg. RUWW 16.01.84.♂ CL 10.1 mm, CW 9.5 mm Site 45. leg. SMF 27.05.05. ♂ CL 9 mm, CW 8.2 mm Site 42. leg. SMF 26.05.05. ♀ CL 8.3 mm, CW 8.1 mm Site 42. leg. SMF 26.05.05. ♂ CL 8.9 mm, CW 8.6 mm Site 42. leg. SMF 26.05.05.

Nobiliella cornigera (Nobili, 1906)
Plate 11 C

State: Recorded in Yemen, Red Sea sample locality 2 from subtidal sand, 5-20 m depth. Not recorded in Gulf of Aden, Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts by Laurie (1915); Mayun Island (Nobili, 1906; Komatsu & Takeda, 2003). Gulf of Aden: Djibouti, Obock (Nobili, 1906; Komatsu & Takeda, 2003).

Materials examined: ♀ CL 4.4 mm, CW 5.2 mm Site 2. leg. SMF 13.04.98.

Ixa holthuisi Tirmizi, 1970
Plate 11 D

State: First record in Yemen, Gulf of Aden, sample localities 17, 30, from subtidal sand, 2-30 m depth. Not recorded in the Red Sea and Arabian Sea.

Earlier records: Arabian Gulf: Apel (2001), Naderloo (2017). Gulf of Oman: Stephensen (1946).

Materials examined: ♀ CL 18.8 mm, CW 27.8 mm Site 30 leg. RUWW 30.05.84. ♂ CL 20.5 mm, CW 31 mm Site 30 leg. RUWW 30.05.84. ♂ CL 7.3 mm, CW 10.5 mm Site 17. leg. SMF 25.03.98.

Arcania undecimspinosa de Haan, 1841
Plate 11 E

State: Recorded in Yemen, Gulf of Aden, sample locality 21, from subtidal sand, 30 m depth. Not recorded in the Red Sea, Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Gulf of Aden: Djibouti (Apel, 2001). In Djibouti coasts at Gulf of Aden, another species of Arcania, *Arcania septemspinosa* (Fabricius, 1787) has been recorded by Galil (2001).

Materials examined: ♀ CL 19.1 mm, CW 16.8 mm Site 21 leg. RUWW 31.05.84. 2♀♀(1. Ovi) CL 9.8-11 mm, CW 8.8-9.8 mm Site 21 leg. RUWW 18.06.85.

Arcania cf. tuberculata Bell, 1855
Plate 11 F

State: Recorded in Yemen, Gulf of Aden, sample locality 17, from subtidal sand, 2-7 m depth. Not recorded in the Red Sea, Arabian Sea and Gulf of Oman.

Earlier records: Arabian Gulf: Galil *et al.* (2012).

Remarks: Only one female specimen available, so the identification without gonopods remains somewhat uncertain.

Materials examined: 2♀♀ CL 7.9-8.7 mm, CW 7.5-7.6 mm Site 17 leg. SMF 25.03.98.

Arcania gracilis Henderson, 1893
Plate 12 A

State: First record in Yemen, Gulf of Aden, at sample locality 21 from subtidal sand, 30 m depth.

Earlier records: Red Sea: Galil (2001). Gulf of Oman: Galil (2001). Arabian Gulf: An unknown locality by Alcock and Anderson (Naderloo, 2017).

Materials examined: ♂ CL 14.2 mm, CW 12.4 mm Site 21 leg. RUWW 30.05.84.

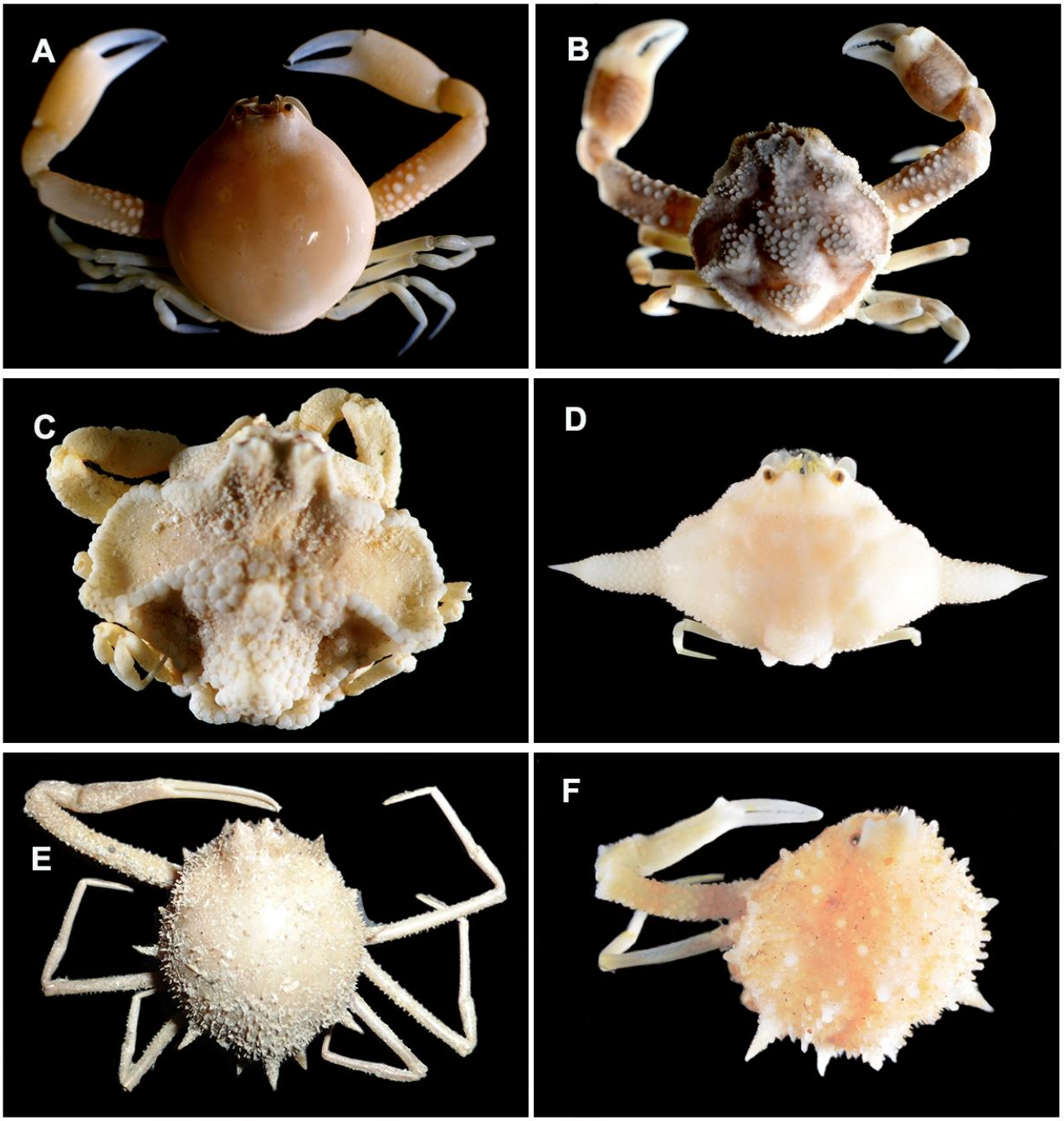

Plate 11: A. *Philyra cf. globus*, ♂ CL 13.3 mm, CW 12.7 mm; **B.** *Nobiliella jousseaumei*, ♂ CL 7.1 mm, CW 8.1 mm; **C.** *Nobiliella cornigera*, ♀ CL 4.4 mm, CW 5.2 mm; **D.** *Ixa holthuisi*, ♂ CL 20.5 mm, CW 31 mm; **E.** *Arcania undecimspinosa*, ♀ CL 19.1 mm, CW 16.8 mm; **F.** *Arcania cf. tuberculata*, ♀ CL 8.7 mm, CW 7.6 mm.

Nursilia dentata Bell, 1855
Plate 12 B

State: First record in Yemen, Gulf of Aden, at sample locality 14 from subtidal sand, 50 m depth. Not recorded in the Red Sea and Gulf of Oman.

Earlier records: Arabian Gulf: Apel (2001). Arabian Sea: Oman (Naderloo, 2017).

Materials examined: ♀ CL 10.5 mm, CW 10.9 mm Site 14 leg. RUWW 27.06.85.

Myra subgranulata Kossmann, 1877
Plate 12 C, D

State: Recorded in Yemen, Gulf of Aden, sample localities 21, 22, 30 from subtidal sand, 30-36 m depth. Not recorded in the Arabian Sea and Gulf of Oman.

Earlier records: Red Sea: Gulf of Suez, Palmahim, Haifa Bay (Laurie, 1915; Galil, 2001); Eritrea**,** Dahlak Archipelago (Galil, 2001). Arabian Gulf: Galil (2012), Naderloo (2017).

Materials examined: ♀ CL 36.1 mm, CW 28.5 mm Site 30 leg. RUWW 30.05.84. ♀ CL 24.8 mm, CW 19.6 mm Site 22 leg. RUWW 15.02.84. ♂ CL 32.8 mm, CW 24.5 mm Site 21 leg. RUWW 31.05.84.

Leucisca rubifera (Müller, 1887)
Plate 12 E

State: First record in Yemen, Gulf of Aden, at sample locality 43 from subtidal sand, 13-17 m depth.

Earlier records: Red Sea: Coasts of Sudan under the synonym *Nursia rubifera* Müller 1887 by Laurie (1915). Arabian Gulf: Under the synonym *Nursia rubifera* Müller, 1887 by Apel (2001), Naderloo & Türkay (2012), Naderloo *et al.* (2013). Gulf of Oman: Naderloo *et al.* (2015).

Materials examined: 1 Juv CL 2.5 mm, CW 2.9 mm Site 43 leg. SMF 27.05.05.

Cryptocnemus cf. pentagonus Stimpson, 1858
Plate 12 F

State: First record in Yemen, Gulf of Aden, at sample locality 36 from corals, 13-17 m depth. Not recorded in the Red Sea, Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Arabian Sea: Oman, Dhofar Province the genus only (*Cryptocnemus* sp.) by Khvorov *et al.* (2012).

Remarks: Only one female specimen available, so the identification without gonopods remains somewhat uncertain.

Materials examined: ♀ CL 5.7 mm, CW 9.6 mm Site 36 leg. SMF 18.05.05.

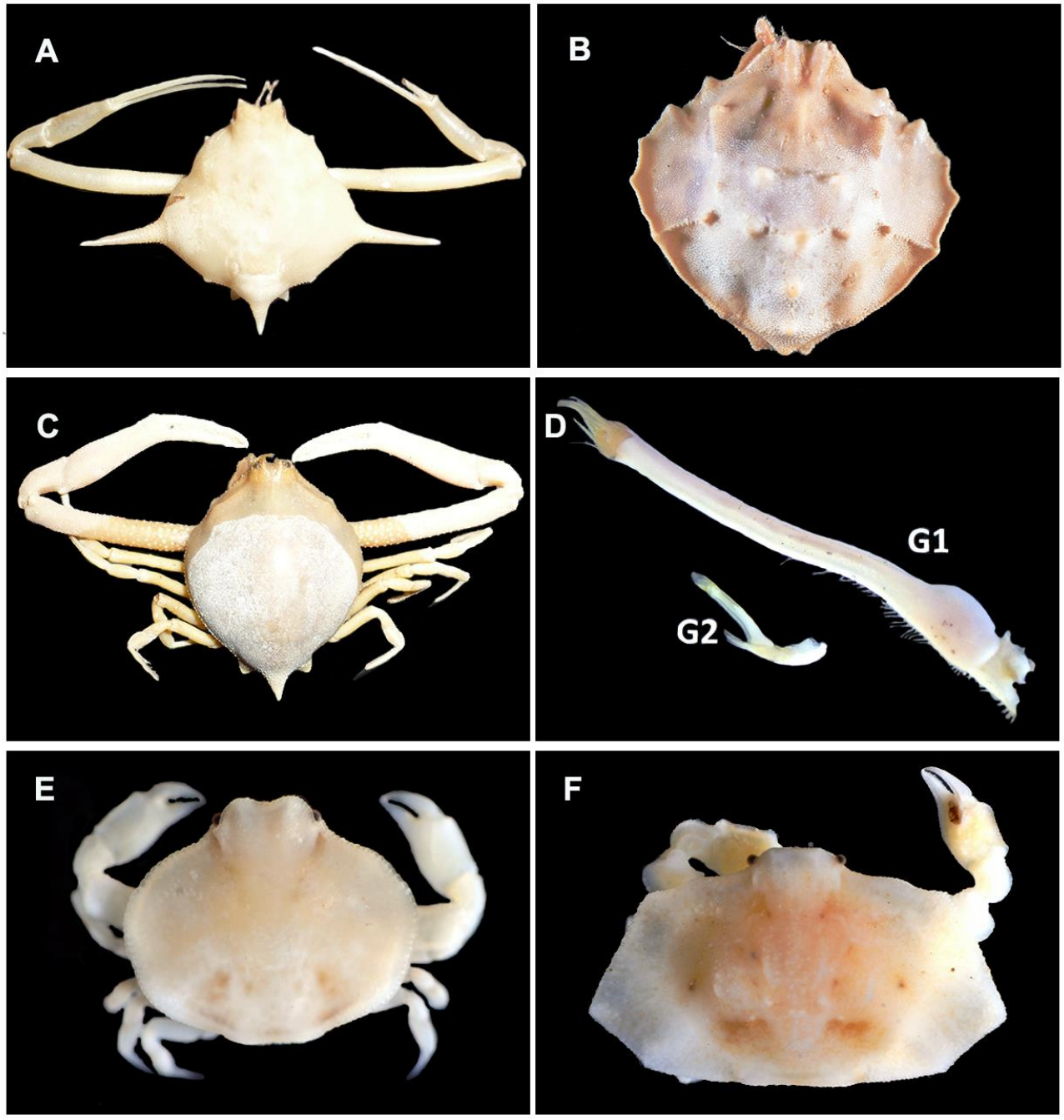

Plate 12: A. *Arcania gracilis*, ♂ CL 14.2 mm, CW 12.4 mm; **B.** *Nursilia dentata*, ♀ CL 10.5 mm, CW 10.9 mm; **C.** *Myra subgranulata*, ♂ CL 32.8 mm, CW 24.5 mm; **D.** *Myra subgranulata*, G1, 13.9 mm & G2; **E.** *Leucisca rubifera*, Juv CL 2.5 mm, CW 2.9 mm; **F.** *Cryptocnemus cf. pentagonus*, ♀ CL 5.7 mm, CW 9.6 mm.

Superfamily Majoidea Samouelle, 1819
Family Majidae Samouelle, 1819

Schizophrys aspera H. Milne Edwards, 1834
Plate 13 A, B

State: Recorded in Yemen, Gulf of Aden, at sample localities 18, 26, 28, 33, 34, 41, 42, 45 from corals, 1- 20 m depth. Also records in the Red Sea, sample locality 8, from corals, 3- 6 m depth.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Kamaran Island (Balss, 1929); Hudaydah coasts (Krupp *et al.*, 2006); Elat and Dahlak Archipelago (Griffin & Tranter, 1974); other coasts (Vine, 1986). Gulf of Aden: Aden, first records by Al-Hindi (2010). Socotra Island: Apel (2001). Arabian Sea: Oman (Khvorov *et al.*, 2012). Gulf of Oman: Apel (2001). Arabian Gulf: Naderloo & Türkay (2012), Naderloo *et al.* (2013).

Materials examined: Data, see appendix.

Micippa platipes Rüppell, 1830
Plate 13 C, D

State: Recorded in Yemen, Gulf of Aden, sample locality 29 from subtidal rock, 1-2 m depth. Also recorded in Socotra Island, sample locality 54 from subtidal rock, 1-2 m depth.

Earlier records: Red Sea: Gulf of Elat, Ras Atantur, Sinai Peninsula, Sharm Sheikh (Griffin & Tranter, 1974); Eretria, Dahlak Archipelago (Griffin & Tranter, 1974), Vine (1986) without a specific location; Mayun Island (Nobili, 1906). Socotra Island: Simões *et al.* (2001), Apel (2001). Arabian Sea: Oman, Dhofar Province (Khvorov *et al.*, 2012). Gulf of Oman: Naderloo *et al.* (2015). Arabian Gulf: Naderloo & Türkay (2012), Naderloo *et al.* (2013), Naderloo (2017).

Materials examined: ♀ CL 22.2 mm, CW 16 mm Site 29, leg. RUWW 20.01.85. ♀ CL 18.9 mm, CW 16 mm Site 54, leg. RUWW 01.03.85. ♂ CL 27.7 mm, CW 22.1 mm Site 54, leg. RUWW 01.03.85.

Cyclax spiniscinctus Heller, 1861
Plate 13 E

State: Recorded in Yemen, Gulf of Aden, sample locality 30 from subtidal sand, 60 m depth. Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Gulf of Aqaba, Elat, Gulf of Suez (Griffin & Tranter, 1974). Gulf of Aden: Takeda (1989).

Materials examined: ♀ CL 13.3 mm, CW 10.3 mm Site 30, leg. RUWW 10.11.84.

Majidae. gen. sp. 1.
Plate 13 F

State: Recorded in Yemen, Gulf of Aden, sample locality 30 from subtidal sand, 60 m depth.

Materials examined: ♀ CL 9.4 mm, CW 7.1 mm Site 30, leg. RUWW 10.11.84.

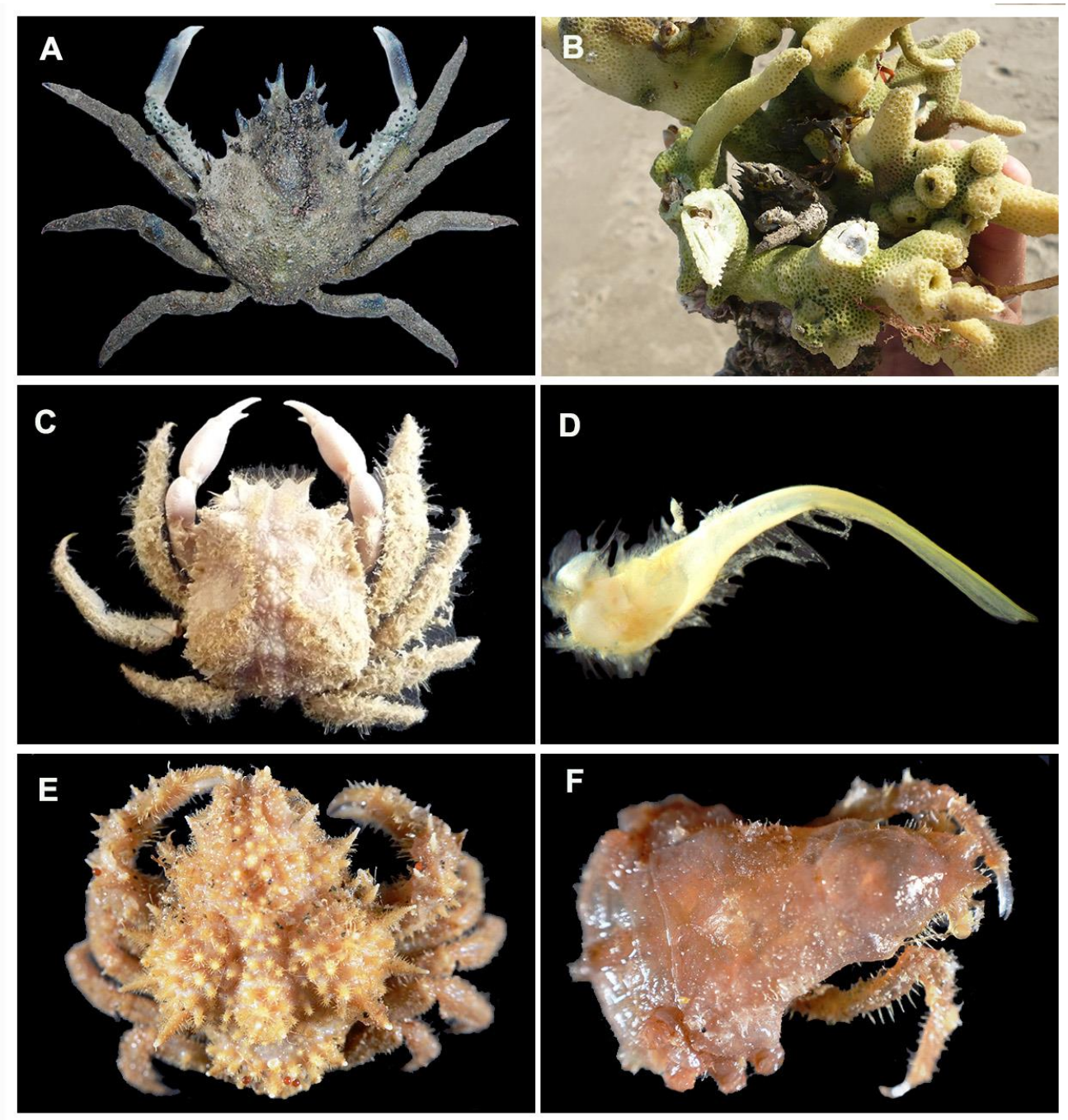

Plate 13: A. *Schizophrys aspera*, ♂ CL 56.2 mm, CW 48.9 mm; **B.** *Schizophrys aspera* inside a branch of corals; **C.** *Micippa platipes*, ♂ CL 27.7 mm, CW 22.1 mm; **D.** *Micippa platipes* G1, 7.6 mm; **E.** *Cyclax spinicinctus* , ♀ CL 13.3 mm, CW 10.3 mm; **F.** Majidae.gen. sp. 1, ♀ CL 7.1 mm, CW 7.1 mm.

***Seiitaoides cf. stimpsonii* (Miers, 1884)**

Plate 14 A, B

State: Recorded in Yemen, Gulf of Aden, at sample locality 27 in the subtidal sand, 20 m depth. Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Gulf of Elat under the synonym *Eurynome stimpsoni* Miers, 1884 by Griffin & Tranter (1974).

Remarks: A reference containing the shape of the gonopods is not available, so the identification remains somewhat uncertain.

Materials examined: ♀ CL 5.2 mm, CW 3.5 mm Site 27 leg. RUWW 13.05.85. 4♂♂ CL 5.1-10.2 mm , CW 3.3-7 mm Site 27 leg. RUWW 13.05.85.

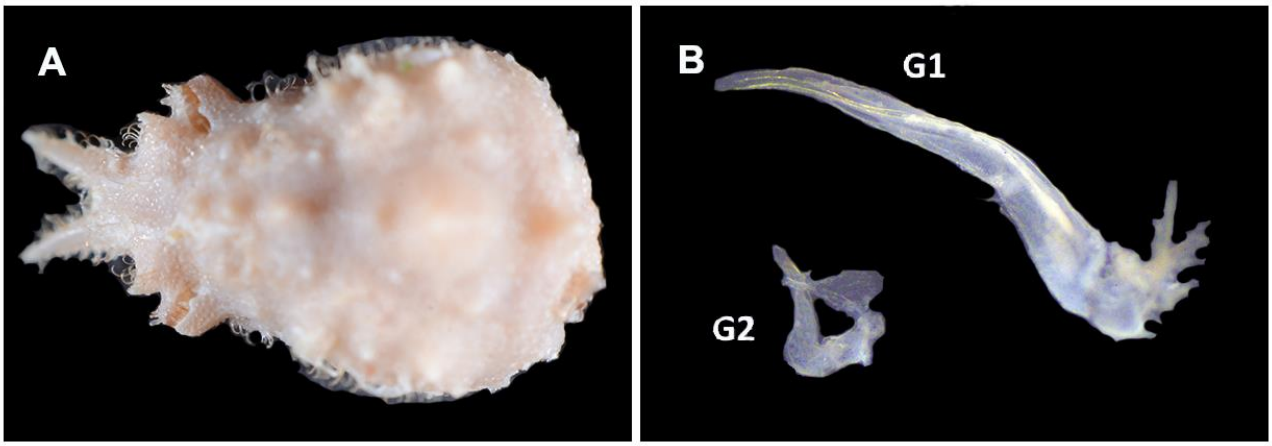

Plate 14: A. *Seiitaoides cf. stimpsonii*, ♂ CL 10.2 mm; CW 7 mm; **B.** Male G1, 2.4 mm & G2 *Seiitaoides cf. stimpsonii.*

Family Epialtidae MacLeay, 1838

***Stilbognathus cervicornis* (Herbst, 1803)**

Plate 15 A, B

State: Recorded in Yemen, Gulf of Aden and Arabian Sea, sample localities 18, 22, 42, 49 from sponge area, 1-20 m depth. Not recorded in the Arabian Sea and Gulf of Oman.

Earlier records: Red Sea: Gulf of Elat, Dahlak Archipelago (Griffin & Tranter, 1974), Vine (1986) without a specific location. Gulf of Aden: From mouth of the gulf, 11° 24' N, 51° 35' E (Griffin, 1974); Aden (Al-Hindi, 2010). Socotra Island: Apel (2001). Arabian Gulf: Apel (2001).

Materials examined: 2♂♂ CL 27.2-32.5 mm, CW 18-21.3 mm Site 18 leg. AUAA 2008. 2♀♀ CL 30-30.2 mm, CW 19-19.4 mm Site 22 leg. AUAA 01.08.10. 3♂♂ CL 26-31.1 mm, CW 16.8-20.5 mm Site 22 leg. AUAA 01.08.10. ♂ CL 12 mm ,CW 7.5 mm Site 49 leg. RUWW 13.05.85. ♀ CL 18.7 mm, CW 10.5 mm Site 42 leg. FSM 26.05.05.

Hyastenus hilgendorfi De Man, 1887
Plate 15 C

State: First record in Yemen, Gulf of Aden, at sample localities 30, 33 and records in Arabian Sea, at sample locality 50, from subtidal sand, 15-61 m depth.

Earlier records: Red Sea: Griffin (1974). Arabian Sea: Oman, Dhofar Province (Khvorov *et al.*, 2012). Gulf of Oman: Naderloo *et al.* (2015). Arabian Gulf: Apel (2001), Naderloo & Sari (2007), Naderloo & Türkay (2012), Naderloo *et al.* (2013).

Materials examined: ♀ CL 24.8 mm, CW 16.8 mm Site 30 leg. RUWW 10.11.84. ♀ CL 19.6 mm, CW 14.2 mm Site 50 leg. RUWW 01.03.84. ♀ CL 10.7 mm, CW 7.8 mm Site 33 leg. FSM 14.05.05.

Hyastenus brockii de Man, 1887
Plate 15 D

State: First record in Yemen, Gulf of Aden, at sample locality 27 from subtidal sand, 20 m depth (only one male specimen). Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Klunzinger, 1906; Laurie, 1915).

Materials examined: ♂ CL 8.9 mm ,CW 6.3 mm Site 27 leg. RUWW 26.01.84.

Huenia heraldica (De Haan, 1837)
Plate 15 E

State: Recorded in Yemen, Gulf of Aden, sample localities 35, 42 from subtidal sand, 5-16 m depth. Not recorded in Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts by Laurie (1915) under the synonym *Huenia proteus* De Haan, 1839; Gulf of Elat under the synonym *Huenia proteus* De Haan, 1839 by Griffin & Tranter (1974); (Nobili, 1906; Vine, 1986) without a specific location. Gulf of Aden: Djibouti (Nobili, 1906). Socotra Island: Simões *et al.* (2001). Arabian Sea: Oman, Dhofar Province (Khvorov *et al.*, 2012).

Materials examined: ♀ovi. CL 15.5 mm, CW 8.4 mm Site 42 leg. SMF 27.05.05. 3♀♀ (1.ovi) CL 11.9-15.6 mm, CW 9.7-12.6 mm Site 42 leg. SMF 26.05.05. ♀ CL 12.8 mm, CW 8.1 mm Site 35 leg. SMF 19.05.05.

Acanthonyx limbatus A. Milne-Edwards, 1862
Plate 15 F

State: First record in Yemen, Gulf of Aden, at sample localities 36, 42 from subtidal sand, 7-17 m depth. Not recorded in the Red Sea.

Earlier records: Socotra Island: Apel (2001). Arabian Sea: Oman (Khvorov *et al.*, 2012). Arabian Gulf: Apel (2001), Naderloo & Türkay (2012).

Materials examined: 2♀♀ (1.ovi) CL 9.8-10.9 mm, CW 7-7.1 mm Site 42 leg. SMF 26.05.05. 6♂♂ CL 6.9-10.7 mm, CW 5.4-6.9 mm Site 42 leg. SMF 26.05.05. ♀ CL 11.5 mm, CW 9.7 mm Site 36 leg. SMF 18.05.05.

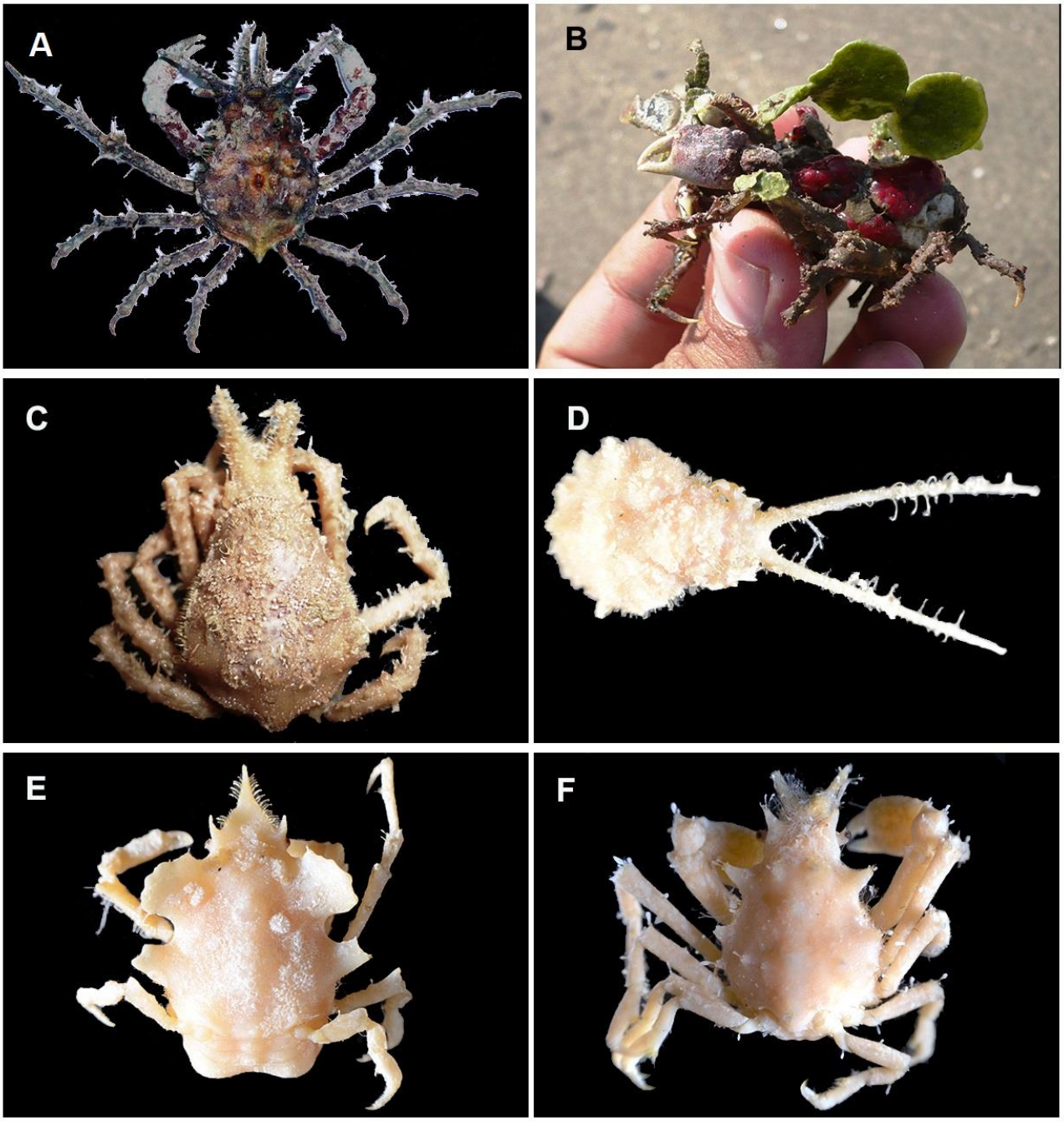

Plate 15: A. *Stilbognathus cervicornis*, ♂ CL 31.1 mm, CW 20.5 mm; **B.** *Stilbognathus cervicornis*, life specimens carry some marine alga; **C.** *Hyastenus hilgendorfi*, ♀ CL 24.8 mm, CW 16.8 mm; **D.** *Hyastenus brockii*, ♂ CL 8.9 mm, CW 6.3 mm; **E.** *Huenia heraldica*, ♀ CL 15.5 mm, CW 8.4 mm; **F.** *Acanthonyx limbatus*, ♂ CL 10.7 mm, CW 6.9 mm.

Simocarcinus simplex (Dana, 1851)
Plate 16 A, B

State: Recorded in Yemen, Gulf of Aden, sample locality 34 from subtidal sand, 15-30 m depth. Not recorded in the Arabian Gulf and Gulf of Oman.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Gulf of Elat (Griffin & Tranter, 1974), Vine (1986) without a specific location. Gulf of Aden: Djibouti (Nobili, 1906). Arabian Sea: Pakistan (Tirmizi & Kazmi, 1991).

Materials examined: 3♂♂ CL 9.1-17.3 mm, CW 3-4.5 mm Site 34 leg. SMF 22.05.05.

Tylocarcinus styx (Herbst, 1803)
Plate 16 C

State: Recorded in Yemen, Gulf of Aden, sample localities 27, 33, 34, 39, 41 from corals, 1-10 m depth. Also recorded in the Red Sea, sample locality 8 from corals, 3-6 m depth. Not recorded in the Arabian Gulf and Gulf of Oman.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Gulf of Elat (Griffin & Tranter, 1974); Zebejir Island (Balss, 1929); Hudaydah coasts (Krupp *et al.*, 2006), Vine (1986) without a specific location. Gulf of Aden: Djibouti (Nobili, 1906). Arabian Sea: Oman, Dhofar Province (Khvorov *et al.*, 2012).

Materials examined: ♀ CL 19.2 mm, CW 12.6 mm Site 8 leg. SMF 08.04.04. ♀ ovi. CL 18.4 mm, CW 11.9 mm Site 39 leg. SMF 24.05.05. ♂ CL 15 mm, CW 9.3 mm Site 39 leg. SMF 24.05.05. ♀ ovi. CL 14.4 mm, CW 11.3 mm Site 33 leg. SMF 19.05.05. ♂ CL 10.3 mm, CW 6.3 mm Site 34 leg. SMF 19.05.05. ♀ CL 16.5 mm, CW 11 mm Site 39 leg. SMF 24.05.05. 2♀♀ CL 10.5-10.8 mm, CW 6.6 - 7 mm Site 41 leg. SMF 26.05.05. 1Juv CL 5.9 mm, CW 4.2 mm Site 41 leg. SMF 26.05.05. ♀ CL 19.4 mm ,CW 12.5 mm Site 27 leg. RUWW 01.01.84.

Menaethius monoceros (Latreille, 1825)
Plate 16 D

State: Recorded in Yemen, Gulf of Aden, sample localities 41, 42 in the subtidal sand, 6-20 m depth.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Gulf of Elat, Ras Atantur, Sinai Peninsula (Griffin & Tranter, 1974); Eretria, Dahlak Archipelago (Griffin & Tranter, 1974); Mayun Island (Nobili, 1906; Balss, 1929), Vine (1986) without a specific location. Gulf of Aden: Djibouti (Nobili, 1906). Socotra Island: Simões *et al.* (2001), Apel (2001). Arabian Sea: Oman (Khvorov *et al.*, 2012). Gulf of Oman: Naderloo *et al.* (2015). Arabian Gulf: Apel (2001), Naderloo & Türkay (2012).

Materials examined: ♀ CL 12.5 mm, CW 6.2 mm Site 42 leg. SMF 28.05.05. ♀ CL 7 mm, CW 4.8 mm Site 41 leg. SMF 26.05.05.

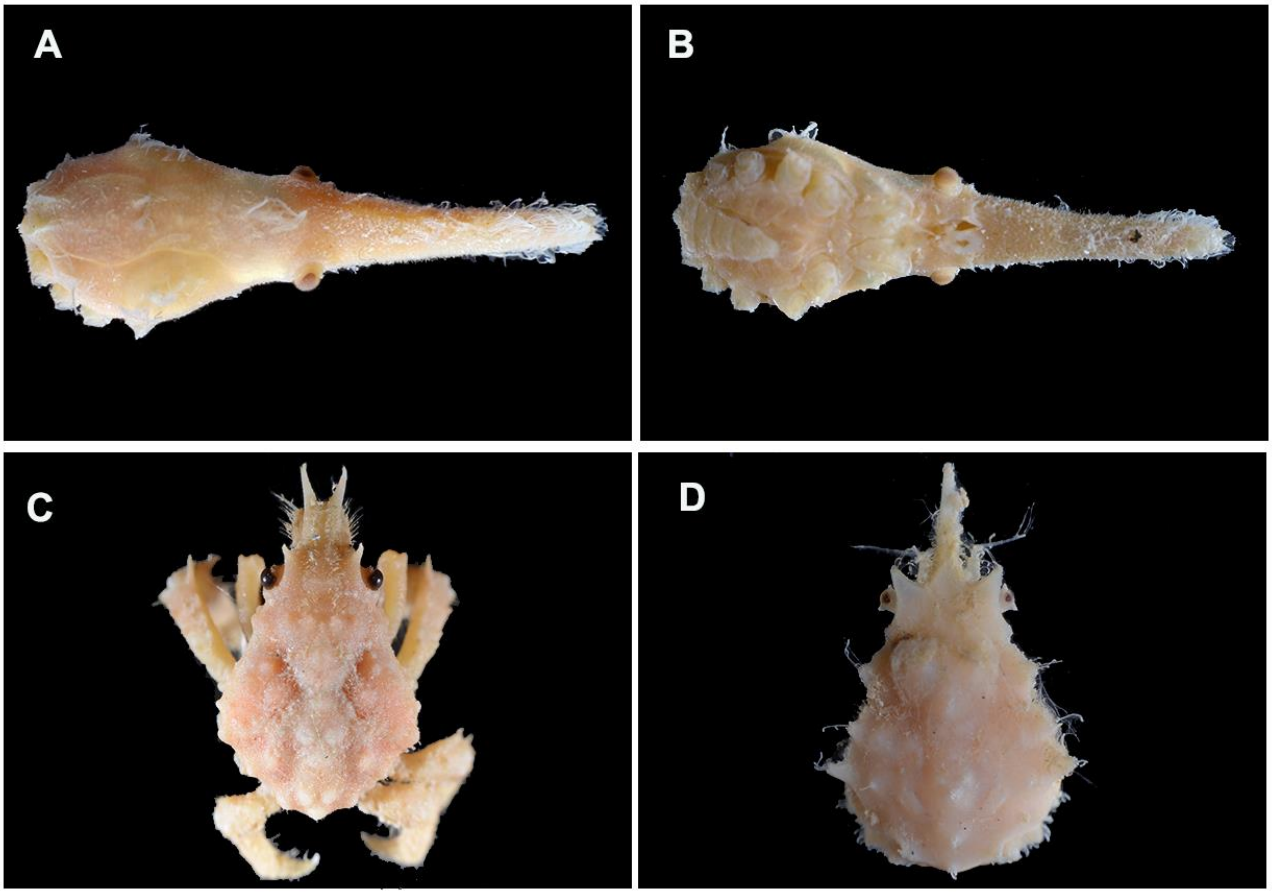

Plate 16: A. *Simocarcinus simplex*, ♂ CL 17.3 mm, CW 4.5 mm (Dorsal view); **B.** *Simocarcinus simplex*, (Ventral view); **C.** *Tylocarcinus styx*, ♂ CL 15 mm, CW 9.3 mm; **D.** *Menaethius monoceros*, ♀ CL 12.5 mm, CW 6.2 mm.

Family Inachidae MacLeay, 1838

Cyrtomaia cf. goodridgei McArdle, 1900

Plate 17 A, B

State: First record in Yemen, Gulf of Aden, at sample locality 21 from subtidal sand, 30 m depth. We have only one female specimen in MMSBRA. Not recorded in the Red Sea, Arabian Sea, Gulf of Oman and Arabian Gulf, hence it is the first record in the marine waters of the Arabian Peninsula.

Remarks: Only one female specimen available, so the identification without gonopods remains somewhat uncertain.

Materials examined: ♀ CL 45 mm, CW 45.2 mm Site 21, leg. MMSBRA 01.01.84.

Sunipea indicus (Alcock, 1895)
Plate 17 C

State: Recorded in Yemen, Gulf of Aden, sample localities 26, 30 from subtidal sand, 60 m depth. Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records in the Red Sea: Gulf of Elat by Griffin & Tranter (1974) under the synonym *Aepinus indicus* Alcock. Gulf of Aden: From mouth of the gulf, 11° 24' N, 51° 35' E, 75-175 m depth, under the synonym *Aepinus indicus* Alcock by Griffin (1974).

Materials examined: 3♀♀ CL 10.8-13.2 mm ,CW 6.3-8.3 mm Site 30 leg. RUWW 10.11.84. 5♂♂ CL 7.7-15.5 mm , CW 5.3-9.6 mm Site 26 leg. RUWW 10.11.84.

Macropodia formosa Rathbun, 1911
Plate 17 D

State: Recorded in Yemen, Gulf of Aden, sample locality 42 from subtidal sand, 20 m depth. Not recorded in the Red Sea, Arabian Sea and Gulf of Oman.

Earlier records: Gulf of Aden: Griffin (1974). Socotra Island: Apel (2001). Arabian Gulf: Apel (2001), Naderloo (2017).

Materials examined: 3♀♀ CL 5.1-10.9 mm ,CW 3.7 - 6.1 mm Site 42 leg. RUWW 13.05.85. 3♂♂ CL 7.1-7.9 mm , CW 4.6-5.3 mm Site 42 leg. RUWW 13.05.85.

Camposcia retusa (Latreille, 1829)
Plate 17 E

State: First record in Yemen, Gulf of Aden, at sample localities 33, 41, 42, 46 from subtidal sand, 2-16 m depth. Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Gulf of Elat (Griffin & Tranter, 1974), Vine (1986) without a specific location.

Materials examined: ♀ CL 10.7 mm, CW 6.8 mm Site 41 leg. SMF 28.05.05. ♀ CL 33.3 mm, CW 23.8 mm Site 33 leg. SMF 27.05.05. ♂ CL 13.2 mm, CW 10.4 mm Site 42 leg. SMF 28.05.05. ♂ CL 26.4 mm, CW 20 mm Site 42 leg. SMF 28.05.05. ♀ CL 29.9 mm, CW 24.2 mm Site 46 leg. SMF 27.05.05.

Inachus dorsettensis (Pennant, 1777)
Plate 17 F

State: Recorded in Yemen, Gulf of Aden, sample locality 42 from subtidal sand, 300 m depth (only 1♀ specimen). Not recorded in the Red Sea, Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Gulf of Aden: From mouth of the gulf, 11° 24' N, 51° 35' E, 75-175 m depth (Griffin, 1974). Not recorded in the Gulf of Aden after this time until this present study.

Materials examined: ♀ CL 11.7 mm, CW 10.8 mm Site 42 leg. RUWW 15.05.85.

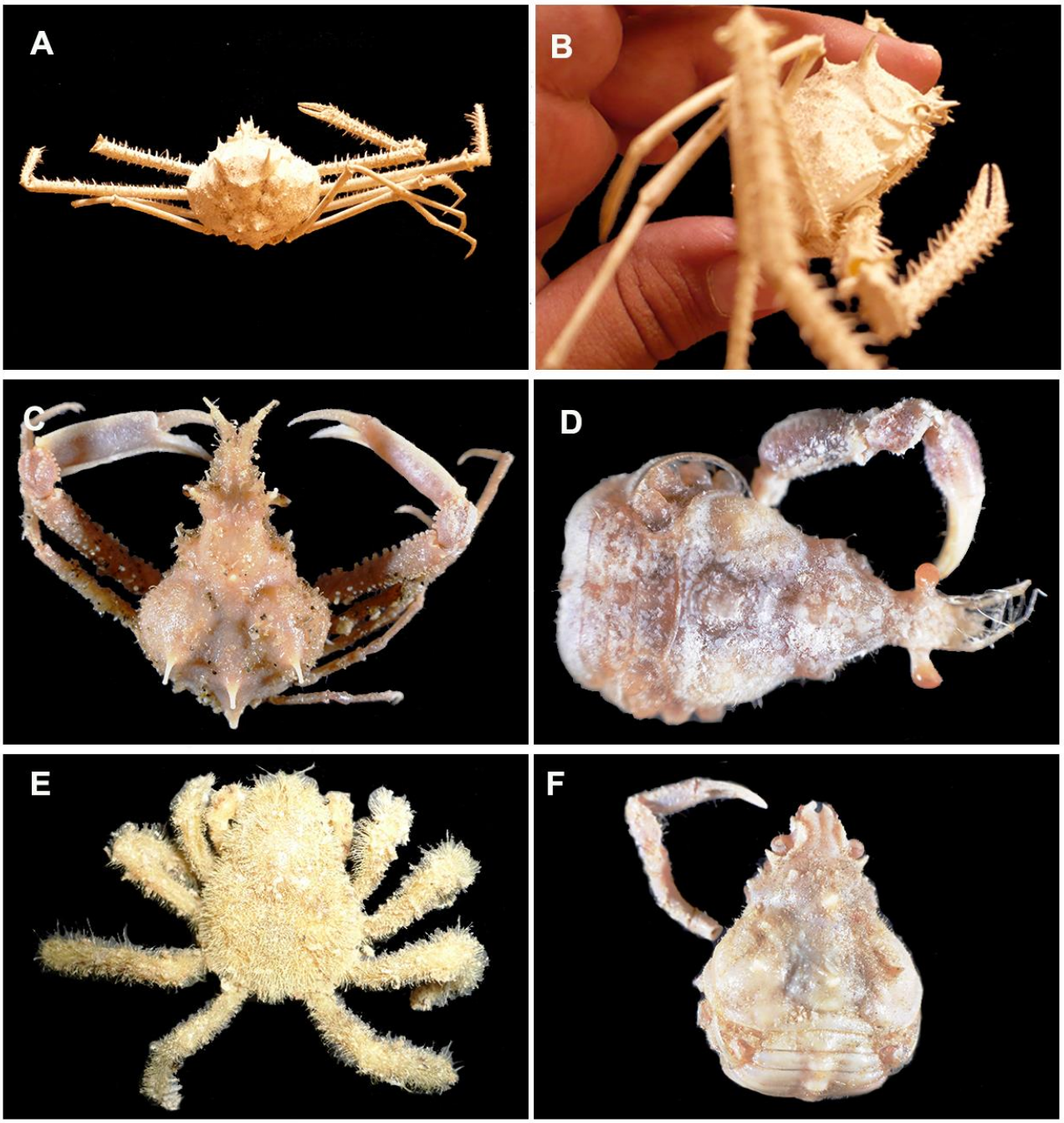

Plate 17: A. *Cyrtomaia cf. goodridgei* , ♀ CL 45.1 mm, CW 45.2 mm (dorsal view); **B.** *Cyrtomaia cf. goodridgei*, (side view); **C.** *Sunipea indicus*, ♂ CL 15.5 mm, CW 9.6 mm; **D.** *Macropodia formosa*, ♀ CL 10.9 mm, CW 6.1 mm; **E.** *Camposcia retusa*, ♂ CL 26.4 mm, CW 20 mm; **F.** *Inachus dorsettensis*, ♀ CL 11.7 mm, CW 10.8 mm.

Superfamily Parthenopoidea MacLeay, 1838
Family Parthenopidae MacLeay, 1838

Daldorfia spinosissima (A. Milne-Edwards, 1862)
Plate 18 A, B

State: First record in Yemen, Gulf of Aden, at sample locality not exactly defined, in subtidal sand, 60 m depth. Only one female specimen was taken from MMSBRA. Not recorded in the Red Sea, Arabian Sea and the Arabian Gulf.

Earlier records: Socotra Island: First record (Tan & Ng, 2007). Gulf of Oman: Muscat (Khvorov *et al.*, 2012).

Materials examined: ♀ CL 49.8 mm, CW 72.3 mm, leg. RUWW 1989.

Daldorfia horrida (Linnaeus, 1758)
Plate 18 C

State: Recorded in Yemen, Gulf of Aden, sample locality 24 from subtidal sand, 1-2 m depth (only one female specimen). Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts by Laurie (1915) under the synonym *Parthenope horrida* (Linnaeus, 1758); Kamaran Island (Balss, 1922), Vine (1986), Tan & Ng (2007) without a specific location. Gulf of Aden: Aden (Al-Hindi, 2010), Djibouti (Tan & Ng, 2007). Socotra Island: Tan & Ng (2003).

Materials examined: ♀ CL 46.4 mm, CW 73.3 mm Site 24, leg. AUAA 2008.

Furtipodia petrosa (Klunzinger, 1906)
Plate 18 D

State: First record in Yemen, Gulf of Aden, at sample locality 35 from subtidal sand, 6-7 m depth (only one female specimen). Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Klunzinger, 1906; Laurie, 1915) under the synonym *Heterocrypta petrosa* Klunzinger, 1906. Socotra Island: Tan & Ng (2003).

Materials examined: ♀ CL 16.6 mm, CW 27 mm Site 35, leg. SMF 17.05.05.

Aethra scruposa (Linnaeus, 1764)
Plate 18 E, F

State: First record in Yemen, Gulf of Aden, at sample locality 27 from subtidal sand, 2 m depth (only one female specimen).

Not recorded in the Red Sea, Arabian Sea, Gulf of Oman and Arabian Gulf. Therefore, this recorded is considered the first record in the marine waters of the Arabian Peninsula.

Materials examined: ♀ CL 48.2 mm, CW 68.8 mm Site 27, leg. RUWW 01.03.84.

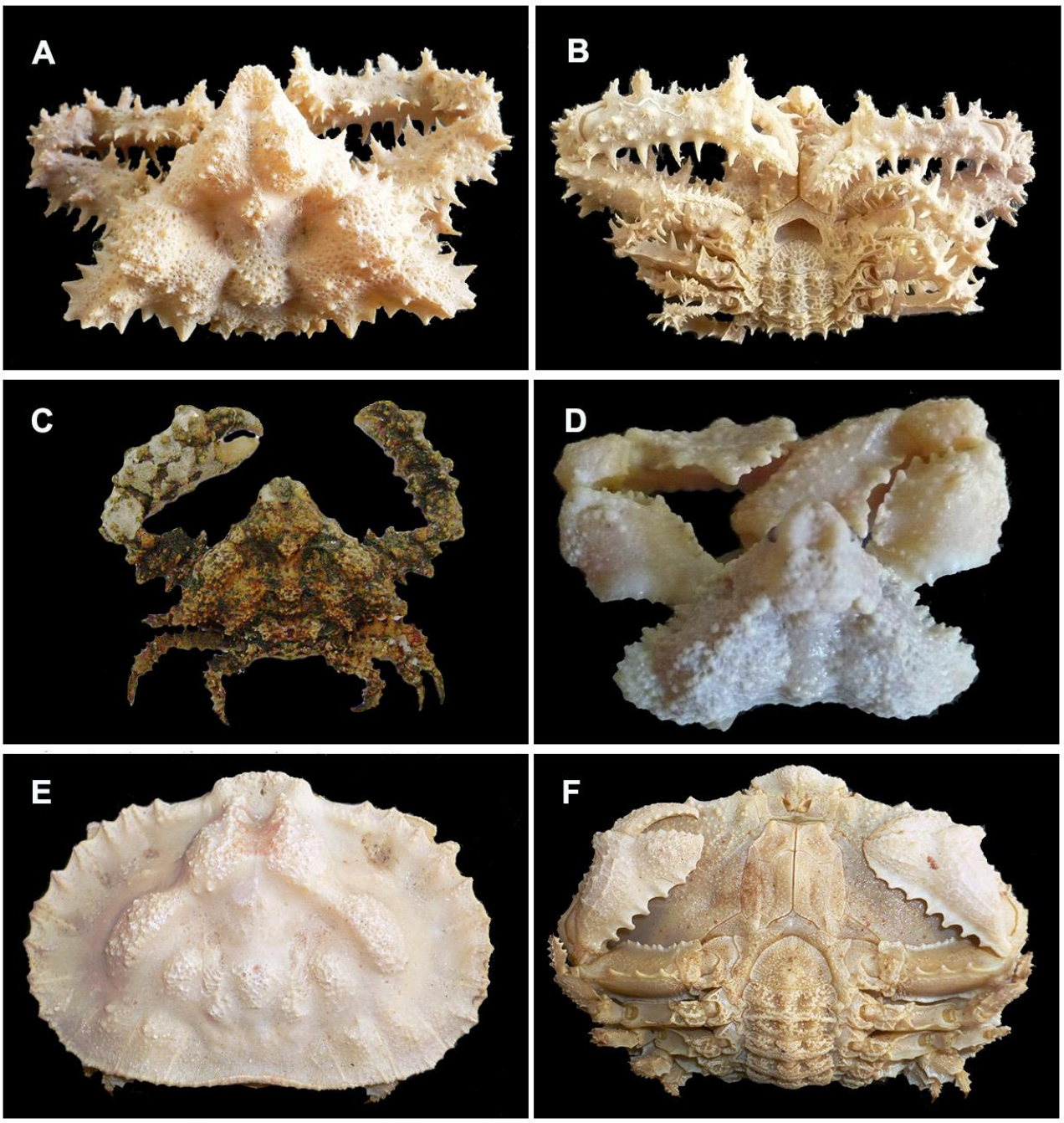

Plate 18: A. *Daldorfia spinosissima*, ♀ CL 49.8 mm (dorsal view), CW 72.3 mm; **B.** *Daldorfia spinosissima* (ventral view);**C.** *Daldorfia horrida*, ♀ CL 46.4 mm, CW 73.3 mm; **D.** *Furtipodia petrosa,* ♀ CL 16.6 mm, CW 27 mm; **E.** *Aethra scruposa,* ♀ CL 48.2 mm, CW 68.8 mm (dorsal view); **F.** *Aethra scruposa* (ventral view).

Parthenope longimanus (Linnaeus, 1758)
Plate 19 A

State: First record in Yemen, Gulf of Aden, at sample locality 17 from subtidal sand, 18 m depth and records in the Red Sea, sample locality 8 from subtidal sand, 3-18 m depth (Krupp *et al*., 2006: *Parthenope* sp.). Not recorded in the Arabian Sea and Gulf of Oman.

Earlier records: Red Sea: Hudaydah coasts as *Parthenope* sp. by Krupp *et al.* (2006). Arabian Gulf: Apel (2001), Naderloo & Sari (2007).

Materials examined: ♀ CL 29.6 mm, CW 27.7 mm Site 17, leg. RUWW 09.10.84. 1 Juv CL 8.3 mm, CW 9 mm Site 8, leg. SMF 07.04.04.

Rhinolambrus longispinus (Miers, 1879)
Plate 19 B

State: First record in Yemen, Gulf of Aden, at sample locality 42 from subtidal sand, 21-24 m depth. We have only one female specimen. Not recorded in the Red Sea, Arabian Sea, Gulf of Oman and the Arabian Gulf. Therefore, this recorded is considered the first record in the marine waters of the Arabian Peninsula.

Materials examined: ♀ CL 8.4 mm, CW 10 mm Site 42, leg. SMF 27.05.05.

Aulacolambrus granulosus (Miers, 1879)
Plate 19 C

State: First record in Yemen, Gulf of Aden, at sample localities 17, 19, 21, 22, 30 in subtidal sand, 2-60 m depth. Not recorded in the Red Sea, Arabian Sea, Gulf of Oman and Arabian Gulf. Therefore, this recorded is considered the first record in the marine waters of the Arabian Peninsula.

Materials examined: 1 ovi.♀ CL 12.97 mm, CW 12.91 mm Site 30, leg. RUWW 10.12.84. ♀ CL 10.7 mm, CW 12 mm Site 21, leg. RUWW 11.11.84. ♂ CL 10.6 mm, CW 11.8 mm Site 30, leg. RUWW 10.11.84. ♀ CL 10.1 mm, CW 11 mm Site 19, leg. RUWW 09.10.84. ♀ CL 9 mm, CW 11.1 mm Site 22, leg. RUWW 01.03.85. 1 ovi.♀ CL 9.61 mm, CW 11.5 mm Site 17, leg. SMF 25.03.98.

Aulacolambrus hoplonotus (Adams & White, 1849)
Plate 19 D

State: First record in Yemen, Gulf of Aden, at sample locality 17 from subtidal sand, 2-7 m depth (only one female specimen). Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts by Laurie (1915) under the synonym *Lambrus (Aulacolambrus) hoplonotus* (Adams & White, 1849).

Materials examined: ♀ CL 9.3 mm, CW 10.3 mm Site 17, leg. SMF 25.03.98.

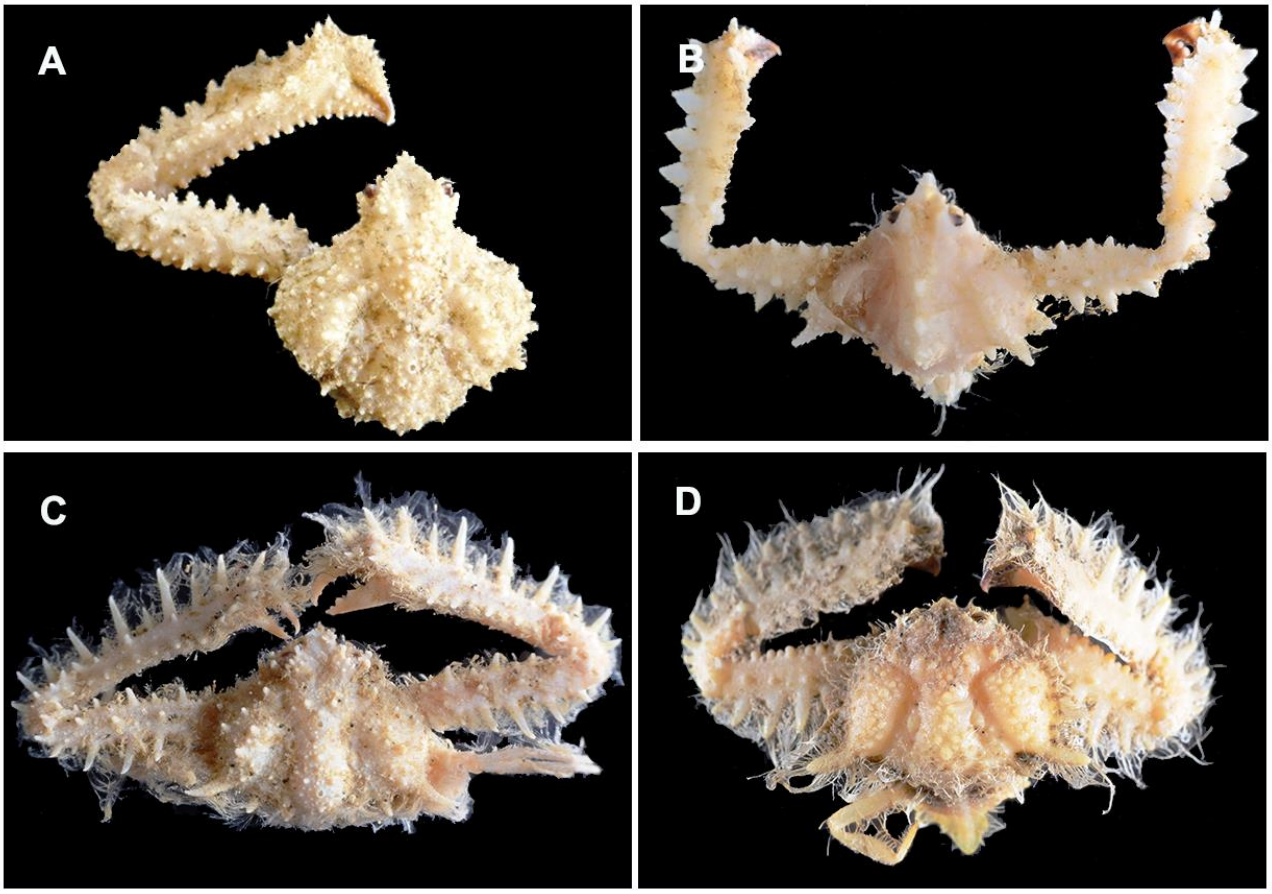

Plate 19: A. *Parthenope longimanus*, ♀ CL 29.6 mm, CW 27.7 mm; **B.** *Rhinolambrus longispinus,* ♀ CL 8.4 mm, CW 10 mm; **C.** *Aulacolambrus granulosus*, ♀ CL 12.97 mm, CW 12.91 mm; **D.** *Aulacolambrus hoplonotus*, ♀ CL 9.3 mm, CW 10.3 mm.

Superfamily Pilumnoidea Samouelle, 1819
Family Pilumnidae Samouelle, 1819

Eurycarcinus orientalis A. Milne-Edwards, 1867
Plate 20 A

State: Recorded in Yemen, Gulf of Aden, sample localities 24, 26 from mud flat. Also recorded in the Red Sea, sample locality 5 from mangrove. Not recorded in the Arabian Sea.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915), Vine (1986) without a specific location. Gulf of Aden: Djibouti (Nobili, 1906; Apel, 2001); Aden (Al-Hindi, 2010). Gulf of Oman: Naderloo *et al.* (2015). Arabian Gulf: Apel (2001), Naderloo & Türkay (2012), Naderloo *et al*. (2013).

Materials examined: ♀ CL 21.9 mm, CW 34.6 mm Site 24, leg. AUAA 05.12.13. 4♂♂ CL 15.6-24.8 mm, CW 25-38.5 mm Site 24, leg. AUAA 05.12.13. ♀ CL 17.2 mm, CW 27.5 mm Site 26, leg. AUAA 08.01.14.

2♂♂ CL 21.4-23.7 mm, CW 33.1-36.4 mm Site 26, leg. AUAA 08.01.14. 11♀♀ (5. ovi) CL 10.2-17 mm, CW 14.5-27.8 mm Site 5, leg. RUWW 24.03.09. 11♂♂ CL 9.9-22.8 mm, CW 13.7-35.3 mm Site 5, leg. RUWW 24.03.09. ♂ CL 25 mm, CW 36 mm Site 24, leg. AUAA 25.10.16, **CO1; AIMSEQ08112016-E07**. 2 Juv CL 7-11 mm, CW 11-16 mm Site 24, leg. AUAA 25.10.16. **CO1; AIMSEQ08112016-C07**, **CO1; AIMSEQ08112016-D07**.

Eurycarcinus integrifrons de Man, 1879
Plate 20 B

State: Recorded in Yemen, Gulf of Aden, sample localities 24, 26 from mud flat. Not recorded in the Arabian Sea.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915), Vine (1986) without a specific location. Gulf of Aden: Aden (Nobili, 1906; Apel, 2001). Gulf of Oman: Naderloo *et al.* (2015). Arabian Gulf: Apel (2001), Naderloo & Türkay (2012), Naderloo *et al*. (2013).

Materials examined: ♂ CL 21.9 mm, CW 30.1 mm Site 24, leg. AUAA 2008. ♂ CL 18.8 mm, CW 25.8 mm Site 26, leg. AUAA 2008.

Pilumnus vespertilio (Fabricius, 1793)
Plate 20 C

State: Recorded in Yemen, Gulf of Aden, sample localities 19, 26 from sand, rock, intertidal zone.

Earlier records: Red Sea: Laurie (1915), Balss (1922), Vine (1986). Socotra Island: Simões *et al.* (2001). Arabian Sea: Oman, first time from Dhofar Province (Hogarth, 1994), Khvorov *et al.* (2012). Gulf of Oman: Naderloo *et al.* (2015). Arabian Gulf: Apel (2001), Naderloo (2017).

Materials examined: 4♀♀ CL 12.2-19.3 mm, CW 16.4-27.9 mm Site 19, leg. AUAA 14.12.13. 2♂♂ CL 18.7-22.8 mm, CW 23.4-31.8 mm Site 19, leg. AUAA 14.12.13. ♂ CL 21.4 mm, CW 29.5 mm Site 26, leg. AUAA 14.12.13 2♀♀ CL 20-24 mm, CW 27-30 mm Site 19, leg. AUAA 21.10.16, **CO1; AIMSEQ08112016-A04**. ♂ CL 20 mm, CW 24 mm Site 19, leg. AUAA 21.10.16.

Pilumnus cf. minutus De Haan, 1835
Plate 20 D

State: Recorded in Yemen, Gulf of Aden, at sample localities 19, 21, 24, 26 from sand, rock, intertidal zone. Not recorded in the Arabian Sea and Gulf of Oman.

Earlier records: Red Sea: Egyptian and Sudanese coasts under the synonym *Pilumnus hirsutus* Stimpson by Laurie (1915). Gulf of Aden: Aden, first records by Al-Hindi (2010). Arabian Gulf: Apel (2001), Naderloo & Sari (2007), Naderloo (2017).

Materials examined: 5♀♀ CL 4-5 mm, CW 5-7 mm Site 24, leg. AUAA 02.11.16. 5♂♂ CL 4-5 mm, CW 6-8 mm Site 24, leg. AUAA 02.11.16, **CO1; AIMSEQ08112016-B04**. ♀ CL 7.4 mm, CW 11.2 mm Site 21, leg. AUAA 01.10.10. ♂ CL 8.1 mm, CW 11.2 mm Site 21, leg. AUAA 01.10.10. ♂ CL 6 mm, CW 8.7 mm Site 19, leg. AUAA 26.04.14. ♀ CL 4.7 mm, CW 6.8 mm Site 21, leg. AUAA 11.01.14. ♂ CL 6 mm, CW 8.5 mm Site 21, leg. AUAA 11.01.14. 2 ovi.♀♀ CL 3.9-5.3 mm, CW 5.5-7.6 mm Site 26, leg. AUAA 08.01.14.

Pilumnus incanus (Forskål, 1775)
Plate 20 E

State: First record in Yemen, Arabian Sea, sample locality 50 and recorded in Gulf of Aden, sample locality 26, from sand, rock, intertidal zone.

Earlier records: Red Sea: Mayun Island by Nobili (1906) under the synonym *Pilumnus forskalii* H. Milne Edwards; Egyptian and Sudanese coasts by Laurie (1915) under the synonym *Pilumnus forskalii* Nobili. Gulf of Oman: Naderloo *et al.* (2015). Arabian Gulf: Naderloo & Türkay (2012).

Materials examined: ♀ CL 15 mm, CW 21.1 mm Site 50 leg. RUWW 01.03.84. ♂ CL 15.7 mm, CW 20.3 mm Site 50 leg. RUWW 01.03.84. 2♂♂ CL 12.2-18.6 mm, CW 15.5-22.9 mm Site 26 leg. RUWW 01.03.84.

Glabropilumnus levimanus (Dana, 1852)
Plate 20 F

State: First record in Yemen, Gulf of Aden, at sample locality 30 from sand, rock, intertidal zone. Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts under the synonym *Pilumnus laevimanus* Dana by Laurie (1915), (Vine, 1986; Galil & Takeda, 1988) without a specific location.

Materials examined: 1 ovi.♀ CL 5 mm, CW 7 mm Site 30, leg. AUAA 02.11.16. 4♂♂ CL 5-7 mm, CW 8-9 mm Site 30, leg. AUAA 02.11.16, **CO1; AIMSEQ08112016-D04**.

Pilumnus savignyi Heller, 1861
Plate 21 A

State: First record in Yemen, Gulf of Aden, at sample localities 21, 41 from sand, rock, 5-25 m depth. Also records in the Red Sea, sample locality 4 from sand, rock, 5-12 m depth.

Earlier records: Red Sea: Laurie (1915), Balss (1922), Vine (1986), Apel (2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994; Khvorov *et al.*, 2012). Gulf of Oman: Naderloo *et al.* (2015). Arabian Gulf: Apel (2001), Naderloo & Türkay (2012), Naderloo *et al*. (2013).

Materials examined: 4♀♀ CL 6.6-8 mm, CW 9.2-11.2 mm Site ?, leg. RUWW 26.03.84. 2♂♂ CL 5.5-5.9 mm, CW 7.5-7.7 mm Site ?, leg. RUWW 26.03.84. 8♀♀ CL 5.5-9.8 mm, CW 6.8-13 mm Site 4, leg. SMF 12.04.04. 10♂♂ CL 4.7-7.6 mm, CW 6.3-10.1 mm Site 4, leg. SMF 12.04.04. 3 Juv CL 2.6-4 mm, CW 3.4-5.3 mm Site 4, leg. SMF 12.04.04. ♀ CL 8.5 mm, CW 11 mm Site 21, leg. RUWW 11.11.84. 1 ovi.♀ CL 6.2 mm, CW 8.6 mm Site 21, leg. RUWW 31.05.83. ♂ CL 8.5 mm, CW 10 mm Site 41, leg. SMF 26.05.05. 1 ovi.♀ CL 6.4 mm, CW 7.9 mm Site 41, leg. SMF 26.05.05.

Pilumnus propinquus Nobili, 1906
Plate 21 B

State: First record in Yemen, Socotra Island, at sample locality 54 from sand, rock, 1-2 m depth. Not recorded in Gulf of Oman.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915). Gulf of Aden: Djibouti (Apel, 2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994; Khvorov *et al.*, 2012). Arabian Gulf: Nobili (1906), Apel (2001), Naderloo (2017).

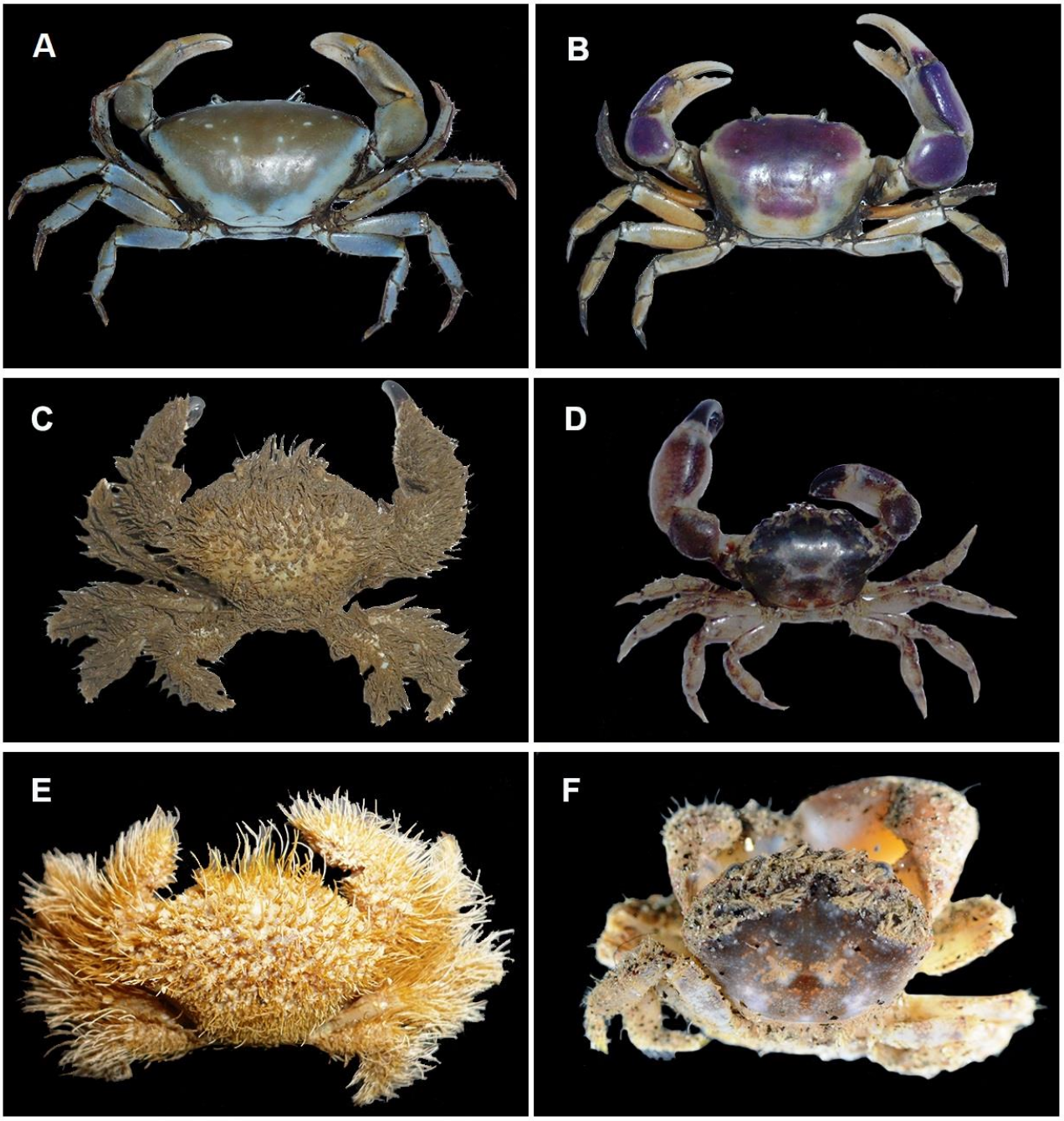

Plate 20: A. *Eurycarcinus orientalis*, ♂ CL 25 mm, CW 36 mm; **B.** *Eurycarcinus integrifrons,* ♂ CL 21.9 mm, CW 30.1 mm; **C.** *Pilumnus vespertilio*, ♂ CL 21.4 mm, CW 29.5 mm; **D.** *Pilumnus cf. minutus*, ♂ CL 8.1 mm, CW 11.2 mm; **E.** *Pilumnus incanus,* ♂ CL 18.6 mm, CW 22.9 mm; **F.** *Glabropilumnus levimanus,* ♂ CL 7 mm, CW 9 mm.

Materials examined: 2♀♀ CL 5-8.8 mm, CW 6.4-12.3 mm Site 54, leg. RUWW 01.03.84.

Actumnus tesselatus Alcock, 1898
Plate 21 C, D

State: First record in Yemen, Gulf of Aden, at sample locality 42 from subtidal sand, 15-20 m depth. Also records in the Red Sea, sample locality 4 from subtidal sand, 5-12 m depth (Krupp *et al*., 2006: *Actumnus* sp.). Not recorded in the Arabian Sea and Gulf of Oman.

Earlier records: Red Sea: Hudaydah coasts (Krupp *et al.*, 2006) under the species name *Actumnus* sp. Arabian Gulf: Stephensen (1946), Apel (2001), Naderloo (2017).

Materials examined: 5♀♀ CL 7.6-14 mm, CW 8.6-17.5 mm Site 4, leg. SMF 12.04.04. 2♂♂ CL 10.1-10.4 mm, CW 12.4-12.5 mm Site 4, leg. SMF 12.04.04. 1 Juv CL 3.7 mm, CW 4.3 mm Site 4, leg. SMF 12.04.04. ♂ CL 8.3 mm, CW 10.9 mm Site 42, leg. SMF 28.05.05.

Actumnus asper (Rüppell, 1830)
Plate 21 E

State: Recorded in Yemen, Gulf of Aden, sample localities 21, 30 from subtidal rock, corals, 3-25 m depth. Not recorded in the Arabian Sea and Gulf of Oman.

Earlier records: Red Sea: Egyptian and Sudanese coasts under the synonym *Actumnus bonnieri* Nobili, 1906 by Laurie (1915), Apel (2001) without a specific location. Gulf of Aden: Djibouti (Nobili, 1906; Apel, 2001). Socotra Island: Apel (2001). Arabian Gulf: Stephensen (1946), Apel (2001), Naderloo (2017).

Materials examined: 8♀♀ (3. ovi) CL 6.2-9 mm, CW 8.6-12.6 mm Site 30, leg. RUWW 26.03.84. 5♂♂ CL 4.5-11.7 mm, CW 6.4-15.3 mm Site 30, leg. RUWW 26.03.84. 1 Juv CL 3.2 mm, CW 4.9 mm Site 30, leg. RUWW 26.03.84. 4♀♀ CL 5.5-7.8 mm, CW 7.4-10.6 mm Site 21, leg. RUWW 08.10.84. ♂ CL 6.6 mm, CW 9.1 mm Site 21, leg. RUWW 08.10.84. 2. ovi ♀♀ CL 5.1-7.3 mm, CW 7.1-10.4 mm Site 21, leg. RUWW 31.05.85. 3♂♂ CL 8.4-10.5 mm, CW 11.9-14.1 mm Site 21, leg. RUWW 31.05.85. ♂ CL 6.5 mm, CW 8.7 mm Site 37, leg. SMF 18.05.05.

Pilumnopeus convexus (Maccagno, 1936)
Plate 21 F

State: Recorded in Yemen, Gulf of Aden, sample locality 25 from mud, rock, intertidal zone.

Earlier records: Red Sea: Maccagno (1936). Gulf of Aden: Aden (Apel, 2001). Arabian Gulf: Cooper (1997), Apel (2001), Naderloo & Türkay (2012), Naderloo *et al.* (2013). Arabian Sea: Pakistan (Ghani & Davie, 2000). Gulf of Oman: Naderloo *et al.* (2015).

Materials examined: 2♀♀ CL 8-9 mm, CW 10-13 mm Site 25, leg. AUAA 02.11.16. 5♂♂ CL 9-10 mm, CW 11-13 mm Site 25, leg. AUAA 02.11.16, **CO1; AIMSEQ08112016-C04**.

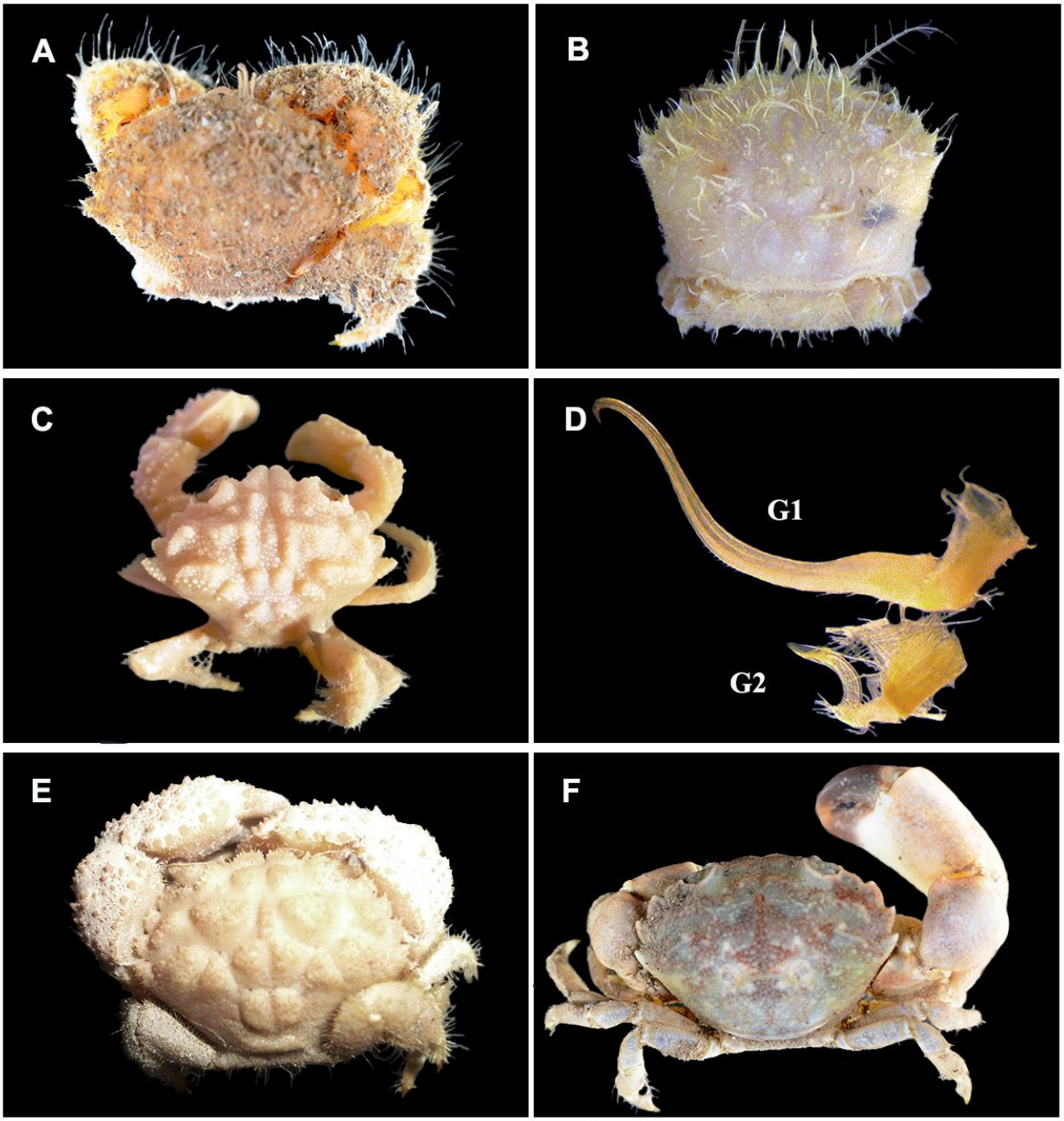

Plate 21: A. *Pilumnus savignyi*, ♀ CL 8.5 mm, CW 11 mm; **B.** *Pilumnus propinquus,* ♀ CL 8.8 mm, CW 12.3 mm; **C.** *Actumnus tesselatus*, ♂ CL 10.4 mm, CW 12.5 mm; **D.** *Actumnus tesselatus*, Male G1 5.8 mm and G2*;* **E.** *Actumnus asper,* ♂ CL 10.5 mm, CW 14.1 mm; **F.** *Pilumnopeus convexus,* ♂ CL 10 mm, CW 13 mm.

Echinoecus pentagonus (A. Milne-Edwards, 1879)

Plate 22 A, B

State: First record in Yemen, Gulf of Aden, at sample locality 33 from sponge, 2-4 m depth. Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian coasts under the synonym *Liomedon pentagonus* Klunzinger by Klunzinger (1906); Sudanese coasts under the synonym *Eumedonus convictor* by Laurie (1915); Gulf of Aqaba, Elat (Chia *et al*., 1999).

Materials examined: ♂ CL 4.7 mm, CW 4.2 mm Site 33, leg. SMF 21.05.05.

Family Galenidae Alcock, 1898

Halimede tyche (Herbst, 1801)

Plate 22 C, D

State: First record in Yemen, Gulf of Aden, at sample locality 41 from subtidal sand, 10-15 m depth. Also records in the Red Sea, sample locality 4 from subtidal sand, 6-12 m depth. Not recorded in the Arabian Sea and Gulf of Oman.

Earlier records: Red Sea: Gulf of Elat, Al-Jubayl coasts (Galil, 2000); Hudaydah coasts (Krupp *et al.*, 2006). Arabian Gulf: Stephensen (1946), Galil (2000), Apel (2001), Naderloo & Sari (2007).

Materials examined: ♂ CL 6.2 mm, CW 7.5 mm Site 4, leg. SMF 12.04.04. ♂ CL 6.6 mm, CW 8.3 mm Site 41, leg. SMF 28.05.05.

Superfamily Potamoidea Ortmann, 1896
Family Potamidae Ortmann, 1896

Socotrapotamon socotrensis (Hilgendorf, 1883)

Plate 22 E, F

State: Recorded in Yemen, Socotra Island, sample locality 56 from fresh waters, 0-0.5 m depth. This species was not recorded in any part of the Arabian Peninsula except on Socotra Island.

Earlier records: Socotra Island: Wranik (1998), Apel & Brandis (2000).

Materials examined: 3♀♀ CL 23.9-24.5 mm, CW 29.2-29.9 mm Site 56, leg. RUWW 01.09.97. 10♂♂ CL 11.1-31.3 mm, CW 13.8-39.5 mm Site 56, leg. RUWW 01.09.97.

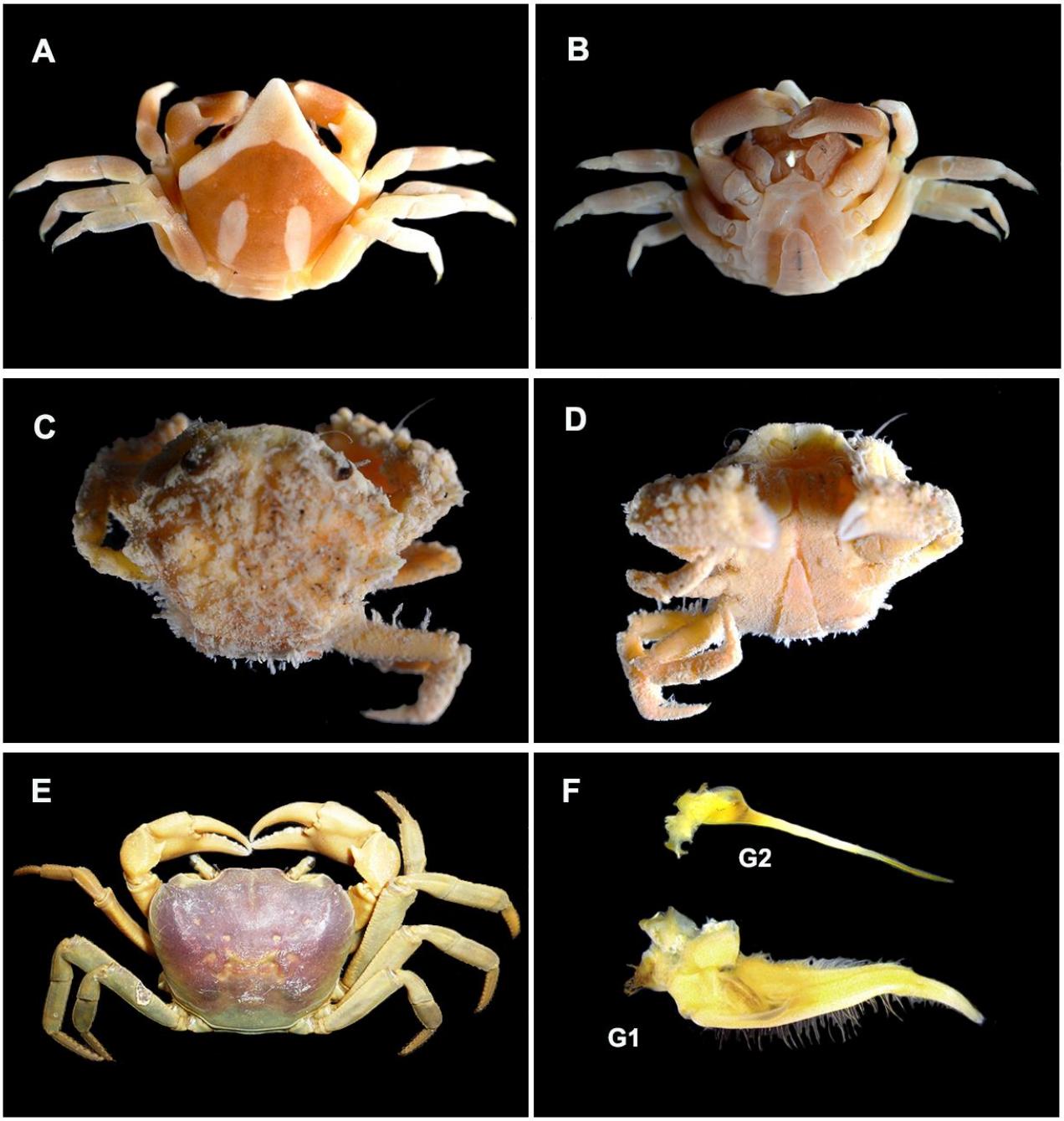

Plate 22: A. *Echinoecus pentagonus*, ♂ CL 4.7 mm, CW 4.2 mm (dorsal view); **B.** *Echinoecus pentagonus,* (ventral view); **C.** *Halimede tyche*, ♂ CL 6.6 mm, CW 8.3 mm (dorsal view); **D.** *Halimede tyche,* (ventral view)*;* **E.** *Socotrapotamon socotrensis*, ♂ CL 31.3 mm, CW 39.5 mm; **F.** *Socotrapotamon socotrensis*, Male G1, 8 mm & G2, 7 mm.

Superfamily Portunoidea Rafinesque, 1815
Family Portunidae Rafinesque, 1815

Charybdis (Goniohellenus) smithii MacLeay, 1838
Plate 23 A

State: Recorded in Yemen, Gulf of Aden, sample localities 24, 30 from sand, rock, 2-50 m depth.

Earlier records: Red Sea: Türkay & Spiridonov (2006). Gulf of Aden: Yemen (Neumann & Spiridonov, 1999; Apel, 2001; Türkay & Spiridonov, 2006; Al-Hindi, 2010; Al-Hindi *et al*., 2012). Arabian Sea: Oman (Türkay & Spiridonov, 2006; Khvorov *et al.*, 2012). Gulf of Oman: Khvorov *et al*. (2012), Naderloo *et al.* (2015). Arabian Gulf: Not recorded before (Apel, 2001; Naderloo, 2017). Somalia: first records (Vannini & Innocenti, 2000).

Materials examined: ♀ CL 37.3 mm, CW 52.6 mm Site 30, leg. RUWW 25.03.84. 8♂♂ CL 40.9-46.2 mm, CW 55.9-64.5 mm Site 30, leg. RUWW 25.03.84. ♂ CL 39.1 mm, CW 52.2 mm Site 24, leg. AUAA 2008.

Charybdis (Charybdis) feriata (Linnaeus, 1758)
Plate 23 B

State: Recorded in Yemen, Gulf of Aden, at sample locality 19 from sand, rock, 2 m depth. Not recorded in the Red Sea.

Earlier records: Gulf of Aden: Aden, first records by Al-Hindi (2010), Al-Hindi *et al*. (2012). Gulf of Oman: Stephensen (1946), Apel & Spiridonov (1998), Khvorov *et al.* (2012), Naderloo *et al*. (2015). Arabian Gulf: Stephensen (1946), Apel & Spiridonov (1998), Apel (2001), Naderloo & Sari (2007). Somalia: Apel (2001).

Materials examined: ♂ CL 85.3 mm, CW 131.3 mm Site 19, leg. MMSBRA 01.01.84.

Charybdis (Charybdis) natator (Herbst, 1794)
Plate 23 C

State: Recorded in Yemen, Gulf of Aden, at sample locality 24 from sand, rock, 2 m depth.

Earlier records: Red Sea: Laurie (1915), Vine (1986), Apel & Spiridonov (1998), Neumann & Spiridonov (1999), Apel (2001). Gulf of Aden: Aden, first records by Al-Hindi (2010), Al-Hindi *et al*. (2012). Arabian Sea: Southern Oman (Khvorov *et al.*, 2012). Gulf of Oman: Apel & Spiridonov (1998), Khvorov *et al.* (2012). Arabian Gulf: Nobili (1906), Apel & Spiridonov (1998).

Materials examined: ♂ CL 68.4 mm, CW 102.4 mm Site 24, leg. AUAA 2008.

Charybdis (Charybdis) orientalis Dana, 1852
Plate 23 D

State: Recorded in Yemen, Gulf of Aden, at sample localities 19, 24, 30 from sand, rock, 0.5-1 m depth. Not recorded in the Arabian Sea, Gulf of Oman and Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Eritrea, Assab (Apel & Spiridonov, 1998); Hudaydah coasts (Krupp *et al.*, 2006). Gulf of Aden: Aden, first records by Al-

Hindi (2010), Al-Hindi *et al*. (2012). Socotra Island: Simões *et al.* (2001). Somalia: Vannini & Innocenti (2000).

Materials examined: 5♀♀ (1.ovi) CL 21.8-31.5 mm, CW 32-45.9 mm Site 19, leg. AUAA 14.12.13. 4♂♂ CL 11.5-32.7 mm, CW 16.5-47.7 mm Site 19, leg. AUAA 14.12.13. ♂ CL 35.7 mm, CW 50.6 mm Site 19, leg. AUAA 02.04.14. ♂ CL 21 mm, CW 30 mm Site 24, leg. AUAA 02.11.16, **CO1; AIMSEQ08112016-E12**. 4♂♂ CL 9-12 mm, CW 13-17 mm Site 30, leg. AUAA 02.11.16.

Charybdis (Charybdis) annulata (Fabricius, 1798)
Plate 23 E

State: Recorded in Yemen, Gulf of Aden, at sample localities 21, 22 from sand, rock, 0.5-1 m depth. And also records in the Arabian Sea, sample locality 51 from sand, rock, 0.5-1 m depth.
Not recorded in the Red Sea and the Arabian Gulf.

Earlier records: Gulf of Aden: Aden, first records by Al-Hindi (2010), Al-Hindi *et al*. (2012). Arabian Sea: Oman (Apel & Spiridonov, 1998; Khvorov *et al.*, 2012). Gulf of Oman: Khvorov *et al.* (2012). Somalia: Vannini & Innocenti (2000).

Materials examined: ♀ CL 38.6 mm, CW 56.2 mm Site 21, leg. AUAA 01.03.13. ♂ CL 32.1 mm, CW 45.7 mm Site 22, leg. RUWW 30.03.07. ♂ CL 16 mm, CW 22 mm Site 51, leg. RUWW 01.10.84.

Charybdis (Charybdis) hellerii (A. Milne-Edwards, 1867)
Plate 23 F

State: Recorded in Yemen, Gulf of Aden, sample localities 19, 24 from sand, rock, 3-6 m depth. And also records in the Arabian Sea, sample localities 51, 52 from sand, rock, 0.5-1 m depth.

Earlier records: Red Sea: Laurie (1915), Vine (1986), Apel & Spiridonov (1998). Gulf of Aden: Neumann & Spiridonov (1999), Al-Hindi (2010), Al-Hindi *et al*. (2012). Arabian Sea: Pakistan (Apel & Spiridonov, 1998). Gulf of Oman: Khvorov *et al.* (2012). Arabian Gulf: Stephensen (1946), Apel (2001), Naderloo & Sari (2007), Naderloo & Türkay (2012), Naderloo *et al.* (2013). Somalia: Vannini & Innocenti (2000).

Materials examined: ♂ CL 13.5 mm, CW 18.8 mm Site 19, leg. AUAA 02.04.14. 2♂♂ CL 40.7-48.8 mm, CW 58.2-69.8 mm Site 24, leg. AUAA 2008. ♀ CL 21.5 mm, CW 31.2 mm Site 51, leg. RUWW 01.03.85. ♂ CL 16.5 mm, CW 22.9 mm Site 51, leg. RUWW 01.03.85. ♂ CL 46.4 mm, CW 68.2 mm Site 52, leg. AUAA 15.03.11.

Charybdis (Goniohellenus) longicollis Leene, 1938
Plate 24 A

State: Recorded in Yemen, Gulf of Aden, sample localities 21, 30 from subtidal sand, 15-40 m depth.

Earlier records: Red Sea: Gulf of Suez (Apel & Spiridonov, 1998), Vine (1986) without a specific location. Gulf of Oman: Stephensen (1946), Apel & Spiridonov (1998), Apel (2001). Arabian Gulf: Stephensen (1946), Apel & Spiridonov (1998), Apel (2001), Naderloo & Sari (2007). Somalia: Vannini & Innocenti (2000).

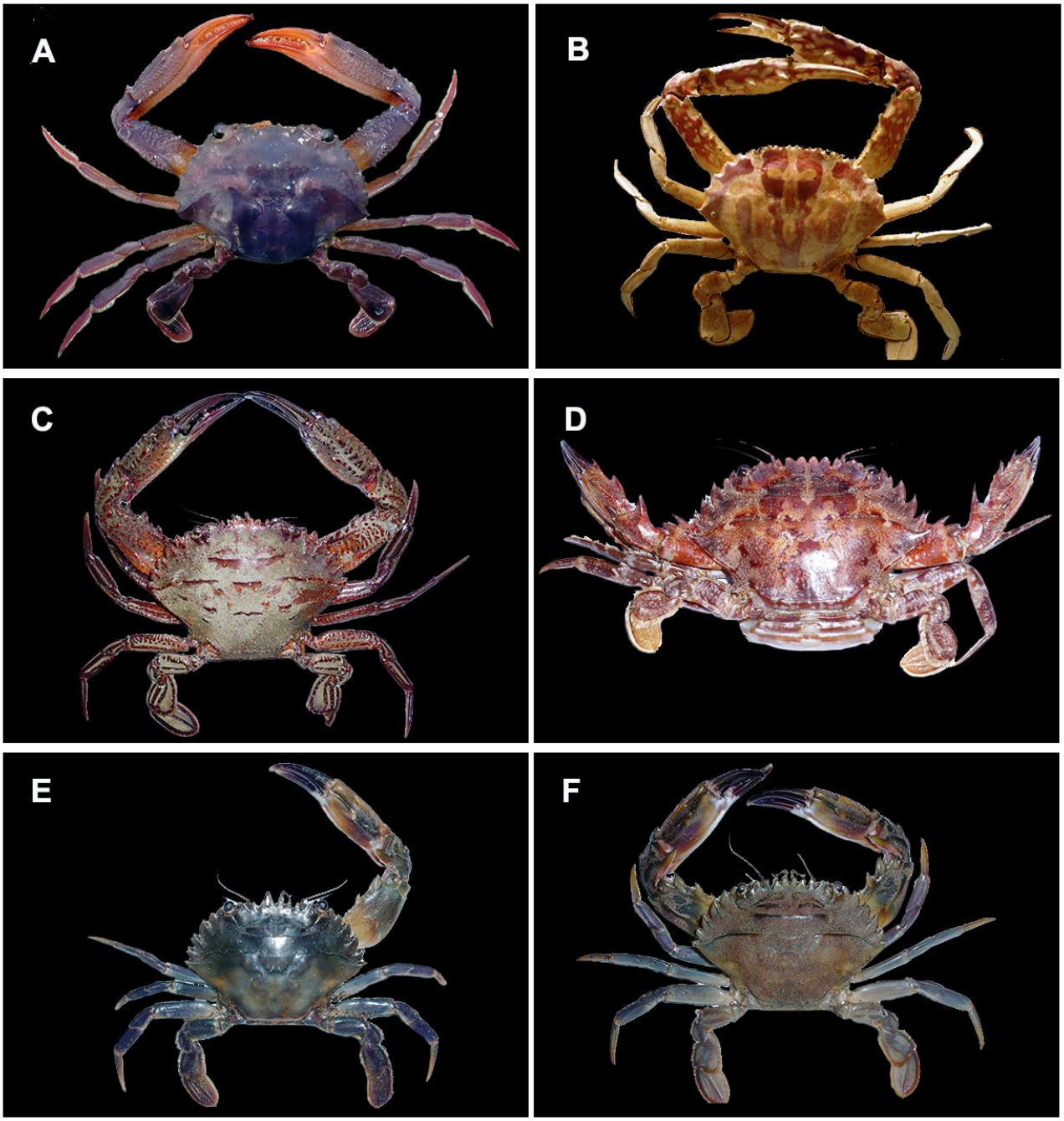

Plate 23: A. *Charybdis (Goniohellenus) smithii*, ♂ CL 39.1 mm, CW 52.2 mm; **B.** *Charybdis (Charybdis) feriata*, ♂ CL 85.3 mm, CW 131.3 mm; **C.** *Charybdis (Charybdis) natator*, ♂ CL 68.4 mm, CW 102.4 mm; **D.** *Charybdis (Charybdis) orientalis*, ♀ CL 31.5 mm, CW 45.9 mm; **E.** *Charybdis (Charybdis) annulata*, ♀ CL 38.6 mm, CW 56.2 mm; **F.** *Charybdis (Charybdis) hellerii*, ♂ CL 48.8 mm, CW 69.8 mm.

Materials examined: 3 ovi.♀♀ CL 18.5-18.7 mm, CW 27.6-27.9 mm Site 21, leg. RUWW 26.03.84. 5♂♂ CL 8.7-27.6 mm, CW 12.5-42.1 mm Site 21, leg. RUWW 26.03.84. 2♀♀ CL 15-16.6 mm, CW 22.1-24.7 mm Site 30, leg. RUWW 25.03.84. 6♂♂ CL 11.9-21 mm, CW 17.7-30.9 mm Site 30, leg. RUWW 25.03.84.

Scylla serrata (Forskål, 1775)
Plate 24 B

State: Recorded in Yemen, Gulf of Aden, sample localities 24, 26 from mud, rock, 0.5- 2 m depth. And also records in the Red Sea, sample locality 5 from mangrove area, 0.5-1 m depth.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Saudi Arabia, Jeddah (Apel & Spiridonov, 1998); Hudaydah coasts (Krupp *et al.*, 2006), Vine (1986) without a specific location. Gulf of Aden: Djibouti (Apel & Spiridonov, 1998); Aden (Al-Hindi, 2010; Al-Hindi *et al*., 2012). Socotra Island: Simões *et al.* (2001), Apel (2001). Arabian Sea: Oman (Khvorov *et al.*, 2012). Gulf of Oman: Apel (2001), Khvorov *et al.* (2012), Naderloo *et al*. (2015). Arabian Gulf: Naderloo & Türkay (2012), Naderloo *et al*. (2013). Somalia: Vannini & Innocenti (2000).

Materials examined: ♂ CL 103.2 mm, CW 148.1 mm Site 24, leg. AUAA 2008. 2♀♀ CL 95-110 mm, CW 135-165 mm Site 26, leg. AUAA 23.10.16. 3♂♂ CL 75-110 mm, CW 110-155 mm Site 26, leg. AUAA 23.10.16, **CO1; AIMSEQ08112016-F12**. 2♂♂ CL 22.4-39.4 mm, CW 32.1-56 mm Site 26, leg. RUWW 23.10.88. ♀ CL 38.6 mm, CW 57 mm Site 5, leg. RUWW 24.03.09. 1 Juv CL 24.9 mm, CW 36.3 mm Site 5, leg. RUWW 24.03.09.

Carupa tenuipes Dana, 1852
Plate 24 C

State: Recorded in Yemen, Gulf of Aden, sample locality 27 from sand, rock, 0.5-2 m depth. And also records in the Red Sea, sample locality 12. Not recorded in the Arabian Sea.

Earlier records: Red Sea: Laurie (1915), Balss (1922), Vine (1986), Apel & Spiridonov (1998), Neumann & Spiridonov (1999), Apel (2001), Spiridonov & Neumann (2007). Gulf of Aden: Djibouti (Apel, 2001). Socotra Island: Simões *et al.* (2001), Apel (2001). Gulf of Oman: Apel & Spiridonov (1998), Apel (2001). Arabian Gulf: Apel & Spiridonov (1998), Apel (2001). Somalia: Vannini & Innocenti (2000).

Materials examined: ♂ CL 15 mm, CW 20 mm Site 27, leg. RUWW 01.03.84. ♀ CL 10 mm ,CW 15.1 mm Site 12, leg. ZSM 23.12.1897.

Portunus (Xiphonectes) arabicus (Nobili, 1906)
Plate 24 D

State: Recorded in Yemen, Gulf of Aden, sample localities 21, 30 from subtidal sand, 20-50 m depth. Not recorded in the Arabian Sea and Gulf of Oman.

Earlier records: Red Sea: Laurie (1915), Vine (1986), Neumann & Spiridonov (1999). Gulf of Aden: Djibouti (Apel & Spiridonov, 1998; Neumann & Spiridonov, 1999). Arabian Gulf: Stephensen (1946), Apel & Spiridonov (1998), Apel (2001), Naderloo & Sari (2007).

Materials examined: ♀ CL 25.2 mm, CW 39.3 mm Site 21 leg. RUWW 31.05.84. ♂ CL 18 mm, CW 26 mm Site 21 leg. RUWW 26.03.84. 2♂♂ CL 11.5-19.5 mm, CW 17.1-28.4 mm Site 30 leg. RUWW 26.03.84.

Portunus (Portunus) segnis (Forskål, 1775)
Plate 24 E, F

State: Recorded in Yemen, Gulf of Aden, sample localities 13, 22, 24, 26 from subtidal sand, sand, rock with algae, sponge 0.5-2 m depth. And also records in the Red Sea, sample localities 5, 11 from mangrove area, 0.5-1 m depth.

Earlier records: Red Sea: Egyptian and Sudanese coasts by Laurie (1915) under the synonym *Neptunus pelagicus* (Linnaeus, 1758); Kamaran Island (Balss, 1922); Hudaydah coasts (Zajonz *et al.,* 1998; Krupp *et al.,* 2006). Gulf of Aden: Aden (Neumann & Spiridonov, 1999; Al-Hindi, 2010; Al-Hindi *et al*., 2012). Socotra Island: Simões *et al.* (2001). Arabian Sea: Oman (Khvorov *et al.*, 2012). Gulf of Oman: Khvorov *et al.* (2012), Naderloo *et al.* (2015). Arabian Gulf: Stephensen (1946), Al-Ghais & Cooper (1996), Apel & Spiridonov (1998), Apel (2001), Naderloo & Türkay (2012), Naderloo *et al*. (2013). Somalia: Vannini & Innocenti (2000).

Materials examined: 4♀♀ CL 65.9-70.5 mm, CW 112.4-116.1 mm Site 26, leg. AUAA 2008. 2♂♂ CL 58.9-67 mm, CW 98.7-109.8 mm Site 26, leg. AUAA 2008. 3♂♂ CL 70-95 mm, CW 115-150 mm Site 26, leg. AUAA 23.10.16, **CO1; AIMSEQ08112016-G12**. ♂ CL 20.8 mm, CW 35.8 mm Site 13, leg. RUWW 01.03.84. 8♂♂ CL 11.5-18.3 mm, CW 19.4-31.2 mm Site 24, leg. RUWW 23.05.84. 2♂♂ CL 14.3-17.9 mm, CW 23.8-30.3 mm Site 11, leg. ZSM 15.12.1897. 2Juv CL 10-15.3 mm, CW 15.3-26.3 mm Site 5, leg. RUWW 24.03.09. 2♂♂ CL 36.7-47.3 mm, CW 64.7-84.7 mm Site 22, leg. RUWW 01.03.07.

Cycloachelous orbitosinus (Rathbun, 1911)
Plate 25 A, B

State: Recorded in Yemen, Gulf of Aden, sample locality 21, 30 from subtidal sand, 15-30 m depth. Not recorded in Gulf of Oman.

Earlier records: Gulf of Aden: Aden, Ras Imran (Apel & Spiridonov, 1998; Apel, 2001). Socotra Island: Neumann & Spiridonov (1999), Apel (2001). Arabian Gulf: Stephensen (1946), Apel & Spiridonov (1998), Apel (2001). Somalia: Vannini & Innocenti (2000).

Materials examined: 2♂♂ CL 12.8-15.3 mm, CW 17.6-21.3 mm Site 21, leg. RUWW 26.03.84. ♀ CL 15.6 mm, CW 20.4 mm Site 30, leg. RUWW 25.03.84.

Cycloachelous granulatus (H. Milne Edwards, 1834)
Plate 25 C, D

State: Recorded in Yemen, Arabian Sea, sample locality 50 from sand, rock, 1-2 m depth. Doubtful record in the Arabian Gulf.

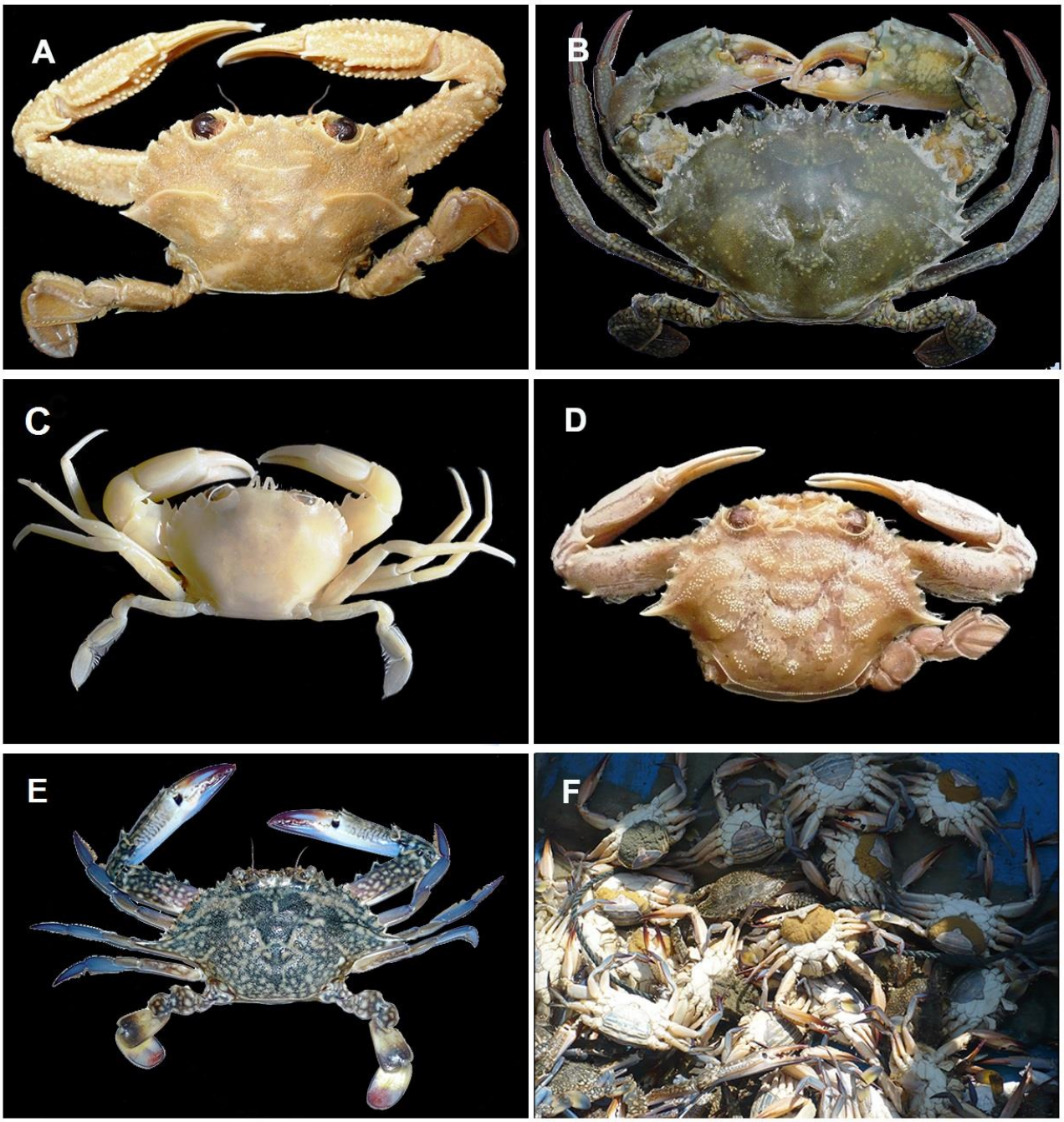

Plate 24: A. *Charybdis* (*Goniohellenus*) *longicollis*, ♂ CL 27.6 mm, CW 42.1 mm; **B.** *Scylla serrata*, ♂ CL 110 mm, CW 155 mm; **C.** *Carupa tenuipes*, ♂ CL 15 mm, CW 20 mm; **D.** *Portunus* (*Xiphonectes*) *arabicus*, ♂ CL 19.5 mm, CW 28.4 mm; **E.** *Portunus* (*Portunus*) *segnis*, ♂ CL 95 mm, CW 150 mm; **F.** *Portunus* (*Portunus*) *segnis,* overfishing for this species, especially for females in the ovulation season in Aden coasts.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Mayun Island (Balss, 1922; Balss, 1924), Vine (1986) without a specific location. Gulf of Aden: Mukalla (Apel & Spiridonov, 1998; Apel, 2001). Socotra Island: Apel (2001). Gulf of Oman: Apel & Spiridonov (1998), Apel (2001). Somalia: Vannini & Innocenti (2000).

Materials examined: ♂ CL 15.1 mm, CW 21.7 mm Site 50, leg. RUWW 01.03.85.

Portunus (Xiphonectes) longispinosus (Dana, 1852)
Plate 25 E

State: Recorded in Yemen, Gulf of Aden, sample localities 19, 22 from sand, rock, 0.5-1 m depth.

Earlier records: Red Sea: Laurie (1915), Balss (1922), Vine (1986). Socotra Island: Neumann & Spiridonov (1999). Gulf of Aden: Djibouti (Apel & Spiridonov, 1998). Gulf of Oman: Apel & Spiridonov (1998), Apel (2001). Arabian Gulf: Apel & Spiridonov (1998), Apel (2001).

Materials examined: 1 Juv CL 9.2 mm, CW 13.5 mm Site 19, leg. AUAA 14.12.13. 1 Juv CL 6 mm, CW 8.9 mm Site 22, leg. RUWW 01.02.84.

Portunus (Xiphonectes) guinotae Stephenson & Rees, 1961
Plate 25 F

State: First record in Yemen, Gulf of Aden, at sample locality 35 from sand, rock, 9-10 m depth. Not recorded in the Arabian Sea and the Arabian Gulf.

Earlier records: Red Sea: Bab al-Mandab (Apel & Spiridonov, 1998; Apel, 2001). Gulf of Oman: Apel & Spiridonov (1998), Apel (2001).

Materials examined: 2 Juv CL 3.1-3.2 mm, CW 4.1-4.2 mm Site 35, leg. SMF 15.05.05.

Portunus (Portunus) sanguinolentus (Herbst, 1783)
Plate 26 A

State: Recorded in Yemen, Gulf of Aden, sample locality 24 from sand, rock, 0.5-2 m depth.

Earlier records: Red Sea: Laurie (1915), Balss (1922), Vine (1986). Gulf of Aden: Mukalla (Apel & Spiridonov, 1998; Apel, 2001); Aden (Al-Hindi, 2010; Al-Hindi *et al*., 2012). Socotra Island: Apel (2001). Arabian Sea: Oman (Khvorov *et al.*, 2012; Apel & Spiridonov, 1998). Gulf of Oman: Apel & Spiridonov (1998), Apel (2001), Khvorov *et al.* (2012), Naderloo *et al.* (2015). Arabian Gulf: Stephensen (1946), Apel & Spiridonov (1998), Apel (2001), Naderloo & Sari (2007).

Remarks: This species is easily recognizable, since it has three circular red spots in the carapace.

Materials examined: ♂ CL 58.9 mm, CW 111.2 mm Site 24, leg. AUAA 2008.

Thalamita crenata Rüppell, 1830
Plate 26 B

State: Recorded in Yemen, Gulf of Aden, sample localities 19, 24, 26 from mud, rock and sand, rock, 0.5-1 m depth. And also records in the Red Sea, sample locality 12 from mud, rock, 1 m depth.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Mayun Island (Balss, 1922); Sudan coasts (Apel & Spiridonov, 1998; Apel, 2001), Vine (1986) without a specific location. Gulf of Aden: Aden (Apel & Spiridonov, 1998; Al-Hindi, 2010; Al-Hindi *et al*., 2012). Socotra Island: Simões *et al.* (2001), Apel (2001). Arabian Sea: Oman (Khvorov *et al.*, 2012). Gulf of Oman: Apel & Spiridonov (1998), Apel (2001), Khvorov *et al.* (2012), Naderloo *et al.* (2015). Arabian Gulf: Stephensen (1946), Al-Ghais & Cooper (1996), Apel & Spiridonov (1998), Apel (2001), Naderloo & Türkay (2012), Naderloo *et al.* (2013).

Materials examined: 2♀♀ (1ovi). CL 38.2-44.8 mm, CW 53.8-63.5 mm Site 19, leg. AUAA 24.03.14. 2♂♂ CL 46.2-48 mm, CW 67.1-67.4 mm Site 19, leg. AUAA 24.03.14. 2♂♂ CL 45-50 mm, CW 65-70 mm Site 26, leg. AUAA 23.10.16. 2♀♀ CL 25-39 mm, CW 35-55 mm Site 24, leg. AUAA 25.10.16, **CO1; AIMSEQ08112016-E03**. 3♂♂ CL 30.4-53.3 mm, CW 44-77 mm Site 26, leg. RUWW 01.03.84. 2♀♀ CL 32.5-38.9 mm, CW 46.2-55.6 mm Site 24, leg. RUWW 25.03.84. ♂ CL 31.5 mm, CW 45.4 mm Site 24, leg. RUWW 25.03.84. ♂ CL 24.4 mm, CW 34.1 mm Site 12, leg. ZSM 01.12.1897.

Thalamita prymna (Herbst, 1803)
Plate 26 C

State: Recorded in Yemen, Gulf of Aden, sample localities 19, 24 from mud, rock and sand, rock, 0.5-1 m depth.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Kamaran and Zebejir Islands (Balss, 1922); Eritrea, Massaua (Apel & Spiridonov, 1998), Vine (1986) without a specific location. Gulf of Aden: Aden and Somalia (Apel & Spiridonov, 1998; Al-Hindi, 2010; Al-Hindi *et al*., 2012). Socotra Island: Apel (2001). Gulf of Oman: Apel & Spiridonov (1998), Apel (2001). Arabian Gulf: Apel & Spiridonov (1998), Apel (2001), Naderloo & Türkay (2012), Naderloo *et al.* (2013). Somalia: First records (Vannini & Innocenti, 2000).

Materials examined: 2♂♂ CL 19-32.9 mm, CW 29-47.8 mm Site 19, leg. AUAA 24.03.14. 3♀♀ CL 25-32 mm, CW 39-45 mm Site 19, leg. AUAA 21.10.16. 3♂♂ CL 25-40 mm, CW 35-55 mm Site 19, leg. AUAA 21.10.16, **CO1; AIMSEQ08112016-F03**. ♂ CL 14 mm, CW 20 mm Site 24, leg. AUAA 02.11.16, **CO1; AIMSEQ08112016-A08**.

Thalamita admete (Herbst, 1803)
Plate 26 D

State: First record in Yemen, Gulf of Aden, at sample localities 19, 24 from sand, rock, 0.5-1 m depth.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Mayun and Kamaran Islands (Balss, 1922); Hudaydah coasts (Krupp *et al.*, 2006). Socotra Island: Simões *et al.* (2001),

Apel (2001). Gulf of Oman: Apel & Spiridonov (1998). Arabian Gulf: Naderloo & Türkay (2012), Naderloo *et al.* (2013). Somalia: Vannini & Innocenti (2000).

Materials examined: ♀ CL 8.4 mm, CW 12.7 mm Site 19, leg. AUAA 24.03.14. ♀ CL 12 mm, CW 21 mm Site 24, leg. AUAA 02.11.16. ♂ CL 17 mm, CW 24 mm Site 24, leg. AUAA 02.11.16, CO1; **AIMSEQ08112016-B08**.

Thalamita poissonii (Audouin, 1826)
Plate 26 E

State: Recorded in Yemen, Gulf of Aden, sample localities 23, 26 from mud, rock, 0.5-2 m depth. And also records in the Red Sea, sample locality 12 in the mud, rock, 1-16 m depth. Not recorded in the Gulf of Oman.

Earlier records: Red Sea: Egyptian and Sudanese coasts by Laurie (1915); Mayun Island (Nobili, 1906; Balss, 1922); Hurgharda coast (Apel & Spiridonov, 1998), Vine (1986) without a specific location. Gulf of Aden: Djibouti (Nobili, 1906; Apel & Spiridonov, 1998). Arabian Gulf: Stephensen (1946), Al-Ghais & Cooper (1996), Apel & Spiridonov (1998), Apel (2001), Naderloo & Türkay (2012), Naderloo *et al.* (2013). Somalia: Vannini & Innocenti (2000).

Materials examined: ♂ CL 15.8 mm, CW 24.2 mm Site 23, leg. AUAA 12.04.14. ♂ CL 18.7 mm, CW 28 mm Site 26, leg. RUWW 04.11.88. 6♀♀ (1.ovi) CL 9.1-13.7 mm, CW 14-20.6 mm Site 12, leg. ZSM 1907. 10♂♂ CL 7.1-17 mm, CW 10.1-25.7 mm Site 12, leg. ZSM 1907. 5♀♀ (1.ovi) CL 6.6-11.3 mm, CW 8.9-16.3 mm Site 12, leg. ZSM 1897. ♂ CL 8.5 mm, CW 12.5 mm Site 12, leg. ZSM 1897. ♀ CL 5.7 mm, CW 8.2 mm Site 12, leg. ZSM 01.02.1897.

Thalamita savignyi A. Milne-Edwards, 1861
Plate 26 F

State: Recorded in Yemen, the Red Sea, sample locality 3, 4-5 m depth. Not recorded in the Arabian Sea.

Earlier records: Red Sea: Mayun Island (Nobili, 1906; Balss, 1922); Hudaydah coasts (Krupp *et al.*, 2006). Gulf of Aden: Djibouti (Apel & Spiridonov, 1998). Gulf of Oman: Naderloo *et al.* (2013). Arabian Gulf: Nobili (1906), Apel & Spiridonov (1998), Apel (2001), Naderloo & Türkay (2012), Naderloo *et al.* (2013).

Materials examined: 2♂♂ CL 23.5-24 mm, CW 33.5-35.4 mm Site 3, leg. ZSM 01.10.1897.

Thalamita mitsiensis Crosnier, 1962
Plate 27 A, B

State: First record in Yemen, Gulf of Aden, at sample locality 21 from sandy rocky shore, 15 m depth. Not recorded in the Red Sea, Arabian Sea, Gulf of Oman and the Arabian Gulf. Hence, this is considered the first record in the marine waters of the Arabian Peninsula.

Materials examined: 3♀♀ (1. ovi) CL 4.9-6.6 mm, CW 6.8-8.9 mm Site 21, leg. RUWW 11.11.84. 4♂♂ CL 4.5-9.1 mm, CW 5.9-12.3 mm Site 21, leg. RUWW 11.11.84.

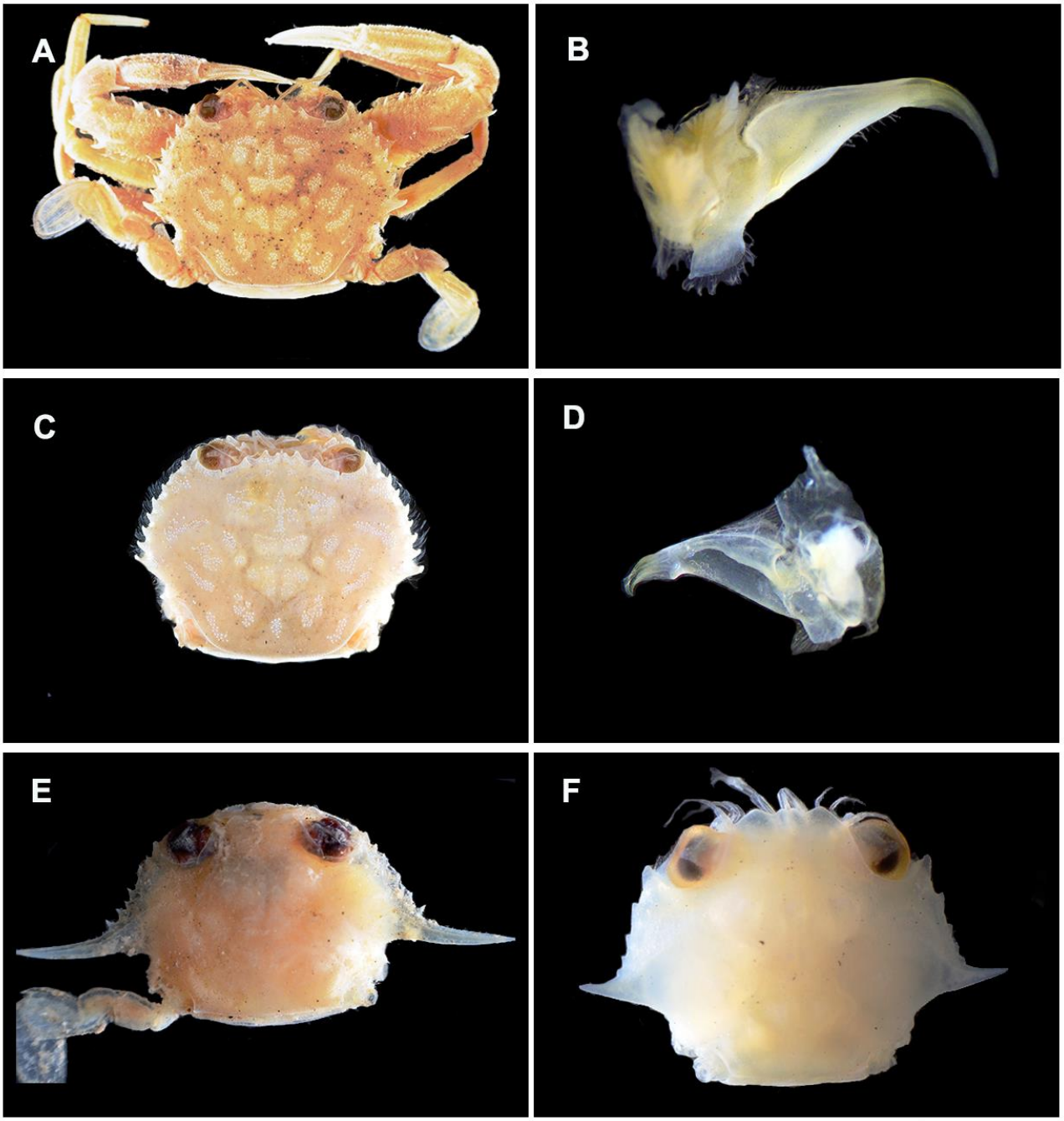

Plate 25: A. *Cycloachelous orbitosinus*, ♂ CL 15.3 mm, CW 21.3 mm; **B.** *Cycloachelous orbitosinus,*G1; **C.** *Cycloachelous granulatus*, ♂ CL 15.1 mm, CW 21.7 mm; **D.** *Cycloachelous granulatus,* G1; **E.** *Portunus (Xiphonectes) longispinosus*, Juv CL 9.2 mm, CW 13.5 mm; **F.** *Portunus (Xiphonectes) guinotae,* Juv CL 3.2 mm, CW 4.2 mm.

Thalamita sexlobata Miers, 1886
Plate 27 C

State: Recorded in Yemen, Gulf of Aden, sample locality 21 from sand, rock, 15 m depth.

Earlier records: Red Sea: Neumann & Spiridonov (1999). Gulf of Aden: Bab al-Mandab (Apel & Spiridonov, 1998; Apel, 2001). Gulf of Oman: Apel & Spiridonov (1998). Arabian Gulf: Without exact locality (Apel & Spiridonov, 1998).

Materials examined: 2. ovi ♀♀ CL 7.5-9.6 mm, CW 11-13.8 mm Site 21, leg. RUWW 11.11.84. ♂ CL 11 mm, CW 15.5 mm Site 21, leg. RUWW 11.11.84.

Thalamita woodmasoni Alcock, 1899
Plate 27 D

State: First record in Yemen, Red Sea, Mayun (Perim) Island, sample locality 12, 4-5 m depth.

Not recorded in Gulf of Aden, Arabian Sea, Gulf of Oman and the Arabian Gulf. Therefore, this recorded is considered the first record in the marine waters of the Arabian Peninsula.

Materials examined: 4♀♀ CL 6.7-12.5 mm, CW 9.5-17.2 mm Site 12, leg. ZSM 1897. ♂ CL 7.9 mm, CW 11.1 mm Site 12, leg. ZSM 1897.

Thalamita chaptalii (Audouin, 1826)
Plate 27 E

State: Recorded in Yemen, the Red Sea, sample locality 12, 4-5 m depth. Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Mayun Island (Nobili, 1906; Balss, 1922). Gulf of Aden: Aden (Nobili, 1906). Somalia: First records (Vannini & Innocenti, 2000).

Materials examined: ♂ CL 8.4 mm, CW 11.8 mm Site 12, leg. ZSM 01.02.1897.

Thalamita bandusia Nobili, 1906
Plate 27 F

State: Recorded in Yemen, Gulf of Aden, sample locality 41 from sand, rock, 5-15 m depth. Not recorded in the Arabian Sea and the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Mayun Island (Nobili, 1906), Vine (1986) without a specific location. Gulf of Aden: Djibouti (Apel & Spiridonov, 1998). Socotra Island: Apel (2001). Gulf of Oman: Apel & Spiridonov (1998), Apel (2001).

Materials examined: 3♀♀ (1. ovi) CL 5.9-6 mm, CW 7.9-8 mm Site 41, leg. SMF 28.05.05. ♂ CL 6.5 mm, CW 8.8 mm Site 41, leg. SMF 28.05.05.

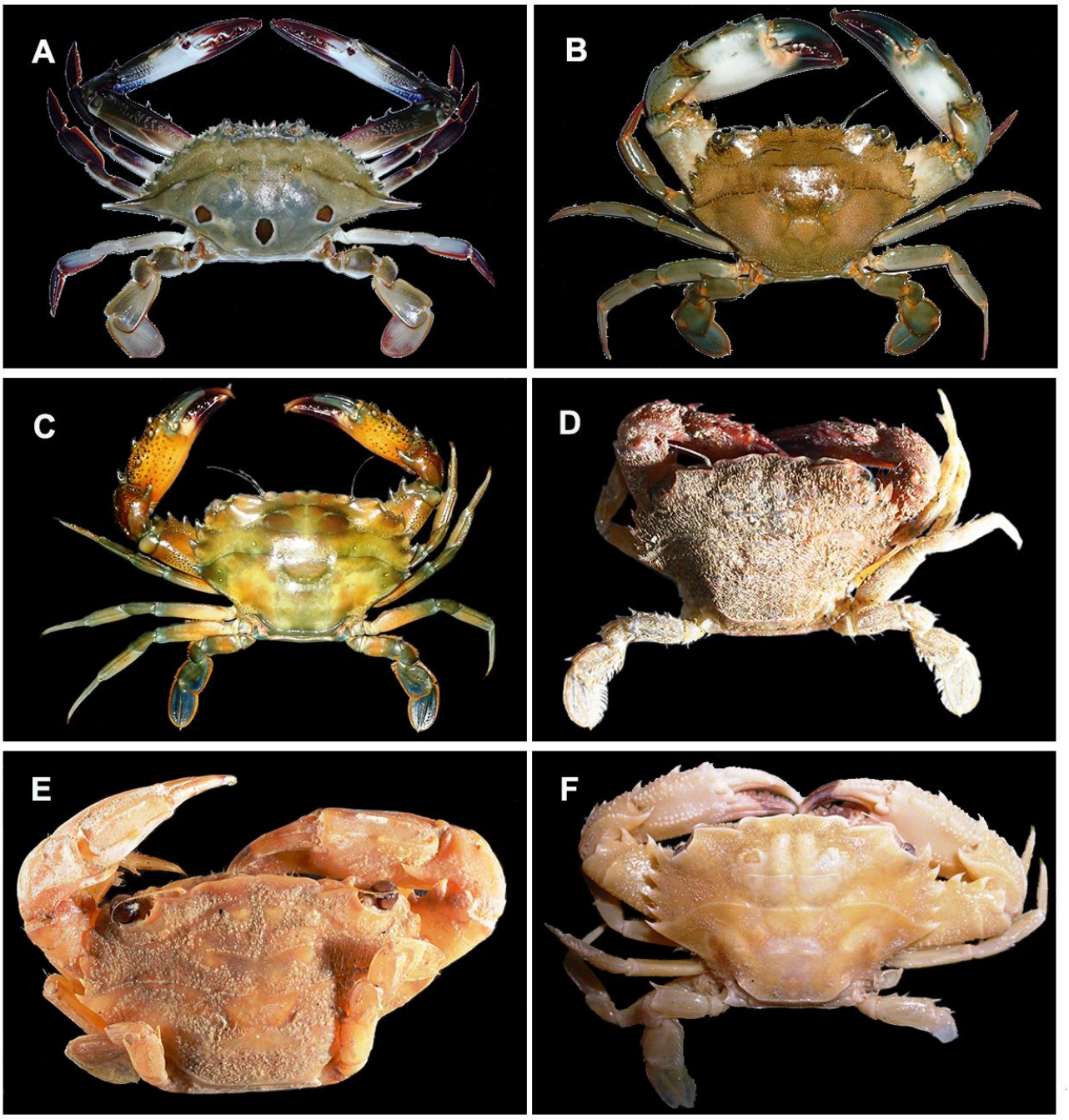

Plate 26: A. *Portunus (Portunus) sanguinolentus*, ♂ CL 58.9 mm, CW 111.2 mm; **B.** *Thalamita crenata,* ♂ CL 48 mm, CW 67.4 mm; **C** *Thalamita prymna*, ♂ CL 40 mm, CW 55 mm; **D.** *Thalamita admete,* ♂ CL 17 mm, CW 24 mm; **E.** *Thalamita poissonii*, ♂ CL 15.8 mm, CW 24.2 mm; **F.** *Thalamita savignyi,* ♂ CL 24 mm, CW 35.4 mm.

Thalamita gatavakensis Nobili, 1906

Plate 28 A

State: First record in Yemen, Gulf of Aden, sample locality 23 from subtidal rock, corals, 2 m depth.
Not recorded in the Red Sea, Arabian Sea, Gulf of Oman and Arabian Gulf. Hence, this is the first record in the marine waters of the Arabian Peninsula.

Materials examined: ♀ CL 3.3 mm, CW 4.8 mm Site 42, leg. SMF 28.05.05. ♂ CL 4.8 mm, CW 7.5 mm Site 42, leg. SMF 28.05.05.

Thalamita quadrilobata Miers, 1884

Plate 28 B

State: Recorded in Yemen, Gulf of Aden, sample localities 35, 41 from subtidal rock, corals, 6-10 m depth. Not recorded in the Arabian Sea.

Earlier records: Red Sea: Laurie (1915), Vine (1986), Apel & Spiridonov (1998), Spiridonov & Neumann (2007). Gulf of Aden: Djibouti (Apel & Spiridonov, 1998). Socotra Island: Apel (2001). Gulf of Oman: Apel & Spiridonov (1998), Apel (2001). Arabian Gulf: Naderloo (2017).

Materials examined: ♀ CL 5.5 mm, CW 8.6 mm Site 35, leg. SMF 19.05.05. 7♂♂ CL 3.7-5.4 mm, CW 4.9-7.7 mm Site 35, leg. SMF 19.05.05. ♂ CL 4 mm, CW 5.6 mm Site 41, leg. SMF 26.05.05.

Thalamita cf. crosnieri Vannini 1983

Plate 28 C

State: Recorded in Yemen, Gulf of Aden, at sample locality 23 from subtidal rock, corals, 2 m depth. Not recorded in the Red Sea, Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Somalia, Sar Uanle (Vannini & Innocenti, 2000).

Remarks: A variable species. The fourth anterolateral tooth can be more or less reduced or even completely absent; the depth of the notch separating the median frontal lobes from the lateral ones is variable and is occasionally absent (Vannini & Innocenti, 2000). Only one female specimen available, so the identification without gonopods remains somewhat uncertain.

Materials examined: 1 ovi. ♀ CL 8.3 mm, CW 10.8 mm Site 23, leg. AUAA 05.04.14.

Thalamita sp.

Plate 28 D

State: Recorded in Yemen, Gulf of Aden, sample locality 21 from subtidal sand, 15 m depth.

Materials examined: 2♀♀ CL 4.7-5.9 mm, CW 6.7-8 mm Site 21, leg. RUWW 26.03.84.

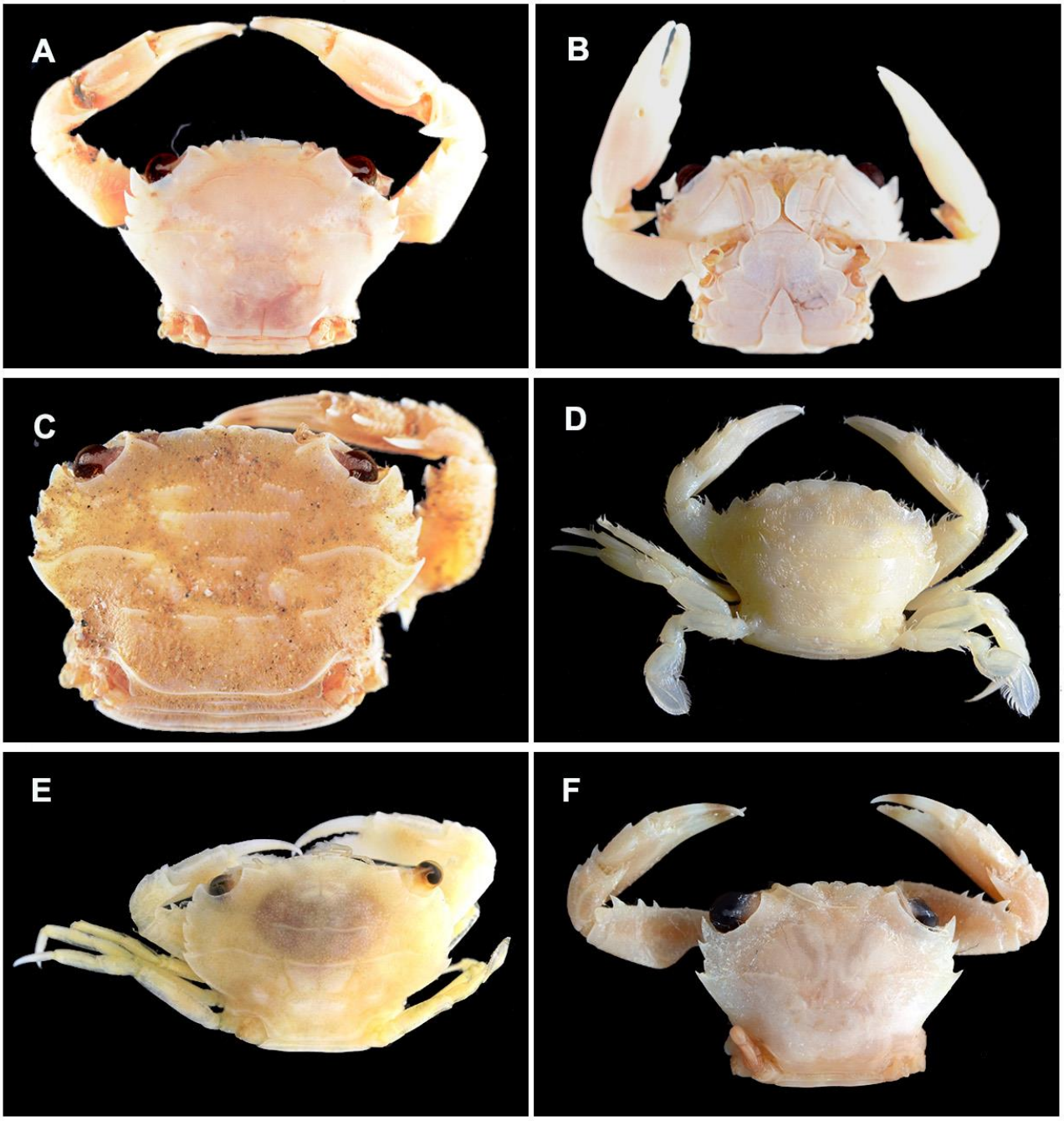

Plate 27: A. *Thalamita mitsiensis*, ♂ CL 9.1 mm, CW 12.3 mm (dorsal view); **B.** *Thalamita mitsiensis*, (ventral view); **C.** *Thalamita sexlobata*, ♂ CL 11 mm, CW 15.5 mm; **D.** *Thalamita woodmasoni,* ♀ CL 12.5 mm, CW 17.2 mm; **E.** *Thalamita chaptalii*, ♂ CL 8.4 mm, CW 11.8 mm; **F.** *Thalamita bandusia,* ♂ CL 6.5 mm, CW 8.8 mm.

Thalamita cf. stephensoni Crosnier 1962
Plate 28 E, F

State: Recorded in Yemen, Gulf of Aden, at sample locality 23 from subtidal rock, corals, 2 m depth. Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915). Socotra Island: Simões *et al.* (2001). Somalia: Vannini & Innocenti (2000).

Remarks: Only one female specimen available, so the identification without gonopods remains somewhat uncertain.

Materials examined: 1 ovi. ♀ CL 11.7 mm, CW 16.9 mm Site 23, leg. AUAA 12.04.14.

Superfamily Trapezioidea Miers, 1886
Family Tetraliidae Castro, Ng & Ahyong, 2004

Tetralia cavimana Heller, 1861
Plate 29 A

State: Recorded in Yemen, Gulf of Aden, sample localities 18, 35 from corals, 1-10 m depth.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Eritrea, Dahlak Archipelago (Neumann & Spiridonov, 1999); Gulf of Suez (Castro, 1999); Hudaydah coasts (Zajonz *et al.,* 1998). Gulf of Aden: Djibouti, Obock (Castro, 1999). Socotra Island: Castro (1999), Apel (2001). Arabian Sea: Oman, Dhofar (Hogarth, 1994; Khvorov *et al.*, 2012). Gulf of Oman: Apel (2001). Arabian Gulf: Stephensen (1946), Castro (1999), Apel (2001), Naderloo (2017).

Materials examined: ♀ CL 6.2 mm, CW 7.6 mm Site 18, leg. AUAA 26.04.14. ♂ CL 5 mm, CW 6 mm Site 18, leg. AUAA 26.04.14. ♀ CL 6.5 mm, CW 7.5 mm Site 35, leg. SMF 17.05.05. ♂ CL 6 mm, CW 6.9 mm Site 35, leg. SMF 17.05.05.

Tetraloides nigrifrons (Dana, 1852)
Plate 29 B

State: First record in Yemen, Gulf of Aden and Socotra Island at sample localities 18, 21, 54 from corals, 1-2 m depth. Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: under the synonym *Tetralia glaberrima nigrifrons* Dana, 1852 by Serène (1984). Somalia: Galil & Clark (1988).

Materials examined: 1. ovi ♀ CL 7.6 mm, CW 8.7 mm Site 21, leg. AUAA 02.04.14. 1. ovi ♀ CL 6.9 mm, CW 7.7 mm Site 18, leg. AUAA 02.04.14. ♂ CL 6.3 mm, CW 7.2 mm Site 18, leg. AUAA 02.04.14. 3. ovi ♀♀ CL 8.8-12.1 mm, CW 10.2-14 mm Sit 54, leg. RUWW 01.03.96. 4♂♂ CL 6.8-12 mm, CW 7.8-12.9 mm Sit 54, leg. RUWW 01.03.96. 2 Juv CL 3.5-4.2 mm, CW 4.4-5.3 mm Sit 54, leg. RUWW 01.03.96.

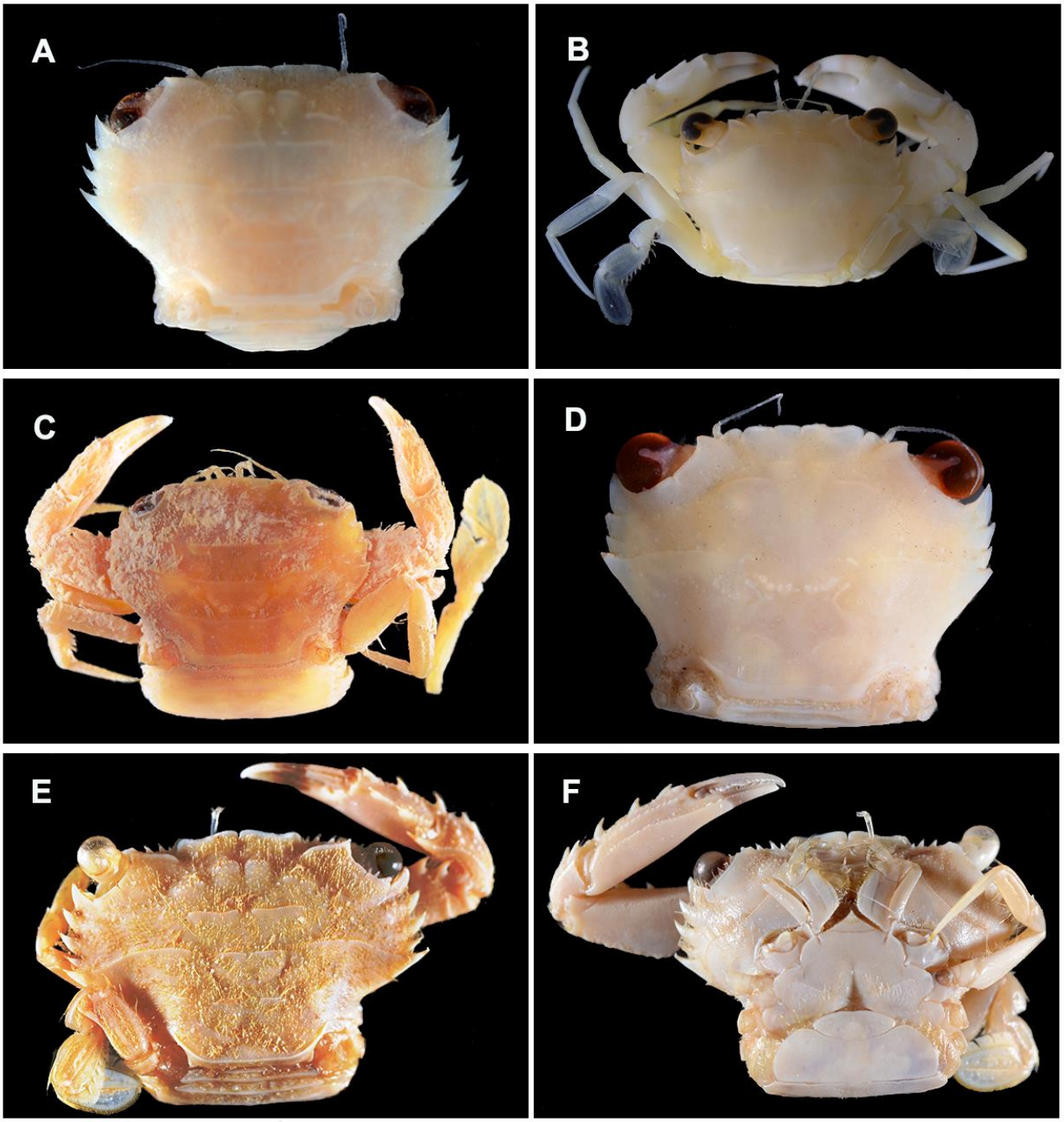

Plate 28: A. *Thalamita gatavakensis*, ♀ CL 3.3 mm, CW 4.8 mm; **B.** *Thalamita quadrilobata*, ♂ CL 5.4 mm, CW 7.7 mm; **C.** *Thalamita cf. crosnieri*, ♀ CL 8.3 mm, CW 10.8 mm; **D.** *Thalamita* sp., ♀ CL 5.9 mm, CW 8 mm; **E.** *Thalamita cf. stephensoni*, ♀ CL 11.7 mm, CW 16.9 mm, (dorsal view); **F.** *Thalamita cf. stephensoni,* (ventral view).

Family Trapeziidae Miers, 1886

Trapezia cymodoce (Herbst, 1801)
Plate 29 C

State: Recorded in Yemen, Red Sea, Gulf of Aden and Socotra Island at sample localities 8, 10, 17, 18, 21, 23, 34, 35, 39, 41, 42, 47, 54 from corals, 1-30 m depth.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Gulf of Suez, Gulf of Elat and Eretria (Galil & Clark, 1990; Castro, 1999; Neumann & Spiridonov, 1999); Mayun Island (Nobili, 1906; Balss, 1922); Hudaydah coasts (Zajonz *et al.,* 1998; Krupp *et al.,* 2006), Vine (1986) without a specific location. Gulf of Aden: Aden (Nobili, 1906; Castro, 1999; Al-Hindi, 2010). Socotra Island: Apel (2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994; Khvorov *et al.*, 2012). Gulf of Oman: Castro (1999), Naderloo *et al.* (2015). Arabian Gulf: Stephensen (1946), Castro (1999), Apel (2001).

Materials examined: Data, see appendix. CO1; AIMSEQ08112016-C08.

Trapezia tigrina Eydoux & Souleyet, 1842
Plate 29 D

State: Recorded in Yemen, Red Sea and Gulf of Aden at sample localities 2, 8, 10, 21, 22, 23, 35 from corals, 1-40 m depth. Not recorded in the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Jiddah and Eretria (Castro, 1999; Neumann & Spiridonov, 1999); Hudaydah coasts (Zajonz *et al.,*1998; Krupp *et al.,* 2006). Gulf of Aden: Djibouti, Aden and Sikha Island (Neumann & Spiridonov, 1999; Castro, 1999). Socotra Island: Apel (2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994; Khvorov *et al.*, 2012). Gulf of Oman: Apel (2001).

Materials examined: Data, see appendix.

Trapezia lutea Castro, 1997
Plate 29 E

State: First records in Yemen, Red Sea, Uqban Island, sample locality 2 from the coral, 2-40 m depth. Not recorded in Gulf of Aden, Arabian Sea, Gulf of Oman and the Arabian Gulf.

Materials examined: ♂ CL 8.2 mm, CW 9.3 mm Site 2, leg. SMF 15.04.98.

Quadrella coronata Dana, 1852
Plate 29 F

State: First record in Yemen, Gulf of Aden, at sample localities 30, 34 from corals, 15-60 m depth. Not recorded in the Arabian Sea and the Arabian Gulf.

Earlier records: Red Sea: Castro (1999). Gulf of Oman: Castro (1999), Apel (2001).

Materials examined: ♀ CL 7 mm, CW 8.5 mm Site 30, leg. RUWW 10.11.84. 1. ovi ♀ CL 6.8 mm, CW 8.6 mm Site 34, leg. SMF 25.05.05. ♂ CL 6.4 mm, CW 7 mm Site 34, leg. SMF 25.05.05. 1 Juv CL 3 mm, CW 3.1 mm Site 34, leg. SMF 25.05.05.

Superfamily Pseudozioidea Alcock, 1898
Family Pseudoziidae Alcock, 1898

Pseudozius caystrus (Adams & White, 1849)
Plate 30 A, B, C, D

State: Recorded in Yemen, Gulf of Aden, Arabian Sea and Socotra Island, sample localities 18, 19, 21, 22, 23, 24, 32, 40, 43, 44, 48, 52, 54, 55 from sand, rock with cobble, 0-0.5 m depth.

Earlier records: Red Sea: Egyptian and Sudanese coasts by Laurie (1915); Vine (1986) without a specific location. Gulf of Aden: Sikha Island (Neumann & Spiridonov, 1999). Socotra Island: Simões *et al.* (2001), Apel (2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994; Khvorov *et al.*, 2012). Gulf of Oman: Apel (2001), Naderloo *et al.* (2015). Arabian Gulf: Naderloo & Türkay, (2012), Naderloo *et al.* (2013).

Remarks: Common and widespread species in all coastal waters of the Arabian Peninsula.

Materials examined: Data, see appendix. CO1; AIMSEQ08112016-F08.

Superfamily Xanthoidea MacLeay, 1838
Family Xanthidae MacLeay, 1838

Atergatis integerrimus (Lamarck, 1818)
Plate 31 A

State: Recorded in Yemen, Gulf of Aden, at sample locality 24 from sand, rock, 0.5-1 m depth. Not recorded in the Arabian Sea.

Earlier records: Red Sea: White (1847). Gulf of Aden: Aden, first records by Al-Hindi (2010). Gulf of Oman: Apel (2001). Arabian Gulf: Stephensen (1946), Naderloo *et al.* (2015).

Materials examined: ♀ CL 46.4 mm, CW 73.3 mm Site 24, leg. AUAA 2008. 1 Juv CL 6 mm, CW 9 mm Site 24, leg. AUAA 02.11.16, CO1; AIMSEQ08112016-G08.

Atergatis latissimus (H. Milne Edwards, 1834)
Plate 31 B

State: First record in Yemen, Socotra Island, at sample locality 55 from subtidal rock, corals, 1-2 m depth. Not recorded in the Red Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Arabian Sea: Oman, Dhofar Province (Khvorov *et al.*, 2012).

Materials examined: ♂ CL 54.7 mm, CW 89.1 mm Site 55, leg. SMF 15.03.99.

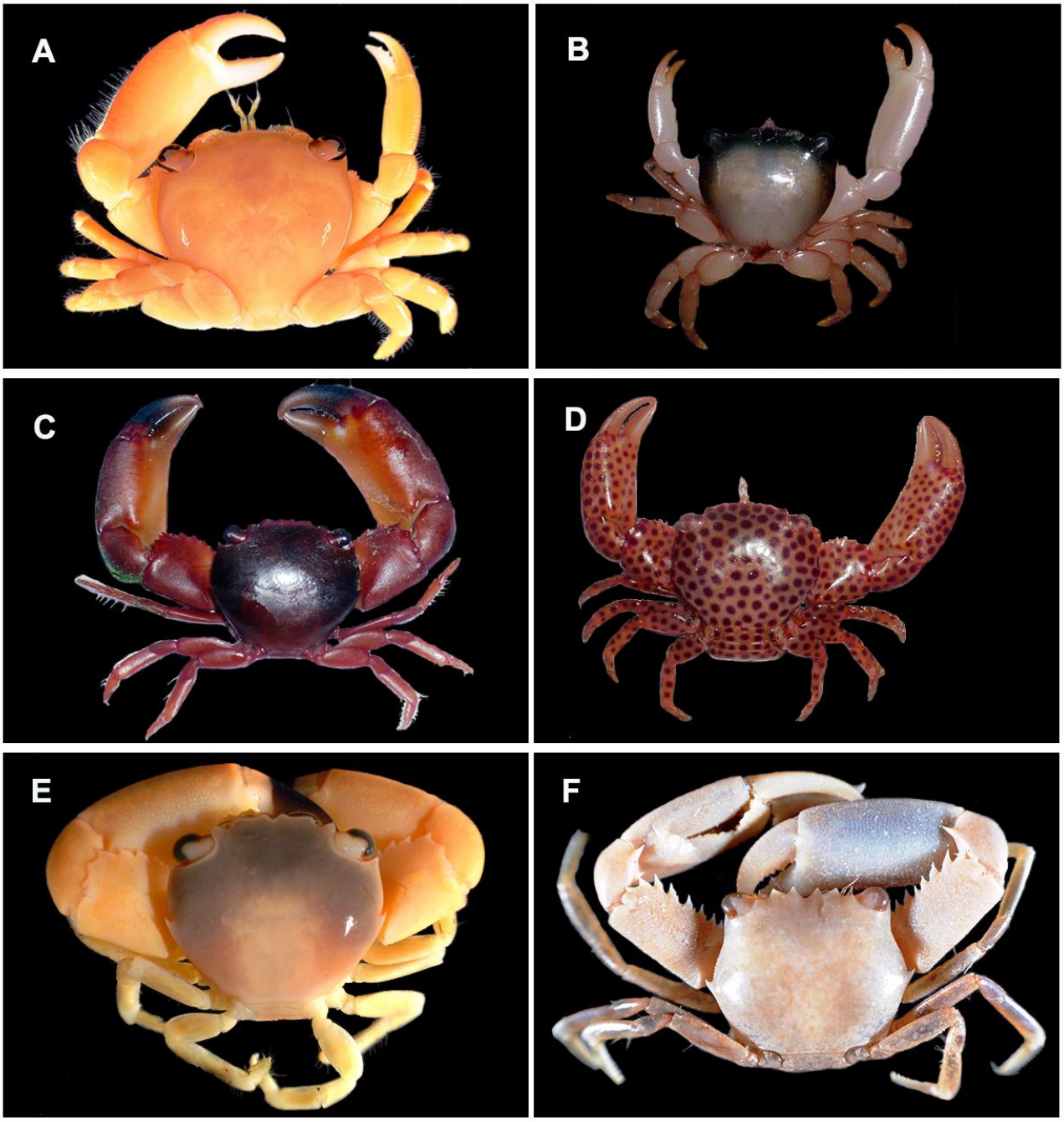

Plate 29: A. *Tetralia cavimana*, ♂ CL 6 mm, CW 6.9 mm; **B.** *Tetraloides nigrifrons*, ♂ CL 6.3 mm, CW 7.2 mm; **C.** *Trapezia cymodoce*, ♂ CL 13.7 mm, CW 15.6 mm; **D.** *Trapezia tigrina,* ♂ CL 13 mm, CW 15 mm; **E.** *Trapezia lutea*, ♂ CL 8.2 mm, CW 9.3 mm; **F.** *Quadrella coronata,* ♀ CL 7 mm, CW 8.5 mm.

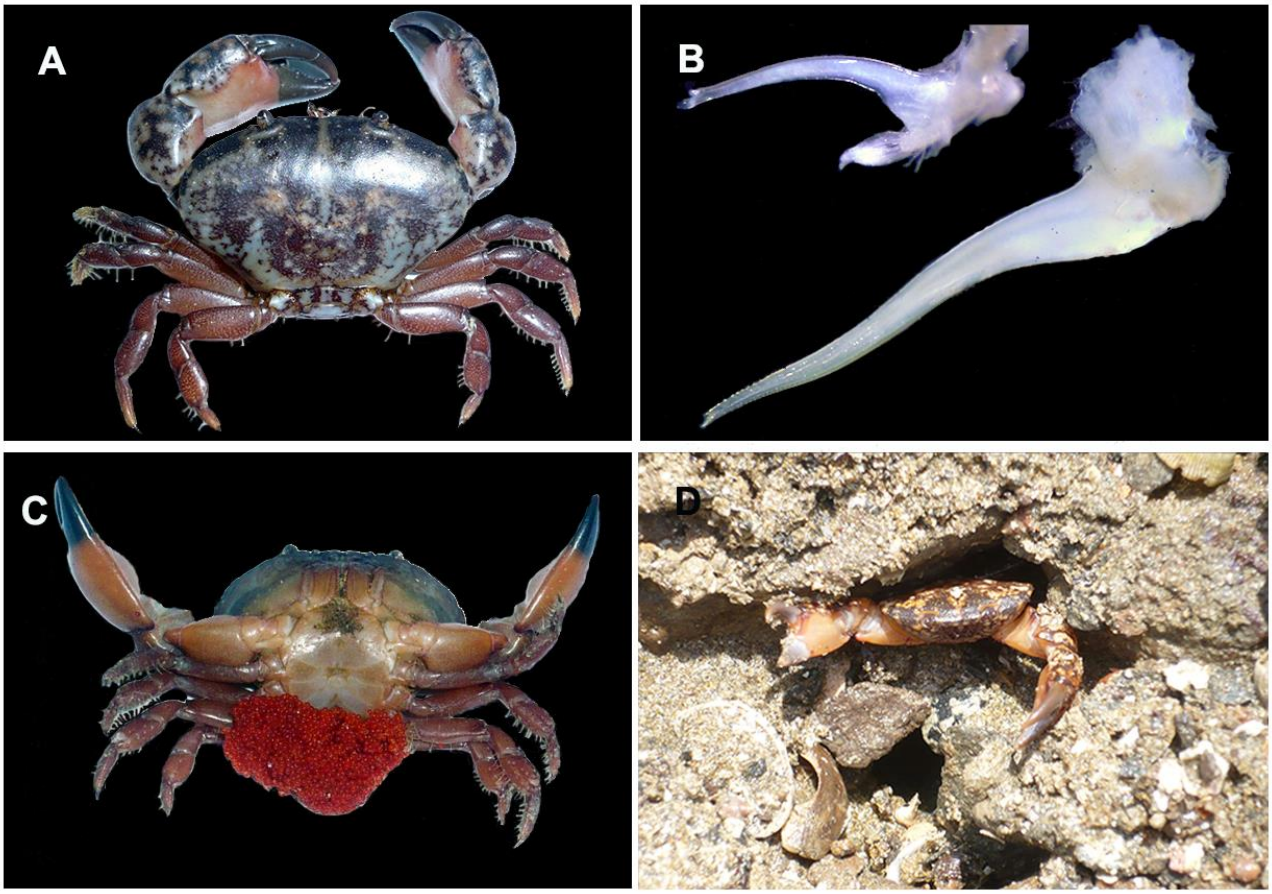

Plate 30: A. *Pseudozius caystrus*, ♂ CL 14.1 mm, CW 23.9 mm; **B.** *Pseudozius caystrus*, G1,6.6 mm & G2; **C.** *Pseudozius caystrus*, ♀ CL 10.5 mm CW 17.7 mm (Female with eggs); **D.** *Pseudozius caystrus* in natural habitat.

Materials examined: Data, see appendix. CO1; AIMSEQ08112016-A09, CO1; AIMSEQ08112016-A11, CO1; AIMSEQ08112016-B09, CO1; AIMSEQ08112016-B11, CO1; AIMSEQ08112016-C09, CO1; AIMSEQ08112016-C11, CO1; AIMSEQ08112016-D09, CO1; AIMSEQ08112016-D11, CO1; AIMSEQ08112016-E04, CO1; AIMSEQ08112016-F04, CO1; AIMSEQ08112016-F10, CO1; AIMSEQ08112016-G10, CO1; AIMSEQ08112016-H08, CO1; AIMSEQ08112016-H10.

Leptodius exaratus (H. Milne Edwards, 1834)
Plate 31 C

State: Recorded in Yemen, Gulf of Aden, Arabian Sea and Socotra Island, sample localities 10, 19, 21, 22, 23, 24, 26, 32, 43, 51, 54 from sand, rock with cobble and mangrove, 0-4 m depth.

Earlier records: Red Sea: Laurie (1915), Balss (1922), Vine (1986), Apel (2001). Gulf of Aden: Djibouti and Sikha Island (Neumann & Spiridonov, 1999; Apel, 2001); Aden (Al-Hindi, 2010). Socotra Island: Simões *et al.* (2001), Apel (2001). Arabian Sea: Oman, Dhofar Province (Hogarth,

1994; Khvorov *et al.*, 2012). Gulf of Oman: Naderloo *et al.* (2015). Arabian Gulf: Stephensen (1946), Apel (2001), Naderloo & Türkay (2012), Naderloo *et al.* (2013). Somalia: Galil &Vannini (1990).

Remarks: Common and widespread species in all coastal waters of the Arabian Peninsula.

Macromedaeus voeltzkowi (Lenz, 1905)
Plate 31 D

State: First record in Yemen, Gulf of Aden, at sample localities 19, 41 from sand, rock with cobble, 0-15 m depth. Not recorded in the Arabian Sea.

Earlier records: Red Sea: Serène (1984), Vine (1986). Gulf of Oman: Naderloo *et al.* (2015). Arabian Gulf : Naderloo & Türkay (2012). Somalia: Galil &Vannini (1990), Apel (2001).

Materials examined: ♂ CL 15.7 mm, CW 23.5 mm Site 19, leg. AUAA 01.04.13. ♂ CL 10.2 mm, CW 14 mm Site 41, leg. SMF 28.05.05.

Xanthias sinensis (A. Milne-Edwards, 1867)
Plate 31 E

State: Recorded in Yemen, Gulf of Aden and Socotra Island, at sample localities 19, 21, 27, 31, 32, 33, 43, 54 from sand, rock with cobble, 0-0.5 m depth.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915). Gulf of Aden: Djibouti, Aden and Sikha Island (Nobili, 1906; Serène, 1984; Neumann & Spiridonov, 1999). Socotra Island: Simões *et al.* (2001), Apel (2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994; Khvorov *et al.*, 2012). Gulf of Oman: Serène (1984), Apel (2001), Naderloo *et al.* (2015). Arabian Gulf: Naderloo & Türkay (2012), Naderloo *et al.* (2013). Somalia: Galil &Vannini (1990).

Materials examined: Data, see appendix. CO1; AIMSEQ08112016-E11.

Xanthias cf. canaliculatus Rathbun, 1906
Plate 31 F

State: Recorded in Yemen, Gulf of Aden, at sample locality 41 from the sandy rocky shore, 10-15 m depth. Not recorded in the Red Sea, Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Somalia, Gesira (Galil &Vannini, 1990).

Remarks: Only one female specimen, so difficulty the identity without taking the gonopods.

Materials examined: ♀ CL 10.8 mm, CW 15.3 mm Site 41, leg. SMF 28.05.05.

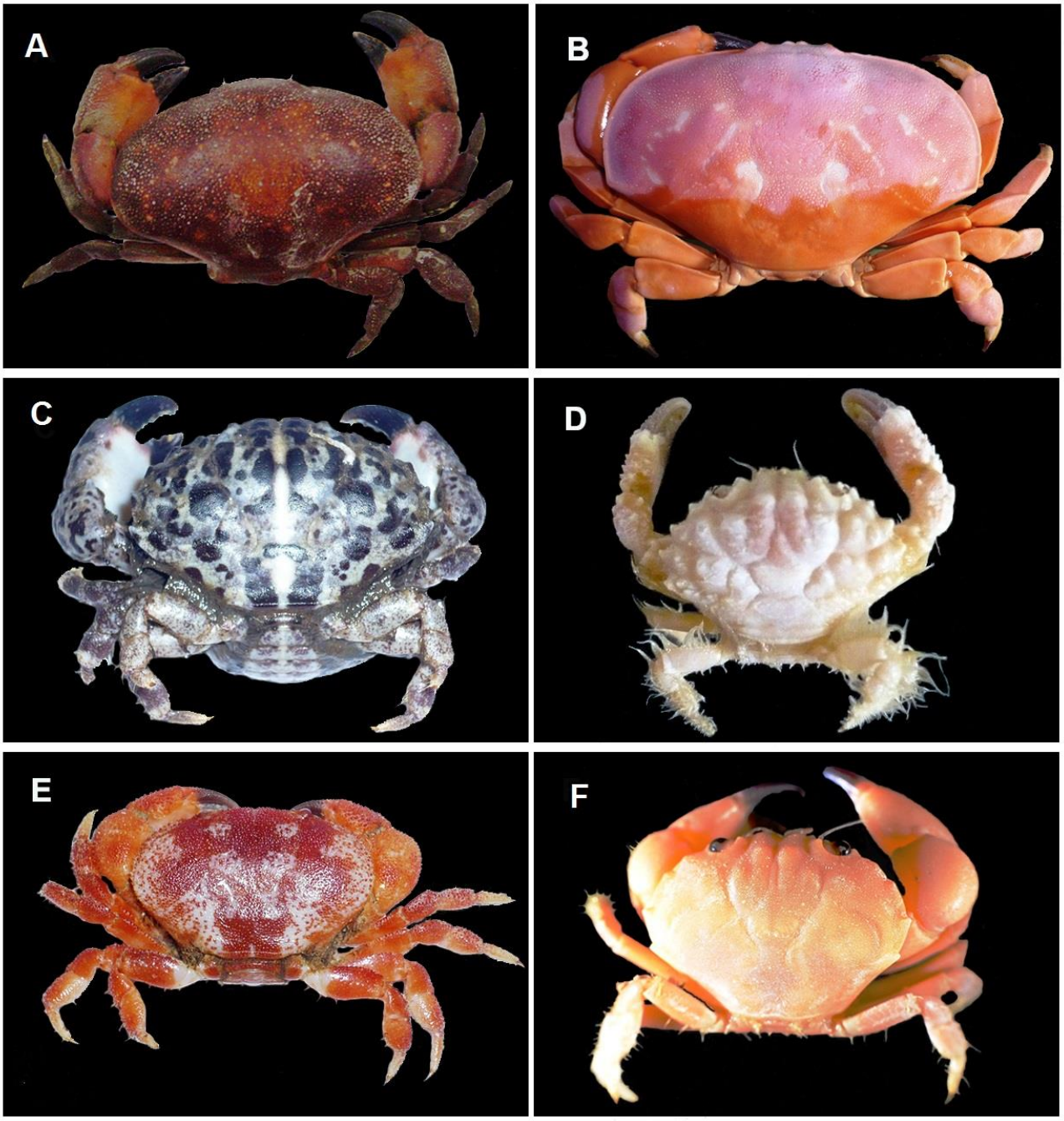

Plate 31: A. *Atergatis integerrimus*, ♀ CL 46.4 mm, CW 73.3 mm; **B.** *Atergatis latissimus,* ♂ CL 54.7 mm, CW 89.1 mm; **C.** *Leptodius exaratus*, ♀ CL 16.6 mm, CW 24.8 mm; **D.** *Macromedaeus voeltzkowi*, ♂ CL 10.2 mm, CW 14 mm*;* **E.** *Xanthias sinensis,* ♀ CL 16.9 mm, CW 26.7 mm*;* **F.** *Xanthias cf. canaliculatus,* ♀ CL 10.8 mm, CW 15.3 mm.

Zosimus aeneus (Linnaeus, 1758)
Plate 32 A

State: First record in Yemen, Gulf of Aden, at sample localities 16, 22 from sand, rock, 1-2 m depth. Not recorded in the Arabian Sea and Gulf of Oman.

Earlier records: Red Sea: Laurie (1915), Balss (1922), Serène (1984), Vine (1986). Arabian Gulf: Naderloo *et al.* (2016). Somalia: Sar Uanle (Galil & Vannini, 1990).

Materials examined: ♂ CL 24.7 mm, CW 35.9 mm Site 16, leg. AUAA 2008. ♀ CL 29.7 mm, CW 42.8 mm Site 22, leg. RUWW 01.03.84. ♂ CL 28.6 mm, CW 41.2 mm Site 22, leg. RUWW 01.03.84.

Luniella spinipes (Heller, 1861)
Plate 32 B

State: Recorded in Yemen, Red Sea, Gulf of Aden and Socotra Island, sample localities 2, 8, 15, 17, 18, 21, 23, 24, 33, 34, 36, 37, 39, 41, 42, 54 from corals, sand, rock with cobble, 0-30 m depth.

Earlier records: Red Sea: Egyptian and Sudanese coasts under the synonym *Chlorodopsis spinipes* Heller, 1861 by Laurie (1915); Mayun Island (Nobili, 1906; Balss, 1922) under the synonym *Chlorodopsis spinipes* Heller, 1861 and the under synonym *Pilodius spinipes* Heller, 1861 by Seréne (1984), Clark & Galil (1993); Hudaydah coasts (Zajonz *et al.,* 1998; Krupp *et al.*, 2006), Vine (1986) without a specific location. Gulf of Aden: Djibouti (Seréne, 1984; Clark & Galil, 1993); Aden (Clark & Galil, 1993); Sikha Island (Neumann & Spiridonov, 1999). Socotra Island: Simões *et al.* (2001), Apel (2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994; Khvorov *et al.*, 2012). Gulf of Oman: Apel (2001). Arabian Gulf: Apel (2001), Naderloo *et al.* (2016). Somalia: Sar Uanle and Gesira by Galil &Vannini (1990).

Remarks: Widespread in all coastal waters of the Arabian Peninsula.

Materials examined: Data, see appendix.

Cyclodius granulatus (Targioni-Tozzetti, 1877)
Plate 32 C

State: First record in Yemen, Gulf of Aden, at sample localities 21, 34, 37, 42, 47 from the corals, 0-2 m depth. Records in Socotra Island, sample locality 54 from corals, 0-2 m depth and record in the Red Sea, sample locality 2, 8 from coral, 3-30 m depth. Not recorded in Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Mayun Island (Balss, 1922; Serène, 1984); Hudaydah coasts (Zajonz *et al.,* 1998; Krupp *et al.*, 2006), Vine (1986) without a specific location. Socotra Island: Apel (2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994; Khvorov *et al.*, 2012). Somalia: Sar Uanle (Galil &Vannini, 1990).

Materials examined: Data, see appendix. CO1; AIMSEQ08112016-E08.

Lophozozymus anaglyptus (Heller, 1861)
Plate 32 D

State: Recorded in Yemen, Gulf of Aden and Arabian Sea, sample localities 15, 22, 30, 39, 42, 50 from sand, rock, 0-10 m depth.

Earlier records: Red Sea: Egyptian coasts, Sudanese coasts and Eritrean coasts (Laurie, 1915; Serène, 1984; Neumann & Spiridonov, 1999); Zebejir and Zuukur Islands (Balss, 1922). Gulf of Aden: Sikha Island (Neumann & Spiridonov, 1999). Socotra Island: Neumann & Spiridonov (1999), Simões *et al.* (2001), Apel (2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994; Khvorov *et al.*, 2012). Gulf of Oman: Apel (2001). Arabian Gulf: Apel (2001), Naderloo *et al.* (2016). Somalia: Sar Uanle (Galil &Vannini, 1990).

Materials examined: 2♂♂ CL 9-14 mm, CW 13-20 mm Site 30, leg. AUAA 02.11.16. ♂ CL 21.4 mm, CW 32.2 mm Site 15, leg. RUWW 01.12.83. ♂ CL 14.1 mm, CW 21.7 mm Site 50, leg. RUWW 01.03.84. ♂ CL 20.2 mm, CW 30.2 mm Site 39, leg. SMF 24.05.05. ♀ CL 12.4 mm, CW 18.5 mm Site 42, leg. SMF 28.05.05. 1 Juv CL 6 mm, CW 8.9 mm Site 22, leg. RUWW 01.03.85.

Etisus laevimanus Randall, 1840
Plate 32 E

State: Recorded in Yemen, Gulf of Aden, sample locality 24 from sand, rock, 0.5-1 m depth.

Earlier records: Red Sea: Laurie (1915), Balss (1922), Serène (1984), Vine (1986). Gulf of Aden: Djibouti (Apel, 2001). Arabian Sea: Oman, Dhofar Province (Khvorov *et al.*, 2012). Gulf of Oman: Naderloo *et al.* (2015). Arabian Gulf: Apel (2001), Naderloo *et al.* (2016).

Materials examined: ♂ CL 35 mm, CW 53 mm Site 24, leg. AUAA 02.11.16, CO1; AIMSEQ08112016-G04.

Hypocolpus cf. guinotae Vannini, 1982
Plate 32 F

State: First record in Yemen, the Red Sea, Kamaran Island, sample locality 4, 5-12 m depth (carapace only). Not recorded in Gulf of Aden, Arabian Sea, Gulf of Oman and Arabian Gulf. Hence, this is the first record in the marine waters of the Arabian Peninsula.

Remarks: Serène (1984) mentioned this species was only known by the male holotype and two females by Nobili (1906), all these samples come from Somalia.
Another species of this genus *Hypocolpus diverticulatus* (Strahl, 1861) has been recorded in the Red Sea: Suez, Jeddah and Dahab under the synonym *Hypocoelus sculptus* A. Milne Edwards by Balss (1924) and recorded in Gulf of Aden: Aden by Nobili (1906).

Materials examined: Carapace only CL 21.5 mm, CW 28.4 mm Site 4, leg. SMF 12.04.04.

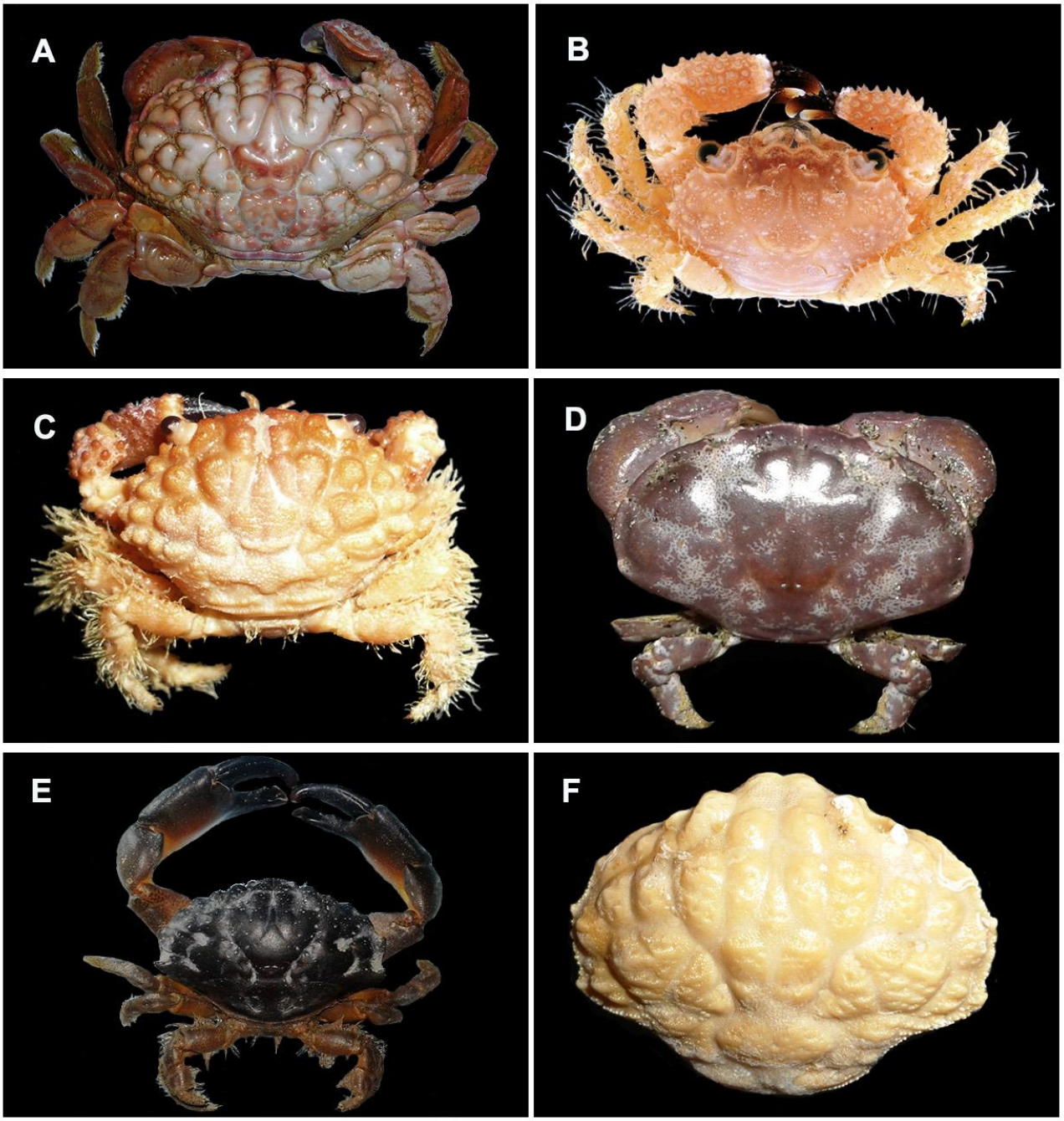

Plate 32: A. *Zosimus aeneus*, ♂ CL 24.7 mm, CW 35.9 mm; **B.** *Luniella spinipes,* ♂ CL 8 mm, CW 12 mm; **C.** *Cyclodius granulatus*, ♂ CL 13.4 mm, CW 19.7 mm; **D.** *Lophozozymus anaglyptus*, ♂ CL 14 mm, CW 20 mm*;* **E.** *Etisus laevimanus,* ♂ CL 35 mm, CW 53 mm; **F.** *Hypocolpus cf. guinotae,* Carapace only CL 21.5 mm, CW 28.4 mm.

Cymo quadrilobatus Miers, 1884
Plate 33 A

State: First record in Yemen, Gulf of Aden, at sample localities 18, 34, 41 from corals, 1-2 m depth. Also records in the Red Sea and Socotra Island, sample localities 8, 54 from the corals, 1-20 m depth. Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian coasts, Sudanese coasts and Eritrea coasts (Laurie, 1915; Serène, 1984); Hudaydah coasts (Krupp *et al.*, 2006). Socotra Island: Apel (2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994; Khvorov *et al.*, 2012). Somalia: Gesira (Galil & Vannini, 1990).

Materials examined: ♀ CL 6.1 mm, CW 6.4 mm Site 18, leg. AUAA 26.04.14. ♂ CL 5.3 mm, CW 5.4 mm Site 18, leg. AUAA 26.04.14. ♀ CL 11.5 mm, CW 11.8 mm Site 54, leg. RUWW 01.03.96. ♂ CL 12.5 mm, CW 12.6 mm Site 54, leg. RUWW 01.03.96. ♀ CL 18.4 mm, CW 20.1 mm Site 34, leg. SMF 16.05.05. ♂ CL 11 mm, CW 10.2 mm Site 8, leg. SMF 08.04.04. ♂ CL 12 mm, CW 12.5 mm Site 41, leg. SMF 26.05.05.

Cymo andreossyi (Audouin, 1826)
Plate 33 B

State: First record in Yemen, Gulf of Aden, at sample localities 17, 18, 23, 34, 39, 42 from corals, 1-10 m depth. Also records in Socotra Island, sample locality 54 from corals, 1-10 m depth.

Earlier records: Red Sea: Egyptian coasts, Sudanese coasts and Eritrea coasts (Laurie, 1915; Serène, 1984; Apel, 2001); Kamaran, Zebejir and Zuukur Islands (Balss, 1922), Vine (1986) without a specific location. Socotra Island: Apel (2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994; Khvorov *et al.*, 2012). Gulf of Oman: Apel (2001). Arabian Gulf: Stephensen (1946), Apel (2001). Somalia: Gesira (Galil &Vannini, 1990).

Materials examined: Data, see appendix.

Cymo melanodactylus Dana, 1852
Plate 33 C

State: Recorded in Yemen, Red Sea sample locality 2 from corals, 3-6 m depth.

Earlier records: Red Sea: Laurie (1915), Balss (1922), Serène (1984), Vine (1986), Neumann & Spiridonov (1999). Gulf of Aden: Djibouti and Aden (Nobili, 1906; Serène, 1984). Socotra Island: Apel (2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994; Khvorov *et al.*, 2012). Gulf of Oman: Apel (2001). Arabian Gulf: Stephensen (1946), Apel (2001). Somalia: Gesira (Galil &Vannini, 1990).

Materials examined: 2♀♀ (1. ovi) CL 8.9-11.5 mm, CW 9.7-11.9 mm Site 2, leg. SMF 05.04.98. ♂ CL 11.8 mm, CW 12 mm Site 2, leg. SMF 05.04.98. 1 Juv CL 6 mm, CW 5.6 mm Site 2, leg. SMF 05.04.98.

Chlorodiella nigra (Forskål, 1775)
Plate 33 D

State: Recorded in Yemen, Red Sea and Gulf of Aden, sample localities 2, 17, 21, 23, 37 from corals, 1-8 m depth.

Earlier records: Red Sea: Egyptian coasts, Sudanese coasts and Eritrea coasts (Laurie, 1915; Neumann & Spiridonov, 1999); Mayun Island (Balss, 1922); Hudaydah coasts (Zajonz *et al.*, 1998). Gulf of Aden: Aden and Sikha Island (Nobili, 1906; Zajonz *et al.,* 1998; Neumann & Spiridonov, 1999). Socotra Island: Apel (2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994). Gulf of Oman: Apel (2001), Naderloo (2017). Arabian Gulf: Stephensen (1946), Apel (2001), Naderloo (2017). Somalia: Gesira (Galil &Vannini, 1990).

Materials examined: 2♀♀ (1. ovi) CL 7.4-8 mm, CW 11.3-12.3 mm Site 21, leg. AUAA 02.04.14. 4♂♂ CL 6.9-10.2 mm, CW 10.6-15.8 mm Site 21, leg. AUAA 02.04.14. 1. ovi ♀ CL 7.6 mm, CW 11.3 mm Site 23, leg. AUAA 04.05.14. 2♂♂ CL 5.7-6.3 mm, CW 8-9.2 mm Site 23, leg. AUAA 04.05.14. ♂ CL 8.9 mm, CW 12.7 mm Site 21, leg. AUAA 01.10.10. ♂ CL 5 mm, CW 6.5 mm Site 2, leg. SMF 05.04.98. ♀ CL 8.8 mm, CW 12.8 mm Site 17, leg. SMF 25.03.98. 3♀♀ (1. ovi) CL 4.7-5.9 mm, CW 7.2-9.1 mm Site 37, leg. SMF 18.05.05. ♂ CL 5.2 mm, CW 6.8 mm Site 37, leg. SMF 18.05.05. 2 Juv CL 3.5-3.8 mm, CW 4.6-4.8 mm Site 37, leg. SMF 18.05.05.

Chlorodiella laevissima (Dana, 1852)
Plate 33 E

State: First record in Yemen, Gulf of Aden, at sample locality 21 from sand, rock, 0-0.5 m depth. Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Hudaydah coasts (Krupp *et al.*, 2006), Vine (1986) without a specific location. Somalia: Gesira (Galil &Vannini, 1990).

Materials examined: ♀ CL 5 mm, CW 7 mm Site 21, leg. AUAA 02.11.16.

Chlorodiella cytherea (Dana, 1852)
Plate 33 F

State: Recorded in Yemen, Red Sea sample localities 8, 10 from corals, 1-2 m depth. Not recorded in Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Hudaydah coasts (Krupp *et al.*, 2006), Vine (1986) without a specific location. Socotra Island: Neumann & Spiridonov (1999), Apel (2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994). Somalia: Gesira (Galil & Vannini, 1990).

Materials examined: ♀ CL 4.1 mm, CW 5.6 mm Site 10, leg. SMF 07.04.04. 2♂♂ CL 3.9-5.5 mm, CW 5.1-7.8 mm Site 10, leg. SMF 07.04.04. 1 Juv CL 1.9 mm, CW 2.4 mm Site 10, leg. SMF 07.04.04. ♂ CL 4 mm, CW 5.1 mm Site 8, leg. SMF 07.04.04.

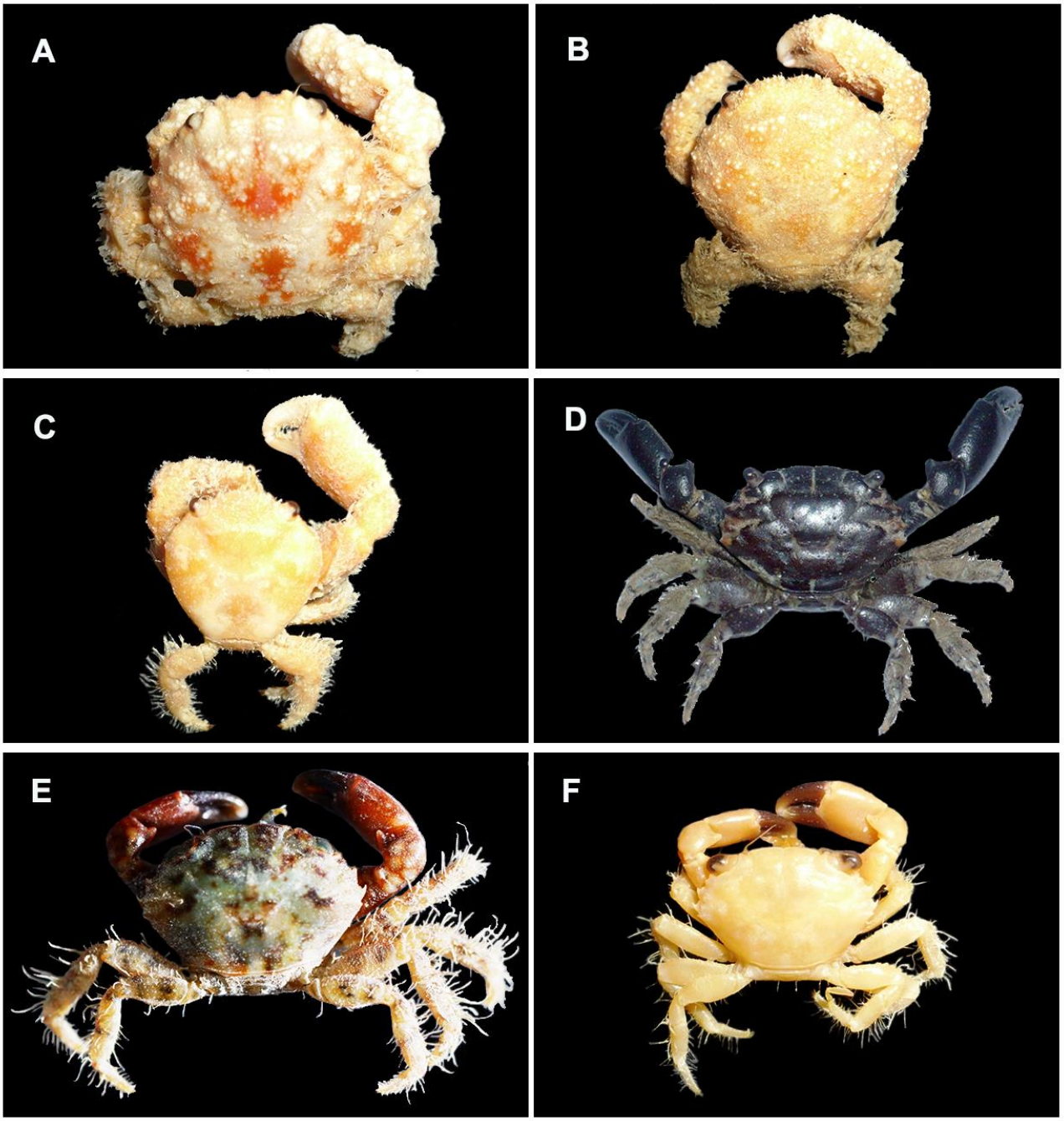

Plate 33: A. *Cymo quadrilobatus*, ♂ CL 12 mm, CW 12.5 mm; **B.** *Cymo andreossyi,* ♂ CL 9.6 mm, CW 9.9 mm*;* **C.** *Cymo melanodactylus*, ♂ CL 11.8 mm, CW 12 mm; **D.** *Chlorodiella nigra*, ♂ CL 10.2 mm, CW15.8 mm*;* **E.** *Chlorodiella laevissima,* ♀ CL 5 mm, CW 7 mm; **F.** *Chlorodiella cytherea,* ♂ CL 5.5 mm, CW 7.8 mm.

Actaea savignii (H. Milne Edwards, 1834)
Plate 34 A

State: Recorded in Yemen, the Red Sea and Socotra Island, sample localities 2, 4, 54 from subtidal rock, corals, 2-20 m depth. Not recorded in the Arabian Sea.

Earlier records: Red Sea: Laurie (1915), Balss (1922), Serène (1984), Vine (1986), Apel (2001), Krupp *et al.* (2006). Socotra Island: Neumann & Spiridonov (1999), Apel (2001).

Materials examined: ♀ CL 17.3 mm, CW 21.9 mm Site 54, leg. RUWW 01.03.84. ♂ CL 15.9 mm ,CW 19.8 mm Site 54, leg. RUWW 01.03.84. 1 Juv CL 6.7 mm, CW 8.4 mm Site 4, leg. SMF 01.04.04. ♀ CL 12 mm, CW 15.7 mm Site 2, leg. SMF 13.04.98.

Actaea jacquelinae Guinot, 1976
Plate 34 B

State: Recorded in Yemen, Red Sea, sample locality 4 in from subtidal sand, 5-15 m depth. Not recorded in the Gulf of Aden until now.

Earlier records: Red Sea: Serène (1984), Krupp *et al.* (2006). Gulf of Oman: Naderloo *et al.* (2015). Arabian Gulf: Stephensen (1946), Serène (1984), Apel (2001), Naderloo & Sari (2007), Naderloo & Türkay (2012).

Materials examined: 1 Juv CL 4.5 mm, CW 5.7 mm Site 4, leg. SMF 01.04.04. ♂ CL 6.4 mm, CW 7.7 mm Site 4, leg. SMF 01.04.04.

Actaea cf. bocki Odhner, 1925
Plate 34 C

State: Recorded in Yemen, Gulf of Aden, at sample locality 33 from sponge, 2-4 m depth. Not recorded in the Red Sea, Arabian Sea, Gulf of Oman and the Arabian Gulf.

Remarks: Only one female specimen, so difficulty the identity without taking the gonopods.

Materials examined: 1. ovi ♀ CL 12.2 mm, CW 17.3 mm Site 33, leg. SMF 21.05.05.

Atergatopsis granulata A. Milne-Edwards, 1865
Plate 34 D

State: First record in Yemen, Socotra Island sample locality 54 from sand, rock, 1-2 m depth. Not recorded in Gulf of Aden, Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915), Serène (1984) without a specific location.

Materials examined: 2♂♂ CL 11.3-24.7 mm, CW 16.5-34.8 mm Site 54, leg. RUWW 01.03.84.

Epiactaea margaritifera (Odhner, 1925)

Plate 34 E

State: First record in Yemen, Socotra Island, sample locality 54 from sand, rock, 1-2 m depth. This species was also recorded in the Gulf of Aden, sample localities 21, 22, 41 from subtidal sand, 6-23 m depth. Not recorded in Gulf of Oman.

Earlier records: Red Sea: Serène (1984). Gulf of Aden: Aden and Djibouti (Nobili, 1906; Serène, 1984; Apel, 2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994). Arabian Gulf: Stephensen (1946), Apel (2001), Naderloo (2017).

Materials examined: 2♀♀ CL 10-15.7 mm, CW 14.1-22.6 mm Site 22, leg. RUWW 15.12.84. 4♀♀ CL 8.7-10.3 mm, CW 12.1-15.4 mm Site 21, leg. RUWW 08.10.84. 5♂♂ CL 7.6-11.6 mm, CW 10.1-17 mm Site 21, leg. RUWW 08.10.84. ♂ CL 8.2 mm, CW 11.8 mm Site 54, leg. RUWW 01.03.84. 3♀♀ (1. ovi) CL 7.4-12.2 mm, CW 10.3-17.5 mm Site ?, leg. RUWW 26.03.84. 3♂♂ CL 6.1-9.2 mm, CW 8.8-12.9 mm Site ?, leg. RUWW 26.03.84.

Glyptoxanthus meandrinus (Klunzinger, 1913)

Plate 34 F

State: First record in Yemen, Gulf of Aden, at sample 37, 41 from subtidal rock, corals, 5-15 m depth. And also records in the Red Sea, sample locality 2 from subtidal sand, 5-20 m depth. Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Klunzinger (1913), Serène (1984), Mendoza & Guinot (2011).

Remarks: *Glyptoxanthus meandrinus* differs from *G. vermiculatus* primarily by the narrower, simpler vermiculations and the wider grooves and furrows on the dorsal carapace surface (vermiculations thicker and more convoluted, and intervening furrows much narrower in *G. vermiculatus*), and by the presence of a distinct oblongate cavity on the 5L subregion (absent in *G. vermiculatus*) (Mendoza & Guinot, 2011).

Materials examined: ♂ CL 10.4 mm, CW 15.4 mm Site 2, leg. SMF 13.03.98. ♀ CL 11.4 mm, CW 17.9 mm Site 41, leg. SMF 28.05.05. ♂ CL 6.9 mm, CW 10.5 mm Site 41, leg. SMF 28.05.05. ♀ CL 7.1 mm, CW 10.8 mm Site 37, leg. SMF 18.05.05.

Actaeodes hirsutissimus (Rüppell, 1830)

Plate 35 A

State: First record in Yemen, Socotra Island, sample locality 54 from sand, rock, 1-2 m depth. And also records in the Red Sea and Gulf of Aden, sample localities 2, 8, 21, 22 from sand, rock, 1-23 m depth. Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Kamaran, Zuukur Islands (Balss, 1922; Balss, 1924); Hudaydah coasts (Krupp *et al.*, 2006), Vine (1986) without a specific location. Gulf of Aden: Sikha Island (Neumann & Spiridonov, 1999). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994; Khvorov *et al.*, 2012). Somalia: Gesira (Galil & Vannini, 1990).

Materials examined: ♀ CL 7 mm, CW 10.1 mm Site 2, leg. SMF 13.04.98. ♂ CL 11.5 mm, CW 18.4 mm Site 8, leg. SMF 08.04.04. ♂ CL 17.5 mm, CW 22.4 mm Site 21, leg. RUWW 08.10.84. ♀ CL 6.6 mm, CW 9.3 mm Site 54, leg. RUWW 01.03.84. ♂ CL 15.1 mm, CW 25.3 mm Site 22, leg. RUWW 01.03.85.

Actaeodes tomentosus (H. Milne Edwards, 1834)
Plate 35 B

State: Recorded in Yemen, Gulf of Aden, sample locality 22 from sand, rock, 1-2 m depth. Not recorded in the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Zebejir Island (Balss, 1922), (Serène, 1984; Vine, 1986) without a specific location. Gulf of Aden: Aden and Sikha Island (Nobili, 1906; Neumann & Spiridonov, 1999). Socotra Island: Simões *et al.* (2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994; Khvorov *et al.*, 2012). Somalia: Sar Uanle and Gesira (Galil &Vannini, 1990).

Materials examined: ♂ CL 15.1 mm, CW 25.3 mm Site 22, leg. RUWW 01.03.85.

Paractaea rufopunctata (H. Milne Edwards, 1834)
Plate 35 C

State: Recorded in Yemen, Gulf of Aden, at sample localities 37, 41 from sand, rock, 5-15 m depth. Not recorded in the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts under the synonym *Actaea rufopunctata* H. Milne Edwards by Laurie (1915), (Guinot, 1969; Serène, 1984) without a specific location. Gulf of Aden: Aden under the synonym *Actaea rufopunctata* H. Milne Edwards by Nobili (1906) and under the synonym *Paractaea rufopunctata rufopunctata* H. Milne Edwards by Guinot (1969). Socotra Island: Simões *et al.* (2001), Apel (2001). Arabian Sea: Oman, Dhofar Province (Khvorov *et al.*, 2012). Gulf of Oman: Apel (2001), Naderloo (2017).

Materials examined: ♂ CL 8.8 mm, CW 12 mm Site 41, leg. SMF 28.05.05. 5♀♀ (1. ovi) CL 5.1-8.9 mm, CW 7.2-12.5 mm Site 37, leg. SMF 18.05.05. 6♀♀ CL 7.6-10.8 mm, CW 10.9-15.5 mm Site 41, leg. SMF 26.05.05.

Lybia plumosa Barnard, 1947
Plate 35 D

State: First record in Yemen, Gulf of Aden, at sample localities 34, 41 from the corals, 5-15 m depth. Not recorded in the Red Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Socotra Island: First time (Neumann & Spiridonov, 1999). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994; Khvorov *et al.*, 2012). Somalia: Gesira (Galil & Vannini, 1990).

Materials examined: ♂ CL 3.6 mm, CW 4.3 mm Site 34, leg. SMF 16.05.05. 2. ovi ♀♀ CL 3.6-5.5 mm, CW 4.1-7.1 mm Site 41, leg. SMF 28.05.05. ♂ CL 3.7 mm, CW 4 mm Site 41, leg. SMF 28.05.05.

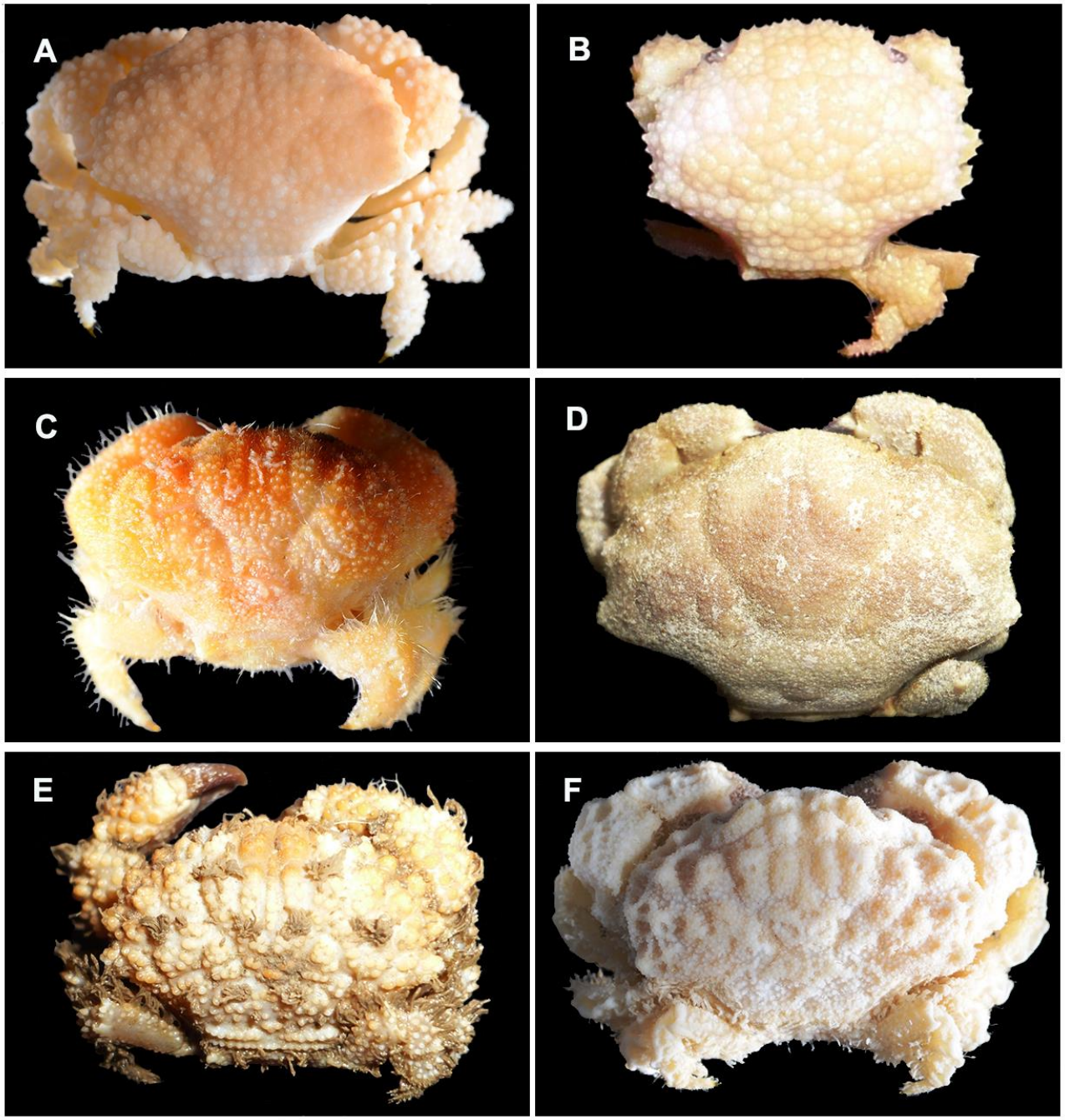

Plate 34: A. *Actaea savignii*, ♀ CL 17.3 mm, CW 21.9 mm; **B.** *Actaea jacquelinae,* ♂ CL 6.4 mm, CW 7.7 mm; **C.** *Actaea bocki*, ♀ CL 12.2 mm, CW 17.3 mm; **D.** *Atergatopsis granulata*, ♂ CL 24.7 mm, CW34.8 mm*;* **E.** *Epiactaea margaritifera,* ♂ CL 11.6 mm, CW 17 mm; **F.** *Glyptoxanthus meandrinus,* ♂ CL 10.4 mm, CW 15.4 mm.

Neoliomera sabaea (Nobili, 1906)

Plate 35 E

State: First record in Yemen, Gulf of Aden, at sample locality 41 from sand, rock, 8-15 m depth. Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts under the synonym *Actaea sabaea* par Nobili, 1906 by Laurie (1915); Mayun Island (Serène, 1984). Somalia: Gesira (Galil &Vannini, 1990).

Materials examined: ♀ CL 18.8 mm, CW 26.8 mm Site 41, leg. SMF 28.05.05. ♀ CL 17.7 mm, CW 24.2 mm Site 41, leg. SMF 26.05.05. ♂ CL 20.8 mm, CW 28.1 mm Site 41, leg. SMF 26.05.05.

Liomera rubra (A. Milne-Edwards, 1865)

Plate 35 F

State: First record in Yemen, Gulf of Aden, at sample locality 41 from subtidal sand, 10-15 m depth. Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915), Serène (1984), Vine (1986) without a specific location.

Materials examined: ♀ CL 7 mm, CW 10.8 mm Site 41, leg. SMF 28.05.05.

Pilodius areolatus (H. Milne Edwards, 1834)

Plate 36 A

State: First record in Yemen, Gulf of Aden, at sample localities 22, 39 from sand, rock and subtidal rock, corals, 0-10 m depth. Not recorded in the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915), Serène (1984) without a specific location. Socotra Island: Simões *et al.* (2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994; Khvorov *et al.*, 2012). Somalia: Gesira (Galil & Vannini, 1990).

Materials examined: 7♀♀ CL 8.8-11.5 mm, CW 13.8-17.7 mm Site 22, leg. RUWW 01.03.07. 2♂♂ CL 14-15.8 mm, CW 21.8-20.7 mm Site 22, leg. RUWW 01.03.07. 2 Juv CL 4.6-4.8 mm, CW 7-7.8 mm Site 22, leg. RUWW 01.03.07. ♀ CL 9 mm, CW 12.6 mm Site 39, leg. SMF 24.05.05. 2♂♂ CL 9.7-11.7 mm, CW 13-17 mm Site 39, leg. SMF 24.05.05.

Forestiana depressa (White, 1848)

Plate 36 B

State: First record in Yemen, Gulf of Aden, at sample locality 33 from sand, rock, 0-0.5 m depth. Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Socotra Island: Simões *et al.,* (2001). Somalia: Sar Uanle (Galil &Vannini, 1990).

Materials examined: ♀ CL 6 mm, CW 9 mm Site 21, leg. AUAA 02.11.16. ♂ CL 10 mm, CW 11 mm Site 21, leg. AUAA 02.11.16. 2♂♂ CL 6-7 mm, CW 8-12 mm Site 21, leg. AUAA 27.10.16. CO1; AIMSEQ08112016-E09, CO1; AIMSEQ08112016-F09, CO1; AIMSEQ08112016-G09.

Neoxanthops lineatus (A. Milne-Edwards, 1867)
Plate 36 C, D

State: Recorded in Yemen, Gulf of Aden, sample locality 41 from the corals, 10-15 m depth. Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts under the synonym *Cycloxanthus lineatus* A. Milne Edwards, 1867 by Laurie (1915), Serène (1984) without a specific location. Gulf of Aden: Aden (Nobili, 1906).

Materials examined: ♀ CL 10.3 mm, CW 14.2 mm Site 41, leg. SMF 28.05.05.

Platypodia cf. pseudogranulosa Serène, 1984
Plate 36 E

State: Recorded in Yemen, Gulf of Aden, sample localities 22, 28, 41 from subtidal sand, 10-15 m depth. Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts under the synonym *Platypodia granulosa* de Man by Laurie (1915). Indian Ocean: Serène (1984).

Remarks: The sample of gonopods is not available, so we have not identified the species more clearly.

Materials examined: ♀ CL 10.2 mm, CW 13.5 mm Site 28, leg. RUWW 01.01.85. ♀ CL 5.8 mm, CW 8.9 mm Site 22, leg. RUWW 01.02.85. ♂ CL 4.9 mm, CW 7.5 mm Site 41, leg. SMF 26.05.05.

Demania mortenseni (Odhner, 1925)
Plate 36 F

State: First record in Yemen, Gulf of Aden, at sample localities 33, 35, 37 from corals, 5-10 m depth. Not recorded in the Red Sea, Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Socotra Island: Neumann & Spiridonov (1999).

Materials examined: 2♀♀ CL 7-7.8 mm, CW 9.6-10.3 mm Site 33, leg. RUWW 06.06.85.♀ CL 4.7 mm, CW 6.1 mm Site 37, leg. SMF 18.05.05. 23♀♀ (10. ovi) CL 4.1-7.9 mm, CW 4.8-9.7 mm Site 35, leg. SMF 19.05.05. 24♂♂ CL 3.7-6.6 mm, CW 4.9-9.3 mm Site 35, leg. SMF 19.05.05. 11 Juv CL 1.8-2.3 mm, CW 2.7-3.4 mm Site 35, leg. SMF 19.05.05.

Xanthidae. gen. sp. 1
Plate 37 A, B

State: Recorded in Yemen, Gulf of Aden, sample locality 19 from sand, rock with cobble, 0-0.5 m depth (only one female specimen with eggs).

Materials examined: 1 ovi ♀ CL 5.6 mm, CW 6.7 mm Site 19, leg. AUAA 14.12.13.

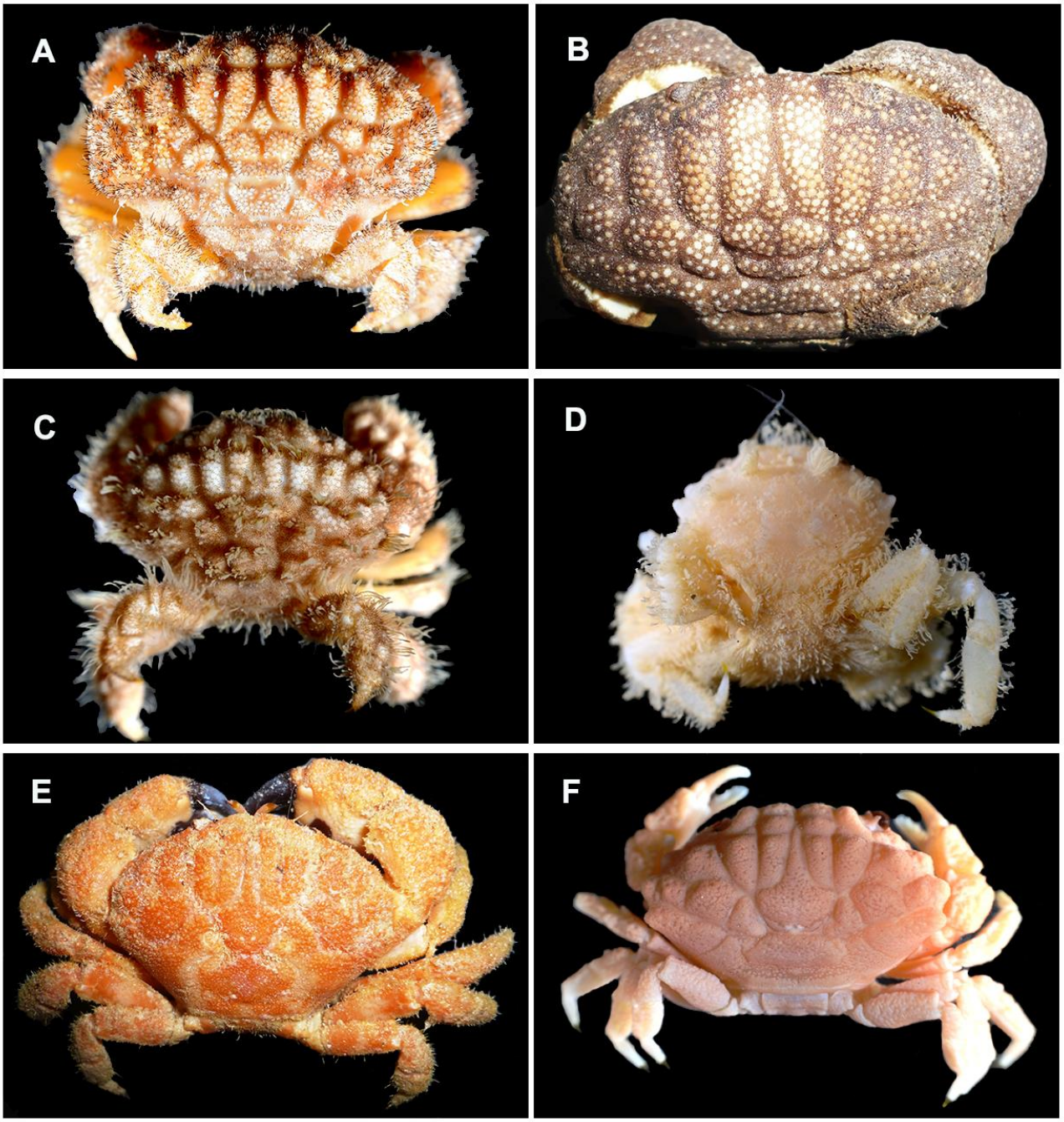

Plate 35: A. *Actaeodes hirsutissimus*, ♂ CL 17.5 mm, CW 22.4 mm; **B.** *Actaeodes tomentosus,* ♂ CL 15.1 mm, CW 25.3 mm; **C.** *Paractaea rufopunctata*, ♂ CL 8.8 mm, CW 12 mm; **D.** *Lybia plumosa*, ♀ CL 5.5 mm, CW7.1 mm; **E.** *Neoliomera sabaea,* ♂ CL 20.8 mm, CW 28.1 mm; **F.** *Liomera rubra,* ♀ CL 7 mm, CW 10.8 mm.

Xanthidae. gen. sp. 2
Plate 37 C, D

State: Recorded in Yemen, Gulf of Aden, sample localities 34, 37 from sand, rock, 5-8 m depth.

Materials examined: ♀ CL 10.1 mm, CW 16.5 mm Site 37, leg. SMF 18.05.05. ♂ CL 8.1 mm, CW 12.3 mm Site 37, leg. SMF 18.05.05. ♀ CL 5.9 mm, CW 8.8 mm Site 34, leg. SMF 22.05.05.

Xanthidae. gen. sp. 3
Plate 37 E, F

State: Recorded in Yemen, Gulf of Aden, sample localities 39, 41 from sand, rock, 6-10 m depth.

Materials examined: ♂ CL 7.1 mm, CW 9.4 mm Site 39, leg. SMF 24.05.05. ♂ CL 4.7 mm, CW 6.7 mm Site 41, leg. SMF 26.05.05.

Subsection: Thoracotremata Guinot, 1977
Superfamily: Grapsoidea MacLeay, 1838

Family: Grapsidae MacLeay, 1838

Grapsus albolineatus Latreille in Milbert, 1812
Plate 38 A

State: Recorded in Yemen, Red Sea, Gulf of Aden, Arabian Sea and Socotra Islands, sample localities 8, 19, 21, 22, 24, 27, 32, 33, 36, 40, 48, 52, 54, 57 from rock, intertidal zone, 0-0.5 m depth.

Earlier records: Red Sea: Sinai Peninsula, Gulf of Suez, Gulf of Aqaba, Dahlak Archipelago, Assab (Laurie, 1915; Balss, 1922; Holthuis, 1977); Hudaydah coasts (Krupp *et al.*, 2006), Vine (1986) without a specific location. Gulf of Aden: Djibouti, Aden and Sikha Island (Apel, 2001; Al-Hindi, 2010). Socotra Island: Simões *et al*. (2001), Apel (2001). Arabian Sea: Oman, Dhofar Province (Khvorov *et al.*, 2012). Gulf of Oman: Apel (2001). Arabian Gulf: Stephensen (1946), Apel (2001), Naderloo & Türkay (2012), Naderloo *et al.* (2013). Somalia: Sar Uanle (Apel, 2001).

Remarks: Common and widespread species in all Yemeni coastal waters.

Materials examined: Data, see appendix.

Grapsus tenuicrustatus (Herbst, 1783)
Plate 38 B

State: First record in Yemen, Arabian Sea, sample locality 52, from rock, intertidal zone, 0-0.5 m depth. Also records in Gulf of Aden and Socotra Island, sample localities 19, 21, 53 from rock, intertidal zone, 0-0.5 m depth. Not recorded in Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Sinai Peninsula, Gulf of Suez, Gulf of Aqaba, coasts of Saudi Arabia, Dahlak Archipelago (Holthuis, 1977), Vine (1986) without a specific location. Gulf of Aden: Sikha Island (Apel, 2001); Aden (Al-Hindi, 2010). Socotra Island: Simões *et al.* (2001, Apel (2001).

Materials examined: ♂ CL 37.5 mm, CW 41.5 mm Site 52, leg. AUAA 15.03.11. ♂ CL 53 mm, CW 59.5 mm Site 21, leg. AUAA 11.01.14. ♀ CL 42.3 mm, CW 44.6 mm Site 19, leg. AUAA 01.04.13. 2♂♂ CL 42.5-52.7 mm, CW 45.2-54.9 mm Site 19, leg. AUAA 01.04.13. 3♂♂ CL 35-39 mm, CW 40-44 mm Site 19, leg. AUAA 21.10.16 CO1;AIMSEQ08112016-A02, CO1;AIMSEQ08112016-B02, CO1; AIMSEQ08112016-C02. ♀ CL 51.4 mm, CW 54.2 mm Site 53, leg. RUWW 05.03.84.

Grapsus granulosus H. Milne Edwards, 1853
Plate 38 C

State: Recorded in Yemen, Red Sea, Gulf of Aden and Socotra Island, sample localities 9,18, 19, 21, 22, 24, 33, 40, 48, 54 from rock, intertidal zone, 0-0.5 m depth.

Earlier records: Red Sea: Sinai Peninsula, Gulf of Suez, Gulf of Aqaba, Dahlak Archipelago (Holthuis, 1977; Apel, 2001); Hudaydah coasts (Krupp *et al.,* 2006). Socotra Island: Simões *et al.* (2001), Apel (2001). Gulf of Oman: Apel (2001), Naderloo (2011), Naderloo *et al.* (2015). Arabian Gulf: Apel (2001), Naderloo & Türkay (2012), Naderloo *et al*. (2013).

Remarks: Widespread species in the Yemeni coastal waters at Red Sea, Gulf of Aden and Socotra Islands.

Materials examined: Data, see appendix. CO1; AIMSEQ08112016-D02, CO1; AIMSEQ08112016-E02, CO1;AIMSEQ08112016-F02, CO1;AIMSEQ08112016-G03, CO1; AIMSEQ08112016-H03.

Geograpsus crinipes (Dana, 1851)
Plate 38 D

State: First record in Yemen, Gulf of Aden, at sample localities, 19, 21, 22, 28 from rock, 0-0.5 m depth. And also records in Socotra Islands, sample locality 58 from rock, intertidal zone, 0-0.5 m depth. Not recorded in the Arabian Sea, Gulf of Oman and the Arabian Gulf.

Earlier records: Red Sea: Sinai Peninsula, Ras Muhammad (Ortmann, 1894; Holthuis, 1977), Vine (1986) without a specific location. Socotra Island: Simões *et al.* (2001).

Materials examined: ♀ CL 31 mm, CW 36 mm Site 21, leg. AUAA 27.10.16. ♂ CL 19.7 mm, CW 23.7 mm Site 28, leg. AUAA 2008. ♀ CL 32 mm, CW 39 mm Site 22, leg. RUWW 01.10.88. ♀ CL 19.8 mm, CW 24.2 mm Site 19, leg. RUWW 01.01.10. ♂ CL 35.3 mm, CW 41.7 mm Site 58, leg. RUWW 01.02.99.

Metopograpsus messor (Forskål, 1775)
Plate 38 E

State: Recorded in Yemen, Gulf of Aden, sample localities 24, 26 exclusively in the mud, rock, intertidal zone, 0-0.5 m depth, and also recorded in the Red Sea and Socotra Islands, sample localities 1, 5, 6, 54, 57 from mangrove, mud, rock, intertidal zone, 0-0.5 m depth.

Earlier records: Red Sea: Laurie (1915), Balss (1922), Holthuis (1977), Vine (1986), Krupp *et al.* (2006). Gulf of Aden: Aden (Ortmann, 1894; Apel, 2001). Socotra Island: Simões *et al.* (2001), Apel (2001). Arabian Sea: Oman, Dhofar Province (Khvorov *et al.*, 2012). Gulf of Oman: Apel

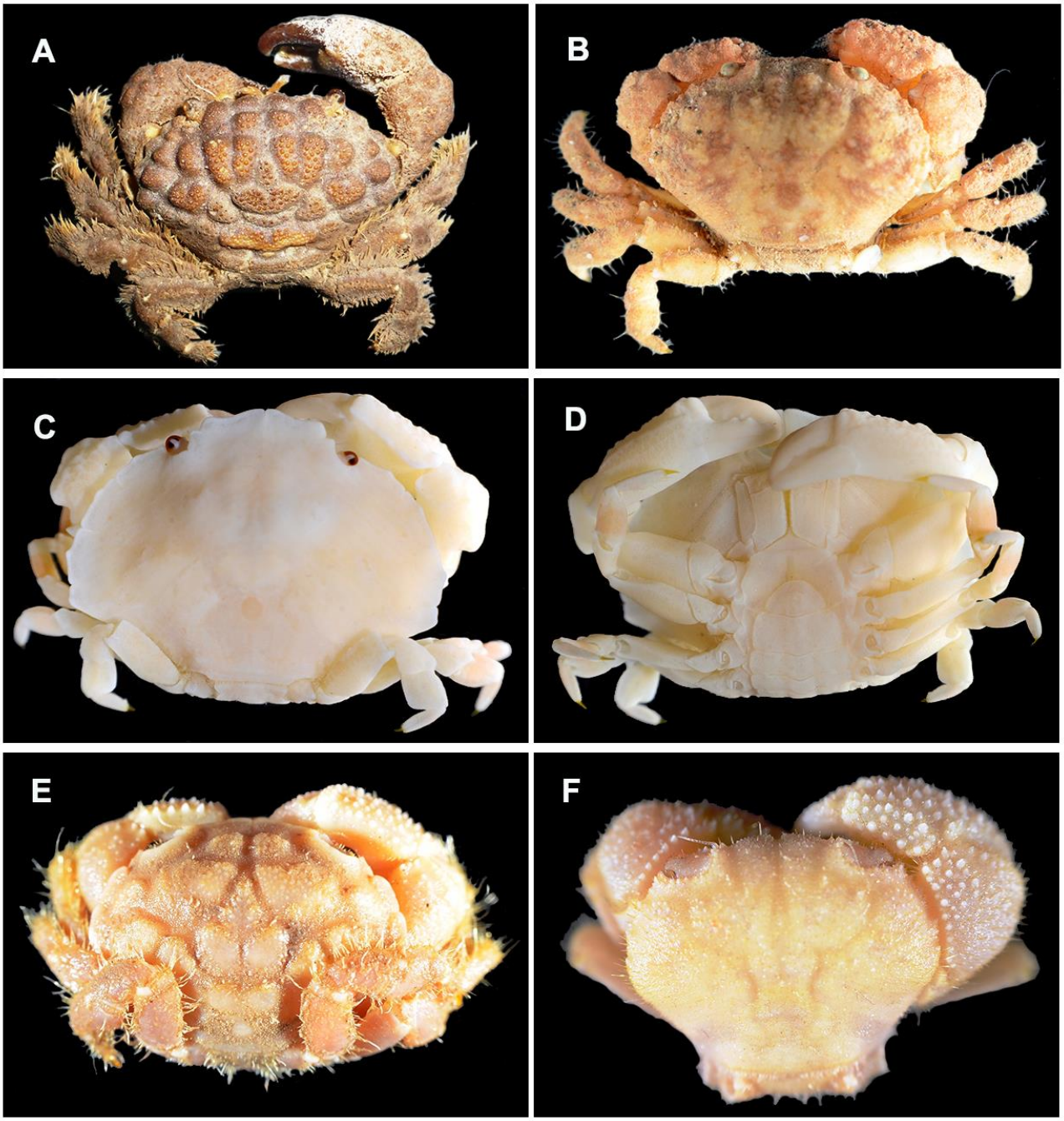

Plate 36: A. *Pilodius areolatus*, ♂ CL 15.8 mm, CW 20.7 mm; **B.** *Forestiana depressa,* ♂ CL 10 mm, CW 11 mm; **C.** *Neoxanthops lineatus*, ♀ CL 10.3 mm, CW 14.2 mm (Dorsal view); **D.** *Neoxanthops lineatus* (Ventral view); **E.** *Platypodia cf. pseudogranulosa,* ♀ CL 10.2 mm, CW 13.5 mm; **F.** *Demania mortenseni,* ♂ CL 6.6 mm, CW 9.3 mm.

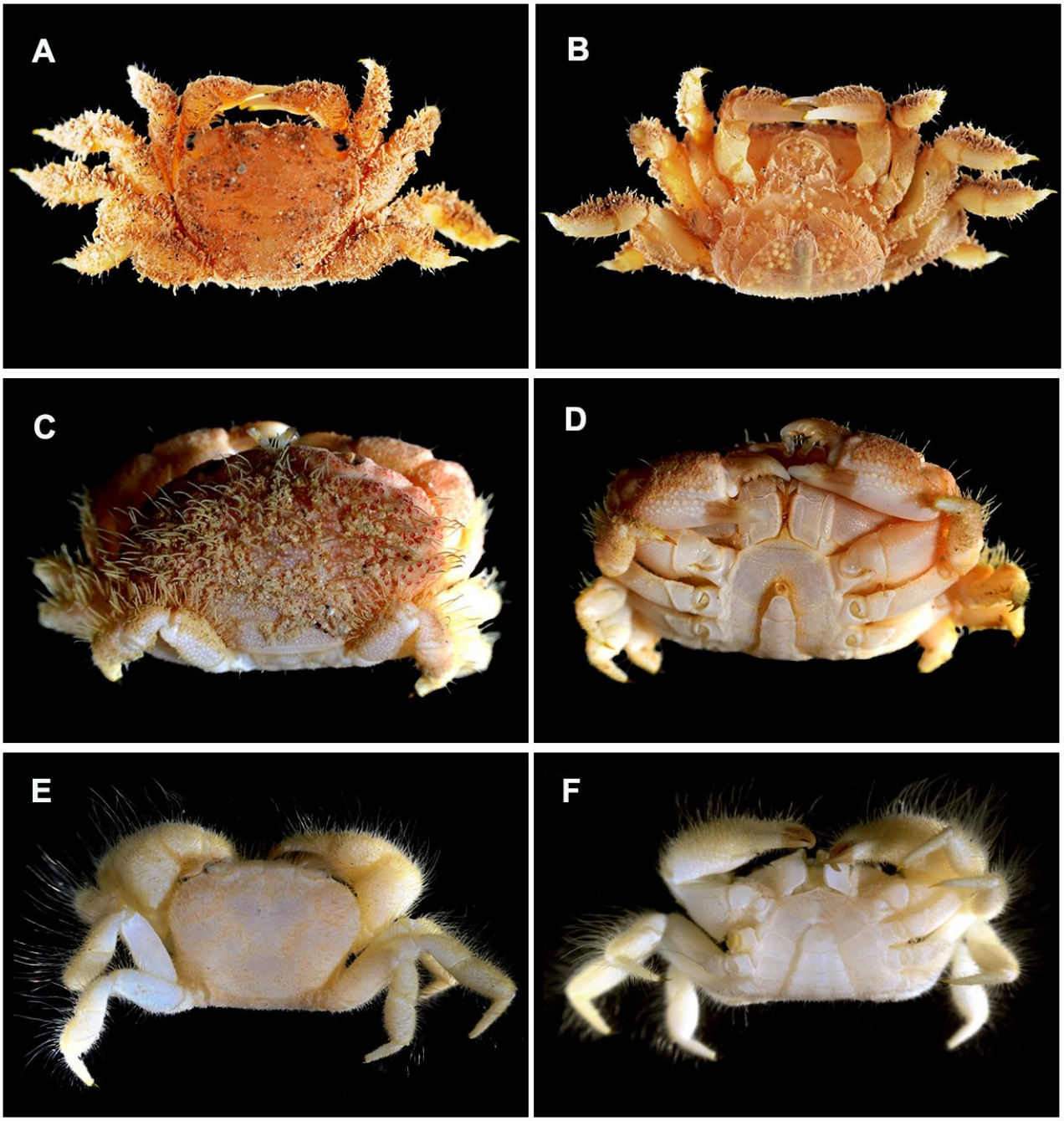

Plate 37: A. Gen. sp. 1, ♀ CL 5.6 mm, CW 6.7 mm (dorsal view); **B.** Gen. sp. 1 (ventral view); **C.** Gen. sp. 2, ♂ CL 8.1 mm, CW 12.3 mm (dorsal view); **D.** Gen. sp. 2 (ventral view); **E.** Gen. sp. 3, ♂ CL 7.1 mm, CW 9.4 mm (dorsal view); **F.** Gen. sp. 3 (ventral view).

(2001), Naderloo *et al.* (2015). Arabian Gulf: Stephensen (1946), Al-Ghais & Cooper (1996), Apel & Türkay (1999), Apel (2001), Naderloo & Türkay (2012), Naderloo *et al.* (2013).

Materials examined: Data, see appendix. CO1; AIMSEQ08112016-G02, CO1; AIMSEQ08112016-H02.

Metopograpsus thukuhar (Owen, 1839)
Plate 38 F

State: Recorded in Yemen, Gulf of Aden, sample locality 24 exclusively in the mud, rock, intertidal zone, 0-0.5 m depth. Not recorded in the Arabian Sea until now.

Earlier records: Red Sea: Sinai Peninsula, Gulf of Suez, Gulf of Aqaba, Dahlak Archipelago (Holthuis, 1977), Vine (1986) without a specific location. Gulf of Aden: Aden (Al-Hindi, 2010). Socotra Island: Simões *et al.* (2001), Apel (2001). Gulf of Oman: Al-Ghais & Cooper (1996), Apel (2001), Naderloo *et al.* (2015). Arabian Gulf: Al-Ghais & Cooper (1996), Apel & Türkay (1999), Apel (2001), Naderloo & Türkay (2012), Naderloo *et al.* (2013).

Materials examined: ♂ CL 18 mm, CW 21 mm Site 24, leg. AUAA 25.10.16 CO1; AIMSEQ08112016-B06. ♀ CL 17.7 mm, CW 22 mm Site 24, leg. AUAA 01.04.13. 2♂♂ CL 21.6-23.1 mm, CW 26.6-27.7 mm Site 24, leg. AUAA 01.04.13, CO1;AIMSEQ08112016-C06.

Family: Varunidae H. Milne Edwards, 1853

Pseudohelice subquadrata (Dana, 1851)
Plate 39 A

State: Recorded in Yemen, Red Sea, sample locality 6 from mud flat, 0-0.5 m depth. Not recorded in Gulf of Aden, Arabian Sea and the Arabian Gulf until now.

Earlier records: Red Sea: Sinai Peninsula, Gulf of'Aqaba (Holthuis, 1977); Hudaydah coasts (Krupp *et al.*, 2006). Socotra Island: Simões *et al.* (2001), Apel (2001). Gulf of Oman: Davies (1994).

Materials examined: ♀ CL 17.3 mm, CW 21.9 mm Site 6, leg. SMF 03.04.04. 2♂♂ CL 16.9-19.2 mm, CW 20.3-23.2 mm Site 6, leg. SMF 03.04.04.

Thalassograpsus harpax (Hilgendorf, 1892)
Plate 39 B

State: Recorded in Yemen, Red Sea, Gulf of Aden and Socotra Island, sample localities 5, 14, 19, 21, 22, 42, 43, 55 from sand, rock with cobbles, intertidal zone, 0-0.5 m depth.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Mayun Island (Holthuis, 1977). Gulf of Aden: Aden (Type locality) by Hilgendorf (1892), (Nobili, 1906). Socotra Island: Simões *et al.* (2001), Apel (2001). Arabian Sea: Oman, Dhofar Province (Khvorov *et al.*, 2012). Gulf of Oman: Hogarth (1989). Arabian Gulf: Naderloo (2011), Naderloo & Türkay (2012), Naderloo *et al.* (2013).

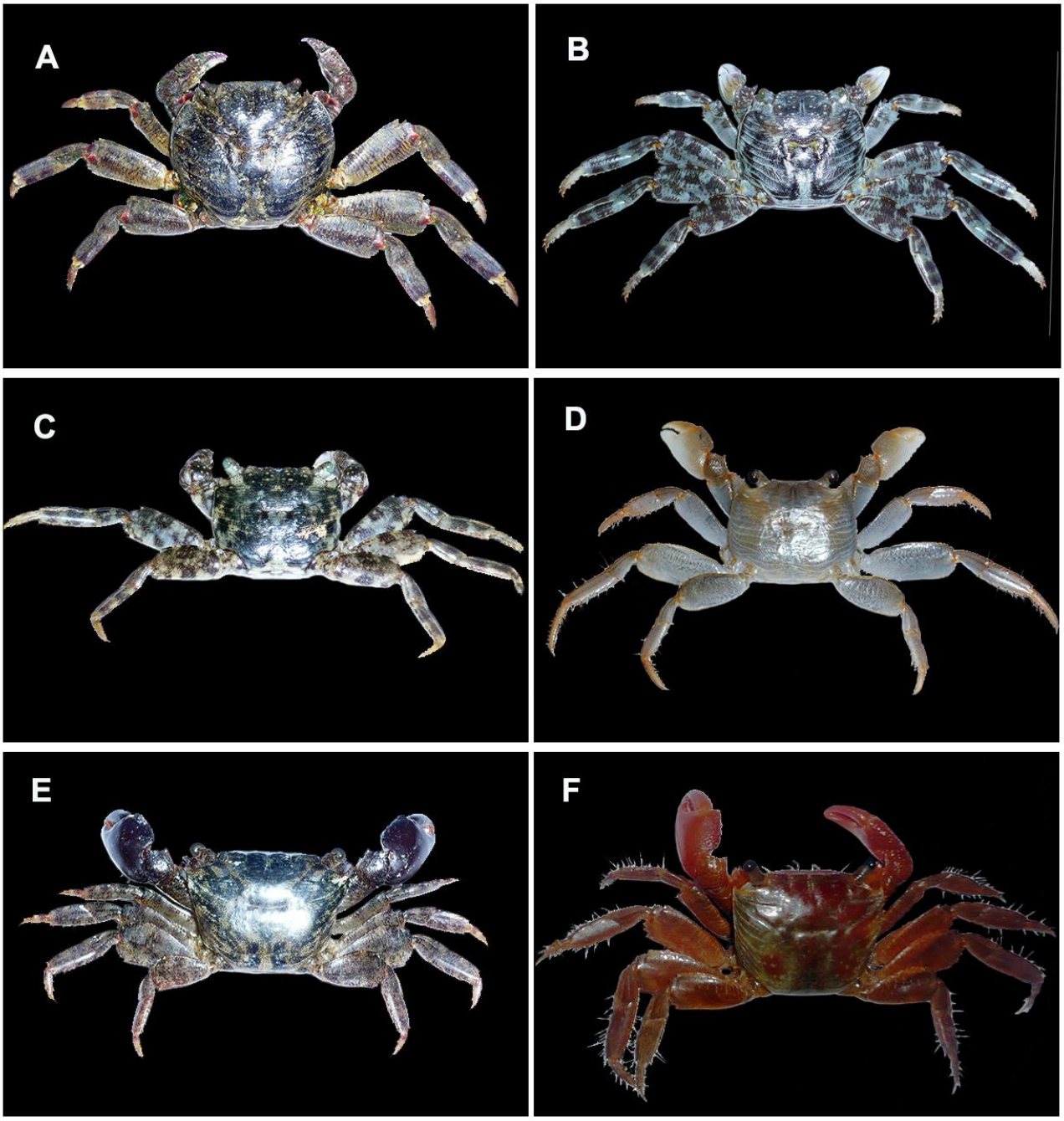

Plate 38: A. *Grapsus albolineatus*, ♂ CL 40.4 mm, CW 44.9 mm; **B.** *Grapsus tenuicrustatus,* ♂ CL 37.5 mm, CW 41.5 mm; **C.** *Grapsus granulosus*, ♀ CL 18 mm, CW 23 mm; **D.** *Geograpsus crinipes*, ♂ CL 19.7 mm, CW 23.7 mm; **E.** *Metopograpsus messor,* ♂ CL 18.4 mm, CW 23.3 mm; **F.** *Metopograpsus thukuhar,* ♂ CL 23.1 mm, CW 27.7 mm.

Remarks: Widespread in the Yemeni coastal waters at Red Sea, Gulf of Aden and Socotra Island.

Materials examined: Data, see appendix. CO1; AIMSEQ08112016-A07, CO1; AIMSEQ08112016-B07, CO1; AIMSEQ08112016-E06, CO1; AIMSEQ08112016-F06, CO1; AIMSEQ08112016-G06, CO1; AIMSEQ08112016-H06.

Family: Sesarmidae Dana, 1851

Perisesarma guttatum (A. Milne-Edwards, 1869)
Plate 39 C

State: Recorded in Yemen, Red Sea, sample localities 1, 5, 6 from mangrove, mud flat, 0-0.5 m depth. Not recorded in Gulf of Aden, Arabian Sea and Arabian Gulf until now.

Earlier records: Red Sea: Eritrea, Dahlak Archipelago (Holthuis, 1977); Hudaydah coasts (Krupp *et al.*, 2006), Vine (1986) without a specific location. Gulf of Oman: Apel (2001), Naderloo (2017).

Materials examined: 6♀♀ (3. ovi) CL 9.3-11.7 mm, CW 13-14.3 mm Site 5, leg. RUWW 26.03.09. 7♂♂ CL 8.6-17.3 mm, CW 10.4-21.6 mm Site 5, leg. RUWW 26.03.09. 3♀♀ CL 5.8-6.3 mm, CW 7.2-8.1 mm Site 1, leg. SMF 01.04.04. 5♂♂ CL 5.8-9 mm, CW 7.2-11.2 mm Site 1, leg. SMF 01.04.04. ♂ CL 15.3 mm, CW 18.1 mm Site 6, leg. SMF 04.04.04.

Family: Plagusiidae Dana, 1851

Percnon planissimum (Herbst, 1804)
Plate 39 D

State: First record in Yemen, Gulf of Aden, at sample locality 22 from rock, algae, 0-1 m depth. Not recorded in the Arabian Sea, Gulf of Oman and Arabian Gulf until now.

Note: This species during the present study was seen on site 18, April 2014, between the rocks.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915), (Holthuis, 1977; Vine, 1986) without a specific location. Socotra Island: Simões *et al.* (2001), Apel (2001).

Materials examined: ♀ CL 23.4 mm, CW 20.8 mm Site 22, leg. RUWW 01.03.85.

Plagusia squamosa (Herbst, 1790)
Plate 39 E, F

State: Recorded in Yemen, Arabian Sea, sample locality 52 from rock, algae, intertidal zone, 0-0.5 m depth. Not recorded in Gulf of Aden and the Arabian Gulf.

Earlier records: Red Sea: Balss (1922), Holthuis (1977) under the synonym *Plagusia tuberculata* Lamarck, 1818. Socotra Island: Simões *et al.* (2001). Arabian Sea: Oman, Dhofar Province (Hogarth, 1994; Khvorov *et al.*, 2012). Gulf of Oman: Apel (2001), Naderloo (2011). Naderloo *et al.* (2015), Naderloo (2017).

Note: This species is widely distributed in the Indo-West Pacific region. Therefore it might be found in the future during a new survey of the Aden coasts because the habitat (rock, algae) of site 52 is very similar to the Aden sites 21 and 22.

Materials examined: 2♀♀ (1. ovi) CL 35.8-37.4 mm, CW 38.8-40 mm Site 52, leg. AUAA 15.03.11. 2♂♂ CL 35-37.3 mm, CW 38.2-40.1 mm Site 52, leg. AUAA 15.03.11. 2 Juv CL 5.8-11.3 mm, CW 6.4-12.4 mm Site 52, leg. AUAA 15.03.11.

Superfamily: Ocypodoidea Rafinesque, 1815
Family: Camptandriidae Stimpson, 1858

Serenella leachii (Audouin, 1826)
Plate 40 A

State: Recorded in Yemen, Red Sea, sample localities 1, 6 from mangrove and mud flat. Not recorded in the Arabian Sea, Gulf of Aden and Socotra Islands.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Eritrea, Dahlak Archipelago and Gulf of Elath (Lewinsohn, 1977): Hudaydah coasts (Krupp *et al.*, 2006). Gulf of Oman: Apel (2001). Arabian Gulf: Al-Ghais & Cooper (1996), Apel & Türkay (1999), Apel (2001).

Materials examined: ♀ CL 5 mm, CW 7.6 mm Site 1, leg. SMF 01.04.04. 2♂♂ CL 5.5-5.9 mm, CW 7.6-8.3 mm Site 1, leg. SMF 01.04.04. 4♀♀ CL 3.9-5.4 mm, CW 5.6-8.6 mm Site 6, leg. SMF 03.04.04. 2♂♂ CL 4.2-4.2 mm, CW 5.8-6.1 mm Site 6, leg. SMF 03.04.04.

Family: Dotillidae Stimpson, 1858

Dotilla sulcata (Forskål, 1775)
Plate 40 B

State: Recorded in Yemen, the Red Sea, Gulf of Aden and Arabian Sea, sample localities 1, 5, 6, 15, 20, 22, 24, 26, 30, 48, 51 from intertidal zone, sand and mangrove.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Eritrea, Dahlak Archipelago and Gulf of Elath (Lewinsohn, 1977); Hudaydah coasts (Krupp *et al.*, 2006), Vine (1986) without a specific location. Gulf of Aden: Aden (Nobili, 1906). Socotra Island: Simões *et al.* (2001). Arabian Gulf: Apel & Türkay (1999), Apel (2001).

Note: Another species, *Dotilla blanfordi* Alcock, 1900, has been recorded in the Arabian Sea in Oman, Dhofar Province, we found this species during the examination of some samples were collected by Dr. Micheal Apel and D. Clayton during time 12-14 Jan 2001 from Barr Al-Hikman (20 .36.592 N, 58 .11.217 E).This location is very close to our study site 52, hence a new survey at this site is suggested for the future.

Remarks: Widespread in the Yemeni coastal waters at the Red Sea, Gulf of Aden and the Arabian Sea.

Materials examined: Data, see appendix.

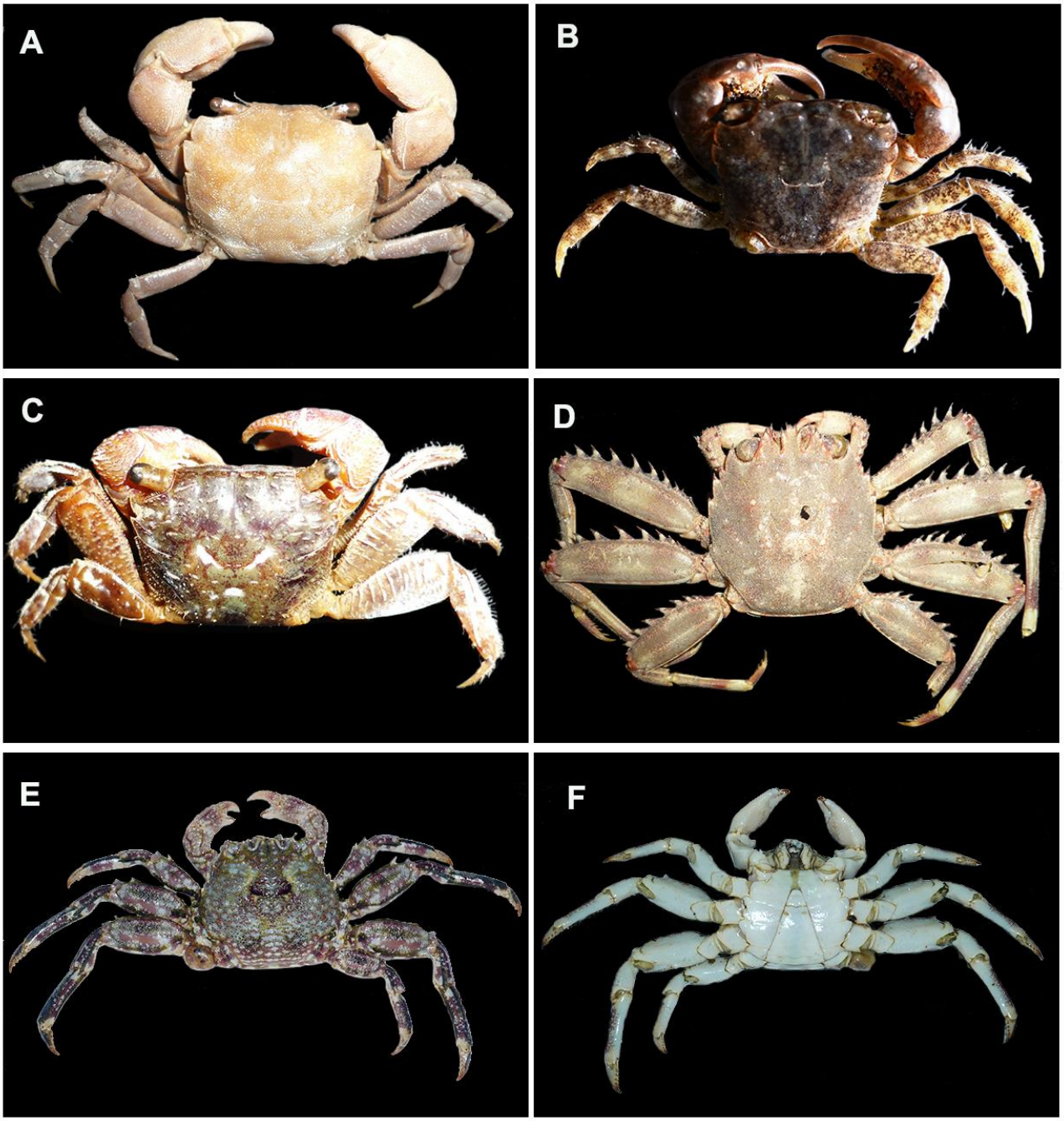

Plate 39: A. *Pseudohelice subquadrata*, ♂ CL 19.2 mm, CW 23.2 mm; **B.** *Thalassograpsus harpax,* ♂ CL 11 mm, CW 13 mm; **C.** *Perisesarma guttatum*, ♂ CL 17.3 mm, CW 21.6 mm; **D.** *Percnon planissimum*, ♀ CL 23.4 mm, CW 20.8 mm; **E.** *Plagusia squamosa,* ♂ CL 37.3 mm, CW 40.1 mm (dorsal view); **F.** *Plagusia squamosa* (ventral view).

Family Macrophthalmidae Dana, 1851

Ilyograpsus paludicola (Rathbun, 1909)

Plate 40 C

State: Recorded in Yemen, Red Sea, sample localities 5, 6 from mud flat, 0-0.5 m depth. Not recorded in the Gulf of Aden and the Arabian Sea.

Earlier records: Red Sea: Sinai Peninsula, Gulf of Suez, Eritrea, Dahlak Archipelago (Holthuis, 1977); Hudaydah coasts (Krupp *et al.*, 2006). Gulf of Oman: Apel (2001). Arabian Gulf: Apel & Türkay (1999), Apel (2001).

Materials examined: ♀ CL 5.6 mm, CW 7.1 mm Site 6, leg. SMF 04.04.04. 2 ovi. ♀♀ CL 4.5-5.2 mm, CW 5.5-7 mm Site 6, leg. SMF 03.04.04. 1 ovi. ♀ CL 5.2 mm, CW 6.4 mm Site 5, leg. SMF 01.04.04.

Macrophthalmus (Macrophthalmus) grandidieri A. Milne-Edwards, 1867

Plate 40 D

State: First record in Yemen, Gulf of Aden, at sample locality 24 from mud flat, intertidal zone. Not recorded in the Arabian Sea.

Earlier records: Red Sea: Gulf of Suez, Gulf of Elath (Lewinsohn, 1977); Hudaydah coasts (Krupp *et al.*, 2006), Vine (1986) without a specific location. Gulf of Oman: Naderloo *et al*. (2011), Naderloo *et al.* (2015). Arabian Gulf: Naderloo *et al.* (2011), Naderloo *et al.* (2013), Naderloo & Türkay (2012), Naderloo (2017).

Materials examined: 3♀♀ CL 9.2-9.6 mm, CW 19-20 mm Site 24, leg. RUWW 23.05.84. 2♂♂ CL 8.8-11.1 mm, CW 17-20.6 mm Site 24, leg. RUWW 23.05.84. 2♀♀ CL 7.8-8.5 mm, CW 14.8-16.8 mm Site 24, leg. RUWW 16.01.84. 3♂♂ CL 9.4-10.4 mm, CW 18.2-20.9 mm Site 24, leg. RUWW 16.01.84. ♂ CL 10.3 mm, CW 21.6 mm Site 24, leg. RUWW 01.11.88. ♂ CL 6.8 mm, CW 14.7 mm Site 24, leg. RUWW 20.03.09.

Macrophthalmus (Macrophthalmus) sulcatus H. Milne Edwards, 1852

Plate 40 E

State: Recorded in Yemen, Gulf of Aden, at sample localities 24, 26 from mud flat, intertidal zone. Not recorded in the Red Sea, Arabian Sea and Gulf of Oman.

Earlier records: Gulf of Aden: Aden, first records by Al-Hindi (2010). Arabian Gulf: Al-Ghais & Cooper (1996), Apel & Türkay (1999), Apel (2001), Naderloo *et al.* (2011), Naderloo *et al.* (2013), Naderloo & Türkay (2012), Naderloo (2017).

Materials examined: 2♂♂ CL 9.3-10.1 mm, CW 19.4-19.9 mm Site 26, leg. AUAA 08.01.14. 3♂♂ CL 9.1-9.6 mm, CW 17.4-20.2 mm Site 24, leg. AUAA 05.12.13.

Macrophthalmus (Mareotis) depressus Rüppell, 1830

Plate 40 F

State: Recorded in Yemen, Red Sea and Gulf of Aden, sample localities 1, 3, 5, 6, 24, 26 from mud flat and mangrove, intertidal zone.

Earlier records: Red Sea: Ortmann (1894), Laurie (1915), Balss (1922), Fishelson (1971), Lewinsohn (1977), Vine (1986), Krupp *et al.* (2006). Gulf of Aden: Aden (Apel, 2001; Al-Hindi, 2010). Arabian Sea: Oman, Dhofar Province (Khvorov *et al.*, 2012). Gulf of Oman: Naderloo *et al.* (2015). Arabian Gulf: Al-Ghais & Cooper (1996), Apel & Türkay (1999), Apel (2001), Naderloo *et al.* (2011), Naderloo *et al.* (2013), Naderloo & Türkay (2012).

Materials examined: Data, see appendix. CO1; AIMSEQ08112016-F07, CO1; AIMSEQ08112016-G07, CO1; AIMSEQ08112016-H07.

Macrophthalmus (Macrophthalmus) serenei Takeda & Komai, 1991

Plate 41 A

State: Recorded in Yemen, Gulf of Aden, sample locality 24 from mud flat, intertidal zone. Not recordeded in the Arabian Sea and Gulf of Oman.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Eritrea, Dahlak Archipelago and Gulf of Elath (Lewinsohn, 1977), Vine (1986) without a specific location. Arabian Gulf: Naderloo *et al.* (2011), Naderloo (2017). Somalia: Apel (2001).

Materials examined: ♀ CL 6.5 mm, CW 11.5 mm Site 24, leg. RUWW 16.02.84. ♂ CL 7.2 mm, CW 12.1 mm Site 24, leg. RUWW 16.02.84.

Macrophthalmus (Macrophthalmus) graeffei A. Milne-Edwards, 1873

Plate 41 B

State: First record in Yemen, Gulf of Aden, at sample locality 21 from subtidal sand, 30 m depth. Not recorded in the Arabian Sea and Gulf of Oman.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915; Apel, 2001); Eritrea, Dahlak Archipelago and Gulf of Elath (Lewinsohn, 1977), Vine (1986) without a specific location. Arabian Gulf: not clear until now (Apel, 2001).

Materials examined: 18♀♀ CL 5.4-8.8 mm, CW 8.4-15.3 mm Site 21, leg. RUWW 26.03.84. 2♂♂ CL 7.8-8.8 mm, CW 12.1-14.1 mm Site 21, leg. RUWW 26.03.84.

Macrophthalmus (Mareotis) laevis A. Milne-Edwards, 1867

Plate 41 C

State: First record in Yemen, Gulf of Aden, at sample locality 26 from mud flat, intertidal zone. Not recorded in the Red Sea and Arabian Sea.

Earlier records: Gulf of Oman: Naderloo *et al.* (2015). Arabian Gulf: Apel & Türkay (1999), Apel (2001), Naderloo *et al.* (2011).

Materials examined: 2♀♀ CL 5.5-6.8 mm, CW 7.7-9.9 mm Site 26, leg. AUAA 08.01.14. ♂ CL 5.5 mm, CW 7.6 mm Site 26, leg. AUAA 08.01.14.

Macrophthalmus (Macrophthalmus) indicus Davie, 2012

Plate 41 D

State: First record in Yemen, Arabian Sea, at sample locality 49 from subtidal sand, 30 m depth. Not record in the Red Sea, Gulf of Aden and Gulf of Oman.

Earlier records: Arabian Gulf: Naderloo *et al.* (2011), Naderloo (2017).

Materials examined: ♂ CL 3.8 mm, CW 6 mm Site 49, leg. RUWW 21.04.85.

Chaenostoma boscii (Audouin, 1826)

Plate 41 E

State: Recorded in Yemen, Gulf of Aden and Socotra Island, sample localities 26, 31, 54 from mud flat, intertidal zone. Not recorded in the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915) under the synonym *Euplax (Chaenostoma) boscii* Audouin, 1826; Mayun Island (Nobili, 1906); Gulf of Suez, Gulf of Elath, Dahlak Archipelago (Lewinsohn, 1977), Vine (1986) without a specific location. Socotra Island: Simões *et al.* (2001). Arabian Sea: Oman, Dhofar Province (Khvorov *et al.*, 2012).

Materials examined: 2♀♀ CL 4.8-4.9 mm, CW 5.9-6.2 mm Site 31, leg. RUWW 01.01.84. 4♂♂ CL 2.9-4.5 mm, CW 3.7-5.6 mm Site 31, leg. RUWW 01.01.84. ♂ CL 6.1 mm, CW 7.7 mm Site 26, leg. RUWW 01.01.85. 2♀♀ CL 6.6-7.7 mm, CW 8-9.2 mm Site 54, leg. RUWW 07.03.84. ♂ CL 6.5 mm, CW 8.1 mm Site 54, leg. RUWW 07.03.84.

Chaenostoma sinuspersici (Naderloo & Türkay, 2011)

Plate 41 F

State: Recorded in Yemen, Gulf of Aden, sample localities 19, 24 from mud flat and sand, rock, intertidal zone. Not recorded in the Arabian Sea.

Earlier records: Red Sea: Egypt, Al-Hurghada (Naderloo & Türkay, 2011). Gulf of Aden: Djibouti (Naderloo & Türkay, 2011). Gulf of Oman (Naderloo & Türkay, 2011). Arabian Gulf: Holotype (Iran) by Naderloo & Türkay (2011).

Materials examined: 5♀♀ CL 4.40-7 mm, CW 5.27-8.82 mm Site 24, leg. AUAA 05.12.13. 3♂♂ CL 5.04-5.75 mm, CW 6-7.90 mm Site 24, leg. AUAA 05.12.13. 3♀♀ CL 4-5 mm, CW 6-7 mm Site 19, leg. AUAA 21.10.16. 4♂♂ CL 3-4 mm, CW 4-6 mm Site 19, leg. AUAA 21.10.16, CO1; AIMSEQ08112016-C10, CO1; AIMSEQ08112016-D10, CO1; AIMSEQ08112016-E10. ♀ CL 5.3 mm, CW 10.1 mm Site 19, leg. AUAA 14.12.13.

Family Ocypodidae Rafinesque, 1815

Ocypode saratan (Forskål, 1775)

Plate 42 A, B

State: Recorded in Yemen, Red Sea, Gulf of Aden, Arabian Sea and Socotra Islands, at sample localities 3, 5, 7, 9, 10, 14, 16, 19, 22, 26, 28, 30, 31, 33, 40, 44, 48, 51, 55, 57, 58, from sand, supralittoral zone. Not recorded in the Arabian Gulf and Gulf of Oman.

Earlier records: Red Sea: Egyptian, Sudanese, Gulf of Elat coasts and coasts of Saudi Arabia (Laurie, 1915; Lewinsohn, 1977; Sakai & Türkay, 2013); Eritrea, Dahlak Archipelago, Massaua, Assab (Lewinsohn, 1977; Sakai & Türkay, 2013); Zebejir and Zuukur Islands (Balss, 1922; Tűrkay *et al.,*1996; Sakai & Türkay, 2013); Hudaydah coasts (Krupp *et al.*, 2006), Vine (1986) without a specific location. Gulf of Aden: Djibouti and Aden (Tűrkay *et al.,*1996; Apel, 2001; Al-Hindi, 2010; Sakai & Türkay, 2013). Socotra Island: Tűrkay *et al.* (1996), Simões *et al.* (2001), Apel (2001). Arabian Sea: Oman, Dhofar Province (Clayton, 1996; Khvorov *et al.*, 2012). Gulf of Oman: Gulf of Masirah peninsula (Sakai & Türkay, 2013).

Remarks: Common and widespread species in all Yemeni coastal waters.

Materials examined: Data, see appendix. CO1; AIMSEQ08112016-D01, CO1; AIMSEQ08112016-E01, CO1; AIMSEQ08112016-F01, CO1; AIMSEQ08112016-G01, CO1; AIMSEQ08112016-H01.

Ocypode cordimana Latreille, 1818

Plate 42 C

State: Recorded in Yemen, Gulf of Aden, sample locality 38 from sand, in the supralittoral zone. Not recorded in the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts, Gulf of Elat and coasts of Saudi Arabia (Laurie, 1915; Lewinsohn, 1977; Sakai & Türkay, 2013); Eritrea, Dahlak Archipelago, Massaua, Assab (Lewinsohn, 1977; Tűrkay *et al.,* 1996; Sakai & Türkay, 2013). Gulf of Aden: Djibouti, Aden and Mukalla (Tűrkay *et al.,*1996; Sakai & Türkay, 2013). Socotra Island: Simões *et al.* (2001), Apel (2001). Arabian Sea: Oman, Dhofar Province (Clayton, 1996; Apel, 2001; Khvorov *et al.*, 2012). Gulf of Oman: Apel (2001), Naderloo (2017).

Materials examined: ♀ CL 23.2 mm, CW 28.2 mm Site 38, leg. FSM 25.05.05.

Ocypode jousseaumei (Nobili, 1906)

Plate 42 D

State: Recorded in Yemen, Gulf of Aden, sample localities 16, 19 from sand, supralittoral zone. Not recorded in the Arabian Gulf.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915), Vine (1986), Tűrkay *et al.* (1996), Sakai & Türkay (2013) without a specific location. Gulf of Aden: Djibouti (Type locality: Obock) and Aden (Nobili, 1906; Tűrkay *et al.,* 1996; Apel, 2001; Sakai & Türkay, 2013). Arabian Sea: Oman, Dhofar Province (Clayton, 1996; Apel, 2001; Khvorov *et al.*, 2012). Gulf of Oman: Clayton (1996), Apel (2001), Sakai & Türkay (2013), Naderloo *et al.* (2015), Naderloo (2017).

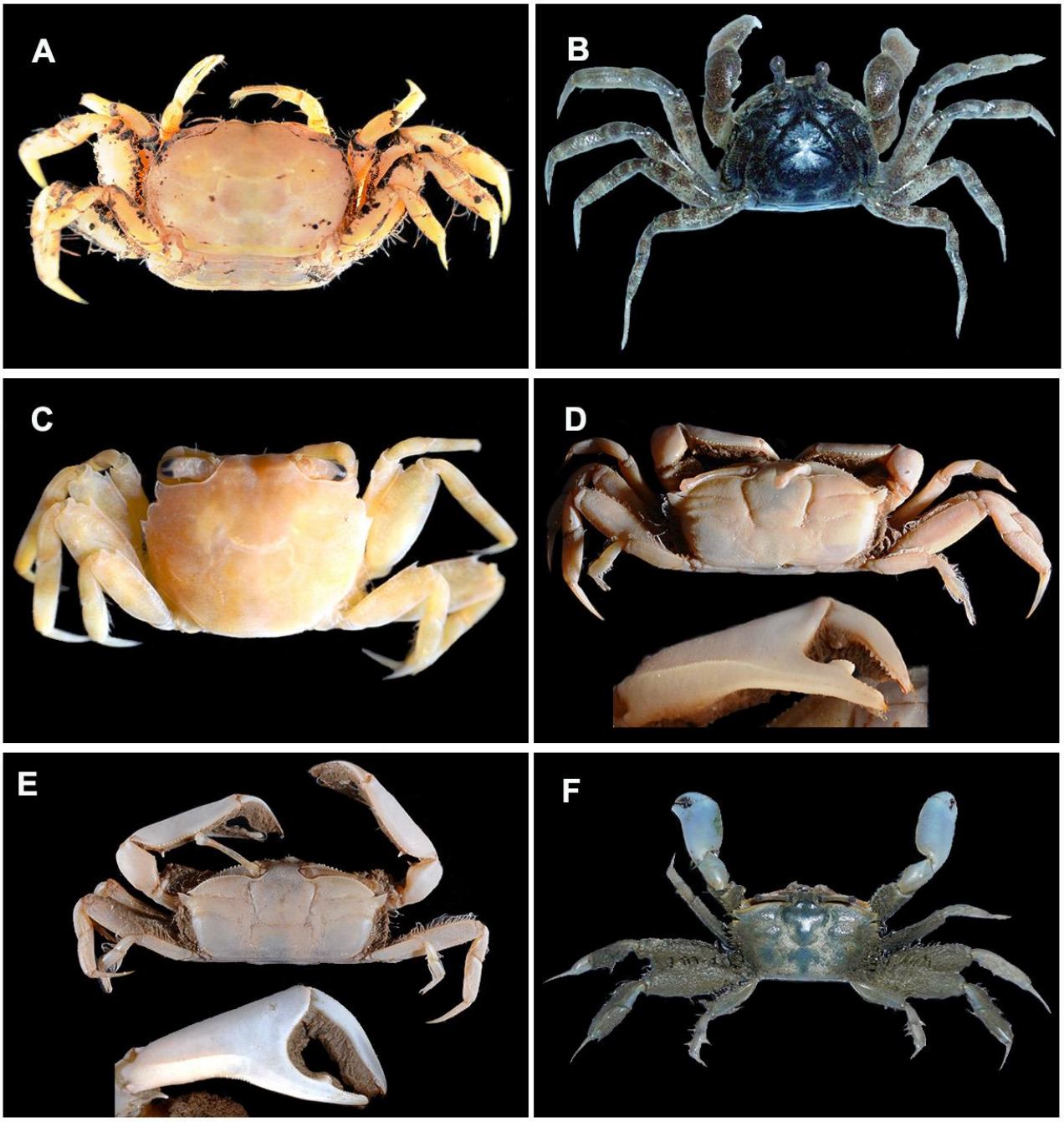

Plate 40: A. *Serenella leachii*, ♀ CL 5.4 mm, CW 8.6 mm; **B.** *Dotilla sulcata*, ♂ CL 6.6 mm, CW 7.4 mm; **C.** *Ilyograpsus paludicola*, ♀ CL 5.6 mm, CW 7.1 mm; **D.** *Macrophthalmus (Macrophthalmus) grandidieri*, ♂ CL 10.3 mm, CW 21.6 mm; **E.** *Macrophthalmus (Macrophthalmus) sulcatus*, ♂ CL 10.1 mm, CW 19.9 mm; **F.** *Macrophthalmus (Mareotis) depressus*, ♂ CL 10.3 mm, CW 15.9 mm.

Materials examined: ♀ CL 29 mm, CW 30 mm Site 16, leg. AUAA 15.10.16, CO1; AIMSEQ08112016-A01. ♂ CL 29 mm, CW 30 mm Site 19, leg. AUAA 21.10.16, CO1; AIMSEQ08112016-B01.

Austruca albimana (Kossmann, 1877)

Plate 43 A, B

State: Recorded in Yemen, Red Sea, Gulf of Aden, Arabian Sea and Socotra Island, sample localities 5, 24, 26, 51, 54 from mud flat and mangrove, intertidal zone.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915); Eritrea, Dahlak Archipelago, Goliath Bay, Museri Island, Massaua, Sheikh Sa'id Island, Melita Island, Gulf of Zula (Lewinsohn, 1977); Hudaydah coasts (Krupp *et al*, 2006), Vine (1986) without a specific location. Gulf of Aden: Aden (Apel, 2001; Al-Hindi, 2010; Naderloo *et al.,* 2010). Socotra Island: Simões *et al.* (2001), Apel (2001). Arabian Sea: Oman, Dhofar Province (Khvorov *et al.*, 2012). Gulf of Oman: Apel (2001), Naderloo *et al.* (2010). Arabian Gulf: Al-Ghais & Cooper (1996), Apel & Türkay (1999), Apel (2001), Naderloo *et al.* (2010), Naderloo (2017).

Remarks: Common and widespread species in all Yemeni coastal waters.

Materials examined: Data, see appendix. CO1; AIMSEQ08112016-C12, CO1; AIMSEQ08112016-F11.

Cranuca inversa (Hoffmann, 1874)

Plate 43 C, D

State: Recorded in Yemen, Red Sea and Gulf of Aden, sample localities 3, 5, 24, 26 from mud flat, intertidal zone.

Earlier records: Red Sea: Egyptian and Sudanese coasts (Laurie, 1915; Apel, 2001); Gulf of Elath, Dahlak Archipelago, Goliath Bay, Museri Island (Lewinsohn, 1977); Mayun Island (Balss 1922); Hudaydah coasts (Krupp *et al.*, 2006), Vine (1986) without a specific location. Gulf of Aden: Djibouti (Apel, 2001). Socotra Island: Simões *et al.* (2001), Apel (2001). Arabian Sea: Oman, Dhofar Province (Khvorov *et al.*, 2012). Gulf of Oman: Apel (2001). Arabian Gulf: Al-Ghais & Cooper (1996), Apel & Türkay (1999), Apel (2001), Naderloo & Türkay (2012), Naderloo *et al.* (2013).

Materials examined: 4♀♀ CL 7.3-8.9 mm, CW 11.9-13.2 mm Site 24, leg. AUAA 05.02.14. 5♂♂ CL 4.6-11.2 mm, CW 7.9-16.6 mm Site 24, leg. AUAA 05.02.14. 2♀♀ CL 7.8-11 mm, CW 12.8-17.4 mm Site 26, leg. RUWW 10.01.84. 2♂♂ CL 10.2-11 mm, CW 16.7-17 mm Site 26, leg. RUWW 10.01.84. 2♂♂ CL 8.2-10.8 mm, CW 13.3-17.9 mm Site 5, leg. RUWW 28.03.09. 2♂♂ CL 9.3-13.3 mm, CW 15.5-21.3 mm Site 3, leg. ZSM Dec. 1897.

Gelasimus hesperiae (Crane, 1975)

Plate 43 E, F

State: First record in Yemen, Gulf of Aden, at sample locality 26 from mud flat, intertidal zone. Not recorded in the Arabian Sea.

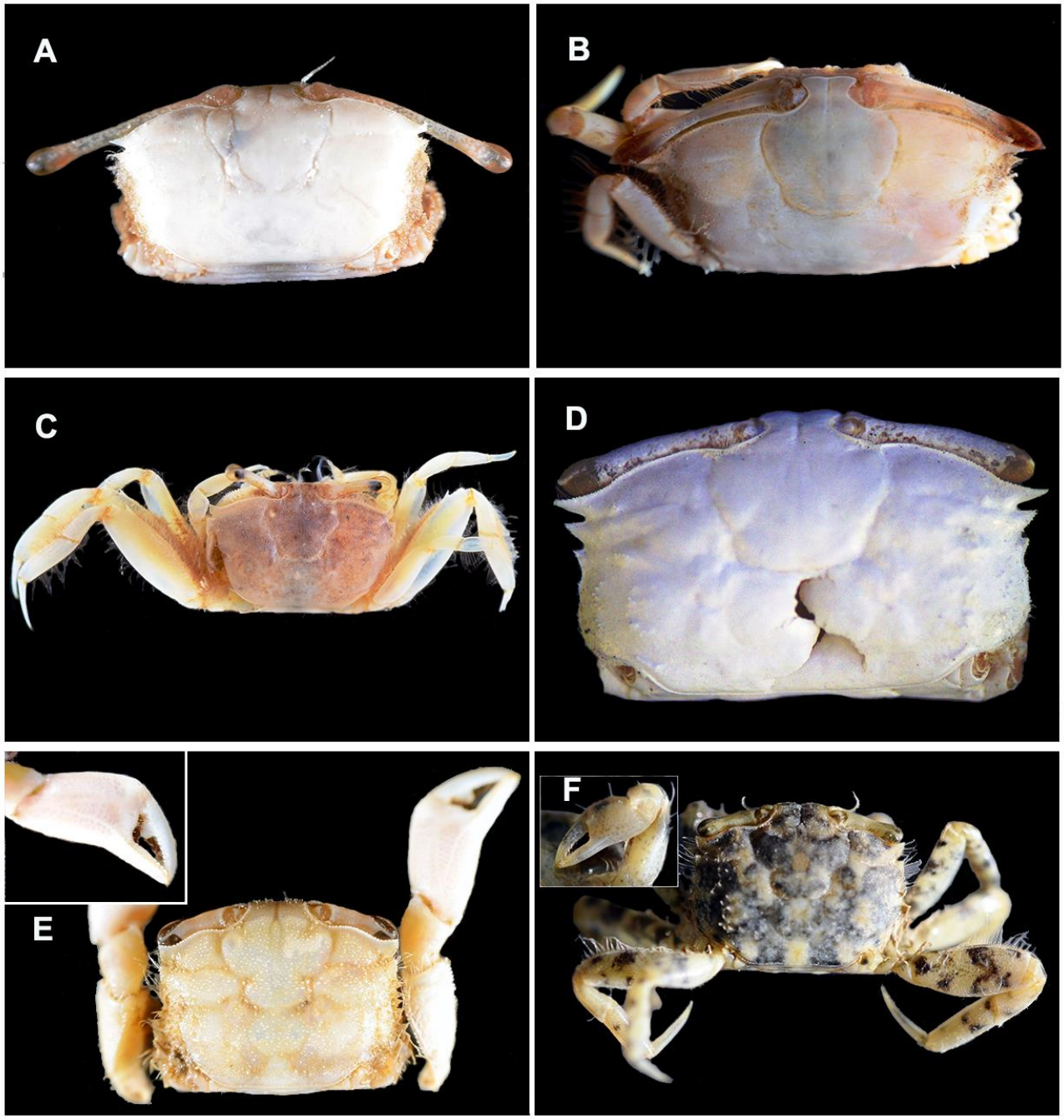

Plate 41: A. *Macrophthalmus (Macrophthalmus) serenei*, ♂ CL 7.2 mm, CW 12.1 mm; **B.** *Macrophthalmus (Macrophthalmus) graeffei*, ♀ CL 8.8 mm, CW 15.3 mm; **C.** *Macrophthalmus (Mareotis) laevis*, ♂ CL 5.5 mm, CW 7.6 mm; **D.** *Macrophthalmus (Macrophthalmus) indicus*, ♂ CL 3.8 mm, CW 6 mm; **E.** *Chaenostoma boscii*, ♂ CL 6.1 mm, CW 7.7 mm; **F.** *Chaenostoma sinuspersici*, ♂ CL 6.1 mm, CW 7.7 mm.

Earlier records: Red Sea: Eritrea, Massaua (Apel, 2001); Hudaydah coasts (Krupp *et al.*, 2006). Gulf of Oman: Apel (2001), Naderloo (2017). Arabian Gulf: Al-Ghais & Cooper (1996), Apel & Türkay (1999), Naderloo (2017).

Materials examined: ♂ CL 14.8 mm, CW 21.1 mm Site 26, leg. RUWW 15.01.85. 4♀♀ CL 10.7-14.3 mm, CW 16.8-20.6 mm Site 26, leg. RUWW 01.12.88. 18♂♂ CL 10.4-16.9 mm, CW 15.3-24.7 mm Site 26, leg. RUWW 01.12.88. ♂ CL 9.6 mm, CW 14.2 mm Site 26, leg. RUWW 05.07.84.

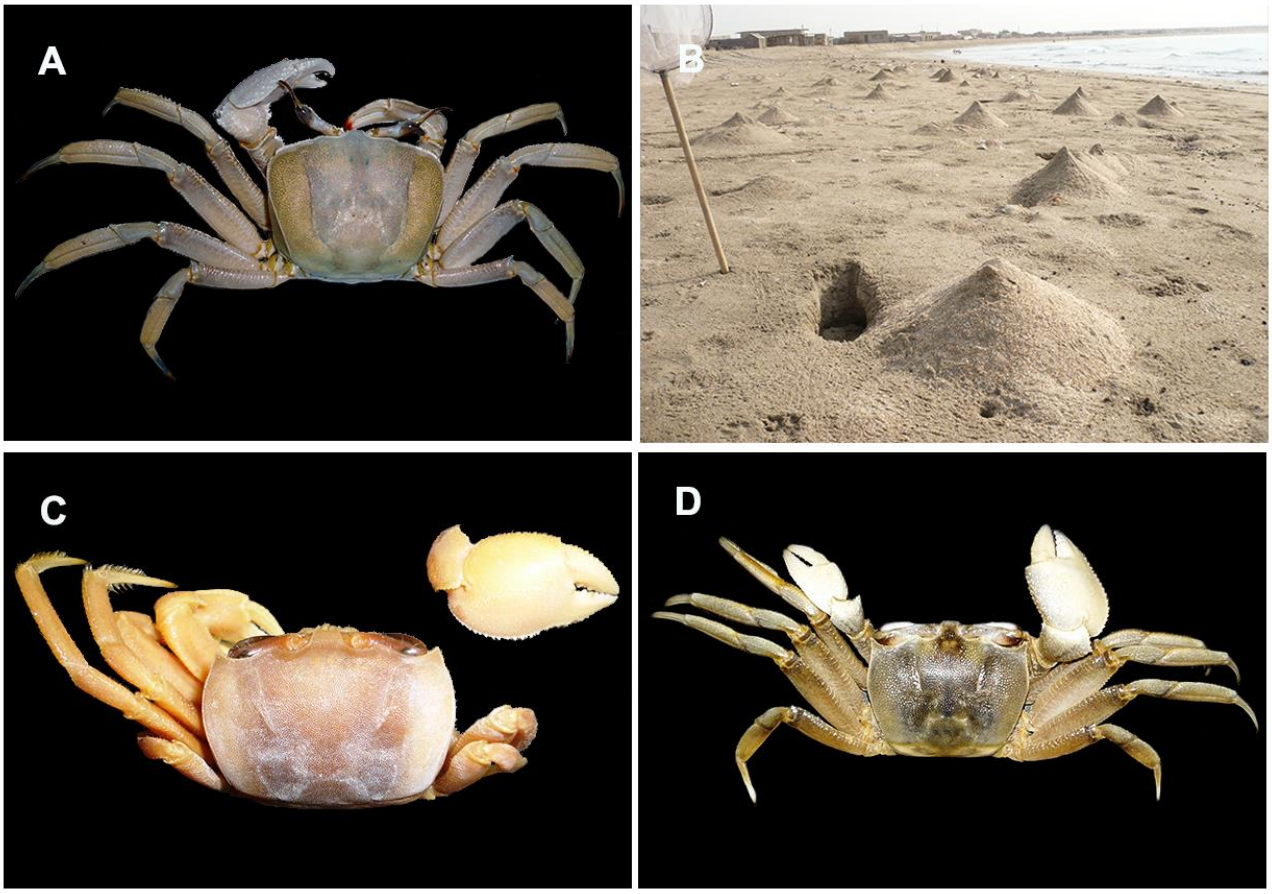

Plate 42: A. *Ocypode saratan*, ♂ CL 48.8 mm, CW 52.1 mm; **B.** Sand pyramids constructed by *Ocypode saratan*; **C.** *Ocypode cordimana*, ♀ CL 23.2 mm, CW 28.2 mm; **D.** *Ocypode jousseaumei*, ♂ CL 29 mm, CW 30 mm.

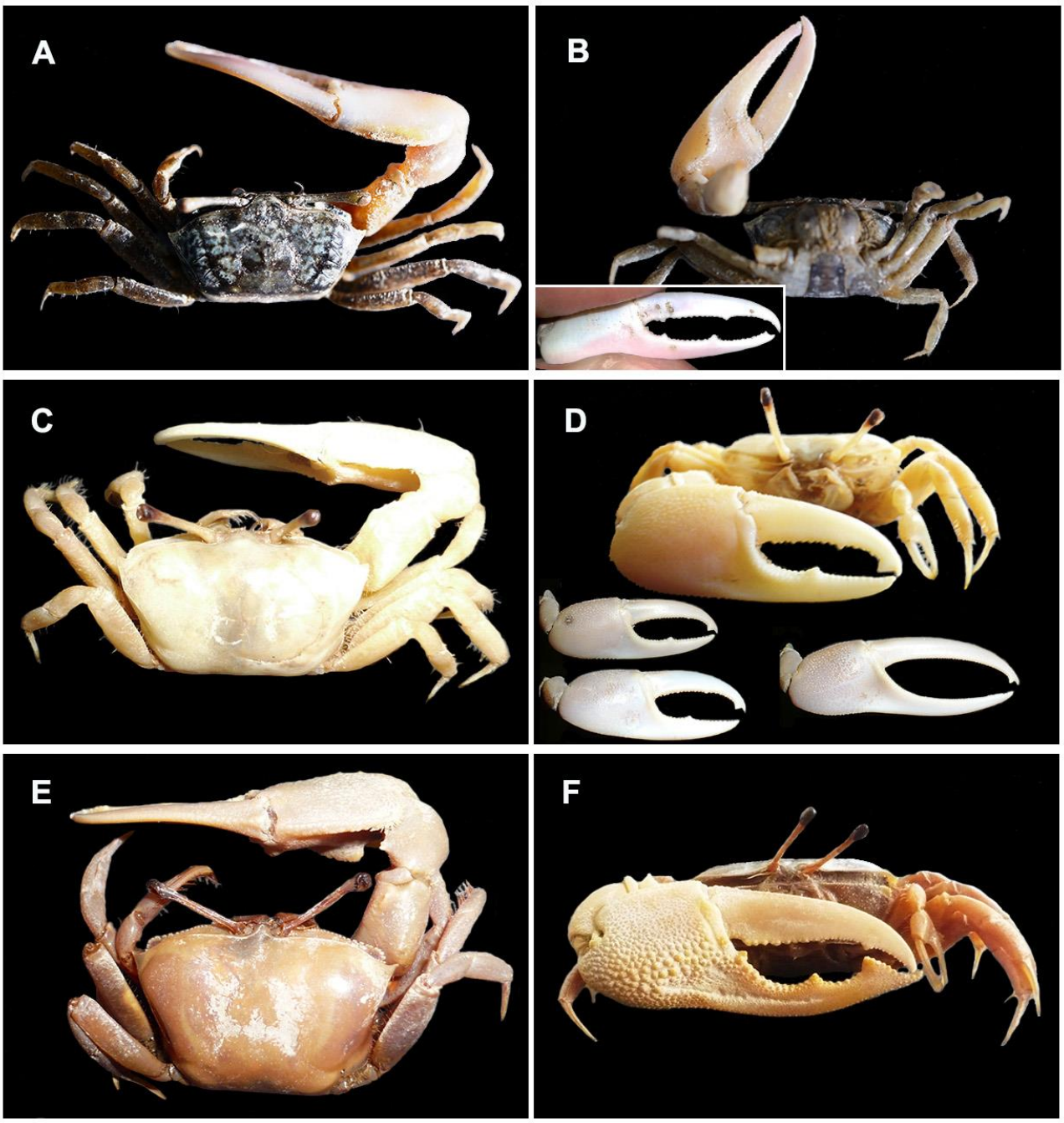

Plate 43: A. *Austruca albimana*, ♂ CL 10.8 mm, CW 17.9 mm (dorsal view); **B.** *Austruca albimana*, (ventral view & different form of the major chela); **C.** *Cranuca inversa*, ♂ CL 13.3 mm, CW 21.3 mm (vorsal view); **D.** *Cranuca inversa*, frontal view with different forms of the major chela; **E.** *Gelasimus hesperiae*, ♂ CL 16.9 mm, CW 24.7 mm (dorsal view); **F.** *Gelasimus hesperiae*, frontal view.

3.2: Faunistics and biodiversity

In the present study 184 species of brachyuran crabs were recorded at the 58 sites studied in the Red Sea, Gulf of Aden, Arabian Sea and Socotra Islands in the Indian Ocean. The sites represent different habitats, such as sandy shores, rocky shores, mud flats, mangroves, coral communities, sponge-covered areas and fresh water habitat. Moreover, different depth zones are covered by the study, i.e. the supralittoral, intertidal (mediolitoral) and sublittoral (infralittoral) until 300 m depth. Fig. 13 shows the number of species recorded at each sample locality.

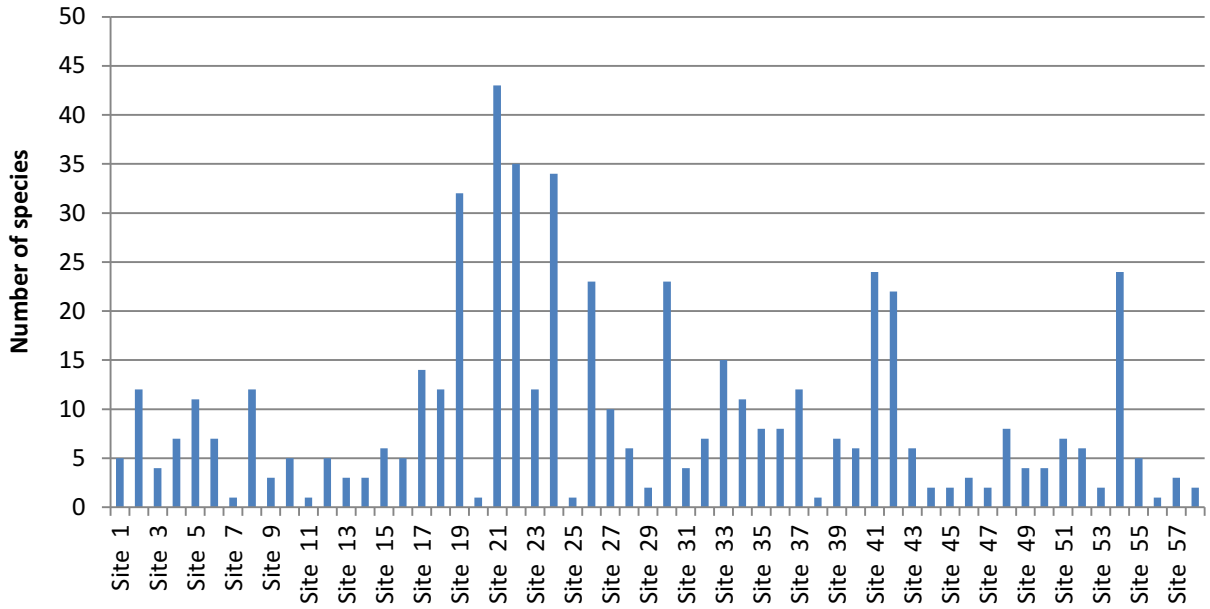

Fig. 13: The number of species recorded at each sample locality.

The Red Sea

Sites in the Red Sea region (sites 1-12) represented different habitats such as sandy shores, rocky shores, mud flats, mangroves and coral reefs. In this region, 50 species belonging to 12 superfamilies, 19 families, and 39 genera have been recorded. Three of these species are first records for this region. Fig. 14 shows all families and superfamilies recorded in the region, and Table 4 (see appendix) shows all the genera and species in these families and superfamilies.

Of the 50 species recorded in the sites of the Red Sea, 13 were recorded exclusively in this region and have not been recorded in any other region of the Yemeni coastal waters in the present study. These species are: *Nobiliella cornigera* from family of Leucosiidae, at site 2; *Thalamita woodmasoni*, *Thalamita chaptalii* and *Thalamita savignyi* from family of Portunidae, at sites 3, 12; *Trapezia lutea* from family of Trapeziidae, at site 2; *Cymo melanodactylus*, *Actaea jacquelinae*, *Chlorodiella cytherea* and *Hypocolpus cf. guinotae* from family of Xanthidae, sites 2, 4, 8, 10; *Pseudohelice subquadrata* from family of Varunidae, at site 6; *Perisesarma guttatum* from family of Sesarmidae, at sites 1, 5, 6; *Serenella leachii* from family of Camptandriidae, at site 1, 6.

The dominant brachyuran crab superfamily in this region was Xanthoidea with 12 species or 24% percent of the total species number. In the second place were Portunoidea with 8 species or 16%. Carpilioidea, Calappoidea and Parthenopoidea have 1 species each and 2% in total (Fig. 15).

Most brachyuran crab species in the Red Sea region were recorded in three habitats only. These habitats are subtidal sand, subtidal rock and corals, and mud flats and mangroves. In subtidal sand we recorded 13 species or 26% percent of the total number of species. None of these species was dominant in this habitat, all are found in few numbers and limited places. In the subtidal rock and corals 12 species or 24% percent of the total number of species were recorded. Four of these were dominant in this habitat. *Trapezia cymodoce*, *Trapezia tigrina* from Trapeziidae, *Cyclodius granulatus* and *Luniella spinipes* from Xanthidae. In mud flats and mangroves, 10 species were recorded with 20% percent of the total species number. Six of these were dominant in this habitat, i.e. *Pseudohelice subquadrata* from Varunidae; *Perisesarma guttatum* from Sesarmidae; *Serenella leachii* from Camptandriidae; *Ilyograpsus paludicola* and *Macrophthalmus (Mareotis) depressus* from Macrophthalmidae.

In sand and rock habitats fewer species than in other habitats were found, 4% percent of the total number of species, 2 species only from the rock habitat: *Grapsus albolineatus* from Grapsidae and *Lydia tenax* from Oziidae, and 2 species only from the sand habitat: *Ocypode saratan* and *Dotilla sulcata.*

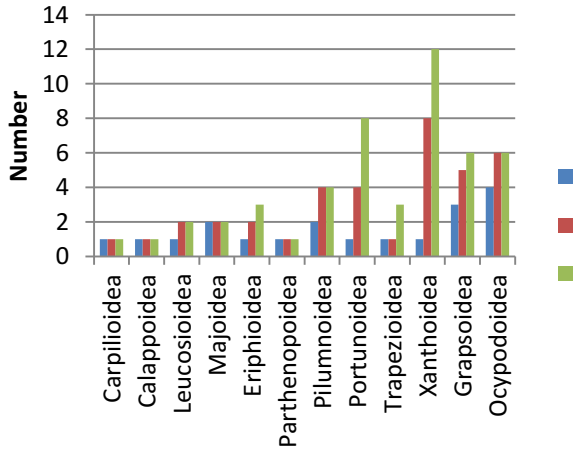

Fig. 14: Number of species, genera and families in all the superfamilies in the Red Sea.

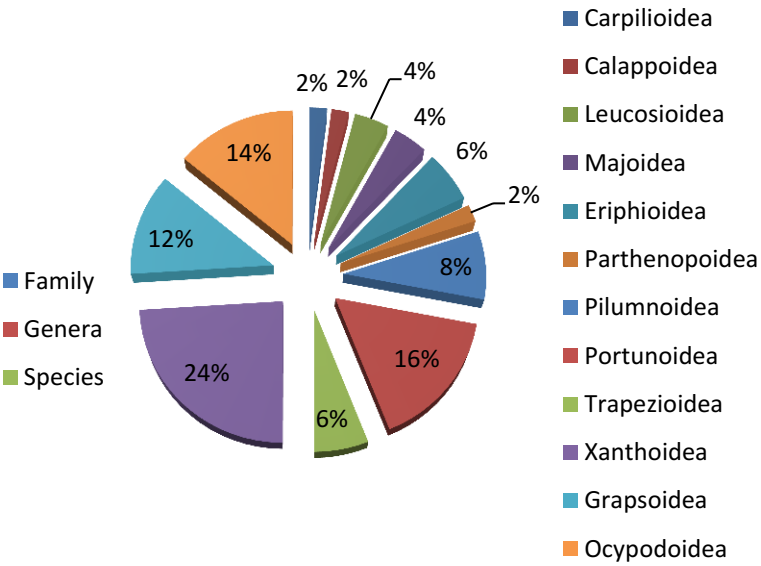

Fig. 15: The percentage of the species counts per superfamilies in the Red Sea.

Socotra

The Socotra Island sites (53-58) also have a variety of habitats including sandy shores, rocky shores, mud flats, sponge areas, coral reefs and fresh waters. In these sites, 32 species were recorded belonging to 11 superfamilies, 14 families and 29 genera. Eight of these species represent first records in this region. Fig. 16 shows all the families and superfamilies, and Table 5 (appendix)

shows all the genera and species in these families and superfamilies. Four species were recorded exclusively in this region, and have not been recorded in any other region of Yemeni coastal waters in the present study. These species are: *Pilumnus propinquus* from family of Pilumnidae, site 54; *Socotrapotamon socotrensis* from family of Potamidae, site 56; *Atergatis latissimus* and *Atergatopsis granulata* from family of Xanthidae, sites 54, 55.

Also, the dominant brachyuran crab superfamily in this region was Xanthoidea, 35% with 11 species recorded, followed by Grapsoidea, 19% with 6 species. Carpilioidea, Eriphioidea, Majoidea, Pseudozioidea, Pilumnoidea and Potamoidea were less species-rich and contribute 3% of all species with 1 species only from each superfamily (Fig. 17).

Most brachyuran crab species in Socotra Islands were recorded in four habitats only, subtidal rock with corals, rocky habitat, sand and freshwater. In subtidal rock with corals 25% percent of the total numbers of species were recorded. This corresponds to a total of 8 species three of these being dominant in this habitat, i.e. *Trapezia cymodoce* and *Trapezia tigrina* from Trapeziidae, and *Cymo andreossyi* from Xanthidae.

In the rocky habitat, 15.5% percent of the total number of species was recorded, in total five. Two of them were dominant in this habitat, *Grapsus albolineatus* from Grapsidae and *Eriphia smithii* from Eriphiidae.

In the habitats of sand and fresh water fewer brachyuran crab species were recorded than in the other habitats, i.e. 3% of all species with one species only per family: *Ocypode saratan* from Ocypodidae in the sand habitat and *Socotrapotamon socotrensis* from Potamidae in the fresh water habitat.

In addition to the habitats mentioned above, Socotra Island has mangrove trees in five locations in the northern part but, unfortunately, no samples were collected from this habitat in the present study.

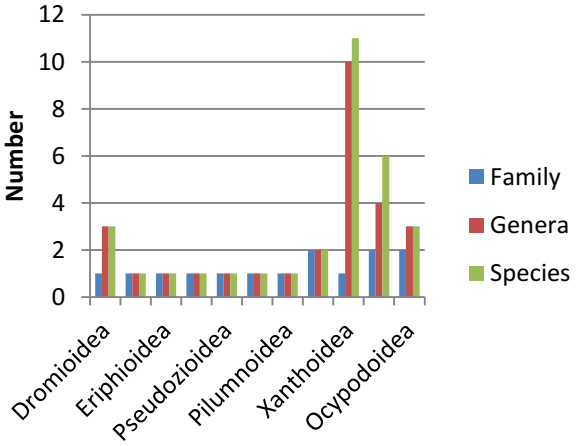

Fig. 16: Number of species, genera and families in all the superfamilies in Socotra islands.

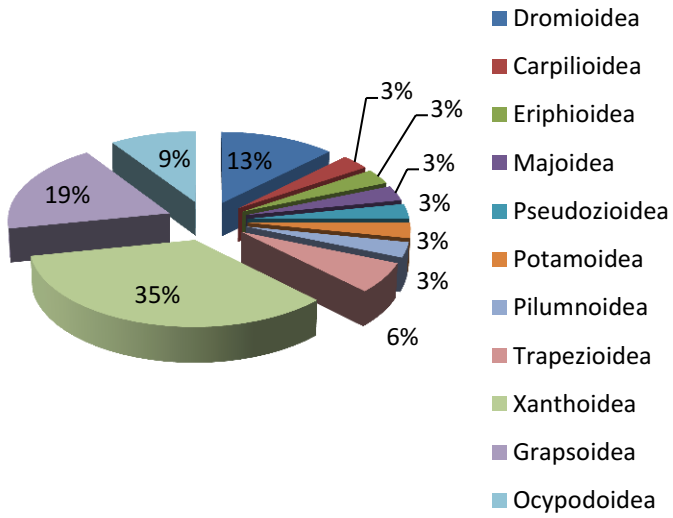

Fig. 17: The percentage of the species counts per superfamilies in Socotra islands.

Gulf of Aden

In the Gulf of Aden region (Sites 13- 48), 163 species of brachyuran crabs were recorded, belonging to 17 superfamilies, 28 families and 110 genera. 53 species of them are first records in this region. Fig. 18 shows all the families and superfamilies in this region and Table 6 (appendix) shows all genera and species in these families and superfamilies.
104 species were recorded exclusively in this region, and have not been recorded in any other region of the Yemeni coastal waters in the present study (see table 1).

Xanthoidea and Portunoidea were dominating in this region with 32 species (20% of all species) and 27 species (16%), respectively, followed by Majoidea with 18 species (11%) and Leucosioidea with 16 species (10%). Raninoida, Carpilioidea, Dorippoidea, Pseudozioidea and Hexapodoidea were represented by less species than the other superfamilies, with 1 species each (1% only of the total species number; Fig. 19).

In the Gulf of Aden region, different habitats were found and studied, i.e. sandy shores, rocky shores, mud flats, sponge area, coral communities. Mangroves are present only at site 33 but unfortunately, there were no samples collected from this habitat.

Most brachyuran crab species in the Gulf of Aden region were recorded from four habitats, subtidal sand, subtidal rock and corals, sand with rock as well as mud flats.
In the subtidal sand habitat, 29% percent of the total number of species was recorded, corresponding to a total of 48 species. Among these were 8 species of Parthenopidae found in this habitat, and 11 species of Leucosiidae.
In the subtidal rock and corals habitat, 17% percent of the total number of species (28 species in total) were recorded. Of these, 8 were dominant: *Trapezia cymodoce* and *Trapezia tigrina* from Trapeziidae; *Schizophrys aspera* from Majidae; *Cyclodius granulatus, Luniella spinipes*, *Chlorodiella nigra* and *Cymo andreossyi* from Xanthidae and *Carpilius convexus* from Carpiliidae.

The third habitat was sand with rock with 15% percent of the total number and 25 species. Five of these species were dominant in this habitat, namely *Leptodius exaratus* and *Xanthias sinensis* from Xanthidae; *Pseudozius caystrus* from Pseudoziidae; *Epixanthus frontalis* from Oziidae and *Thalassograpsus harpax* from Varunidae.
In the fourth habitat (mud flat), 8% percent of the total numbers of species, in total 13 species were harvested. Three of them were dominant in this habitat: *Eurycarcinus orientalis* from Pilumnidae; *Macrophthalmus (Mareotis) depressus* from Macrophthalmidae and *Austruca albimana* from Ocypodidae.

Other habitats (rock, mud rock, sponge, sand and rock with algae) varied in species number as well (1-7). On rock 4% percent of the total number of species, i.e. 7 species, were recorded. Three of these were dominant in this habitat, *Grapsus albolineatus* from Grapsidae; *Eriphia smithii* from Eriphiidae and and *Lydia tenax* from Oziidae.

Mud, rock contained 4% percent of the total number of species and 7 species in total. Two of these were dominant in this habitat, *Metopograpsus messor* from Grapsidae, intertidal zone and *Thalamita crenata* from Portunidae, 0.5-1 m depth.

The habitat sponge had 4% percent of the total number of species, 7 species in total. One of these was dominant, *Lewindromia unidentata* from Dromiidae.

In sand and rock with algae fewer species than in other habitats were found. In sand, 2.5% percent of the total number of species (4 species) was recorded. Two of them were dominant in this habitat: *Dotilla sulcata* from Dotillidae, and *Ocypode saratan* from Ocypodidae.
The rock with algae habitat had 0.6% percent of the total number of species (1 species). The single species recorded in this habitat was *Percnon planissimum* from Plagusiidae.

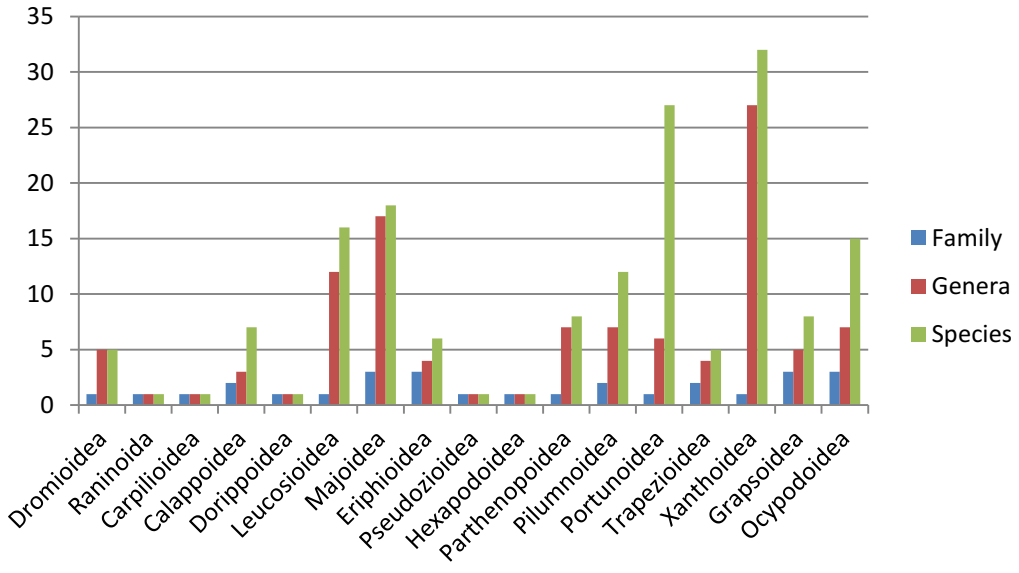

Fig. 18: Number of species, genera and families in all the superfamilies in Gulf of Aden.

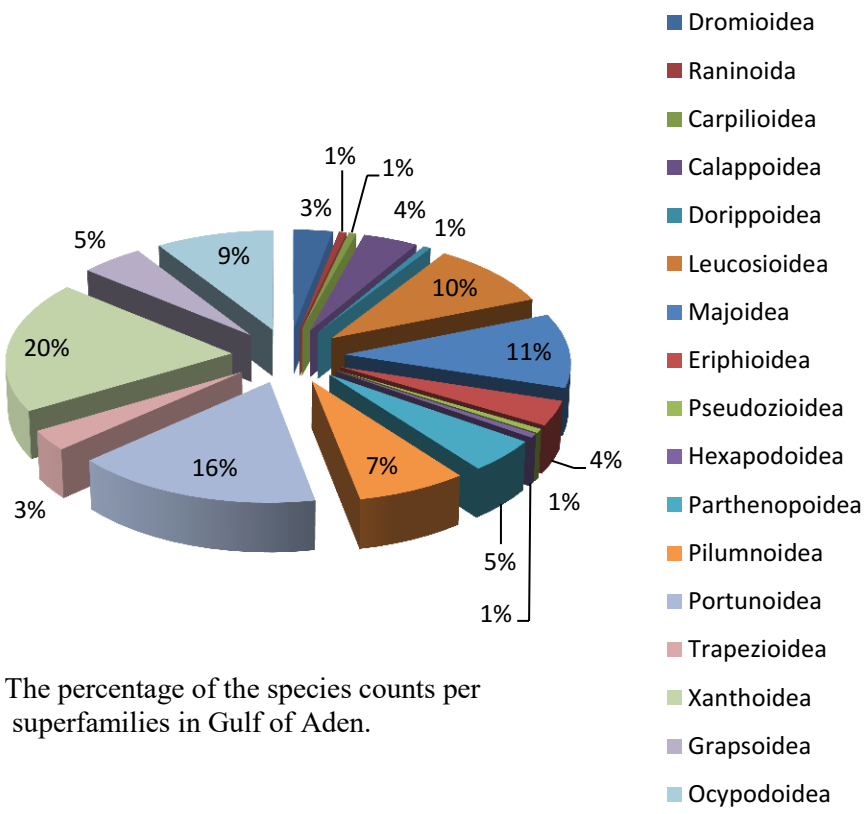

Fig. 19: The percentage of the species counts per superfamilies in Gulf of Aden.

Arabian Sea

The lowest species number was recorded in the Arabian Sea region (Sites 49- 52) with only 21 species belonging to 10 superfamilies, 14 families and 19 genera. Six of them represent first records for this region.

The habitats studied were sandy shores, rocky shores and mangrove areas. Fig. 20 show all families and superfamilies in this region and table 7 (see appendix) shows all genera and species in these families and superfamilies.

Three species were recorded exclusively in this region, i.e. they have not been recorded in any other region of Yemeni coastal waters in the present study. These are *Cycloachelous granulatus* from Portunidae, site 50; *Plagusia squamosa* from Plagusiidae, site 52 and *Macrophthalmus (Macrophthalmus) indicus* from Macrophthalmidae, site 49.

The superfamily Ocypodoidea is dominant in this region with 4 species in total, followed by Grapsoidea, Eriphioidea and Portunoidea with 3 species (14%) each.

Compared to this, Pseudozioidea, Pilumnoidea, Leucosioidea and Hexapodoidea were less species-rich since only 1 species was found for each family (altogether 5% of the total species count) (Fig. 21).

Most brachyuran crab species in the Arabian Sea region were recorded from three habitats. These are sand with rock, subtidal sand, and rock. In the sand with rock habitat, 33% percent of the total numbers of species were found 8 species. Three of these were dominant in this habitat, i.e. *Leptodius exaratus*, *Pseudozius caystrus* from Pseudoziidae and *Epixanthus frontalis* from Oziidae.

In subtidal sand 4 species were recorded (19%). None of these is dominant, since all of them were found in low numbers and only a few places. These are *Nobiliella jousseaumei* from Leucosiidae, *Hyastenus hilgendorfi* from Epialtidae and *Hexapinus simplex* from Hexapodidae.

In rock habitat 4 species (19%) were recorded, 2 species of them dominant in this habitat: *Grapsus albolineatus* from Grapsidae and *Eriphia smithii* from Eriphiidae.

The habitats sponge and rock with algae had fewer species than the others, altogether 4.7% percent of the total number of species, corresponding to one species in each family. In the sponge habitat, *Stilbognathus cervicornis* from Epialtidae and in the rock with algae habitat *Plagusia squamosa* from Plagusiidae were recorded.

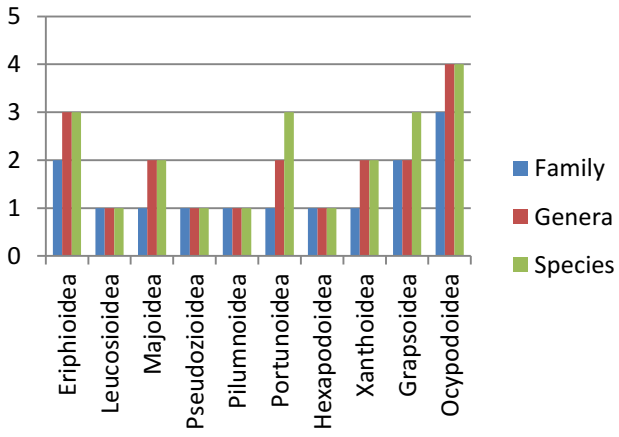

Fig. 20: Number of species, genera and families in all the superfamilies in the Arabian Sea.

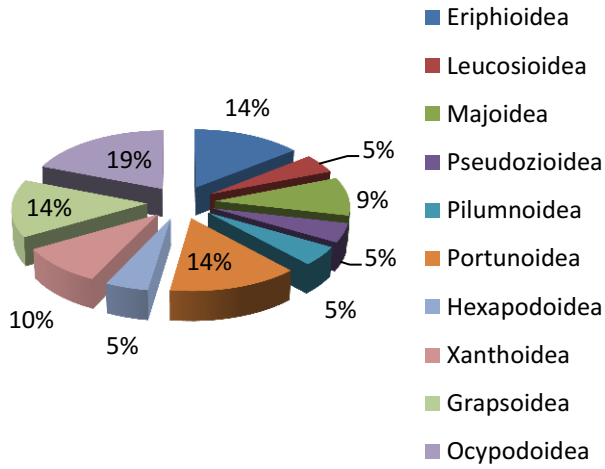

Fig. 21: The percentage of the species counts per superfamilies in the Arabian Sea.

In the Arabian Sea region, the present study reports for the first time a site with a mangrove habitat (Site 51). Here, three 3 species corresponding to 14% of all species were found, *Dotilla sulcata* from Dotillidae, *Austruca albimana* from Ocypodidae and *Leptodius exaratus* from Xanthidae

Comparison of the four studied biogeographic regions

The most common species that were recorded in all four Yemeni coastal regions were the following four: *Leptodius exaratus* in sand, rock habitat and in the intertidal zone at sites 10, 19, 21, 22, 23, 24, 26, 32, 43, 51 and 54, *Grapsus albolineatus* in rocky shores habitat and the intertidal at sites 8, 19, 21, 22, 24, 27, 32, 33, 36, 40, 48, 52, 54 and 57, *Ocypode saratan* in sandy shores habitat and the supra-littoral zone at sites 3, 5, 7, 9, 10, 14, 16, 19, 22, 26, 28, 30, 31, 33, 40, 44, 48, 51, 55, 57 and 58, and *Austruca albimana* in mud flats and mangrove areas at sites 5, 24, 26, 51 and 5. Fig. 22 (A) shows the distribution these species in Yemeni coastal waters.
Three brachyuran crab families are first records represented by a single species only in all of the Yemeni coastal water. These families are the Raninidae, Dorippidae and Hexapodidae. We recorded *Notosceles serratifrons* from Raninidae in Gulf of Aden, site 19, at 50 m depth in subtidal sand. This family has not been not recorded in Arabian Sea, Gulf of Oman, and Arabian Gulf until now.
From Dorippidae, *Dorippe frascone* has been recorded in the Gulf of Aden only, at sites 16, 17, 19, 30, 36, at 2-25 m depth in subtidal sand. It has not been recorded before in the regions of the Red Sea, Arabian Sea and Socotra Islands.
From Hexapodidae, only *Hexapinus simplex* has been recorded in the Gulf of Aden and the Arabian Sea sites 19, 49, at 20-50 m depth from subtidal sand. This family has not been recorded in the Red Sea or the Gulf of Oman until now, but in the Arabian Gulf, where a related species was found by Apel (2001) and Naderloo (2017), *Hexapus sexpes* (Fabricius, 1798). Fig. 22 (B) shows the distribution of these rarely encountered species in Yemeni coastal waters.

In total 44 species can be considered rare, i.e. they were present at only one site with one specimen only, while 14 species are widespread, i.e. they are present at three Yemeni coastal regions.
Based on the present a number of the Yemeni coastal water regions, number of the sites and number of the specimens per species were classified into the categories common, widespread, present and rare species. In table 8 at (appendix) the brachyuran crab species found at the Yemeni coast in this present study are classified accordingly.

Ten species were first recorded in the marine waters of the Arabian Peninsula at the Red Sea, Gulf of Aden, Arabian Sea, and Socotra Islands. These species belong to 6 families. Eight species were recorded in the Gulf of Aden, two species in the Red Sea and one (Repeated) in the Arabian Sea. These species are: *Notosceles serratifrons* from Raninidae, record in Gulf of Aden, site 19, 50 m depth; *Hexapinus simplex* from Hexapodidae, record in Gulf of Aden and Arabian Sea, sample localities 19, 49, 20-50 m depth; *Cyrtomaia cf. goodridgei* from Inachidae, record in Gulf of Aden, site 21, 30 m depth; *Aethra scruposa*, *Aulacolambrus granulosus* and *Rhinolambrus longispinus* from Parthenopidae. *Aethra scruposa* record in Gulf of Aden, site 27, 2 m depth, *Aulacolambrus granulosus* record in Gulf of Aden, sites 17, 19, 21, 22, 30, 2-60 m depth, *Rhinolambrus longispinus* record in Gulf of Aden, site 42, 21-24 m depth. *Hypocolpus cf. guinotae* from Xanthidae, was record in Red Sea, Kamaran Island (Site 4), 5-12 m depth. The last 3 species from Portunidae that were recorded for the first time in the Arabian Peninsula are *Thalamita woodmasoni*, which was recorded in the Red Sea, Mayun Island (Site 12), 4-5 m depth, *Thalamita gatavakensis* recorded in the Gulf of

Aden, site 42, 2 m depth and *Thalamita mitsiensis*, recorded in the Gulf of Aden, site 21, 15 m depth. Fig. 23 shows the distribution of these species.

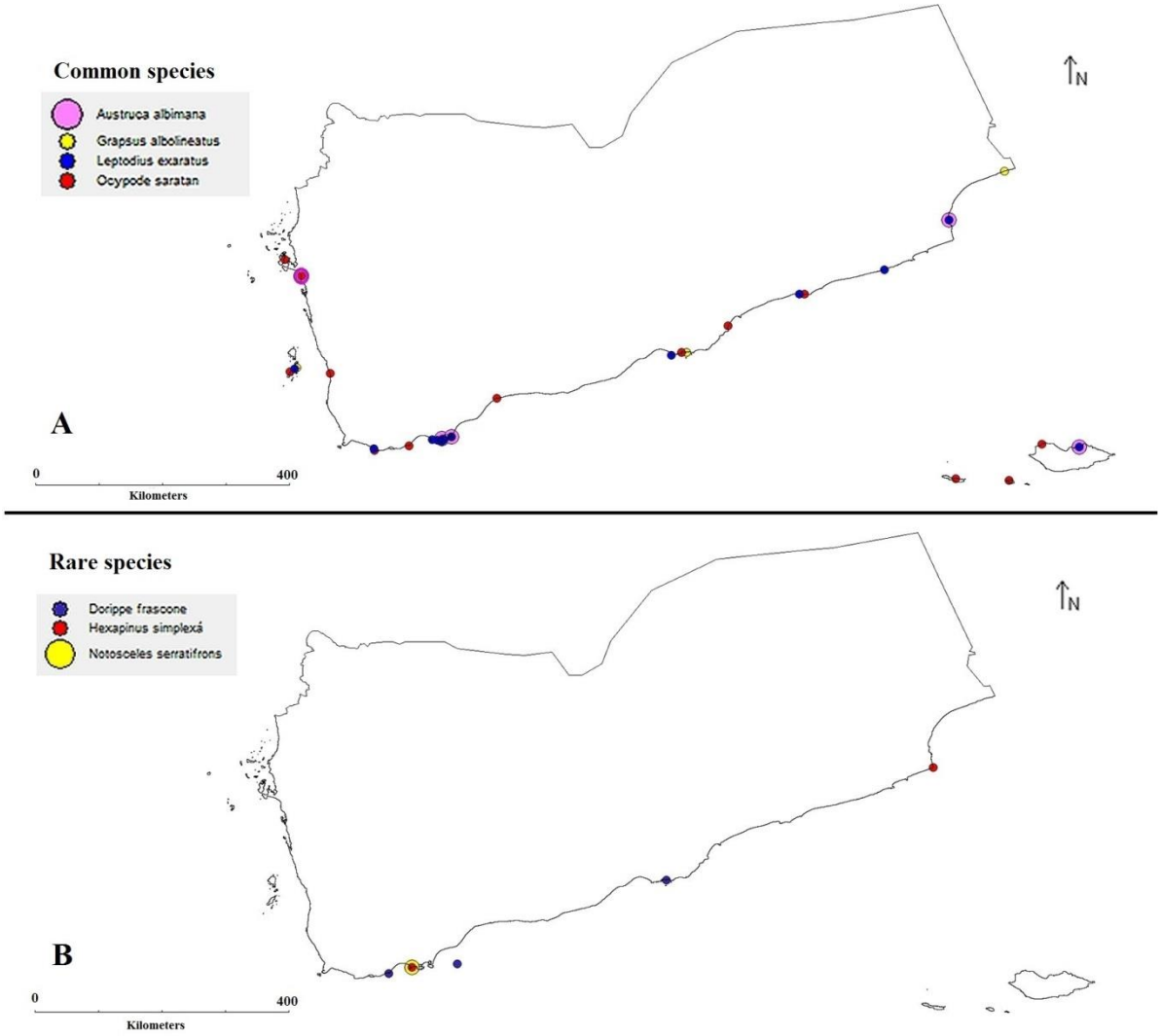

Fig. 22: Distribution of common (A) and rare (B) brachyuran crab species in Yemeni coastal waters.

In addition to these species, we recorded another rare species, *Inachus dorsettensis* from Inachidae in the Gulf of Aden at site 42, 300 m depth. This species was record earlier by Griffin (1974) in the mouth of the Gulf of Aden at 75-175 m depth. These are the only records of this species in any marine waters of the Arabian Peninsula at the Red Sea, Gulf of Aden, Arabian Sea, Gulf of Oman and Arabian Gulf until now.

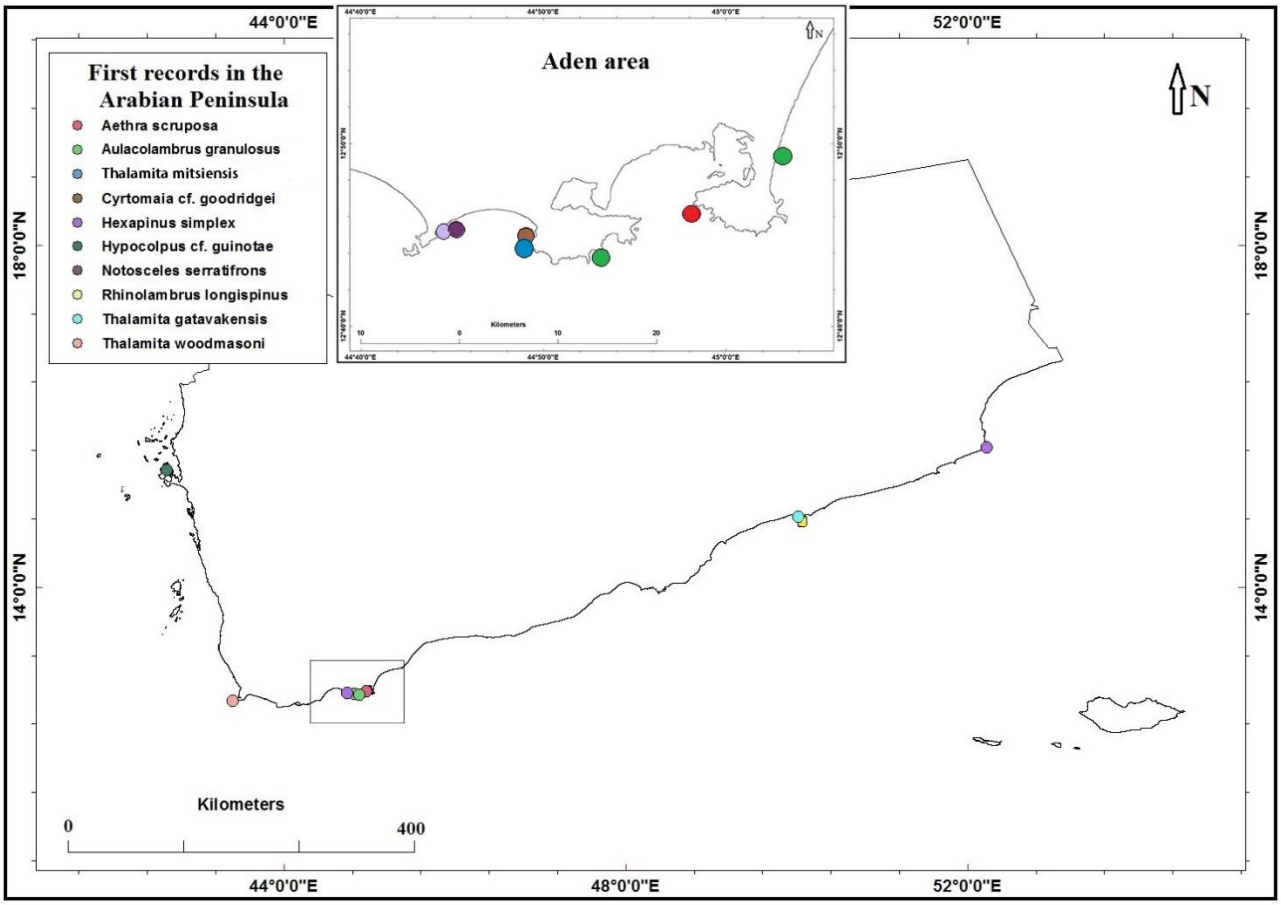

Fig. 23: First records of brachyuran crab species for Arabian Peninsula coastal waters.

Number of species

In this study, the number of species found reflects the different sampling efforts between areas. Since sampling was not done on equally sized areas and not all specimen occurring in a defined space were collected, the different number of specimen sampled in different locations also defines, to some extent, the number of different species found. Still, the samples may be grouped in geographic units (8grids). When roughly compiled to grids of 112 x 112 km (Fig. 24), the areas with most species reported in this study can be seen around Aden, Mukalla and in the Hadramout coastal area. The highest number of species was observed in the west Aden area (Sites 13-28) with 93-115 species, followed by east Aden (Site 29 & 30) and Hadramout east of Mukalla (Sites 41-47), where 47-69 species were recorded per grid. In the Red Sea (Sites 1-5), Gulf of Aden, Bir Ali area (Sites 32-37) and Socotra Islands (Sites 53 & 54), 24-46 species per grid were recorded. The lowest number of species was found in the southern Red Sea (Sites 6-12), Socotra Islands (Sites 55-58) and Arabian Sea (Sites 49-52), where only 1-23 species per grid were observed. However, this result depends on grid size, the number of sampling sites in a grid, the diversity of habitats sampled in one grid and the intensity of sampling. These results show sudden changes between adjacent areas (red/dark green, yellow/dark green) that may reflect habitat diversity, but also sampling intensity.

The highest species number was recorded at sites 21, 22, 24 and 19 (site 21 with 43 species, site 22 with 35 species, site 19 with 32 species). In these localities, very diverse habitats are found such as sand, rock, subtidal sand, sponge, subtidal rock with corals and sand with rock. Also, these sites are semi-sheltered as rocky headlands are found at the outskirts. The dominant family in these sites is Xanthidae with 15 species followed by Portunidae with 10 species. At site 24, 33 species were recorded. This site has mud flats, mud with rock, sand, rock, sponge and subtidal sand as habitats. The dominant family here was Macrophthalmidae with 5 species.

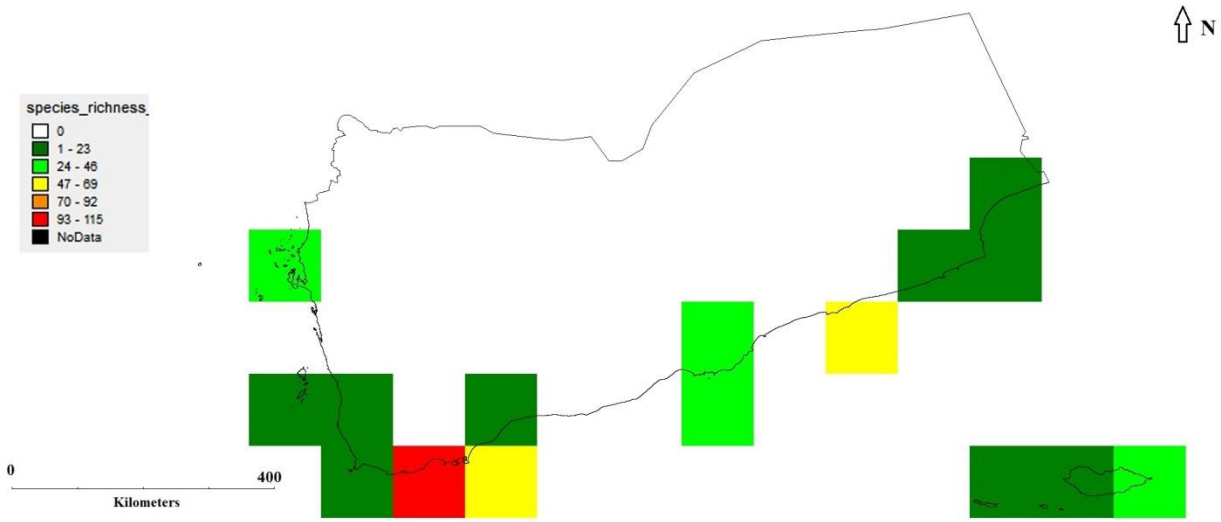

Fig. 24: Grid map of species richness in the Yemeni coastal water regions.

The highest number of brachyuran crab species was found in habitat of sand with rock. In this habitat 64 species, i.e. 30% of the total numbers of species were recorded. Of these, 25 were from the intertidal zone, while the others were found in sublittoral.
In the second place with respect to species numbers was the subtidal sand. In this habitat 54 species (26%) were recorded. In the habitat of the coral communities, 26 species (12%) were found. Furthermore, in the habitat of rock with alga only 2 species (1%) were recorded. The other habitats recorded uneven numbers of species (4-17, corresponding to 2- 8 % of all species) (Fig. 25).

Cluster analysis

When the information about the brachyuran communities in the different habitats is used in a cluster analyses, where the presence/absence information of 58 sites is clustered (Fig. 26), the brachyuran crab communities are separated into three main groups (G1, G2 and G3). G1 and G2, i.e. freshwater and rock with algae differ strongly from cluster G3. Also, the latter is separated into two subgroups (G3A and G3B), and these subgroups split up further into sub branches. In order to calculate this analysis, the species were divided according to the types of substrate in which they live.

G1, the fresh water habitat from valleys in Socotra, contains only one species, *Socotrapotamon socotrensis*, and therefore is very special. G2 represents the habitat of rock with algae from the intertidal which combines only two species of Plagusiidae, *Percnon planissimum* and *Plagusia squamosa*.

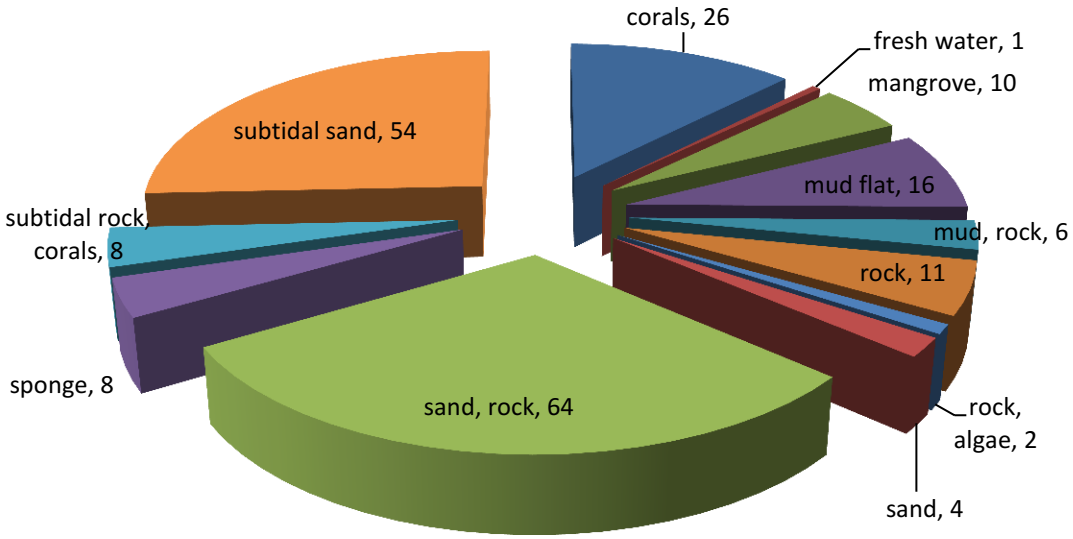

Fig. 25: Percentage of species number in different habitats.

Cluster G3 combines all other habitat-specific brachyuran communities. These are separated further into two main subclusters, G3A and G3B, which generally match the two main benthic substrate types in the sea, i.e. hard bottom and soft bottom. The exceptions are subtidal sand and clustering with hard substrates and sand clustering with muddy habitats.
The hard bottom brachyuran communities (cluster G3A) are comparatively different form one another and well separated into five groups of different subtypes of habitats: rock, subtidal rock with corals, corals, sponge, and sand with rock, which are found from the intertidal to the sublittoral zone at 0- 300 m depth. In this group, the exception, subtidal sand, has the closest similarity to sand with rock. Both habitats also display the highest absolute number of species detected.

The similarity between the species in this group was only 5%. This group G3A1 (Rock- hard substrate- from intertidal zone) recorded 11 species. G3A2 (Subtidal rock with corals-hard substrate) recorded 7 species. G3A3 (Corals- hard substrate) recorded 26 species. In G3A4 the similarity between the species was only 7-12%. The habitat sponge (G3A4a) from the sublittoral zone at >2 m depth, which is not significantly different from cluster G3A4b as indicated by SIMPROF analyses, recorded 8 species. Cluster G3A4b separates into two groups, G3A4b1 and G3A4b2, with 12% similarity between the species. Some species in this group extend from the intertidal zone to sublittoral zone. G3A4b1 (Subtidal sand-soft substrate) recorded 54 species, while G3A4b2 (Sand, rock) recorded the highest number of brachyuran crabs species in this habitat (64 species).

Cluster G3B separation, without further not significant branching, shows two groups G3B1 and G3B2, the similarity between the species in this group was 6%. Cluster G3B1 (Sand) recorded only 4 species. One of these species, *Dotilla sulcata*, is the reason why this habitat shares a cluster with muddy substrates.

Cluster G3B2 separate into two groups G3B2a and G3B2b. Similarity between the species in this group was 18%. G3B2a (Mud, rock) recorded 6 species with *Scylla serrata* and *Portunus (Portunus) segnis* supporting the close neighborhood to mangroves and mud flats in G3B2b.

Also cluster G3B2b separated into two groups, G3B2b1 and G3B2b2, with 40% similarity. G3B2b1 (Mud flat) recorded 16 species while in G3B2b2 (Mangrove) 10 species were found. The common species in those two habitats generating the cluster are *Austruca albimana*, *Perisesarma guttatum*, *Dotilla sulcata*, *Macrophthalmus (Mareotis) depressus* and *Eurycarcinus orientalis*.

We note from the cluster analysis that brachyuran crabs recorded in these habitats also approximately follow a division into three major groups based on zonation. These zones are i) supralittoral with sandy shores, ii) intertidal (mediolitoral) including mangrove, mud flats, mud with rocks and sand with rock, and iii) sublittoral (infralittoral) including subtidal sand, sponge, corals and subtidal rock with corals. Habitats subtidal sand, as before, does not fit this division by depth zonation.
Naturally the fresh waters habitat was placed in a group outside the coastal waters habitat.

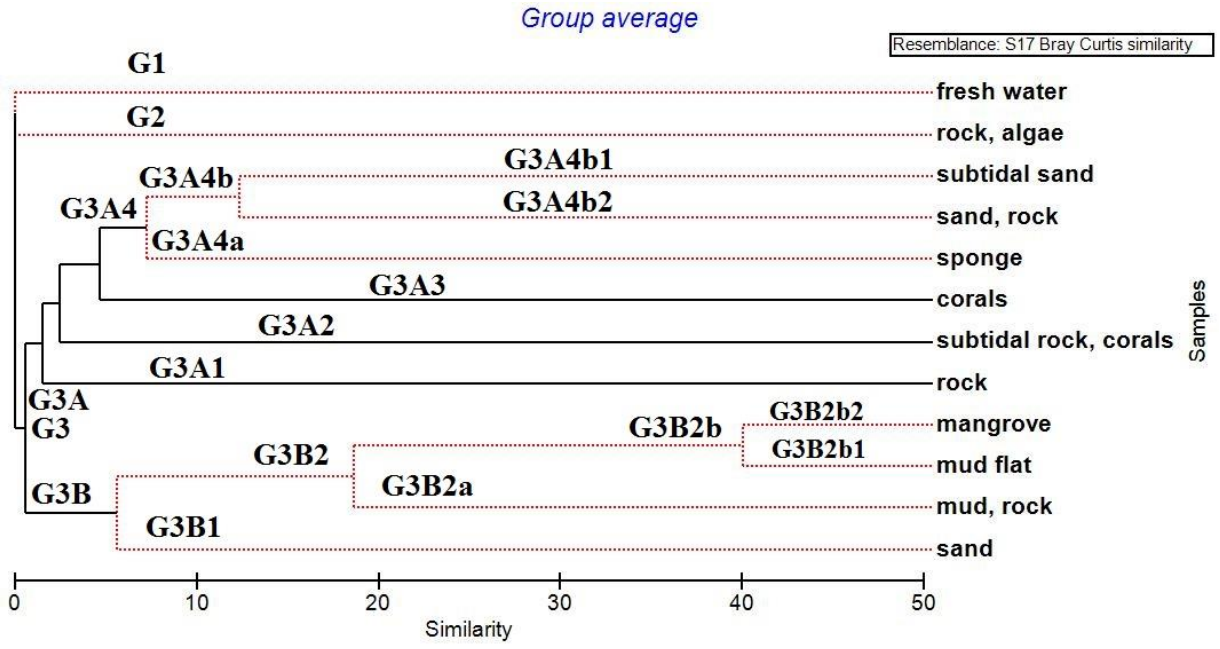

Fig. 26: Cluster analysis of the brachyuran crab species in different habitats.

The comparison of similarity of brachyuran crab species between all sites visited is shown in Fig. 27. The cluster analysis using presence/absence information indicates that there is a species similarity up to 86% among some sites, while other sites were completely dissimilar. The sites in Fig. 27 separate into three sites with one species each that was not found in any other site (clusters 1-3) and one main cluster (4). The unique species were *Pilumnopeus convexus* in site 25 and *Ocypode cordimana* in site 38 at Gulf of Aden, while *Socotrapotamon socotrensis* separated site 56 at the Indian Ocean, Socotra Islands, from the remaining stations.

Cluster 4 includes similarities from 2% up to 86%, with eight clusters >50% similarity. Two of these combine two stations in the Gulf of Aden, three combine one station from Gulf of Aden with one from the Red Sea area and one combines an Indian Ocean with Gulf of Aden site. Two high similarity clusters include 3 stations, one from the Red Sea only, the other one combining stations at Red Sea, Gulf of Aden and Indian Ocean (Socotra). The highest species similarity in this group (Fig. 27) is found in sites 40 & 48 at Gulf of Aden (86%) followed by sites 1 & 6 at the Red Sea (82%) and site 7 at the Red Sea and site 44 at Gulf of Aden (66%).

In site 40 and 48 with high similarity 6 and 8 species were recorded respectively. These sites have similar habitats such as rocky shores, sandy shores and sand with rocks. All the species which were recorded in site 40 were also found in site 48 (*Eriphia smithii*, *Lydia tenax*, *Pseudozius caystrus*, *Grapsus albolineatus*, *Grapsus granulosus* and *Ocypode saratan*).

The sites 1, 5 and 6 at the Red Sea are characterized by similar species as recorded in the Red Sea sites (5-11 species). All these sites have similar habitats such as mud flats and mangroves. The species common to the three sites 1, 5, and 6 were *Metopograpsus messor*, *Macrophthalmus (Mareotis) depressus*, *Perisesarma guttatu*, *Serenella leachii* and *Dotilla sulcata*.

Also Sites 24 and 26 at the Gulf of Aden also have mud flats and mud flat with rocks habitats, but without mangroves. They are similar to one another, but species differ from those in the muddy mangrove sites at the Red Sea. Therefore, only two species are similar with the Red Sea sites, *Metopograpsus messor* and *Macrophthalmus (Mareotis) depressus*. This results in a clear separation at <30% similarity of muddy sites without mangroves from those with mangrove tree, which in this case is also a separation by geographic area.

In sites 7 (Red Sea), 44 (Gulf of Aden) and 58 (Indian Ocean; Socotra Islands) similarity is as high as 59-66%. Sandy shores exist as similar habitats in all regions, but only *Ocypode saratan* occurred as the common species in all three sites.

Sites 8 at the Red Sea and site 34 at the Gulf of Aden with 52% similarity, are characterized by coral communities and show six common species (*Schizophrys aspera*, *Tylocarcinus styx*, *Trapezia cymodoce*, *Cyclodius granulatus*, *Luniella spinipes* and *Cymo quadrilobatus*).

On the contrary, a cluster such as sites 45 and 49 (Gulf of Aden, Arabian Sea) with similar habitats (subtidal sand), but one species in common only (*Nobiliella jousseaumei*) is characterized by low similarity (33%).

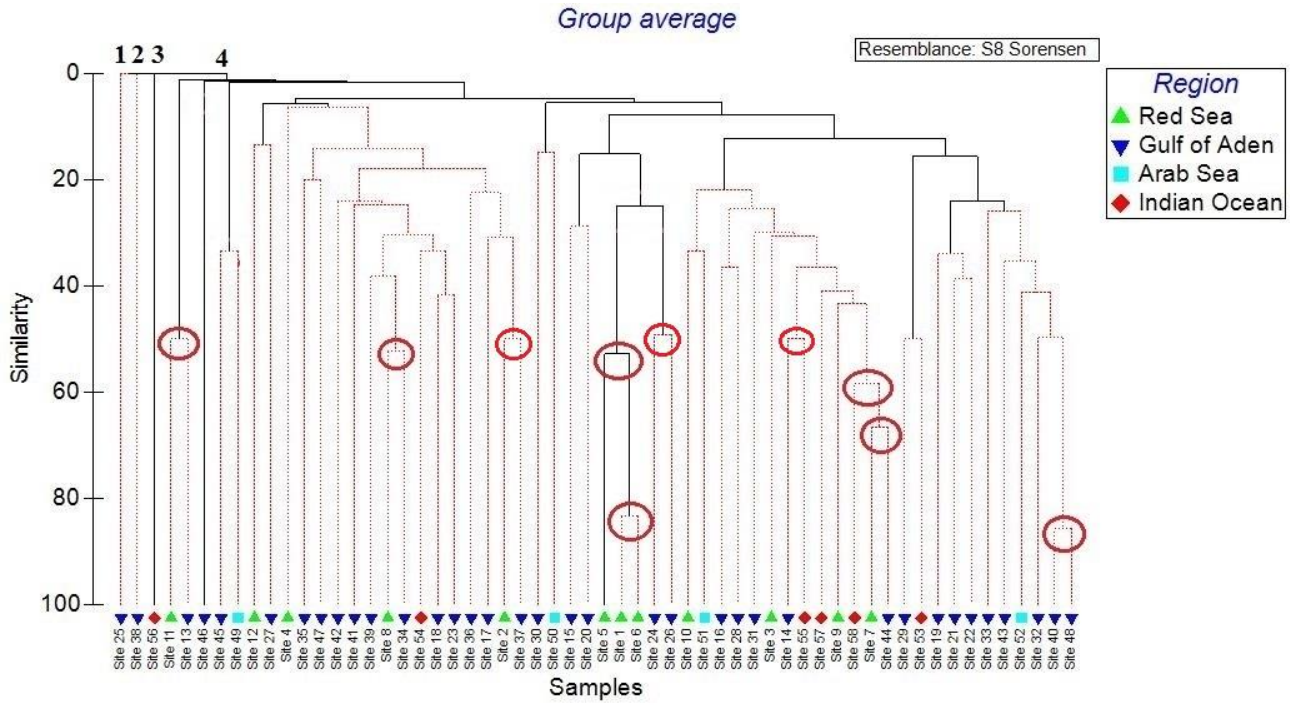

Fig. 27: Cluster analysis of the brachyuran crab species in 58 sites. Red cycles indicate to the sites which have a similarity ratio.

3.3: The molecular phylogenetic results

We obtained the first CO1 sequences for 95 brachyuran specimens that were collected from Gulf of Aden (Accession numbers AIMSEQ08112016-A01- AIMSEQ08112016-H12). All the specimens belong to the section Eubrachyura with representatives of both, subsection Heterotremata with 23 species, 21 genera and 8 families, and subsection Thoracotremata with 10 species, 6 genera and 4 families, see fig. 28.

The basal branchings of the tree are not well supported. However, this is not surprising since CO1 usually gives significant results at the species or genus level, but not at deeper branchings. The tree presented in fig. 28 at least indicates monophyly of the Thoracotremata studied here, while Heterotremata would be paraphyletic. In addition, for many of the families, namely Grapsidae, Ocypodidae, Pilumnidae, Xanthidae and Oziidae either paraphyletic or polyphyletic arrangements are suggested.

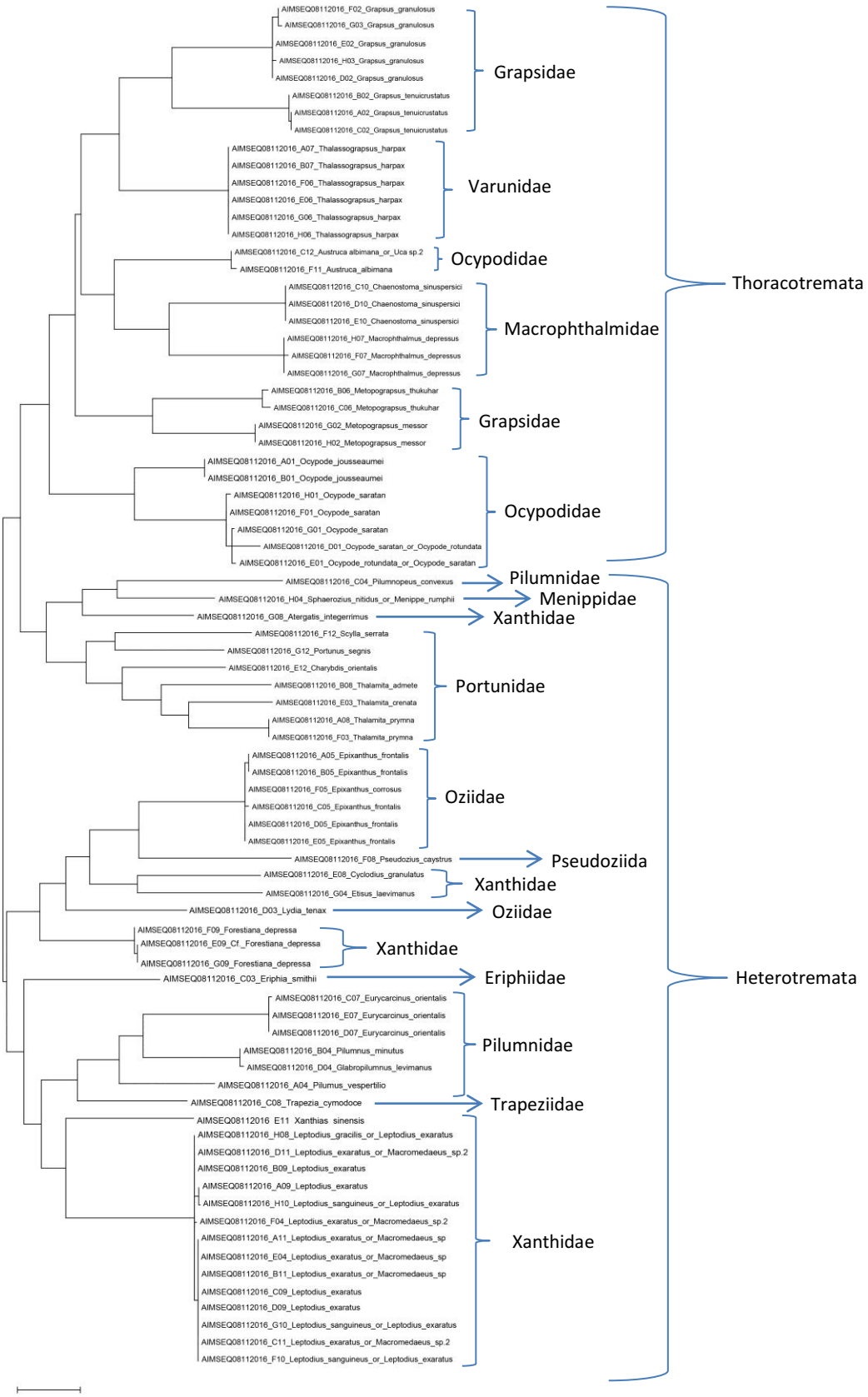

Fig. 28: Phylogenetic tree of the brachyuran crabs based on CO1 sequences showing the placement of 80 specimens.

As stated above, these are not to be taken serious. However, in the tree depicted here, all the genera turn out to be represented in distinct CO1 clades, except for *Pilumnus* and *Glabropilumnus* (see below).

In addition to the tree, ABGD analyses (based on Kimura K80) are used to calculate the distance between individuals of the major genus, such as; *Leptodius, Ocypode, Epixanthus, Grapsus* and *Pilumnus.*

Eight families of Heterotremata are represented in this analysis: Oziidae with the two species *Epixanthus frontalis* and *Lydia tenax*, Eriphiidae with *Eriphia smithii*, Menippidae with *Menippe rumphii*, Pilumnidae with five species, *Eurycarcinus orientalis, Pilumnus vespertilio, Pilumnus minutus, Glabropilumnus levimanus* and *Pilumnopeus convexus*, Portunidae with six species, *Charybdis (Charybdis) orientalis, Scylla serrata, Portunus (Portunus) segnis, Thalamita crenata, Thalamita prymna* and *Thalamita admete*, Trapeziidae with *Trapezia cymodoce*, Pseudoziidae with *Pseudozius caystrus* and Xanthidae with six species, *Xanthias sinensis*, *Leptodius exaratus*, *Forestiana depressa, Etisus laevimanus*, *Cyclodius granulatus* and *Atergatis integerrimus*.

Xanthidae

Among the xanthid species, *Xanthias sinensis*, *Forestiana depressa, Etisus laevimanus*, *Cyclodius granulatus* and *Atergatis integerrimus* form clearly defined – and distant - CO1 clades.
F. depressa, a specimen that could not clearly be identified using morphology alone, turned out to be placed well with the other *Forestiana* specimens. Compared to this, the situation in specimens of *Leptodius* is more complex.
Some of these could unequivocally be identified as *Leptodius exaratus* but for some specimens the identification was unclear, since they might also be *Leptodius gracilis*, *Leptodius sanguineus* or species of *Macromedaeus*. Though the arrangement of the subclades clearly indicates that they are all closely together, there are differences suggesting the presence of four different clades within the samples.
In the ABGD analysis the *Leptodius* specimens (AIMSEQ08112016-A11, AIMSEQ08112016-B09, AIMSEQ08112016-B11, AIMSEQ08112016-C09, AIMSEQ08112016-C11, AIMSEQ08112016-D09, AIMSEQ08112016-D11, AIMSEQ08112016-E04, AIMSEQ08112016-F10, AIMSEQ08112016-G10, AIMSEQ08112016-H08, AIMSEQ08112016-H10) also split into 4 different groups, see fig. 29.

Pilumnidae

Of the five species of Pilumnidae analysed here, *Pilumnopeus convexus, Eurycarcinus orientalis* and *Pilumnus vespertilio* are highly distinct clades, but *Pilumnus minutus* and *Glabropilumnus levimanus* are closely together indicating that the species delineation of the species of Pilumnidae studied here is unclear.
The ABGD analysis of the four species *Eurycarcinus orientalis* (AIMSEQ08112016-C07, AIMSEQ08112016-D07, AIMSEQ08112016-E07), *Pilumnus vespertilio* (AIMSEQ08112016-A04), *Pilumnus minutus* (AIMSEQ08112016-B04) and *Glabropilumnus levimanus* (AIMSEQ08112016-D04) corresponds well with the phylogenetical placement of the CO1 clades, but also shows that the species delineation of the species of *Pilumnus* and *Glabropilumnus* is not well founded, see fig. 30.

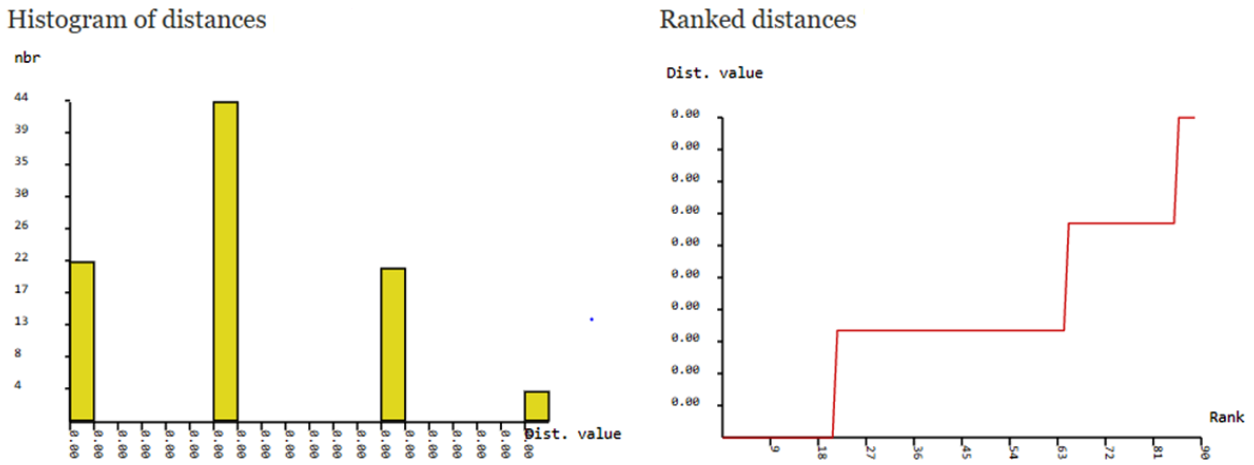

Fig. 29: ABGD analysis of the distances between the individuals inside the genus *Leptodius*.

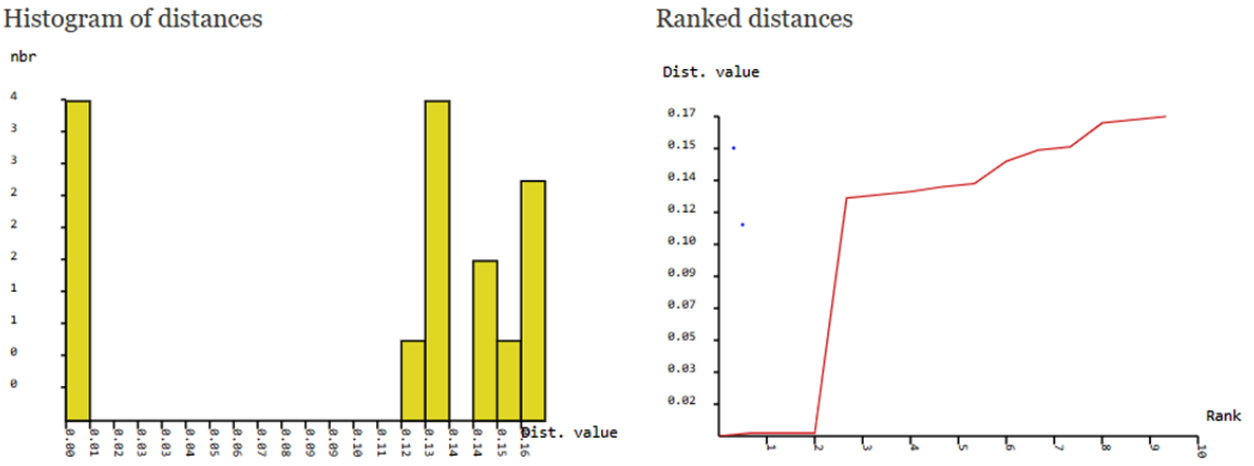

Fig. 30: ABGD analysis of the distances between the individuals inside the family Pilumnidae.

Portunidae

All six portunid species studied here, i.e. *Charybdis (Charybdis) orientalis, Scylla serrata, Portunus (Portunus) segnis, Thalamita crenata, Thalamita prymna* and *Thalamita admete* can be attributed to distinct CO1 clades with the three species of *Thalamita* being placed in one closely related group. Hence, a mismatch between morphological features and DNA sequences is not found, see fig. 28.

Oziidae

In this family, *Lydia tenax* and *Epixanthus frontalis* form two clearly distinct clades. In addition to the *E. frontalis* specimens, one was tentatively identified as *E. corneus*. In the tree, one to three different branches are indicated, but the distance between them is very low.
The ABGD analysis, however, hints at three groups (specimens AIMSEQ08112016-A05, AIMSEQ08112016-B05, AIMSEQ08112016-C05, AIMSEQ08112016-D05, AIMSEQ08112016-E05 and AIMSEQ08112016-F05), see fig. 31. This is thus also a case in which detailed analyses are required to clarify the species delineations.

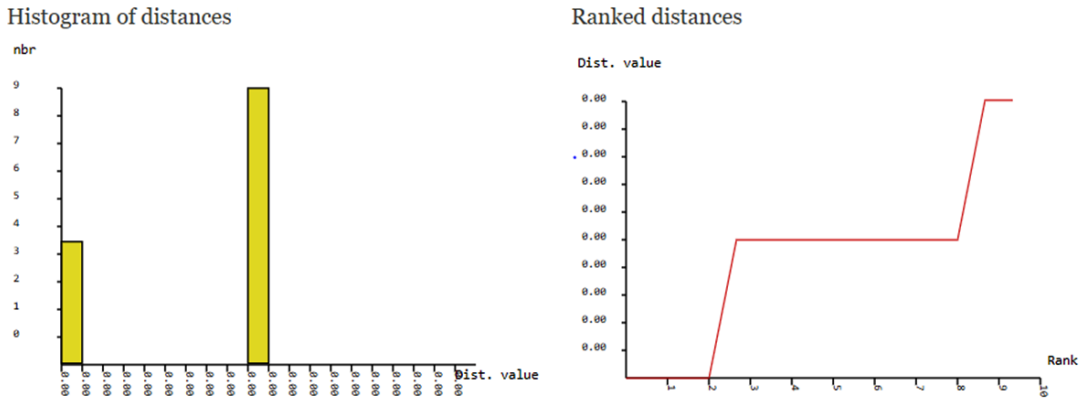

Fig. 31: ABGD analysis of the distances between the individuals inside the genus *Epixanthus*.

Eriphiidae, Menippidae, Trapeziidae and Pseudoziidae

With *Eriphia smithii*, *Menippe rumphii*, *Trapezia cymodoce* and *Pseudozius caystrus* these four families are represented by one species each. All of these form distinct clades in the tree, see fig. 28.

In Thoracotremata four families are represented in this analysis: Grapsidae with four species *Grapsus tenuicrustatus, Grapsus granulosus, Metopograpsus messor* and *Metopograpsus thukuhar*; Varunidae with *Thalassograpsus harpax*, Macrophthalmidae with two species, *Macrophthalmus (Mareotis) depressus* and *Chaenostoma sinuspersici* and Ocypodidae with three species, *Ocypode jousseaumei*, *Ocypode saratan* and *Austruca albimana*.

Grapsidae

The specimens identified morphologically as *Grapsus granulosus* and *Grapsus tenuicrustatus* form two clearly separated clades in the CO1 tree. In one branch are all the *G. tenuicrustatus* specimens (AIMSEQ08112016-A02, AIMSEQ08112016-B02, AIMSEQ08112016-C02) and the other combines the specimens of *G. granulosus* (AIMSEQ08112016-D02, AIMSEQ08112016-E02, AIMSEQ08112016-F02, AIMSEQ08112016-G03, AIMSEQ08112016-H03). Further splitting of *Grapsus granulosus* and *Grapsus tenuicrustatus* is observed on the tree as well as in the ABGD analysis, but this is probably due to the presence of different *G. granulosus* populations rather than cryptic species.
The two other grapsids analysed here, *Metopograpsus tukuhar* and *M. messor*, are also in two clearly distinct CO1 sister clades confirming the morphological features used for differential diagnosis of these two species.

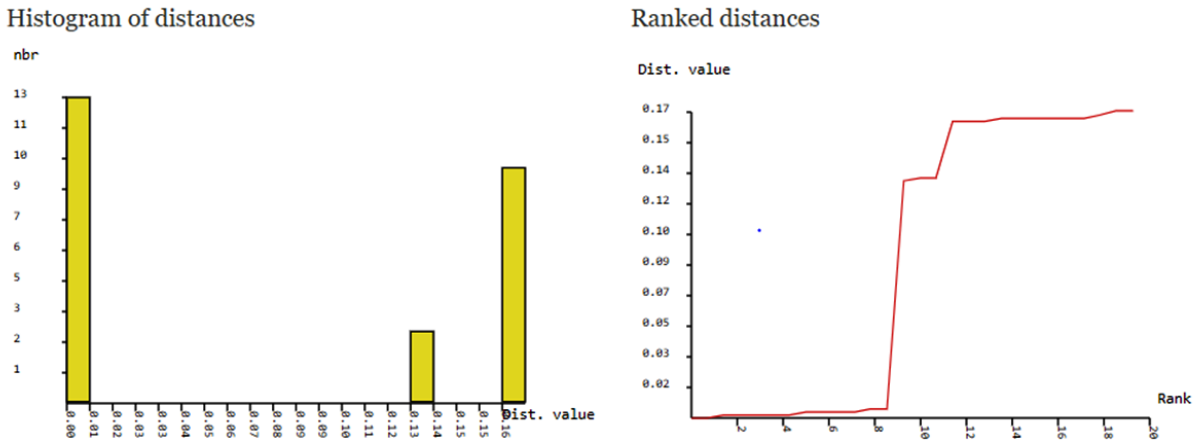

Fig. 32: ABGD analysis of the distances between *Grapsus granulosus* and *Grapsus tenuicrustatus*.

Varunidae

CO1 sequences of six specimens of *Thalassograpsus harpax* all belong to the same haplotype indicating that this species is well defined morphologically.

Ocypodidae

In this analysis, there was one specimen that could not be clearly attributed to *Austruca albimana* using morphological features. In the CO1 analysis, this specimen is very close to a clear *A. albimana*, but they are definitely not of the same haplotype.

Among the species of *Ocypode*, *O. jousseaumei* specimens form a distinct CO1 clade, while in *O. saratan* the situation is more complex. All five specimens are in one clade, but this is composed of three distinct groups, (i) two specimens that were unequivocally identified as *O. saratan*, (ii) a specimen identified as *O. saratan* plus a specimen that was morphologically between *O. saratan* and *O. rotundata*, and (iii) another specimen with a mix of *O. saratan* and *O. rotundata* features and a relatively high genetic distance.
The ABGD analysis of these samples (AIMSEQ08112016-A01, AIMSEQ08112016-B01, AIMSEQ08112016-D01, AIMSEQ08112016-E01, AIMSEQ08112016-F01, AIMSEQ08112016-G01, AIMSEQ08112016-H01) also shows at least three groups indicating that *O. saratan* might be a species complex that needs to be studied in detail, see fig. 33.

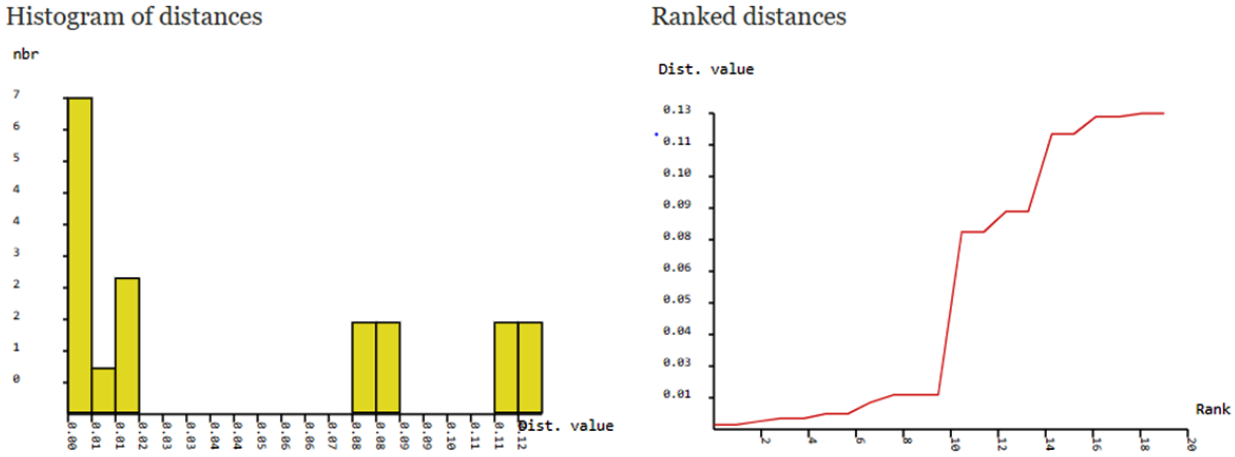

Fig. 33: ABGD analysis of the distances between the individuals inside the genus *Ocypode*.

Macrophthalmidae

The two macrophthalmid species covered by this study, *Macrophthalmus (Mareotis) depressus* and *Chaenostoma sinuspersici,* form two genetically distinct CO1 clades corresponding with the morphological species distinction.

4. The discussion

4.1: General discussion

A basic aim of this study is the extension of knowledge on brachyuran crab species in Yemeni coastal waters. This was done based on data from Al-Hindi (2010), intensive collections of specimen during 2013-2017 by the author, material collected by Wranik (RUWW) 1983-2010, and processing of samples from different previous investigations from museum collections. Additionally data from the literature were used for interpretation.

Families, species and regions

As a result of the processing of samples in this thesis, 184 species of crabs could be distinguished. We report 65 first records for Yemeni coastal waters (3 in the Red Sea, 53 in the Gulf of Aden, 6 in the Arabian Sea and 8 from the Socotra Islands), among them 10 species new for the Arabian Peninsula. In 10 species there are still some uncertainties in the final identification, and 5 species remain unidentified up to now (one of them until genus level).
Including the data from the literature, the currently known total species number for Yemeni waters is 289 species belonging to 146 genera and 34 families (see table 14 in the appendix). Related to the four distinguished regions there are 159 species in the Red Sea, 195 species in the Gulf of Aden, 21 species in the Arabian Sea and 159 species on Socotra Islands.

While the results of this study increase the knowledge of brachyuran crabs in the region significantly, many questions and problems remain. These problems do not only concern the need for further investigations. The difficulties of exact identification of the species remain. There is still a lack of well-worked comprehensive keys and references for identification especially with a regional range. This work should also be a contribution to this issue.

We found the highest number of species in the Gulf of Aden. This region seems richer in brachyuran crab species of than the others regions investigated. We report species numbers in this thesis. The term –species richness" used to compare the numbers of species found in other studies strictly requires sampling with respect to a defined area (e.g. per m^2) and needs a comparable number of samples for each of the regions. It may also require complete sampling of all specimen from a defined areas of comparable size (sampling effort). Since this approach was not followed here, species number in this study replaces the use the term species richness. Number of species found give credit to the different sampling efforts between areas. For instance, in the Gulf of Aden 1750 specimen were collected at many occasions, while on the Socotra Islands only 105 specimen were sampled yielding 32 species. In relation to the effort there are more species found on the Socotra Islands (32/105) than in Gulf of Aden (163/1750).
The area of Aden where most species were found in this study comprises many different habitats such as sandy shores, rocky shores, mud flats, sponge and corals communities. This may be the reason, besides the intensity of collecting activities and methods, why many species are found here. Conversely, one might expect that in other areas, too, many more species may be detected, if the same high effort and intensive sampling work could be invested in the future. Another cause for the abundance of species in the Gulf of Aden are the existence of islands and possibly an influence of upwelling during the southwest monsoon giving additional food as microalgae blooms to the local benthic fauna. The islands are concentrated in two areas in the Gulf, the area of Bir Ali (includes 4 islands, e.g. Sikha, Hallaniya, Ghadda Rayan) and the Aden area (includes 17 islands, among these

Labour Island, Mabtoha and Bahra). In addition, the abundance of coral communities between these islands adds to the diversity of habitats. The current study in the area helps reduce the lack of knowledge and may foster investigations in the area.

With 38 species the Xanthidae is the group richest in species. This is due to the multiple environments, which the Xanthidae colonise (sand with rock, mangroves, corals, sponge). They were also present in various depth zones from the intertidal zone to 20 m depth. Twelve Xanthidae species were found in the Red Sea, 32 species in the Gulf of Aden, 11 in Socotra Islands and 2 species in the Arabian Sea. From previous studies a total of 78 species were recorded, 34 species from the Red Sea, 23 species from Gulf of Aden and 42 species from Socotra Island, while from the Arabian Sea no report exists from any previous study. Consequently, forty of the Xanthidae species potentially present in the Yemini waters were not found in the present study.

The second richest group was Portunidae with 31 species. Here, too, the large numbers of species is due to the many environments they inhabit (sand with rock, subtidal sand, corals, sponge, mangroves, mud with rock). Furthermore, these swimming crab species, where the dactyl of the last pair of legs functions as a paddle, may move relatively easily between the different coastal regions and the open sea. Also the abundance of food in Yemeni waters based on upwelling could be one reason for the abundance of these species, especially in the northeastern part of the Gulf of Aden and the area south of Socotra, as reported in the report of PERSGA (2002). Primary production fuelled by upwelling would have to be channelled into higher trophic levels such as bivalves or fish to explain this link. Eight species were recorded from the Red Sea, 27 species from Gulf of Aden and 3 species from the Arabian Sea. In Socotra Islands, no specimens of Portunidae have been collected. Previous studies recorded more Portunidae species, with 56 species in total, 23 from the Red Sea, 29 from Gulf of Aden and 19 from Socotra Island, while none were found from the Arabian Sea . Thus twenty-five species were not found in the present study.

The families with only one species recorded at only one site were the Raninidae, Menippidae and Potamidae. Other families with also only one species recorded in only one region but at more than one site were the Dorippidae, Sesarmidae and Camptandriidae. We regard theses species as rare in Yemini waters. There are also some families that have only one species in Yemeni waters, but this species was recorded in more than one coastal region and several sites. These were Carpiliidae, Hexapodidae, Galenidae, Pseudiziidae, and Dotillidae.

Typical species in the studied habitats

Based on the cluster analysis in the percent study and our personal observations during the field study in different coasts at the Gulf of Aden and the Arabian Sea, the highest number of species per habitat was found in the sandy habitat with rocks, where 64 species were recorded. The dominant species in this habitat were the three species *Pseudozius caystrus*, *Leptodius exaratus* and *Xanthias sinensis* in all four regions.
The dominant species in the rocky shore habitat were three species: *Eriphia smithii, Lydia tenax* and *Grapsus albolineatus*. According to previous studies these are also widespread in rocky shores all along the Arabian Peninsula, (Laurie, 1915; Balss, 1922; Stephensen, 1946; Holthuis, 1977; Hogarth, 1994; Neumann & Spiridonov, 1999; Apel, 2001; Khvorov *et al.*, 2012; Naderloo & Türkay, 2012 Naderloo *et al,* 2015; Naderloo, 2017).

The dominant species in corals habitat were the two species *Cymo andreossyi* and *Trapezia cymodoce*.

The cluster analysis for habitats yielded mud flats and mangroves in one cluster. Similarity of the species in these two habitats is very high and most the species that were recorded in mud flats can actually be found in mangrove habitats as well. The dominant species in the mud flats are *Austruca albimana*, *Macrophthalmus (Mareotis) depressus* and *Eurycarcinus orientalis*, while from mangrove habitats it was difficult to identify a dominant species, since samples from mangrove habitats on Socotra Island and Gulf of Aden were not available and only few samples from the mangrove at the Arabian Sea exist.

Two species (*Serenella leachi* and *Ilyograpsus paludicola*) are widespread in mud flats and mangroves at the Red Sea where there extensive mangrove stands, Gulf of Oman and Arabian Gulf (Holthuis, 1977; Al-Ghais & Cooper, 1996; Apel & Türkay, 1999; Apel, 2001; Krupp *et al*., 2006). In contrast, these species are not recorded in mud flats and mangroves at Gulf of Aden, Socotra Islands and Arabian Sea up to now. There exists only one mangrove (*Avicennia marina*) stand along the 1400 km Gulf of Aden coast located in Dabout, site 51, which is poorly studied until now. The long distances between this site and other sites in the Red Sea area may make it difficult for the species to migrate and colonise site 51. Similarly, the distances to Socotra Island may be too large to overcome.

The sandy shore habitats in Yemeni coastal waters harbour four species of *Ocypode* (ghost crabs), three of them recorded in this present study (*Ocypode saratan*, *Ocypode cordimana* and *Ocypode jousseaumei*), while the fourth species *Ocypode ryderi* Kingsley, 1881 was recorded in Socotra Island by Simões *et al.* (2001) and Sakai & Türkay (2013). This latter species is not found in any sandy shores of Yemen on the mainland up to the present time.
The dominant species of this genus was *Ocypode saratan*. This species disappeared from some sandy shore in site 30, due to construction operations and landfilling as well as human traffic. The species is constantly decreasing in other sites of the Aden area, they may disappear from sites 19 and 28, which are also heavily impacted by increased human activity. Contrary to this, the numbers of this species increased in the sites away from human activities as in site 16. This example may indicate the problems associated with human activity along the coast and the need for environmental monitoring activities.
The same species may be regarded as problematic at some sites. We found many hatchlings of marine sea turtles killed by *Ocypode saratan* in site 51. This species is a natural predator to young sea turtles and locally affects the reproductive success of sea turtles, however, this is a natural phenomenon.

A special case in this study is the freshwater habitat. Here we recorded only one endemic species on Socotra Island: *Socotrapotamon socotrensis*. Two more species from this family were recorded in freshwater in Socotra Islandby Apel & Brandis (2000) and Cumberlidge & Wranik (2002).

The overall most common species in this study are *Leptodius exaratus* from the habitat sand with rock in the intertidal, *Grapsus albolineatus* from rocky intertidal zone, *Ocypode saratan* from sand medio- and supra-littoral and *Austruca albimana* from muddy intertidal flats. According to previous studies these species, along with 23 other ones, are considered widespread around the Arabian Peninsula (e.g. Laurie (1915), Balss (1922) and may others). Table 9 shows the distribution of these ubiquitous 27 species in the coastal waters of the Arabian Peninsula.

Comparison with earlier studies

One of the objectives of the present study is to compare the new information obtained on brachyuran crab species distribution in the Yemeni coastal waters with previous studies and their findings. A general list of brachyuran crabs in all Yemeni coastal waters was to be established and is included in the result section. Here we compare each Yemeni region separately as follows (see tables 10 – 14, appendix).

Red Sea

There are many earlier studies in which the brachyuran crabs on the Red Sea coast of Yemen and its islands were studied. Among these, Nobili (1906) recorded 33 brachyuran crab species in Mione Island including one previously unrecorded family (Pinnotheridae (pea crabs) with *Arcotheres borradailei* Nobili, 1906). Balss (1916) recorded 8 species in Mione and Kamaran Islands, and Balss (1922) 30 brachyuran crab species in the four Yemeni islands Mione, Kamaran, Zebejir and Zuckur. Later on, Balss (1924 and 1929) again recorded 32 and 4 species of Majidae, respectively, from the three Yemeni islands (Mione, Kamaran, Zebejir). In addition, Balss (1933) recorded for the first time a genus and species in Mione Island, a single female of the pilumnid *Pseudactumnus pestae*. Ever since, this species has not been recorded in any other place in Yemen.

After these comprehensive early studies, a few more species records have been published. Serène (1984) recorded three species in Mione Island, Clark & Galil (1993) one species also in Mione, Apel (2001) 5 species from the same locality, as well as Komatsu & Takeda (2003) one species. Moreover, Sakai & Türkay (2013) recorded one species from Kamaran and Zebejir Islands, Castro (1999) recorded one species, again from Mione and Krupp *et al.* (2006) recorded 49 species from 31 sites at Hudaydah coasts.

The total species number that can be taken from all these studies was 113 species belonging to 37 genera and 24 families (see table 10 in the appendix). Of these, 70 species from 14 families were not recorded again in the present study.

The island of Mione has been the most intensely studied locality at the Red Sea in the past. More than 60 species have been recorded there belonging to 12 families. In the present study, only 5 species of brachyurans were recoded there, all belonging to Portunidae. We refer to only 37 specimens in the present study, which had been collected by the Pola expedition 1897-1907 and kept in ZSM until 2011. The island Mione became a military site of the Yemeni army in 1967 after the British colonisation, a situation that prevents investigations in this island since then to the present time. This is the reason why there are no new samples over the last forty years to the present. Probably the rich species inventory of Mione Island persists.

The only relatively new and comprehensive study of brachyurans from the Yemeni Red Sea coasts is that by Krupp *et al*. (2006). Since that, the present study is the first survey of this kind done. Krupp *et al.* (2006) recorded 49 species belonging to 11 superfamilies, 18 families, and 35 genera, while in the present study 50 species belonging to 12 superfamilies, 19 families, and 39 genera, were recorded. These numbers are remarkable similar. Thirty-four of those 49 species were found in both studies, while 15 were different. Moreover, in the present study, more genera were recorded compared to Krupp *et al.* (2006), i.e. 39 versus 35. In addition, in the present study the family of Leucosiidae is included, with 2 genera and 2 species, *Hiplyra variegata* and *Nobiliella cornigera*. The latter are missing in Krupp *et al* (2006). Figs 34 and 35 in the appendix show the comparison between the two studies, and table 10 (appendix) summarizes all the species records of both these two studies, and the earlier ones.

The total species number of brachyuran crabs in the Yemeni coasts on the Red Sea that can be taken from all these studies is 118. These belong to 76 genera and 24 families (see table 10 in the appendix). Five of these have been recorded only in the present study and not in the previous ones, and thus are first records for this stretch of the coast, i.e. *Eurycarcinus orientalis, Thalamita woodmasoni*, *Trapezia lutea*, *Glyptoxanthus meandrinus* and *Hypocolpus cf. guinotae*.

Socotra Islands

For Socotra Islands, also some earlier studies of brachyuran crabs exist. MacAlister *et al*. (1996) recorded 29 species in Socotra, Wranik (1998) 6 species, Neumann & Spiridonov (1999) 23 species, Castro (1999) 2 species. Apel & Brandis (2000) found a previously undescribed species *Socotrapotamon nojidensis* Apel & Brandis, 2000, and also Cumberlidge & Wranik (2002) found a new genus and species, *Socotra pseudocardiosoma* Cumberlidge & Wranik, 2002. Moreover, Simões *et al* (2001) recorded 77 species, Apel (2001) 78 species, Tan & Ng (2003) 2 species, Tan & Ng (2007) recorded another species of Parthenopidae, Tűrkay *et al*. (1996) recorded one and Sakai & Tűrkay (2013) two more species of Ocypodidae (see table 11 in the appendix where details of all the previous studies are summarized).
The total brachyuran species number from these previous studies is 151 species belonging to 81 genera and 26 families, of which 127 species were not found in the present study.
The most recent and intensive study in Socotra Islands was done by Simões *et al.* (2001), in which they recorded 77 species, while in the present study recorded 31 species. Eight of these species are first records in the present study: *Lewindromia unidentata*, *Ascidiophilus caphyraeformis*, *Pilumnus propinquus*, *Tetraloides nigrifrons*, *Atergatis latissimus*, *Actaeodes hirsutissimus*, *Atergatopsis granulata* and *Epiactaea margaritifera*. Simões *et al* (2001) did not report the families Carpiliidae, Potamidae, Tetraliidae and Trapeziidae) found in the present study on Socotra Islands (see figs. 36 & 37, appendix, for a comparison between the present study and Simões *et al.* (2001).

The land crabs *Cardisoma carnifex* of Grapsoidea was recorded in Socotra Island by Wranik (1998) and Simões *et al*. (2001). This species was not recorded again in the present study, neither on Socotra nor the Red Sea or the Gulf of Aden.

Gulf of Aden and Southern coast of Arabian Peninsula

The coasts in the south of the Arabian Peninsula at Gulf of Aden and Arabian Sea have not received much attention and studies in marine biodiversity field and specially in brachyuran crabs, leading to a large gap in knowledge on the fauna of brachyuran crabs in this region (Sheppard *et al*., 1992; Saad, 1992; Apel & Spiridonov, 1998; Neumann & Spiridonov, 1999; Al-Hindi, 2010; Al-Hindi *et al*., 2012; Khvorov *et al.*, 2012).
There are several reasons for this knowledge gap in southern Arabia, for instance a connection between scientific expeditions and colonial movements. When reading the list of crustaceans in the British Museum, which was prepared by White (1847), there are no samples from the Arabian Peninsula. Most samples from the Arabian Peninsula date after the British colonisation. Focusing on the major and important cities in the south of the Arabian Peninsula (Aden during time 1838-1967 and Mukalla during time 1937-1967), the British left the regions between the two cities, a huge area inhabited by Arabian tribes, largely unstudied. Foreign researchers did not approach it during the

period of British colonisation of southern Yemen.
Another reason is the system of government in southern Yemen (Yemeni Socialist Party, 1970-1990). This system worked to enhance relations to socialist countries, and therefore prevented, despite exceptions like the Japanese involvement, many researchers from capitalist countries from research in the south of the Arabian Peninsula. The lack of local researchers also played a role in this knowledge gap in southern Arabia.

The biodiversity of brachyuran crabs at the northern shore of the Gulf of Aden are even more limited and almost completely unknown. Some previous scattered studies on brachyuran crabs in this area are by Ortmann (1894) who recorded one species, Nobili (1906) 26 species, Guinot (1969) with one species, Griffin (1974) 5 species, Serène (1984) 3 species, Clark & Galil (1993) one species, Galil & Clark (1994) 3 species, Tűrkay *et al.* (1996) and Sakai & Tűrkay (2013) 3 species, Apel & Spiridonov (1998) 19 species, Neumann & Spiridonov (1999) 28 species, Castro (1999) 2 species, Türkay & Spiridonov (2006) record a new subspecies from genus *Charybdis*, Spiridonov & Apel (2007) 2 species, Al-Hindi (2010) 60 species and Al-Hindi *et al*. (2012) with14 species.
The total species number from these studies which recorded the brachyuran crabs in the Gulf of Aden was 99 species (see table 12 in the appendix). Thirty-two species of them not found in the present study.
In this present study, we try covering the large gap in knowledge on the fauna of brachyuran crabs inhabiting in the Gulf of Aden. 1745 specimens were collected in this study from 35 sites at Gulf of Aden (Sites 13- 48) and 163 species were recorded. When we compare this result with previous studies, we did not find any intensive study in this area, except for Neumann & Spiridonov (1999). They sampled two sites only (Sikha Island and Bir Ali) at Gulf of Aden. Twenty-eight species were recorded in this study. Figs (38 & 39) show the comparing between these two studies.

The total species number from these previous studies and the present study recorded 195 species (see table 12 in the appendix).

One species (*Eucrate crenata*) has not been recorded in any site at Gulf of Aden after 1905 when it was recorded by Nobili (1906). presently this species was disappeared from Gulf of Aden.
Also *Calocarcinus africanus* from Trapeziidae, only known from three syntypes collected between Aden and Abyan (Zanzibar), seems to have disappeared from the Gulf of Aden and Indonesia since 1908.
Nobili (1906) recorded *Arcotheres borradailei* (pea crab) in Mione Island under the synonym *Pinnotheres borradailei*. We found this species in Aden, site 30 in 2011. We found this species inside the bivlave *Meretrix meretrix*, but unfortunately, the specimen was lost during the Yemeni war in March 2015 in Aden city.
These examples show that the present study is still insufficient and the Gulf of Aden still needs further studies in the future.

No previous studies are available about the Yemeni coasts at the Arabian Sea. Therefore, this study is considered the first study in this region. We have 52 specimens collected and 21 species recorded here. Therefore, this region is considered the one with least number of species in the list of this present study, the reason being the limited studies up to now.

The Arabian Sea coast at Dhofar Province, southern Oman is very similar to this region, especially in the sites 51 and 52. In this present study may be thus compared with two previous studies at the Arabian Sea coast at Dhofar Province, southern Oman by Hogarth (1994) and Khvorov *et al.* (2012). These two previous studies recorded 130 species and a high biodiversity of brachyuran crabs with

more species, genera and families then our present study. Despite the high diversity shown by Hogarth (1994) and Khvorov *et al.* (2012), the present study recorded two families (Hexapodidae and Dotillidae) and 10 species not recorded in the Omani list. Figs (40 & 41) show the comparing between the present study with Hogarth (1994) and Khvorov *et al.* (2012). Also table 13 (in the appendix) gives all the species details in these studies.

4.2. Species distribution

According to Sheppard *et al*. (1992), the Western Indian Ocean is divided into four subregions, the Arabian Peninsula, East and southern Africa including Madagascar and the other islands, Pakistan (western India and Sri Lanka) and the Maldive Islands, linked with parts of the Eastern Indian Ocean.

When considering the results of the present study we find that the brachyuran crab species in Yemeni coastal waters are similar to the brachyuran crab species which are known from the surrounding of the Arabian Peninsula, that is Red Sea, Gulf of Aden, Arabian Sea, Gulf of Oman and Arabian Gulf (see table 9). This result is consistent with the division of Sheppard *et al*. (1992) in that the Arabian Peninsula is one region in general. Moreover, Hogarth (1994) mention that the xanthid faunal composition of Dhofar shows similarity to Somalia, the Arabian Gulf, Mozambique, the Maldives, the Gulf of Aden, and the Red Sea. This result was supported by Simões *et al.* (2001) and the present study supports this distribution too.

Exceptions to this pattern are the new species that were first recorded on the Arabian Peninsula and the endemic species in Socotra Island. These species are *Hexapinus simplex* (Type locality: Ekas, Lombok, Indonesia), *Notosceles serratifrons* (Type locality: Sri Lanka), *Cyrtomaia cf. goodridgei* (Type locality: Sri Lanka), *Aethra scruposa* (Type locality: India), *Rhinolambrus longispinus* (Type locality: unknown), *Aulacolambrus granulosus* (Type locality: South China Sea), *Thalamita mitsiensis* (Type locality: Madagascar) *Thalamita woodmasoni* (Type locality: Philippine) and *Thalamita gatavakensis* (Type locality: Indo-West Pacific). The occurrence of these new records still has to be confirmed by more and rigorous sampling, especially since some of these results are based on only one specimen. The possible occurrence of fauna elements from the distant Indian Ocean (and maybe Pacific Ocean) is in principle in accordance with Hogarth (1994). Despite the gap of information, the possibility of the presence of these species in the Gulf of Aden exists. Currents may transfer species to the Arabian Peninsula, abilities to swim (three of them portunide crabs) may provide gradual migration. Commercial and fishing vessels can transport larvae and adults, especially since the Gulf of Aden and Bab Al-Mandab are international shipping trade routes and important passages for oil tankers.

The brachyuran crab fauna recorded in the Red Sea sites (1-12) was very similar to the brachyuran crab species which were recorded in all part of the Red Sea, except for two species recorded for the first time in the Red Sea, *Thalamita woodmasoni* and *Hypocolpus cf. guinotae*.

There seem to be some differences in fauna to the Arabian Gulf. At the Gulf of Aden some species were recorded for the first time which were also earlier recorded in the Red Sea, but not recorded in the Arabian Sea, Gulf of Oman and Arabian Gulf up to now, these species are: *Dorippe frascone*, *Ashtoret picta*, *Hyastenus brockii*, *Sunipea indicus*, *Camposcia retusa*, *Daldorfia horrida*, *Furtipodia petrosa*, *Aulacolambrus hoplonotus*, *Echinoecus pentagonus*, *Glyptoxanthus meandrinus*, *Actaeodes hirsutissimus*, *Neoliomera sabaea*, *Liomera rubra*, *Forestiana depressa*, *Neoxanthops lineatus*, *Geograpsus crinipes* and *Percnon planissimum*.

Three species from genus *Ocypode* that are widespread in sandy shores at the Red Sea, Gulf of Aden and Arabian Sea, but are not recorded in the Arabian Gulf, also supporting some differences.

On the other hand, fauna elements like *Actumnus tesselatus*, an endemic species and type locality in Arabian Gulf according Naderloo (2017), connect the Arabian Gulf with the regions further west. *Actumnus tesselatus* was recorded in the present study at site 42 in Gulf of Aden and site 4 at the Red Sea.

The problems that arise from difficulties of species identification may be shown in the following example. Neumann & Spiridonov (1999) recorded *Lydia annulipes* in Gulf of Aden, Aden coasts (1♀, 4♂♂), however, this species is easily confused with the very similar *Lydia tenax*. During the present study and earlier survey (2008-2017) *Lydia annulipes* was not seen in Aden coasts. Probably the identity can be questioned, because *Lydia tenax* is the common species in Aden coasts.

As in many coast worldwide, constructions and land use are going on at the Yemini coast, too. Risk assessment and monitoring to guide and protect coastal habitats while making use of these natural resources would be a necessary task. A number of species found in this study are widespread and common, but there have been no real stock assessments, there are no data on population size and population trends. Other species might be rare and even endangered. One the one hand there are not sufficient data, but there are still significant environmental impact effects going on, such as sewage and pollutants from land and sea side (heavily used shipping route) and habitat destruction, overfishing especially for *Portunus* (*Portunus*) *segnis*, destruction of coral reefs.

Necessary monitoring activities do not take place at the moment and are difficult to carry out without adequate knowledge of important groups and species, such as crabs. This thesis is the summary of all available date on crabs in Yemeni coastal waters and an essential contribution to measures accompanying the use and protection of the marine resources of the country and the necessary scientific investigations.

4.3. DNA Barcoding

For the first time, both adult morphological characters, and DNA barcoding are used for the identification of 95 crab specimens that were collected from the Gulf of Aden. The present study combines both molecular and morphological analysis into integrative taxonomy of crabs of this rich yet under-studied region.

The present molecular phylogeny based on the CO1 sequences confirms many aspects of current systematic classification of the 33 brachyuran species, belonging to 27 genera and 12 families, but also provides relevant additional evidence for some unsolved issues at the genus and species level. These will not be thoroughly analysed here, but some ideas for future detailed analyses using integrative taxonomy will be presented

Many species in this analysis showed congruence between the genetic and morphological results. However, a mismatch between morphology and gene is revealed for *Leptodius exaratus*, *Epixanthus frontalis*, *Grapsus granulosus*, *Austruca albimana* and *Ocypode saratan*. Remarkably, these are species in which the morphological characteristics are very well defined and show little variation.

The former family Xanthidae contained a wide variety of disparate forms and was the largest single family of the Decapods, with an estimated 130 genera and over 1,000 species (Rice, 1980; Martin & Davis, 2001). Molecular studies (Karasawa & Schweitzer, 2006; Ahyong *et al*., 2007), however, suggested that Xanthoidea are a paraphyletic grouping, and therefore some families were separated

from Xanthoidea, namely Trapezioidea, Pilumnoidea, Carpilioidea, Eriphioidea, Hexapodoidea. This corresponds well with the present study.

In *Leptodius exaratus* one finds a high variation amongst the adult forms, such as differences of color, shape of the chela, size and number of the spines inside the chela. Moreover, it is very similar to other species, *Leptodius sanguineus, Leptodius gracilis* and *Macromedaeus crassimanus*. For this reason, this species is hard to identify morphologically. In the present study, a molecular analysis of 11 specimens of different color and shape of the chela has been done. The result is that all the samples can be attributed to *Leptodius exaratus*, but a separation into three clades on the phylogenetic tree, and even four subgroups suggested by ABGD is suggested by the analyses. (see fig. 42). These groupings could be explained by the presence in the analysis of different populations, but further detailed studies are needed before these issues can be solved.

In species of Pilumnidae, the present results show that *Pilumnopeus* does not represent a sister group of the genera of *Pilumnus* and *Eurycarcinus.* This is clearly demonstrated by the phylogenetic tree (see fig. 28). Moreover, the genetic analysis put two species of Pilumnidae closely together in tne same clade (*Pilumnus minutus* and *Glabropilumnus levimanus*), although they have different morphological characters (carapaces and gonopods, see plates, 20 D & F and 46 H & I). Hence, the position of the species remains unclear and needs to be studied in greater detail in the future, e.g., using more genes (16S rRNA, 16S, 12S). In this case, *Pilumnus minutus* is still questionable and therefore ~~–e~~f" is added, especially since it was not recorded in the Gulf of Aden before. Pilumnids are among the most difficult of crabs to identify to species level. *Pilumnus* Leach, 1816 is perhaps the most difficult genus in the pilumnids (Poore, 2004). It is also possible that the specimen determined as *Pilumnus minutus* is *Glabropilumnus levimanus* or part of its populations.

All six portunid species studied in the present study support the classification into one monophyletic group. Among these species, *Portunus (Portunus) segnis* and *Portunus pelagicus* are morphologically very similar, so these species may be confusing for the identification, as also shown in some earlier studies (Neumann & Spiridonov, 1999; Al-Hindi, 2010; Al-Hindi *et al*., 2012). Here, *P. segnis* is recorded for the Gulf of Aden, while in the above mentioned earlier studies, *Portunus pelagicus* has been recorded for Aden. According to the present study, only *Portunus (Portunus) segnis* is found in Aden, but not *Portunus pelagicus*.

The present molecular analyses includes four species of grapsid crabs, belong to two genera, *Grapsus* and *Metopograpsus.* It is suggested that these genera are well separated and do not belong into one monophyletic group. This confirms ideas presented in Fratini *et al*. (2017) and IP *et al*. (2016).
We noticed through this study and the previous study (Al-Hindi, 2010), that two genera *Grapsus* and *Metopograpsus* also have differences in behavior and life habits. For example; species of *Metopograpsus* inhabit shelters in the mud with rocky shores and mangrove forests nearby, and far away from strong waves and current, while species of *Grapsus* inhabit exposed rocky shores with strong waves and currents.

Ocypodidae in this study is represented by three species belonging to two genera (*Ocypode* and *Austruca*). These genera according to the present results are well separated, as has also been suggested by Shih *et al*. (2016).

In the present study, the genus *Ocypode* is represented by two species, *Ocypode saratan* and *Ocypode jousseaumei*, that can be clearly identified using morphology. Using CO1, however, inside

Ocypode saratan (AIMSEQ08112016-D01, AIMSEQ08112016-E01, and AIMSEQ08112016-G01) three distinct groups were detected, see fig. 43. Though the morphology of these specimens is very similar except for a few differences in size, color and carapace shape, and also the gonopods of these specimens are very similar except for some differences at the tip of gonopods (see plate 51 J & K in the appendix). Hence, it will have to be analysed whether all samples belong to *Ocypode saratan* or either to another species (*Ocypode rotundata*) or to differences at the level of populations.

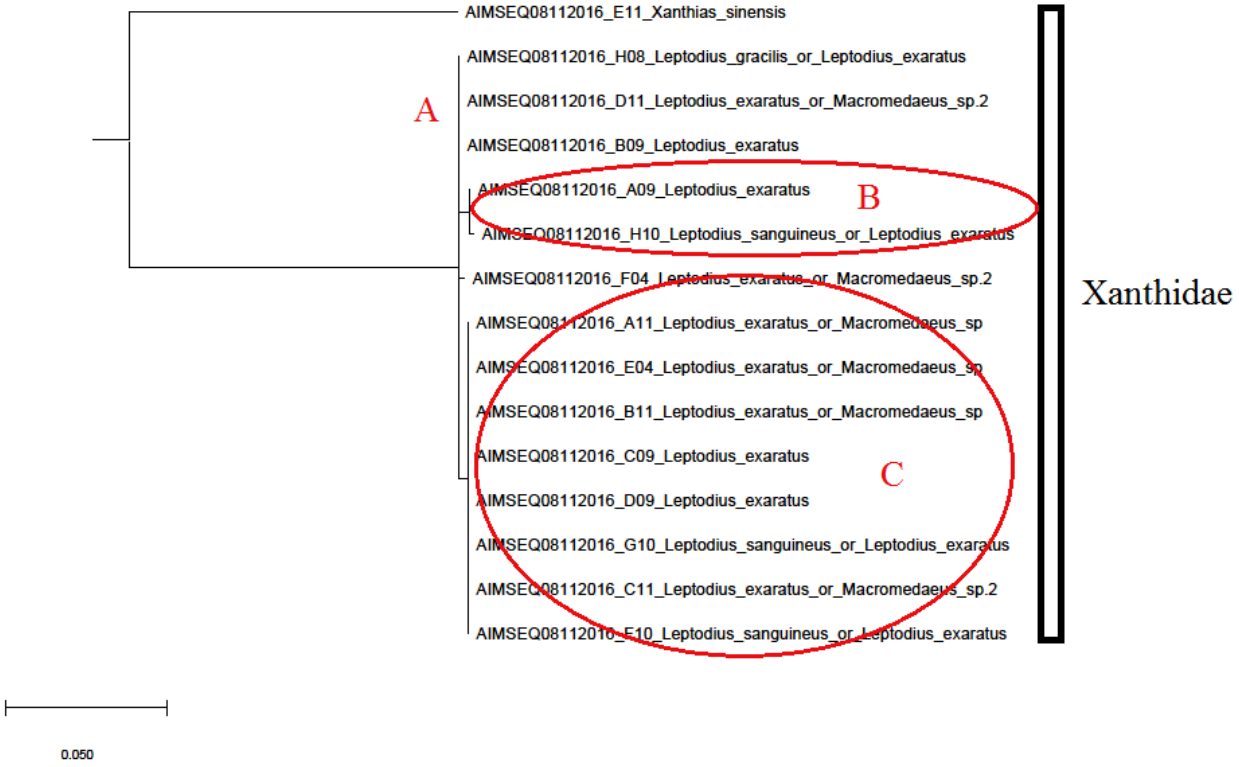

Fig. 42: Phylogenetic tree of *Leptodius exaratus* samples based on CO1 sequences. The red circles and letters indicate differences between individuals inside the groups.

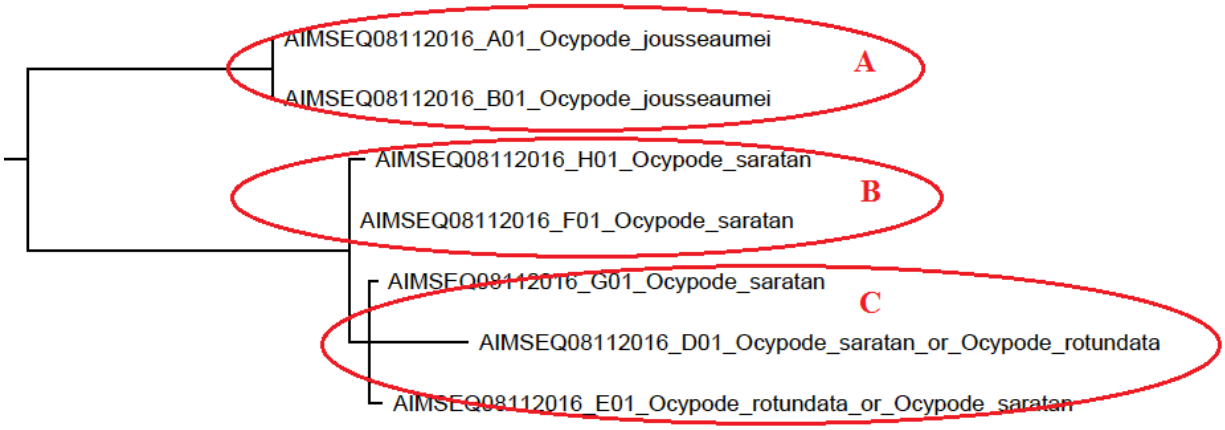

Fig. 43: Phylogenetic tree of the genus *Ocypode* based on CO1 sequences. Red circles and letters indicate differences between individuals inside the groups.

Table 9: Shows the widespread species in the Arabian Peninsula coastal waters on the RS: Red Sea, GA: Gulf of Aden, AR: Arab Sea, GO: Gulf of Oman and AG: Arabian Gulf. (+) present, (-) absent.

Family	Species name	RS	GA	AS	GO	AG
Eriphiidae	*Eriphia smithii* MacLeay, 1838	+	+	+	+	+
Portunidae	*Charybdis (Goniohellenus) smithii* MacLeay, 1838	+	+	+	+	+
	Charybdis (Charybdis) hellerii (A. Milne-Edwards, 1867)	+	+	+	+	+
	Charybdis (Goniohellenus) longicollis Leene, 1938	+	+	+	+	+
	Scylla serrata (Forskål, 1775)	+	+	+	+	+
	Carupa tenuipes Dana, 1852	+	+	-	+	+
	Portunus (Portunus) segnis (Forskål, 1775)	+	+	+	+	+
	Portunus (Xiphonectes) longispinosus (Dana, 1852)	+	+	+	+	+
	Portunus (Portunus) sanguinolentus (Herbst, 1783)	+	+	+	+	+
	Thalamita crenata Rüppell, 1830	+	+	+	+	+
	Thalamita prymna (Herbst, 1803)	+	+	-	+	+
	Thalamita sexlobata Miers, 1886	+	+	-	+	+
Tetraliidae	*Tetralia cavimana* Heller, 1861	+	+	+	+	+
Trapeziidae	*Trapezia cymodoce* (Herbst, 1801)	+	+	+	+	+
Pseudoziidae	*Pseudozius caystrus* (Adams & White, 1849)	+	+	+	+	+
Xanthidae	*Xanthias sinensis* (A. Milne-Edwards, 1867)	+	+	+	+	+
	Leptodius exaratus (H. Milne Edwards, 1834)	+	+	+	+	+
	Lophozozymus anaglyptus (Heller, 1861)	+	+	+	+	+
	Luniella spinipes (Heller, 1861)	+	+	+	+	+
	Chlorodiella nigra (Forskål, 1775)	+	+	+	+	+
	Epiactaea margaritifera (Odhner, 1925) *(X sp.7)*	+	+	+	-	+
Grapsidae	*Grapsus albolineatus* Latreille in Milbert, 1812	+	+	+	+	+
Varunidae	*Thalassograpsus harpax* (Hilgendorf, 1892)	+	+	+	+	+
Dotillidae	*Dotilla sulcata* (Forskål, 1775)	+	+	+	+	+
Macrophthal-midae	*Macrophthalmus (Mareotis) depressus* Rüppell, 1830	+	+	+	+	+
Ocypodidae	*Ocypode saratan* (Forskål, 1775)	+	+	+	+	-
	Austruca albimana (Kossmann, 1877)	+	+	+	+	+

References

Abubakr, M. M., 2004. The Republic of Yemen Marine Biotic Ecosystem (Resources-Habitats And Species). The Republic of Yemen Ministry of Water and Environmnet Protction Authority.

Ahyong, S. T., Lai, J. C.Y., Sharkey, D., Colgan, D. J & Ng, P. K. L., 2007. Phylogenetics of the brachyuran crabs (Crustacea: Decapoda): the status of Podotremata based on small subunit nuclear ribosomal RNA. Molecular Phylogenetics and Evolution, 45, 576–586.

Al Saafani, M. A. Y., 2008. Physical Oceanography of the Gulf of Aden. Thesis submitted to Goa University for the Degree of Doctor of Philosophy in Marine Sciences.

Al Saafani, M. A., Sheno, S. S. C., Shankar, D., Aparna, M., Kurian, J., Durand, F & Vinayachandran, P. N., 2007. Westward movement of eddies into the Gulf of Aden from the Arabian Sea.

Al-Aidaroos, A. M., Kumar, A. A. J., Al-Haj, A. E & Sonnewald, M., 2017. A new species of *Schizophrys* (Majoidea: Majidae: Majinae) from the Red Sea coast of Saudi Arabia, with description of its first zoea. Senckenberg Gesellschaft für Naturforschung and Springer-Verlag GmbH Germany.

Alcock, A., 1899. Material for a carcinological Fauna of India. No. 4: The Brachyura Cyclometopa. Part II: A revision of the Cyclometopa, with an account of the families Portunidae, Cancridae and Corystidae. Journal of the Asiatic Society of Bengal, 68 (2), 1–104.

Al-Ghais, S. M & Cooper, R.T., 1996. Brachyura (Grapsidae, Ocypodidae, Portunidae, Xanthidae and Leucosiidae) of Umm Al Quwain mangal, United Arab Emirates. Tropical Zoology, 9, 409-430.

Al-Hindi, A. N., Moqbil, A. A & Ali, A. A., 2012. Survey and morphological study of Brachyuran crabs (Family: Portunidae-Order: Decapoda) in Aden coasts at the Gulf of Aden. Journal of Aden University for Applied & Natural sciences, 16 (2), 102-112.

Al-Hindi, A. N., 2010. Survey and morphological study of Shores and Sea crabs (Brachyuran crabs) in Aden coasts at Gulf of Aden. A Thesis submitted to the Department of Biology-Faculty of Aden Education in partial fulfillment of the requirements for the Master degree in Zoology,University of Aden, 238 pp.

Apel, M., Jones, D. A., Klaus, R., Pilcher, N. J., Saad, M. A., Simões, F. N., Symens, P. E .C & Zajonz, U., 2000. Conservation and Sustainable Use of Biodiversity of Socotra Archipelago. Marine Habitat, Biodiversity and Fisheries Surveys and Management (unpublished).

Apel, M & Brandis, D., 2000. A new species of freshwater crab (Crustacea: Brachyura: Potamidae) from Socotra Island and description of *Socotrapotamon* n. gen. Fauna of Saudi Arabia, 18: 133-144.

Apel, M & Spiridonov, V. A., 1998. Taxonomy and zoogeography of the portunid crabs (Crustacea: Decapoda: Brachyura: Portunidae) of the Arabian Gulf and adjacent waters. Fauna Arabia, 17, 159-331.

Apel, M & Türkay, M., 1999. Taxonomic Composition, Distribution and Zoogeographic Relationships of the Grapsid and Ocypodid Crab Fauna of Intertidal Soft Bottoms in the Arabian Gulf. Estuarine, Coastal and Shelf Science, 49 (Supplement A), 131-142.

Apel, M., 2001. Taxonomie und Zoogeographie der Brachyura, Paguridea und Porcellanidae (Crustacea: Decapoda) des Persisch-Arabischen Golfes. Dissertation zur Erlangung des Doktorgrades der Naturwissenschaftenvorgelegt beim Fachbereich Biologie der Johann Wolfgang Goethe-Universität, Frankfurt am Main, 268 pp.

AWCP, 2009. Marine Biodiversity of Aden Wetlands Protected Areas. Yemen Society for the Protection of Wildlife, Environmental Protection Authority, Aden Wetlands Conservation Project, 34 pp.

ArRajehi, A., McClusky, S., Reilinger, R., Daoud, M., Alchalbi, A., Ergintav, S., Gomez, F., Sholan, J., Bou-Rabee, F., Ogubazghi, G., Haileab, B., Fisseha, S., Asfaw, L., Mahmoud, S., Rayan, A., Bendik, R., Kogan, L., 2010. Geodetic constraints on present-day motion of the Arabian Plate: Implications for Red Sea and Gulf of Aden rifting: Arabia Plate Motion. Tectonics 29.

Balss, H., 1916. Die Decapoden des Roten Meeres. II. Anomuren, Dromiaceen und Oxystomen. In: Expeditionen S.M. Schiff Pola in das Rote Meer. Nördliche und Südliche Hälfte 1895/96-1897/98. Zoologische Ergebnisse. Vol. XXXI. Denkschriften der kaiserlichen Akademie der Wissenschaften zu Wien, Mathematisch-naturwissenschaftliche Klasse, 92(10): 1-20, figs 1-9.

Balss, H., 1922. Ostasiatische Decapoden III. Die Dromiaceen, Oxystomen und Parthenopiden. Archiv für Naturgeschichte, 88A (3): 104-140, figs 1-9.

Balss, H., 1924. Expedition S, M, Schiff„Pola" In Das Rote Heer I Nordliche Und Sudliche Halfte Zoologische Ergebnisse XXXIV Decapoden Des Roten Meeres I11.

Balss, H., 1929. Decapoden Des Roten Meeres Iv Oxyrhyncha Und Schlussbetrachtungen. Zoologische Ergebnisse XXXVI.

Balss, H., 1933. Über zwei interessante Xanthidae (Crustacea Dekapoda) des Naturhistorischen Museums in Wien.

Bawazir, G., 2003. "Environmental pressures in the coastal zone of Aden and their impacts on the natural resources."(In Arabic) A Dissertation Submitted to the board of the Faculty of Arts-University of Aden it is part of the requirement of master degree in Physical Geography.

Bawazir, G. M., 2017. Coral and Coral Communities in the Southwestern Coasts of Yemen between Sirah Mountain and Ras Imran (Aden). A Dissertation Submitted to the board of the Faculty of Arts-University of Aden it is part of the requirement of Ph. D degree in Physical Geography.

Benzoni, F., Bianchi, C. N & Morri, C., 2003. Coral communities of the northwestern Gulf of Aden (Yemen): variation in framework building related to environmental factors and biotic conditions. Coral Reefs. 22: 475-484.

Bonfil, R & Abdallah, M., 2004. Field Identification Guide to the Sharks and Rays of the Red Sea and Gulf of Aden. FAO Species Identification Guide for Fishery Purposes. Food and Agriculture Organization of the United Nations, Rome.

Bower, A. S., Fratantoni, D. M., Johns, W. E., Peters, H., 2002. Gulf of Aden eddies and their impact on Red Sea Water. Geophys. Res. Lett. 29:21 (1-4).

Castro, P., 1999. Trapeziid crabs (Crustacea, Brachyura, Xanthoidea, Trapeziidae) of the Indian Ocean and the Red Sea. Zoosystema 21:93-120.

Chia, D.G.B., Castro, P & Ng, P. K. L., 1999. Revision of the genus Echinoecus (Decapoda: Brachyura: Eumedonidae), crabs symbiotic with sea urchins. Journal of Crustacean Biology, 19: 809-824.

Clark, P.F & Galil, B.S., 1993. A revision of the xanthid genus *Pilodius* Dana, 1851 (Crustacea: Brachyura: Xanthoidea). J. Nat. Hist. 27, 1119-1206.

Clarke, K. R & Gorley, R. N., 2006. PRIMER v6: User Manual/Tutorial. PRIMER-E: Plymouth.

Cox, K.G., Gass, I.G & Mallick, D.I.J., 1970. The Peralkaline Volcanic Suite of Aden and Little Aden, South Arabia. J. Petrol. 11, 433-462.

Crosnier, A., 1962. Crustacés Décapodes Portunidae. Faune de Madagascar, 16: 1-154, figs 1-256, pls 1-13.

Cumberlidge, N & Wranik, W., 2002. A new genus and new species of freshwater crab (Potamoidea: Potamidae) from Socotra Island, Yemen. Journal of Natural History, 36 (1): 51-64.

Damme, K.V & Banfield, L., 2011. Past and present human impacts on the biodiversity of Socotra Island (Yemen): implications for future conservation. Zool. Middle East 54, 31-88.

Davie, P. J. F., 1989. New records of Demania (Crustacea: Decapoda: Xanthidae) from Australia. Memoirs of the Queensland Museum 27: 123-128.

Davie, P. J. F., 2002. Crustacea: Malacostraca: Eucarida (Part 2): Decapoda - Anomura, Brachyura. Vol. 19.3B. Csiro Publishing: Melbourne. xiv, 641 pp.

De Grave, S., Pentcheff, N. D., Ahyong, S. T., Chan, T. Y., Crandall, K. A., Dworschak, P. C., Felder, D. L., Feldmann, R. M., Fransen, C. H. J. M., Goulding, L.Y. D., Lemaitre, R., Low, M. E. Y., Martin, J. W., Ng, P. K. L., Schweitzer, C. E., Tan, C. G. S., Tshudy, S. H. D & Wetzer, R., 2009. A classification of living and fossil genera of decapod crustaceans. Raffles Bulletin of Zoology, Supplement 21: 1-109.

DiBattista, J. D., Roberts, M. B., Bouwmeester, J., Bowen, B. W., Coker, D. J., Lozano-Cortés, D. F., Howard, C, J., Gaither, M. R., Hobbs, J. P. A., Khalil, M. T., Kochzius, M., Myers, R. F., Paulay, G., Robitzch, V. S. N., Saenz-Agudelo, P., Salas, E., Sinclair-Taylor, T. H., Toonen, R. J., Westneat, M. W., Williams, S. T & Berumen, M. L., 2016. A review of contemporary patterns of endemism for shallow water reef fauna in the Red Sea. J. Biogeogr. 43, 423-439.

FAO, 2004. Food and Agriculture Organization of the United Nations. Species identification sheets for fishery purposes Western Indian Ocean.

Fishelson, L., 1971. Ecology and distribution of the benthic fauna in the shallow waters of the Red Sea. Mar Biol 10:113-133.

Forskål, P., 1775. Descriptiones animalium avium, amphibiorum, piscium, insectorum, vermium; quae in itinere orientali observavit Petrus Forskål. Post mortem auctoris edidit Carsten Niebuhr.

Adjuncta est materia medica Kahirina atque tabula maris rubric geographica. 20 + XXXIV + 164 pp. Hauniae.

Fratini, S., Cannicci, S & Schubart, C. D., 2017. A molecular phylogeny of the crab genus *Metopograpsus* H. Milne Edwards, 1853 (Decapoda: Brachyura : Grapsidae) reveals high intraspecific genetic variation and distinct evolutionarily significant units. Invertebrate Systematics https://doi.org/10.1071/IS17034.

Galil, B., 1997. Crustacea Decapoda: a revision of the Indo-Pacific species of genus *Calappa* Weber, 1795 (Calappidae). In: Crosnier A (ed) Résultats des Campagnes Musorstom, 18, Mémoires du Muséum national d'Histoire naturelle, Paris, pp 171-335.

Galil, B., 2001. A revision of the genus *Arcania* Leach, 1817 (Crustacea: Decapoda: Leucosioidea). Zool Meded 75:169–206.

Galil, B. S., 2009. An examination of the genus *Philyra* Leach, 1817 (Crustacea, Decapoda, Leucosiidae) with descriptions of seven new genera and six new species. Zoosystema 31: 279-320.

Galil, B. S., 2000. *Halimede tyche* (Herbst, 1801) (Decapoda; Xanthoidea; Halimedinae) from the Mediterranean coast of Israel, with a review of the genus. Journal of Crustacean Biology: 325-331.

Galil, B & Takeda, M., 1988. A Revision of the Genus *Glabropilumnus* (Crustacea, Decapoda, Brachyura). Bull. Natn. Sci. Mus., Tokyo, Ser. A, 14 (2), pp. 67-90.

Galil, B & Vannini, M., 1990. Research on the coast of Somalia. Xanthidae, Trapeziidae, Carpiliidae, Menippidae (Crustacea Brachyura). Tropical Zoology, 3: 2l-56.

Galil, B. S & Clark, P. F, 1994. A revision of the genus *Matuta* Weber, 1795 (Crustacea: Brachyura: Calappidae). Zool Verh 294:1–55, figs 51–57, pls 51–14.

Galil, B. S & Clark, P. F., 1990. Crustacea Decapoda: Notes on trapeziid crabs from New Caledonia including description of two new species. In: A. Crosnier (ed.), Resultats des Campagnes Musorstom, (6), 145 : 369-388. Paris ISBN : 2-85653-171-7.

Galil, B.,1986. *Quadrella* (Brachyura: Xanthoidea: Trapeziidae)- review and revision. J Crustac Biol 6: 275-293.

Galil, B. S., 1997. Crustacea Decapoda: A revision of the Indo-Pacific species of the genus *Calappa* Weber (Calappidae). In: Crosnier, A. (ed.): Résultats des Campagnes Musorstom, Vol. 18. Mémoires du Muséum National d'Histoire Naturelle, 176, 271-335.

Galil, B. S., 2003. Contribution to the knowledge of Leucosiidae II. *Euclosia* gen. nov. (Crustacea: Brachyura). Zoologische Mededelingen, 77 (20), 331–347.

Gladstone, W., Krupp, F., Younis, M., 2003. Development and management of a network of marine protected areas in the Red Sea and Gulf of Aden region. Ocean Coast. Manag. 46, 741-761.

Griffin, D. J. G. & Tranter, H. A., 1974. Spider crabs of the family Majidae (Crustacea: Decapoda: Brachyura) from the Red Sea. Israel Journal of Zoology, 23 (3-4): 162-198.

Guinot, D., 1977. Propositions pour une novelle classification des Crustacés, Décapodes, Brachyoures. Comptes Rendus Hebdomadaires de Séances de l'Académie des Sciences, Paris 285: 1049-1052.

Guinot, D., 1969. Sur divers Xanthidae notament sur Actaea de Haan et *Paractaea* gen. nov. (Crustacea Decapoda Brachyura). Cahiers du Pacifique, 13: 223-267.

Hadden, R. L., 2012. The Geology of Yemen: An Annotated Bibliography of Yemen's Geology, Geography and Earth Science. Army Geospatial Center (U.S.).

Heller, C., 1862. Neue Crustaceen, gesammelt während der Weltumseglung der k.k. Fregatte Novara. Zweiter vorläufiger Bericht. Verhandlungen der kaiserlich-königlichen zoologischbotanischen Gesellschaft in Wien, 12: 519-528.

Heller, C., 1863. Die Crustaceen des südlichen Europa. Crustacea Podophthalmia. Mit einer Übersicht über die horizontale Verbreitung sämmtlicher europäischer Arten: i-xi, 1-336, pls 1-10.

Hogarth, P. J., 1994. Brachyuran crabs (Xanthoidea: Xanthidae, Pilumnidae, Menippidae and Trapeziidae) of southern Oman. Tropical Zoology, **7**: 93-108.

Holthuis, L. B., 1977. The Grapsidae, Gecarcinidae and Palicidae (Crustacea: Decapoda: Brachyura) of the Red Sea. Isr J Zool 26:141-192.

Hultgren, K. M & Stachowicz, J. J., 2008. Molecular phylogeny of the brachyuran crab superfamily Majoidea indicates close congruence with trees based on larval morphology. Molecular Phylogenetics and Evolution 48: 986-996.

IP, B. H. Y., Schubart, C. D., Tsang, L. M & Chu, K. H., 2015. Phylogeny of the shore crab family Grapsidae (Decapoda: Brachyura: Thoracotremata) based on a multilocus approach. Zoological Journal of the Linnean Society 174, 217-227.

Karasawa, H & Schweitzer, C. E., 2006. A new classification of the Xanthoidea sensu lato (Crustacea: Decapoda: Brachyura) based on phylogenetic analysis and traditional systematics and evaluation of all fossil Xanthoidea sensu lato. Contr. Zool. 75 (1/2), 23-73.

Kemp, J. M & Benzoni, F., 2000. A preliminary study of coral communities in the northern Gulf of Aden. Fauna of Arabia. 18: 67-86.

Kemp, J. M., 2000. Zoogeography of the coral reef fishes of the north-eastern Gulf of Aden, with eight new records of coral reef fishes from Arabia. Fauna of Arabia. 18: 293-321.

Khvorov, S. A., Al-Sinawi, M. N., Al-Kharusi, L. H & Al-Mosharfi, M. N., 2012. Catalogue of Brachyuran Crabs (Decapoda) of The Sultanate of Oman: Part I. The Arabian Sea Coast (Dhofar, Al-Wusta, Southern Part of Sharqiya). Crustaceana 00 (0) 1-10.

Klaus, R & Turner, J. R., 2004. The marine biotopes of the Socotra Archipelago. Fauna of Arabia 20: 45-115.

Klunzinger, C. B., 1906. Die Spitz- und Spitzmundkrabben (Oxyrhyncha und Oxystomata) des Roten Meeres, Stuttgart: i-vii, 1-91, figs 1-13, pls 1-2.

Klunzinger, C. B., 1913. Die Rundkrabben (Cyclometopa) des Roten Meeres. Abhandlungen der kaiserlich Leop-Carol Deutschen Akademie der Naturforscher Halle 2:97-402.

Komatsu, H & Takeda, M., 2003 .A new genus of leucosiid crabs (Crustacea, Decapoda, Brachyura) from the Red Sea. Zoosystema 25 (3) : 413-423.

Kossmann, R., 1877. Zoologische Ergebnisse einer Reise in die küstengebiete des Rothen Meeres. Malacostraca. 1. Theil: Brachyura. Leipzig, W. Engelmann: 1-66, pls 1-3.

Krupp, F., Amui, A. M., Lavergne, E., Schneider, M., Apel, M., Aikawa, M & Janssen, R., 2005. Field Report: Coastal Zone Management of Pilot Areas in the Gulf of Aden, Governorates of Hadramout and Shabwa, Republic of Yemen.

Krupp, F., Apel, M., Hamoud, A., Schneider, W & Zajonz, U., 2006. Zoological survey in the Red Sea coastal zone of Yemen. Fauna of Arabia, 21, 11-32.

Laurie, R. D., 1915. Reports on the Marine Biology of the Sudanese Red Sea, from Collections made by Cyril Crossland, M.Z., B.Sc., F.Z.S., XXI. On the Brachyura. The Journal of the Linnean Society, London (Zoology), 31 (209): 407-475.

Lewinsohn, C., 1977. Die Dromiidae des Roten Meeres (Crustacea, Decapoda, Brachyura). Zoologische Verhandelingen 151:3–41.

MacAlister, E & Partners, M., 1996. Biodiversity conservation and sustainable development programme Socotra Archipelago, Republic of Yemen, report (marine team): 61 pp.

Maccagno, T., 1936. Crostacei di Assab: Decapodi Stomatopodi Anfipodi. Spedizione del Barone Raimondo Franchetti in Dancalia (1928–29). Annali del Museo Civico di Storia Naturale di Genova 59:171–186.

Martin, J. W & Davis, G. E., 2001. An Updated Classification of the Recent Crustacea. Nat. Hist. Mus. L.A. County, Sci. Ser. 39, 1‑124.

Milne, E. H., 1834. Histoire naturelle des Crustacés, comprenant l'Anatomie, la Physiologie et la Classification de ces animaux. I. Paris.

Milne, E. H., 1837. Histoire naturelle des Crustacés (Atlas). Paris, 1837:1-32, pls 1-42.

Mistafa, N., 2005. The Red Sea and Gulf of Aden. GIWA Regional Assessment Sub-regions 48, 49.

Naderloo, R & Apel, M., 2012. Leucosiid crabs of the genus *Hiplyra* Galil, 2009 (Crustacea: Brachyura: Leucosiidae) from the Persian Gulf and Gulf of Oman, with Description of a New Species. Zoological Studies, 51 (2), 248–258.

Naderloo, R & Sari, A., 2007. Subtidal crabs of the Iranian coast of the Persian Gulf: new collections and biogeographic considerations. Aquat Ecosyst Health Manage 10:341-349.

Naderloo, R & Türkay, M., 2012. Decapod crustaceans of the littoral and shallow sublittoral Iranian coast of the Persian Gulf: Faunistics, Biodiversity and Zoogeography. Zootaxa, 3374, 1-67.

Naderloo, R., 2011. Grapsoid crabs (Decapoda: Brachyura: Thoracotremata) of the Persian Gulf and the Gulf of Oman. Zootaxa, 3048, 1-43.

Naderloo, R., 2017. Atlas of Crabs of the Persian Gulf. Springer International Publishing AG 2017, 444 pp.

Naderloo, R., Ebrahimnejad, S & Sari, A., 2015. Annotated checklist of the decapod crustaceans of the Gulf of Oman, northwestern Indian Ocean. Zootaxa 4028: 397-412.

Naderloo, R., Moradmad, M., Sari, A & Türkay, M., 2012. An annotated check list of hermit crabs (Crustacea, Decapoda, Anomura) of the Persian Gulf and the Gulf of Oman with five new records and an identification key to the North Indian Ocean genera. Zoosystematics and Evolution, 88 (1), 63-70.

Naderloo, R., Türkay, M & Chen, H. L., 2010. Taxonomic revision of the wide-front fiddler crabs of the *Uca lactea* group (Crustacea: Decapoda: Brachyura: Ocypodidae) in the Indo-West Pacific. Zootaxa, 2500, 1-38.

Naderloo, R., Türkay, M & Sari, A., 2013. Intertidal habitats and decapod (Crustacea) diversity of Qeshm Island, a biodiversity hotspot within the Persian Gulf. Mar Biodivers 43: 445-462.

Neumann, V & Spiridonov, V. A., 1999. Shallow water crabs from the Western Indian Ocean: Portunoidea and Xanthoidea excluding Pilumnidae (Crustacea Decapoda Brachyura). Tropical Zoology, 12: 9-66.

Ng, P. K. L., Guinot, D & Davie, P. J. F., 2008. Systema Brachyurorum: Part I. An annotated checklist of extant brachyuran crabs of the world. Raffles Bulletin of Zoology, Supplement No. 17: 1-286.

Nobili, G., 1906. Faune carcinologique de la Mer Rouge. Décapodes et Stomatopodes. Annales des Sciences naturelles, (Zoologie) 9:1-347.

Ortmann, A. E., 1894. Die Decapoden-Krebse des Strassburger Museums, mit besonderer Berücksichtigung der von Herrn Dr. Döderlein bei Japan und bei den Liu-Kiu-Inseln gesammelten und zur Zeit im Strassburger Museum aufbewahrten Formen. VIII Theil. Abtheilung; Brachyura (Brachyura genuina Boas) III. Unterabtheilung: Cancroidea, 2. Section: Cancrinea, 2. Gruppe: Catametopa. Zool. Jahrbuch 7:683-772, pl.23.

Paul‘son, O., 1875. Izsledovaniya rakoobraznykh Krasnago Morya s zametkami otnositel‘no rakoobraznykh drugikh morei. Chast_I. Podophthalmata i Edriophthalmata (Cumacea), Kiew.

PERSGA, 1996. The experience of the World Bank in the legal, institutional and financial aspects of regional environment program: potential applications of lessons learned for the ROPME and PERSGA programs. Report No. 21298.

PERSGA, 2002. Status of the Living Marine Resources in the Red Sea and Gulf of Aden and Their Management.

PERSGA, 2003. Regional Status of Breeding Seabirds in the Red Sea and the Gulf of Aden. Report.

PERSGA, 2004. Status of Mangroves in the Red Sea and Gulf of Aden. PERSGA Technical Series No. 11. PERSGA, Jeddah.

Poore, G. C. B., 2004. Marine Decapod Crustacea of Southern Australia: A Guide to Identification. Csiro Publishing- Australia, 574 pp.

Rasul, N. M. A & Stewart, I. C. F., 2015. The Red Sea: The formation, Morphology, Oceanography and Environment of a Young Ocean Basin. Springer Earth System Sciences. 637 pp.

Rice, A. L., 1980. Crab zoeal morphology and its bearing on classification of the Brachyura. Trans. Zool. Soc. Lond. 35, 271-424.

Rüppell, E., 1830. Beschreibung und Abbildung von 24 Arten kurzschwänzigen Krabben, als Beitrag zur Naturgeschichte des rothen Meeres. H.L. Brönner, Frankfurt a. M.

Saad, M. A., 1992. Observations of benthic fauna of the south Yemeni coastal waters. J. Mar. Biol. Ass. India, 34 (1&2): 171-178.

Saad, M. A., 1996b. Spiny rock lobsters collection from Socotra. First International Scientific Symposium on Socotra Island, University of Aden, Aden, Yemen 24-28 March 1996: 13 unnumbered pages.

Sakai, K & Türkay, M., 2013. Revision of the genus *Ocypode* with the description of a new genus, Hoplocypode (Crustacea: Decapoda: Brachyura). Memoirs of the Queensland Museum, 56 (2), 665-793.

Serène, R., 1984. Crustacés Décapodes Brachyoures de l'Océan Indien Occidental et de la Mer Rouge. Xanthoidea: Xanthidae et Trapeziidae. Avec un addendum par A. Crosnier: Carpiliidae et Menippidae. Faune Tropicale, XXIV. 400 pp.

Sheppard, C., Andrew, P & Callum, R., 1992. Marine Ecology of the Arabian Region Patterns and Processes in extreme tropical environments: 26-67.

Shih, H.T., Ng, P. K. L., Davie, P. J. F., Schubart, C. D., Türkay, M., Naderloo, R., Jones, Diana & Liu, M. Yun., 2016. Systematics of the family Ocypodidae Rafinesque, 1815 (Crustacea: Brachyura), based on phylogenetic relationships, with a reorganization of subfamily rankings and a review of the taxonomic status of *Uca* Leach, 1814, sensu lato and its subgenera. Raffles Bulletin of Zoology 64: 139-175.

Simões, N., Apel, M & Jones, D, A., 2001. Intertidal habitats and decapod faunal assemblages (Crustacea: Decapoda) of Socotra Island, Republic of Yemen. Hydrobiologia 449: 81-97.

Spears, T., Abele, L. G & Kim, W., 1992. The monophyly of brachyuran crabs: a phylogenetic study based on 18S rRNA. Syst. Biol. 41 (4): 446-461.

Spiridonov, V & Türkay, M., 2006. Deep water swimming crabs of the subgenus *Charybdis* (*Goniohellenus*) of the western Indian Ocean (Crustacea: Decapoda: Portunidae). Fauna Of Arabia 22: 199-223.

Spiridonov, V. A & Apel, M., 2007. A new species and new records of deepwater Calappidae (Crustacea: Decapoda) from the Indian Ocean with a key to the *Mursia* Desmarest, 1823 species of the region. J Nat Hist 41:2851-2890.

Spiridonov, V. A & Türkay, M., 2007. Deep sea crabs of the subfamily Ethusinae Guinot, 1977 from the north-western Indian Ocean (Crustacea: Decapoda: Brachyura: Dorippidae). Fauna of Arabia 23: 125-150.

Stephensen, K., 1946. The Brachyura of the Iranian Gulf with an appendix: The male pleopoda of the Brachyura. Danish Scientific Investigations in Iran, 4: 57-237.

Števčić, Z., 2005. The reclassification of brachyuran crabs (Crustacea: Decapoda: Brachyura). Natura Croatica, 14 Supplement 1: 1-159.

Takeda, M & Komatsu, H., 2018. Offshore crabs of the family Xanthidae and some related families (Crustacea, Decapoda, Brachyura) from the Ogasawara Islands, Japan, Mem. Natl. Mus. Nat. Sci., Tokyo, (52), pp. 153-189.

Tan, S & Ng, P. K., 2007. Descriptions of new genera from the subfamily Parthenopinae (Crustacea: Decapoda: Brachyura: Parthenopidae). Raffles Bull Zool 16: 95-119.

Tan, S.H., Ng, P. K. L., 2003. The Parthenopinae of Guam (Crustacea: Decapoda: Brachyura: Parthenopidae). Micronesica 35-36: 387-418.

Tirmizi, N. M & Ghani, N., 1996. Marine fauna of Pakistan: 5: Crustacea: Brachyura, Brachyrhyncha Part I (Xanthidae, Goneplacidae, Pinnotheridae, Ocypodidae, Grapsidae). University of Karachi, Karachi, 188 pp.

Tirmizi, N. M & Kazmi, Q. B., 1988. Marine fauna of Pakistan. Vol. 4. Crustacea: Brachyura (Dromiacea, Archaebrachyura, Oxystomata, Oxyrhyncha). University of Karachi, Karachi, 244 pp.

Türkay, M., 1986. Crustacea Decapoda Reptantia der Tiefsee des Roten Meeres. Senckenberg Marit 18:123-185.

Türkay, M., Sakai, K & Apel, M., 1996. The *Ocypode* ghost crabs (Crustacea: Decapoda: Brachyura) of the Arabian Peninsula and adjacent regions. Fauna Saudi Arab 15:99–117.

UNEP, 1997. Assessment of Land-based Sources and Activities Affecting the Marine Environment in the Red Sea and Gulf of Aden, Regional Seas Reports and Studies No. 166.

UNEP, 2010. National Environmental Summary for Yemen 2010. Final Report.

Vannini, M & Innocenti, G., 2000. Research on the coast of Somalia. Portunidae (Crustacea Brachyura). Tropical Zoology, 13: 251-298.

Vine, P., 1986. Red Sea invertebrates. IMMEL Publishing London, 224 pp.

Wee, D. P. C & Ng, P. K. L., 1995. Swimming crabs of the genera *Charybdis* de haan, 1833, and *Thalamita* latreille, 1829 (Crustacea: Decapoda: Brachyura: Portunidae) from Peninsular Malaysia and Singapore. The Raffl. Bull. Of Zool., Supplement, No. 1, 128 pp.

White, A., 1847. List of the specimens in the collection of the British Museum. British Museum, London.

Wilson, S. C & Klaus, R., 2000. The Gulf of Aden, in: Sheppard, C.R.C. (Ed.) Seas at the millennium: an environmental evaluation: 2. Regional chapters: The Indian Ocean to The Pacific. pp. 47-61.

Wilson, G., Price, A. R. G., Huntington, T & Wilson, S. C., 2003. Environmental status of Yemen‘s Gulf of Aden coast determined from rapid field assessment and satellite imagery. Aquatic Ecosystem Health & Management, 6 (2): 119-129.

Wranik, W., 1998. Faunistic notes on Soqotra Island. Soqotra. In Dumont, H. J. (ed.), Proceedings of the International Symposium on Soqotra Island: Present & Future. New York, United Nations Publications 1: 135-198.

Zajonz, U., Heemstra, P., Kemp, J & Eisinger, M., 1998. Preliminary report of the Arabian Seas expedition on the scientific work executed by the visiting scientists between Aden and the Kamaran Archipelago, from March 23rd to April 16th 1998.

Acknowledgements

All praise is due to God, the lord of the worlds, and the Almighty Allah praise prophet Mohammed, and render his household safe and secure from all evil. First of all, praise be to Allah for granting and facilitating to achieve my work.

I am indebted to many people who have helped me both directly and indirectly. Dr. Wolfgang Wranik, the early and previous supervisor of my thesis (2013-2015), he gave me the help and the support since 2010 up to now and provided many samples. Dr. Stefan Foster, my new supervisor (2016 up to now), also gave me all the help and the support since 2016 up to now and guidance in my research.

I would also like to thank Prof. Gerhard Graf, the former chairman of Institut für Biowissenschaften-Meeresbiologie, who helped me and met my needs during the study and scientific research. Similarly my thanks are extended to the present chairwomen Prof. Inna Sokolova who did the same. I am thankful to Dr. Martin Powilleit, who supported me with the cluster analyses and to the technical team in Meeresbiologie, Mrs. Elke Meier and Mr. Holger Pielenz, for their help in the provision of equipment and laboratory capacities to accomplish my research.

I would also like to thank the team of researchers and the staff of Zoologische Staatssammlung München (ZSM), especially Prof. Roland Melzer for many hours of reading, Mr. Stefan Friedrich, Dr. Jörg Spelda, Mr. Jérôme Moriuiére and Mr. Siddhanth Rao, for their introduction to and help with the use of equipment (samples, µCT, DNA analysis, Diva GIS analysis, digital cameras Nikon D7000 and others), teaching of concepts and finding a bed for the many nights in München.

I am indebted to Dr. Michael Apel from Museum Mensch und Natur (Munich), the specialist in this field, for his support in reclassifying the species, providing all the samples which came from Senckenberg Museum Frankfurt (SMF) examined in this present study and for providing us with many references.

Furthermore I would like to thank the president of Aden University and all the staff of the department of biology, Dr, Salem Busais and Dr. Ebtisam Shikoo, the former chairman and chairwomen of our department, and Dr. Othman Hammod, the present chairman, for their help in the provision of equipment and capabilities for my research.

I would also like to thank the staff of embassy of the Republic of Yemeni in Berlin- Germany, especially our ambassador Dr. Yahia Mohammed Al-Shaibi and culture department; Mr. Abdul Bari Muawada, Mrs. Asma and Mr. Amin Mohammed Abdo for their help in the provision of my scholarship and for the facilitate the difficulties encountered during my study.

I would also like to thank the former manager of Environmental study and science centre-Aden University, Dr. Abdullah Bin Dahman, and the present manager of the centre, Dr. Ahmed Mohren, and all its staff (Merfat Mahfood, Hanan Abdo and Soaad Ahmed) for their diverse help with equipment and capabilities to accomplish my research such as GPS, swimming glasses, digital calipers, ethanol and so on.

I'd also like to thank the team of researchers and the staff of the Marine Science and Biological Research Authority (MSBRA), Dr. Saleh Awad, Dr. Mohammed Saad and Dr. Gamal M. Bawazir

for cooperating and providing us with references they had available and for allowing us to take measurements for some specimen found in the museum of marine biology.

I want to also thank all my friends here in Rostock (Abdulsalam Bin Nasser, Waleed Almhameed, Omar Foued, Mahmod Issa, Gaafar Zain, Ahmed Al- Maweri, Ali Al-Nehmi, Dr. Mohammed Saif, Dr. Amr Ali, Dr. Ahmed Ali, Hani Ali, Amir Abdelaziz, Khaled Zain, Wessam, Hakim Msaddek, Abdulrahman Kaddoura, Rami Waleed Huseen, Osama Jende, Ziaul Badar, Sakhir Shibli) and especially Mr. Abdulwahed Bin Mothana and Dr. Ashour Ahmed for their moral support and suggestions. The thanks are also extended to all my friends in Aden and Mukalla cities: Khaled Binhuwail, Qasem Abdullah Othman, Naseer Saeed Ba-Fadel, Muneer Abdullah, Arafat Amer, Khaldoon Murshed, Dr. Momammed Al- Kashiah, Fahmi Fraj Bayousuf, Ahmed Al-Haj, Fadel Bin Mothana, Yusuf Sufian and Abdulkawi Ali.

I want to thank all my family (My mother, my wife, my sisters, my daughter and my sons) and relatives for their helpfulness, especially Salem Nasser Al-Hindi, Abdullah Salem Al-Hindi, Nasser Salem Al-Hindi, Aref Fadil Al-Hindi, Ahmed Salem Al-Zamiki, Anower Mohammed Al-Hindi, Tariq Salem Al-Zamiki, Ahmed Mohammed Al-Hindi, Momammed Kaled Al-Aqil, Abobaker Kaled Al-Aqil, Salem Kaled Al-Aqil, Yonus Abobaker Al-Aqil and Nasser Gamal Al-Fahad.

Finally, I would also like to thank the local fishermen Raid Ahmed and Moner Al-Rbash for various ways of helping me.

Declaration

I hereby declare that I have completed the work submitted here independently and have composed it without outside assistance. Furthermore, I have not used anything other than the resources and sources stated and where I have taken sections from these works in terms of content or text, I have identified this appropriately.

Rostock, 22.02.2019

Appendix I:
Plates of brachyuran crabs gonopods:

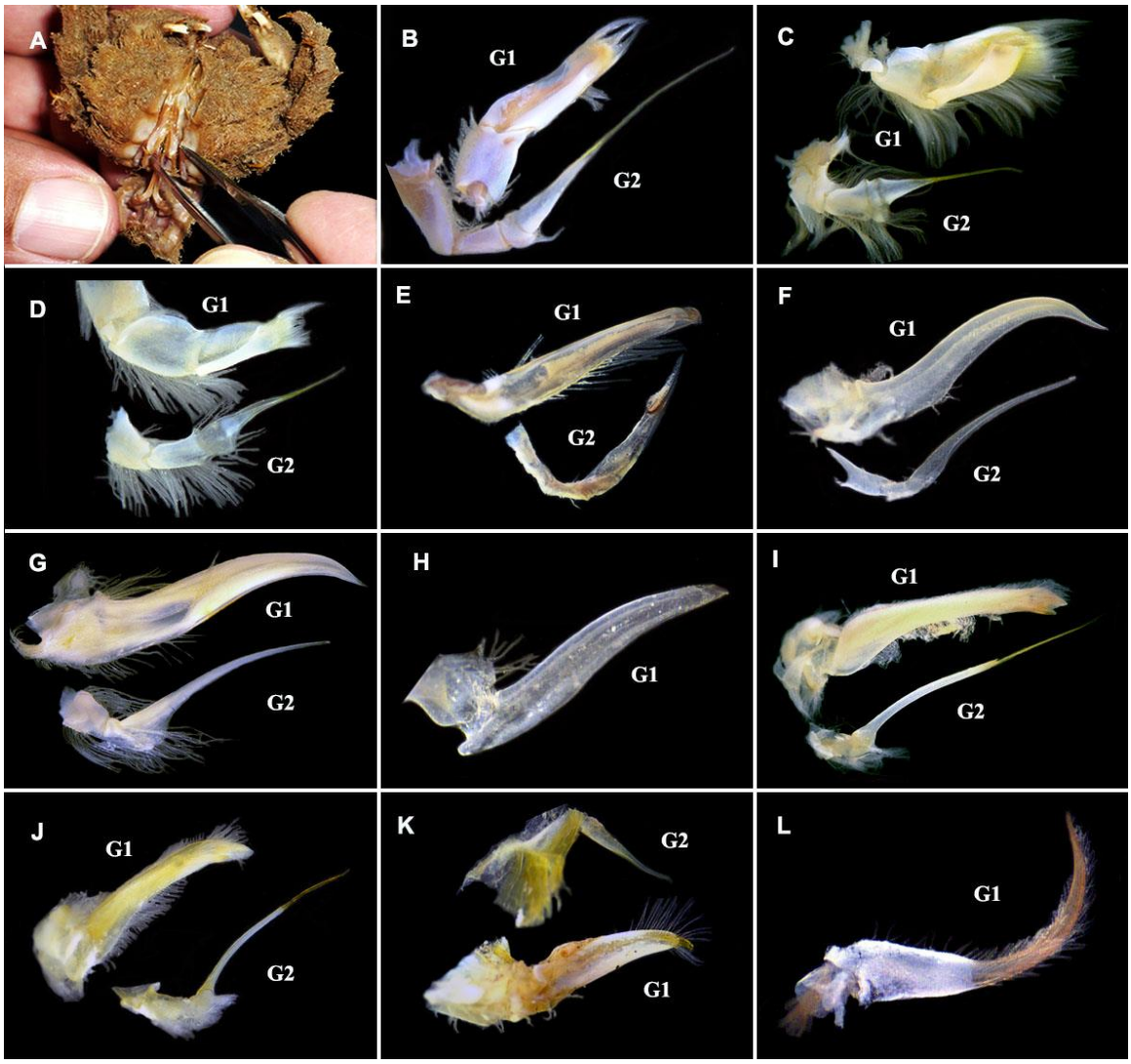

Plate 44: Gonopods of Dromiidae, Raninidae, Calappidae, Matutidae, Dorippidae and Hexapodidae. **A.** Position of the gonopods; **B.** *Lewindromia unidentata*, male G1 (13 mm) & G2 (17.9 mm), CW 26.2 mm; **C.** *Epigodromia granulata*, male G1 (3.8 mm); **D.** *Cryptodromia fallax,* male G1 (4.1 mm); **E.** *Notosceles serratifrons*, male G1 (4 mm); **F.** *Calappa philargius*, male G1 (6.2 mm); **G.** *Calappa hepatica*, male G1 (5.6 mm); **H.** *Calappa capellonis*, male G1 (3.3 mm); **I.** *Ashtoret lunaris*, male G1 (10.3 mm); **J.** *Ashtoret picta*, male G1 (6.7 mm); **K.** *Dorippe frascone,* male G1 (5.6 mm); **L.** *Hexapinus simplex,* male G1 (3 mm).

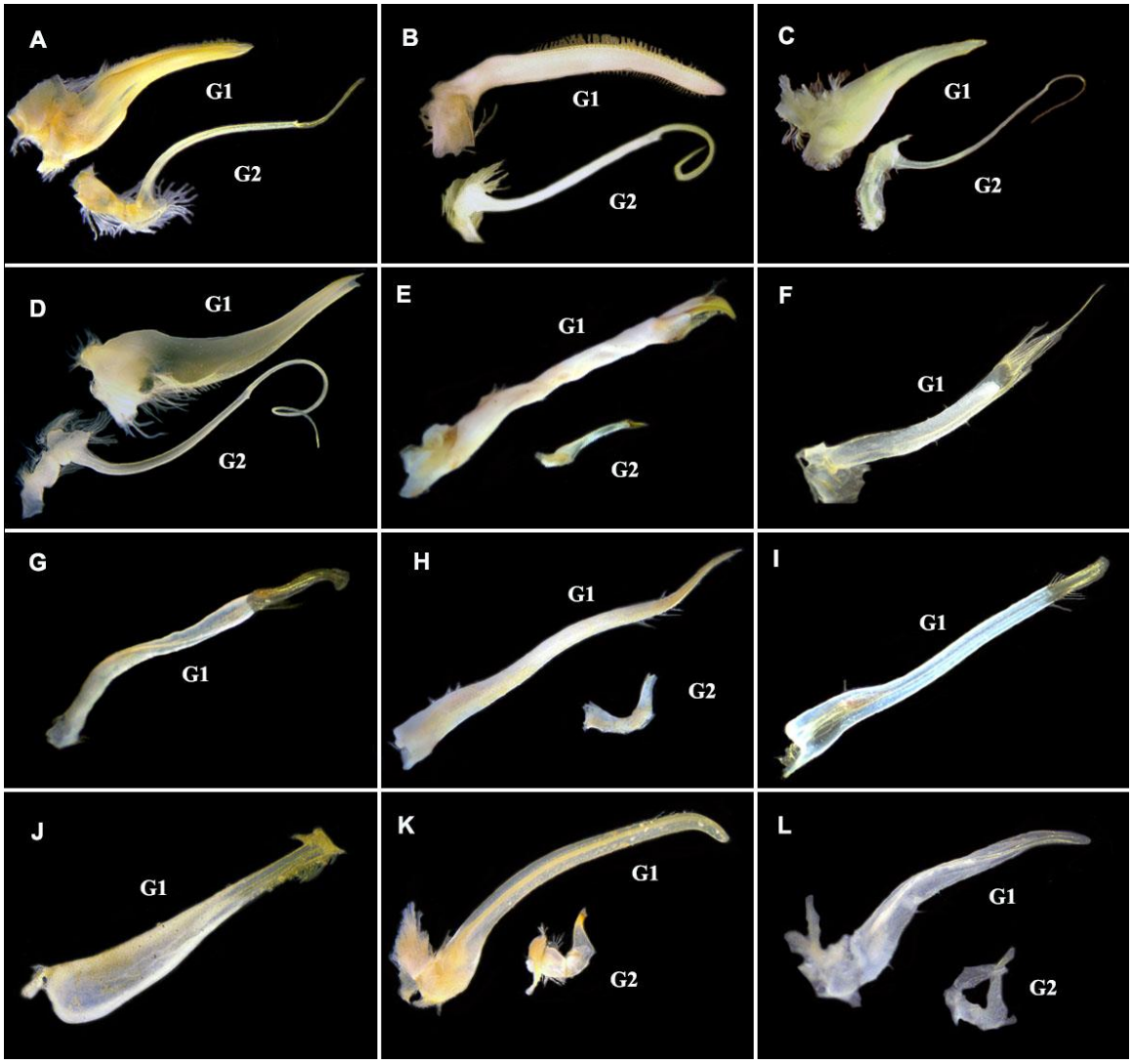

Plate 45: Gonopods of Eriphiidae, Menippidae, Oziidae, Leucosiidae, Parthenopidae and Majidae. **A.** *Eriphia smithii*, male G1 (9.5 mm); **B.** *Menippe rumphii*, male G1 (10 mm); **C.** *Epixanthus frontalis*, male G1 (6.5 mm); **D.** *Lydia tenax,* male G1 (9 mm); **E.** *Leucosia anatum*, male G1 (10.1 mm); **F.** *Ryphila cancellus***,** male G1 (6.4 mm); **G.** *Nobiliella jousseaumei*, male G1 (4 mm); **H.** *Ixa holthuisi,* male G1 (13 mm); **I.** *Arcania gracilis*, male G1 (5.9mm); **J.** *Aulacolambrus granulosus*, male G1 (4 mm); **K.** *Schizophrys aspera*, male G1 (16.7 mm); **L.** *Seiitaoides cf. stimpsonii,* male G1 (2.4 mm).

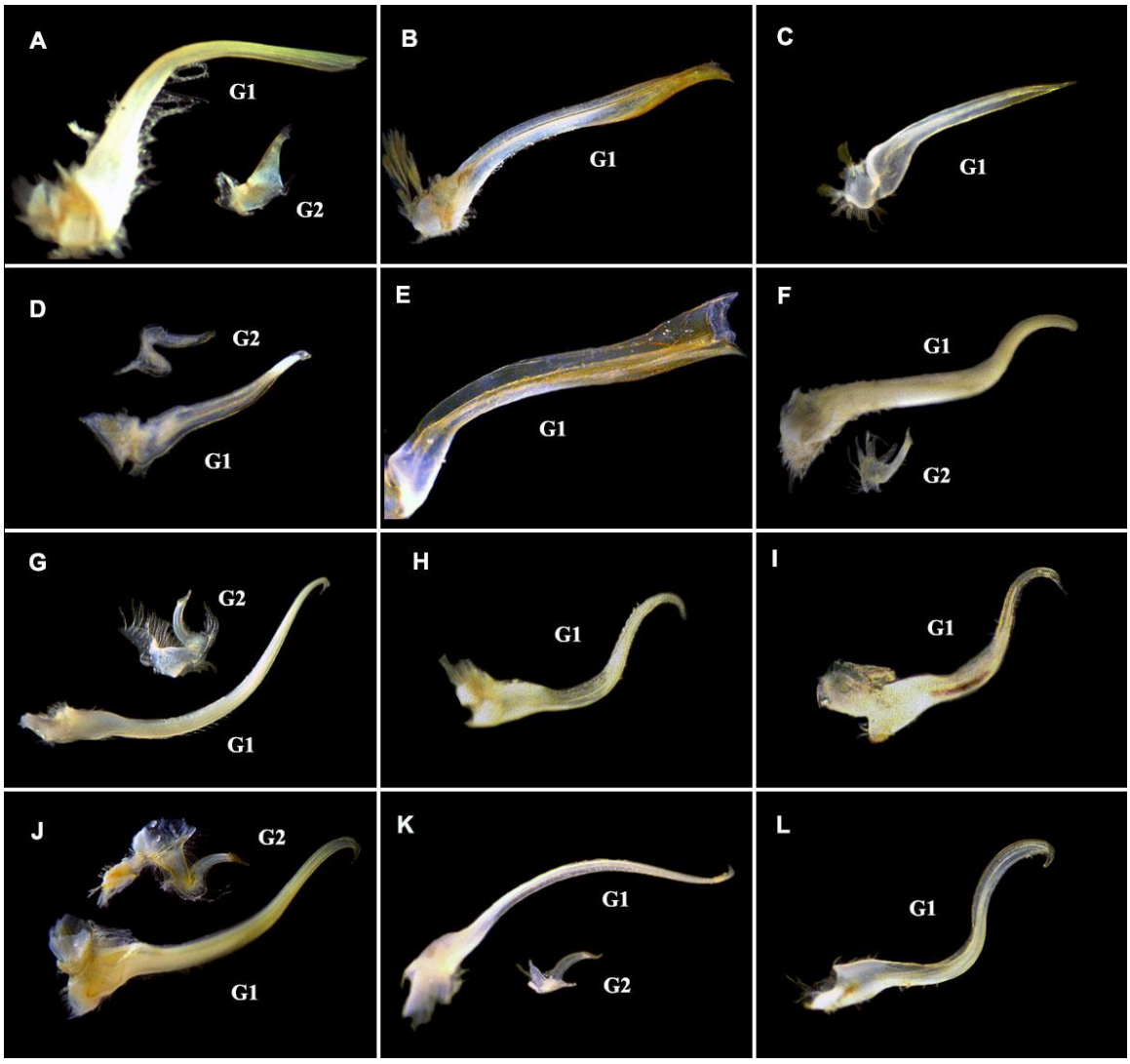

Plate 46: Gonopods of Majidae, Epialtidae, Inachidae and Pilumnidae. **A.** *Micippa platipes*, male G1 (7.6 mm); **B.** *Stilbognathus cervicornis*, male G1 (8.4 mm); **C.** *Hyastenus brockii*, male G1 (3 mm); **D.** *Macropodia formosa,* male G1 (2.2 mm); **E.** *Sunipea indicus*, male G1 (3.9 mm); **F.** *Eurycarcinus integrifrons***,** male G1 (9.6 mm); **G.** *Pilumnus vespertilio*, male G1 (9.1 mm); **H.** *Pilumnus minutus*, male G1 (3.5 mm); **I.** *Glabropilumnus levimanus*, male G1 (3.4 mm); **J.** *Pilumnus incanus*, male G1 (8.1 mm); **K.** *Actumnus asper*, male G1 (6.7 mm); **L.** *Pilumnopeus convexus*, male G1 (3.4 mm).

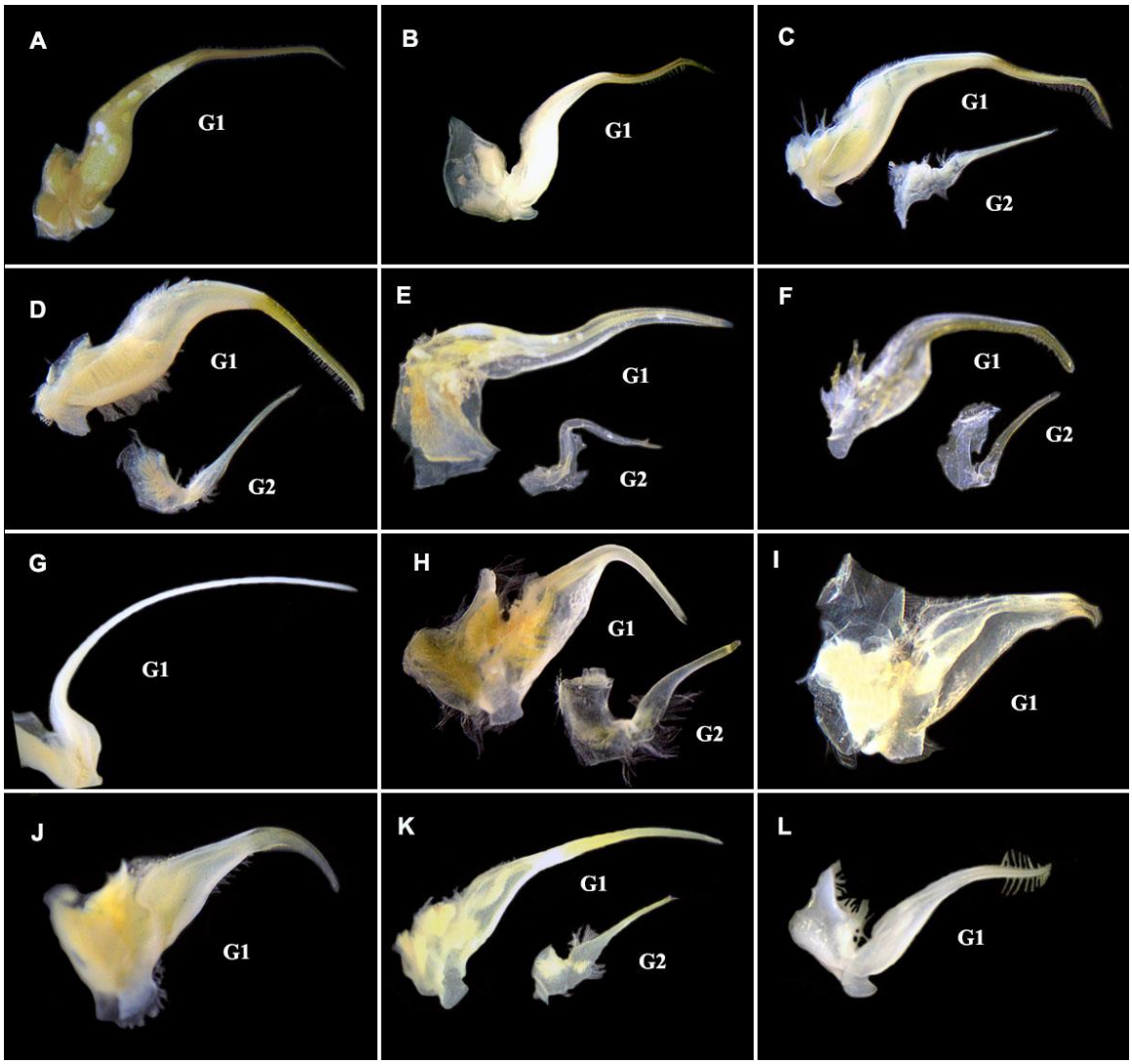

Plate 47: Gonopods of Portunidae. **A.** *Charybdis (Charybdis) natator*, male G1 (17 mm); **B.** *Charybdis (Charybdis) orientalis*, male G1 (8 mm); **C.** *Charybdis (Charybdis) annulata*, male G1 (10.8 mm); **D.** *Charybdis (Goniohellenus) longicollis,* male G1 (8.5 mm); **E.** *Scylla serrate*, male G1 (10.5 mm); **F.** *Carupa tenuipes*, male G1 (5 mm); **G.** *Portunus (Portunus) segnis*, male G1 (16.8 mm); **H.** *Portunus (Xiphonectes) arabicus*, male G1 (5 mm); **I.** *Cycloachelous granulatus,* male G1 (3.2 mm); **J.** *Cycloachelous orbitosinus,* male G1 (4.2 mm); **K.** *Thalamita crenata,* male G1 (18.7 mm); **L.** *Thalamita admete,* male G1 (5.5 mm).

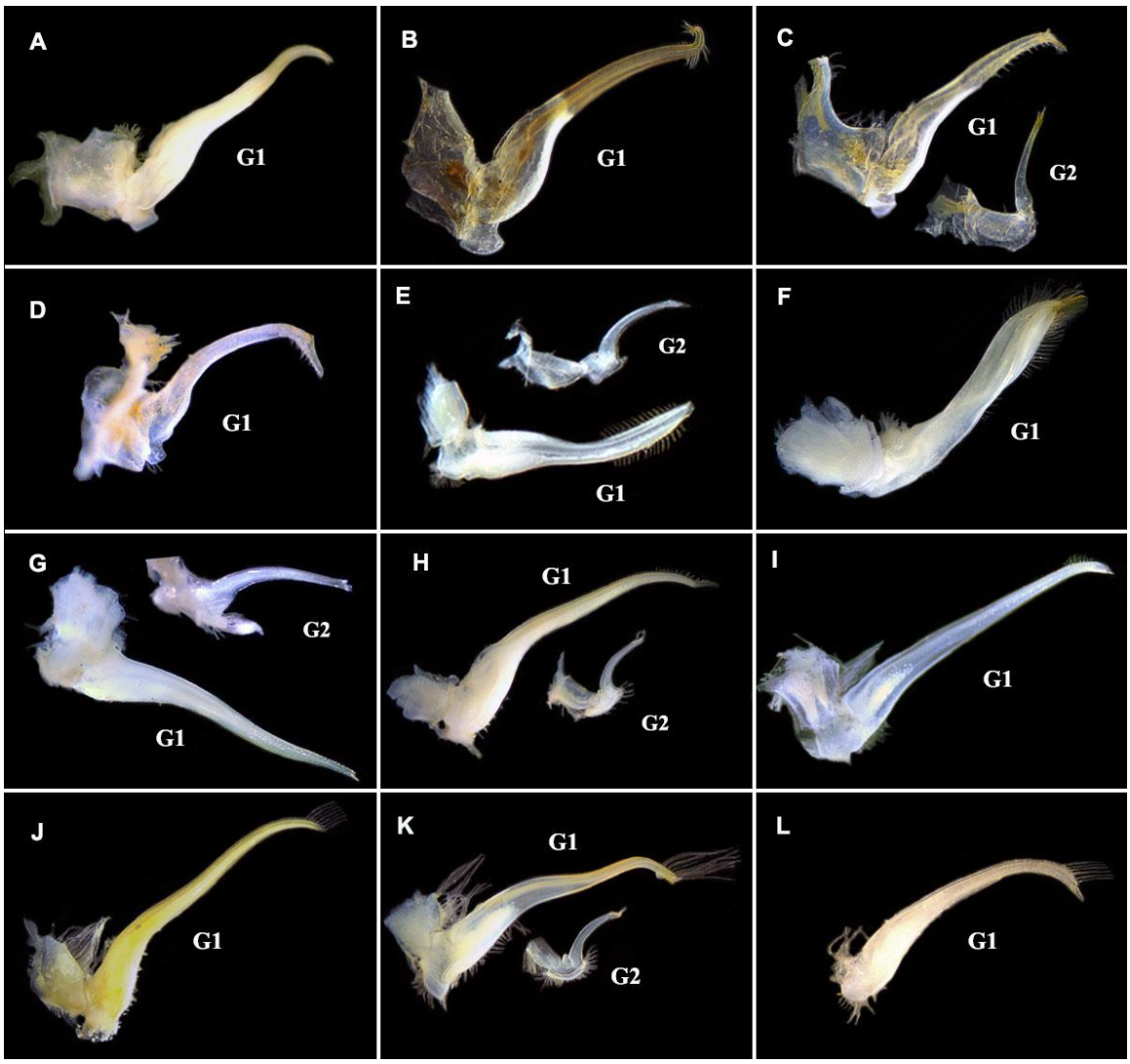

Plate 48: Gonopods of Portunidae, Tetraliidae, Trapeziidae, Pseudoziidae and Xanthidae. **A.** *Thalamita prymna*, male G1 (14 mm); **B.** *Thalamita poissonii*, male G1 (6.5 mm); **C.** *Thalamita sexlobata*, male G1 (4.3 mm); **D.** *Thalamita mitsiensis,* male G1 (3.7 mm); **E.** *Tetraloides nigrifrons*, male G1 (3.7 mm); **F.** *Trapezia cymodoce***,** male G1 (7 mm); **G.** *Pseudozius caystrus*, male G1 (13 mm); **H.** *Leptodius exaratus*, male G1 (7.2 mm); **I.** *Macromedaeus voeltzkowi*, male G1 (5.6 mm); **J.** *Lophozozymus anaglyptus*, male G1 (8.6 mm); **K.** *Pilodius areolatus*, male G1 (6.3 mm); **L.** *Glyptoxanthus meandrinus*, male G1 (3 mm).

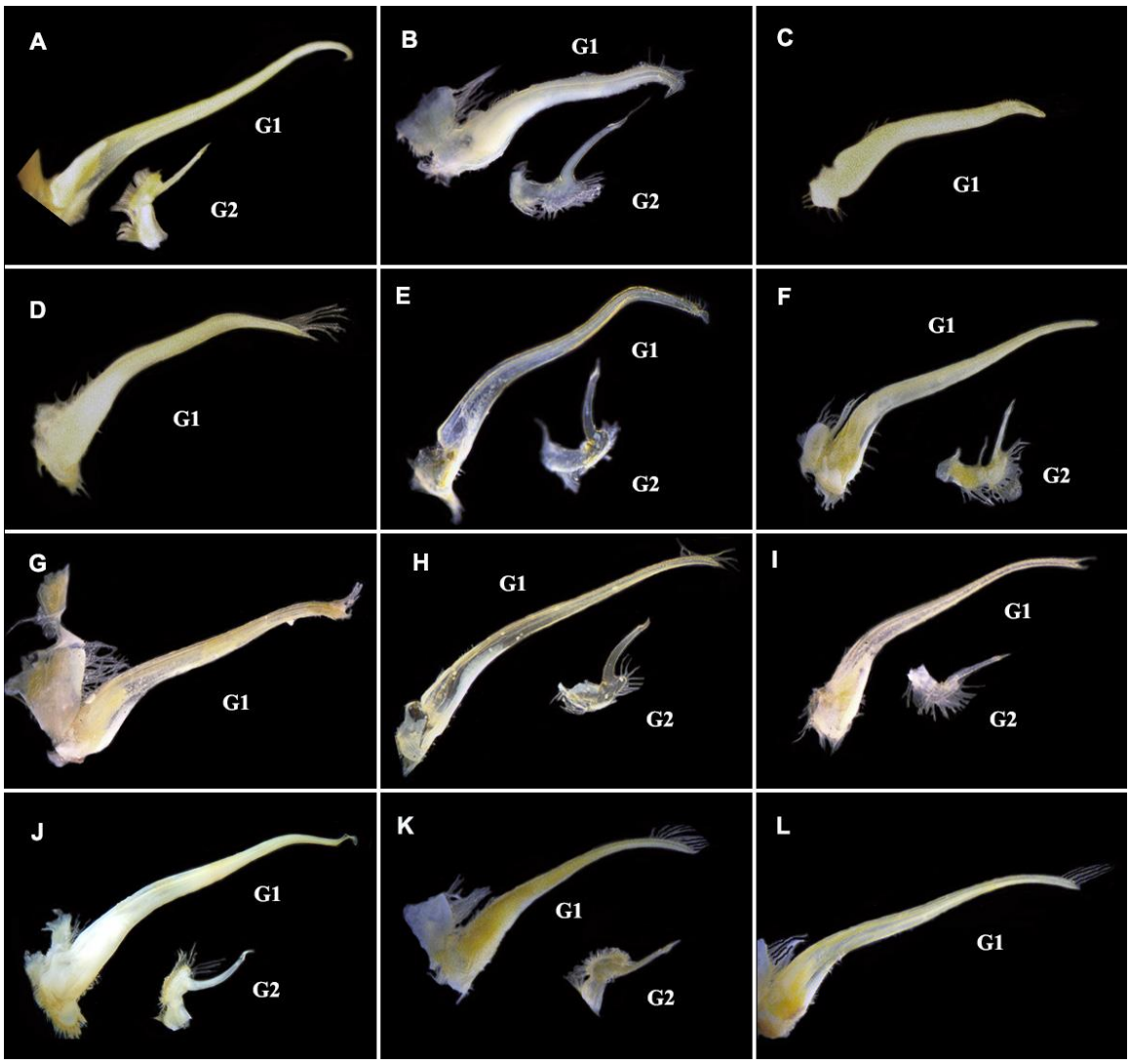

Plate 49: Gonopods of Xanthidae. **A.** *Atergatis latissimus*, male G1 (23 mm); **B.** *Cymo quadrilobatus*, male G1 (4.2 mm); **C.** *Cymo andreossyi*, male G1 (4.3 mm); **D.** *Cyclodius granulatus,* male G1 (5 mm); **E.** *Chlorodiella nigra*, male G1 (4.4 mm); **F.** *Atergatopsis granulate,* male G1 (12 mm); **G.** *Actaeodes hirsutissimus*, male G1 (7.3 mm); **H.** *Actaeodes tomentosus*, male G1 (8.4 mm); **I.** *Epiactaea margaritifera*, male G1 (5.9 mm); **J.** *Etisus laevimanus*, male G1 (14.5 mm); **K.** *Xanthias sinensis*, male G1 (7.5 mm); **L.** *Zosimus aeneus,* male G1 (13 mm).

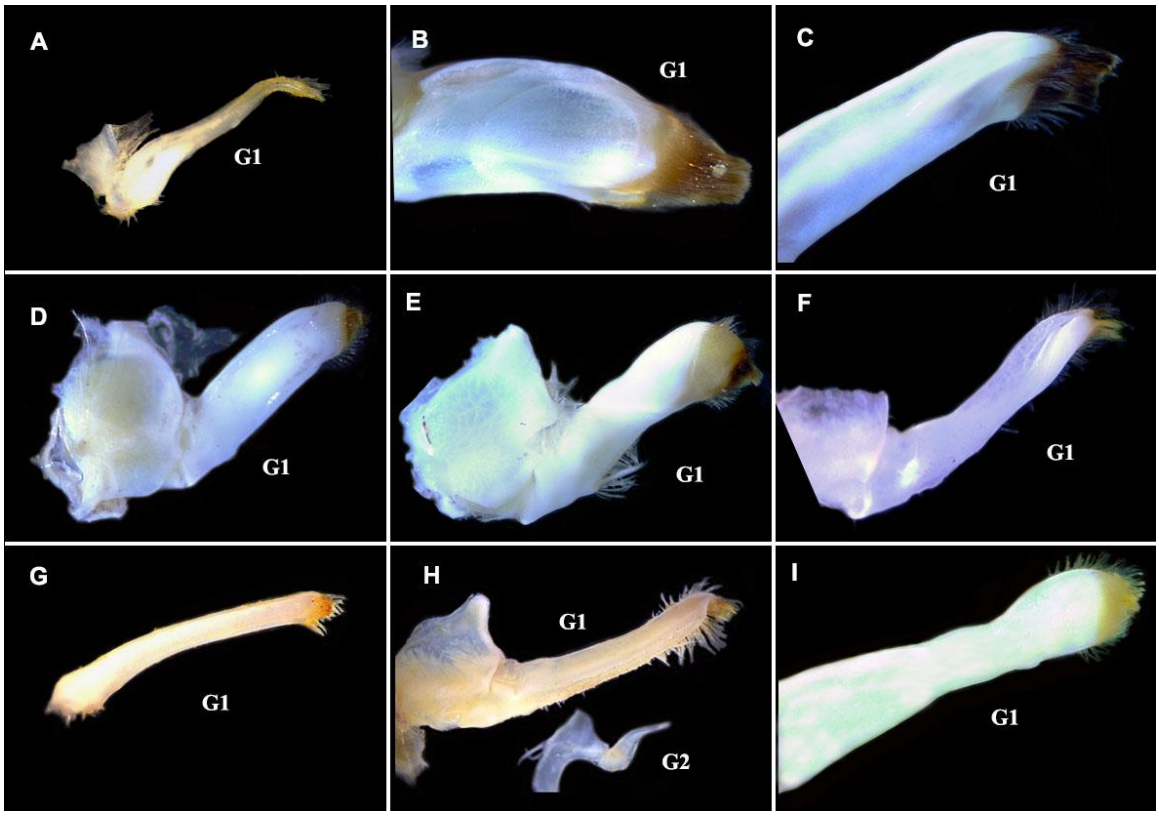

Plate 50: Gonopods of Xanthidae, Grapsidae, Varunidae, Sesarmidae and Plagusiidae. **A.** *Forestiana depressa*, male G1 (4 mm); **B.** *Grapsus albolineatus*, male G1 (12.5 mm); **C.** *Grapsus tenuicrustatus*, male G1 (11.7 mm); **D.** *Grapsus granulosus,* male G1 (8.2 mm); **E.** *Metopograpsus messor,* male G1 (8.4 mm); **F.** *Metopograpsus thukuhar,* male G1 (9 mm); **G.** *Thalassograpsus harpax*, male G1 (4.2 mm); **H.** *Perisesarma guttatum*, male G1 (7.8 mm); **I.** *Plagusia squamosal*, male G1 (10.2 mm).

Plate 51: Gonopods of Dotillidae, Macrophthalmidae and Ocypodidae. **A.** *Dotilla sulcata*, male G1 (3.2 mm); **B.** *Macrophthalmus (Macrophthalmus) grandidieri*, male G1 (6.3 mm); **C.** *Macrophthalmus (Macrophthalmus) sulcatus*, male G1 (6 mm); **D.** *Macrophthalmus (Mareotis) depressus,* male G1 (6 mm); **E.** *Macrophthalmus (Macrophthalmus) graeffei* male G1 (5.1 mm); **F.** *Chaenostoma sinuspersici***,** male G1 (2.5 mm); **G.** *Chaenostoma boscii*, male G1 (3.5 mm); **H.** *Austruca albimana*, male G1 (4.5 mm); **I.** *Cranuca inversa,* male G1 (6.6 mm); **J.** *Ocypode saratan*, male G1 (22.9 mm); **K.** *Ocypode saratan* (or *Ocypode rotundata*, or subspecies of *Ocypode saratan*), male G1 (19.3 mm); **L.** *Ocypode jousseaumei,* male G1 (13 mm).

Appendix II

In the following all the brachyuran crabs‘ species including; species name, synonym (from Marine Species Identification Portal http://species-identification.org/index.php and WoRMS http://www.marinespecies.org), Type localities, distribution and some materials examined of some species which has large numbers of the specimens:

Section: Dromiacea De Haan, 1833
Superfamily Dromioidea De Haan, 1833
Family Dromiidae De Haan, 1833

Lauridromia dehaani (Rathbun, 1923) Plate 4 A

Dromia rumphii H. Milne Edwards, 1837; Stimpson, 1858d; Ortmann, 1892.
Dromia indica Targioni Tozzetti, 1872.
Dromia dormia Rathbun, 1902; Borradaile, 1903.
Dromia dehaani Rathbun, 1923; Sakai, 1936; Tirmizi & Kazmi, 1991.
Lauridromia dehaani McLay, 1993; Ng *et al.,* 2008.

Type locality: Japan.

Distribution: Red Sea, Gulf of Aden, South Arabia, South Africa, Arabian Gulf, Pakistan, India, Sri Lanka, Gulf of Martaban, Japan, Korea, China and Indonesia.

Lewindromia unidentata (Rüppell, 1830) Plate 4 B

Dromia unidentata Rüppell, 1830; H. Milne Edwards, 1837; Laurie, 1915.
Dromidia unidentata Kossmann, 1880; de Man, 1888b Ortmann, 1894; Nobili, 1903: Nobili, 1906; Stephensen, 1946.
Dromidia unidentata hawaiiensis Edmondson, 1922.
Dromidia unidentata unidentata Garth, 1957a; Retamal, 1981.
Cryptodromia unilobata Campbell & Stephenson, 1970.
Cryptodromiopsis unidentata Rüppell, 1830; McLay, 1993; Wada, 1995; Muraoka, 1998.

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden, Socotra Island, East coast of Africa, Arabian Gulf, Pakistan, India, Sri Lanka, Andaman Islands, Japan, Korea, Philippines, Thailand, Singapore, Indonesia, Australia, New Caledonia, Hawaiian Islands and Easter Island; 0-100 m.

Epigodromia granulata (Kossman, 1878) Plate 4 C

Epidromia granulata Kossmann, 1878: 256.
Cryptodromia granulata Kossmann, 1877; Nobili, 1906: 147, pl 9, fig5; Gordon, 1950: 208, figs 2a, b; Guinot, 1967: 240; Lewinsohn, 1977.
Epigodromia granulata McLay, 1993: 216; Apel, 2001: 44; Ng *et al.,* 2008.

Type locality: Red Sea.

Distribution: Gulf of Aden, Socotra Island, South Africa, Arabian Gulf, Pakistan, India, Sri Lanka, Japan, East China Sea, Taiwan, China, Hong Kong, Thailand, Singapore and Australia; 30-100.

Ascidiophilus caphyraeformis Richters, 1880 Plate 4 D

Pseudodromia integrifrons Nobili, 1906: 147; Laurie, 1915: 40g; Guinot, 1967: 240.
Pseudodromia caphyraeformis Balss, 1922: 110.
Pseudodromia integrifrons Henderson, 1888.
Pseudodromia murrayi Gordon, 1950.

Type locality: unknown.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Mozambique, Republic of Mauritius and Tanzania.

Cryptodromia fallax (Latreille in Milbert, 1812) Plate 4 E, F

Dromia fallax Lamarck, 1818: 264; H. Milne Edwards, 1837: 176.
Cryptodromia canaliculata Stimpson, 1858: 240; Alcock, 1901: 50, pl. 2, fig. 8; Nobili, 1906; de Man, 1929b: 21; Balss, 1934b: 502; Lewinsohn, 1977: 18, fig. 4.
Dromia tomentosa Heller, 1861a: 21.
Cryptodromia tomentosa Paulson, 1875: 83; Kossmann, 1880: 68; Guinot, 1976: 240.
Dromia (Cryptodromia) tomentosa Hilgendorf, 1879: 813, pl. 2, figs 3-5.
Cryptodromia fallax Ives, 1891: 217; Alcock, 1901: 77; McLay, 1993: 206, fig. 18e; McLay, 2001: 832.
Dromia (Cryptodromia) canaliculata Alcock, 1900a: 142.
Cryptodromia hirsuta Borradaile, 1903: 577, pl. 33, fig. 3.
Cryptodromia canaliculata var. *sibogae* Ihle, 1913: 42.
Cryptodromia canaliculata var. *obtusifrons* Ihle, 1913: 43, pl. 1, fig. 7.

Type locality: Le Réunion.

Distribution: Red Sea, Gulf of Aden, Socotra Island, South Africa, Zanzibar, Mozambique, Arabian Gulf, Maldives, Andaman Islands, Japan, Taiwan, China, Philippines, Indonesia, New Caledonia, Marshall Islands and Tuamotu Archipelago; intertidal to 3 m.

Section: Raninoida De Haan, 1839

Family Raninidae De Haan, 1839

Notosceles serratifrons (Henderson, 1893) Plate 5 A, B, C, D

Raninoides serratifrons Henderson, 1893: 403, figs 10-12; Alcock, 1896: 293; Laurie, 1906: 367; Sakai, 1965b: 2, pl. 1, fig. 4; Takeda, 1973c: 20; Miyake, 1983: 1, pl. 1, fig. 2.
Notosceles serratifrons Serène & Umali, 1972: 36 (key), 44, fig. 34, pl. 3, figs 7-10.
Non Raninoides serrtifrons; Stebbing, 1920b: 250; Barnard, 1950: 399, figs 75e-g.
Notosceles barnardi (Sakai, 1974).

Type locality: Sri Lanka.

Distribution: Gulf of Aden: Aden , India: Malabar Coast, Sri Lanka, west coast of Thailand, Japan, China Sea, South China Sea and Australia; 30-81 m.

Section: Eubrachyura de Saint Laurent, 1980
Subsections: Heterotremata Guinot, 1977
Superfamily: Carpilioidea Ortmann, 1893
Family: Carpiliidae Ortmann, 1893

Carpilius convexus (Forskål, 1775) Plate 6 A

Cancer convexus Forskål, 1775: 88; Herbst, 1783: 140.
Cancer adspersus Herbst, 1790: 264, pl. 21, fig. 119.
Carpilius convexus Rüppell, 1830: 13, pl. 3, fig. 2, pl. 6, fig. 6; H. Milne Edwards, 1834: 382; Dana, 1852c: 159; Wang & Liu, 1998; Sakai, 1999: 31, pl. 16B.

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Somalia, Kenya, Zanzibar, Mozambique, South Africa, Madagascar, Gulf of Oman, Arabian Gulf, Japan, China, Indonesia, New Caledonia, Fiji, Hawaii and Tahiti.

Superfamily: Calappoidea De Haan, 1833
Family: Calappidae De Haan, 1833

Calappa philargius (Linnaeus, 1758) Plate 6 B

Cancer philargius Linnaeus, 1758: 626; Herbst, 1785.
Calappa cristata Fabricius, 1798: 346; Latreille, 1803a: 393.
Calappa inconspecta Bosc, 1801: 185; Bosc, 1828-1830 (1830): 215.
Calappa (Lophos) philargius de Haan, 1833-1849 (1837): 71(part), pl. 19, fig. 1.
Calappa philargius Herklots, 1861: 25; Nauck, 1880: 46; de Man, 1888b: 196; Henderson, 1893: 396; Alcock, 1896: 145; Nobili, 1899: 249; Serène, 1968: 41(list); Sakai, 1976: 130, pl. 37, fig. 2; Galil, 1997a: 275(key), 307, figs 17d, 20d, 21, 33; Ng, 1998c: 1093(key), 1097, fig.
Calappa Philargius de Man, 1888d: 388.
Calappa philargicus Estampador, 1937.
Calappa philarguius Miyake, 1939b.
Calappa philargia Miyake et al., 1962.

Type locality: Asia.

Distribution: Red Sea, Gulf of Aden, Arabian Gulf ?!, Gulf of Oman, Sri Lanka, Andaman Islands, West Malay Peninsula, Japan, Korea, China, Hong Kong, Taiwan, Philippines, New Guinea and Australia; 8-120 m.

Calappa hepatica (Linnaeus, 1758) Plate 6 C

Cancer hepaticus Linnaeus, 1758: 630.
Cancer tuberculatus Herbst, 1785: 204, pl. 13, fig. 78.
Calappa tuberculata Weber, 1795: 92.
Calappa tuberculosa Guérin-Méneville, 1829-1844 (1829): pl. 12, figs 2a-b.

Calappa (Calappa) hepatica de Haan, 1833-1849 (1837): 70, pl.
Calappa spinosissima H. Milne Edwards, 1837: 106
Calappa sandwichensis Eydoux & Souleyet, 1842: pl. 3, figs 9-10.
Calappa hepatica White, 1847f: 44; Miers, 1876b.
Calappa uberculata Heller, 1861a.
Calappa spinosissimus Stebbing, 1917c: 19.
Calappa alata (not Rathbun, 1911) Curtiss, 1938: 170.
Calappa hepatica var. spinosissima Buitendijk, 1939: 231.
Calappa hepatica hepatica Serène, 1968: 41(list).
Calappa hepatica spinosissima Serène, 1968: 41(list).

Type locality: India.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Kenya, Tanzania, Mozambique, South Africa, Gulf of Oman, Strait of Hormuz, Arabian Gulf, India, Laccadives, Maldives, Japan, Korea, Taiwan, Thailand, Philippines, Australia, Fiji, Hawaiian Islands and New Zealand; intertidal to 100 m.

Materials examined: 2♂♂ CL 21-23.02 mm, CW 31.2-33.9 mm Site 17, leg. RUWW 20.01.85. 3♀♀ CL 13.05-20.9 mm, CW 18.10-30.2.6 mm Site 27, leg. RUWW 01.03.84. 5♀♀ CL 18.8-21.5 mm, CW 25.9-30.7 mm Site 22, leg. RUWW 01.02.84. 2♀♀ CL 21.9-22.7 mm, CW 33.6-33.7 mm Site 22, leg. RUWW 01.02.84. 2♂♂ CL 8.7-13.5 mm, CW 11.7-17.1 mm Site 30, leg. RUWW 26.03.84. ♂ CL 12.3 mm, CW 12.8 mm Site 30, leg. RUWW 30.05.84. 2♀♀ CL 9.7-15 mm, CW 11.5-17.6 mm Site 2, leg. SMF 13.04.98. 2♂♂ CL 15.8-18.7 mm, CW 17.2 - 21.5 mm Site 2, leg. SMF 13.04.98. ♀ CL 11.7 mm, CW 12.7 mm Site 17, leg. SMF 25.03.98. 4♀♀ (2. ovi) CL 11.4-15.1mm, CW 12.3-17.2 mm Site 17, leg. SMF 25.03.98. 2♂♂ CL 8.4 - 11.6 mm, CW 9-12.3 mm Site 17, leg. SMF 25.03.98. ♂ CL 13.4 mm, CW 14.6 mm Site 4, leg. SMF 12.04.04. ♀ CL 15.5 mm, CW 16.1 mm Site 37, leg. SMF 18.05.05. 6♂♂ CL 11.9-14.5 mm, CW 13-16.6 mm Site 37, leg. SMF 18.05.05. ♀ CL 14.7 mm, CW 15 mm Site 42, leg. SMF 26.05.05. ♂ CL 19.7 mm, CW 21.6 mm Site 42, leg. SMF 26.05.05. 2♀♀ CL 11.6-14.8 mm, CW 12.3-16.4 mm Site 36, leg. SMF 18.05.05. 4♂♂ CL 12.2-14.5 mm, CW 12.9-15.6 mm Site 36, leg. SMF 18.05.05. ♂ CL 15.2 mm, CW 17.3 mm Site 42, leg. SMF 27.05.05. 5♂♂ CL 15.1-36.1 mm, CW 18.4-45.3 mm Site 22, leg. RUWW 29.03.07.

Calappa capellonis Laurie, 1906 Plate 6 D

Calappa gallus capellonis Laurie, 1906; Urita, 1926a, Sakai, 1934a, Takeda & Suga, 1979, Miyake, 1983, Muraoka, 1998.
Calappa gallus var. capellonis Ihle, 1918.
Calappa gallus (part = capellonis) Rathbun, 1937: 214(part).
Calappa capellonis Takeda & Koyama, 1974, Takeda & Shikatani, 1990, Chen H, 1993b, Galil, 1997a.

Type locality: Sri Lanka.

Distribution: Gulf of Aden, Seychelles, Madagascar, Pakistan, Sri Lanka, Japan, Taiwan, Indonesia, Australia and New Caledonia; 9-80 m.

Calappa gallus (Herbst, 1803) Plate 6 E

Cancer gallus Herbst, 1803: 46, pl. 58, fig. 1.

Cancer (Calappa) gallus Latreille, 1816a: 24.
Gallus gallus de Haan, 1833-1849 (1837): 70.
Calappa gallus H. Milne Edwards, 1837: 105; Guinot, 1967: 245; Serène, 1968: 41(list); Zarenkov, 1971: 170; Galil, 1997a: 275(key), 293, figs 10c, 12, 13c, 31.
Calappa lophos (not Herbst, 1785) Buitendijk, 1939: 231 (part), pl. 8, fig. 5.
Calappa galloides Stimpson, 1859.

Type locality: East Indies.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Mozambique, Madagascar, South Africa, Arabian Sea, Arabian Gulf ?!, Pakistan, India; Sri Lanka, Japan, Taiwan, South China Sea, Philippines, Indonesia and Hawaiian Islands.

Mursia bicristimana Alcock & Anderson, 1894 Plate 6 F

Mursia bicristimana Alcock & Anderson, 1894, p 179; 1896, Plate 24, Figure 5; Alcock, 1896, p 150–151; 1899, p 23–24, Plate III, Figures 3, 3a, b.
? Mursia armata bicristimana: Doflein, 1904, p 41, Plate 17, Figure 3, Plate 18, Figure 4.
Mursia bicristimana Lloyd, 1907, p 6; Kemp & Sewell, 1912, p 29.
? *Mursia bicristimana*: Galil, 1993, p 356–357.
Mursia armata: Zarenkov, 1994, p 100–101 (part: Vitiaz St. 2560, 2573, 2825) [not *Mursia armata* de Haan, 1837].
Not *Mursia bicristimana*: Laurie, 1906, p 355–356; Galil, 1993, p 356–357 (part: specimens from Sri Lanka and the Laccadives deposited in the NHM), Figures 1f, 3j, k, 5c, d.

Type locality: Gulf of Manaar, Sri Lanka.

Distribution: Gulf of Aden, Socotra Island, Laccadive Sea and Gulf of Manaar.

Family Matutidae De Haan, 1835

Ashtoret lunaris (Forskål, 1775) Plate 7 A

Cancer lunaris Rumphius, 1705-1766 (1741): 11, pl. 7(s) (pre-Linnaean); Forskål, 1775: 91(part).
Matuta banksii Leach, 1817: 14; Miers, 1877b: 245, pl. 40, figs 1-2; de Man, 1896b: 363; Nobili, 1899: 250 (part); Balss, 1916; Barnard, 1950: 359, fig. 67 h-k.
Matuta victor (nec Fabricius, 1781) Desmarest, 1825: 101, pl. 7 (2); White, 1847f: 46 (part).
Matuta lunaris White, 1847f: 46 (part); Yamaguchi & Baba, 1993: 317, fig. 100.
Matuta Banksii de Man, 1888d: 389; Nobili, 1903c: 23.
Matuta banksi Ortmann, 1892: 573; Bouvier, 1915b: 39; Ihle, 1918: 185 (part), 308.
Matuta Banksi Bouvier, 1915b: 216.
Ashtoret lunaris Galil & Clark, 1995: 5, fig. 1a-b, pl. 1a-b; Ng, 1998c: 1093 (key), 1096, fig. 8a.

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden: Aden, Socotra Island, Mozambique, South Africa, Gulf of Oman, Indian Ocean, Malaysia, Taiwan, China, Philippines, Indonesia, west of Celebes and Australia.

Ashtoret picta (Hess, 1865) Plate 7 B

Matuta lunaris (nec Rumphius, 1741) Leach, 1817: 13, pl. 127, figs 3-5.
Matuta picta Hess, 1865: 158, pl. 6, fig. 13; Miers, 1877b: 246, pl. 40, figs 5-7; de Man, 1881b: 118(part).
Matuta distinguenda Hoffmann, 1874: 27, pl. 6, figs 49-52, pl. 7, figs 53-55.
Matuta picta Ortmann, 1892: 573.
Matuta banksi var. *picta* Nobili, 1899: 251.
Matuta banksii (not Leach, 1817) Lanchester, 1902: 552 (part); Klunzinger, 1906: 65, pl. 2, fig. 12; Sakai, 1937a: 98, pl. 13, fig. 2; Barnard, 1950: 359, fig. 67h-k.
Matuta banksi (not Leach, 1817) Sakai, 1976: 141(part), pl. 45, fig. 1.
Ashtoret picta Galil & Clark, 1995: 18, fig. 3c-d, pl. 6a-b.

Type locality: Sydney, Australia.

Distribution: Red Sea, Gulf of Aden: Aden, Kenya, Zanzibar, South Africa, Madagascar, Seychelles, Sri Lanka, Malaysia, Japan, Taiwan, Indonesia and Australia: Sydney.

Superfamily Dorippoidea MacLeay, 1838
Family Dorippidae MacLeay, 1838

Dorippe frascone (Herbst, 1785) Plate 7 C, D

Cancer frascone Herbst, 1785: 192.
Dorippe frascone; Thomassin, 1978, annexe: 61; Chen, 1986a: 182, figs. 2a-b; 1986*b*: 119-120, figs.' 1-2 (4, 6, 8); Kensley, 1981: 38.
Dorippe dorsipes; Borradaile, 1903: 439; Lenz, 1910: 545; Stephensen, 1945 : 63, figs. 4a-b; Barnard,1950 : 390, fig. 73.
Dorippe sp; Fourmanoir, 1954: 15.

Type locality: South China Sea.

Distribution: Gulf of Aden, East and South coasts of Africa, Australia, China and Japan.

Superfamily Eriphioidea MacLeay, 1838
Family Eriphiidae MacLeay, 1838

Eriphia smithii MacLeay, 1838 Plate 8 A

Eriphia Smithii MacLeay, 1838: 60; Krauss, 1843: 30, pl. 2, fig. 3; Dana, 1852c: 251.
Eriphia laevimana var. smithii Hilgendorf, 1879: 797; Miers, 1880a: 237.
Eriphia laevimana var. Smithii de Man, 1888d: 327; Alcock, 1898: 216.
Eriphia laevimana var. Smithi Nobili, 1906: 291; Nobili, 1906: 142.
Eriphia smithii Stimpson, 1907: 72; Barnard, 1950: 274, figs 37f, 51; Michel, 1964: 26; Yamaguchi *et al*., 1976: 38; Chang & Chen, 1992.
Eriphia sebana smithi Stimpson, 1907: 72; Stephensen, 1945: 140, fig. 34C-D; Guinot, 1964b: 89.
Eriphia sebana smithii Sakai, 1935a: 71.
Eriphia laevimana smithii Sakai, 1939: 523, fig. 49, pl. 64, fig. 4; Sakai, 1954: 75.
Eriphia laevimana smithi Shen, 1940b: 72, 86.
Eriphia smithi Sakai, 1976: 478, pl. 172, fig. 3; Miyake, 1983: 131, pl. 44, fig. 3.

Type locality: South Africa.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Kenya, Zanzibar, Mozambique, South Africa, Madagascar, Arabian Gulf, Gulf of Oman, Pakistan, India, Malaysia, Japan, China, Hong Kong, Singapore and Indonesia.

Materials examined: ♀ CL 28.8 mm, CW 37.9 mm Site 23, leg. AUAA 05.04.14. Juv CL 8.9 mm, CW 12.2 mm Site 23, leg. AUAA 05.04.14. 2♀♀ CL 37.4 - 38.7 mm, CW 50.2 - 52.3 mm Site 19, leg. AUAA 26.04.14. ♂ CL 29.1 mm, CW 38.7 mm Site 19, leg. AUAA 26.04.14. ♀ CL 40.3 mm, CW 53.8 mm Site 21, leg. AUAA 02.04.14. ♀ CL 40.9 mm, CW 53.1 mm Site 18 leg. AUAA 26.04.14. 2ovi.♀♀ CL 18.8 - 27.2 mm, CW 25.7 - 36.5 mm Site 21 leg. AUAA 01.03.13. ♂ CL 26.7 mm, CW 35.9 mm Site 21 leg. AUAA 01.03.13. 2♂♂ CL 20.7 - 33 mm, CW 27.4 - 44.8 mm Site 48 leg. AUAA 17.03.11. ♀ CL 31.2 mm, CW 41.3 mm Site 51 leg. AUAA 16.03.11. CL 36 mm, CW 48 mm Site 51 leg. AUAA 16.03.11. ♀ CL 37.8 mm, CW 48.7 mm Site 52 leg. AUAA 15.03.11. 3♀♀ CL 29 - 44 mm, CW 37 - 55 mm Site 19 leg. AUAA 21.10.16. ♀ CL 30.5 mm, CW 40.6 mm Site 40, leg. RUWW 01.03.84. ♂ CL 31.3 mm, CW 42.7 mm Site 40, leg. RUWW 01.03.84. ♂ CL 24.7 mm, CW 32.2 mm Site 40, leg. RUWW 01.03.85. ♀ CL 32.5 mm, CW 44.3 mm Site 29, leg. RUWW 01.10.88. ♂ CL 22.2 mm, CW 29.1 mm Site 22, leg. RUWW 01.03.84. ♀ CL 26.3 mm, CW 35.3 mm Site 33, leg. SMF 16.05.05. ♂ CL 34.1 mm, CW 45 mm Site 33, leg. SMF 16.05.05. ♂ CL 37.8 mm, CW 50.4 mm Site 32, leg. SMF 23.05.05. 3♀♀ CL 20 - 27.5 mm, CW 27 - 36.6 mm Site 33, leg. SMF 23.05.05. ♂ CL 34.1 mm, CW 44.6 mm Site 33, leg. SMF 23.05.05. ♀ CL 27.4 mm, CW 36.2 mm Site 43, leg. SMF 27.05.05. ♂ CL 27.5 mm, CW 37 mm Site 43, leg. SMF 27.05.05. 2♀♀ CL 38.6 - 44.2 mm, CW 52.8 - 60.1mm Site 53, leg. RUWW 01.03.84. ♂ CL 32.4 mm, CW 42.6 mm Site 53, leg. RUWW 01.03.84.2Juv CL 5.7 - 6.8 mm, CW 8.1 - 8.9 mm Site 15, leg. RUWW01.12.83. 2♀♀ CL 14.6 - 20.8 mm, CW 20 - 27.3 mm Site 43, leg. SMF 27.05.05.

Eriphia sebana (Shaw & Nodder, 1803) Plate 8 B

Cancer sebana Shaw & Nodder, 1803: pl. 591.
Eriphia laevimana Guérin-Méneville, 1829-1844 (1831-1832): pl. 3, fig. 1; A. Milne Edwards, 1862c: 5.
Eriphia levimana Dana, 1852c: 249; Dana, 1855: pl. 14, fig. 7a-c; Stimpson, 1907: 72.
Eriphia trapeziformis Hess, 1865: 135, pl. 6, fig. 4; de Man, 1887a: 690, 695.
Eriphia sebana Rathbun, 1906: 865; Rathbun, 1911: 233; Edmondson, 1923: 19; Sendler, 1923: 39; Guinot, 1964b: 88; Takeda & Hayashi, 1973: 73; Sakai, 1976: 478, pl. 172, fig. 1.
Eriphia sebena Takeda & Nunomura, 1976: 76.

Type locality: unknown.

Distribution: Red Sea, Gulf of Aden, Arabian Sea: Oman, South Africa, Zanzibar, Madagascar, Somalia, Seychelles, Burma, Japan, China, Indonesia and Hawaii.

Family Menippidae Ortmann, 1893

Menippe rumphii (Fabricius, 1798) Plate 8 C

Cancer Rumphii Fabricius, 1798: 336; Herbst, 1799: 63, pl. 49, fig. 2.
Pseudocarcinus Bellangeri H. Milne Edwards, 1834: 409, pl. 14 bis, fig. 15.
Menippe bellangeri Heller, 1865: 15; Müller, 1887: 474.
Menippe rumphii Alcock, 1898: 178; Shen, 1936c: 67; Chopra & Das, 1937: 404.
Menippe Rumphii Klunzinger, 1913: 283.

Type locality: East Indies.

Distribution: Red Sea; Gulf of Aden, Socotra Island, Mozambique, Gulf of Oman, Arabian Gulf, Pakistan, Laccadive Islands, India, Sri Lanka, Burma, Taiwan and Malaysia.

Family Oziidae Dana, 1851

Epixanthus frontalis (H. Milne Edwards, 1834) Plate 8 D

Ozius frontalis H. Milne Edwards, 1834: 406.
Epixanthus Kotschii Heller, 1861b: 325, pl. 1, fig. 14.
Epixanthus frontalis Heller, 1865: 20; A. Milne Edwards, 1873a: 241; Chang & Chen, 1992.
Galene natalensis (not Krauss, 1843) Stebbing, 1921b: 456.

Type locality: Tranquebar.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Somalia, Zanzibar, Mozambique, South Africa, Madagascar, Arabian Sea, Arabian Gulf, Pakistan, India, Burma, Japan, China, Gulf of Thailand, Philippines, Indonesia and Australia.

Materials examined: 2♀♀ CL 13.4-14.2 mm, CW 22.5-23.7mm Site 26, leg. AUAA 08.01.14. ♂ CL 15 mm, CW 25.3 mm Site 26, leg. AUAA 08.01.14. 1 ovi.♀ CL 16.2 mm, CW 27.2 mm Site 18 leg. AUAA 26.04.14. 4♀♀ (1 ovi). CL 14.7-17.9 mm, CW 24.8-30.9 mm Site 21 leg. AUAA 01.03.13. 6♂♂ CL 8.6-20.9 mm, CW 14 - 33.8 mm Site 21 leg. AUAA 01.03.13. 3(1 ovi).♀♀ CL 10.6-15.3 mm, CW 17.9-25.7 mm Site 19 leg. AUAA 01.04.13. 2♂♂ CL 10.6 - 21.1 mm, CW 17.5 - 20.2 mm Site 19 leg. AUAA 01.04.13. 3♀♀ CL 15.5 - 17.5 mm, CW 25.5 - 30.5 mm Site 48 leg. AUAA 17.03.11. 2♂♂ CL 16 - 20.4 mm, CW 28.6 - 33.2 mm Site 51 leg. AUAA 16.03.11. 2♀♀ CL 14-14.1 mm, CW 23-24 mm Site 21 leg. AUAA 27.10.16. ♂ CL 22 mm, CW 36 mm Site 24 leg. AUAA 02.11.16. ♀ CL 20.7 mm, CW 35.8 mm Site 26, leg. RUWW 07.08.96. ♂ CL 19.5 mm, CW 33 mm Site 26, leg. RUWW 07.08.96. 2♀♀ CL 16.2 – 20 mm, CW 27.3 - 34 mm Site 26, leg. RUWW 08.08.84. ♂ CL 19.5 mm, CW 33.3 mm Site 26, leg. RUWW 08.08.84. ♀ CL 10 mm, CW 16.4 mm Site 22, leg. RUWW 01.03.07. ♂ CL 11.8 mm, CW 19.3 mm Site 22, leg. RUWW 01.03.07. 9♀♀ CL 7.4 - 14.6 mm, CW 12.2 - 24.4 mm Site 9, leg. SMF 06.04.04. 10♂♂ CL 10 - 14.5 mm, CW 16.4 - 23.8 mm Site 9, leg. SMF 06.04.04. ♀ CL 13.5 mm, CW 23.1 mm Site 32, leg. SMF 23.05.05. ♂ CL 12 mm, CW 19.9 mm Site 32, leg. SMF 23.05.05.

Epixanthus corrosus A. Milne-Edwards, 1873 Plate 8 E

Epixanthus corrosus A. Milne Edwards, 1873a: 241, pl. 9, fig. 1; de Man, 1888d: 292, pl. 11, fig. 3; Nobili, 1906: 273; Guinot, 1958: 276, figs 28, 30.
Epixanthus rugosus Kossmann, 1877: 36.

Type locality: New Caledonia.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Gulf of Oman, Arabian Gulf, Mayotte, Madagascar, Chagos Archipelago, Japan, Taiwan, China, Indonesia and New Caledonia.

Lydia tenax (Rüppell, 1830) Plate 8 F

Cancer tenax Rüppell, 1830: 11, pl 3, fig. 1, pl 6, fig. 5.
Ozius (*Euruppellia*) *tenax* Alcock, 1898: 187.
Lydia tenax Serène 1984: 309, pl 46f; Hogarth, 1994: 102.
Lydia (*Ozius*) *tenax* Hornby, 1997: 16.

Type locality: Red Sea (Massaua).

Distribution: Red Sea, Gulf of Aden, Socotra Island, Arabian Sea, Arabian Gulf, Gulf of Oman, Pakistan, East Africa and Seychelles.

Superfamily Hexapodoidea Miers, 1886
Family Hexapodidae Miers, 1886

Hexapinus simplex Rahayu & Ng, 2014 Plate 9 A, B

Hexapinus simplex Rahayu & Ng, 2014.

Type locality: Ekas, Lombok, Indonesia.

Distribution: Gulf of Aden: Aden, Arabian Sea, South coast of Lombok Island, Indonesia, Singapore, Ryukyu Islands, Japan, South China Sea and Taiwan Strait.

Superfamily Leucosioidea Samouelle, 1819
Family Leucosiidae Samouelle, 1819

Coleusia biannulata Tyndale-Biscoe & George, 1962 Plate. 10 A

Leucosia biannulata Tyndale-Biscoe & George, 1962: 92, 93, fig 4.
Leucosia longifrons var. neocaledonica Alcock, 1896: 218.
Leucosia longifrons Nobili, 1906: 97; Stephensen, 1946: 93–94; Chhapgar, 1969: 610, pl 1b.
Leucosia perlata Stephensen, 1946: 95.
Leucosia biannulata Titgen 1982: 247; Tirmizi & Kazmi, 1986: 94‑97, fig 27a‑f; Apel, 2001: 52; Ng *et al*., 2008: 94.
Coleusia biannulate Galil, 2006: 57, figs 1a, 3a, 4a.

Type locality: India.

Distribution: Red Sea, Gulf of Aden, ?! Arabian Gulf, Pakistan, and India.

Leucosia anatum (Herbst, 1783) Plate 10 B

Cancellus Anatum Rumphius, 1705-1766 (1741): pl. 10, fig. A8.
Cancer urania Herbst, 1801: 17, pl. 53, fig. 3.

Leucosia anatum Leach, 1815b: 334; Holthuis, 1959a: 107; Tyndale-Biscoe & George, 1962: 80, figs 4(12), 5-6, 8(7), pl. 3, figs 1-2.
Leucosia urania H. Milne Edwards, 1836-1844 (1837): pl. 25, figs 1, 1a-d; Bell, 1855: 283.
Leucosia longifrons de Haan, 1833-1849 (1841): 132, pl. 33, fig. 4; Bell, 1855: 284; Ortmann, 1892: 585; Alcock, 1896: 217; Laurie, 1906: 362.
Leucosia polita Hess, 1865: 155, pl. 6, fig. 14; Haswell, 1882c: 120; de Man, 1887a: 703.
Leucosia neocaledonica A. Milne Edwards, 1874: 40, pl. 2, fig. 1; Haswell, 1879b: 46.
Leucosia ornata Miers, 1877b: 236, pl. 38, figs 7-9; de Man, 1888b: 198.
Leucosia pulcherrima Miers, 1877b: 236, pl. 38, figs 4-6; de Man, 1881c: 123.
Leucosia splendida Haswell, 1879b: 47, pl. 5, fig. 1.
Leucosia Urania Lenz & Richters, 1881: 425.
Leucosia australiensis Miers, 1886: 322, pl. 27, figs 1, 1a-c; Stebbing, 1893: 127, pl. 2.
Leucosia longifrons var. pulcherrima Alcock, 1896: 219; Ihle, 1918: 316(list).
Leucosia longifrons var. Pulcherrima Calman, 1900: 27; Laurie, 1906: 362.
Leucosides longifrons Rathbun, 1902a: 30; Rathbun, 1910a: 309; Urita, 1926a: 37.
Leucosides urania Rathbun, 1910a: 309, pl. 1, fig. 1.
Leucosides longifrons pulcherrima Rathbun, 1910a: 309, pl. 1, fig. 14.
Leucosia (longifrons var.) pulcherrima Stephensen, 1945: 94, fig. 17c.

Type locality: Ambon, Indonesia.

Distribution: Red Sea, Gulf of Aden: Aden , Madagascar, Mauritius, Gulf of Oman, Arabian Gulf, Pakistan, Sri Lanka, Andaman Islands, Mergui Archipelago, Japan, Taiwan, China, Philippines, Indonesia, Australia, New Caledonia and Fiji; 15-80 m.

Ebalia abdominalis Nobili, 1906 Plate 10 C

Ebalia abdominalis Nobili, 1906c: 399.
Ebalia abdominalis Nobili, 1906: 155, 157, pl 9, fig 2; Ihle 1918: 310.

Type locality: Red Sea and Gulf of Aden.

Distribution: Red Sea, Gulf of Aden and Arabian Gulf.

Ryphila cancellus (Herbst, 1783) Plate 10 D

Cancer cancellus Herbst, 1783: 94, pl. 2, fi g. 20.
Leucosia scabriuscula Fabricius, 1798: 349; Lichtenstein, 1816: 142; Latreille, 1802: 116.
Philyra scabriuscula Leach, 1817: 22; Desmarest, 1825: 167; H. Milne Edwards, 1837: 132, pl. 20, fi gs 9, 10; White, 1847: 47; Bell, 1855a: 365; 1855b: 299; 1855c: 14; Tirmizi & Kazmi, 1988: 106, fi g. 31.
Philyra punctata Barnard, 1926: 120.
Philyra corallicola Chhapgar, 1957: 408, fi g. 8n.
Philyria globulosa Devi *et al*., 1988: 21, fi g. 2.
Philyra cancella K. Sakai, 1999: 17, pl. 7B.

Type locality: Unknown.

Distribution: Gulf of Aden, Socotra Island, Mozambique, Madagascar, Gulf of Oman, Arabian Gulf, Pakistan, India, Mergui Archipelago, Malay Archipelago, Burma, Thailand, Borneo, Sumatra and Australia.

Philyra granigera Nobili, 1906 Plate 10 E

Philyra granigera Nobili, 1906: 162.
Philyra granigera Nobili, 1906: 102‑104, pl 6, fig 30; Ihle 1918: 315; Stephensen, 1946: (?partly) 85‑87, figs 13, 14; Guinot, 1967: 249.

Type locality: Arabian Gulf.

Distribution: Red Sea, Gulf of Aden, Gulf of Oman and Arabian Gulf.

Hiplyra variegata (Rüppell, 1830) Plate 10 F

Myra variegata Rüppell, 1830: 17, pl 4–4.
Myra variegata Nobili, 1906: 169.
Philyra platycheira Paul'son, 1875: 83, pl 10, fig 3; Alcock 1896: 242.
Philyra variegata Laurie, 1915: 410; Stephensen, 1946: 89, figs 15f–k, 16; Serène 1968: 46.

Type locality: Red Sea (Egypt).

Distribution: Red Sea, Gulf of Aden, Gulf of Oman, East Africa (Mombasa, Kenya) and Arabian Gulf.

Philyra cf. globus (Fabricius, 1775) Plate 11 A

Cancer globus Fabricius, 1775: 401.
Cancer globosus Fabricius, 1787: 315.
Leucosia globosa Fabricius, 1798: 349.
Leucosia globulosus Bosc, 1801.
Philyra polita Henderson, 1893.

Type locality: India (Malabar Coast).

Distribution: Gulf of Aden: Aden, Socotra Island, Gulf of Oman, Arabian Gulf, Pakistan, India, Sri Lanka and Mergui Archipelago.

Nobiliella jousseaumei (Nobili, 1906) Plate 11 B

Nursia jousseaumei Nobili, 1906 (type locality: Red Sea: Mayun (Perim)); 1906: 151, pl. 9(4).

Type locality: Mayun (Perim), Yemen, Red Sea.

Distribution: Red Sea: Mayun (Perim), Gulf of Aden, Arabian Sea: Yemen.

Nobiliella cornigera (Nobili, 1906) Plate 11 C

Nursia cornigera Nobili, 1906: 398.

Type locality: Red Sea.

Distribution: Red Sea and Gulf of Aden: Obock (Djibouti).

Ixa holthuisi Tirmizi, 1970 Plate 11 D

Ixa holthuisi Tirmizi, 1970: 313, figs 1, 2.
Ixa holthuisi Tirmizi & Kazmi, 1986: 69‑71, fig 19a–f; Apel, 2001: 50, 51.
Ixa edwardsi Stephensen, 1946: 73, 74.
Ixa sp. 5 Basson *et al*., 1977: 243.

Type locality: Pakistan (Karachi).

Distribution: Gulf of Aden, Arabian Gulf, Gulf of Oman and Pakistan.

Arcania undecimspinosa de Haan, 1841 Plate 11 E

Arcania spinosa de Haan, 1833-1849 (1841): 135, pl. 33, fig. 8; de Haan, 1833-1849 (1844): pl. J; Yamaguchi, 1993: 587.
Arcania undecimspinosa Bell, 1855: 309; Miers, 1884b: 548; Sakai, 1976: 91, pl. 28, fig. 1; Wang & Chen, 1981; Tirmizi & Kazmi, 1991: 76, fig. 22; Galil, 2001: 197-199, figs 3D, 7D.
Arcania granulosa Miers, 1877b: 240, pl. 38, fig. 29; Haswell, 1879b: 58; Haswell, 1882c: 131.

Type locality: Japan.

Distribution: Gulf of Aden, Seychelles, Pakistan, India, Gulf of Martaban, Japan, Korea, East China Sea, Hong Kong, Taiwan, Vietnam, Thailand, Philippines and Australia; 14-420 m.

Arcania cf. tuberculata Bell, 1855 Plate 11 F

Arcania tuberculata Bell, 1855a: 367; Bell, 1855b: 310, pl. 34, fig. 8; Alcock, 1896: 268; Borradaile,1903: 438; Laurie, 1906: 366; Lenz, 1910: 545; Ihle, 1918: 264; Serène, 1968: 45.
Arcania laevimana White, 1847: 50 (nom. nud.); Bell, 1855a: 367; Bell, 1855b: 310, pl. 34, fig. 10; Bell, 1855c: 22; A. Milne Edwards, 1874: 48, pl. 3, fig. 4; Alcock & Anderson, 1894: 203; Ihle, 1918: 264.
Arcania loevimana Serène, 1968: 45 [erroneus spelling].
Arcania globata; Tan, 1996: 1027, fig. 1c.
not *Arcania tuberculata*; Tyndale-Biscoe & George, 1962: 76 [= *A. fungilifera* spec. nov.].

Type locality: Philippines.

Distribution: Gulf of Aden, New Caledonia, Australia, Indonesia, Philippines, South China Sea, Andamans, Sri Lanka, Maldives, Seychelles, Arabian Gulf and Madagascar; 10-124 m depth.

Arcania gracilis Henderson, 1893 Plate 12 A

Arcania septemspinosa var. gracilis Henderson, 1893: 403.
Arcania quinquespinosa Alcock & Anderson, 1894b: 206; Alcock & Anderson, 1896: pl. 24, fig. 6; Alcock, 1896: 266; Sakai, 1965b: 41, pl. 16, fig. 5.
Arcania gracilis Takeda, 1973d: 89, pl. 2 B; Takeda, 1979a: 153; Galil, 2001: 184-187, figs 2C, 5D.

Type locality: off Madras coast, India.

Distribution: Red Sea, Gulf of Aden, Arabian Gulf, Strait of Hormuz, Oman, Madagascar, India, Sri Lanka, Singapore, Japan, Taiwan, China, Vietnam, Philippines, Indonesia and New Caledonia; 21-366 m.

Nursilia dentata Bell, 1855 Plate 12 B

Nursilia dentata Bell, 1855b: 309, pl 34, fig 6.
Nursilia dentata Alcock, 1896: 260; Ihle, 1918: 244, 245; Chen, 1982: 267, 268, fig 1 (1, 2); Apel, 2001: 55;
Ng *et al*., 2008: 92.
Type locality: Indian Ocean.

Distribution: Gulf of Aden, Mozambique, Seychelles, Arabian Sea, Arabian Gulf, Maledives, India, Sri Lanka, Thailand, China, Japan, Indonesia, Australia and Fiji.

Myra subgranulata Kossmann, 1877 Plate 12- C, D

Myra subgranulata Kossmann, 1877: 65, pl 1, fig 7.
Myra fugax Nobili, 1906: 164; Hilgendorf, 1878: 811; Richters, 1880: 157; Klunzinger, 1906: 73; Nobili, 1906: 164; Lenz, 1910: 544; Balss, 1915; Tirmizi & Kazmi, 1986: 89, fig 26 k.
Myra coalita Hilgendorf, 1878: 812, pl. 10, figs 6, 7.
Myra affinis Nobili, 1906: 165.
Persephona fugax Laurie, 1915: 428.
Myra cyrenae Ward, 1942: 67, pl. 5, fig. 1; Serène, 1968: 44.
Myra subgranulata Galil, 2001: 431, fig 3a, 16; Ng *et al*., 2008: 92 (in list); Galil *et al*., 2012: 3, fig 2c.

Type locality: Red Sea.

Distribution: Red Sea, Suez Canal, Gulf of Aden, Arabian Gulf, South Africa, Mozambique, Madagascar, Mauritius, Eastern Mediterranean (Lessepsian migrant).

Leucisca rubifera (Müller, 1887) Plate 12 E

Nursia rubifera Müller, 1887: 480, pl 4, figs 4, 4a, b; Laurie, 1915; Apel, 2001.
Nursia rubifera Alcock, 1896: 180 (in key), 185; Ihle, 1918: 236 (in key), 312; Tirmizi & Kazmi, 1986: 80, fig 23a–e.
Leucisca rubifera Ng *et al*., 2008: 89.

Type locality: Sri Lanka.

Distribution: Red Sea, Gulf of Aden, Madagascar, Arabian Gulf, Gulf of Oman, Pakistan, India and Sri Lanka.

Cryptocnemus cf. pentagonus Stimpson, 1858 Plate 12 F

Cryptocnemus pentagonus Stimpson, 1858c: 162; Stimpson, 1907: 163, pl. 14, figs 5-6; Ihle, 1918: 317(list); Sakai, 1934a: 285, fig. 1; Sakai, 1976: 124, fig. 70, pl. 36, fig. 3; Takeda, 1989: 137.

Type locality: Kagoshima Bay, Japan.

Distribution: Gulf of Aden: Aden, Japan.

Superfamily Majoidea Samouelle, 1819
Family Majidae Samouelle, 1819

Schizophrys aspera H. Milne Edwards, 1834 Plate 13 A, B

Mithrax asper H. Milne Edwards, 1834: 320; Dana, 1852c: 97; Dana, 1855, pl. 2, fig. 4a-b.
Maja (Mithrax) dichotoma de Haan, 1833-1849 (1837): pl. 22, fig. 4; Yamaguchi, 1993: 584.
Maja (Dione) affinis de Haan, 1833-1849 (1839): 94, pl. G; Yamaguchi, 1993: 584.
Mithrax spinifrons A. Milne Edwards, 1867: 263.
Schizophrys aspera A. Milne Edwards , 1872: 231, pl. 10, fig. 1, 1a-f; Rathbun, 1924c: 6; Sakai, 1935a: 66; Sakai, 1976: 246, pl. 89, fig. 3; Tirmizi & Kazmi, 1991: 175, figs 54-56.
Mithrax (Schizophrys) affinis Kossmann, 1877: 11, 13.
Mithrax (Schizophrys) triangularis Kossmann, 1877: 11, 13.
Mithrax (Schizophrys) triangularis var. asper Kossmann, 1877: 11.
Mithrax (Schizophrys) triangularis var. indica Kossmann, 1877: 11.
Mithrax (Schizophrys) triangularis var. africanus Kossmann, 1877: 11.
Dione affinis Stimpson, 1907: 18.
Schizophrys asper Chopra & Das, 1937: 390.
Schizophrys spiniger (not White, 1848) Ward, 1941: 1.
Schizophrys serratus Ward, 1942b: 74; Michel, 1964: 7.
Non *Schizophrys aspera* -Rathbun, 1918b: 25; Hale, 1927a: 138(part).
= *Schizophrys rufescens* Griffin & Tranter, 1986.

Type locality: unknown.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Mozambique, South Africa, Madagascar, Arabian Gulf, Gulf of Oman, Pakistan, India, Sri Lanka, Malaysia, Japan, China, Philippines, Indonesia, Australia, New Caledonia and Hawaiian Islands; 0-40 m.

Materials examined: 2♀♀ CL 26.3-33.4 mm, CW 21.1-27.7 mm Site 18 leg. AUAA 2008. 3♂♂ CL 37.2-56.2 mm, CW 30.3-48.9 mm Site 18 leg. AUAA 2008. ♀ CL 42.7 mm, CW 36 mm Site 26, leg. RUWW 04.11.88. 3♂♂ CL 45.9-56.3 mm, CW 38.6-50.8 mm Site 26, leg. RUWW 04.11.88. ♂ CL 50.5 mm, CW 42.3 mm Site 26, leg. RUWW 01.03.85. Juv CL 12.7 mm, CW 9.6 mm Site 28, leg. RUWW 01.01.85. Juv CL 11.6 mm, CW 9 mm Site 2 leg. SMF 08.04.04. ♂ CL 27.1 mm, CW 22.4 mm Site 34 leg. SMF 16.05.05. ♀ CL 28.8 mm, CW 17.6 mm Site 41 leg. SMF 26.05.05. ♀ CL 22.9 mm, CW 19 mm Site 33 leg. SMF 21.05.05. ♂ CL 13.3 mm, CW 11.9 mm Site 41 leg. SMF 28.05.05. ♀ CL 13.6 mm, CW 10.5 mm Site 45 leg. SMF 27.05.05. ♀ CL 15.1 mm, CW 12.3 mm Site 42 leg. SMF 28.05.05. 2 ♂♂ CL 13.8-18.6 mm, CW 11.2-15.1 mm Site 42 leg. SMF 28.05.05.

Micippa platipes Rüppell, 1830 Plate 13 C, D

Micippa platipes Rüppell, 1830: 8, pl. 1, fig. 4; Heller, 1861b: 299, pl. 1, fig. 2; Sakai, 1976: 258, figs 138b-b', pl. 90, fig. 2; Tirmizi & Kazmi, 1991: 185, fig. 58; Wada, 1995: 388, fig. 21-291B, pl. 104, fig. 4.
Paramicippe platipes H. Milne Edwards, 1834: 333.
Paramicippa platipes de Man, 1887d: 227; de Man, 1888c: 250; Rathbun, 1910b: 305.
Micippa biarinata Adams & White, 1848: 16.
Micippa hirtipes Dana, 1851d: 268; Dana, 1855, pl. 1, fig. 4a-e; Stimpson, 1907: 15.
Micippa spatulifrons A. Milne Edwards, 1872: 240, pl. 11, fig. 3.
Micippa philyra var. platipes Kossmann, 1877: 4, 7, pl. 3, fig. 3.
Micippa philyra var. latifrons Richters, 1880: 142, pl. 15, figs 1-5.
Micippe platipes Klunzinger, 1906: 37, fig. 8, pl. 1, figs 8a-f.
Micippa bicarinata Ward, 1941: 1 (in list).

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden: Aden , Socotra Island, Kenya, Gulf of Oman, Arabian Gulf, Pakistan, Sri Lanka, Japan, China, Philippines, Indonesia and New Caledonia; intertidal to 45 m.

Cyclax spinicinctus Heller, 1861 Plate 13 E

Cyclax spinicinctus Heller, 1861b: 304, pl. 1, figs 7-8; Forest & Guinot, 1961: 16, figs 7, 8, 11, pl. 6, fig. 3; Griffin, 1966c: 286(in key); Griffin & Tranter, 1974: 165; Chen H., 1980b: 128, fig. 11, pl. 2, figs 1-2.
Cyclomaia margariata A. Milne Edwards, 1872: 236 (part).

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden, Madagascar, Japan, China and New Caledonia.

Majidae.gen. sp. 1 Plate 13 F

Type locality: Unknown.

Distribution: Unknown

Seiitaoides cf. stimpsonii (Miers, 1884) Plate 14 A, B

Eurynome stimpsoni Miers, 1884:523-524, pi. 47 fig. A, a; Griffin & Tranter, 1974.

Type locality: unknown.

Distribution: Red Sea, Gulf of Aden: Aden.

Family Epialtidae MacLeay, 1838

Stilbognathus cervicornis (Herbst, 1803) Plate 15 A, B

Cancer Cervicornis Herbst, 1803: 49, pl. 58, fig. 2.
Stenocionops cervicornis H. Milne Edwards, 1834: 338; H. Milne Edwards, 1836-1844 (1839): pl. 31, figs 1, 1a-d; Henderson, 1893: 343; Alcock, 1895a: 248; Michel, 1964: 7.
Ophthalmias cervicornis Rathbun, 1906: 882; Sakai, 1938a: 249, figs 25a-b; Guinot, 1962c: 46, fig. 33; Griffin, 1974: 22, figs 5, 7a-c; Sakai, 1976: 190, pl. 66, fig. 1; Tirmizi & Kazmi, 1991: 150, fig. 46.
Stilbognathus cervicornis Griffin & Tranter, 1986a: 64; Muraoka, 1998: 24; Sakai K., 1999: 23, pl. 10D.
Stilbognathus ? curvicornis Kazmi & Tirmizi, 1999: 381, fig. 5 (erroneous spelling).

Type locality: East Indies.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Arabian Sea, India, Japan, Indonesia and Hawaiian Islands; 10-30 m.

Hyastenus hilgendorfi De Man, 1887 Plate 15 C

Hyastenus hilgendorfi de Man, 1887b: 14, pl. 1, figs 3-4; Alcock, 1895a: 209; Stephensen, 1945: 107, fig. 20 D; Griffin, 1968a: 103, fig. 1, pl. 1; Tirmizi & Serène, 1971: 25, pl. 2, fig. B; Griffin, 1974: 15.
Halimus hilgendorfi Rathbun, 1906: 881.

Type locality: Mergui Archipelago.

Distribution: Red Sea, Gulf of Aden: Aden, Arabian Sea, Arabian Gulf, Strait of Hormuz, India, Sri Lanka, Andaman Sea, Strait of Malacca, Gulf of Thailand, Singapore, Philippines, Indonesia, Australia and Hawaiian Islands; 5-108 m.

Hyastenus brockii de Man, 1887 Plate 15 D

Hyastenus Brockii de Man, 1887b, pp. 221-3, pi. 7, figs. 1, la, lb.
Hyastenus brockii de Man: Griffin, 1966, p. 282 (in key).

Type locality: unknown.

Distribution: Red Sea, Gulf of Aden: Aden, Indian Ocean, Indo-Malaya and Australia.

Huenia heraldica (De Haan, 1837) Plate 15 E

Maja (Huenia) elongata de Haan, 1833-1849 (1837): pl. 23, figs 4-5.
Maja (Huenia) heraldica de Haan, 1833-1849 (1837): pl. 23, fig. 6.
Maja (Huenia) proteus de Haan, 1833-1849 (1839): 95, fig. G; Yamaguchi, 1993: 585.
Huenia proteus De Haan, 1839, Laurie, 1915; Griffin & Tranter, 1974.
Huenia proteus Adams & White, 1848: 21, pl. 4, figs 4-7; Ortmann, 1893: 40; Laurie, 1906: 372; Sakai, 1938a: 264, fig. 31, pl. 26, figs 4-5; Griffin, 1976: 190; Griffin & Tranter, 1986a: 84, fig. 24c-d.
Huenia brevirostrata Dana, 1852c: 134; Dana, 1855, pl. 6, fig. 4a-c.
Huenia heraldica Holthuis, 1987: 15; Yamaguchi & Baba, 1993: 354, fig. 114.
Non *Huenia proteus* Borradaile, 1903c: 686(part), fig. 124, pl. 47, fig. 2.

= *Huenia brevifrons* Ward, 1941.
Non *Huenia proteus* Hale, 1927a, fig. 132.
= *Huenia halei* Griffin & Tranter, 1986.
Non *Huenia proteus* Barnard, 1950: 41(part), fig. 9a-f.
= *Huenia grandidierii* Milne Edwards, 1865.
Non *Huenia proteus* Griffin & Tranter, 1974: 169.
= *Menaethius orientalis* (Sakai, 1969).

Type locality: Japan.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Arabian Sea, Kenya, Seychelles, Mauritius, Andamans, Japan, Korea, Taiwan, China, Indonesia and Australia; 0-36 m.

Acanthonyx limbatus A. Milne-Edwards, 1862 Plate 15 F

Dehaanius (Acanthonyx) limbatus A. Milne Edwards, 1862: 7-8, pl. 17 figs. 4, 4 a-b.
Acanthonyx (Dehaanius?) (*limbatus* A. Milne Edwards?); Stephensen, 1945: 101 (Schlüssel), 102-105, figs. 19 A-H.
Acanthonyx limbatus Guinot, 1967: 292 (Liste); Basson Et Al., 1977: 237, 256; Titgen, 1982: 114-115, 248 (Liste); Griffin & Tranter, 1986: 68-69; Hogarth, 1989: 108; Tirmizi & Kazmi, 1991: 159-161, figs. 48-49.

Type locality: Réunion.

Distribution: Gulf of Aden, Socotra Island, Dhofar, Arabian Gulf, Pakistan, Bombay, South India, Réunion and Mauritius.

Simocarcinus simplex (Dana, 1851) Plate 16 A, B

Huenia simplex Dana, 1852c: 133; Dana, 1855: pl. 6, fig. 3a-c.
Simocarcinus helleri Paulson, 1875.
Simocarcinus simplex Miers, 1879d: 649; Miers, 1886: 35; Henderson, 1893: 342; Alcock, 1895a: 196; Griffin & Tranter, 1974: 182; Tirmizi, 1978: 311, figs 1-8; Tirmizi & Kazmi, 1991: 154, fig. 47.
Simocarcinus camelus Klunzinger, 1906: 17, pl. 1, fig. 2a-c, f; Balss, 1938a: 18 (name only).
Simocarcinus camelus brevirostris Klunzinger, 1906: 18, pl. 1, fig. 2d.
Simocarcinus camelus pinnirostris Klunzinger, 1906: 18, pl. 1, fig. 2e, g; Lenz, 1910: 540; Sakai, 1938a: 265, fig. 32a-b.
Trigonothir simplex Balss, 1938a: 18; Sakai, 1976: 209.
Huenia platyrostrata Pillai, 1951: 3, fig. 1a-b.
Trigonothir samoaensis Edmondson, 1951: 207, fig. 13a-d.
Trigonothir camelus Sakai, 1976: 211, fig. 114a-b; Dai & Yang, 1991: 134, pl. 15(4).

Type locality: Sandwich Islands.

Distribution: Red Sea, Gulf of Aden, Arabian Sea, Japan, China, Australia and Hawaiian Islands.

Tylocarcinus styx (Herbst, 1803) Plate 16 C

Cancer Styx Herbst, 1803: 53, pl. 58, fig. 6.
Pisa styx H. Milne Edwards, 1834: 308; Richters, 1880: 141.

Arctopsis styx Adams & White, 1848: 10.
Microphrys styx A. Milne Edwards , 1872: 247, pl. 11, fig. 4; Paulson, 1875: 1, 11-12, pl. 1, fig. 1a-f.
Tylocarcinus styx Miers, 1879c: 14; de Man, 1881a: 94; Ortmann, 1893: 62; Guinot, 1962b: 242, fig. 17a-b; Griffin & Tranter, 1974: 186; Sakai, 1976: 221, pl. 76, fig. 2.
Tylocarcinus Styx de Man, 1887d: 228.
Tylocarcinus (Microphrys) styx Bouvier, 1915b: 245.

Type locality: East Indies.

Distribution: Red Sea, Gulf of Aden, Arabian Sea, Mauritius, Sri Lanka, Japan, Taiwan, China, Indonesia, Borneo Bank, Solomon Islands - Florida Group, New Caledonia, Fiji and Samoa; 0-4 m.

Menaethius monoceros (Latreille, 1825) Plate 16 D

Pisa monoceros Latreille, 1825b: 139.
Inachus arabicus Rüppell, 1830: 24, pl. 5, fig. 5, pl. 6, fig. 19.
Menaethius monoceros H. Milne Edwards, 1834: 339, pl. 15, figs 12-13; Ortmann, 1893: 39; Alcock, 1895a: 197; de Man, 1902a: 662; Griffin & Tranter, 1974: 176; Sakai, 1976: 205, pl. 70, fig. 1; Tirmizi & Kazmi, 1991: 170, fig. 53.
Menaethius subserratus Adams & White, 1848: 18, pl. 4, fig. 1; Dana, 1852c: 122.
Menaethius porcellus Adams & White, 1848.
Menaethius tuberculatus Adams & White, 1848: 19; Dana, 1852c: 123.
Menaethius angustus Dana, 1852c: 120; Dana, 1855, pl. 4, fig. 5a-b.
Menaethius depressus Dana, 1852c: 121; Dana, 1855, pl. 4, fig. 6a-e; Stimpson, 1907: 26.
Menaethius areolatus Dana, 1852c: 124; Dana, 1855, pl. 5, fig. 2a-c.
Menaethius inornatus Dana, 1852c: 125; Dana, 1855, pl. 5, fig. 3a-d'.
Menaethius dentatus Stimpson, 1857c: 219; Stimpson, 1907: 25, pl. 3, fig. 6.
Menaethius rugosus A. Milne Edwards, 1863.
Menaethius monoceros var. angusta Miers, 1886: 37.
Type locality: unknown.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Zanzibar, Mozambique Island and Delagoa Bay, South Africa, Madagascar, Mauritius, Seychelles, Gulf of Oman, Arabian Gulf, Pakistan, India, Japan, Korea, Taiwan, China, Indonesia, New Caledonia, Hawaiian Islands, Tahiti and Tuamotu Archipelago; intertidal to 57 m.

Family Inachidae MacLeay, 1838

Cyrtomaia cf. goodridgei McArdle, 1900 Plate 17 A, B

Cyrtomaia Goodridgei McArdle, 1900: 472; MacGilchrist, 1905: 251.
Cyrtomaia goodridgei Alcock & McArdle, 1903: pl. 59, figs 1, 1a-c; Guinot & Richer de Forges, 1982b: 35, fig. 18; Griffin & Tranter, 1986a: 25, pl. 1.
Cyrtomaia suhmi platyceros Doflein, 1904: 55, pl. 19, fig. 3, pl. 40, fig. 1-7, pl. 43, fig. 4, pl. 45, figs 1-5, pl. 56, figs 6, 6a.
Cyrtomaia Goodridgii Alcock *et al*., 1907: pl. 78, figs 2, 2a.

Type locality: Sri Lanka.

Distribution: Gulf of Aden: Aden, Sri Lanka, Bay of Bengal, Andaman Sea, Japan, Philippines and Indonesia, 370-942 m.

Sunipea indicus (Alcock, 1895) Plate 17 C

Apocremnus indicus Alcock, 1895a: 188, pl. 4, fig. 2-2a; Alcock & Anderson, 1896: pl. 20, figs 1, 1a.
Aepinus indicus Griffin, 1972: 68, fig. 3; Griffin, 1974: 6; Griffin & Tranter, 1974: 164.
Sunipea indicus Griffin & Tranter, 1986a: 59, figs 15a, d.

Type locality: Andamans.

Distribution: Red Sea, Gulf of Aden, Somalia, Seychelles, Mozambique, Sri Lanka, Andaman Islands, Japan, Indonesia and Australia; 47-300 m.

Macropodia formosa Rathbun, 1911 Plate 17 D

Macropodia formosa Rathbun, 1911: 242–244, fig 1.
Macropodia formosa Griffin, 1974: 19, fig 4c, d; Griffin & Tranter, 1986: 33; Kazmi & Tirmizi, 1995: 62–64, fig 2a–i; Apel, 2001: 62, 63; Ng *et al.,* 2008: 112(in list).
Achaeus tenuicollis Stephensen, 1946: 97, fig 18a, b;

Type locality: Saint Brandon.

Distribution: Gulf of Aden, Socotra Island, Arabian Gulf, Pakistan and Saint Brandon.

Camposcia retusa (Latreille, 1829) Plate 17 E

Camposcia retusa Latreille, 1829: 60; H. Milne Edwards, 1834: 283, pl. 15, figs 15-16; Alcock, 1895a: 184; Griffin, 1974: 7; Griffin & Tranter, 1974: 165.
(Camposcia) retusus de Haan, 1833-1849 (1839): pl. H.
Type locality: unknown.

Distribution: Red Sea, Gulf of Aden, Mozambique, South Africa, Madagascar, Mauritius, Pakistan, Sri Lanka, Japan, Taiwan, China, Indonesia and Australia; 10-50 m.

Inachus dorsettensis (Pennant, 1777) Plate 17 F

Cancer dorsettensis Pennant, 1777
Cancer scorpio Fabricius, 1779
Inachus scorpio Fabricius, 1798
Inachus dorsettensis Leach, 1815
Pseudocollodes complectens Rathbun, 1911:248, pi. 20: fig. 4

Type locality: unknown.

Distribution: Gulf of Aden, Eastern Atlantic Ocean from the coast of Norway to South Africa, extending into the western Indian Ocean to Lourenc, Marques and Seychelles.

Superfamily Parthenopoidea MacLeay, 1838
Family Parthenopidae MacLeay, 1838

Daldorfia spinosissima (A. Milne-Edwards, 1862) Plate 18 A, B

Parthenope spinosissima A. Milne Edwards, 1862a: 8, pl. 18; Alcock, 1895a: 280; Flipse, 1930: 66 (key), 93 (list).
Daldorfia spinosissima Serène & Umali, 1972: 58, pl. 5, figs 9-10; Sakai, 1976: 286, fig. 160.
Parthenope horrida var. spinosissima Ortmann, 1893: 417.

Type locality: Réunion.

Distribution: Gulf of Aden: Yemen, Socotra Island, Gulf of Oman, Réunion, Mauritius, Bay of Bengal, Japan, Philippines and Indonesia.

Daldorfia horrida (Linnaeus, 1758) Plate 18 C

Cancer horridus Linnaeus, 1758: 629; Herbst, 1788: 222, pl. 14, fig. 88.
Parthenope horrida Fabricius, 1798: 353; Leach, 1814-1817: 107; A. Milne Edwards, 1872: 225; Ortmann, 1893b: 417; Alcock, 1895a: 279; Laurie, 1915: 434; Sakai, 1976: 283, fig. 157, pl. 96, fig. 2.
Non *Daldorfia horrida* Rathbun, 1906: 886, fig. 39, pl. 14, fig. 5.
= *Daldorfia rathbuni* (de Man, 1902).

Type locality: unknown.

Distribution: Red Sea, Gulf of Aden, Socotra Island, South Africa, Mauritius, Sri Lanka, Japan, Taiwan, China, Singapore, Philippines, Indonesia, south off New Guinea and New Caledonia; 33-125 m.

Furtipodia petrosa (Klunzinger, 1906) Plate 18 D

Heterocrypta petrosa Klunzinger, 1906: 53, pl. 2, fig. 9; Lenz, 1910: 543; Laurie, 1915.
Daldorfia horrida — Hoover, 1998: 271, photo (b). Not *Cancer horridus* Linnaeus, 1758.

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Sri Lanka, Guam, Australia, New Caledonia and Hawaii.

Aethra scruposa (Linnaeus, 1764) Plate 18 E, F

Cancer scruposus Linnaeus, 1764: 450.
Cancer Polynome Herbst, 1801: 23, pl. 53, figs 4-5.
Cancer depressa Lamarck, 1801: 265.
Aethra scruposa Milne Edwards H, 1836-1844 (1838), pl. 38, figs 2, 2a; Stimpson, 1907: 32; Guinot, 1966: 748, fig. 11; Sakai, 1976: 289, pl. 97, fig. 3.

Oethra scruposa Alcock, 1895a: 285; Sakai, 1938a: 344, pl. 40, fig. 3; Michel, 1964: 9.

Type locality: India.

Distribution: Gulf of Aden: Aden, East of Africa, Mauritius, India, Sri Lanka, Japan, Taiwan, China, New Caledonia and Fiji; 35-200 m.

Parthenope longimanus (Linnaeus, 1758) Plate 19 A

Cancer longimanus Linnaeus, 1764: 441, 1047; Herbst, 1790: 252, pl. 19, figs 105, 106.
Lambrus longimanus Leach, 1815b: 310; H. Milne Edwards, 1836-1844(1836): pl. 26, figs 1, 1a-b; de Man, 1895a: 493; Alcock, 1895a: 260; Nobili, 1899: 26.
Parthenope (Parthenope) longimanus Rathbun, 1911: 256; Campbell & Stephenson, 1970: 263, fig. 31.
Lambrus (Lambrus) longimanus Nobili, 1903c: 28; Tirmizi & Kazmi, 1991: 198, fig. 61.
Parthenope longimanus Serène & Vadon, 1981: 124; Wang & Chen, 1981; Takeda, 1989: 150.

Type locality: unknown.

Distribution: Red Sea, Gulf of Aden: Aden, Mauritius, Arabian Gulf, Pakistan, India, Sri Lanka, Japan, Philippines, South China Sea, Indonesia and Australia; 25-70 m.

Rhinolambrus longispinus (Miers, 1879) Plate 19 B

Lambrus longispinus Miers, 1879b, pp. 18-19.
Lambrus spinifer Haswell, 1880a, pp. 451-2, pi. 27, fig. 1.
Lambrus (Rhinolambrus) longispinis Miers: Alcock, 1895, pp. 266-7. Flipse, 1930, p. 28.
Parthenope (Rhinolambrus) longispinis (Miers): McNeill, 1968, p. 48.
non; *Lambrus {Rhinolambrus) longispinis* Miers: Sakai, 1938, pp. 333-4, pi. 39, fig. 2.

Type locality: unknown.

Distribution: Gulf of Aden: Yenem, India, Japan, Australia, and Samoa.

Aulacolambrus granulosus (Miers, 1879) Plate 19 C

Parthenope (Aulacolambrus) brevibrachiatus Shen *et al.,* 1982: 142, fig. 2(5), pl. 1, fig. 6; Dai & Yang, 1991: 171, fig. 87(1-4), pl. 21(4).
Aulacolambrus brevibrachiatus Tan *et al.,* 1999.

Type locality: South China Sea.

Distribution: Gulf of Aden: Aden, China, South China Sea, Beibu Gulf, South and Taiwan; 174 m.

Aulacolambrus hoplonotus (Adams & White, 1849) Plate 19 D

Lambrus hoplonotus Adams & White, 1848: 35, pl. 7, fig. 3; A. Milne Edwards , 1872: 258; Miers, 1879b: 22; Haswell, 1882c: 33; Henderson, 1893: 351.

Lambrus (Aulacolambrus) hoplonotus Miers, 1886: 98; Ortmann, 1894b: 48; Alcock, 1895a: 273; Laurie, 1915: 435; Forest & Guinot, 1961: 26; Michel, 1964: 8.
Parthenope (Aulacolambrus) hoplonotus Rathbun, 1906: 885; Rathbun, 1911: 257; Sakai, 1976: 280, pl. 95, fig. 1.
Aulacolambrus hoplonotus Serène & Vadon, 1981: 124; Tan *et al*., 1999.

Type locality: Eastern Sea.

Distribution: Red Sea, Gulf of Aden, Madagascar, Mauritius, Sri Lanka, Bay of Bengal, Andaman Islands, Japan, Taiwan, Singapore, Philippines, Indonesia, Australia, Hawaiian Islands and Tahiti.

Superfamily Pilumnoidea Samouelle, 1819
Family Pilumnidae Samouelle, 1819

Eurycarcinus orientalis A. Milne-Edwards, 1867 Plate 20 A

Eurycarcinus orientalis A. Milne-Edwards, 1867: 277.
Eurycarcinus orientalis Jones, 1986a: 162, pl 47; Apel & Türkay, 1992: 194, 204, 205; Apel, 2001: 97, 98; Ng *et al.,* 2008: 140.
Eurycarcinus grandidieri Alcock, 1898: 211, 212.
Eurycarcinus sp. Basson *et al*., 1977: 58, 228 (in list), fig 38; Titgen, 1982: 131.
not *Eurycarcinus orientalis* Alcock, 1898: 210, 211; Chhapgar, 1957: 436, 437, pl 11, d–f; Tirmizi *et al*., 1986: 8–10, fig 3a–d; Tirmizi & Ghani, 1996: 30–32, fig 10 [= *Eurycarcinus integrifrons* De Man, 1879].

Type locality: India (Mumbai).

Distribution: Red Sea, Gulf of Aden, Arabian Gulf, Gulf of Oman, Pakistan, India and Thailand.

Eurycarcinus integrifrons de Man, 1879 Plate 20 B

Eurycarcinus integrifrons De Man, 1879: 55, 56.

Type locality: unknown.

Distribution: Red Sea, Gulf of Aden, Arabian Gulf, Gulf of Oman, Pakistan and India.

Pilumnus vespertilio (Fabricius, 1793) Plate 20 C

Cancer vespertilio Fabricius, 1793: 463; Fabricius, 1798: 338.
Pilumnus vespertilio H. Milne Edwards, 1834: 418; Miers, 1884a: 219; de Man, 1887b: 58; Guinot, 1958: 278; Sakai, 1976: 484, fig. 258.
Pilumnus ursulus Adams & White, 1848: 45, pl. 9, fig. 6; Kossmann, 1877: 39.
Pilumnus mus Dana, 1852c: 240; Stimpson, 1858a: 36.
Actaea dentata Edmondson, 1935: 29, fig. 9, pl. 1B.

Type locality: India.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Zanzibar, Tanzania, Mozambique, Madagascar, Arabian Sea, Gulf of Oman, Arabian Gulf, Mauritius, India, Malay

Peninsula, Taiwan, China, Singapore, Philippines, Indonesia, New Guinea, Australia, New Caledonia, Fiji, Tongatabu, Hawaiian Islands and New Zealand.

Pilumnus cf. minutus De Haan, 1835 Plate 20 D

Cancer (Pilumnus) minutus de Haan, 1833-1849 (1833): pl. 3, fig. 2, pl. B.
Pilumnus hirsutus Stimpson, 1858a: 37; Miers, 1879b: 31; Ortmann, 1893b: 437; Alcock, 1898: 197; Laurie (1914.
Pilumnus minutus A. Milne Edwards, 1872: 250; Sakai, 1934a: 307
Pilumnus minutus (?) *var. hirsutus* Miers, 1886: 154.
Pilumnus minutus hirsutus Lanchester, 1900b: 743.
Pilumnus habererianus Doflein, 1902: 629, pl. 5, fig. 5; Parisi, 1916: 185.

Type locality: Japan.

Distribution: Red Sea, Gulf of Aden, South Africa, Arabian Gulf, Maldives, Sri Lanka, Japan, Korea, China, Taiwan, Philippines, Indonesia, Australia and New Caledonia; littoral to 276 m.

Pilumnus incanus (Forskål, 1775) Plate 20 E

Cancer incanus Forskål, 1775: 92.
Pilumnus forskalii Nobili, 1906.
Pilumnus incanus Klunzinger, 1913: 259, fig 16, tab 7, figs a-d.

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden, Arabian Sea, Gulf of Oman and Arabian Gulf.

Glabropilumnus levimanus (Dana, 1852) Plate 20 F

Glabropilumnus laevimanus Galil & Takeda, 1988: 72, figs. 3C, 4.
Pilumnus laevimanus Dana, 1852, p. 237; 1855, pi. 13, fig. 11a; A. Milne Edwards, 1873, p. 250, pi. 10, fig. 4; De Man, 1888, p. 301; Lanchester, 1901, p. 542; Lenz, 1905, p. 356; Nobili, 1906, p. 279; Laurie, 1915; Gordon, 1934, P. 53.
Pilumnus edamensis De Man, 1888, p. 302, pi. 11, fig. 5.
Pilumnus laevis Lanchester, 1900, p. 743.
Glabropilumnus edamensis BALSS, 1932, p. 516 (list); 1933, p. 39 (list); Takeda & Miyake, 1969, p. 131 (list); SERENE, 1968, p. 87 (list); 1969, p. 288 (list).
Glabropilumnus laevimanus Balss, 1938, p. 61; Guinot, 1962a, p. 273 (list); 1962b, p. 2, fig. 1.
Glabropilumnus loevimanus Serene, 1968, p. 87 (list).
Nee *Pilumnus edamensis* Montgomery, 1931, p. 445, pi. 27, fig. 1 (=G. gordonae Balss).

Type locality: Balabac Strait, north of Borneo.

Distribution: Red Sea, Gulf of Aden, Zanzibar, Cocos-Keeling Island, Singapore, Kelantan, Malay Penin, Malacca, South China Sea, Hong Kong, Pulo, Edam and New Caledonia.

Pilumnus savignyi Heller, 1861 Plate 21 A

Pilumnus savignyi Heller, 1861a: 345.
Pilumnus savignyi Nobili, 1906: 138; Balss, 1933: 20; Guinot, 1967: 274 (in list); Titgen, 1982: 252 (in list); Jones, 1986a: 163, pl 48; Hogarth, 1989: 106, 114; Hogarth, 1994: 101; Apel, 2001: 100.
Pilumnus (*savignyi* Heller?) Stephensen, 1946: 145, 146, fig 36b, c.

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden, Southern Oman, Gulf of Oman, Arabian Gulf, East Africa and Aldabra.

Pilumnus propinquus Nobili, 1906 Plate 21 B

Pilumnus propinquus Nobili, 1906: 163.
Pilumnus propinquus Nobili, 1906: 140–142; Nobili, 1906: 277, pl 10, fig 7; Balss, 1933: 12; Stephensen, 1946: 147, 206 (in list); Guinot, 1964: 3 (in list), 7, 95, 97, fig 56a, b; Guinot, 1967: 274 (in list); Titgen, 1982: 252 (in list); Hogarth, 1989: 106; Hogarth, 1994: 101; Apel, 2001: 100; Ng *et al*., 2008: 142 (in list).
Pilumnus? *propinquus* Titgen, 1982: 137.

Type locality: Arabian Gulf and Red Sea.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Southern Oman, Gulf of Oman, Arabian Gulf and Aldabra.

Actumnus tesselatus Alcock, 1898 Plate 21 C, D

Actumnus tesselatus Alcock, 1898: 205.
Actumnus tesselatus Alcock & Anderson, 1899: pl 37, fig 9; Nobili, 1906: 132; Stephensen, 1946: 142; Titgen 1982: 251 (in list); Apel, 2001: 96; Ng *et al*., 2008: 140 (in list).

Type locality: Arabian Gulf.

Distribution: Red Sea, Gulf of Aden and Arabian Gulf.

Actumnus asper (Rüppell, 1830) Plate 21 E

Xantho asper Rüppell, 1830: 21, pl 4, fig 8.
Actumnus bonnieri Nobili, 1906: 163; Laurie, 1915.
Actumnus bonnieri Nobili, 1906: 132, pl 6, fig 32.
Actumnus asper Stephensen, 1946: 141, 142, 206, fig 35c, d; Guinot, 1964: 98‑100, fig 55a, b, 57, pl 11(2); Guinot, 1967: 272 (in list); Apel, 2001: 95: Ng *et al*., 2008: 139 (in list).

Type locality: *Actumnus asper*: Red Sea (Jeddah). *Actumnus bonnieri*: Arabian Gulf (Abu Dhabi, UAE).

Distribution: Red Sea, Gulf of Aden, Socotra Island, Arabian Gulf, India (Gulf of Mannar), Sri Lanka, Andaman Sea, Indo Malayan Archipelago, Seychelles, South China Sea and Tuamotu.

Pilumnopeus convexus (Maccagno, 1936) Plate 21 F

Heteropanope convexa Maccagno, 1936: 176, 177.
Pilumnopeus vauquelini Stephensen, 1946: 141, fig 35a, b; Guinot, 1967: 275 (in list; partly); Basson *et al*., 1977: 228, 231, 243; Titgen, 1982: 252 (in list); Hornby, 1997: 15; Naderloo & Türkay, 2012: 37.
Pilumnopeus convexa Davie, 1989: 142, 143.
Pilumnopeus convexus Cooper, 1997: 171‑173, figs 6, 16; Apel, 2001: 98; Ng *et al*., 2008: 141.

Type locality: Red Sea (Eritrea, Asab).

Distribution: Red Sea, Gulf of Aden, Arabian Gulf, Gulf of Oman, Pakistan, Indian coasts and South Africa.

Echinoecus pentagonus (A. Milne-Edwards, 1879) Plate 22 A, B

Eumedon pentagonus A. Milne Edwards, 1879c: 104.
Echinoecus pentagonus Rathbun, 1894b: 66; Rathbun, 1906: 880, fig. 37; Sakai, 1976: 295, pl. 100, fig. 1.
Eumedon convictor Bouvier & Seurat, 1905: 629; Nobili, 1907: 382.
Liomedon pentagonus Klunzinger, 1906: 57, pl. 2, figs 11a-d.
Eumedonus convictor Laurie, 1915: 408, 411; Holthuis, 1953: 6.
Eumedonus petiti Gravier, 1922: 484; Miyake, 1939a: 85.
Eumedonus pentagonus Balss, 1922b: 137; Balss, 1924b: 70.
Echinoecus rathbunae Miyake, 1939a: 84, 88, figs 1A, 2A1-2, 3A1-2.
Echinoecus rathbunae convictor Miyake, 1939a: 84, 88.
Echinoecus petiti nipponensis Miyake, 1939a: 90, figs 1B, 2B1-3, 3B1-3.
Echinoecus klunzingeri Miyake, 1939a: 85, 88.

Type locality: Mauritius.

Distribution: Red Sea, Gulf of Aden, Madagascar, Mauritius, Japan, Korea, Taiwan, South China Sea, Vietnam and Hawaiian Islands.

Family Galenidae Alcock, 1898

Halimede tyche (Herbst, 1801) Plate 22 C, D

Cancer Tyche Herbst, 1801: 35, pl. 52, fig. 3.
Halimede thurstoni Henderson, 1893: 360, pl. 36, figs 13-14; Rathbun, 1910a: 353, pl. 1, fig. 19, pl. 2, fig. 7; Odhner, 1925: 81.
Halimede hendersoni Nobili, 1906: 162; Nobili, 1906: 123, pl. 6, fig. 1; Odhner, 1925: 82.
Halimede ochtodes (not Herbst, 1783) Rathbun, 1910a: 353 (part); Stephensen, 1945: 158, figs 41B-D; Guinot, 1967: 264; Sakai, 1976: 387, fig. 208b; Ghani & Tirmizi, 1992: 41, fig. 3.

Halimede tyche Serène, 1968: 72 (list); Sakai K., 1999: 35, pl. 18H; Galil, 2000: 329, fig. 3A-B.
Non Halimede tyche; Rathbun, 1910a: 353; Balss, 1922c: 129; Dai & Yang, 1991: 264, fig. 142 (1), pl. 32 (6).
= *Halimede fragifer* de Haan, 1835.

Type locality: East Indies.

Distribution: Red Sea, Gulf of Aden: Yemen, Arabian Gulf, India, Japan, Thailand, Australia and first recorded in the Mediterranean as an immigrant coming from the Red Sea via the Suez Canal.

Superfamily Potamoidea Ortmann, 1896
Family Potamidae Ortmann, 1896
Socotrapotamon socotrensis (Hilgendorf, 1883) Plate 22 E, F

Telphusa socotrensis Hilgendorf, 1883. In: Taschenberg, 1883; Zeitschr. f. Naturwiss. 56: 171-173.
Telphusa granosa Koelbel, 1884; Sitzungsber. Akad. Wiss. Wien math.-naturw. Kl. 90 (1): 321, Plate 1 Fig. 6.
Thelphusa Socotrensis A. Milne Edwards 1887; Ann. Sci. Nat. Zool. (7) 4: 133 [also: Bibl. de l'ecole des Hautes Etudes, sect. sci. nat. 33 (4): 13].
Potamon Socotrense de Man, 1898; Ann. Mus. Civ. Stor. Nat. Genova (2) 19: 438.
Potamon socotrensis Pocock, 1903; In: Forbes, H.O., Nat. Hist. Sokotra Abd-el-Kuri: 212-213, Figs a-d.
Potamon (Geothelphusa) socotrensis Rathbun, 1904-1906, Nouv. Arch. Mus. hist. nat. (4) 6 (1904): 7, 241; (1905): 202 (key), 212.
Potamon socotrense BALSS, 1929; Zool. Jahrb. Abt. Syst. Okol. Geogr. Tiere 58: 342-343.
Potamon socotrensis Chace 1942; Bull. Mus. Comp. Zool. 91 (3): 222; Wranik 1986; Contr. Flora and Fauna Peoples' Dem. Rep. Yemen: 77-78; Wranik 1998; Proc. 1st Int. Symp. Soqotra Isl.: Present and Future, Vol. 1: 164, 169 (fig.).

Type locality: Yemen, Socotra Island.

Distribution: This is endemic species in Yemen: Socotra Island, where it is common in freshwater streams and wadis throughout the island from the low coastal areas in the north to the mountainous parts of the Hagghier.

Superfamily Portunoidea Rafinesque, 1815
Family Portunidae Rafinesque, 1815
Charybdis (Goniohellenus) smithii MacLeay, 1838 Plate 23 A

Charybdis Smithii MacLeay, 1838. — In: Smith, A. (ed.). Illustrations of the Zoology of South Africa: 61.
Charybdis Smithii Krauss, 1843: 24; Stebbing 1910: 37; Griffin & Stanbury, 1970: 123.
Goniosoma truncatum, A. Milne Edwards, 1861: 380, pl. 34 fig. 4. [not *Portunus truncatus* Fabricius, 1798: 365].
Charybdis (Goniohellenus) edwardsi Leene & Buitendijk, 1949- Bijdragen tot de Dierkunde 28: 296-298, figs 3, 4 c.
Gonioneptunus smithii Barnard, 1950: 163-164, fig. 31 j; Hashmi, 1964: 452.
Charybdis (Goniohellenus) edwardsi Sankarankutty & Rangarajan, 1964: 311; Della Croce & Holthuis, 1965: 33-38, figure; Silas, 1969: 26, fig. 11, pl. 3 A-B.

Charybdis smithii Stephenson & Rees, 1967 b: 285-287; Stephenson & Rees, 1967 c: 9; Tirmizi & Kazmi, 1996: 6 (list).
Charybdis edwardsi Stephenson, 1967 c: 9; Losse, 1969: 145-152.
Charybdis hoplites var. *omanensis* Zarenkov, 1968: 34-35 (part: material from the Bay of Bengal). [not *Charybdis omanensis* Leene, 1938].
Charybdis (Goniohellenus) smithii Stephenson, 1972 b: 13 (key), 35; Crosnier & Thomassin, 1974: 1109-1111, figs 9 a-f.
Charybdis smithi Kensley, 1981: 42 (list); Zamorov *et al*., 1991: 39-42.
Charybdis (Charybdis) smithii Balasubramanian & Suseelan, 1990: 385-391.
Charybdis (Goniohellenus) smithi Spiridonov, 1994: 133-134.
Charybdis hoplites longicollis Zarenkov, 1994: 115, figs 3 B, 11. [not *Charybdis (Goniohellenus) hoplites* var. *longicollis* Leene, 1938].

Type locality: Cape of Good Hope (South Africa).

Distribution: Red Sea, Gulf of Aden, Arabian Sea, Gulf of Oman, Somalia, Madagascar, East African coast, South Africa, Seychelles and Saya de Malha.

Charybdis (Charybdis) feriata (Linnaeus, 1758) Plate 23 B

Cancer Marinus Laevis Rumphius, 1705-1766 (1705): 10, pl. 6, fig. P.
Cancer feriatus Linnaeus, 1758: 627.
Cancer sexdentatus (part = feriatus) Herbst, 1783: 153(part), pl. 8, fig. 53 (not pl. 7, fig. 52).
Cancer cruciatus Herbst, 1794: 155, pl. 38, fig. 1.
Portunus crucifer Fabricius, 1798: 364; von Siebold, 1824: 14.
Portunus (Oceanus) crucifer de Haan, 1833-1849 (1833): pl. A; de Haan, 1833-1849 (1835): 40; Yamaguchi, 1993: 577.
Thalamita crucifera H. Milne Edwards, 1834: 462.
Charybdis crucifera Dana, 1852c: 286; Stimpson, 1858a: 39; Balss, 1922c: 104.
Goniosoma cruciferum A. Milne Edwards, 1861: 371; de Man, 1888d: 334; Henderson, 1893: 374.
Gonisoma (Oceanus) cruciferum Thallwitz, 1891: 53.
Charybdis (Goniosoma) crucifera Alcock, 1899a: 51; Nobili, 1903c: 31; Gordon, 1931: fig. 13e.
Charybdis cruciatus Stebbing, 1910: 306.
Charybdis cruciata Rathbun, 1910a: 362; Rathbun, 1910b: 313; Sakai, 1965b: 123, pl. 62, pl. 63, fig. 1.
Charybdis (Goniosoma) cruciatus Delsman & de Man, 1925: 311, 312; Chopra, 1935: 482, figs 7a-b.
Charybdis (Goniosoma) cruciata Shen, 1932a: 38, fig. 6, pl. 8; Chopra & Das, 1937: 392; Chhapgar, 1957b: 20, pl. A, fig. 1, pl. 5 d-g; Khan & Ahmad, 1975: 77.
Charybdis (Charybdis) cruciata Leene, 1938: 24, figs 1-2; Stephensen, 1945: 114, fig. 24A; Crosnier, 1962: 75, figs 130-132.
Charybdis crusiata Lin, 1949: 19 (erroneous spelling).
Charybdis feriata Holthuis, 1959a: 111Bahmani, 1997: 6, 8.
Charybdis (Charybdis) feriatus Stephenson & Rees, 1967a: 10; Stephenson, 1975: 177.
Charybdis feriatus Stephenson, 1967: 10; Campbell & Stephenson, 1970: 273; Tirmizi & Kazmi, 1996: 28(key), 39, figs 19, 20A-G, pl. 2 A.
Charybdis (goniosoma) cruciata Khan, 1975: 379 (list), 387, 383 (key), fig. 4, pl. 1.

Type locality: Ambon, Indonesia.

Distribution: Gulf of Aden, Arabian Gulf, Gulf of Oman, Somalia, Mozambique, East African, South Africa, Madagascar, India, Sri Lanka, Japan, China, Taiwan, Hong Kong, Vietnam, Singapore, Philippines, Indonesia and Australia; 5-30 m.

Charybdis (Charybdis) natator (Herbst, 1794) Plate 23 C

Cancer natator Herbst, 1794: 156, pl. 40, fig. 1; Herbst, 1803: 6.
Portunus (Charybdis) natator de Haan, 1833-1849 (1833): 10, pl. A.
Thalamita natator H. Milne Edwards, 1834: 463, pl. 17, figs 13-14.
Goniosoma natator A. Milne Edwards, 1861: 370; de Man, 1888d: 334, pl. 13, fig. 5.
Charybdis (Goniosoma) natator Alcock, 1899a: 61; Nobili, 1906: 115; Laurie, 1906: 418.
Charybdis (Goniosoma) natatrix Nobili, 1906: 196.
Charybdis natator Stebbing, 1908: 9, pls 28-29; Balss, 1922c: 106; Stephenson, 1967: 11; Tirmizi & Kazmi, 1996: 35, fig. 17A-C.
Charybdis (Charybdis) natator Rathbun, 1923a: 131; Stephensen, 1945: 116; Sakai, 1976: 360, fig. 193a-b, pl. 127, fig. 1; Tirmizi & Kazmi, 1983: 379.

Type locality: East coast of India.

Distribution: Red Sea, Gulf of Aden, Arabian Gulf, Gulf of Oman, Mozambique, South Africa, Madagascar, India, Sri Lanka, West Malay Peninsula, Thailand, Japan, Taiwan, China, Philippines, Singapore, Indonesia and Australia; 15-55 m.

Charybdis (Charybdis) orientalis Dana, 1852 Plate 23 D

Talamita sexdentata (not Herbst, 1783) Rüppell, 1830: 4 (part), pl. 1, fig. 1.
Charybdis orientalis Dana, 1852b: 85; Dana, 1852c: 285; Tirmizi & Kazmi, 1996: 42, figs 21, 22A-J, pl. 1 C.
Goniosoma orientale A. Milne Edwards , 1861: 383; Henderson, 1893: 375; Klunzinger, 1913: 365, pl. 11, fig. 21.
Goniosoma dubium Hoffmann, 1874: 11, pl. 2, figs 6-8; de Man, 1879: 60; Fransen et al., 1997: 105.
Charybdis (Goniosoma) orientalis Laurie, 1906: 418; Nobili, 1906: 195; Chhapgar, 1957a: 422, pl. 7.
Charybdis (Goniosoma) helleri (not A. Milne Edwards, 1867) Nobili, 1906: 195.
Charybdis merguiensis (not de Man, 1887) Urita, 1926a: 8 (part).
Charybdis (Charybdis) orientalis Leene, 1938: 68, figs 32-34; Stephenson, 1972b: 10(key), 33; Wee & Ng, 1995: 45, fig. 22A-I; Apel & Spiridonov, 1998: 185 (key), 206, figs 24, 29.
Charybdis (goniosoma) orientalis Khan, 1975: 379 (list), 387, 391 (key), fig. 4, pl. 2.
Non *Goniosoma orientale* Heller, 1865: 29, pl. 3, fig. 3.
= *Charybdis annulata* (Fabricius, 1798).
Non *Charybdis (Goniosoma) orientalis* Alcock, 1899a: 63.
= ? *Thalamita exetastica* Alcock, 1899.
Non *Charybdis orientalis* Rathbun, 1906: 872, fig. 32, pl. 13, fig. 1; Edmondson, 1946: 281, fig. 173e.
= *Charybdis hawaiiensis* Edmondson, 1954.

Type locality: Mindanao, Philippines.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Mozambique, South Africa, Madagascar, Mauritius, Pakistan, India, Sri Lanka, Thailand, Japan, China, Singapore, Philippines, Indonesia and Australia; 10-50 m.

Charybdis (Charybdis) annulata (Fabricius, 1798) Plate 23 E

Portunus annulatus Fabricius, 1798: 364.
Thalamita annulata H. Milne Edwards, 1834: 463.
Goniosoma annulatum A. Milne Edwards, 1861: 374, 385; Hoffmann, 1874: 11.

Goniosoma orientale (not Dana, 1852) Heller, 1865: 29, pl. 3, fig. 3.
Goniosoma annulatum var. de Man, 1883: 151 (specimen from Madagascar).
Charybdis (Goniosoma) annulata Alcock, 1899a: 54; Nobili, 1903c: 31; Chhapgar, 1957b: 22, pl. 6 h-k.
Charybdis annulata Rathbun, 1910a: 364; Balss, 1922: 106; Tirmizi & Kazmi, 1996: 29(key), 50, fig. 25A-E, pl. 2 B; Ng, 1998c: 1117(key), 1131, fig.
Charybdis (Charybdis) annulata Leene, 1938: 60, figs 26-28; Crosnier, 1962: 78, figs 136-139, pl. 5, fig. 2; Sakai, 1976: 356, fig. 192; Tirmizi & Kazmi, 1983: 379; Wee & Ng, 1995: 17, fig. 6A-H; Apel & Spiridonov, 1998: 185(key), 187, figs 10-11, 16.
? *Charybdis annulata* Zarenkov, 1968b: 32.
Charybdis (goniosoma) annulata Khan, 1975: 379 (list), 185, 391 (key), fig. 2, pl. 2.
Non *Goniosoma annulatum* de Man, 1883: 151.
= *Charybdis hellerii* A. Milne Edwards, 1867.
Non *Goniosoma annulatum* Henderson, 1893: 375.
= *Charybdis callianassa* (Herbst, 1789).
Non *Charybdis annulata* Balss, 1938a: 32.
= *Charybdis hellerii* A. Milne Edwards, 1867.

Type locality: "Oceano Indico", probably from Tranquebar.

Distribution: Gulf of Aden: Aden, Arabian Sea, Gulf of Oman, South Africa, Madagascar, Somalia, Pakistan, India, Sri Lanka, Burma, Malaysia, Japan, China, Taiwan, Thailand, Singapore, Philippines, Indonesia and New Guinea.

Charybdis (Charybdis) hellerii (A. Milne-Edwards, 1867) Plate 23 F

Talamita sexdentata (nec Herbst, 1783) Rüppell, 1830: 4 (part), pl. 1, fig. 1.
Goniosoma sexdentatum A. Milne Edwards, 1861: 372; Klunzinger, 1913: 366.
Goniosoma Hellerii A. Milne Edwards, 1867: 282; Henderson, 1893: 375.
Goniosoma annulatum (not Fabricius, 1798) de Man, 1883: 151.
Goniosoma spiniferum Miers, 1884a: 233, pl. 23 C.
Goniosoma merguiense de Man, 1887c: 82, pl. 5, figs 3-4; de Man, 1888d: 335.
Charybdis merguiensis Nobili, 1899: 254; Urita, 1926a: 8(part); Barnard, 1950: 168, figs 27d, 32b.
Charybdis (Goniosoma) merguiensis Alcock, 1899a: 55; Nobili, 1906: 196.
Goniosoma merguiensis Klunzinger, 1913: 367.
Charybdis (Charybdis) Hellerii Leene, 1938: 44, figs 15-17.
Charybdis annulata (not Fabricius, 1798) Balss, 1938a: 32.
Charybdis (Charybdis) lucifera (not Fabricius, 1798) Stephensen, 1945: 115.
Charybdis (Charybdis) helleri Stephensen, 1945: 117; Crosnier, 1962: 77, figs 133-135, pl. V, fig. 1; Guinot, 1962c: 10; Sakai, 1976b: 30, fig. 1, pl. 4, fig. 2.
Charybdis hellerii Edmondson, 1954: 247, figs 32a-f; Tirmizi & Kazmi, 1996: 29 (key), 45, fig. 23A-I, pl. 1 B.
Charybdis (Charybdis) hellerii Shen & Dai, 1964: 56, fig; Stephenson, 1972b: 11 (key), 32; Stephenson, 1976: 14; Wee & Ng, 1995: 32, fig. 14A-G; Apel & Spiridonov, 1998: 185 (key), 194, figs 13-15, 17.
Non *Charybdis (Goniosoma) Hellerii* Nobili, 1906: 195.
= *Charybdis orientalis* Dana, 1852.
Non *Goniosoma Hellerii* Klunzinger, 1913: 367.
= *Charybdis orientalis* Dana, 1852.

Type locality: New Caledonia.

Distribution: Red Sea, Gulf of Aden, Arabian Sea, Gulf of Oman, Arabian Gulf, Pakistan, India, Sri Lanka, Burma, Thailand, Japan, Taiwan, China, Malaysia, Philippines, Indonesia, Australia, New Caledonia, Hawaii, Florida, Colombia, Brazil,

eastern Mediterranean (probably arrived via the Suez Canal as a Lessepsian migrant), Mozambique, South Africa, Madagascar and Somalia.

Charybdis (*Goniohellenus*) *longicollis* Leene, 1938 Plate 24 A

Charybdis (Goniohellenus) hoplites var. *longicollis* Leene, 1938: 107–110, figs 59, 60a–c.
Charybdis (Goniohellenus) hoplites var. *longicollis* Stephensen, 1946: 118, 119, figs 24f, g, 25.
Charybdis hoplites var. *longicollis* Guinot, 1967: 255 (in list).
Charybdis (Goniohellenus) longicollis Titgen, 1982: 250 (in list); Apel & Spiridonov, 1998: 214–216, figs 32, 34; Apel, 2001: 72; Naderloo & Sari, 2007: 343, tab 1; Ng *et al*., 2008: 154 (in list).
Charybdis (Goniohellenus) hoplites Monod, 1938: 114-115. [not *Goniosoma hoplites* Wood-Mason, 1877].
Charybdis (Goniohellenus) hoplites longicollis Holthuis, 1961: 47, figs 14-15.

Type locality: Ras Abu Somer- Egypt, northern Red Sea.

Distribution: Red Sea, Gulf of Aden, Gulf of Oman, Arabian Gulf, East African coast, Somalia and Seychelles. Furthermore it invaded the eastern Mediterranean as a Lessepsian migrant.

Scylla serrata (Forskål, 1775) Plate 24 B

Cancer serratus Forskål, 1775: 90.
Portunus serratus Rüppell, 1830: 10, pl. 2.
Portunus (Scylla) serrata de Haan, 1833-1849 (1835): 44.
Achelous crassimanus MacLeay, 1838: 61; Stebbing, 1910: 308.
Scylla tranquebarica var. *oceanica* Dana, 1852c: 270; Dana, 1855: pl. 16, fig. 6a-b; Alcock, 1899a: 27; Nobili, 1906: 189; Stimpson, 1907: 75; Klunzinger, 1913: 345. Sakai, 1976: 335, pl. 115; Apel & Spiridonov, 1998: 312.
Scylla oceanica (not Dana, 1852) Estampador, 1949: 101, pl. 1, fig. 2.
Scylla serrata var. *paramamosain* (not Estampador, 1949) Serène, 1952: 134, fig. 1D, pl. 1, fig. 4, pl. 2, figs 4, D.
Scylla tranquebarica (not Fabricius, 1798) Joel & Raj, 1980: 39, figs 1, 3, 5, 7, 9a-b.

Type locality: Red Sea (Jeddah, Saudi Arabia).

Distribution: Red Sea, Gulf of Aden, Socotra Island, Somalia, Mozambique, South Africa, Mauritius, Arabian Sea, Gulf of Oman, Arabian Gulf, India, Burma, Japan, Korea, Taiwan, China, Vietnam, Singapore, Philippines, Indonesia, Australia, New Caledonia, Fiji, Hawaiian Islands; Tahiti and New Zealand.

Carupa tenuipes Dana, 1852 Plate 24 C

Carupa tenuipes Dana, 1852b: 85; Dana, 1852c: 279; A. Milne Edwards , 1861: 386; Klunzinger, 1913: 329; Stephenson, 1975: 175; Sakai, 1976: 325, pl. 110, fig. 3; Apel & Spiridonov, 1998: 172, fig. 4, pl. 1.
Carupa laeviuscula Heller, 1862: 520; Heller, 1865: 27, pl. 3, fig. 2; de Man, 1888d: 336; Ortmann, 1893: 68; Chen H., 1975: 162, fig. 5, pl. 1, fig. 4.
Carupa laeviscula (sic) Leene, 1938: 9, 147 (list); Taylor, 1971: 95 (list).
Carupa tanuipes (sic) Türkay, 1971: 113.

Type locality: Tuamotu Archipelago.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Somalia, Gulf of Oman, Arabian Gulf, India, Malayan Archipelago, Australia, French Polynesia, Japan, Hawaii and Madagascar.

Portunus (*Xiphonectes*) *arabicus* (Nobili, 1906) Plate 24 D

Neptunus (*Hellenus*) *arabicus* Nobili, 1906a: 163.
Portunus acerbiterminalis Stephenson and Rees, 1967a: 14–16, fig 1, pl 1b.
Neptunus (Hellenus) arabicus Nobili, 1906: 115, pl 5, figs 22, 22a, 1906b: 190 (in key), 191; Stephensen, 1946: 121, 122, fig 26a–c.
Neptunus (Hellenus) andersoni Alcock, 1899a: 39; Stephensen, 1946: 122; Titgen, 1982: 250 (in list).
Portunus arabicus Guinot, 1967: 258 (in list); Titgen, 1982: 250 (in list); Cooper, 1997: 166, 167; Apel & Spiridonov, 1998: 281–284, figs 95, 98, 99, 106; Apel, 2001: 74.
Portunus acerbiterminalis Stephenson and Rees, 1967b: 287; Stephenson, 1972b: 15 (in key), 38 (partly: material from Saudi Arabia and East Africa).
? *Portunus sp. nr. hastatoides* Basson *et al.,* 1977: 224, 227, 231, 243, 250.
Portunus (Xiphonectes) *arabicus* Ng *et al.,* 2008: 152 (in list).

Type locality: Arabian Gulf- Abu Dhabi and Gulf of Aden- Djibouti.

Distribution: Southern Red Sea, Gulf of Aden and Arabian Gulf.

Portunus (*Portunus*) *segnis* (Forskål, 1775) Plate 24 E, F

Cancer segnis Forskål, 1775: 18, 91.
Cancer pelagicus Forskål, 1775: 89.
Portunus mauritianus Ward, 1942: 79, Pl. 5 Fig. 5.
Portunus trituberculatus Stephenson & Rees, 1967b: 51–53 (in part, material from the Red Sea) [not *P. trituberculatus* Miers, 1876].
Lupa pelagica Heller, 1861: 355 (part); Barnard, 1950: 152–154 Fig. 27b; Fourmanoir, 1954: 7, Fig. 7.
Neptunus (Neptunus) pelagicus Parisi, 1916: 171 (part); Stephensen, 1946: 124, 125, Fig. 26E.
Portunus (Portunus) pelagicus Audouin, 1826: 83; 1827: 261; Tirmizi & Kazmi, 1983: 369; Ng *et al*., 2008: 152.
Neptunus pelagicus Hoffmann, 1874: 7, 8; Paul'son 1875: 61; De Man, 1888: 328; Nobili, 1906: 190; Klunzinger, 1913: 336 Pl. 7: Fig. 17.
Portunus pelagicus Crosnier, 1962: 43–45, Figs. 58, 61, 67; Guinot, 1962: 10; Heath, 1973: 2 (key), 13, Fig. 4b; Tirmizi & Kazmi, 1996: 18-21; Apel & Spiridonov, 1998: 279 (key), 300–303, Pls. 10, 11; Neumann & Spiridonov, 1999: 21; Vannini & Innocenti, 2000: 266, Figs. 18, 23, 76.
Portunus (Portunus) segnis Ng *et al*., 2008: 152.
Portunus pelagicus or *P. segnis* Guinot & Cleva, 2009: 70, Pl.

Type locality: Red Sea, southern Gulf of Suez.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Arabian Sea, Gulf of Oman, Arabian Gulf, Pakistan, South Africa, Mozambique, Madagascar, Mauritius and eastern Mediterranean Sea, as a Lessepsian migrant through the Suez Canal.

Cycloachelous orbitosinus (Rathbun, 1911) Plate 25 A, B

Portunus (Amphitrite) Gladiator (not Fabricius, 1798) de Haan, 1833-1849(1837): 65.

Portunus (Amphitrite) Gladiator var. de Haan, 1833-1849 (1837): pl. 18, fig. 1.
Achelous granulatus (not H. Milne Edwards, 1834) Richters, 1880: 152 (part).
? *Neptunus granulatus* Alcock, 1899a: 45(part).
Portunus (Achelous) orbitosinus Rathbun, 1911: 205, pl. 15, fig. 11; Michel, 1964: 17.
Neptunus (Achelous) orbitosinus Gordon, 1938: 182, figs 5a, 5g, 6c, 6d; Stephensen, 1945: 120.
Neptunus (Achelous) orbitospinis (sic) Sakai, 1939: 396, fig. 8a, pl. 81, fig. 3; Lin, 1949: 19.
Portunus orbitosinus Stephenson & Campbell, 1959: 113, figs 2L, 3L, pl. 3, fig. 4, pls 4L, 5L; Stephenson, 1967: 17; Crosnier, 1984a: 398.
Portunus orbitospinus (sic) Sakai, 1965b: 118, pl. 57, fig. 2.
Portunus (Cycloachelous) orbitosinus Sakai, 1976: 349, figs 188a-b; Takeda & Nunomura, 1976: 68.
Portunus cf. orbitosinus Türkay, 1981: 53, figs 22-25.
Portunus (Amphitrite) gladiator Yamaguchi, 1993: 577 (part).

Type locality: Cargados Carajos Islands, 54 m.

Distribution: Red Sea, Gulf of Aden: Aden, Socotra Island, Madagascar, Mauritius, Arabian Gulf, West of Malay Peninsula, Thailand, Japan, Taiwan, South China Sea, Philippines, Indonesia, Australia and New Caledonia; 20-320 m.

Cycloachelous granulatus (H. Milne Edwards, 1834) Plate 25 C, D

Lupea granulata H. Milne Edwards, 1834: 454.
Achelous granulatus A. Milne Edwards, 1861: 344; Richters, 1880: 152 (part).
Neptunus (Achelous) granulatus Miers, 1886: 180; Ortmann, 1893: 72; Alcock, 1899a: 45 (part); Stephensen, 1945: 121; Lin, 1949: 19.
Portunus (Achelous) granulatus Rathbun, 1911: 205, pl. 15, fig. 10; Edmondson, 1923: 22; Sendler, 1923: 40; Michel, 1964: 17; Serène, 1968: 68.
Cycloachelous granulatus Ward, 1942b: 53 (list), 80, pl. 5, fig. 5; Barnard, 1954b: 124, figs 3a-b.
Portunus granulatus Stephenson & Campbell, 1959: 108, figs 2I, 3I, pl. 3, fig. 1, pls 4I, 5I; Stephenson & Rees, 1967a: 25(part), fig. 5c-e (not fig. 5a-b); Türkay, 1981: 51; Tirmizi & Kazmi, 1996: 23, fig. 10A-F; Apel & Spiridonov, 1998: 286, figs 97, 109.
Portunus (Cycloschelous) granulatus Sakai, 1976: 348, figs 187a-b, pl. 120, fig. 2; Tirmizi & Kazmi, 1983: 369.
Non *Portunus (Achelous) granulatus* Rathbun, 1906: 871, pl. 12, fig. 2; Edmondson, 1954: 239, fig. 16a-b.
= *Portunus suborbicularis* Stephenson, 1975.
Non *Neptunus (Achelous) granulatus* Sakai, 1939: 397 (part), pl. 81, fig. 2.
= *Portunus suborbicularis* Stephenson, 1975.
Non *Portunus granulatus* Stephenson & Rees, 1967a: 25 (part), fig. 5a-b.
= *Portunus suborbicularis* Stephenson, 1975.

Type locality: Mauritius.

Distribution: Red Sea, Gulf of Aden: Mukalla, Socotra Island, Arabian Sea, Gulf of Oman, Pakistan; India, Sri Lanka, Somalia, Madagascar, Kenya, South Africa, Seychelles, Mauritius, Australia, Indonesia, Taiwan, Philippines, Japan, China, Fiji and Tahiti; 30-120 m.

Portunus (Xiphonectes) longispinosus (Dana, 1852) Plate 25 E

? Amphitrite longi-spinosa Dana, 1852a: 84.
? Amphitrite longi-spinosa Dana, 1852b: 277, pl 17, fig 2.
Neptunus (Hellenus) longispinosus Alcock, 1899a: 40; Stephensen, 1946: 123.

Portunus longispinosus Guinot, 1967: 258 (in list; partly); Titgen, 1982: 250 (in list).
? Portunus emarginatus Basson *et al.,* 1977: 224.
Portunus cf. longispinosus Apel & Spiridonov, 1998: 296–298, figs 92, 114; Apel, 2001: 276.
Portunus (Xiphonectes) longispinosus Ng *et al.,* 2008: 152 (in list).

Type locality: Hong Kong.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Gulf of Oman, Arabian Gulf, western Indian Ocean islands, Madagascar, Fiji, French Polynesia, Japan and Hawaii.

Portunus (Xiphonectes) guinotae Stephenson & Rees, 1961 Plate 25 F

Portunus guinotae Stephenson & Rees, 1961: 425, figs 1b, d, g, 2d–f.
Portunus guinotae Apel & Spiridonov, 1998: 290, 291, figs 102–104; Apel, 2001: 75.
Portunus (Xiphonectes) aff. Guinotae Serène, 1977: 59-60, figs 17-21; Guinot, 1985: 449 (list).
Portunus (Xiphonectes) guinotae Ng *et al.,* 2008: 152 (in list).

Type locality: Maldives.

Distribution: Red Sea, Gulf of Aden: Yemen, Gulf of Oman, Seychelles, Maldives and Tuamotu.

Portunus (Portunus) sanguinolentus (Herbst, 1783) Plate 26 A

Cancer sanguinolentus Herbst, 1783: 161, pl. 8, figs 56-57.
Lupa sanguinolenta H. Milne Edwards, 1834: 451; H. Milne Edwards, 1836-1844 (1840): pl. 10, figs 1, 1a-b; Dana, 1852c: 271.
Neptunus sanguinolentus de Haan, 1833-1849 (1835): 38; de Man, 1888d: 328; Alcock, 1899a: 32.
Neptunus (Neptunus) sanguinolentus Miers, 1886: 174; Ortmann, 1893: 75; de Man, 1902a: 642; Balss, 1922c: 106, 107; Stephensen, 1945: 123, fig. 26D; Lin, 1949: 18; Chhapgar, 1957: 417, pl. A, fig. 3.
Portunus sanguinolentus Rathbun, 1902b: 130; Rathbun, 1906: 870; Sakai, 1965b: 116, pl. 53; Ng, 1998c: 1119 (key), 1125, fig.
Portunus (Portunus) sanguinolentus Rathbun, 1923a: 130; Serène, 1968: 68; Sakai, 1976: 338, pl. 117.
Portunus sanguinolentus sanguinolentus Campbell & Stephenson, 1970: 272; Stephenson, 1972a: 138.
Portunus (Neptunus) sanguinolentus Yamaguchi, 1993: 576.

Type locality: Tranquebar, SE-India.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Arabian Sea, Arabian Gulf, Strait of Hormuz, Gulf of Oman, Mozambique, South Africa, Madagascar, Mauritius, India, Maldives, Sri Lanka, Burma, Thailand, Japan, Korea, Taiwan, China, Singapore, Philippines, Indonesia, Australia, New Caledonia and Hawaiian Islands; 5-30 m.

Thalamita crenata Rüppell, 1830 Plate 26 B

Talamita crenata Rüppell, 1830: 6, pl. 1, fig. 2.
Portunus crenatus H. Milne Edwards, 1834: 461.
Thalamita crenata H. Milne Edwards, 1834: 461; A. Milne Edwards , 1861: 365; Alcock, 1899a: 73 (key), 76; de Man, 1902a: 644; Nobili, 1903c: 32; Chhapgar, 1957b: 25, pl. 7 l-n; Stephenson, 1972a: 145; Apel & Spiridonov, 1998: 233, figs 44, 49-50, pl. 8; Ng, 1998c: 1116 (key), 1129, fig.
Thalamita prymna var. *crenata* Kossmann, 1877: 49; Laurie, 1906: 418; Stephensen, 1945: 125, 206 (list).
Thalamita ceranata Hashmi, 1963b: 117.
Non *Thalamita crenata* Dana, 1852c: 282; Dana, 1855: pl. 17, fig. 7a-b.

= *Thalamita danae* Stimpson, 1858.

Type locality: Southern Red Sea.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Kenya, Mombasa, Zanzibar, Mozambique, South Africa, Madagascar, Mauritius, Seychelles, Arabian Sea, Arabian Gulf, Gulf of Oman, Pakistan, India, Thailand, Japan, Korea, Taiwan, China, Singapore, Philippines, Indonesia, Australia and New Caledonia; intertidal.

Thalamita prymna (Herbst, 1803) Plate 26 C

Cancer Prymna Herbst, 1803: 41, pl. 57, fig. 2.
Portunus (Thalamita) Prymna de Haan, 1833-1849 (1833): pl. A.
Thalamita prymna H. Milne Edwards, 1834: 461; Nobili, 1906: 201(key), 203; Klunzinger, 1913: 354, pl. 11, fig. 20; Chhapgar, 1957b: 26, pl. 7 o-q; Tirmizi & Kazmi, 1996: 60, figs 31-32, pl. 2 C; Apel & Spiridonov, 1998: 257, figs 76, 85.
Thalamita crassimana Dana, 1852b: 85; Stimpson, 1907: 86.
? *Thalamita prymna* form C Calman, 1900: 22.
Thalamita tenuipes Borradaile, 1902a: 204, fig. 35a-b; Stephenson & Hudson, 1957: 316 (key).
? *Thalamita prymna* var. *annectans* Laurie, 1906: 418.
Thalamita prymna form b Tweedie, 1950a: 84, fig. 1b.
Portunus (Thalamita) prymna Yamaguchi, 1993: 578.
Non *Portunus (Thalamita) Prymna* de Haan, 1833-1849 (1835): 43 (part).
= *Thalamita danae* Stimpson, 1858.
Non *Thalamita prymna* form A Calman, 1900: 22.
= *Thalamita pelsarti* Montgomery, 1931.
Non *Thalamita prymna* form B Calman, 1900: 22.
= ? *Thalamita danae* Stimpson, 1858.
Non *Thalamita prymna* Parisi, 1916: 176; Sakai, 1965b: 125, pl. 64, fig. 2.
= *Thalamita pelsarti* Montgomery, 1931.
Non *Thalamita prymna* form a Tweedie, 1950a: 84, fig. 1a.
= *Thalamita pelsarti* Montgomery, 1931.
Non *Thalamita prymna* Titgen, 1982: 124.
= *Thalamita rubridens* Apel & Spiridonov, 1998.

Type locality: "Ostindien", refer to the east coast of India, but also to the Indo-Malayan Archipelago.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Somalia, Kenya, South Africa, Madagascar, Seychelles, Mauritius, Arabian Gulf, Gulf of Oman, Pakistan, India, Maldives, Burma, Thailand, Japan, China, Malaysia, Philippines, Indonesia, Australia; intertidal to 20 m.

Thalamita admete (Herbst, 1803) Plate 26 D

Cancer Admete Herbst, 1803: 40, pl. 57, fig. 1.
Thalamita admete H. Milne Edwards, 1836-1844 (1838): pl. 9, figs 2, 2a-b; Dana, 1852c: 281; Stephenson, 1975: 188; Apel & Spiridonov, 1998: 228, figs 42, 47.
Thalamita savignyi (not A. Milne Edwards, 1861) A. Milne Edwards, 1873a: 163; de Man, 1887c: 73.
Thalamita admeta Alcock, 1899a: 82.
Thalamita admete var. *edwardsi* Borradaile, 1900: 579; Borradaile, 1902a: 202.
Thalamita edwardsi Rathbun, 1906: 873; Edmondson, 1954: 254, figs 28b, 29a-d

Thalamita dispar Rathbun, 1914c: 657, pl. 1, fig. 4.
Non *Thalamites Admete* Guérin-Méneville, 1829-1844 (1829): pl. 1, fig. 4.
= ? *Thalamita prymna* (Herbst, 1803).
Non *Thalamita admete* Heller, 1861b: 355; Klunzinger, 1913: 356, pl. 8, fig. 11.
= *Thalamita savignyi* A. Milne Edwards, 1861.
Non *Thalamita admeta* Paulson, 1875: 58.
= *Thalamita savignyi* A. Milne Edwards, 1861 and *Thalamita poissonii* (Savigny, 1817).
Non *Thalamita admeta* Laurie, 1906: 420 (part).
= *Thalamita gatavakensis* Nobili, 1907.
Non *Thalamita ? admete* Titgen, 1982: 120.
= *Thalamita savignyi* A. Milne Edwards, 1861.
Non *Thalamita admete* Kalopissis & Kalopissis, 1984: 133, figs 1-3.
= *Thalamita poissonii* (Savigny, 1817).

Type locality: "Ostindien", refer to the east coast of India, but also to the Indo-Malayan Archipelago

Distribution: Gulf of Aden: Aden, Socotra Island, Somalia, Kenya, Zanzibar, Mozambique, South Africa, Madagascar, Mauritius, Seychelles, Arabian Gulf, Gulf of Oman, Pakistan, India, Japan, Taiwan, South China Sea, Indonesia, Australia, New Caledonia, Fiji, Hawaiian Islands, Tahiti and Tuamotu Archipelago; 0-12 m.

Thalamita poissonii (Audouin, 1826) Plate 26 E

Portunus poissonii Savigny, 1817: pl 4, figs 3(1, 2), 5 (1, 2).
Portunus poissonii Audouin, 1826: 84.
Thalamita poissonii Alcock, 1899b: 74 (in key), 81; Nobili, 1906: 206; Stephensen, 1946: 133, fig 31; Guinot, 1967: 256 (in list); Titgen, 1982: 250 (in list); Vousden, 1987: 32, 56; Cooper, 1997: 167, fig 13.
Thalamita poissoni Basson *et al*., 1977: 224, 231, 250, 256; Al-Ghais & Cooper, 1996: 424, 425; Hornby, 1997: 75.

Type locality: Red Sea (Gulf of Suez).

Distribution: Red Sea, Gulf of Aden, Arabian Gulf, western coast of India, Sri Lanka, Seychelles, Somalia, East Africa, Madagascar, Mauritius, Angola, Canary Islands, South Africa and Mediterranean (Lessepsian migrant).

Thalamita savignyi A. Milne-Edwards, 1861 Plate 26 F

Thalamita savignyi A. Milne-Edwards, 1861: 357, 358, 367 (in key).
Thalamita savignyi Alcock, 1899a: 74 (in key), 84; Ng *et al*., 2008: 155 (in list).
Thalamita admete Alcock, 1899a: 82–84 (partly: material from the Arabian Gulf).
Thalamita admete var. *savignyi* Nobili, 1906: 120; Laurie, 1915: 440.
Thalamita admete savignyi Stephensen, 1946: 136, 206 (in list).
Thalamita admete Heller, 1861a: 355, 356; Guinot, 1967: 255 (in list; partly: records from the Arabian Gulf); Basson *et al*., 1977: 227, 231, 243; Titgen, 1982: 250 (in list).
Thalamita? admete Titgen, 1982: 120, 121.

Type locality: Red Sea (Gulf of Suez).

Distribution: Red Sea, Gulf of Aden, Arabian Gulf, Gulf of Oman and East Africa (Zanzibar).

Thalamita mitsiensis Crosnier, 1962 Plate 27 A, B

Thalamita mitsiensis Crosnier, 1962: 127, figs 212-213, 216-218; Stephenson & Rees, 1967a: 80, fig. 29; Stephenson, 1972a: 150; Crosnier & Thomassin, 1974: 1114, fig. 8e; Stephenson, 1975: 199; Sakai, 1976: 372, pl. 133, fig. 3; Poupin, 1996a: 36, pl. 17 e.

Type locality: Iles Mitsio, Madagascar, 30 m.

Distribution: Gulf of Aden: Aden, Madagascar, Japan, Indonesia and Tubuai Islands; 24-85 m.

Thalamita sexlobata Miers, 1886 Plate 27 C

Thalamita sexlobata Miers, 1886: 196, pl. 16, fig. 2a-c; Henderson, 1893: 373; Alcock, 1899a: 87; Stephensen, 1945: 136, fig. 32C-D; Wee & Ng, 1995: 106, fig. 58A-E; Apel & Spiridonov, 1998: 271, figs 89-90, 93.
? *Thalamita macrodonta* Borradaile, 1902a: 203(part); Crosnier, 1975: 720 (part), fig. 4e.
Thalamita poissonii (not Savigny, 1817) Sakai, 1939: 423, fig. 17, pl. 85, fig. 2.

Type locality: off Nukalofa, Tongatabu, "Challenger" stn 172, 33 m.

Distribution: Red Sea, Gulf of Aden, Madagascar, Arabian Gulf, Gulf of Oman, India, Burma, Japan, Indonesia, Australia and Hawaii; 5-55 m.

Thalamita woodmasoni Alcock, 1899 Plate 27 D

Thalamita wood-masoni Alcock, 1899, Care. Faun. India, Journ. Asiat. Soc. Bengal 68, 90; Estampador, 1959, p 70.

Type locality: Philippine.

Distribution: Red Sea: Mayun (Perim) Island, Madagascar and Philippine.

Thalamita chaptalii (Audouin, 1826) Plate 27 E

Portunus Chaptalii Savigny, 1809: pl. 4, fig. 1; Audouin, 1826: 83.
Thalamita chaptali A.Milne Edwards, 1861: 360, 367; Rathbun, 1910a: 365, fig. 44; Stephenson & Hudson, 1957: 327, figs 2F, 3F, pl. 1, fig. 3, pls 7C, 10B.
Thalamita Chaptalii Alcock, 1899a: 80; Klunzinger, 1913: 360, pl. 8, fig. 13.
Thalamita Chaptali Bouvier, 1915b: 257.
Thalamita chaptalii Stephenson, 1972a: 144; Stephenson, 1972b: 19(key), 45; Stephenson, 1976: 20.

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden, Somalia, Madagascar, Mauritius, Sri Lanka, Andaman Islands, Thailand, Japan, China, Philippines, Australia, Fiji and Tahiti; intertidal to 40 m.

Thalamita bandusia Nobili, 1906 Plate 27 F

Thalamita bandusia Nobili, 1906b: 402.
Thalamita bandusia Nobili, 1906: 211, 212; Apel & Spiridonov, 1998: 231–233, figs 43, 45, 46, 60, 61; Apel, 2001: 78; Ng *et al*., 2008: 154 (in list).
Thalamita mitsiensis Zarenkov, 1971: 186, fig. 84. [not *T. mitsiensis* Crosnier, 1962].

Type locality: Mayun (Perim) Island and Gulf of Aden: Aden.

Distribution: Red Sea, Gulf of Aden, Socotra Island and Gulf of Oman.

Thalamita gatavakensis Nobili, 1906 Plate 28 A

Thalamita pilumnoides var. *gatavakensis* Nobili, 1906: 262; 1907: 384 ("Gatavake" = Mangareva).
Thalamita pilumnoides ssp. *gatavakensis* -Forest & Gwnot, 1961: 34, fig. 22a-b. 23-25 (Mangareva); 1962: 60 (Biogeography "Tahiti-Tuamotu").
Thalamita gofavakensis Crosnier, 1962: 99, fig. 156a-c, e (Mangareva; syntypes); Stewenson & Rees, 1967: 75 (Bora Bora. Tahiti).
Thalamita (Thalamita) gatavakensis Guinot, 1985: 449 (List) – New material - Coll. C. Hily, det. K. Moosa (Tahiti).

Type locality: Indo-West Pacific.

Distribution: Gulf of Aden: Aden, Madagascar, French Polynesian, lndo-Malaysian and Hawaiian Islands.

Thalamita quadrilobata Miers, 1884 Plate 28 B

Thalamita quadrilobata Miers, 1884. In: Report on the zoological collections in the Indopacific Ocean […]: 539-540, pl. XLVIII fig. B.
Thalamita quadrilobata Alcock, 1899: 84-85; Stephenson & Hudson 1957: 349-350, figs 2 G, 3 G, pl. 4 fig. 4, pls 9 M, 9 F; Heath 1973: 3 (key), 17, figs 9 f, 12 f; Stephenson 1972 a: 151; Stephenson 1972 b: 18 (key), 51; Stephenson 1976: 24; Poupin 1996 b: 36.
Thalamita admeta var. F quadrilobata Borradaile, 1903 a: 202-203.
Thalamita admeta var. *E intermedia* Borradaile, 1903. In: Gardiner, J.S. (ed.). The Fauna and Geography of the Maldive and Laccadive Archipelagoes: 202-203. [not *Thalamita intermedia* Miers, 1886].
Thalamita (Pseudothalamitopsis) quadrilobata Guinot, 1985: 449 (list).
Thalamita borradailei Wee & Ng, 1995: 61-62. [replacement name for *T. intermedia* Borradaile, 1903].

Type locality: Seychelles.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Madagascar, Mauritius, Seychelles, East Africa, Arabian Gulf, Gulf of Oman, Maldives, Andaman Sea, Indonesia, Philippines, Palau, Australia and French Polynesia.

Thalamita cf. crosnieri Vannini 1983 Plate 28 C

Thalamita crosnieri Vannini, 1983: 805, figs 2A-B, 3A, 4A-B, 7A, 8A, D, 9A, E, 10A, E.
Thalamita wood-masoni Barnard, 1950: 177, fig. 33d-f.
Thalamita woodmasoni Stephenson, 1972b: 152; Heath, 1973: 17, figs 7, 12g; Vannini, 1976: 123.
Thalamita cf. woodmasoni Crosnier, 1962: 121, figs 205-206.

Type locality: Somalia.

Distribution: Gulf of Aden: Aden, Somalia, East African coast, Madagascar, Andaman Islands, India, Sri Lanka and Mauritius.

Thalamita sp. Plate 28 D

Type locality: ??!

Distribution: ???!!

Thalamita cf. stephensoni Crosnier 1962 Plate 28 E, F

Thalamita stephensoni Crosnier, 1962: 140, figs 241-248; Stephenson & Rees, 1967a: 98; Stephenson, 1975: 204; Dai & Yang, 1991: 257, fig. 140A(1), pl. 32(2); Yu *et al*., 1996; Huang & Yu, 1997: 126, fig.

Type locality: Madagascar, intertidal.

Distribution: Red Sea, Gulf of Aden: Aden, Socotra Island, Somalia, Madagascar, Taiwan, China, Indonesia, Solomon Islands and Hawaii; intertidal.

Superfamily Trapezioidea Miers, 1886
Family Tetraliidae Castro, Ng & Ahyong, 2004

Tetralia cavimana Heller, 1861 Plate 29 A

Tetralia cavimana Heller, 1861b: 14.
Tetralia cavimana Heller, 1861a: 353, pl 3, figs 24, 25; Galil, 1988: 59 (in key), 59–62, figs 1a, 2a, b; Hogarth, 1994: 103; Castro, 1999: 100, 101.
Tetralia glaberrima Nobili, 1906: 143; Stephensen, 1946: 161, fig 42c, d; Guinot, 1967: 275 (in list; partly); Hogarth, 1989: 106; Apel, 2001: 84; Ng *et al.,* 2008: 184.

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Arabian Sea, Gulf of Oman, Arabian Gulf and Kenya.

Tetraloides nigrifrons (Dana, 1852) Plate 29 B

Tetralia nigrifrons Dana, 1852a: 83.
Tetralia cavimanus Miers, 1884b: 537 (part) (Indian Ocean). Not *T. cavimana* Heller, 1861.
?*Tetralia glaberrima* Henderson, 1893: 336, 367 (part) (India).
Tetralia glaberrima Borradaile, 1902: 265 (part) (Maldives); Rathbun, 1911: 235 (part) (Seychelles).
Tetralia hetrodactyla heterodactyla Garth, 1971: 185 (Maldives). Not *Tetraloides heterodactyla* (Heller, 1861).
Tetralia heterodactyla Garth, 1974: 205 (part) (Maldives, Sri Lanka); Serène, 1984: 120 (Seychelles); Tsateva, 1980: 121 (Western Australia).
Tetralia heterodactyla lissodactyla Serène, 1984: 285, fig. 189, pl. 42C (Seychelles, îles Glorieuses, La Réunion).

Tetraloides nigrifrons Galil, 1986a: 72 (part) (Seychelles, Christmas Is., Maldives?, Sri Lanka?); Galil and Clark, 1988: 149, figs. 1E, 3D, 4E, 4J, 5B, 6E (Somalia, Kenya, Christmas Is.); Castro 1997a: 72, pl. 1F (Seychelles, îles Glorieuses, La Réunion).

Type locality: East Africa.

Distribution: Red Sea, Gulf of Aden: Aden, Socotra Island and Somalia.

Family Trapeziidae Miers, 1886

Trapezia cymodoce (Herbst, 1801) Plate 29 C

Cancer Cymodoce Herbst, 1801: 22, pl. 51, fig. 5.
Trapezia cymodoce Savigny, 1817: pl. 5, fig. 2; Audouin, 1826: 85; Miers, 1878b: 409; de Man, 1881a: 94; Ortmann, 1897a: 203; Nobili, 1906: 143; Laurie, 1915: 460 (part); Balss, 1922c: 134; Sakai, 1976: 507, pl. 181, fig. 1, pl. 184, fig. 1; Galil, 1988a: 161, fig. 1; Galil & Clark, 1990: 378(part).
Trapezia dentifrons Latreille, 1828: 695; H. Milne Edwards, 1834: 428.
Trapezia coerulea Rüppell, 1830: 27(part), pl. 5, fig. 7; Heller, 1861b: 348.
Cancer (Trapezia) cymodoce de Haan, 1833-1849 (1833): 22.
Grapsillus dentatus MacLeay, 1838: 67, pl. 3; Krauss, 1843: 35.
Trapezia hirtipes Jacquinot, 1842-1853: pl. 4, fig. 14; Jacquinot & P.H. Lucas, 1853: 44.
Trapezia dentata Dana, 1852c: 258; A. Milne Edwards, 1873a: 261; Klunzinger, 1913: 310, pl. 8, fig. 10.
? *Trapezia dentata* var. *subintegra* Dana, 1852c: 258; Dana, 1855: pl. 15, fig. 7a-b.
Trapezia ferruginea var. *coerulea* Paulson, 1875: 53, pl. 7, fig. 4.
Trapezia cymodoce var. *typica* Ortmann, 1893b: 482; Wedenissow, 1894: 412.
Trapezia cymodoce var. *dentata* Ortmann, 1893b: 483(part).
Grapsillus cymodoce Nobili, 1899: 260.
Trapezia cymodoce dentata (part = cymodoce) Rathbun, 1907: 58 (part); Sakai, 1939: 551.
Trapezia ferruginea (not Latreille, 1828) Boone, 1934: 171, pl. 88.
Non *Trapezia cymodoce* Rüppell, 1830: 27; Dana, 1855: pl. 15, fig. 5a-I; A. Milne Edwards, 1873a: 260 (part).
= *Trapezia ferruginea* Latreille, 1825.
Non *Trapezia cymodoce* Laurie, 1906: 410 (part); Rathbun, 1911: 234 (part); Galil & Clark, 1990: 378 (part, specimens from New Caledonia).
= *Trapezia lutea* Castro, 1997.
Non *Trapezia cymodoce* Garth, 1973: 321.
= *Trapezia punctimanus* Odinetz, 1984.
Non *Grapsillus cymodoce* Rathbun, 1906: 865, pl. 11, fig. 6.

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Kenya, Zanzibar, Tanzania, Mozambique, South Africa, Madagascar, Mauritius, Arabian Sea, Arabian Gulf, Pakistan, India, Sri Lanka, Japan, Taiwan, China, Philippines, Australia, New, Fiji, Tahiti and Tuamotu Archipelago.

Materials examined: 4♀♀ (1.ovi) CL 9.1-12.4 mm, CW 10.4-14.8 mm Site 18, leg. AUAA 26.04.14. 10♂♂ CL 5.3-12.3 mm, CW 6.2-14.2 mm Site 18, leg. AUAA 26.04.14. 1 ovi. ♀ CL 10.7 mm, CW 12.8 mm Site 23, leg. AUAA 05.04.14. 3♂♂ CL 4-11 mm, CW 5-12.8 mm Site 23, leg. AUAA 05.04.14. 5♀♀ (1.ovi) CL 7-14.4 mm, CW 8-17.1 mm Site 21, leg. AUAA 11.01.14. 9♂♂ CL 11-13.7 mm, CW 12.3-15.6 mm Site 21, leg. AUAA 11.01.14. 2♀♀ (1.ovi) CL 10-11 mm, CW 12-13 mm Site 21, leg. AUAA 27.10.16. ♂ CL 11 mm, CW 13 mm Site 21, leg. AUAA 27.10.16. 6♀♀ CL 6.6-11.8 mm, CW 8-14.4 mm Site 8, leg. SMF 08.04.04. 3♂♂ CL 11.1-12.7 mm, CW 12.9-14.6 mm Site 8, leg. SMF 08.04.04. 3 Juv CL 4.6-5.9 mm, CW 5.7-7

mm Site 8, leg. SMF 08.04.04. ♂ CL 7.4 mm, CW 8.2 mm Site 10, leg. SMF 07.04.04. 1 Juv CL 3.8 mm, CW 4.9 mm Site 10, leg. SMF 07.04.04. 6♀♀ (3. ovi) CL 8.7-14 mm, CW 10.1-16.6 mm Site 39, leg. SMF 24.05.05. 4♂♂ CL 5.9-14.3 mm, CW 6.5-16.9 mm Site 39, leg. SMF 24.05.05. 2 ovi. ♀♀ CL 9.3-11 mm, CW 10.8-13.4 mm Site 35, leg. SMF 15.05.05. 2♀♀ (1. ovi) CL 6.9-9 mm, CW 7.8-10.6 mm Site 34, leg. SMF 22.05.05. ♀ CL 10.6 mm, CW 12.6 mm Site 34, leg. SMF 16.05.05. 2 Juv CL 4.2-4.7 mm, CW 4.8-5.9 mm Site 34, leg. SMF 16.05.05. 2♀♀ CL 8.7-10.5 mm, CW 10.3-12.6 mm Site 42, leg. SMF 28.05.05. 3♂♂ CL 8.2-10.2 mm, CW 9.38-12.1 mm Site 42, leg. SMF 28.05.05. ♀ CL 10.3 mm, CW 11.9 mm Site 47, leg. SMF 27.05.05. 1 ovi. ♀ CL 12.5 mm, CW 14.9 mm Site 41, leg. SMF 26.05.05. ♂ CL 10.8 mm, CW 12.4 mm Site 41, leg. SMF 26.05.05. ♀ CL 7.1 mm, CW 8.8 mm Site 34, leg. SMF 19.05.05. ♂ CL 6.9 mm, CW 8.2 mm Site 34, leg. SMF 19.05.05. 14 Juv CL 4-5.7 mm, CW 4.9-6.9 mm Site 34, leg. SMF 19.05.05. 1. ovi ♀ CL 7.3 mm, CW 8.4 mm Site 35, leg. SMF 15.05.05.10 Juv CL 2.8-4.7 mm, CW 3.6-5.9 mm Site 34, leg. SMF 19.05.05. 1 Juv CL 2.7 mm, CW 3.4 mm Site 41, leg. SMF 26.05.05. ♀ CL 12.8 mm, CW 15.4 mm Site 34, leg. SMF 19.05.05. 2♂♂ CL 7.1-13.4 mm, CW 8.1-15.4 mm Site 34, leg. SMF 19.05.05. ♂ CL 11.6 mm, CW 13.4 mm Sit 17, leg. RUWW 20.01.84. 3♀♀ CL 7.3-11.8 mm, CW 8.2-13.5 mm Sit 54, leg. RUWW 01.03.84. ♂ CL 11.6 mm, CW 13.3 mm Sit 54, leg. RUWW 01.03.84.

Trapezia tigrina Eydoux & Souleyet, 1842 Plate 29 D

Cancer rufopunctatus (not Herbst, 1799) Rüppell, 1830: 27, 28 (mentioned under *Trapezia coerulea*).
Trapezia tigrina Eydoux & Souleyet, 1842: 232, pl. 2, fig. 4; Galil, 1988a: 167, fig. 5; Hogarth, 1994: 103.
Trapezia maculata (not MacLeay, 1838) Dana, 1852c: 256(part); Dana, 1855: pl. 15, fig. 4b-c; Alcock, 1898: 221(part); Nobili, 1906: 293; Stimpson, 1907: 73.
Trapezia rufopunctata (not Herbst, 1799) Jacquinot & P.H. Lucas, 1853: 41(part, Nuku Hiva); Heller, 1861a: 13; A. Milne Edwards, 1868a: 71; de Man, 1881a: 94.
?*Trapezia punctata* Coulon, 1864: 569.
Trapezia ferruginea var. *rufopunctata* (not Herbst, 1799) Paulson, 1875: 48, pl. 7, fig. 3.
? *Trapezia rufopunctata* Cano, 1889: 211; Edmondson, 1923: 20.
Trapezia rufopunctata var. *maculata* (not MacLeay, 1838) Ortmann, 1893b: 484.
Trapezia ferruginea maculata (not MacLeay, 1838) Ortmann, 1897a: 206 (part).
Trapezia ferruginea var. *maculata* (not MacLeay, 1838) Borradaile, 1900: 590.
? *Trapezia ferruginea maculata* (not MacLeay, 1838) Lenz, 1901: 466.
? *Trapezia maculata* (not MacLeay, 1838) Lenz, 1905: 351; Laurie, 1906: 410; Stebbing, 1910: 304.
Grapsillus maculatus (not MacLeay, 1838) Rathbun, 1906: 865.
Trapezia cymodoce maculata (not MacLeay, 1838) Rathbun, 1907: 59 (part, Makemo).
Trapezia ferruginea forme maculata (not MacLeay, 1838) Bouvier, 1915b: 272 (part).
Trapezia cymodoce var. maculata (not MacLeay, 1838) Laurie, 1915: 462.
Trapezia cymodoce maculata (not MacLeay, 1838) Rathbun, 1930: 558, pl. 228, figs 3-4.
Trapezia danae Ward, 1939: 13, figs 17-18.
Trapezia guttata Barnard, 1950: 277.
Trapezia ferruginea subsp. maculata (not MacLeay, 1838) Michel, 1964: 30.
Trapezia danai Knudsen, 1967: 51; Garth, 1971a: 189.
Trapezia wardi Serène, 1971b: 914, pl. 4 C; Serène, 1971a: 140, figs 7, 11, 17-20, 23, 25.
Trapezia aff. wardi Garth, 1971a: 189; Serène, 1971a: 143, figs 8, 12; Garth, 1974a: 205.
Trapezia aff. danai Serène, 1971a: 136 (part), fig. 14A; Garth, 1971a: 189.
Trapezia aff maculata (not MacLeay, 1838) Garth, 1974a: 205.
Trapezia aff. tigrina Garth, 1974a: 205.
Non *Trapezia tigrina* Serène, 1971a: 133, fig. 4.
= *Trapezia flavopunctata* Eydoux & Souleyet, 1842.

Type locality: Hawaiian Islands.

Distribution: Red Sea, Gulf of Aden, Somalia, Kenya, Tanzania, Zanzibar, Mozambique, Seychelles, Madagascar, Mauritius, Arabian Sea, Gulf of Oman, India, Japan, Taiwan, Vietnam, Philippines, Indonesia, Hawaiian Islands, Tahiti and Tuamotu Archipelago.

Materials examined: 1 ovi. ♀ CL 11.4 mm, CW 13.8 mm Site 21, leg. AUAA 24.03.14. 4♂♂ CL 4.5-6.2 mm, CW 5-7.2 mm Site 21, leg. AUAA 24.03.14. 1 ovi. ♀ CL 14.9 mm, CW 17.3 mm Site 23, leg. AUAA 05.04.14. 3♂♂ CL 4.5-13 mm, CW 5.2-15 mm Site 23, leg. AUAA 05.04.14. 2♀♀ CL 9.4-11.4 mm, CW 10.9-13.9 mm Sit 22, leg. RUWW 01.03.85. ♂ CL 12.2 mm, CW 13.9 mm Site 10, leg. SMF 07.04.04. 1 ovi. ♀ CL 11.3 mm, CW 13.5 mm Site 8, leg. SMF 07.04.04. 2♀♀ (1. ovi) CL 11.4-14 mm, CW 13.8-16.2 mm Site 8, leg. SMF 08.04.04. 2♂♂ CL 11.9-13 mm, CW 13.5-13.9 mm Site 8, leg. SMF 08.04.04. 1 Juv CL 6.5 mm, CW 7.2 mm Site 8, leg. SMF 08.04.04. 1 ovi. ♀ CL 13.3 mm, CW 16 mm Site 35, leg. SMF 15.05.05. 1 Juv CL 2.4 mm, CW 3.2 mm Site 35, leg. SMF 28.05.05. 1 Juv CL 4.9 mm, CW 6.1 mm Site 2, leg. SMF 15.04.98.

Trapezia lutea Castro, 1997 Plate 29 E

? *Trapezia cymodoce* Hilgendorf, 1869: 76 (part), pl. 2, fig. 5; Borradaile, 1902b: 265 (part).
Trapezia cymodoce (non Herbst, 1801) Laurie, 1906: 410 (part); Rathbun, 1911: 234 (part); Garth, 1971a: 188 (part); Serène, 1984: 272 (part); Galil & Clark, 1990: 378 (part, specimens from New Caledonia).
Trapezia lutea Castro, 1997a: 84, figs 2C-D, 3A-C, pls 2C, 5A; Castro, 1997b: 126; Jeng, 1998; Castro, 1999b: 29 (list), 31 (in key), 52.

Type locality: Maître Island, New Caledonia, 22°19.80'S, 166°25.10'E, 5 m.

Distribution: Red Sea: Uqban Island, Kenya, Mozambique, South Africa, Madagascar, Seychelles, Mauritius, Maldives, Sri Lanka, Western Australia, Japan, Taiwan, Vietnam, Philippines, Indonesia and New Caledonia.

Quadrella coronata Dana, 1852 Plate 29 F

Quadrella coronata Dana, 1852b: 84; Dana, 1855: pl. 16, fig. 5a-d; Alcock & Anderson, 1894b: 201; Ortmann, 1897a: 210; Serène, 1984: 286 (key), 287 (key), 289, fig. 195, pl. 41F; Galil & Takeda, 1985: 200, fig. 2; Galil, 1986b: 282, figs 3E, 4C-E; Castro, 1997a: 63, pl. 7A.
Quadrella coronata var. *granulosa* Borradaile, 1902b: 266; Laurie, 1906: 411.
Quadrella boopsis granulosa Sakai, 1965b: 164, fig. 20, pl. 80, fig. 5.
Quadrella coronata coronata Serène, 1968: 89.
Quadrella granulosa Serène, 1973b: 207; Sakai, 1976: 512, fig. 271, pl. 184, fig. 3.
Non *Quadrella coronata* var Nobili, 1906: 143; Nobili, 1906: 294.

Type locality: Sulu Sea or Balabac Strait.

Distribution: Red Sea, Gulf of Aden: Aden, Gulf of Oman, Mozambique, South Africa, Madagascar, Maldives, India, Sri Lanka, Japan, South China Sea, Philippines, Australia and Vanuatu; 5-220 m.

Superfamily Pseudozioidea Alcock, 1898
Family Pseudoziidae Alcock, 1898

Pseudozius caystrus (Adams & White, 1849) Plate 30 A, B, C, D

Panopeus caystrus Adams & White, 1849: 42, pl. 9, fig. 2.
Pseudozius planus Dana, 1852b: 81; Dana, 1855: pl. 13, fig. 6a-h; Richters, 1880: 148.
Pseudozius microphthalmus Stimpson, 1858a: 35; Stimpson, 1907: 61, pl. 7, fig. 3.
Pseudozius caystrus Miers, 1886: 142; Ortmann, 1893b: 434; Alcock, 1898: 181; Nobili, 1906: 272. Guinot, 1968c: 330; Sakai, 1976: 471, fig. 252; Wang & Liu, 1998.

Type locality: Eastern Seas.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Arabian Sea, Gulf of Oman, Arabian Gulf, Kenya, Tanzania, South Africa, Madagascar, Seychelles, Mauritius, Pakistan, Maldives, Japan, Taiwan, China, Philippines, Hawaiian Islands and Tuamotu Archipelago.

Materials examined: 2♀♀ CL 12-13.5 mm, CW 20.6-23 mm Site 19, leg. AUAA 24.03.14. 4♂♂ CL 7.8-13.8 mm, CW 13-24.1 mm Site 19, leg. AUAA 24.03.14. 2♀♀ CL 9-12.4 mm, CW 15.5-21.2 mm Site 21, leg. AUAA 11.01.14. 3♂♂ CL 9.5-14.1 mm, CW 15.6-23.9 mm Site 21, leg. AUAA 11.01.14. 2. ovi ♀♀ CL 8.1-10.5 mm, CW 14-17.7 mm Site 23, leg. AUAA 05.0414. 3♂♂ CL 6.3-13.1 mm, CW 9.9-21.8 mm Site 23, leg. AUAA 05.0414. 3♀♀ CL 10.4-14.3 mm, CW 17.5-24.8 mm Site 18, leg. AUAA 26.04.14. ♂ CL 10.4mm, CW 17.6 mm Site 18, leg. AUAA 26.04.14. 2♂♂ CL 12-13.9 mm, CW 20-23 mm Site 24, leg. AUAA 08.01.14. 8♀♀ (1. ovi) CL 9.6-17.3 mm, CW 16.3-28.7 mm Site 19, leg. AUAA 01.04.13. 8♂♂ CL 6.8-16.5 mm, CW 10.7-27.1 mm Site 19, leg. AUAA 01.04.13. 3♂♂ CL 14-14.5 mm, CW 22-23 mm Site 19, leg. AUAA 27.10.16. 3♀♀ CL 6-8 mm, CW 10-12 mm Site 48, leg. AUAA 17.03.11. 5♂♂ CL 10-11 mm, CW 15-17 mm Site 48, leg. AUAA 17.03.11. 3♀♀ CL 10.5-14 mm, CW 17.5-22 mm Site 52, leg. AUAA 15.03.11. 2♂♂ CL 9.5-12.5 mm, CW 15-21.5 mm Site 52, leg. AUAA 15.03.11. ♂ CL 12.3 mm, CW 19.9 mm Site 55, leg. RUWW 01.03.85. 2♀♀ (1. ovi) CL 5-5.3 mm, CW 8-8.7 mm Site 54, leg. RUWW 04.03.84. 3♂♂ CL 6-6.9 mm, CW 9.4-9.5 mm Site 54, leg. RUWW 04.03.84. 2♀♀ CL 10.3-11.1 mm, CW 16.7-18.7 mm Site 22, leg. RUWW 01.03.07. 4♂♂ CL 7.3-9.4 mm, CW 11.9-15.2 mm Site 22, leg. RUWW 01.03.07. 4♀♀ CL 7.3-12.3 mm, CW 12.1-19.6 mm Site 44, leg. RUWW 23.02.85. 2♂♂ CL 9.4-11.3 mm, CW 16-18.1 mm Site 40, leg. RUWW 23.02.85. ♀ CL 8.5 mm, CW 13.1 mm Site 54, leg. RUWW 01.03.84. 6♂♂ CL 6.7-7.5 mm, CW 9.9-13.3 mm Site 54, leg. RUWW 01.03.84. 20♀♀ (3. ovi) CL 6.7-12.8 mm, CW 10.4-22 mm Site 43, leg. SMF 27.05.05. 13♂♂ CL 7.8-15.1 mm, CW 13.1-24.2 mm Site 43, leg. SMF 27.05.05. 19♀♀ CL 6.2-11.3 mm, CW 9.9-18.4 mm Site 32, leg. SMF 23.05.05. 22♂♂ CL 5.3-12.4 mm, CW 8.7-20.1 mm Site 32, leg. SMF 23.05.05.

Superfamily Xanthoidea MacLeay, 1838
Family Xanthidae MacLeay, 1838

Atergatis integerrimus (Lamarck, 1818) Plate 31 A

Cancer laevis latipes Seba, 1761: pl. 19, figs 6-7.

Cancer integerrimus Lamarck, 1801: 272; Lamarck, 1818: 272; H. Milne Edwards, 1836-1844 (1840): pl. 11bis, figs 1, 1a-b.
Cancer (Atergatis) integerrimus de Haan, 1833-1849 (1835): 45, pl. 14, fig. 1; Yamaguchi, 1993: 579.
Atergatis subdivisus Adams & White, 1848: 38, pl. 8, fig. 3.
Atergatis integerrimus Dana, 1852c: 158; Stimpson, 1858a: 32; A. Milne Edwards, 1865c: 235; Miers, 1880a: 231; de Man, 1887b: 24; Ortmann, 1893b: 462; Balss, 1922c: 124; Sakai, 1976: 410, pl. 147, fig. 2.
Atergatis integerrimus typicus Sakai, 1935a: 71.

Type locality: Unknown.

Distribution: Gulf of Aden: Aden, Zanzibar, Mauritius, Gulf of Oman, Arabian Gulf, India, Sri Lanka, Malaysia, Japan, Taiwan, China, Singapore, Philippines, Indonesia and New Caledonia; 10-30 m.

Atergatis latissimus (H. Milne Edwards, 1834) Plate 31 B

Zozimus latissimus H. Milne Edwards, 1834: 384.
Cancer (Atergatis) frontalis de Haan, 1833-1849 (1835): 46, pl. 14, fig. 3; Yamaguchi, 1993: 578.
Atergatis sinuatifrons White, 1848a: 224; Adams & White, 1848: 38.
Atergatis latissimus A. Milne Edwards, 1865c: 237, pl. 14, fig. 1; Odhner, 1925: 83; Balss, 1938a: 37; Guinot, 1967: 261; Serène, 1980: 713, pl. 1A.
Atergatis frontalis A. Milne Edwards, 1865c: 238; Shen, 1940b: 72, 85; Sakai, 1976: 410, fig. 215.
Atergatis integerrimus frontalis Paulson, 1875: 14.
Atergatis latissimus frontalis de Man, 1926b: 205; Sakai, 1939: 448, pl. 88, fig. 1.
Non *Atergatis frontalis* de Man, 1879: 54.
= *Atergatis reticulatus* de Haan, 1835.

Type locality: Australia.

Distribution: Socotra Island, Arabian Sea: Dhofar, Mauritius, Japan, Taiwan, China Sea, Australia and Marshall Islands.

Leptodius exaratus (H. Milne Edwards, 1834) Plate 31 C

Chlorodius exaratus H. Milne Edwards, 1834: 402; Dana, 1852c: 208; Stimpson, 1907: 52.
Cancer (Xantho) affinis de Haan, 1833-1849 (1835): 48, pl. 13, fig. 8 (not 6).
Cancer (Xantho) lividus de Haan, 1833-1849 (1835): 48, pl. 13, fig. 6 (not 8); Yamaguchi, 1993: 580.
Cancer exaratus H. Milne Edwards, 1836-1844 (1842): pl. 11, figs 3, 3a-c.
Leptodius exaratus A. Milne Edwards, 1868a: 71; A. Milne Edwards , 1873a: 222; Miers, 1879b: 31; Henderson, 1893: 362; Nobili, 1907: 389; Chhapgar, 1957b: 29, pl. 8 o-q; Sakai, 1976: 423, pl. 153, fig. 1; Serène, 1984: 183, fig. 106, pl. 26A.
Actaeodes lividus Paulson, 1875: 26, pl. 5, fig. 2; Paulson, 1961: 35, pl. 5, fig. 2.
Chlorodius (Leptodius) exaratus Kossmann, 1877: 32, pl. 2; Hilgendorf, 1879: 790.
Leptodius lividus Miers, 1884a: 214.
Xantho (Leptodius) exaratus var. *typica* Ortmann, 1893b: 445; Ortmann, 1894b: 50.
Xantho (Leptodius) exaratus Alcock, 1898: 118; Calman, 1900: 6; Laurie, 1906: 402; Balss, 1938a: 41.
Chlorodius exaratus var. *typicus* Stimpson, 1907: 55.
Leptodius exaratus var. *Rathbun*, 1910b: 310.
Xantho hydrophilus Laurie, 1915: 444, pl. 43, fig. 1; Montgomery, 1931: 435.
Xantho exaratus Gordon, 1931: figs. 20, 22B; Monod, 1938: 125, fig. 17B.
Xantho (= *Leptodius) exaratus* Stephensen, 1945: 149, fig. 37C.
Xantho (Leptodius) hydrophilus Barnard, 1950: 220 (key), 223, figs 41c, 42c-e; Barnard, 1955: 3.

Type locality: Coasts of India.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Gulf of Oman, Arabian Gulf, Zanzibar, Mozambique, South Africa, Madagascar, Somalia, Seychelles, Mauritius, Pakistan, India, Sri Lanka, Burma, Malaysia, Japan, Taiwan, China, Philippines, Indonesia, New Caledonia and Hawaiian; between high and low tidal marks.

Materials examined: 1. ovi♀ CL 11.3 mm, CW 17.1 mm Site 19, leg. AUAA 14.12.13. ♂ CL 16.7 mm, CW 24.2 mm Site 19, leg. AUAA 14.12.13. ♀ CL 12.8 mm, CW 19.1 mm Site 21, leg. AUAA 11.01.14. ♂ CL 17.8 mm, CW 26.7 mm Site 21, leg. AUAA 11.01.14. ♂ CL 12.3 mm, CW 18 mm Site 23, leg. AUAA 05.04.14. ♂ CL 12.8 mm, CW 18.8 mm Site 26, leg. AUAA 08.01.14. 3♀♀ CL 9.4-13.5 mm, CW 13.5-21 mm Site 48, leg. AUAA 17.03.11. 2♂♂ CL 10.5-14.5 mm, CW 15-24.6 mm Site 48, leg. AUAA 17.03.11. ♀ CL 10.3 mm, CW 14.6 mm Site 51, leg. AUAA 16.03.11. ♀ CL 15 mm, CW 22 mm Site 19, leg. AUAA 21.10.16. 2♂♂ CL 13-19 mm, CW 17-25 mm Site 19, leg. AUAA 21.10.16. ♀ CL 14 mm, CW 19 mm Site 19, leg. AUAA 27.10.16. 5♂♂ CL 13-17 mm, CW 17-26 mm Site 19, leg. AUAA 27.10.16. ♀ CL 7 mm, CW 12 mm Site 24, leg. AUAA 02.11.16. 4♀♀ (2.ovi) CL 11.8-14.6 mm, CW 18.1-22.2 mm Site 19, leg. AUAA 01.01.10. 5♂♂ CL 12.6-18.8 mm, CW 18.7-29.1 mm Site 19, leg. AUAA 01.01.10. ♂ CL 9.8 mm, CW 13.9 mm Site 19, leg. AUAA 24.03.14. ♂ CL 9.1 mm, CW 13.1 mm Site 19, leg. AUAA 26.04.14. 7♀♀ (1.ovi) CL 8.1-16.6 mm, CW 12-24.8 mm Site 21, leg. AUAA 14.12.13. 5♂♂ CL 11.6-15.9 mm, CW 17.3-24.2 mm Site 21, leg. AUAA 14.12.13. 3♀♀ (1.ovi) CL 6.5-10.6 mm, CW 10-15.9 mm Site 21, leg. AUAA 01.03.13. ♂ CL 16.3 mm, CW 24.8 mm Site 43, leg. SMF 27.05.05. 3♂♂ CL 7.7-10.4 mm, CW 11.2-15.3 mm Site 32, leg. SMF 23.05.05. ♀ CL 6.1 mm, CW 8.6 mm Site 22, leg. RUWW 01.03.07. 8♂♂ CL 5.4-9.6 mm, CW 7.9-14.3 mm Site 22, leg. RUWW 01.03.07. 3♀♀ (2.ovi) CL 13-19.1 mm, CW 18.7-29.6 mm Site 26, leg. RUWW 23.10.88. ♂ CL 16.8 mm, CW 26.1 mm Site 26, leg. RUWW 23.10.88. ♀ CL 9.5 mm, CW 14 mm Site 54, leg. RUWW 01.03.96. 3♂♂ CL 4.4-11.4 mm, CW 6.9-17.4 mm Site 54, leg. RUWW 01.03.96. 2♀♀ CL 9.9-10.1 mm, CW 14.4-14.8 mm Site 43, leg. SMF 27.05.05. 6♂♂ CL 6.9-17.7 mm, CW 9.9-27.1 mm Site 43, leg. SMF 27.05.05. ♂ CL 6.9 mm, CW 10 mm Site 13, leg. RUWW 01.12.83. 1. ovi♀ CL 10.1 mm, CW 15.1 mm Site 54, leg. RUWW 04.03.84. 2♂♂ CL 15.1-14.7 mm, CW 20-12.8 mm Site 54, leg. RUWW 01.03.85. ♂ CL 15.8 mm, CW 24.5 mm Site 19, leg. AUAA 01.01.10. 3♂♂ CL 13-15 mm, CW 17-21 mm Site 19, leg. AUAA 21.10.16. 2♀♀ CL 14.6-15.4 mm, CW 22-23.3 mm Site 19, leg. AUAA 14.12.13. 2♂♂ CL 13.8-16.3 mm, CW 20.8-24.3 mm Site 19, leg. AUAA 14.12.13. 4♀♀ (1.ovi) CL 11.3-14.6 mm, CW 16.4-21.4 mm Site 21, leg. AUAA 24.03.14. 2♂♂ CL 14.2-15.8 mm, CW 20.7-23.9 mm Site 21, leg. AUAA 24.03.14. 1. ovi♀ CL 12 mm, CW 17.7 mm Site 10, leg. SMF 07.04.04. 1. ovi♀ CL 9.6 mm, CW 14.5 mm Site 10, leg. SMF 06.04.04.

Macromedaeus voeltzkowi (Lenz, 1905) Plate 31 D

Macromedaeus voeltzkowi Lenz, 1905: 353, pl 47, figs 6, 6a.
Macromedaeus voeltzkowi Serène, 1984: 177 (in key), 178, 179, fig 102, pl 25f.

Type locality: Zanzibar.

Distribution: Red Sea, Gulf of Aden: Aden, Gulf of Oman, Arabian Gulf, South Africa, East Africa and Somalia.

Xanthias sinensis (A. Milne-Edwards, 1867) Plate 31 E

Pseudozius sinensis A. Milne-Edwards, 1867: 278.
Lioxantho asperatus Alcock, 1898: 92.
Lioxantho asperatus Alcock & Anderson, 1899: pl 36, fig 9; Nobili, 1906: 120.
Xanthias sinensis Serène, 1984: 195, fig 111, pl 28a; Hogarth, 1989: 106, 114; Hogarth, 1994: 100; Hornby, 1997: 16; Apel, 2001: 90, 91; Ng *et al.,* 2008: 204 (in list).

Type locality: Pakistan (Karachi).

Distribution: Red Sea, Gulf of Aden, Socotra Island, Southern Oman, Gulf of Oman, Arabian Gulf, Pakistan, Somalia and China.

Materials examined: ♂ CL 20.6 mm, CW 32.1 mm Site 19, leg. AUAA 24.03.14. 9♀♀ CL 10-16.9 mm, CW 16.1-26.7 mm Site 19, leg. AUAA 2008. 9♂♂ CL 15.2-17 mm, CW 23.4-27.8 mm Site 19, leg. AUAA 2008. ♀ CL 13 mm, CW 18 mm Site 19, leg. AUAA 21.10.16. ♀ CL 14 mm, CW 19 mm Site 21, leg. AUAA 27.10.16. ♂ CL 14 mm, CW 22 mm Site 21, leg. AUAA 27.10.16. ♀ CL 16.3 mm, CW 26.2 mm Site 21, leg. AUAA 01.10.10. 2♂♂ CL 15.3-17.8 mm, CW 23.3-28.5 mm Site 21, leg. AUAA 01.10.10. ♀ CL 13.3 mm, CW 20.5 mm Site 27, leg. RUWW 01.03.84. ♂ CL 19.6 mm, CW 31.3 mm Site 27, leg. RUWW 01.03.84. ♂ CL 16.3 mm, CW 25.9 mm Site 33, leg. RUWW 01.03.84. ♂ CL 10 mm, CW 15.2 mm Site 54, leg. RUWW 01.03.84. ♂ CL 15.2 mm, CW 23.2 mm Site 31, leg. RUWW 01.05.83. ♀ CL 17.2 mm, CW 27.8 mm Site 32, leg. SMF 23.05.05. 2♂♂ CL 14.9-16.1 mm, CW 23.4-25.6 mm Site 32, leg. SMF 23.05.05. 3 Juv CL 6.8-7.5 mm, CW 10.7-11.9 mm Site 32, leg. SMF 27.05.05. 2 Juv CL 6.7-8.8 mm, CW 9.9-13.9 mm Site 43, leg. SMF 23.05.05.

Xanthias cf. canaliculatus Rathbun, 1906 Plate 31 F

Xanthias canaliculatus Rathbun, 1906: 856, fig. 17, pl. 9, fig. 12; Edmondson, 1946: 291, fig. 177d; Edmondson, 1962a: 244, fig. 7f; Guinot, 1964b: 28, fig. 12; Sakai, 1976: 428, fig. 225; Serène, 1984: 193 (key), 194 (key), 199, fig. 118, pl. 28C; Dai & Yang, 1991: 296, fig. 156A (1), pl. 37 (8).

Type locality: Honolulu, Hawaii.

Distribution: Gulf of Aden: Yemen, Somalia, Madagascar, Japan, China, Hawaii, Honolulu and Tuamotu Archipelago.

Zosimus aeneus (Linnaeus, 1758) Plate 32 A

Cancer aeneus Linnaeus, 1758: 630; Linnaeus, 1764: 451; Linnaeus, 1767: 1048.
Cancer floridus (not Rumphius, 1705) Herbst, 1783: 132, pl. 3, fig. 39; Herbst, 1790: 264, pl. 21, fig. 120.
Cancer Amphitrite Herbst, 1801: 5, pl. 53, fig. 1.
Zozymus aeneus Dana, 1852c: 192; Miers, 1879a: 486; Nobili, 1907: 388; Stimpson, 1907: 42. Sakai, 1976: 402, pl. 143.
Atergatis aeneus Paulson, 1875: 16, pl. 4, fig. 3; Paulson, 1961: 26, pl. 4, fig. 3.
Zosimus aeneus Rathbun, 1906: 846; Guinot, 1967: 270; Serène, 1984: 165, fig. 98, pl. 24A.

Type locality: India.

Distribution: Red Sea, Gulf of Aden: Aden, Arabian Gulf, Tanzania, South Africa, Madagascar, Somalia, Mauritius, Laccadive Islands, Japan, Taiwan, China, Indonesia, Australia, Hawaiian Islands, Tahiti and Tuamotu Archipelago; shallow waters.

Luniella spinipes (Heller, 1861) Plate 32 B

Luniella spinipes (Heller, 1861); Lasley *et al*., 2015, p 174.
Chlorodopsis sipsin (Heller, 1861); Nobili, 1906; Laurie, 1915, plate 43**.** figs. 3 a-3 d, p 455; Balss, 1922.
Pilodius spinipes Heller, 1861b: 11, 12.
Pilodius spinipes Heller, 1861a: 340, 341, pl 3, fig 22; Titgen, 1982: 134, 252 (in list); Serène, 1984: 237 (in key), 243, figs 143 g, 148, pl 34a, b; Clark & Galil, 1993: 1155–1159, figs 15a–g, 38a, b, 39a, 44a, c; Hogarth, 1989: 106; Hogarth, 1994: 99; Apel, 2001: 89; Ng *et al.,* 2008: 197 (in list).

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden, Socotra Island, southern Oman, Gulf of Oman, Arabian Gulf, East Africa, Madagascar, Mauritius, Seychelles, Aldabra, South Africa, India, Andaman Sea and Mergui Archipelago.

Materials examined: ♂ CL 8 mm, CW 12 mm Site 24, leg. AUAA 02.11.16. ♀ CL 7.7 mm, CW 12 mm Site 18, leg. AUAA 26.04.14. ♂ CL 6 mm, CW 9.2 mm Site 23, leg. AUAA 05.04.14. 2♂♂ CL 3.2-5.8 mm, CW 4.6-8.7 mm Site 21, leg. AUAA 02.04.14. 2♂♂ CL 4.8-5.1 mm, CW 7.3-7.5 mm Site 54, leg. RUWW 01.03.96. 2. ovi ♀♀ CL 4.7-6.2 mm, CW 7.8-9.2 mm Site 8, leg. SMF 08.04.04. 3♂♂ CL 5.4-6.1 mm, CW 8.5-9 mm Site 8, leg. SMF 08.04.04. ♀ CL 6.7 mm, CW 9.6 mm Site 8, leg. SMF 07.04.04. ♂ CL 5.3 mm, CW 7.3 mm Site 8, leg. SMF 07.04.04. 1 Juv CL 4.9 mm, CW 7.1 mm Site 8, leg. SMF 07.04.04. ♀ CL 7.4 mm, CW 11.7 mm Site 2, leg. SMF 05.04.98. ♂ CL 6.2 mm, CW 9.2 mm Site 2, leg. SMF 05.04.98. 1 Juv CL 3.9 mm, CW 5.9 mm Site 2, leg. SMF 05.04.98. 14♀♀ CL 5.5-8.1 mm, CW 7.2-12.7 mm Site 41, leg. SMF 26.05.05. 3♂♂ CL 6.9-8 mm, CW 10.2-12.4 mm Site 41, leg. SMF 26.05.05. 10 Juv CL 2.9-3.6 mm, CW 4.2-5.7 mm Site 41, leg. SMF 26.05.05. ♀ CL 8.5 mm, CW 12.9 mm Site 42, leg. SMF 28.05.05. ♀ CL 6.5 mm, CW 9.5 mm Site 41, leg. SMF 28.05.05. ♂ CL 9 mm, CW 13.9 mm Site 41, leg. SMF 28.05.05. ♂ CL 10.7 mm, CW 16.1 mm Site 36, leg. SMF 20.05.05. ♂ CL 8 mm, CW 11.9 mm Site 34, leg. SMF 16.05.05. ♀ CL 5.3 mm, CW 7.8 mm Site 34, leg. SMF 16.05.05. 5♀♀ CL 6.8-9.9 mm, CW 9.8-14.7 mm Site 39, leg. SMF 24.05.05. 3♂♂ CL 7.7-9.8 mm, CW 11.7-13.9 mm Site 39, leg. SMF 24.05.05. ♀ CL 5.7 mm, CW 8.3 mm Site 33, leg. SMF 21.05.05. ♀ CL 7.3 mm, CW 11 mm Site 37, leg. SMF 18.05.05.

Cyclodius granulatus (Targioni-Tozzetti, 1877) Plate 32 C

Cyclodius granulatus (Targioni Tozzetti, 1877); Lasley *et al.*, 2015, p 173.
Pilodius granulatus Stimpson, 1859: 34, 1907: 58, pi. VII, fig. 2.
Chlorodopsis granulatus: Miers, 1884: 216 (part), plate XXI, fig. a'.
Chlorodopsis philippinensis Ward, 1941: 11.
Pilodius serenei Miyake & Takeda, 1968: 393, figs 3, 4; Takeda & Nunomura, 1976: 62 (fist), 73.
Non *Chlorodopsis granulatus*: Miers, 1884: 216, pi. XXI, fig. A (part); Sakai, 1936a: 164, pi. 49, fig. 1, 1939: 503, fig. 41, pi. 62, fig. 1, 98, fig. 6; Serene & Luom, 1959: 307, fig. lA, fig. 2E, F, pi. I, fig. D, pi. Ill, fig. c, F = *Pilodius miersi* Ward, 1936.
Non *Chlorodopsis granulatus*: Nobili, 1907: 46 = *Pilodius paumotensis* Rathbun, 1907.

Non *Pilodius granulatus*: Sakai, 1965: 148, pi. 73, fig. 6, 1976: 460, pi. 164, fig. 3; Serene, 1984: 240; Dai *et al*, 1986: 306, pi. 43 (3), fig. 165B (2); Dai & Yang, 1991: 329, pi. 43 (3), fig. 165B = *Pilodius miersi* Ward, 1936.

Type locality: Hong Kong.

Distribution: Red Sea, Gulf of Aden: Aden, Socotra Island, Southern Oman, Somalia, Hong Kong, Singapore and Australia.

Materials examined: 3♂♂ CL 7-11 mm, CW 10-16 mm Site 21, leg. AUAA 27.10.16. 2♂♂ CL 6.4-7.2 mm, CW 9.7-9.8 mm Site 54, leg. RUWW 01.03.96. 5♂♂ CL 6.4-10 mm, CW 8.8-15.2 mm Site 8, leg. SMF 08.04.04. 4 Juv CL 4.7-6.1 mm, CW 6.6-8.8 mm Site 8, leg. SMF 08.04.04. 4♀♀ CL 7.4-10.4 mm, CW 10.8-15.3 mm Site 8, leg. SMF 07.04.04. ♂ CL 10.3 mm, CW 15 mm Site 8, leg. SMF 07.04.04. 1 Juv CL 5.7 mm, CW 8 mm Site 8, leg. SMF 07.04.04. ♂ CL 7.7 mm, CW 11 mm Site 2, leg. SMF 05.04.98. 4♀♀ (1. ovi) CL 7.2-10.9 mm, CW 10.4-15.9 mm Site 34, leg. SMF 22.05.05. ♂ CL 13.4 mm, CW 19.7 mm Site 34, leg. SMF 22.05.05. 3♀♀ CL 10.1-11.5 mm, CW 14.9-16.6 mm Site 47, leg. SMF 27.05.05. ♂ CL 14.1 mm, CW 20.7 mm Site 47, leg. SMF 27.05.05. 1.ovi ♀ CL 8.8 mm, CW 12.8 mm Site 42, leg. SMF 28.05.05. ♂ CL 9.4 mm, CW 13.9 mm Site 42, leg. SMF 28.05.05. 2♀♀ (1. ovi) CL 7.6-7.8 mm, CW 11-11.1 mm Site 34, leg. SMF 19.05.05. ♂ CL 9.3 mm, CW 13.2 mm Site 34, leg. SMF 19.05.05. 2♀♀ (1. ovi) CL 7.1-10.3 mm, CW 10.1-14.8 mm Site 37, leg. SMF 19.05.05. ♀ CL 5.3 mm, CW 7.6 mm Site 37, leg. SMF 19.05.05. 2 Juv CL 3.1-3.8 mm, CW 3.6-5.6 mm Site 42, leg. SMF 26.05.05. 1 Juv CL 3.5 mm, CW 4.7 mm Site 34, leg. SMF 22.05.05.

Lophozozymus anaglyptus (Heller, 1861) Plate 32 D

Atergatis anaglyptus Heller, 1861a: 6; Paulson, 1875: 15, pl. 4, fig. 2.
Lophactaea anaglypta A. Milne Edwards, 1865c: 251; Alcock, 1898: 102; Nobili, 1901b: 12; Laurie, 1906: 395; Lenz, 1912: 3; Klunzinger, 1913: 160.
Lophactaea Helleri Kossmann, 1877: 21, pl. 1, fig. 2.
Platypodia anaglypta Rathbun, 1907: 38; Balss, 1924a: 6; Guinot, 1962c: 19; Sakai, 1976: 405, pl. 144, fig. 2; Serène, 1984: 154(key), 158(key), 159, fig. 92, pl. 22A; Dai & Yang, 1991: 279, pl. 35(5).
Lophactaea (Atergatis, Platypodia) anaglypta Stephensen, 1945: 147.
Non *Platypodia anaglypta* Boone, 1934: 96, pl. 49.
= *Platypodia granulosa* (Rüppell, 1830).

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Arabian Sea, Arabian Gulf, Madagascar, Mauritius, Sri Lanka, Japan, China, Malay Peninsula and Vanuatu.

Etisus laevimanus Randall, 1840 Plate 32 E

Etisus laevimanus Randall, 1840: 115; Hilgendorf, 1879: 791; Richters, 1880: 146; Miers, 1884a: 217; de Man, 1888d: 289; Henderson, 1893: 362; Alcock, 1898: 131; Nobili, 1907: 390; Balss, 1922c: 131; Guinot, 1967: 263; Serène, 1984: 219 (key), 223 (key), 225, fig. 136, pl. 32B.
Etisus macrodactylus Bianconi J.J., 1851: 107, pl. 10, fig. 1; Jacquinot, 1842-1853 (1852): pl. 9, fig. 2.
Etisus levimanus Dana, 1852c: 185; Kossmann, 1877: 30.
Etisus convexus Stimpson, 1858a: 31; Stimpson, 1907: 36, pl. 5, fig. 2.
Etisus maculatus Heller, 1861b: 332; de Man, 1880c: 173.

Chlorodopsis espinosus Borradaile, 1902b: 262, fig. 57.
Etisus (Etisus) laevimanus Holthuis, 1953: 21.
Pilodius espinosus McNeill, 1968.

Type locality: Hawaii.

Distribution: Red Sea, Gulf of Aden, Zanzibar, Mozambique, Madagascar, Mauritius, Arabian Sea, Gulf of Oman, Arabian Gulf, Karachi, India, Laccadive Islands, Japan, Taiwan, China, Indonesia, Australia, New Caledonia, Fiji and Hawaii.

Hypocolpus cf. guinotae Vannini, 1982 Plate 32 F

Hypocolpus sculptus, Nobili, 1906 c, p. 239, en partie.
Hypocolpus sp. Guinot-Dumortier, 1960 b, p. 184, pl. 2, fig. 9; pl. 3, fig. 19; pl. 4, fig. 25,27; Pl. 10, fig. 56, 57.
Hypocolpus guinotae Vannini, 1982, p. 102, fig. 1 B, 2, pl. 1, fig. A-C.

Type locality: Somalia.

Distribution: Red Sea: Yemen (Kamaran Island) and Somalia.

Cymo quadrilobatus Miers, 1884 Plate 33 A

Cymo andreossyi var. *quadrilobatus* Miers, 1884b: 532.
Cymo quadrilobatus Alcock & Anderson, 1894b: 200; Alcock, 1898: 173(key), 175; Nobili, 1906: 272; Guinot, 1962b: 239; Serène, 1984: 32(key), 34, fig. 9, pl. 2E-F.

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden: Yemen, Socotra Island, Arabian Sea, Somalia, Seychelles, Mauritius, Chagos Archipelago, Andaman Islands, Taiwan and China.

Cymo andreossyi (Audouin, 1826) Plate 33 B

Pilumnus andreossyi Savigny, 1809: pl. 5, fig. 5; Audouin, 1826: 86.
Cancer (Cymo) Andreossji de Haan, 1833-1849 (1833): 22.
Cancer (Cymo) Andreossyi de Haan, 1833-1849 (1835): pl. D.
Cymo Andreossyi Dana, 1852c: 225; Dana, 1855: pl. 13, fig. 2a-b; de Man, 1888d: 291; Klunzinger, 1913: 255, pl. 7, fig. 7.
Cymo andreossyi Stimpson, 1858a: 34; Paulson, 1875: 38, pl. 6, fig. 5; Miers, 1884b: 532; de Man, 1887b: 35; Ortmann, 1894b: 49; Alcock, 1898: 173; Nobili, 1906: 271; Laurie, 1906: 406; Balss, 1922c: 128; Guinot, 1967: 263; Sakai, 1976: 467, pl. 166, fig. 4; Serène, 1984: 32 (key), 33, fig. 7, pl. 2C.
Cymo Andreossii Kossmann, 1877: 35.
Cymo andreossyi var. *maculata s. pentagonalis* Klunzinger, 1913: 256, pl. 11, fig. 1.

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden: Aden, Socotra Island, Somalia, Dar es Salaam, Madagascar, Mauritius, Arabian Sea, Gulf of Oman, Arabian Gulf, Pakistan, Sri Lanka,

Andaman Islands, Japan, Taiwan, China, Malaysia, Philippines, Indonesia, Fiji and Tahiti; shallow waters.

Materials examined: 4♀♀ (1. ovi) CL 4.2-6.3 mm, CW 5.8-6.5 mm Site 23, leg. AUAA 12.04.14. 3♀♀ (1. ovi) CL 5.2-9.9 mm, CW 5.5-10.3 mm Site 18, leg. AUAA 26.04.14. 2♂♂ CL 3.7-4.3 mm, CW 5.5-10.3 mm Site 18, leg. AUAA 26.04.14. ♀ CL 12.9 mm, CW 13.8 mm Site 54, leg. RUWW 01.03.96. 1 Juv CL 4.7 mm, CW 4.9 mm Site 54, leg. RUWW 01.03.96. 1. ovi ♀ CL 14.4 mm, CW 11 mm Site 34, leg. SMF 19.05.05. ♂ CL 5.9 mm, CW 5.4 mm Site 17, leg. SMF 25.03.98. 1. ovi ♀ CL 17.4 mm, CW 19.2 mm Site 39, leg. SMF 24.05.05. ♂ CL 11.8 mm, CW 12.4 mm Site 39, leg. SMF 24.05.05. 2. ovi ♀♀ CL 12.4-13.9 mm, CW 13.5-13.6 mm Site 42, leg. SMF 28.05.05. ♂ CL 9.6 mm, CW 9.9 mm Site 42, leg. SMF 28.05.05.

Cymo melanodactylus Dana, 1852 Plate 33 C

Cancer (Cymo) melanodactylus de Haan, 1833-1849 (1833): 22.
Cymo melanodactylus Dana, 1852c: 225; Dana, 1855: pl. 13, fig. 1; Stimpson, 1858a: 34; Ortmann, 1893b: 442; Alcock, 1898: 173(key), 174; Sakai, 1976: 467, pl. 166, fig. 3; Serène, 1984: 32 (key), 34, fig. 8, pl. 2B.
Cymo andreossyi var. *melanodactyla* Lanchester, 1900b: 740; Nobili, 1907: 397; Stimpson, 1907: 59; Stephensen, 1945: 153, fig. 38A-B.
Cymo Andreossyi var. *melanodactyle s. nuda* Klunzinger, 1913: 256.
Cymo melanodactylus savaiiensis Ward, 1939: 11.
Cymo andreossyi subsp. melanodactylus Michel, 1964: 24.

Type locality: Java.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Somalia, Madagascar, Mauritius, Arabian Sea, Gulf of Oman, Arabian Gulf, India, Sri Lanka, Andaman Islands, Japan, Taiwan, China, Indonesia, Australia; New Caledonia, Fiji, Tahiti and Tuamotu Archipelago; shallow waters.

Chlorodiella nigra (Forskål, 1775) Plate 33 D

Cancer niger Forskål, 1775: 89.
Chlorodius niger Rüppell, 1830: 20, pl. 4, fig. 7; Dana, 1852c: 216; de Man, 1880c: 174; Nobili, 1907: 393; Stimpson, 1907: 50; Stephensen, 1945: 156, fig. 38D-E.
? *Chlorodius hirtipes* Adams & White, 1848: 40, pl. 11, fig. 4.
Chlorodius nebulosus Dana, 1852c: 214; Dana, 1855: pl. 12, fig. 3.
Chlorodius depressus Heller, 1861b: 338.
Chlorodiella nigra Rathbun, 1897a: 157; Balss, 1924a: 10; de Man, 1929b: 4; Sakai, 1965b: 150, pl. 75, fig. 2; Serène, 1984: 255(key), 257(key), 258, fig. 168, pl. 36B; Dai *et al*., 1986.
Chlorodiella (Chlorodius) niger Laurie, 1906: 405.
Chlorodiella niger Rathbun, 1906: 857; Rathbun, 1911: 225.

Type locality: Red Sea: Saudi Arabia, Jeddah.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Somalia, east coast of Africa, Mayotte, Madagascar, Mauritius, Arabian Sea, Gulf of Oman, Arabian Gulf, Pakistan, Andaman Islands, Japan, Malaysia, Philippines, Indonesia, Australia, New Caledonia, Fiji, Tahiti and Tuamotu.

Chlorodiella laevissima (Dana, 1852) Plate 33 E

? *Menippe martensi* Krauss, 1843: 34, pl. 2, fig. 1.
Chlorodius laevissimus Dana, 1852b: 80; Alcock & Anderson, 1894b: 200; Nobili, 1907: 393.
Chlorodiella laevissima Rathbun, 1906: 857; Guinot, 1964b: 70; Sakai, 1965b: 151, pl. 75, fig. 1; Serène, 1984: 260.
Chlorodiella laevissima form *laevissima* Serène, 1984: 255 (key), 257 (key), fig. 171, pl. 36 D.
Non *Chlorodiella laevissima* Miyake, 1938a: 192, fig. 3b.
= *Chlorodiella crispipleopa* Dai et al., 1986.

Type locality: Sandwich Island, Hawaiian Islands.

Distribution: Red Sea, Gulf of Aden: Aden, Somalia, South Africa, Mauritius, Sri Lanka, Japan, Taiwan, Hawaiian Islands and Tahiti; coral reef to 40 m.

Chlorodiella cytherea (Dana, 1852) Plate 33 F

Chlorodius cytherea Dana, 1852b: 79; Stimpson, 1907: 50.
Pilodius martensi (not Krauss, 1843) Nobili, 1906: 268.
Chlorodiella cytherea Holthuis, 1953: 14; Forest & Guinot, 1961: 95, figs 90-92, 98; Guinot, 1964b: 70; Serène, 1984: 255 (key), 257 (key), 259, fig. 169, pl. 36C.
? *Chlorodiella cytherea* Ward, 1939: 11.
Non *Chlorodiella cytherea* Chen H. & Lan, 1978: 270, figs 5, 7 (1-3), pl. 2, fig. 5.
= *Chlorodiella crispipleopa* Dai & Yang, 1984.

Type locality: Tuamotu Archipelago.

Distribution: Red Sea, Socotra Island, Somalia, Madagascar, Mauritius, Arabian Sea, Maldives, Seychelles, Japan, Taiwan, China, Hawaii, Tahiti and Tuamotu.

Actaea savignii (H. Milne Edwards, 1834) Plate 34 A

Cancer granulatus (not Linnaeus, 1758) Audouin, 1826: 87.
Cancer savignyii H. Milne Edwards, 1834: 378.
Actaea granulata (part = *savignyii*) A. Milne Edwards, 1865c: 275 (part); A. Milne Edwards, 1873a: 192; Miers, 1879b: 30.
Euxanthodes granulata Paulson, 1875: 42, pl. 6, fig. 3.
Actaea Savignii Kossmann, 1877: 25, pl. 3, fig. 8; Hilgendorf, 1879: 787.
Actaea calculosa (not H. Milne Edwards, 1834) Nobili, 1906: 261(part).
Actaea savignyi Rathbun, 1911: 221; Balss, 1924a: 8 (part); Guinot, 1976: 211, figs 38A, 39A, 39a, 41A, pl. 9, figs 1-3; Serène, 1984: 109 (key), 111 (key), 113, fig. 66, pl. 14, fig. B.
Actaea (Euxanthodes) Savignyi Klunzinger, 1913: 178, 194, pl. 5, fig. 6, pl. 7, fig. 4, pl. 10, fig. 8.
Actaea savignii Campbell & Stephenson, 1970: 278, fig. 37.
Non *Actaea granulata* Ortmann, 1893b: 455.
= *Actaea semblatae* Guinot, 1976.
Non *Actaea granulata* Nobili, 1906: 127.
= *Actaea jacquelinae* Guinot, 1976.
Non *Actaea savignyi* Sakai, 1939: 485, fig. 37, pl. 61, fig. 2; Sakai, 1976: 442, pl. 158, fig. 2.
= *Actaea semblatae* Guinot, 1976.
Non *Actaea savignyi* Stephensen, 1945: 151, fig. 38C.
= ? *Actaea jacquelinae* Guinot, 1976.

Type locality: Unknown.

Distribution: Red Sea, Socotra Island, Mozambique, South Africa, Madagascar, Mauritius, Arabian Gulf, Pakistan, India, Sri Lanka, Taiwan, China, Indonesia, Australia and New Caledonia.

Actaea jacquelinae Guinot, 1976 Plate 34 B

Actaea jacquelinae Guinot, 1976: 227, fig 39d, pl 10, figs 3-3b.
Actaea calculosa Alcock, 1898: 152 (partly: material from the Arabian Gulf); Chopra and Das 1937: 400 (partly: material from the Arabian Gulf); Stephensen, 1946: 153; Guinot, 1967: 260.
Actaea granulata Nobili, 1906: 127.
Actaea savignyi Stephensen, 1946: 151, fig 38c; Guinot, 1964: 44; Guinot, 1967: 260.
Actaea jacquelinae Serène, 1984: 113, fig 65, pl 14c; Tirmizi & Ghani, 1996: 11–13, fig 3; Apel, 2001: 81.

Type locality: Arabian Gulf (Arzanah Island, Abu- Dhabi, UAE).

Distribution: Red Sea, Arabian Gulf, Gulf of Oman, Pakistan and India.

Actaea cf. bocki Odhner, 1925 Plate 34 C

Actaea rüpelli (not Krauss, 1843) Balss, 1922c: 121.
Actaea bocki Odhner, 1925: 44, pl. 3, fig. 1; Sakai, 1939: 483, pl. 93, fig. 5; Takeda, 1979: 155.
(Actaea) bocki Guinot, 1976: 203, 262, fig. 47D, d.
Gaillardiellus bocki Takeda, 1997: 245.

Type locality: Sagami Bay, Japan, 180 m.

Distribution: Gulf of Aden: Yemen, South Africa, Japan, Sagami Bay, Korea Strait, East China Sea and Taiwan Strait.

Atergatopsis granulata A. Milne-Edwards, 1865 Plate 34 D

Atergatopsis granulatus A. Milne-Edwards, 1865: 255, pl 13, figs 2, 2b; Kossmann, 1877: 22; Nobili, 1906:235; Klunzinger, 1913: 156 (60); Serène, 1984: 143, fig 83, pl. 20b.
Not *Atergatopsis granulatus* Miers, 1884b: 529 = not *Atergatopsis*, according to Buitendijk (1960).
Not *Atergatopsis granulatus* Miers, 1886: 123 = *Atergatopsis tweediei* Balss, 1938b, according to Buitendijk (1960).
Not *Atergatopsis granulatus* Balss, 1924 a: 6, fig. 1 = *Banareia parvula* (Krauss, 1843).

Type locality: Zanzibar.

Distribution: Red Sea, Socotra Island, Madagascar, Zanzibar, Pakistan (Karachi), Aldabra, South China Sea and New Guinea, 26-46 m depth.

Epiactaea margaritifera (Odhner, 1925) Plate 34 E

Actaea margaritifera Odhner, 1925: 48, pl 3, fig 10.
Actaea nodulosa Henderson, 1893: 356; Alcock, 1898: 148; Nobili, 1906: 257, pl 10, fig 2.
Actaea margaritifera Stephensen, 1946: 152; Guinot, 1967: 261 (in list); Titgen, 1982: 251 (in list).
Epiactaea margaritifera Serène, 1984: 117, fig 70, pl 15b; Hogarth, 1994: 95; Apel, 2001: 84; Ng *et al.,* 2008: 195 (in list).

Type locality: Gulf of Aden: Aden.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Southern Oman, Arabian Gulf, Pakistan, Sri Lanka, Thailand, Indonesia, Singapore and Torres Strait.

Glyptoxanthus meandrinus (Klunzinger, 1913) Plate 34 F

Actäa (Psaumis) mäandrina Klunzinger, 1913: 185 [89], pl. 1 fig. 5, pl. 6 fig. 4 (type locality: Kosseir, Red Sea).
Actaea vermiculata Odhner, 1925: 57, pl. 4 fig. 1. Not *Cancer vermiculatus* Lamarck, 1818.
?*Glyptoxanthus meandrinus* Guinot, 1971: 1073.
Glyptoxanthus meandrinus Guinot, 1967: 556; 1979: 68, pl. 6 fig. 7; Serène 1984: 83.

Type locality: Red Sea: Al-Qusair, Egyptian coast.

Distribution: Red Sea, Gulf of Aden: Yemen and the western Indian Ocean.

Actaeodes hirsutissimus (Rüppell, 1830) Plate 35 A

Xantho hirsutissimus Rüppell, 1830: 26, pl. 5, fig. 6, pl. 6, fig. 21; H. Milne Edwards, 1834: 389.
Cancer (Actaea) hirsutissima de Haan, 1833-1849 (1833): 18; de Haan, 1833-1849 (1835): pl. D.
Actaea hirsutissima Dana, 1852c: 164; Heller, 1865: 9; A. Milne Edwards, 1865c: 265; Ortmann, 1893b: 453; Alcock, 1898: 141; Guinot, 1967: 259.
Actäa (Actäana) hirsutissima Klunzinger, 1913: 178, 196, fig. 9, pl. 10, fig. 9.
Actaeodes hirsutissimus Guinot, 1967d: 561; Guinot, 1976: 245, fig. 38E, pl. 15, fig. 2; Sakai, 1976: 448, pl. 159, fig. 3; Serène, 1984: 133 (key), 134 (key), 135, fig. 79, pl. 18B.
Non *Actaea hirsutissima* Rathbun, 1906: 852.
= *Gaillardiellus superciliaris* (Odhner, 1925).

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Somalia, Kenya, Tanzania- Dar es Salaam, Mozambique, Madagascar, Mauritius, Arabian Sea, Andaman Islands, Japan, Taiwan, China, Vietnam, Singapore, Indonesia, New Guinea, Australia, Fiji and Tahiti; coral reef, shallow waters.

Actaeodes tomentosus (H. Milne Edwards, 1834) Plate 35 B

Zozymus tomentosus H. Milne Edwards, 1834: 358; Hoffmann, 1874: 38.
Actaeodes tomentosus Dana, 1852c: 197; Heller, 1861a: 9; A. Milne Edwards, 1865c: 262; Miers, 1879a: 486; Sakai, 1976: 447, fig. 239; Serène, 1984: 133 (key), 134, fig. 78, pl. 18A.
Actaea tomentosa Targioni Tozzetti, 1877: 35, pl. 3, figs 13-14, 16-17, 19, 22-23, 25, 27; Hilgendorf, 1879: 788; Ortmann, 1893b: 453; Laurie, 1915: 446; Guinot, 1967: 260.
Acteodes tomentosus Stimpson, 1907: 44.

Type locality: Indian Ocean.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Somalia, Kenya, Tanzania, Zanzibar, Mozambique, South Africa, Madagascar, Seychelles, Mauritius, Arabian Sea,

Laccadive Islands, Maldives, Japan, Taiwan, China, Singapore, Philippines, Indonesia, Australia, New Caledonia, Marshall Islands, Hawaiian Islands and Tuamotu Archipelago.

Paractaea rufopunctata (H. Milne Edwards, 1834) Plate 35 C

Xantho rufopunctatus H. Milne Edwards, 1834, p. 389.
Actaea rufopunctatus H. Milne Edwards, 1834; Laurie, 1915; Nobili, 1906.
Actaea rufopunctata: A. Milne Edwards 1865, p. 268, pi. 18, fig. 1,1a
Paractaea rufopunctata rufopunctata: Guinot, 1969, p. 246, figs. 19, 20 [Neo-type locality: Mauritius]; 1976, p. 249; Sakai, 1976, p. 449, text-fig. 240 a; Serène, 1984.

Type locality: Gulf of Aden (Aden and Djibouti).

Distribution: Red Sea, Gulf of Aden, Socotra Island, Arabian Sea, Gulf of Oman, Madagascar, Aldabra, Mauritius and Japan.

Lybia plumosa Barnard, 1947 Plate 35 D

Lybia plumosa Barnard, 1947, p. 364; 1950, p. 252, fig. 46 f; 1954 a, p. 126; 1955, p. 4, fig. 13 d; 1958, p. 4; Sakai, 1967, p. 80; Guinot, 1967 c, p. 274; 1976, p. 76, fig. 16 A, a, B, b, 17 C, 18 B, F, 21 A-D, 22 F, pl. 2, fig. 3-5; Serène, 1968, p. 88; Kensley, 1970, p. 104; 1981, p. 44; Serène, 1984, p. 29, fig. 5, pl. I c.
Lybia aff. plicinosa, Guinot, 1964 a, p. 20, fig. 5 a-c, 6.
Lybia leptochelis Balss, 1934 b, p. 159; Peyrot-Clausade, 1977, a, index espèces, p. 27. Non *leptochelis* (Zehntner, 1894).

Type locality: East African coast.

Distribution: Gulf of Aden: Yemen, Socotra Island, Arabian Sea: Oman, Dhofar, Western Indian Ocean islands, East African coast, Somalia, Kenya, Mozambique and South Africa.

Neoliomera sabaea (Nobili, 1906) Plate 35 E

Actaea sabaea Nobili, 1906, p. 403; 1906 C, p. 254, pl. 10, fig. 3; Klunzinger, 1913, p. 192 (96); Laurie, 1915; Forest et Guinot, 1961, p. 86, fig. a-c; Guinot, 1967 cyp . 261; Serène, 1984, p. 69, fig. 27; pl. viii c, d.
Neoliomera sabaea, Odhner, 1925, p. 31, pl. 2, fig. 11; Balss, 1934 b, p. 514; Barnard, 1950, p. 241, fig. 37 c; Tweedie, 1950 a, p. 91; Guinot, 1958, p. 92; 1971 a, p. 1074.
? *Neoliomera* aff. *intermedia* Serène, 1980, p. 716, pl. 1 F.

Type locality: Red Sea: Mayun Island (Perim).

Distribution: Red Sea, Gulf of Aden: Yemen, Western Indian Ocean, South Africa, Madagascar, Somalia, Mayotte and Mauritius.

Liomera rubra (A. Milne-Edwards, 1865) Plate 35 F

Carpilodes ruber A. Milne Edwards, 1865c: 228, pl. 11, fig. 4; Lenz, 1901: 464; Nobili, 1906: 215; Rathbun, 1906: 842; Klunzinger, 1913: 138; Laurie, 1915, p. 412.

Carpilodes pediger Borradaile, 1902b: 260.
Carpilodes coccineus Rathbun, 1906: 843, pl. 8, fig. 4.
Carpilodes rugipes (not Heller, 1861) Klunzinger, 1913: 137, pl. 9, fig. 4.
Liomera rubra Guinot, 1967: 260; Sakai, 1976: 395, pl. 140, fig. 2; Takeda & Miyake, 1976: 109.
Liomera (Liomera) rubra Serène, 1984: 53 (key), 55 (key), 65, fig. 26, pl. 6E-F, pl. 9F.
Non *Carpilodes ruber* Ortmann, 1893b: 466.
= *Liomera margaritata* (A. Milne Edwards, 1873).
Non *Carpilodes ruber* Borradaile, 1902b: 260.
= *Liomera pediger* (Alcock, 1898).
Non *Carpilodes ruber* Rathbun, 1914c: 657; Rathbun, 1924c: 15.
= *Liomera venosa* (H. Milne Edwards, 1834).

Type locality: Honolulu, Hawaiian Islands.

Distribution: Red Sea, Gulf of Aden: Yemen, Zanzibar, Madagascar, Mauritius, Maldives, Japan, Philippines, Vietnam, Australia and Hawaii; shallow waters.

Pilodius areolatus (H. Milne Edwards, 1834) Plate 36 A

Chlorodius areolatus H. Milne Edwards, 1834: 400; White, 1847f: 18; Adams & White, 1849: 41.
Chlorodius perlatus MacLeay, 1838: 59; Krauss, 1843: 31.
Xantho dehaanii Krauss, 1843: 29, pl. 1, fig. 2.
Etisodes caelatus Dana, 1852b: 77; Dana, 1855: pl. 9, fig. 4a-d; Whitelegge, 1897: 131.
Actaeodes affinis Dana, 1852b: 78; Dana, 1855: pl. 11, fig. 3.
Actaea affinis A. Milne Edwards, 1865c: 263; Rathbun, 1911: 219; Balss, 1922c: 121.
Chlorodopsis areolatus A. Milne Edwards, 1873a: 231, pl. 8, fig. 8; Miers, 1884b: 517, 532; Ortmann, 1893b: 470; Balss, 1922c: 131.
Actaeodes tomentosus (part = areolatus) Miers, 1886: 135 (part); Lanchester, 1900b: 734 (part).
Chlorodopsis areolata Alcock, 1898: 166; Laurie, 1906: 405; Nobili, 1906: 269; Odhner, 1925: 36; Barnard, 1950: 214, fig. 39d-e.
Acteodes affinis Stimpson, 1907: 43.
Phymodius ungulatus (not H. Milne Edwards, 1834) Boone, 1934: 143 (part); Serène & Luom, 1958: 96.
Actea perlata Ward, 1942b: 88.
Chlorodopsis areolata var. *brandonensis* Ward, 1942b: 97, pl. 6, fig. 3.
Pilodius areolatus Forest & Guinot, 1961: 90; Sakai, 1976: 460, pl. 164, fig. 1; Serène, 1984: 241, figs 143c, 144, pl. 33C; Clark & Galil, 1993: 1125, figs 1A-G, 31A, 40A, 44B.

Type locality: Nouvelle-Hollande (Australia).

Distribution: Red Sea, Gulf of Aden, Socotra Island, Arabian Sea: Oman, Somalia, Zanzibar, Mozambique, South Africa, Seychelles, Madagascar, Mauritius, Sri Lanka, Maldives, Japan, Taiwan, China, Philippines, Australia, New Caledonia, Fiji and Hawaiian Islands.

Forestiana depressa (White, 1848) Plate 36 B

Pilumnus granulatus Krauss, 1843: 33; Stebbing, 1920b: 235.
Xantho depressa White, 1847f: 17 (nomen nudum); White, 1848a: 225.
Actaea parvula (not Krauss, 1843) de Man, 1887b: 27; Alcock, 1898: 146.
Actaea depressa Odhner, 1925: 38, pl. 2, fig. 19; Sakai, 1939: 483, pl. 94, fig. 1; Barnard, 1950: 227 (key), 229, fig. 43a; Serène, 1961: 202; Guinot, 1967: 261; Sakai, 1976: 446, fig. 237.
Pilumnus planes Edmondson, 1931: 8, figs 3c-d, pl. 3.

? *Actaea depressa* Balss, 1935b: 136.
Forestia depressa Guinot, 1976: 262, fig. 42B, 44A, 45B, b, b', c, pl. 18, fig. 1; Serène, 1984: 106, fig. 64, pl. 15, fig. D.
Non *Actaea depressa* Balss, 1938b: 54.
= *Forestia scabra* (Odhner, 1925).

Type locality: Corregidor Island, Philippines.

Distribution: Gulf of Aden, Socotra Island, Somalia, South Africa, Kenya, Madagascar, Sri Lanka, Andaman Islands, Mergui Archipelago, Japan, Taiwan; Philippines and Hawaiian Islands.

Neoxanthops lineatus (A. Milne-Edwards, 1867) Plate 36 C, D

Cycloxanthus lineatus A. Milne Edwards, 1867: 269; Miers, 1884a: 183, 212; Nobili, 1906: 243; Lenz, 1910: 548; Klunzinger, 1913: 208; Laurie, 1915.
Cycloxanthops lineatus Rathbun, 1910: 350, pl. 2, fig. 15; Balss, 1934b: 514; Sakai, 1934a: 310, fig. 20; Guinot, 1967: 262.
Neoxanthops lineatus Guinot, 1968: 700, fig. 16; Sakai, 1976: 436, pl. 157, fig. 1; Takeda, 1978a: 40; Serène, 1984: 211(key), 212, fig. 127, pl. 29C.

Type locality: New Caledonia.

Distribution: Red Sea, Gulf of Aden: Yemen, Kenya, Zanzibar, Madagascar, Sri Lanka, Japan, Taiwan; Gulf of Thailand, Australia and New Caledonia; littoral to 23 m.

Platypodia cf. pseudogranulosa Serène, 1984 Plate 36 E

Lophactaea granulosa A. Milne Edwards, 1873 a, p. 187; Nobili, 1907, p. 388. Non *Platypodia gramlosa* (Riippell, 1830).
Platypodia granulosa de Man; Laurie, 1915.
Platypodia granulosa Edmondson, 1925, p. 52; 1962, p. 226, fig. 2 b; Ward, 1933 a, p. 242; Sakai, 1939, p. 452, pl. 89, fig. 3; Forest et Guinot, 1961, p. 51. Non *Platypodia granulosa* (Riippell, 1830).

Type locality: French Polynésie.

Distribution: Red Sea, Gulf of Aden: Yemen, Indian Ocean and west Pacific Ocean.

Demania mortenseni (Odhner, 1925) Plate 36 F

Actaea mortenseni Odhner, 1925: 51, pl. 5, fig. 9; ? Sakai, 1976: 442, pl. 158, fig. 1.
(Actaea) mortenseni Guinot, 1976: 204, pl. 19, fig. 4, 4a.
Demania mortenseni Davie, 1993b: 508, fig. 3, pl. 3; Poupin, 1996a: 40, pl. 19 e; Davie, 1997: 372.

Type locality: Kepulauan Kai, Indonesia.

Distribution: Gulf of Aden: Yemen, Socotra Island, Japan, Taiwan, Indonesia and Tuamotu Archipelago; 200-370 m.

Xanthidae. gen. sp.1 **Plate 37 A, B**

Type locality: Unknown.

Distribution: Unknown.

Xanthidae. gen. sp. 2 **Plate 37 C, D**

Type locality: Unknown.

Distribution: Unknown.

Xanthidae. gen. sp. 3 **Plate 37 E, F**

Type locality: Unknown.

Distribution: Unknown.

Subsection: Thoracotremata Guinot, 1977
Superfamily: Grapsoidea MacLeay, 1838
Family: Grapsidae MacLeay, 1838

***Grapsus albolineatus* Latreille in Milbert, 1812 Plate 38 A**

Cancer strigosus (not Linnaeus, 1761) Herbst, 1799: 55, pl. 47, fig. 7.
Grapsus albolineatus Latreille in Milbert, 1812: 274.
Grapsus albo-lineatus Lamarck, 1818: 249.
Grapsus (Goniopsis) strigosus (not Linnaeus, 1761) de Haan, 1833-1849 (1835): 33, pl. D.
Grapsus (Goniopsis) flavipes MacLeay, 1838: 66.
Grapsus peroni H. Milne Edwards, 1853: 169.
Grapsus granulosus H. Milne Edwards, 1853: 169; Crosnier, 1965: figs. 9, 12, pl. 2, fig. 1.
Grapsus longipes Stimpson, 1858b: 102; Stimpson, 1907: 119.
Grapsus strigosus (not Linnaeus, 1761) Dana, 1852c: 338; A. Milne Edwards, 1873a: 286; Ortmann, 1894a: 705; Alcock, 1900b: 393; Laurie, 1915, p. 416; Balss, 1922; Chhapgar, 1957b: 53, pl. B, fig. 5, pl. 15 k-m.
Grapsus albolineatus Holthuis, 1958: 48; Banerjee, 1960: 147, figs 1c, 2z, p, 3a, f; Sakai, 1976: 630, pl. 215; Ng, 1998c: 1139 (key), 1142, fig.

Type locality: Mauritius.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Arabian Sea, Gulf of Oman, Arabian Gulf, East of Africa, Somalia, Mauritius, Pakistan, India, Sri Lanka, Andaman Islands, Japan, Taiwan, Indonesia, New Guinea, Australia, New Caledonia, Hawaiian Islands and Chile.

Materials examined: ♀ CL 35 mm, CW 39.1 mm Site 21, leg. AUAA 11.01.14. ♂ CL 40.4 mm, CW 44.9 mm Site 21, leg. AUAA 11.01.14. ♀ CL 36.4 mm, CW 41.3 mm Site 23, leg. AUAA 05.01.14. ♀ CL 48.9 mm, CW 54.6 mm Site 19, leg. AUAA 14.12.13. ♀ CL 37.4 mm,

CW 42.1 mm Site 19, leg. AUAA 01.03.13. 3♂♂ CL 41.2-44.1 mm, CW 45.6-48.9 mm Site 19, leg. AUAA 01.03.13. 2♀♀ CL 29-52.5 mm, CW 32.5-59 mm Site 52, leg. AUAA 15.03.11. ♂ CL 33.5 mm, CW 37.5 mm Site 48, leg. AUAA 17.03.11. ♂ CL 39 mm, CW 44 mm Site 24, leg. AUAA 02.11.16. 4♀♀ CL 24.9-50.6 mm, CW 28-56.1 mm Site 40, leg. RUWW 01.10.88. 5♂♂ CL 14.1-57.1 mm, CW 16.3-63.1 mm Site 40, leg. RUWW 01.10.88. ♀ CL 12.4 mm, CW 15.1 mm Site 22, leg. RUWW 17.02.84. 2♀♀ CL 12.5-21.5 mm, CW 14.4-25.3 mm Site 27, leg. RUWW 01.10.84. 2♂♂ CL 20.6-45.6 mm, CW 24.1-50.6 mm Site 27, leg. RUWW 01.10.84. 4♀♀ CL 18.7-41.7 mm, CW 21.6-45.6 mm Site 22, leg. RUWW 01.11.88. 7♂♂ CL 12.4-46.7 mm, CW 14.6-50.9 mm Site 22, leg. RUWW 01.11.88. ♀ CL 41 mm, CW 46.3 mm Site 33, leg. RUWW 01.03.84. ♂ CL 42.9 mm, CW 49.7 mm Site 57, leg. RUWW 06.02.02. 2♀♀ CL 15.4-22.3 mm, CW 17.9-24.4 mm Site 54, leg. RUWW 01.03.96. 2♂♂ CL 36.7-39.6 mm, CW 39.7-44.1 mm Site 22, leg. RUWW 29.03.07. ♂ CL 30.2 mm, CW 34.9 mm Site 58, leg. RUWW 01.02.99. 1. ovi ♀ CL 54.5 mm, CW 60 mm Site 8, leg. SMF 08.04.04. 2♂♂ CL 28.4-52.5 mm, CW 31.6-58.4 mm Site 32, leg. SMF 23.05.05. ♀ CL 47.4 mm, CW 52.1mm Site 36, leg. SMF 20.05.05. 3 Juv CL 14-16.5 mm, CW 16.1-18.9mm Site 36, leg. SMF 20.05.05.

Grapsus tenuicrustatus (Herbst, 1783) Plate 38 B

Cancer tenuicrustatus Herbst, 1783: 113, pl. 3, figs 33-34.
Grapsus hirtus Randall, 1840: 124.
Grapsus rudis H. Milne Edwards, 1853: 168; Kossmann, 1877: 60, pl. 3, fig. 12; Stimpson, 1907: 118.
Grapsus pharaonis H. Milne Edwards, 1853: 168.
Grapsus gracilipes H. Milne Edwards, 1853: 168; Sendler, 1923: 31.
Grapsus maculatus pharaonis A. Milne Edwards, 1873a: 285.
Grapsus maculatus tenuicrustatus Kingsley, 1880c: 193; Stephensen, 1945: 194, figs 59A-D.
Grapsus Pharaonis Lenz & Richters, 1881: 425.
Grapsus grapsus tenuicrustatus Rathbun, 1906: 838; Edmondson, 1923: 9; Sendler, 1923: 30.
Grapsus grapsus Parisi, 1918: 100.
Grapsus maculatus gracilipes Tesch, 1918a: 72, pl. 4, fig. 3.
Grapsus gracillimus Sendler, 1923: 32, pl. 21, fig. 5.
Grapsus tenuicrustatus de Man, 1929b: 17; Holthuis, 1958: 48; Crosnier, 1965: 10, figs 1-3, pl. 1, fig. 1; Sakai, 1976: 629, pl. 214; Ng, 1998c: 1139 (key), 1142, fig.
Grapsus maculatus (not H. Milne Edwards, 1853) Barnard, 1950: 113, figs 22d, 23b.
Grapsus maculatus ssp. tenuicrustatus Michel, 1964: 13.

Type locality: Unknown.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Arabian Sea: Yemen, Mozambique, South Africa, Madagascar, Mauritius, Japan, Taiwan, South China Sea, Indonesia, New Guinea, Australia, Hawaiian Islands, Tahiti and Tuamotu Archipelago; intertidal zone.

Grapsus granulosus H. Milne Edwards, 1853 Plate 38 C

Grapsus granulosus H. Milne-Edwards, 1853: 169; Heller, 1861: 18, 31; Hilgendorf, 1869: 87, 109;
A. Milne-Edwards, 1873: 287; Holthuis, 1958: 48, fig. 4a, 1977: 148; Crosnier, 1965: 15, 17, figs. 9, 12; Guinot, 1967: 284.
Grapsus intermedius Ramadan, 1936: 38; Banerjee, 1960: 155 (Gulf of Aqaba material); Guinot, 1967: 284 (pp.). [not *Grapsus intermedius* De Man, 1881].

Grapsus longitarsis Monod, 1938: 151, fig. 28; Guinot, 1967: 284 (pp.). [not *Grapsus longitarsis* Dana, 1851].
Grapsus strigosus Monod, 1938: 150 (Gulf of Aqaba material); Banerjee, 1960: 155 (Gulf of Aqaba material). [not *Cancer strigosus* Herbst, 1799 = *Grapsus albolineatus* Lamarck, 1818].

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Gulf of Oman, Arabian Gulf and southern Mediterranean (Lessepsian Migrant) from Red Sea: Gulf of Suez.

Materials examined: 2♂♂ CL 13-15.3 mm, CW 15.1-17.4 mm Site 21, leg. AUAA 18.01.14. 2♂♂ CL 8.7-21.7 mm, CW 10.3-24.3 mm Site 18, leg. AUAA 26.04.14. 1. ovi ♀ CL 15.1 mm, CW 17.4 mm Site 21, leg. AUAA 01.03.13. 3♂♂ CL 10.3-21.6 mm, CW 12.1-14.5 mm Site 21, leg. AUAA 01.03.13. 2♂♂ CL 9-14 mm, CW 10-16 mm Site 19, leg. AUAA 02.10.16. 2♀♀ CL 17-18 mm, CW 19-23 mm Site 24, leg. AUAA 02.11.16. ♂ CL 17 mm, CW 20 mm Site 24, leg. AUAA 02.11.16. 2♀♀ CL 7.4-10.2 mm, CW 8.6-12.1 mm Site 40, leg. RUWW 01.10.88. 2♂♂ CL 12.2-17.2 mm, CW 13.6-19.8 mm Site 40, leg. RUWW 01.10.88. ♀ CL 19.2 mm, CW 22.6 mm Site 54, leg. RUWW 01.03.84. 3♂♂ CL 17.6-19.8 mm, CW 20.6-22.9 mm Site 54, leg. RUWW 01.03.84. ♂ CL 12.4 mm, CW 14 mm Site 48, leg. RUWW 01.03.85. ♀ CL 10 mm, CW 11.6 mm Site 22, leg. RUWW 30.03.07. 3♀♀ (1. ovi) CL 4.6-10.9 mm, CW 5.7-13.5 mm Site 33, leg. SMF 16.05.05. 4♂♂ CL 7.8-11.8 mm, CW 9.7-14 mm Site 33, leg. SMF 16.05.05. ♀ CL 5.8 mm, CW 6.8 mm Site 43, leg. SMF 27.05.05. 3 Juv CL 4.6-5.8 mm, CW 5.3-7.2 mm Site 9, leg. SMF 06.04.04.

Geograpsus crinipes (Dana, 1851) Plate 38 D

Grapsus crinipes Dana, 1851e: 249; Dana, 1852c: 341; Dana, 1855: pl. 21, fig. 6a-d.
Geograpsus crinipes Ortmann, 1894a: 706; de Man, 1895b: 83; Alcock, 1900b: 396; Balss, 1922c: 149; Sakai, 1976: 632, pl. 217, fig. 2.
Geograpsus antelmei Ward, 1942b: 105, figs.

Type locality: Sandwich Island, Hawaiian Islands.

Distribution: Red Sea, Gulf of Aden: Aden, Socotra Island, East of Africa, Mauritius, Laccadive Islands, Andaman Islands, Japan, Taiwan; China, Hawaiian Islands and Tuamotu Archipelago.

Metopograpsus messor (Forskål, 1775) Plate 38 E

Cancer messor Forskål, 1775: 88.
Grapsus gaimardi Audouin, 1826: 82.
Grapsus Savignyi de Haan, 1833-1849 (1835): 59.
Grapsus messor H. Milne Edwards, 1837: 88.
Grapsus (Pachygrapsus) aethiopicus Hilgendorf, 1869: 88, pl. 4, fig. 2.
Metopograpsus messor Kossmann, 1877: 57; Lenz & Richters, 1881: 425; de Man, 1888d: 361, pl. 15, fig. 6; Ortmann, 1894a: 701; Alcock, 1900b: 397; Nobili, 1906: 155; Balss, 1922c; Chhapgar, 1957b: 54, pl. B, fig. 4, pl. 15 n-q; Sakai, 1976: 633, pl. 216, fig. 2.
Metopograpsus thukuhar (not Owen, 1839) Edmondson, 1959: 166, fig. 6b, 7c.
Non *Metopograpsus messor* Edmondson, 1959: 165, figs 6a, 7a-b.
= *Metopograpsus thukuhar* (Owen, 1839).

Type locality: Unknown.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Zanzibar, Dar es Salaam, Mozambique, South Africa, Madagascar, Arabian Sea, Arabian Gulf, Strait of Hormuz, Pakistan, India, Japan, Taiwan, Indonesia, Australia and Hawaiian Islands; intertidal.

Materials examined: 3♀♀ CL 10.41-14.7 mm, CW 13.8-19.7 mm Site 24, leg. AUAA 05.02.14. 6♂♂ CL 12.3-18.4 mm, CW 16.1-23.3 mm Site 24, leg. AUAA 05.02.14. 4♀♀ CL 11.3-16.5 mm, CW 14.8-22.6 mm Site 26, leg. AUAA 04.01.14. 4♂♂ CL 12.5-16.5 mm, CW 16-20.5 mm Site 26, leg. AUAA 04.01.14. 5♀♀ CL 18.3-22.9 mm, CW 23.8-29.7 mm Site 24, leg. AUAA 01.04.13. 3♂♂ CL 20-21.3 mm, CW 26.1-17.7 mm Site 24, leg. AUAA 01.04.13. ♀ CL 13 mm, CW 17 mm Site 24, leg. AUAA 25.10.16. 2♂♂ CL 14-15 mm, CW 19-19.1 mm Site 24, leg. AUAA 25.10.16. ♂ CL 27.9 mm, CW 35.9 mm Site 57, leg. RUWW 01.02.99. 2♀♀ CL 13.9-16.9 mm, CW 16.9-23.6 mm Site 24, leg. RUWW 23.05.84. ♂ CL 13.9 mm, CW 17 mm Site 24, leg. RUWW 23.05.84. 6♀♀ CL 12.6-15.6 mm, CW 16.2-21.1 mm Site 26, leg. RUWW 01.02.88. 8♂♂ CL 10.6-21.4 mm, CW 13.8-28.1 mm Site 26, leg. RUWW 01.02.88. ♂ CL 18.5 mm, CW 24.3 mm Site 5, leg. RUWW 24.03.09. 1 Juv CL 5.3 mm, CW 7.9 mm Site 54, leg. RUWW 01.03.84. ♀ CL 17.3 mm, CW 22.5 mm Site 5, leg. SMF 01.04.04. 3♀♀ CL 22.5-25.1 mm, CW 29.7-33.3 mm Site 6, leg. SMF 04.04.04. 5♂♂ CL 17.6-25.9 mm, CW 23-33.8 mm Site 6, leg. SMF 04.04.04. 2♀♀ CL 10.3-11 mm, CW 13.9-15.4 mm Site 1, leg. SMF 01.04.04. 2♂♂ CL 9.8-12.2 mm, CW 13.7-16.3 mm Site 1, leg. SMF 01.04.04. 2 Juv CL 5.5-7.9 mm, CW 8.4-11.3 mm Site 1, leg. SMF 01.04.04.

Metopograpsus thukuhar (Owen, 1839) Plate 38 F

Grapsus thukuhar Owen, 1839: 80, pl. 24, fig. 3.
Metopograpsus eydouxi H. Milne Edwards, 1853: 165; Tesch, 1918a: 79 (key).
Metopograpsus thukuhar A. Milne Edwards, 1873a: 290; Michel, 1964: 13; Crosnier, 1965: 25, figs 20-22, 27; Sakai, 1976: 633, fig. 346.
Metopograpsus Thukuhar de Man, 1888d: 362, pl. 15, fig. 5.
Metopograpsus messor var. *thukuhar* Ortmann, 1894a: 702.
? *Metopograpsus thukuhar* Stimpson, 1907: 114.
Metopograpsus messor (not Forskål, 1775) Edmondson, 1959: 165, figs 6a, 7a-b.
Non *Metopograpsus thukuhar* Edmondson, 1959: 166.
= *Metopograpsus messor* Forskål, 1775.

Type locality: Hawaii.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Dar es Salaam, Madagascar, Mauritius, Gulf of Oman, Arabian Gulf, Japan, Taiwan, China, Indonesia, New Caledonia, Hawaiian Islands and Tahiti.

Family: Varunidae H. Milne Edwards, 1853

Pseudohelice subquadrata (Dana, 1851) Plate 39 A

Chasmagnathus subquadratus Dana, 1851e: 251; Ortmann, 1894a: 728; Poupin, 1996b: 69.
Helice leachii Hess, 1865: 153; de Man, 1887a: 702; Holthuis, 1958: 51; Crosnier, 1965: 76, figs 125-128, pl. 5, fig. 2.

Helice subquadrata Tesch, 1918a: 120, pl. 6, fig. 1.
Helice leachi Tesch, 1918a: 120; Sakai, 1976: 672, figs 370a-b, pl. 228, fig. 2; Wada, 1995: fig. 21-295C.
Helice (Helice) leachii Dai & Yang, 1991: 553, fig. 286(5-6), pl. 72(1).

Type locality: Sydney, Australien.

Distribution: Red Sea, Socotra Island, Gulf of Oman, Dar es Salaam, South Africa, Madagascar, Japan, Korea, Taiwan, Indonesia, Australia and New Caledonia.

Thalassograpsus harpax (Hilgendorf, 1892) Plate 39 B

Brachynotus harpax Hilgendorf, 1892: 38; de Man, 1895b: 124; Nobili, 1906: 320; Laurie, 1915, p. 416; Sakai, 1939: 675, figs 119a-c; Lin, 1949: 29.
Thalassograpsus harpax Tweedie, 1950b: 134, figs 4a-b; Serène & Umali, 1972: 95, figs 130-131, pl. 9, fig. 10; Sakai, 1976: 652, pl. 223, fig. 1.

Type locality: Gulf of Aden: Aden.

Distribution: Red Sea, Gulf of Aden: Aden, Socotra Island, Arabian Sea: Dhofar, Arabian Gulf, Dar es Salaam, Japan, Taiwan and Samoa.

Materials examined: 2♀♀ CL 5.1-5.2 mm, CW 6.1-6.2 mm Site 21, leg. AUAA 11.01.14. 2♀♀ CL 6.8-8.7 mm, CW 8.4-10.7 mm Site 19, leg. AUAA 14.12.13. 12♂♂ CL 9-11 mm, CW 12-13 mm Site 21, leg. AUAA 27.10.16. 5♀♀ CL 6-8 mm, CW 7-10 mm Site 21, leg. AUAA 27.10.16. ♂ CL 10.8 mm, CW 12.6 mm Site 21, leg. AUAA 01.10.10. ♂ CL 8.8 mm, CW 11.2 mm Site 42, leg. RUWW 01.03.85. 4♀♀ (3. ovi) CL 5.9-7 mm, CW 7-8.8 mm Site 22, leg. RUWW 25.03.07. ♂ CL 11.1 mm, CW 12.9 mm Site 22, leg. RUWW 25.03.07. 2♀♀ CL 6.4-6.6 mm, CW 7.3-7.7 mm Site 14, leg. RUWW 21.12.83. ♂ CL 9.2 mm, CW 10.7 mm Site 14, leg. RUWW 21.12.83. ♀ CL 8.1 mm, CW 9.3 mm Site 55, leg. RUWW 01.03.85. ♂ CL 8.9 mm, CW 10.6 mm Site 55, leg. RUWW 01.03.85. 9♀♀ (5. ovi) CL 5.9-7 mm, CW 7.2-8.5 mm Site 5, leg. RUWW 24.03.09. ♂ CL 7.1 mm, CW 8.9 mm Site 5, leg. RUWW 24.03.09. 6♀♀ (1. ovi) CL 6.4-7.9 mm, CW 7.9-9.4 mm Site 43, leg. SMF 27.05.05. 5♂♂ CL 8.5-10 mm, CW 10.2-12 mm Site 43, leg. SMF 27.05.05.

Family: Sesarmidae Dana, 1851

Perisesarma guttatum (A. Milne-Edwards, 1869) Plate 39 C

Sesarma guttatum A. Milne-Edwards, 1869: 26.
Sesarma (Chiromantes) guttatum Crosnier, 1965: 68, figs 94, 97, 106.
Sesarma (Perisesarma) guttatum Holthuis, 1977: 171.
Sesarma guttatum Vannini & Volmori, 1981: 87, figs 17d, 18d, 19c.
Perisesarma guttatum Hywel-Davies, 1994: 29, 37, 48, app. 4; Apel, 2001: 119, 120.

Type locality: Zanzibar.

Distribution: Red Sea, Gulf of Oman, South Africa, Madagascar, Tanzania and Kenya.

Family: Plagusiidae Dana, 1851

Percnon planissimum (Herbst, 1804) Plate 39 D

Cancer planissimus Herbst, 1804: 3, pl. 59, fig. 3.
Plagusia clavimana Latreille, 1806: 34; H. Milne Edwards, 1836-1844 (1839): pl. 23, figs 3, 3a-d.
Plagusia serripes Lamarck, 1818: 247.
Ocypode (Acanthopus) planissima de Haan, 1833-1849 (1835): pl. C.
Ocypode (Acanthopus) clavimana de Haan, 1833-1849 (1835): 30.
Percnon planissimus H. Milne Edwards, 1837: 92.
Acanthopus clavimanus Krauss, 1843: 42.
Acanthopus planissimus Dana, 1852c: 372; A. Milne Edwards, 1873a: 299; Stimpson, 1907: 123.
Liolophus planissimus Miers, 1876b: 46; Alcock, 1900b: 439; de Man, 1902a: 543, pl. 20, fig. 12.
Leiolophus planissimus de Man, 1888d: 372; Ortmann, 1894a: 731.
Percnon planissimum Rathbun, 1906: 842; Balss, 1922c: 156; Michel, 1964: 13; Sakai, 1976: 676, pl. 230, fig. 2; Yu *et al.,* 1996; Shokita *et al.,* 2000: 658(list).

Type locality: East Indies.

Distribution: Red Sea, Gulf of Aden: Aden, Socotra Island, Dar es Salaam, South Africa, Madagascar, Mauritius, Laccadive Islands, Sri Lanka, Japan, Taiwan, China, Indonesia, New Guinea, New Caledonia, Hawaiian Islands, Tahiti and Tuamotu Archipelago.

Plagusia squamosa (Herbst, 1790) Plate 39 E, F

Cancer squamosus Herbst, 1790: 260, 261, pl 90, fig 113.
Plagusia tuberculata Lamarck, 1818: 247; Holthuis, 1977.
Plagusia squamosa H. Milne Edwards, 1837a: 94; Nobili, 1906: 324; Schubart & Ng, 2000: 327, fig 3; Ng *et al.,* 2008: 218 (in list); Naderloo, 2011: 36-40, figs 17a-f, 18e-f.
Plagusia tuberculata Holthuis, 1977: 176; Vannini & Valmori, 1981: 92, figs 25a, 26a, 27; Hogarth, 1989: 113; Tirmizi & Ghani, 1996: 148-150, fig 57; Apel, 2001: 120.
Plagusia depressa var. *squamosa* Alcock, 1900: 438.
Plagusia depressa tuberculata Lamarck; Balss, 1922, p. 16.

Type locality: East India or Indo-Malayan Archipelago.

Distribution: Red Sea, Gulf of Aden, Socotra Island, East Africa, Somalia, Southern Oman, Gulf of Oman, Pakistan, India, South Africa, Madagascar, Comoros, Mauritius, China, Japan, Australia, New Zealand, Hawaii, Mediterranean and Eastern Pacific.

Superfamily: Ocypodoidea Rafinesque, 1815
Family: Camptandriidae Stimpson, 1858

Serenella leachii (Audouin, 1826) Plate 40 A

Macrophthalmus Leachii Audouin, 1826: 257; Savigny, Taf. 2 Fig. 1.
Cleistostoma Leachii H. Milne Edwards, 1837: 68; Heller, 1861: 18.
Cleistostoma Leachii var. *penicillata* Paulson, 1875: 67, Taf. 8 Fig. 6, 6a, 6b (1961: 73).
Cleistostoma leachii De Man, 1896: 90-93.
Paraclistostoma Leachii Nobili, 1906: 316, 317.
Paraclistostoma leachii Laurie, 1915: 469; Caiman, 1927: 215.

Paracleistostoma leachii Holthuis, 1958: 53; Guinot, 1967: 283; Fishelson, 1971: 128, 130; Lewinsohn, 1977, p. 78.
Serenella leachii Manning and Holthuis, 1981: 211, 212, fig 55a-d; Al-Ghais & Cooper, 1996: 422, 423, fig 9; Cooper, 1997: 159–160; Apel & Türkay, 1999, p. 135, 136; Apel, 2001, p. 113.

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden, Gulf of Oman and Arabian Gulf.

Family: Dotillidae Stimpson, 1858

Dotilla sulcata (Forskål, 1775) Plate 40 B

Cancer sulcatus Forskâl, 1775: 92; Herbst, 1783: 96.
Myctiris sulcatus Audouin, 1826: 255, 256 ; Savigny, Taf. 1 Fig. 3.
Ocypode (Doto) sulcata De Haan, 1833: 24.
Ocypode (Doto) Sulcata Herklots, 1861: 14.
Doto sulcatus H . Milne Edwards, 1837: 38, 39; White, 1847: 34; H . Milne Edwards, 1852: 153; Heller, 1861: 17 (Synopsis); Heller, 1861a: 361, 362; Klunzinger, 1877· 332; Klunzinger, 1878: 339; De Man, 1880: 184.
Dotilla sulcata Cano, 1889: 249; Nobili, 1906: 315, 316; Laurie, 1915: 467» 469; Balss, 1924: 15; Caiman, 1927: 215; Maccagno, 1936: 177; Ramadan, 1936: 37; Gohar & AlKholy, 1957: 161170, Taf. 8 Fig. 16; Holthuis, 1958: 53 ; Guinot, 1967: 282; Fishelson, 1971: 117, 119, 128, 131, Fig. 6 (1).
Dotilla fenestrata Por & Dor, 1975: 146 (not *D. fenestrata* Hilgendorf).

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Somalia, Arabian Sea, Gulf of Oman and Arabian Gulf.

Materials examined: 2♀♀ CL 3.7-4 mm, CW 4.1-4.5 mm Site 24, leg. AUAA 05.12.13. 7♂♂ CL 3-6.6 mm, CW 3.9 - 7.4 mm Site 24, leg. AUAA 05.12.13. 3♀♀ (1. ovi) CL 3.4-4.2 mm, CW 4.6-5.1 mm Site 20, leg. AUAA 18.01.14. 4♂♂ CL 2.8-4.7 mm, CW 4-5.8 mm Site 20, leg. AUAA 18.01.14. 2♀♀ CL 3.1-3.1 mm, CW 4.3-4.5 mm Site 26, leg. AUAA 08.01.14. 7♂♂ CL 2.7-4.7 mm, CW 3.7-6 mm Site 26, leg. AUAA 08.01.14. 5♂♂ CL 5.5-6.5 mm, CW 7.5-8 mm Site 48, leg. AUAA 17.03.11. 2♀♀ CL 4.6-6 mm, CW 7.8-8 mm Site 51, leg. AUAA 16.03.11. 3♂♂ CL 5-6.5 mm, CW 7-7.5 mm Site 51, leg. AUAA 16.03.11. ♂ CL 6.5 mm, CW 7.5 mm Site 24, leg. AUAA 01.10.10. ♀ CL 5.1 mm, CW 6.2 mm Site 26, leg. RUWW 05.07.84. ♂ CL 5.5 mm, CW 6.9 mm Site 26, leg. RUWW 05.07.84. 4♀♀ CL 5.1-6.5 mm, CW 7.2-7.9 mm Site 30, leg. RUWW 28.10.88. 8♂♂ CL 5.8-6.5 mm, CW 7.8-8.6 mm Site 30, leg. RUWW 28.10.88. ♂ CL 6 mm, CW 8 mm Site 24, leg. RUWW 23.05.84. 3♀♀ CL 4.3-6.2 mm, CW 5.9-7.5 mm Site 24, leg. RUWW 16.01.84. 5♂♂ CL 5-8.2 mm, CW 7.2-9.5 mm Site 24, leg. RUWW 16.01.84. ♂ CL 6.4 mm, CW 8.9 mm Site 26, leg. RUWW 05.07.84. 2♀♀ CL 5-6 mm, CW 6.3-8.2 mm Site 22, leg. RUWW 01.10.88. 10♂♂ CL 4.8-7 mm, CW 6.6-8.5 mm Site 22, leg. RUWW 01.10.88. ♂ CL 6.6 mm, CW 8.1 mm Site 15, leg. RUWW 01.12.83. 6♀♀ CL 4.1-6 mm, CW 5-7.2 mm Site 5, leg. SMF 01.04.04. 5♂♂ CL 4.3-6.3 mm, CW 5.1-8 mm Site 5, leg. SMF 01.04.04. 2♀♀ (1. ovi) CL 4.9-5 mm, CW 5.6-5.6 mm Site 6, leg. SMF 10.04.04. 3♂♂ CL 5.5-5.7 mm, CW 7.1-7.3 mm Site 6, leg. SMF 10.04.04. 1 ovi. ♀ CL 4.4 mm, CW 5.2 mm Site 6, leg. SMF 03.04.04. 2♂♂ CL 4.9-5.7 mm, CW 5.9-6.9 mm Site 6, leg. SMF 03.04.04. ♀ CL 5.6 mm, CW 6.9 mm Site 1, leg. SMF 01.04.04.

Family Macrophthalmidae Dana, 1851

Ilyograpsus paludicola (Rathbun, 1909) Plate 40 C

Camptandrium paludicola Rathbun, 1909: 109; Rathbun, 1910: 326-327, figs. 9 a-b.
Iliograpsus paludicola Fishelson, 1971:128.
Iliograpsus paludicola Rathbun, 1909; Lewinsohn, 1977, p. 161.
Ilyograpsus paludicola. Basson *et al.,* 1977: 228, 234; Titgen, 1982: 254 (Liste); Jones, 1986 a: 160, pl. 46; Vousden, 1987: tab. 4; Ismail & Ahmed, 1993: 158; Hywel-Davies, 1994: 37, 48; Apel, 1996: 331; Al-Ghais & Cooper, 1996: 415; Tirmizi & Ghani, 1996: 143-145, Fig. 55; Hornby, 1997: 14; Apel & Türkay, 1999: 132-133.

Type locality: Laem Ngop, Gulf of Thailand.

Distribution: Red Sea, East of Africa, Dar es Salaam, Madagascar, Gulf of Oman, Arabian Gulf, Japan, Gulf of Thailand and New Caledonia.

Macrophthalmus (*Macrophthalmus*) *grandidieri* A. Milne-Edwards, 1867 Plate 40 D

Macrophthalmus brevis Hilgendorf, 1869: 86, 87; Nobili, 1006: 318.
Macrophthalmus carinimanus Hilgendorf, 1879: 806, 807.
Macrophthalmus grandidieri. Tesch, 1915: 166168, Taf. 6 Fig. 3; Monod, 1938: 148, 149, Text Fig. 27; Holthuis, 1958: 53 ; Guinot, 1967: 283.
Macrophthalmus (Macrophthalmus) grandidieri. Barnes, 1970: 223225, Text Fig. 6.
Macrophthalmus (M.) sulcatus grandidieri. Pretzmann, 1974: 438, Taf. 1.1, 2.4.

Type locality: Zanzibar.

Distribution: Red Sea, Gulf of Aden: Aden, Arabian Gulf, Gulf of Oman**,** South Africa, East Africa and East Malaysia.

Macrophthalmus (*Macrophthalmus*) *sulcatus* H. Milne Edwards, 1852 Plate 40 E

Macrophthalmus sulcatus H. Milne Edwards, 1852: 156.
Macrophthalmus (Macrophthalmus) dilatatus sulcatus. Barnes, 1970: 216, fig 4; Titgen, 1982: 149, 253 (in list); Tirmizi & Ghani, 1996: 112, fig 42; Al-Ghais & Cooper, 1996, p. 417.
Macrophthalmus sulcatus sulcatus. Pretzmann 1974: 438, figs 2, 3; Barnes, 2010: 35 (in key), 40.
Macrophthalmus grandidieri. Basson *et al.,* 1977: 60, 63, 228, 231, 235; Titgen, 1982: 253 (in list); Clayton, 1986: 87, fig 3; Jones, 1986a: 159, pl 45; Vousden, 1987: 35; Tirmizi & Ghani, 1996: 114, fig 43; Al-Khayat and Jones, 1999: 58, 61.

Type locality: Mauritius.

Distribution: Gulf of Aden: Aden, Arabian Gulf, Pakistan, India, Malaysia and Mauritius.

Macrophthalmus (*Mareotis*) *depressus* Rüppell, 1830 Plate 40 F

Macrophthalmus depressus Rüppell, 1830: 19, 20, Taf. 4 Fig. 6; H . Milne Edwards, 1837: 66; 1852: 159; Heller, 1861a: 362; Paulson, 1875: 6567, Taf. 8 Fig. 5, 7 (1961 : 7173); De Man, 1881: 255; Nobili, 1006:

318, 319; Nobili, 1906: 155; Laurie, 1915: 472; Tesch, 1915: 196198; Balss, 1924: 15; Caiman, 1927: 215; Ramadan, 1936: 38; Monod, 1938: 149; Holthuis, 1958: 53; Guinot, 1967: 282; Fishelson, 1971: 128.
Ocypode (Macrophthalmus) Depressa. Herklots, 1861: 14.
Macrophthalmus (Mareotis) depressus. Barnes, 1970: 226, Text Fig. 7; 1971: 37 (Schlüsssei); Pretzmann, 1974: 440; Apel & Türkay, 1999: 134; Apel, 2001: 110.

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden, East Africa, Madagascar, South Africa, Arabian Sea, Gulf of Oman, Arabian Gulf , Pakistan and west coast of India.

Materials examined: 1 ovi. ♀ CL 8.1 mm, CW 17 mm Site 26, leg. AUAA 08.01.14. ♂ CL 10.3 mm, CW 15.9 mm Site 26, leg. AUAA 08.01.14. 2♀♀ CL 8.1-10.3 mm, CW 13-16.6 mm Site 24, leg. AUAA 05.12.13. 2♂♂ CL 9.6-9.8 mm, CW 14.6-14.8 mm Site 24, leg. AUAA 05.12.13. 8♀♀ CL 6-10.9 mm, CW 14.8-16.8 mm Site 26, leg. RUWW 23.10.88. 2♂♂ CL 8.1-9.6 mm, CW 12.9-15.1 mm Site 26, leg. RUWW 23.10.88. 2♀♀ (1. ovi) CL 7.2-8.2 mm, CW 11.1-12.5 mm Site 1, leg. SMF 01.04.04. 3♂♂ CL 7.3-10.5 mm, CW 11.7-16.3 mm Site 1, leg. SMF 01.04.04. 3♀♀ (1. ovi) CL 6.1-6.8 mm, CW 8.6-10.4 mm Site 6, leg. SMF 03.04.04. 2♂♂ CL 6.1-8.3 mm, CW 9.5-13 mm Site 6, leg. SMF 03.04.04. 1 Juv CL 4.2 mm, CW 6.6 mm Site 6, leg. SMF 03.04.04. ♀ CL 6.2 mm, CW 8.1 mm Site 3, leg. SMF 12.04.04. ♂ CL 6.9 mm, CW 8.9 mm Site 3, leg. SMF 12.04.04. 1 ovi. ♀ CL 9.2 mm, CW 14.1 mm Site 1, leg. SMF 02.04.04. ♂ CL 8.3 mm, CW 13.5 mm Site 5, leg. SMF 01.04.04.

Macrophthalmus (Macrophthalmus) serenei Takeda & Komai, 1991 Plate 41 A

Macrophthalmus verreauxi (not H. Milne Edwards, 1848). De Man, 1880: 184 Nobili, 1906: 317; Rathbun, 1910a: 332, fig. 6; Laurie, 1915: 472, fig. 5; Crosnier, 1965, fig. 227.
Macrophthalmus Verreauxi ?Alcock, 1900b: 377.
Macrophthalmus telescopicus (not Owen, 1839) Stimpson, 1907: 95; Tesch, 1915: 161, pl. 5, fig. 2; Sakai, 1935a: 73; Shen, 1936c: 70.
Macrophthalmus cf. telescopicus (not Owen, 1839) Tweedie, 1950b: 128(part).
Macrophthalmus (Macrophthalmus) telescopicus Barnes, 1967: 205(part), fig. 1 (not pl. 1a= *Macrophthalmus milloti)*; Barnes, 1970: 219(part); Lewinsohn, 1977, p. 67.
Macrophthalmus (Macrophthalmus) verreauxi Serène, 1973a: 107, fig. 2a-b, pl. 3 C-D; Barnes, 1976: 135, fig. 2; Sakai, 1976: 610, fig. 334, pl. 210, fig. 3; Takeda, 1981b: 70.
Macrophthalmus (Macrophthalmus) cf. verreauxi Hartnoll, 1975: 309 (list).
Macrophthalmus (Macrophthalmus) kempi Serène, 1981b: 1140.
Macrophthalmus serenei Takeda & Komai, 1991: 168, fig. 3 (replacement name for *Macrophthalmus kempi* Serène, 1981); Jeng, 1997.
Macrophthalmus serenei Takeda & Komai, 1991: 168, fig 3a-e.
Macrophthalmus (Macrophthalmus) serenei Komai *et al.,* 1995: 122, fig. 9.

Type locality: Red Sea and Gulf of Aden.

Distribution: Red Sea, Gulf of Aden, Madagascar, Somalia, Arabian Gulf, Japan and Australia.

Macrophthalmus (Macrophthalmus) graeffei A. Milne-Edwards, 1873 Plate 41 B

Macrophthalmus graeffei A. Milne Edwards, 1873 a: 257, pl. 2 fig. 5; Laurie, 1915: 470472, Text Fig. 5; Monod, 1938: 149.
Macrophthalmus (Macrophthalmus) graeffei. Barnes, 1970: 225, 226.
? *Macrophthalmus convexus*. Guinot, 1967: 282.
Macrophthalmus (Macrophthalmus) graeffei. Lewinsohn, 1977, p. 74; Apel, 2001, p. 108.

Type locality: Upolu (Samoa).

Distribution: Red Sea, Gulf of Aden: Aden, ? Arabian Gulf and IndoWest Pacific Ocean.

Macrophthalmus (Mareotis) laevis A. Milne-Edwards, 1867 Plate 41 C

Macrophthalmus laevis A. Milne-Edwards, 1867: 287; Barnes 1976: 143, fig. 6a–c; Titgen 1982: 150.
Macrophthalmus (Macrophthalmus) ressli Pretzmann, 1971: 382, pl. 9 figs. 23.
Macrophthalmus resseli [sic!]. Pretzmann, 1974: 441.
Macrophthalmus (Macrophthalmus) laevis. Barnes 1977: 277 (in key), 280 (in list); 2010: 35 (in key), 40; Tirmizi & Ghani, 1988: 253, figs. 1–11; Tirmizi & Ghani, 1996: 109, fig. 41; Apel & Türkay, 1999: 135; Apel, 2001: 109.

Type locality: Indian Seas.

Distribution: Gulf of Aden: Aden, Arabian Gulf, Gulf of Oman and Pakistan.

Macrophthalmus (Macrophthalmus) indicus Davie, 2012 Plate 41 D

Macrophthalmus (Macrophthalmus) indicus Davie, 2012: 168, 169, figs 10d–f, 11a–c, 12a.
Macrophthalmus (Macrophthalmus) graeffei. Barnes, 1970: 225; Barnes, 1971: 13, 36 (in key), fig 3; Barnes, 1977: 276 (in key), 279 (in list); Barnes, 2010: 34 (in key), 39; Apel, 2001: 108; Ng *et al.,* 2008: 237 (in list); Naderloo *et al.,* 2011: 19–23, fig 11a–e, 12a–d, 17a, b.
Macrophthalmus (*convexus*, Stimpson?). Stephensen, 1946: 191.

Type locality: Arabian Gulf (Khark Island, Iran).

Distribution: Red Sea, Arabian Sea: Yemen, Arabian Gulf and Indonesia.

Chaenostoma boscii (Audouin, 1826) Plate 41 E

Macrophthalmus boscii Audouin, 1826: 258, Pl. 2, fig. 2.
Macrophthalmus franchettii. Maccagno, 1936: 177–179; Guinot, 1967: 283 (in list).
Macrophthalmus (Mopsocarcinus) franchettii. Barnes, 1967: 203 (in list).
Macrophthalmus (Mopsocarcinus) boscii. Barnes, 1977: 277 (in key).

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden, Socotra Island and Arabian Sea: Dhofar.

Chaenostoma sinuspersici (Naderloo & Türkay, 2011) Plate 41 F

Macrophthalmus boscii. Crosnier, 1965: 134–136, figs. 244–248; Tirmizi & Ghani, 1996: 118–121, fig. 45 [not *Macrophthalmus boscii* Audouin, 1826].

Type locality: Arabian Gulf, Hormuzgan- Moghdan Village.

Distribution: Red Sea, Gulf of Aden, East Africa, Madagascar, Gulf of Oman, Arabian Gulf and Pakistan.

Family Ocypodidae Rafinesque, 1815

Ocypode saratan (Forskål, 1775) Plate 42 A, B

Cancer saratan Forskål, 1775: 87.
Ocypode saratan. Olivier, 1811: 414, 416 [in part, Red Sea except Suez Canal]; Holthuis, 1958: 52; George & Knott, 1965: 19; Crosnier, 1965: 92, 95 [in part], figs 153, 161, 169–170, pl. 8, fig. 2, pl. 10, fig. 5; Linsenmair, 1967: 403–456; Serène, 1968: 97; Ng *etal*., 2008: 240.
Ocypode (Ocypode) saratan. De Haan, 1835: 29.
Ocypode Fabricii. White, 1847:35 .
Ocypode cursor. White, 1847: 35 [in part: only material from the Red Sea].
Ocypode aegyptiaca Gerstäcker, 1856: 134; Miers, 1878: 409; De Man, 1881: 247; Ortmann, 1894a: 762, 769; Laurie, 1915: 416, 467 [in part: not material from the Persian Gulf]; Balss, 1924: 14 [material from the Gulf of Aqaba but not the Red Sea]: 14 [in part: including *O. cordimanus* from Noman I.]; Ramadan, 1936: 37; Monod, 1937: 18 [in part].
Ocypoda aegyptiaca. Heller, 1861a: 16; 1861b: 361; 1862: 292; Miers, 1882: 381, pl. 17, figs 3, 3a; Ortmann, 1897: 360, 366; Nobili, 1901a: 16; 1906b: 309, 310; Lenz, 1912: 4.
Ocypoda cordimana. Heller, 1861a: 17; 1861b: 361; 1862: 292.
Ocypoda cursor. Heller, 1861a: 17.
Ocypode ceratophthalma. Von Martens, 1866: 381; Kossmann, 1877: 55; Neumann, 1878: 26.
Ocypode ceratophthalma var. *Ceratophthalma-aegyptiaca*. Paul'son, 1875: 64.
Ocypoda ceratophthalma var. *aegyptiaca.* Kingsley, 1880: 180.
Ocypoda ceratophthalma. Nobili, 1906: 310; Parenzan, 1931: 1001, fig. 1, pl. 14, figs 1–6, pl. 15, figs 7–8.
Ocypode aegypticus [sic.]; Serène, 1968: 97.

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Gulf of Oman, Arabian Sea: Dhofar and the northeastern coast of Somalia.

Materials examined: ♀ CL 41.6 mm, CW 47.3 mm Site 20, leg. AUAA 18.01.14. ♀ CL 40.2 mm, CW 46.1 mm Site 21, leg. AUAA 11.01.14. ♀ CL 39.9 mm, CW 45.5 mm Site 19, leg. AUAA 14.12.13. ♂ CL 39 mm, CW 45.5 mm Site 19, leg. AUAA 14.12.13. ♂ CL 43.1 mm, CW 49 mm Site 19, leg. AUAA 01.04.13. 2♂♂ CL 38.4-42 mm, CW 44.3-50.5 mm Site 48, leg. AUAA 17.03.11. ♂ CL 37.3 mm, CW 45.7 mm Site 51, leg. AUAA 16.03.11. ♀ CL 50 mm, CW 51 mm Site 16, leg. AUAA 15.10.16. 2♀♀ CL 45-50 mm, CW 47-51 mm Site 19, leg. AUAA 21.10.16. 5♂♂ CL 30-45 mm, CW 31-47 mm Site 19, leg. AUAA 21.10.16. ♀ CL 43 mm, CW 45 mm Site 19, leg. AUAA 21.10.16. ♂ CL 48 mm, CW 49 mm Site 16, leg. AUAA 15.10.16. ♀ CL 35.6 mm, CW 40.5 mm Site 48, leg. AUAA 17.03.11. ♂ CL 8.7 mm, CW 10.3 mm Site 19, leg. AUAA 14.12.13. ♂ CL 44.8 mm, CW 49.5 mm Site 57, leg. RUWW 06.02.02. 2♂♂ CL 20.8-37.3 mm, CW 24.4-44 mm Site 58, leg. RUWW 15.02.99. 2♂♂ CL 25.9-28.5 mm, CW

30.6-33 mm Site ?, leg. RUWW 19.09.98. 2 Juv CL 6.3-9.2 mm, CW 7.3-10.7 mm Site 57, leg. RUWW 01.02.99. 6 Juv CL 6.3-14.7 mm, CW 7.5-18.4 mm Site 30, leg. RUWW 01.01.85. 4 Juv CL 6.2-13.5 mm, CW 7.3-16.8 mm Site 40, leg. RUWW 01.03.85. 1 Juv CL 8.9 mm, CW 10.2 mm Site 26, leg. RUWW 23.10.88. 1 Juv CL 10.5 mm, CW 12.5 mm Site 51, leg. RUWW 01.03.84. 6 Juv CL 6.2-11.9 mm, CW 7.5-14.6 mm Site 22, leg. RUWW 01.10.88. 5 Juv CL 7-10.1 mm, CW 9.6-12 mm Site 28, leg. RUWW 20.01.85. ♀ CL 23.1 mm, CW 29.6 mm Site 40, leg. RUWW 01.10.88. ♂ CL 42.5 mm, CW 48.8 mm Site 40, leg. RUWW 01.10.88. 5 Juv CL 5.6-7.6 mm, CW 6.7-8.7 mm Site 26, leg. RUWW 01.01.85. ♀ CL 34 mm, CW 39.9 mm Site 14, leg. RUWW 21.12.83. ♂ CL 43.1 mm, CW 46 mm Site 14, leg. RUWW 21.12.83. ♀ CL 26.2 mm, CW 31.2 mm Site 33, leg. RUWW 01.03.85. 2♂♂ CL 38.1-43.9 mm, CW 43.4-48.4 mm Site 33, leg. RUWW 01.03.85. ♀ CL 33 mm, CW 40.1 mm Site 22, leg. RUWW 01.09.83. 2♂♂ CL 20.6-23.4 mm, CW 24.8-27.6 mm Site 22, leg. RUWW 01.09.83. 2♀♀ CL 24.9-29.1 mm, CW 31.4-34.3 mm Site 30, leg. RUWW 20.10.88. 7♂♂ CL 16.3-38.3 mm, CW 20.4-43.6 mm Site 30, leg. RUWW 20.10.88. 3♀♀ CL 23.5-35.4 mm, CW 28.4-40.7 mm Site 31, leg. RUWW 01.12.88. 5♂♂ CL 15.9-43.9 mm, CW 19.1-48.2 mm Site 31, leg. RUWW 01.12.88. ♀ CL 42.9 mm, CW 47.8 mm Site 55, leg. ZSM 12.04.99. ♂ CL 48.8 mm, CW 52.1 mm Site 55, leg. ZSM 12.04.99. 4♂♂ CL 34.1-40.8 mm, CW 44.4-46.6 mm Site 10, leg. SMF 06.04.04. 2♀♀ CL 29.4-40 mm, CW 34.2-45.3 mm Site 7, leg. SMF 05.04.04. 2♂♂ CL 24.8-32.9 mm, CW 28.3-39 mm Site 7, leg. SMF 05.04.04. ♀ CL 32.3 mm, CW 38 mm Site 3, leg. SMF 02.04.98. 2♂♂ CL 18.2-19.3 mm, CW 22-23 mm Site 3, leg. SMF 02.04.98. ♂ CL 30 mm, CW 33.6 mm Site 5, leg. SMF 01.04.04. ♀ CL 30.1 mm, CW 36.3 mm Site 9, leg. SMF 06.04.04. ♀ CL 41.9 mm, CW 47.5 mm Site 33, leg. SMF 16.05.05. ♂ CL 45.8 mm, CW 50.7 mm Site 33, leg. SMF 16.05.05. 1 Juv CL 12 mm, CW 15.2 mm Site 33, leg. SMF 16.05.05. ♀ CL 29.3 mm, CW 33.8 mm Site 44, leg. SMF 27.05.05. 2 Juv CL 5.9-20.3 mm, CW 7.2-24.6 mm Site 44, leg. SMF 27.05.05.8 Juv CL 7.4-15.5 mm, CW 8.3-18.5 mm Site 33, leg. SMF 16.05.05.

Ocypode cordimana Latreille, 1818 Plate 42 C

Ocypode cordimana Latreille, 1818: 198, figs 1–3, 11; Desmarest, 1825: 121; Miers, 1880: 308; Richters, 1880: 155; De Man, 1881: 248; Ortmann, 1897: 359, 362; Alcock, 1900: 349; Nobili, 1906a: 494; Nobili, 1906: 310; Stimpson, 1907: 110, pl. 15, fig. 2; Sakai, T.,1976: 599, text-fig. 327a, pl. 206, fig. 3; Dai & Yang, 1991: 455, text-fig. 230, pl. 58 (3); Ng *et. al*., 2008: 240.
Ocypoda cordimana. Sakai, T. & Nakazawa, 1947: 664, fig. 1916.
Ocypode cordimanus. Michel, 1964: 11; Crosnier, 1965: 96, figs 154, 162, 171–172, pl. 8, fig. 3; Pretzmann, 1968: 5; Serène, 1968: 97; Sakai, K. & Türkay, 1977a: 178; Davie et *al.,* 1998: 19, fig.;
Davie, 2002: 357; Poupin et al., 2011: 18.
? *Ocypode cordimana* MacLeay, 1838: 64; Kraus, 1843: 41; White, 1847: 34; Herklots, 1851: 23; Laurie, 1915: 416.
Ocypoda ceratophthalma. Pesta, 1911: 55.
Ocypode albicans. Estampador, 1937: 542.
Ocypoda laevis. Sendler, 1923: 22.
Ocypode aegyptiaca. Balss, 1924: 14 [in part].
Cancer roberti Curtiss, 1938: 175; Ng, Eldredge & Evenhuis, 2011: 45, 52.
Ocypode sinensis Dai *et al.,* 1985: 372, 377, figs 8–14 [in Chinese]; Dai *et al*., 1986: 418; Dai & Yang, 1991: 456, fig. 230A; Ng *et al*., 2001: 36.

Type locality: Indes orientales.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Gulf of Oman, Arabian Sea: Dhofar, the East of Africa to the Indo-West Pacific (French Polynesia).

Ocypode jousseaumei (Nobili, 1906) Plate 42 D

Ocypoda Jousseaumei Nobili, 1906b: 233, fig. 2; 1906b: 310.
Ocypode jousseaumei. Laurie, 1915: 416; Crosnier, 1965: 99, figs 156, 163, 173–174, pl. 10, figs 2, 6; Serène, 1968: 97; Türkay *et al.,* 1996: 102, figs 4–6, 11; Clayton, 2001: 37–55; Clayton, 2005: 53–70, figs 1–9; Ng *et. al.,* 2008: 240.

Type locality: Gulf of Aden (Obock, Djibouti).

Distribution: Red Sea, Gulf of Aden, Arabian Sea: Dhofar and the Gulf of Oman.

Austruca albimana (Kossmann, 1877) Plate 43 A, B

Gelasimus annulipes var. *albimana Kossmann*, 1877: 53–54.
Uca annulipes. Nobili, 1906: 150–151; 1906b: 311 (in key), 312; Laurie, 1915 (in list): 416; Balss, 1924: 15; Hornby, 1997: 15; Al-Ghais & Cooper, 1996, p. 419.
Uca (Celuca) lactea annulipes. Crane, 1975: 299, 301, 611. [part.: Red Sea material].
Uca (Paraleptuca) albimana (Kossmann, 1877).
Uca (Paraleptuca) lactea albimana (Kossmann, 1877).

Type locality: Red Sea.

Distribution: Red Sea, Gulf of Aden, Socotra Island, Arabian Sea: Dhofar, Gulf of Oman and Arabian Gulf.

Materials examined: 2♂♂ CL 5-6 mm, CW 8-10 mm Site 24, leg. AUAA 05.11.16. ♀ CL 8.1 mm, CW 12.5 mm Site 26, leg. AUAA 08.01.14. 2♂♂ CL 6.1-8.2 mm, CW 9.1-12.1 mm Site 26, leg. AUAA 08.01.14. 4♂♂ CL 8-10.1 mm, CW 11.8-16 mm Site 24, leg. AUAA 01.04.13. 3♂♂ CL 5.6-7.1 mm, CW 7.8-10.4 mm Site 24, leg. AUAA 05.02.14. 11♂♂ CL 5-7 mm, CW 9-12 mm Site 24, leg. AUAA 05.11.16. 3♂♂ CL 6-8 mm, CW 10-14.5 mm Site 51, leg. AUAA 16.03.11. 3♀♀ CL 5-7.2 mm, CW 7.9-11.2 mm Site 24, leg. AUAA 05.02.14. ♂ CL 8.2 mm, CW 13 mm Site 24, leg. AUAA 05.02.14. 2♂♂ CL 5.8-7.5 mm, CW 8.5-11.6 mm Site 26, leg. AUAA 08.01.14. 6♂♂ CL 7.5-9.5 mm, CW 12-14.7 mm Site 24, leg. AUAA 01.04.13. 3♂♂ CL 6-8 mm, CW 11-12 mm Site 26, leg. AUAA 23.10.16. ♂ CL 6.1 mm, CW 9.8 mm Site 26, leg. RUWW 10.01.84. 11♀♀ CL 5.32-7.5 mm, CW 7-12 mm Site 26, leg. RUWW 01.12.88. 13♂♂ CL 6.6-8.5 mm, CW 11.4-14.8 mm Site 26, leg. RUWW 01.12.88. 3♀♀ CL 6.8-8 mm, CW 11.5-13.7 mm Site 26, leg. RUWW 23.07.84. 4♂♂ CL 5.9-9 mm, CW 8.3-13.9 mm Site 26, leg. RUWW 23.07.84. 3♂♂ CL 4.9-8.1 mm, CW 8.2-12.4 mm Site 54, leg. RUWW 01.03.2000. 2♂♂ CL 8.2-10.8 mm, CW 13.3-17.9 mm Site 5, leg. RUWW 28.03.09. 5♂♂ CL 5.9-8.9 mm, CW 10-13.2 mm Site 26, leg. RUWW 01.12.88.

Cranuca inversa (Hoffmann, 1874) Plate 43 C, D

Gelasimus inversus Hoffmann 1874: 19, pl 4, figs 23–26.
Gelasimus smithii Kingsley, 1880.
Gelasimus variegatus Heller, 1862.
Uca (Cranuca) inversa (Hoffmann, 1874).

Uca (Cranuca) inversa inversa (Hoffmann, 1874).

Type locality: Madagascar.

Distribution: Red Sea, Gulf of Aden, Socotra Island, East Africa, Madagascar, South Africa, Arabian Sea: Dhofar, Gulf of Oman, Arabian Gulf and Pakistan.

Gelasimus hesperiae (Crane, 1975) Plate 43 E, F

Gelasimus tetragonon var. spinicarpa Kossmann, 1877.
Uca (Gelasimus) hesperiae Crane, 1975.
Uca (Gelasimus) vocans hesperiae Crane, 1975.

Type locality: Tanzania, Zanzibar.

Distribution: Red Sea, Gulf of Aden: Aden , East Africa, Gulf of Oman, Arabian Gulf, Pakistan, India, Sri Lanka, Burma, Malaysia and Singapore.

Appendix III: The tables

Table 2: All the brachyuran crab superfamilies with the numbers of families, genera and species in the present study.

Super family	Families	Genera	Species
Dromioidea	1	5	5
Raninoida	1	1	1
Calappoidea	2	3	7
Carpilioidea	1	1	1
Dorippoidea	1	1	1
Eriphioidea	3	4	6
Hexapodoidea	1	1	1
Leucosioidea	1	13	17
Majoidea	3	17	18
Parthenopoidea	1	6	8
Pilumnoidea	2	7	13
Portunoidea	1	6	31
Potamoidea	1	1	1
Trapezioidea	2	4	6
Pseudozioidea	1	1	1
Xanthoidea	1	29	38
Grapsoidea	4	8	11
Ocypodoidea	4	9	18
Total: 18	31	118	184

Table 4: The brachyuran crabs which were recorded in the Red Sea sites in the present study.

Superfamily	Family	Taxon
Carpilioidea	Carpiliidae	*Carpilius convexus* (Forskål, 1775)
Calappoidea	Calappidae	*Calappa hepatica* (Linnaeus, 1758)
Leucosioidea	Leucosiidae	*Hiplyra variegata* (Rüppell, 1830)
		Nobiliella cornigera (Nobili, 1906)
Majoidea	Epialtidae	*Tylocarcinus styx* (Herbst, 1803)
	Majidae	*Schizophrys aspera* H. Milne Edwards, 1834
Eriphioidea	Oziidae	*Epixanthus frontalis* (H. Milne Edwards, 1834)
		Epixanthus corrosus A. Milne-Edwards, 1873
		Lydia tenax (Rüppell, 1830)
Parthenopoidea	Parthinopidae	*Parthenope longimanus* (Linnaeus, 1758)
Pilumnoidea	Pilumnidae	*Eurycarcinus orientalis* A. Milne-Edwards, 1867
		Actumnus tesselatus Alcock, 1898
		Pilumnus savignyi Heller, 1861
	Galenidae	*Halimede tyche* (Herbst, 1801)
Portunoidea	Portunidae	*Portunus (Portunus) segnis* (Forskål, 1775)
		Scylla serrata (Forskål, 1775)
		Carupa tenuipes Dana, 1852
		Thalamita crenata Rüppell, 1830
		Thalamita poissonii (Audouin, 1826)
		Thalamita savignyi A. Milne-Edwards, 1861
		Thalamita woodmasoni Alcock, 1899
		Thalamita chaptalii (Audouin, 1826)
Trapezioidea	Trapeziidae	*Trapezia cymodoce* (Herbst, 1801)
		Trapezia tigrina Eydoux & Souleyet, 1842
		Trapezia lutea Castro, 1997
Xanthoidea	Xanthidae	*Leptodius exaratus* (H. Milne Edwards, 1834)
		Hypocolpus cf. guinotae Vannini, 1982
		Chlorodiella cytherea (Dana, 1852)
		Chlorodiella nigra (Forskål, 1775)
		Cyclodius granulatus (Targioni-Tozzetti, 1877)
		Glyptoxanthus meandrinus (Klunzinger, 1913)
		Actaea savignii (H. Milne Edwards, 1834)
		Actaea jacquelinae Guinot, 1976
		Actaeodes hirsutissimus (Rüppell, 1830)
		Cymo quadrilobatus Miers, 1884
		Cymo melanodactylus Dana, 1852
		Luniella spinipes (Heller, 1861)
Grapsoidea	Grapsidae	*Grapsus albolineatus* Latreille in Milbert, 1812
		Grapsus granulosus H. Milne Edwards, 1853

		Metopograpsus messor (Forskål, 1775)
	Varunidae	*Pseudohelice subquadrata* (Dana, 1851)
		Thalassograpsus harpax (Hilgendorf, 1892)
	Sesarmidae	*Perisesarma guttatum* (A. Milne-Edwards, 1869)
Ocypodoidea	Macrophthalmidae	*Ilyograpsus paludicola* (Rathbun, 1909)
		Macrophthalmus (Mareotis) depressus Rüppell, 1830
	Dotillidae	*Dotilla sulcata* (Forskål, 1775)
	Camptandriidae	*Serenella leachii* (Audouin, 1826)
	Ocypodidae	*Ocypode saratan* (Forskål, 1775)
		Cranuca inversa (Hoffmann, 1874)
		Austruca albimana (Kossmann, 1877)

Table 5: The brachyuran crabs which were recorded in Socotra Islands sites in the present study.

Superfamily	Family	Taxon
Dromioidea	Dromiidae	*Cryptodromia fallax* (Latreille in Milbert, 1812)
		Ascidiophilus caphyraeformis Richters, 1880
		Epigodromia granulata (Kossman, 1878)
		Lewindromia unidentata (Rüppell, 1830)
Carpilioidea	Carpiliidae	*Carpilius convexus* (Forskål, 1775)
Eriphioidea	Eriphiidae	*Eriphia smithii* MacLeay, 1838
Majoidea	Majidae	*Micippa platipes* Rüppell, 1830
Pseudozioidea	Pseudoziidae	*Pseudozius caystrus* (Adams & White, 1849)
Pilumnoidea	Pilumnidae	*Pilumnus propinquus* Nobili, 1906
Potamoidea	Potamidae	*Socotrapotamon socotrensis* (Hilgendorf, 1883)
Trapezioidea	Trapeziidae	*Trapezia cymodoce* (Herbst, 1801)
	Tetraliidae	*Tetraloides nigrifrons* (Dana, 1852)
Xanthoidea	Xanthidae	*Atergatis latissimus* (H. Milne Edwards, 1834)
		Xanthias sinensis (A. Milne-Edwards, 1867)
		Leptodius exaratus (H. Milne Edwards, 1834)
		Cyclodius granulatus (Targioni-Tozzetti, 1877)
		Atergatopsis granulata A. Milne-Edwards, 1865
		Actaea savignii (H. Milne Edwards, 1834)
		Actaeodes hirsutissimus (Rüppell, 1830)
		Epiactaea margaritifera (Odhner, 1925)
		Cymo andreossyi (Audouin, 1826)
		Cymo quadrilobatus Miers, 1884
		Luniella spinipes (Heller, 1861)
Grapsoidea	Grapsidae	*Grapsus albolineatus* Latreille in Milbert, 1812
		Grapsus granulosus H. Milne Edwards, 1853
		Grapsus tenuicrustatus (Herbst, 1783)
		Metopograpsus messor (Forskål, 1775)
		Geograpsus crinipes (Dana, 1851)
	Varunidae	*Thalassograpsus harpax* (Hilgendorf, 1892)
Ocypodoidea	Ocypodidae	*Ocypode saratan* (Forskål, 1775)
		Austruca albimana (Kossmann, 1877)
	Macrophthalmidae	*Chaenostoma boscii* (Audouin, 1826)

Table 6: The brachyuran crabs which were recorded in the Gulf of Aden sites in the present study.

Superfamily	Family	Species name
Dromioidea	Dromiidae	*Lauridromia dehaani* (Rathbun, 1923)
		Epigodromia granulata (Kossman, 1878)
		Lewindromia unidentata (Rüppell, 1830)
		Ascidiophilus caphyraeformis Richters, 1880
		Cryptodromia fallax (Latreille in Milbert, 1812)
Raninoida	Raninidae	*Notosceles serratifrons* (Henderson, 1893)
Carpilioidea	Carpiliidae	*Carpilius convexus* (Forskål, 1775)
Calappoidea	Calappidae	*Calappa philargius* (Linnaeus, 1758)
		Calappa hepatica (Linnaeus, 1758)
		Calappa capellonis Laurie, 1906
		Calappa gallus (Herbst, 1803)
		Mursia bicristimana Alcock & Anderson, 1894
	Matutidae	*Ashtoret lunaris* (Forskål, 1775)
		Ashtoret picta (Hess, 1865)
Dorippoidea	Dorippidae	*Dorippe frascone* (Herbst, 1785)
Eriphioidea	Eriphiidae	*Eriphia smithii* MacLeay, 1838
		Eriphia sebana (Shaw & Nodder, 1803)
	Menippidae	*Menippe rumphii* (Fabricius, 1798)
	Oziidae	*Epixanthus frontalis* (H. Milne Edwards, 1834)
		Epixanthus corrosus A. Milne-Edwards, 1873
		Lydia tenax (Rüppell, 1830)
Hexapodoidea	Hexapodida	*Hexapinus simplex* Rahayu & Ng, 2014
Leucosioidea	Leucosiidae	*Coleusia biannulata* Tyndale-Biscoe & George, 1962
		Leucosia anatum (Herbst, 1783)
		Ebalia abdominalis Nobili, 1906
		Ryphila cancellus (Herbst, 1783)
		Philyra granigera Nobili, 1906
		Hiplyra variegata (Rüppell, 1830)
		Philyra cf. globus (Fabricius, 1775)
		Nobiliella jousseaumei (Nobili, 1906)
		Ixa holthuisi Tirmizi, 1970
		Arcania undecimspinosa de Haan, 1841
		Arcania cf. tuberculata Bell, 1855
		Myra subgranulata Kossmann, 1877
		Arcania gracilis Henderson, 1893
		Cryptocnemus cf. pentagonus Stimpson, 1858
		Leucisca rubifera (Müller, 1887)
		Nursilia dentata Bell, 1855
Majoidea	Majidae	*Schizophrys aspera* H. Milne Edwards, 1834
		Micippa platipes Rüppell, 1830
		Cyclax spinicinctus Heller, 1861
		Majidae.gen. sp. 1
		Seiitaoides cf. stimpsonii (Miers, 1884)

	Epialtidae	*Stilbognathus cervicornis* (Herbst, 1803)
		Hyastenus hilgendorfi De Man, 1887
		Hyastenus brockii de Man, 1887
		Huenia heraldica (De Haan, 1837)
		Acanthonyx limbatus A. Milne-Edwards, 1862
		Simocarcinus simplex (Dana, 1851)
		Tylocarcinus styx (Herbst, 1803)
		Menaethius monoceros (Latreille, 1825)
	Inachidae	*Macropodia formosa* Rathbun, 1911
		Cyrtomaia cf. goodridgei McArdle, 1900
		Sunipea indicus (Alcock, 1895)
		Camposcia retusa (Latreille, 1829)
		Inachus dorsettensis (Pennant, 1777)
Parthenopoidea	Parthenopidae	*Daldorfia horrida* (Linnaeus, 1758)
		Aethra scruposa (Linnaeus, 1764)
		Daldorfia spinosissima (A. Milne-Edwards, 1862)
		Parthenope longimanus (Linnaeus, 1758)
		Rhinolambrus longispinus (Miers, 1879)
		Furtipodia petrosa (Klunzinger, 1906)
		Aulacolambrus granulosus (Miers, 1879)
		Aulacolambrus hoplonotus (Adams & White, 1849)
Pilumnoidea	Pilumnidae	*Eurycarcinus orientalis* A. Milne-Edwards, 1867
		Eurycarcinus integrifrons de Man, 1879
		Pilumnus vespertilio (Fabricius, 1793)
		Pilumnus cf. minutus De Haan, 1835
		Glabropilumnus levimanus (Dana, 1852)
		Pilumnus savignyi Heller, 1861
		Echinoecus pentagonus (A. Milne-Edwards, 1879)
		Pilumnus incanus (Forskål, 1775)
		Actumnus tesselatus Alcock, 1898
		Actumnus asper (Rüppell, 1830)
		Pilumnopeus convexus (Maccagno, 1936)
	Galenidae	*Halimede tyche* (Herbst, 1801)
Portunoidea	Portunidae	*Charybdis (Goniohellenus) smithii* MacLeay, 1838
		Charybdis (Charybdis) feriata (Linnaeus, 1758)
		Charybdis (Charybdis) natator (Herbst, 1794)
		Charybdis (Charybdis) orientalis Dana, 1852
		Charybdis (Charybdis) annulata (Fabricius, 1798)
		Charybdis (Charybdis) hellerii (A. Milne-Edwards, 1867)
		Charybdis (Goniohellenus) longicollis Leene, 1938
		Scylla serrata (Forskål, 1775)
		Carupa tenuipes Dana, 1852
		Portunus (Portunus) segnis (Forskål, 1775)
		Portunus (Xiphonectes) arabicus (Nobili, 1906)
		Cycloachelous orbitosinus (Rathbun, 1911)
		Portunus (Xiphonectes) longispinosus (Dana, 1852)
		Portunus (Xiphonectes) guinotae Stephenson &

		Rees, 1961
		Portunus (Portunus) sanguinolentus (Herbst, 1783)
		Thalamita crenata Rüppell, 1830
		Thalamita prymna (Herbst, 1803)
		Thalamita admete (Herbst, 1803)
		Thalamita poissonii (Audouin, 1826)
		Thalamita mitsiensis Crosnier, 1962
		Thalamita sexlobata Miers, 1886
		Thalamita bandusia Nobili, 1906
		Thalamita gatavakensis Nobili, 1906
		Thalamita quadrilobata Miers, 1884
		Thalamita sp.
		Thalamita cf. crosnieri Vannini 1983
		Thalamita cf. stephensoni Crosnier 1962
Trapezioidea	Tetraliidae	*Tetralia cavimana* Heller, 1861
		Tetraloides nigrifrons (Dana, 1852)
	Trapeziidae	*Trapezia cymodoce* (Herbst, 1801)
		Trapezia tigrina Eydoux & Souleyet, 1842
		Quadrella coronata Dana, 1852
Pseudozioidea	Pseudoziidae	*Pseudozius caystrus* (Adams & White, 1849)
Xanthoidea	Xanthidae	*Atergatis integerrimus* (Lamarck, 1818)
		Xanthias sinensis (A. Milne-Edwards, 1867)
		Leptodius exaratus (H. Milne Edwards, 1834)
		Platypodia cf. pseudogranulosa Serène, 1984
		Macromedaeus voeltzkowi (Lenz, 1905)
		Zosimus aeneus (Linnaeus, 1758)
		Cymo quadrilobatus Miers, 1884
		Cymo andreossyi (Audouin, 1826)
		Lophozozymus anaglyptus (Heller, 1861)
		Luniella spinipes (Heller, 1861)
		Lybia plumosa Barnard, 1946
		Cyclodius granulatus (Targioni-Tozzetti, 1877)
		Neoliomera sabaea (Nobili, 1906)
		Glyptoxanthus meandrinus (Klunzinger, 1913)
		Actaeodes hirsutissimus (Rüppell, 1830)
		Actaeodes tomentosus (H. Milne Edwards, 1834)
		Paractaea rufopunctata (H. Milne Edwards, 1834)
		Chlorodiella nigra (Forskål, 1775)
		Chlorodiella laevissima (Dana, 1852)
		Pilodius areolatus (H. Milne Edwards, 1834)
		Demania mortenseni (Odhner, 1925)
		Forestiana depressa (White, 1848)
		Etisus laevimanus Randall, 1840
		Liomera rubra (A. Milne-Edwards, 1865)
		Neoxanthops lineatus (A. Milne-Edwards, 1867)
		Epiactaea margaritifera (Odhner, 1925)
		Actaea cf. bocki Odhner, 1925
		Xanthias cf.canaliculatus Rathbun, 1906

		gen. sp. 1
		gen. sp. 2
		gen. sp. 3
Grapsoidea	Grapsidae	*Grapsus albolineatus* Latreille in Milbert, 1812
		Grapsus tenuicrustatus (Herbst, 1783)
		Metopograpsus messor (Forskål, 1775)
		Metopograpsus thukuhar (Owen, 1839)
		Grapsus granulosus H. Milne Edwards, 1853
		Geograpsus crinipes (Dana, 1851)
	Varunidae	*Thalassograpsus harpax* (Hilgendorf, 1892)
	Plagusiidae	*Percnon planissimum* (Herbst, 1804)
Ocypodoidea	Dotillidae	*Dotilla sulcata* (Forskål, 1775)
	Macrophthalmidae	*Macrophthalmus (Macrophthalmus) grandidieri* A. Milne-Edwards, 1867
		Macrophthalmus (Macrophthalmus) sulcatus H. Milne Edwards, 1852
		Macrophthalmus (Mareotis) depressus Rüppell, 1830
		Chaenostoma boscii (Audouin, 1826)
		Macrophthalmus (Macrophthalmus) serenei Takeda & Komai, 1991
		Macrophthalmus (Macrophthalmus) graeffei A. Milne-Edwards, 1873
		Chaenostoma sinuspersici (Naderloo & Türkay, 2011)
		Macrophthalmus (Mareotis) laevis A. Milne-Edwards, 1867
	Ocypodidae	*Ocypode jousseaumei* (Nobili, 1906)
		Ocypode saratan (Forskål, 1775)
		Ocypode cordimana Latreille, 1818
		Austruca albimana (Kossmann, 1877)
		Cranuca inversa (Hoffmann, 1874)
		Gelasimus hesperiae (Crane, 1975)

Table 7: The brachyuran crabs which were recorded in the Arabian Sea sites in the present study.

Superfamily	Family	Taxon
Eriphioidea	Eriphiidae	*Eriphia smithii* MacLeay, 1838
	Oziidae	*Epixanthus frontalis* (H. Milne Edwards, 1834)
		Lydia tenax (Rüppell, 1830)
Hexapodoidea	Hexapodidae	*Hexapinus simplex* Rahayu & Ng, 2014
Leucosioidea	Leucosiidae	*Nobiliella jousseaumei* (Nobili, 1906)
Majoidea	Epialtidae	*Stilbognathus cervicornis* (Herbst, 1803)
		Hyastenus hilgendorfi De Man, 1887
Pseudozioidea	Pseudoziidae	*Pseudozius caystrus* (Adams & White, 1849)
Pilumnoidea	Pilumnidae	*Pilumnus incanus* (Forskål, 1775)
Portunoidea	Portunidae	*Charybdis (Charybdis) annulata* (Fabricius, 1798)
		Charybdis (Charybdis) hellerii (A. Milne-Edwards, 1867)
		Cycloachelous granulatus (H. Milne Edwards, 1834)
Xanthoidea	Xanthidae	*Leptodius exaratus* (H. Milne Edwards, 1834)
		Lophozozymus anaglyptus (Heller, 1861)
Grapsoidea	Grapsidae	*Grapsus albolineatus* Latreille in Milbert, 1812
		Grapsus tenuicrustatus (Herbst, 1783)
	Plagusiidae	*Plagusia squamosa* (Herbst, 1790)
Ocypodoidea	Macrophthalmidae	*Macrophthalmus (Macrophthalmus) indicus* Davie, 2012
	Dotillidae	*Dotilla sulcata* (Forskål, 1775)
	Ocypodidae	*Ocypode saratan* (Forskål, 1775)
		Austruca albimana (Kossmann, 1877)

Table 8: key of the brachyuran crab species distributions on the Yemeni coastal waters; common species (■, recorded in all Yemeni coastal water, more specimens, more sites), widespread (▲, recorded in three Yemeni coastal regions, more specimens, more sites), present (+, one or two Yemeni coastal regions, few specimens, few sites) and rare species (●, at one location only with one specimen only)

Family	Species name	RS	GA	AS	SI
Dromiidae	*Lauridromia dehaani* (Rathbun, 1923)		+		
	Epigodromia granulata (Kossman, 1878)		+		+
	Lewindromia unidentata (Rüppell, 1830)		+		+
	Ascidiophilus caphyraeformis Richters, 1880		+		+
	Cryptodromia fallax (Latreille in Milbert, 1812)		+		+
Raninidae	*Notosceles serratifrons* (Henderson, 1893)		●		
Carpiliidae	*Carpilius convexus* (Forskål, 1775)	▲	▲		▲
Calappidae	*Calappa philargius* (Linnaeus, 1758)		+		
	Calappa hepatica (Linnaeus, 1758)	+	+		
	Calappa capellonis Laurie, 1906		+		
	Calappa gallus (Herbst, 1803)		●		
	Mursia bicristimana Alcock & Anderson, 1894		●		
Matutidae	*Ashtoret lunaris* (Forskål, 1775)		+		
	Ashtoret picta (Hess, 1865)		+		
Dorippidae	*Dorippe frascone* (Herbst, 1785)		+		
Eriphiidae	*Eriphia smithii* MacLeay, 1838		▲	▲	▲
	Eriphia sebana (Shaw & Nodder, 1803)		●		
Menippidae	*Menippe rumphii* (Fabricius, 1798)		+		
Oziidae	*Epixanthus frontalis* (H. Milne Edwards, 1834)	▲	▲	▲	
	Epixanthus corrosus A. Milne-Edwards, 1873	+	+		
	Lydia tenax (Rüppell, 1830)	▲	▲	▲	
Hexapodida	*Hexapinus simplex* Rahayu & Ng, 2014		+	+	
Leucosiidae	*Coleusia biannulata* Tyndale-Biscoe & George, 1962		+		
	Leucosia anatum (Herbst, 1783)		+		
	Ebalia abdominalis Nobili, 1906		+		
	Ryphila cancellus (Herbst, 1783)		+		
	Philyra granigera Nobili, 1906		+		
	Hiplyra variegata (Rüppell, 1830)	+	+		
	Philyra cf. globus (Fabricius, 1775)		+		
	Nobiliella jousseaumei (Nobili, 1906)		+	+	
	Nobiliella cornigera (Nobili, 1906)	●			
	Ixa holthuisi Tirmizi, 1970		+		
	Arcania undecimspinosa de Haan, 1841		+		
	Arcania cf. tuberculata Bell, 1855		+		
	Myra subgranulata Kossmann, 1877		+		
	Arcania gracilis Henderson, 1893		●		
	Cryptocnemus cf. pentagonus Stimpson, 1858		●		
	Leucisca rubifera (Müller, 1887)		●		

	Nursilia dentata Bell, 1855		●		
Majidae	*Schizophrys aspera* H. Milne Edwards, 1834	+	+		
	Micippa platipes Rüppell, 1830		+		+
	Cyclax spinicinctus Heller, 1861		●		
	Majidae.gen. sp. 1		●		
	Seiitaoides cf. stimpsonii (Miers, 1884)		+		
Epialtidae	*Stilbognathus cervicornis* (Herbst, 1803)		+	+	
	Hyastenus hilgendorfi De Man, 1887		+	+	
	Hyastenus brockii de Man, 1887		●		
	Huenia heraldica (De Haan, 1837)		+		
	Acanthonyx limbatus A. Milne-Edwards, 1862		+		
	Simocarcinus simplex (Dana, 1851)		+		
	Tylocarcinus styx (Herbst, 1803)	+	+		
	Menaethius monoceros (Latreille, 1825)		+		
Inachidae	*Macropodia formosa* Rathbun, 1911		+		
	Cyrtomaia cf. goodridgei McArdle, 1900		●		
	Sunipea indicus (Alcock, 1895)		+		
	Camposcia retusa (Latreille, 1829)		+		
	Inachus dorsettensis (Pennant, 1777)		●		
Parthenopidae	*Daldorfia horrida* (Linnaeus, 1758)		●		
	Aethra scruposa (Linnaeus, 1764)		●		
	Daldorfia spinosissima (A. Milne-Edwards, 1862)		●		
	Parthenope longimanus (Linnaeus, 1758)	+	+		
	Rhinolambrus longispinus (Miers, 1879)		●		
	Furtipodia petrosa (Klunzinger, 1906)		●		
	Aulacolambrus granulosus (Miers, 1879)		+		
	Aulacolambrus hoplonotus (Adams & White, 1849)		●		
Pilumnidae	*Eurycarcinus orientalis* A. Milne-Edwards, 1867	+	+		
	Eurycarcinus integrifrons de Man, 1879		+		
	Pilumnus vespertilio (Fabricius, 1793)		+		
	Pilumnus cf. minutus De Haan, 1835		+		
	Glabropilumnus levimanus (Dana, 1852)		+		
	Pilumnus savignyi Heller, 1861	+	+		
	Echinoecus pentagonus (A. Milne-Edwards, 1879)		●		
	Pilumnus incanus (Forskål, 1775)		+	+	
	Pilumnus propinquus Nobili, 1906				+
	Actumnus tesselatus Alcock, 1898	+	+		
	Actumnus asper (Rüppell, 1830)		+		
	Pilumnopeus convexus (Maccagno, 1936)		+		
Galenidae	*Halimede tyche* (Herbst, 1801)	+	+		
Potamidae	*Socotrapotamon socotrensis* (Hilgendorf, 1883)				+
Portunidae	*Charybdis (Goniohellenus) smithii* MacLeay, 1838		+		
	Charybdis (Charybdis) feriata (Linnaeus, 1758)		●		
	Charybdis (Charybdis) natator (Herbst, 1794)		●		

	Charybdis (Charybdis) orientalis Dana, 1852		+		
	Charybdis (Charybdis) annulata (Fabricius, 1798)		+	+	
	Charybdis (Charybdis) hellerii (A. Milne-Edwards, 1867)		+	+	
	Charybdis (Goniohellenus) longicollis Leene, 1938		+		
	Scylla serrata (Forskål, 1775)	+	+		
	Carupa tenuipes Dana, 1852	+	+		
	Portunus (Portunus) segnis (Forskål, 1775)	+	+		
	Portunus (Xiphonectes) arabicus (Nobili, 1906)		+		
	Cycloachelous granulatus (H. Milne Edwards, 1834)			●	
	Cycloachelous orbitosinus (Rathbun, 1911)		+		
	Portunus (Xiphonectes) longispinosus (Dana, 1852)		●		
	Portunus (Xiphonectes) guinotae Stephenson & Rees, 1961		+		
	Portunus (Portunus) sanguinolentus (Herbst, 1783)		●		
	Thalamita crenata Rüppell, 1830	+	+		
	Thalamita prymna (Herbst, 1803)		+		
	Thalamita admete (Herbst, 1803)		+		
	Thalamita poissonii (Audouin, 1826)	+	+		
	Thalamita savignyi A. Milne-Edwards, 1861	+			
	Thalamita mitsiensis Crosnier, 1962		+		
	Thalamita sexlobata Miers, 1886		+		
	Thalamita woodmasoni Alcock, 1899	+			
	Thalamita chaptalii (Audouin, 1826)	●			
	Thalamita bandusia Nobili, 1906		+		
	Thalamita gatavakensis Nobili, 1906		+		
	Thalamita quadrilobata Miers, 1884		+		
	Thalamita sp.		+		
	Thalamita cf. crosnieri Vannini 1983		●		
	Thalamita cf. stephensoni Crosnier 1962		●		
Tetraliidae	*Tetralia cavimana* Heller, 1861		+		
	Tetraloides nigrifrons (Dana, 1852)		+		+
Trapeziidae	*Trapezia cymodoce* (Herbst, 1801)	▲	▲		▲
	Trapezia tigrina Eydoux & Souleyet, 1842	+	+		
	Trapezia lutea Castro, 1997	●			
	Quadrella coronata Dana, 1852		+		
Pseudoziidae	*Pseudozius caystrus* (Adams & White, 1849)		▲	▲	▲
Xanthidae	*Atergatis integerrimus* (Lamarck, 1818)		+		
	Atergatis latissimus (H. Milne Edwards, 1834)				●
	Xanthias sinensis (A. Milne-Edwards, 1867)		+		+
	Leptodius exaratus (H. Milne Edwards, 1834)	■	■	■	■
	Platypodia cf. pseudogranulosa Serène, 1984		+		
	Macromedaeus voeltzkowi (Lenz, 1905)		+		

	Zosimus aeneus (Linnaeus, 1758)		+		
	Cymo quadrilobatus Miers, 1884	▲	▲		▲
	Cymo andreossyi (Audouin, 1826)		+		+
	Cymo melanodactylus Dana, 1852	+			
	Lophozozymus anaglyptus (Heller, 1861)		+	+	
	Luniella spinipes (Heller, 1861)	▲	▲		▲
	Lybia plumosa Barnard, 1946		▲		
	Cyclodius granulatus (Targioni-Tozzetti, 1877)	▲	▲		▲
	Neoliomera sabaea (Nobili, 1906)		+		
	Actaea savignii (H. Milne Edwards, 1834)	+			+
	Glyptoxanthus meandrinus (Klunzinger, 1913)	+	+		
	Actaea jacquelinae Guinot, 1976	+			
	Actaeodes hirsutissimus (Rüppell, 1830)	▲	▲		▲
	Actaeodes tomentosus (H. Milne Edwards, 1834)		●		
	Paractaea rufopunctata (H. Milne Edwards, 1834)		+		
	Chlorodiella nigra (Forskål, 1775)	+	+		
	Chlorodiella laevissima (Dana, 1852)		●		
	Chlorodiella cytherea (Dana, 1852)	+			
	Pilodius areolatus (H. Milne Edwards, 1834)		+		
	Demania mortenseni (Odhner, 1925)		+		
	Forestiana depressa (White, 1848)		+		
	Etisus laevimanus Randall, 1840		●		
	Hypocolpus cf. guinotae Vannini, 1982	●			
	Liomera rubra (A. Milne-Edwards, 1865)		●		
	Neoxanthops lineatus (A. Milne-Edwards, 1867)		●		
	Atergatopsis granulata A. Milne-Edwards, 1865				+
	Epiactaea margaritifera (Odhner, 1925) *(X sp.7)*		+		+
	Actaea *cf.* bocki Odhner, 1925		●		
	Xanthias cf. canaliculatus Rathbun, 1906		●		
	gen. sp. 1		●		
	gen. sp. 2		+		
	gen. sp. 3		+		
Grapsidae	*Grapsus albolineatus* Latreille in Milbert, 1812	■	■	■	■
	Grapsus tenuicrustatus (Herbst, 1783)		▲	▲	▲
	Metopograpsus messor (Forskål, 1775)	+	+		+
	Metopograpsus thukuhar (Owen, 1839)		+		
	Grapsus granulosus H. Milne Edwards, 1853	▲	▲		▲
	Geograpsus crinipes (Dana, 1851)		+		+
Varunidae	*Pseudohelice subquadrata* (Dana, 1851)	+			
	Thalassograpsus harpax (Hilgendorf, 1892)	▲	▲		▲
Sesarmidae	*Perisesarma guttatum* (A. Milne-Edwards, 1869)	+			
Plagusiidae	*Plagusia squamosa* (Herbst, 1790)			+	
	Percnon planissimum (Herbst, 1804)		●		
Camptandriidae	*Serenella leachii* (Audouin, 1826)	+			
Dotillidae	*Dotilla sulcata* (Forskål, 1775)	▲	▲	▲	

Macrophthalmidae	*Ilyograpsus paludicola* (Rathbun, 1909)	+			
	Macrophthalmus (Macrophthalmus) grandidieri A. Milne-Edwards, 1867		+		
	Macrophthalmus (Macrophthalmus) sulcatus H. Milne Edwards, 1852		+		
	Macrophthalmus (Mareotis) depressus Rüppell, 1830	+	+		
	Chaenostoma boscii (Audouin, 1826)		+		+
	Macrophthalmus (Macrophthalmus) serenei Takeda & Komai, 1991		+		
	Macrophthalmus (Macrophthalmus) graeffei A. Milne-Edwards, 1873		+		
	Chaenostoma sinuspersici (Naderloo & Türkay, 2011)		+		
	Macrophthalmus (Mareotis) laevis A. Milne-Edwards, 1867		+		
	Macrophthalmus (Macrophthalmus) indicus Davie, 2012			●	
Ocypodidae	*Ocypode jousseaumei* (Nobili, 1906)		+		
	Ocypode saratan (Forskål, 1775)	■	■	■	■
	Ocypode cordimana Latreille, 1818		●		
	Austruca albimana (Kossmann, 1877)	■	■	■	■
	Cranuca inversa (Hoffmann, 1874)	+	+		
	Gelasimus hesperiae (Crane, 1975)		+		

Table 10: Shows the comparing between the present study* in the coastal waters on the Red Sea with Krupp *et al.* (2006)** and other studies***: Nobili (1906) +[1], Balss (1916) +[2], Balss (1922) +[3], Balss (1924) +[4], Balss (1929) +[5], Balss (1933) +[6], Serène (1984) +[7], Clark & Galil (1993)+[8], Apel (2001) +[9], Komatsu & Takeda (2003) +[10], Sakai & Türkay (2013) +[11], Castro (1999) +[12]. Present (+) and absent (-).

Family	Taxon	*	**	***
Dromiidae	*Epigodromia granulata* (Kossman, 1878)	-	-	+[1],+[2]
	Cryptodromia fallax (Latreille in Milbert, 1812)	-	-	+[1]
	Cryptodromia hilgendorfi de Man, 1888	-	-	+[1], +[9]
Carpiliidae	*Carpilius convexus* (Forskål, 1775)	+	+	-
Calappidae	*Calappa hepatica* (Linnaeus, 1758)	+	+	+[2]
Matutidae	*Matuta victor* (Fabricius, 1781)	-	-	+[1],+[2]
	Ashtoret lunaris (Forskål, 1775)	-	-	+[1],+[2]
Leucosiidae	*Hiplyra variegata* (Rüppell, 1830)	+	-	+[1],+[2]
	Nobiliella cornigera (Nobili, 1906)	+	-	+[1], +[10]
	Nobiliella jousseaumei (Nobili, 1906)	-	-	+[1], +[10]
	Leucosia corallicola Alcock, 1896	-	-	+[1]
	Philyra granigera Nobili, 1906	-	-	+[2]
	Hiplyra platycheir (De Haan, 1841	-	-	+[2]
	Coleusia signata (Paul'son, 1875)	-	-	+[2]
	Ebalia abdominalis Nobili, 1906	-	-	+[9]
	Urnalana pulchella (Bell, 1855)	-	-	+[9]
Epialtidae	*Tylocarcinus styx* (Herbst, 1803)	+	+	-
	Stilbognathus erythraeus von Martens, 1866	-	-	+[5]
	Menaethius monoceros (Latreille, 1825)	-	-	+[1],+[5]
	Tylocarcinus styx (Herbst, 1803)	-	-	+[5]
Majidae	*Schizophrys aspera* H. Milne Edwards, 1834	+	+	+[5]
	Micippa thalia (Herbst, 1803)	-	-	+[1]
Eriphiidae	*Eriphia sebana* (Shaw & Nodder, 1803)	-	-	+[3]
Oziidae	*Epixanthus frontalis* (H. Milne Edwards, 1834)	+	+	-
	Epixanthus corrosus A. Milne-Edwards, 1873	+	+	-
	Lydia tenax (Rüppell, 1830)	+	+	-
Parthinopidae	*Parthenope longimanus* (Linnaeus, 1758)	+	+	-
	Rhinolambrus pelagicus (Rüppell, 1830)	-	-	+[1]
	Daldorfia horrida (Linnaeus, 1758)	-	-	+[3]
Pilumnidae	*Eurycarcinus orientalis* A. Milne-Edwards, 1867	+	-	-
	Actumnus tesselatus Alcock, 1898	+	+	-
	Actumnus sp 2.	-	+	-
	Pilumnus savignyi Heller, 1861	+	+	-
	Pilumnus incanus (Forskål, 1775)	-	-	+[1]
	Planopilumnus spongiosus (Nobili, 1906)	-	-	+[1]
	Pseudactumnus pestae Balss, 1933	-	-	+[6]

	Heteropilumnus trichophoroides de Man, 1895	-	-	+[1]
Galenidae	*Halimede tyche* (Herbst, 1801)	+	+	-
Portunidae	*Carupa tenuipes* Dana, 1852	+	-	+[3]
	Charybdis (Charybdis) orientalis Dana, 1852	-	+	-
	Gonioinfradens giardi (Nobili, 1906)	-	-	+[3]
	Portunus (Portunus) segnis (Forskål, 1775)	+	+	+[3]
	Portunus (Xiphonectes) alcocki (Nobili, 1906)	-	+	-
	Portunus (Xiphonectes) iranjae Crosnier, 1962	-	+	-
	Portunus guinotae Stephenson & Rees, 1961	-	-	+[9]
	Cycloachelous granulatus (H. Milne Edwards, 1834)	-	-	+[3]
	Scylla serrata (Forskål, 1775)	+	+	-
	Thalamita admete (Herbst, 1803)	-	+	+[3]
	Thalamita cf. integra Dana, 1852	-	+	+[1], +[3]
	Thalamita iranica Stephensen, 1946	-	+	-
	Thalamita savignyi A. Milne-Edwards, 1861	+	+	+[1]
	Thalamita poissonii (Audouin, 1826)	+	-	+[1],+[3]
	Thalamita woodmasoni Alcock, 1899	+	-	-
	Thalamita chaptalii (Audouin, 1826)	+	-	+[1], +[3]
	Thalamita crenata Rüppell, 1830	+	-	+[3]
	Thalamita prymna (Herbst, 1803)	-	-	+[3]
	Thalamitoides tridens A. Milne Edwards, 1869	-	+	-
	Thalamita bandusia Nobili, 1906	-	-	+[1]
Trapeziidae	*Trapezia cymodoce* (Herbst, 1801)	+	+	+[1], +[3]
	Trapezia tigrina Eydoux & Souleyet, 1842	+	+	-
	Trapezia lutea Castro, 1997	+	-	-
	Trapezia rufopunctata (Herbst, 1799)	-	-	+[1],+[3]
Tetraliidae	*Tetralia glaberrima* (Herbst, 1790	-	-	+[12]
Xanthidae	*Leptodius exaratus* (H. Milne Edwards, 1834)	+	+	-
	Hypocolpus guinotae Vannini, 1982	+	-	-
	Chlorodiella cytherea (Dana, 1852)	+	+	-
	Chlorodiella laevissima (Dana, 1852)	-	+	-
	Chlorodiella nigra (Forskål, 1775)	+	-	+[1],+[3]
	Cyclodius granulatus (Targioni-Tozzetti, 1877)	+	+	-
	Cyclodius ungulatus (H. Milne Edwards, 1834)	-	-	+[3]
	Cyclodius nitidus (Dana, 1852)	-	-	+[3]
	Glyptoxanthus meandrinus (Klunzinger, 1913)	+	-	-
	Euxanthus sp.	-	+	-
	Actaea savignii (H. Milne Edwards, 1834)	+	+	-
	Actaea jacquelinae Guinot, 1976	+	+	-
	Actaeodes hirsutissimus (Rüppell, 1830)	+	+	+[3]
	Actaeodes tomentosus (H. Milne Edwards, 1834)	-	-	+[3]
	Actaea sabae Nobili, 1906	-	-	+[1]
	Actaea flosculata Alcock, 1898	-	-	+[3]

	Banareia banareias (Rathbun, 1911)	-	-	+[3]
	Neoliomera sabaea (Nobili, 1906) Serène (1984) +7	-	-	+[7]
	Neoliornera nobilìi Odhner, 1925	-	-	+[7]
	Neoliomera pubescens (H. Milne Edwards, 1834)	-	-	+[1]
	Liomera margaritata (A. Milne-Edwards, 1873)	-	-	+[1]
	Liomera rugata (H. Milne Edwards, 1834)	-	-	+[1], +[3], +[4]
	Liomera laevis (A. Milne-Edwards, 1873)	-	-	+[3]
	Xanthias punctatus (H. Milne Edwards, 1834)	-	-	+[3]
	Pseudoliomera granosimana (A. Milne-Edwards, 1865)	-	-	+[4]
	Lophozozymus anaglyptus (Heller, 1861)	-	-	+[3]
	Platypodia cristata (A. Milne-Edwards, 1865)	-	-	+[3]
	Cymo quadrilobatus Miers, 1884	+	+	-
	Cymo melanodactylus Dana, 1852	-	+	+[1]
	Cymo andreossyi (Audouin, 1826)	-	-	+[3]
	Luniella spinipes (Heller, 1861)	+	+	+[1], +[3], +[7], +[8]
	Xanthias sinensis (A. Milne-Edwards, 1867)	-	-	+[1]
	Atergatis granulatus de Man, 1889	-	-	+[1]
	Zozymodes xanthoides (Krauss, 1843)	-	-	+[1]
	Etisus anaglyptus H. Milne Edwards, 1834	-	-	+[1]
Grapsidae	*Grapsus albolineatus* Latreille in Milbert, 1812	+	+	-
	Grapsus granulosus H. Milne Edwards, 1853	+	+	+[9]
	Metopograpsus messor (Forskål, 1775)	+	+	-
Varunidae	*Pseudohelice subquadrata* (Dana, 1851)	+	+	-
	Thalassograpsus harpax (Hilgendorf, 1892)	+	-	+[1]
Sesarmidae	*Perisesarma guttatum* (A. Milne-Edwards, 1869)	+	+	-
Camptandriidae	*Serenella leachii* (Audouin, 1826)	+	+	-
Dotillidae	*Dotilla sulcata* (Forskål, 1775)	+	+	-
Macrophthalmidae	*Ilyograpsus paludicola* (Rathbun, 1909)	+	+	-
	Macrophthalmus (Mareotis) depressus Rüppell, 1830	+	+	-
	M. (Macrophthalmus) grandidieri A. Milne-Edwards, 1867	-	+	-
	Macrophthalmus (Macrophthalmus) brevis (Herbst, 1804)	-	-	+[1]
	Chaenostoma boscii (Audouin, 1826)	-	-	+[1]
Ocypodidae	*Ocypode saratan* (Forskål, 1775)	+	+	+[3],+[11]
	Cranuca inversa (Hoffmann, 1874)	+	+	+[3]
	Gelasimus hesperiae (Crane, 1975)	-	+	-
	Gelasimus tetragonon (Herbst, 1790)	-	+	-
	Austruca albimana (Kossmann, 1877)	-	+	-
Pinnotheridae	*Arcotheres borradailei* Nobili, 1906	-	-	+[1]

Table 11: Shows the comparing between the present study* and other studies for Socotra Islands. Simões *et al.* (2001) **, MacAlister *et al*. (1996) ▲, Wranik (1998) ■ Neumann & Spiridonov (1999)+[1], Castro (1999)+[2], Apel & Brandis (2000)+[3], Cumberlidge & Wranik (2002)+[4], Apel (2001)+[5], Tan & Ng (2003)+[6], Tan & Ng (2007)+[7], Sakai & Tűrkay (2013) +[8], Tűrkay *etal*. (1996) +[9]. Present (+) and absent (-).

Family	Taxon	*	**	▲	■	●
Dromiidae	*Cryptodromia fallax* (Latreille in Milbert, 1812)	+	+	-	-	+[5]
	Epigodromia granulata (Kossman, 1878)	+	+	-	-	-
	Lauridromia dehaani (Rathbun, 1923)	-	-	-	-	+[5]
	Lewindromia unidentata (Rüppell, 1830)	+	-	-	-	-
	Ascidiophilus caphyraeformis Richters, 1880	+	-	-	-	-
Carpiliidae	*Carpilius convexus* (Forskål, 1775)	+	-	-	-	+[5]
Eriphiidae	*Eriphia smithii* MacLeay, 1838	+	+	-	+	+[5]
Menippidae	*Menippe rumphii* (Fabricius, 1798)	-	+	-	-	+[5]
Oziidae	*Epixanthus frontalis* (H. Milne Edwards, 1834)	-	+	-	-	+[5]
	Epixanthus corrosus A. Milne-Edwards, 1873	-	+	-	-	+[5]
	Epixanthus sp.		-	+	-	-
	Lydia tenax (Rüppell, 1830)	-	+	-	-	+[5]
Calappidae	*Calappa gallus* (Herbst, 1803)	-	+	-	-	+[5]
	Calappa dumortieri Guinot, 1962	-	-	-	-	+[5]
Matutidae	*Ashtoret lunaris* (Forskål, 1775)	-	+	-	-	+[5]
	Matuta victor (Fabricius, 1781)	-	-	-	-	+[5]
Leucosiidae	*Leucosia* sp.	-	+	-	-	-
	Ryphila cancellus (Herbst, 1783)	-	+	-	-	-
	Philyra sp [aff. *platycheir* de Haan, 1841]	-	+	-	-	-
	Philyra globus (Fabricius, 1775)	-	-	-	-	+[5]
	Philyra sp.	-	-	+	-	-
Majidae	*Micippa platipes* Rüppell, 1830	+	+	-	-	+[5]
	Micippa thalia (Herbst, 1803)	-	+	-	-	+[5]
	Pseudomicippe griffini Kazmi & Tirmizi, 1999	-	+	-	-	-
	Schizophrys aspera H. Milne Edwards, 1834	-	-	-	-	+[5]
Inachidae	*Achaeus* sp.	-	+	-	-	-
	Macropodia formosa Rathbun, 1911	-	-	-	-	+[5]
Epialtidae	*Huenia heraldica* (De Haan, 1837)	-	+	-	-	-
	Cyphocarcinus sp.	-	-	+	-	-
	Cyphocarcinus minutus A. Milne Edwards, 1868	-	-	-	-	+[5]
	Huenia grandidierii A. Milne-Edwards, 1865	-	+	-	-	-
	Huenia sp.	-	+	-	-	-
	Menaethiops contiguicornis (Klunzinger, 1906)	-	+	-	-	-
	Menaethiops nodulosa (Nobili)	-	+	-	-	+[5]
	Menaethiops sp. [aff. fascicularis (Krauss, 1843)]	-	+	-	-	-

	Menaethius monoceros (Latreille, 1825)	-	+	+	-	+[5]
	Menaethius orientalis (Sakai, 1969)	-	+	-	-	+[5]
	Menaethius sp.1	-	-	+	-	-
	Menaethius sp.2	-	-	+	-	-
	Acanthonyx limbatus A. Milne Edwards, 1862	-	-	-	-	+[5]
	Simocarcinus pyramidatus (Heller, 1861)	-	+	-	-	-
	Stilbognathus erythraeus von Martens, 1866	-	+	-	-	-
	Stilbognathus cervicornis (Herbst, 1803)	-	-	-	-	+[5]
	gen. sp.	-	+	+	-	-
Pseudoziidae	*Pseudozius caystrus* (Adams & White, 1849)	+	+	-	-	+[5]
Parthenopidae	*Furtipodia petrosa* (Klunzinger, 1906)	-	+	-	-	+[6]
	Daldorfia horrida (Linnaeus, 1758)	-	-	-	-	+[6]
	Daldorfia spinosissima (A. Milne-Edwards, 1862)	-	-	-	-	+[7]
Portunidae	*Carupa tenuipes* Dana, 1852	-	+	-	-	+[5]
	Portunus (Portunus) segnis (Forskål, 1775)	-	+	+	-	-
	Portunus (Monomia) euglyphus (Laurie, 1906)	-	-	-	-	+[1]
	Portunus (Xiphonectes) hastatoides Fabricius, 1798	-	-	-	-	+[5]
	Portunus (Xiphonectes) tenuicaudatus Stephenson, 1961	-	-	-	-	+[1]
	Portunus longispinosus (Dana 1852)	-	-	-	-	+[1]
	Portunus orbitosinus Rathbun 1911	-	-	-	-	+[5]
	Portunus pubescens (Dana 1852)	-	-	-	-	+[1]
	Portunus convexus De Haan, 1833	-	-	-	-	+[5]
	Portunus (Portunus) sanguinolentus (Herbst, 1783)	-	-	-	-	+[5]
	Portunus sp.	-	-	+	-	-
	Scylla serrata (Forskål, 1775)	-	+	-	-	+[5]
	Thalamita admete (Herbst, 1803)	-	+	+	-	+[5]
	Thalamita spinifera Borradaile, 1902	-	-	+	-	+[1]
	Thalamita bandusia Nobili, 1906	-	-	-	-	+[5]
	Thalamita crenata Rüppell, 1830	-	+	-	-	+[5]
	Thalamita prymna (Herbst, 1803)	-	-	-	-	+[5]
	Thalamita quadrilobata Miers, 1884	-	-	-	-	+[5]
	Thalamita cf. stephensoni Crosnier 1962	-	+	-	-	-
	Thalamita auaensis Rathbun 1906 ssp. margaritimana Rathbun 1911	-	-	-	-	+[1]
	Thalamita philippinensis Stephenson & Rees 1967 ssp.	-	-	-	-	+[1]
	Lissocarcinus laevis Miers 1886	-	-	-	-	+[1]
	Lupocyclus tugelae Barnard 1950	-	-	-	-	+[1]
Pilumnidae	*Actumnus setifer* (De Haan, 1835)	-	+	-	-	+[5]
	Actumnus asper (Rüppell, 1830)	-	-	-	-	+[5]

	Pilumnopeus sp. 1	-	+	-	-	-
	Pilumnus propinquus Nobili, 1906	+	-	-	-	-
	Pilumnus vespertilio (Fabricius, 1793)	-	-	+	-	-
	Heteropilumnus lanuginosus (Klunzinger, 1913)	-	-	-	-	+[5]
	Pilumnus sp. 1	-	+	-	-	-
	Gen. sp.1	-	-	+	-	-
Potamidae	*Socotrapotamon socotrensis* (Hilgendorf, 1883)	+	-	-	-	-
	Socotrapotamon nojidensis Apel & Brandis, 2000	-	-	-	-	+[3]
	Socotra pseudocardiosoma Cumberlidge & Wranik, 2002	-	-	-	-	+[4]
Trapeziidae	*Trapezia cymodoce* (Herbst, 1801)	+	-	-	-	+[5]
	Trapezia tigrina Eydoux & Souleyet, 1842	-	-	-	-	+[5]
	Trapezia rufopunctata (Herbst, 1799)	-	-	-	-	+[5]
Tetraliidae	*Tetraloides nigrifrons* (Dana, 1852)	+	-	-	-	-
	Tetralia cavimana Heller, 1861	-	-	-	-	+[2],+[5]
	Tetralia muta (Linnaeus, 1758)	-	-	-	-	+[2]
Xanthidae	*Xanthias sinensis* (A. Milne-Edwards, 1867)	+	+	-	-	+[5]
	Xanthias punctatus (H. Milne Edwards, 1834)	-	-	-	-	+[5]
	Leptodius exaratus (H. Milne Edwards, 1834)	+	+	+	-	+[5]
	Leptodius sanguineus (H. Milne Edwards, 1834)	-	+	-	-	+[5]
	Leptodius gracilis (Dana, 1852)	-	-	+	-	-
	Lybia plumosa Barnard 1947	-	-	-	-	+[1]
	Actaeodes tomentosus (H. Milne Edwards, 1834)	-	+	-	-	-
	Actaea savignyi (H. Milne-Edwards 1834)	-	-	-	-	+[5]
	Actaea cf. spinosissima Borradaile 1902	-	-	-	-	+[5]
	Paractaea rufopunctata f. illusoria Guinot 1969	-	-	-	-	+[5]
	Actaea sp.	-	-	+	-	-
	Actaeodes hirsutissimus (Rüppell, 1830)	+	-	-	-	-
	Atergatis latissimus (H. Milne Edwards, 1834)	+	-	-	-	-
	Atergatopsis granulata A. Milne-Edwards, 1865	+	-	-	-	-
	Atergatopsis alcocki (Laurie 1906)	-	-	-	-	+[1]
	Epiactaea margaritifera (Odhner, 1925)	+	-	-	-	-
	Cymo quadrilobatus Miers, 1884	+	-	-	-	+[5]
	Cymo andreossyi (Audouin, 1826)	+	-	-	-	+[5]
	Cymo deplanatus A. Milne Edwards 1873	-	-	-	-	+[5]
	Cymo melanodactylus Dana, 1852	-	-	-	-	+[5]
	Chlorodiella cytherea (Dana 1852)	-	-	-	-	+[5]
	Chlorodiella nigra (Forskål, 1775)	-	-	-	-	+[5]
	Etisus anaglyptus H. Milne Edwards, 1834	-	+	-	-	+[5]

	Etisus electra (Herbst, 1801)	-	+	-	-	+[5]
	Gaillardiellus rueppelli (Krauss, 1843)	-	-	-	-	+[5]
	Paraxanthodes cumatodes (Macgilchrist, 1905)	-	-	-	-	+[5]
	Forestiana depressa (White, 1848)	-	+	-	-	-
	Lachnopodus subacutus (Stimpson, 1858)	-	+	-	-	-
	Liomera rugata (H. Milne Edwards, 1834)	-	+	-	-	-
	Liomera rugipes (Heller 1861)	-	-	-	-	+[1]
	Pseudoliomera helleri (A. Milne-Edwards 1865)	-	-	-	-	+[1]
	Paractaea rufopunctata (H. Milne Edwards, 1834)	-	+	-	-	-
	Paractaeopsis quadriareolatus (Takeda & Miyake, 1968)	-	+	-	-	-
	Pilodius areolatus (H. Milne Edwards, 1834)	-	+	-	-	-
	Pilodius sp.	-	-	+	-	-
	Demania aff. mortenseni (Odhner 1925)	-	-	-	-	+[1]
	Luniella spinipes (Heller, 1861)	+	+	+	-	+[5]
	Cyclodius granulatus (Targioni-Tozzetti, 1877)	+	-	-	-	+[5]
	Cyclodius paumotensis (Rathbun, 1907)	-	-	+	-	-
	Lophozozymus anaglyptus (Heller, 1861)	-	+	+	-	+[5]
	Lophozozymus dodone (Herbst 1801)	-	-	-	-	+[1]
	Lophozozymus guezei Guinot 1977	-	-	-	-	+[1]
	Pseudoliomera remota (Rathbun, 1907)	-	+	-	-	-
	Zozymodes cavipes (Dana, 1852)	-	+	-	-	+[5]
	Psaumis cavipes (Dana, 1852)	-	-	-	-	+[5]
	Zozymodes xanthoides (Krauss, 1843)	-	+	-	-	+[5]
Grapsidae	*Cyclograpsus integer* H. Milne Edwards, 1837	-	+	-	-	-
	Grapsus albolineatus Latreille in Milbert, 1812	+	+	+	+	+[5]
	Grapsus granulosus H. Milne Edwards, 1853	+	+	-	-	+[5]
	Grapsus tenuicrustatus (Herbst, 1783)	+	+	-	-	+[5]
	Grapsus longitarsus Dana, 1851	-	-	+	-	
	Grapsus sp.1	-	-	+	-	-
	Grapsus sp.2	-	-	+	-	-
	Metopograpsus messor (Forskål, 1775)	+	+	+	-	+[5]
	Metopograpsus thukuhar (Owen, 1839)	+	+	-	-	+[5]
	Geograpsus crinipes (Dana, 1851)	+	+	-	-	-
	Pachygrapsus minutus A. Milne-Edwards, 1873	-	+	-	-	+[5]
Plagusiidae	*Percnon guinotae* Crosnier, 1965	-	+	-	-	+[5]
	Percnon planissimum (Herbst, 1804)	-	+	-	-	+[5]
	Plagusia tuberculata Lamarck, 1818	-	+	-	-	+[5]
Varunidae	*Thalassograpsus harpax* (Hilgendorf, 1892)	+	+	+	-	+[5]
	Pseudohelice subquadrata (Dana, 1851)	-	+	-	-	+[5]
Gecarcinidae	*Cardisoma carnifex* (Herbst, 1796)	-	+	-	+	-
Macrophthalmidae	*Chaenostoma boscii* (Audouin, 1826)	+	+	-	+	-

Dotillidae	*Dotilla sulcata* (Forskål, 1775)	-	+	-	-	+[5]
Ocypodidae	*Ocypode saratan* (Forskål, 1775)	+	+	+	+	+[5], +[8], +[9]
	Ocypode cordimana Latreille, 1818	-	+	+	-	+[5]
	Ocypode ryderi Kingsley, 1880	-	+	-	-	+[8]
	Ocypode cf. rotundata Miers, 1882	-	-	+	-	-
	Austruca albimana (Kossmann, 1877)	+	+	-	-	+[5]
	Cranuca inversa (Hoffmann, 1874)	-	+	-	+	+[5]

Table 12: Shows the comparing for the Gulf of Aden between the present study* and Neumann & Spiridonov (1999)** with other studies***: (Ortmann (1894)+[1], Nobili (1906)+[2], Guinot (1969)+[3], Griffin (1974)+[4], Serène (1984)+[5], Clark & Galil (1993)+[6], Galil & Clark (1994) +[7], Tűrkay *etal.* (1996) and Sakai & Tűrkay (2013)+[8], Apel & Spiridonov (1998)+[9], Castro (1999)+[10], Apel (2001) +[11], Türkay & Spiridonov (2006) +[12], Spiridonov & Apel (2007)+[13], Al-Hindi (2010) +[14], Al-Hindi *et al*., 2012+[15]). Present (+) and absent (-).

Family	Taxon	*	**	***
Dromiidae	*Lauridromia dehaani* (Rathbun, 1923)	+	-	+[11], +[14]
	Epigodromia granulata (Kossman, 1878)	+	-	-
	Cryptodromia fallax (Latreille in Milbert, 1812)	+	-	+[11]
	Cryptodromia hilgendorfi De Man, 1888	-	-	+[11]
	Cryptodromia pentagonalis (Hilgendorf, 1879)	-	-	+[2]
	Ascidiophilus caphyraeformis Richters, 1880	+	-	-
	Lewindromia unidentata (Rüppell, 1830)	+	-	-
Raninidae	*Notosceles serratifrons* (Henderson, 1893)	+	-	-
Carpiliidae	*Carpilius convexus* (Forskål, 1775)	+	-	-
Calappidae	*Calappa hepatica* (Linnaeus, 1758)	+	-	-
	Calappa capellonis Laurie, 1906	+	-	-
	Calappa gallus (Herbst, 1803)	+	-	-
	Calappa philargius (Linnaeus, 1758)	+	-	+[14]
	Mursia bicristimana Alcock & Anderson, 1894	+	-	-
Matutidae	*Ashtoret lunaris* (Forskål, 1775)	+	-	+[2], +[7], +[14]
	Ashtoret picta (Hess, 1865)	+	-	+[7]
	Matuta victor (Fabricius, 1781)	-	-	+[2], +[7], +[14]
Dorippidae	*Dorippe frascone* (Herbst, 1785)	+	-	+[14]
Eriphiidae	*Eriphia smithii* MacLeay, 1838	+	+	+[14]
	Eriphia sebana (Shaw & Nodder, 1803)	+	-	+[14]
Oziidae	*Epixanthus frontalis* (H. Milne Edwards, 1834)	+	-	-
	Epixanthus corrosus A. Milne-Edwards, 1873	+	-	-
	Lydia tenax (Rüppell, 1830)	+	-	-
	Lydia annulipes (H. Milne-Edwards 1834)	-	+	-
Menippidae	*Menippe rumphii* (Fabricius, 1798)	+	-	-
Hexapodidae	*Hexapinus simplex* Rahayu & Ng, 2014	+	-	-
Leucosiidae	*Coleusia biannulata* Tyndale-Biscoe & George, 1962	+	-	-
	Leucosia anatum (Herbst, 1783)	+	-	+[11]
	Hiplyra quamosal (Rüppell, 1830)	+	-	+[2]
	Philyra granigera Nobili, 1906	+	-	-
	Ebalia abdominalis Nobili, 1906	+	-	+[11]
	Nobiliella jousseaumei (Nobili, 1906)	+	-	+[2]
	Nucia tuberculosa A. Milne-Edwards, 1874	-	-	+[2]
	Ryphila cancellus (Herbst, 1783)	+	-	+[11]

	Philyra cf. globus (Fabricius, 1775)	+	-	-
	Nursilia dentata Bell, 1855	+	-	-
	Cryptocnemus cf. pentagonus Stimpson, 1858	+	-	-
	Leucisca rubifera (Müller, 1887)	+	-	-
	Arcania gracilis Henderson, 1893	+	-	-
	Ixa holthuisi Tirmizi, 1970	+	-	-
	Myra subgranulata Kossmann, 1877	+	-	-
	Arcania cf. tuberculata Bell, 1855	+	-	-
	Arcania undecimspinosa de Haan, 1841	+	-	+[11]
Epialtidae	*Acanthonyx limbatus* A. Milne-Edwards, 1862	+	-	-
	Stilbognathus cervicornis (Herbst, 1803)	+	-	-
	Tylocarcinus styx (Herbst, 1803)	+	-	-
	Huenia heraldica (De Haan, 1837)	+	-	-
	Simocarcinus simplex (Dana, 1851)	+	-	-
	Hyastenus hilgendorfi De Man, 1887	+	-	-
	Hyastenus brockii de Man, 1887	+	-	-
	Menaethius monoceros (Latreille, 1825)	+	-	-
Majidae	*Schizophrys aspera* H. Milne Edwards, 1834	+	-	+[14]
	Micippa platipes Rüppell, 1830	+	-	-
	Seiitaoides cf. stimpsonii (Miers, 1884)	+	-	-
	Cyclax spinicinctus Heller, 1861	+	-	-
	Majidae.gen. sp. 1	+	-	-
Inachidae	*Sunipea indicus* (Alcock, 1895)	+	-	-
	Cyrtomaia cf. goodridgei McArdle, 1900	+	-	-
	Camposcia retusa (Latreille, 1829)	+	-	-
	Macropodia quamos Rathbun, 1911	+	-	-
	Inachus dorsettensis (Pennant, 1777)	+	-	-
Pseudoziidae	*Pseudozius caystrus* (Adams & White, 1849)	+	+	+[14]
Parthinopidae	*Daldorfia horrida* (Linnaeus, 1758)	+	-	+[14]
	Aethra scruposa (Linnaeus, 1764)	+	-	-
	Daldorfia spinosissima (A. Milne-Edwards, 1862)	+	-	-
	Parthenope longimanus (Linnaeus, 1758)	+	-	-
	Furtipodia petrosa (Klunzinger, 1906)	+	-	-
	Rhinolambrus longispinus (Miers, 1879)	+	-	-
	Aulacolambrus granulosus (Miers, 1879)	+	-	-
	Aulacolambrus hoplonotus (Adams & White, 1849)	+	-	-
Pilumnidae	*Eurycarcinus orientalis* A. Milne-Edwards, 1867	+	-	+[14]
	Eurycarcinus integrifrons de Man, 1879	+	-	+[2], +[11], +[14]
	Pilumnus vespertilio (Fabricius, 1793)	+	-	-
	Pilumnus minutus De Haan, 1835	+	-	+[14]

	Pilumnus eudaemoneus Nobili, 1906	-	-	+[2]
	Glabropilumnus levimanus (Dana, 1852)	+	-	-
	Pilumnopeus convexus (Maccagno, 1936)	+	-	+[11]
	Pilumnus incanus (Forskål, 1775)	+	-	-
	Actumnus tesselatus Alcock, 1898	+	-	-
	Actumnus asper (Rüppell, 1830)	+	-	+[2]
	Pilumnus savignyi Heller, 1861	+	-	-
	Echinoecus pentagonus (A. Milne-Edwards, 1879)	+	-	-
	Calocarcinus africanus Calman, 1909	-	-	+[5], +[6]
Galenidae	*Halimede tyche* (Herbst, 1801)	+	-	-
Portunidae	*Charybdis (Goniohellenus) smithii* MacLeay, 1838	+	+	+[9],+[11], +[12], +[14], +[15]
	Charybdis (Goniohellenus) omanensis Leene 1938	-	+	+[9],+[12]
	Charybdis (Charybdis) feriata (Linnaeus, 1758)	+	-	+[14], +[15]
	Charybdis (Charybdis) natator (Herbst, 1794)	+	-	+[14], +[15]
	Charybdis (Charybdis) orientalis Dana, 1852	+	-	+[14], +[15]
	Charybdis (Charybdis) annulata (Fabricius, 1798)	+	-	+[14], +[15]
	Charybdis (Charybdis) hellerii (A. Milne-Edwards, 1867)	+	+	+[14], +[15]
	Charybdis (Goniohellenus) longicollis Leene, 1938	+	-	-
	Podophthalmus vigil (Weber, 1795)	-	-	+[2], +[9],+[11]
	Portunus (Portunus) segnis (Forskål, 1775)	+	+	+[14], +[15]
	Portunus (Xiphonectes) arabicus (Nobili, 1906)	+	+	+[9]
	Portunus (Xiphonectes) quamosa (A. Milne-Edwards, 1861)	-	-	+[9]
	Cycloachelous orbitosinus (Rathbun, 1911)	+	-	+[9],+[11]
	Cycloachelous granulatus (H. Milne Edwards, 1834)	-	-	+[9],+[11]
	Xiphonectes alcocki (Nobili, 1906)	-	+	-
	Portunus argentatus (A. Milne-Edwards 1861)	-	+	-
	Portunus (Portunus) sanguinolentus (Herbst, 1783)	+	-	+[9],+[11], +[14], +[15]
	Portunus (Xiphonectes) longispinosus (Dana, 1852)	+	-	+[9]
	Portunus (Xiphonectes) guinotae Stephenson & Rees, 1961	+	-	-
	Portunus (Achelous) dubius (Laurie, 1906)	-	+	-
	Scylla serrata (Forskål, 1775)	+	-	+[9], +[14], +[15]
	Carupa tenuipes Dana, 1852	+	-	-

	Thalamita crenata Rüppell, 1830	+	-	+[9],+[11], +[14], +[15]
	Thalamita prymna (Herbst, 1803)	+	-	+[9], +[14], +[15]
	Thalamita admete (Herbst, 1803)	+	-	-
	Thalamita poissonii (Audouin, 1826)	+	-	+[9]
	Thalamita mitsiensis Crosnier, 1962	+	-	-
	Thalamita sexlobata Miers, 1886	+	-	+[9],+[11]
	Thalamita bandusia Nobili, 1906	+	-	+[9]
	Thalamita gatavakensis Nobili, 1906	+	-	-
	Thalamita cf. crosnieri Vannini 1983	+	-	-
	Thalamita quadrilobata Miers, 1884	+	-	+[9]
	Thalamita savignyi A. Milne-Edwards, 1861	-	-	+[9]
	Thalamita foresti Crosnier, 1962	-	-	+[9]
	Thalamita indistincta Apel & Spiridonov, 1998	-	-	+[9]
	Thalamita sp.	+	-	-
	Thalamita cf. stephensoni Crosnier 1962	+	-	-
	Thalamita aff. Exetastica Alcock 1899	-	+	-
	Thalamita chaptalii (Audouin, 1826)	-	-	+[2]
Trapeziidae	*Trapezia cymodoce* (Herbst, 1801)	+	+	+[2],+[10], +[14]
	Trapezia tigrina Eydoux & Souleyet, 1842	+	+	+[10]
	Trapezia rufopunctata (Herbst, 1799)	-	-	+[2], +[14]
	Quadrella coronata Dana, 1852	+	-	-
	Calocarcinus africanus Calman, 1909	-	-	+[5]
Tetraliidae	*Tetraloides nigrifrons* (Dana, 1852)	+	-	-
	Tetralia cavimana Heller, 1861	+	-	-
Euryplacidae	*Eucrate crenata* (De Haan, 1835)	-	-	+[2]
Xanthidae	*Atergatis integerrimus* (Lamarck, 1818)	+	-	+[14]
	Demania mortenseni (Odhner, 1925)	+	-	-
	Etisus laevimanus Randall, 1840	+	-	+[11]
	Xanthias sinensis (A. Milne-Edwards, 1867)	+	+	+[2], +[14]
	Lybia quamos Barnard, 1946	+	-	-
	Platypodia cf. pseudogranulosa Serène, 1984	+	-	-
	Leptodius exaratus (H. Milne Edwards, 1834)	+	+	+[11], +[14]
	Leptodius sanguineus (H. Milne-Edwards 1834)	-	+	+[2], +[14]
	Macromedaeus crassimanus (A. Milne-Edwards 1867)	-	+	+[11], +[14]
	Macromedaeus voeltzkowi (Lenz, 1905)	+	-	-
	Forestiana depressa (White, 1848)	+	-	-
	Hypocolpus diverticulatus (Strahl, 1861)	-	-	+[2]
	Neoliomera sabaea (Nobili, 1906)	+	-	-
	Neoxanthops lineatus (A. Milne-Edwards, 1867)	+	-	+[2]

	Neoxanthias impressus (Lamarck 1818)	-	+	-
	gen. sp. 1	+	-	-
	gen. sp. 2	+	-	-
	gen. sp. 3	+	-	-
	Chlorodiella laevissima (Dana, 1852)	+	-	-
	Chlorodiella nigra (Forskål, 1775)	+	+	+[2]
	Liocarpilodes harmsi (Balss 1934)	-	+	-
	Cyclodius granulatus (Targioni-Tozzetti, 1877)	+	-	-
	Cyclodius drachi (Guinot, 1964)	-	+	-
	Zosimus aeneus (Linnaeus, 1758)	+	-	-
	Psaumis cavipes (Dana, 1852)	-	-	+[2],+[11]
	Zozymodes pumilus (Jacquinot 1852)	-	+	-
	Glyptoxanthus meandrinus (Klunzinger, 1913)	+	-	-
	Actaea cf. bocki Odhner, 1925	+	-	-
	Actaeodes hirsutissimus (Rüppell, 1830)	+	+	-
	Actaeodes tomentosus (H. Milne Edwards, 1834)	+	+	+[2]
	Paractaea rufopunctata (H. Milne Edwards, 1834)	+	-	+[2],+[3],+[5]
	Epiactaea margaritifera (Odhner, 1925)	+	-	+[2],+[5],+[11]
	Lophozozymus anaglyptus (Heller, 1861)	+	+	-
	Pilodius areolatus (H. Milne Edwards, 1834)	+	-	-
	Xanthias cf. canaliculatus Rathbun, 1906	+	-	-
	Cymo andreossyi (Audouin, 1826)	+	-	-
	Cymo quadrilobatus Miers, 1884	+	-	-
	Cymo melanodactylus Dana, 1852	-	-	+[2]
	Liomera rubra (A. Milne-Edwards, 1865)	+	-	-
	Pseudoliomera speciosa (Dana 1852)	-	+	+[2]
	Lachnopodus subacutus (Stimpson 1858)	-	+	+[14]
	Luniella spinipes (Heller, 1861)	+	-	+[6]
Grapsidae	*Grapsus albolineatus* Latreille in Milbert, 1812	+	-	+[11], +[14]
	Grapsus tenuicrustatus (Herbst, 1783)	+	-	+[11], +[14]
	Grapsus granulosus H. Milne Edwards, 1853	+	-	+[11], +[14]
	Metopograpsus messor (Forskål, 1775)	+	-	+[1], +[11], +[14]
	Metopograpsus thukuhar (Owen, 1839)	+	-	+[14]
	Geograpsus crinipes (Dana, 1851)	+	-	-
Varunidae	*Thalassograpsus harpax* (Hilgendorf, 1892)	+	-	+[2],+[11]
Plagusiidae	*Percnon planissimum* (Herbst, 1804)	+	-	-
Macrophthalmidae	*Macrophthalmus (Macrophthalmus) sulcatus* H. Milne Edwards, 1852	+	-	+[14]
	Macrophthalmus (Macrophthalmus) grandidieri A. Milne-Edwards, 1867	+	-	-
	Macrophthalmus (Mareotis) depressus	+	-	+[11], +[14]

	Rüppell, 1830			
	Macrophthalmus (Macrophthalmus) graeffei A. Milne-Edwards, 1873	+	-	-
	Macrophthalmus (Macrophthalmus) serenei Takeda & Komai, 1991	+	-	-
	Chaenostoma boscii (Audouin, 1826)	+	-	-
	Macrophthalmus (Mareotis) laevis A. Milne-Edwards, 1867	+	-	-
	Chaenostoma sinuspersici (Naderloo & Türkay, 2011)	+	-	-
Dotillidae	*Dotilla sulcata* (Forskål, 1775)	+	-	+[2], +[14]
Ocypodidae	*Ocypode saratan* (Forskål, 1775)	+	-	+[8], +[11], +[14]
	Ocypode cordimana Latreille, 1818	+	-	+[8]
	Ocypode jousseaumei (Nobili, 1906)	+		+[8], +[11], +[14]
	Austruca albimana (Kossmann, 1877)	+	-	+[11], +[14]
	Cranuca inversa (Hoffmann, 1874)	+	-	-
	Gelasimus hesperiae (Crane, 1975)	+	-	-

Table 13: Shows the comparing between the present study* in the Yemeni coasts at the Arabian Sea with coasts of Dhofar Province, southern Oman, by Hogarth (1994) ** and Khvorov *et al.* (2012) ***. Present (+) and absent (-).

Family	Species name	*	**	***
Dromiidae	*Epigodromia quamosal* (Kossman, 1878)	-	-	+
	Lewindromia unidentata (Rüppell, 1830)	-	-	+
	Cryptodromia fallax (Latreille in Milbert, 1812)	-	-	+
Calappidae	*Calappa philargius* (Linnaeus, 1758)	-	-	+
	Calappa japonica Ortmann, 1892	-	-	+
	Calappa lophos Herbst, 1782	-	-	+
	Calappa hepatica (Linnaeus, 1758)	-	-	+
	Calappa gallus (Herbst, 1803)	-	-	+
	Mursia bicristimana Alcock & Anderson, 1894	-	-	+
Matutidae	*Ashtoret lunaris* (Forskål, 1775)	-	-	+
Eriphiidae	*Eriphia smithii* MacLeay, 1838	+	+	+
	Eriphia sebana (Shaw & Nodder, 1803)	-	-	+
Menippidae	*Sphaerozius nitidus* Stimpson, 1858	-	+	+
Oziidae	*Epixanthus frontalis* (H. Milne Edwards, 1834)	+	+	+
	Lydia tenax (Rüppell, 1830)	+	+	+
Hexapodida	*Hexapinus simplex* Rahayu & Ng, 2014	+	-	-
Leucosiidae	*Philyra scabriuscula* (Fabricius, 1798)	-	-	+
	Euclosia obtusifrons (De Haan, 1841)	-	-	+
	Bellidilia undecimspinosa (Kinahan, 1856)	-	-	+
	Ebalia sp.	-	-	+
	Arcania sp.	-	-	+
	Cryptocnemus sp.	-	-	+
	Nobiliella jousseaumei (Nobili, 1906)	+	-	-
Majidae	*Schizophrys aspera* H. Milne Edwards, 1834	-	-	+
	Cyphocarcinus minutus A. Milne-Edwards, 1868	-	-	+
	Micippa platipes Rüppell, 1830	-	-	+
Epialtidae	*Stilbognathus curvirostris* A. Milne-Edwards, 1865	-	-	+
	Stilbognathus cervicornis (Herbst, 1803)	+	-	-
	Hyastenus hilgendorfi De Man, 1887	+	-	+
	Hyastenus diacanthus (De Haan, 1839)	-	-	+
	Huenia heraldica (De Haan, 1837)	-	-	+
	Acanthonyx limbatus A. Milne-Edwards, 1862	-	-	+
	Acanthonyx scuttelatus MacLeay, 1838	-	-	+
	Tylocarcinus styx (Herbst, 1803)	-	-	+
	Menaethius monoceros (Latreille, 1825)	-	-	+
	Menaethiops contiguicornis (Klunzinger, 1906)	-	-	+
	Menaethiops nodulosus (Nobili, 1906)	-	-	+
	Menaethiops brevicornis (A. Milne-Edwards, 1868)	-	-	+

	Lahaina sp.	-	-	+
	Naxioides sp.	-	-	+
Hymenosomatidae	*Elamena quamosa* (Stimpson, 1858)	-	-	+
Inachidae	*Encephalloides armstrongi* Wood-Mason, 1890	-	-	+
Parthenopidae	Parthenopidae gen. sp.	-	-	+
Pilumnidae	*Actumnus digitalis* (Rathbun, 1907)	-	-	+
	Actumnus setifer (De Haan, 1835)	-	-	+
	Pilumnopeus sp.	-	-	+
	Nanopilumnus heterodon (Sakai, 1934)	-	-	+
	Pilumnus vespertilio (Fabricius, 1793)	-	+	+
	Pilumnus spinifer H. Milne Edwards, 1834	-	-	+
	Pilumnus savignyi Heller, 1861	-	+	-
	Pilumnus incanus (Forskål, 1775)	+	-	-
	Echinoecus pentagonus (A. Milne-Edwards, 1879)	-	-	+
	Pilumnus propinquus Nobili, 1906	-	+	+
	Actumnus digitalis (Rathbun 1907)	-	+	-
	Actumnus setiler (De Haan 1833)	-	+	-
	Aniptumnus quadridentatus (De Mann, 1895)	-	-	+
	Pilumnopeus laevis Dana 1852	-	+	-
	Parapilumnus quaclridentstus (De Man 1895)	-	+	-
Homolidae	*Homola* sp.	-	-	+
Cryptochiridae	*Cryptochirus coralliodytes* Heller, 1861	-	-	+
	Neotroglocarcinus hongkongensis (Shen, 1936)	-	-	+
	Xynomaia sheni (Fize & Serène, 1956)	-	-	+
Portunidae	*Charybdis (Goniohellenus) smithii* MacLeay, 1838	-	-	+
	Charybdis (Charybdis) hellerii (A. Milne-Edwards, 1867)	+	-	-
	Charybdis (Charybdis) natator (Herbst, 1794)	-	-	+
	Charybdis (Goniohellenus) omanensis Leene, 1938	-	-	+
	Charybdis (Charybdis) sagamiensis Parisi, 1916	-	-	+
	Charybdis (Charybdis) annulata (Fabricius, 1798)	+	-	+
	Charybdis sp.	-	-	+
	Charybdis (Goniohellenus) longicollis Leene, 1938	-	-	+
	Charybdis (Charybdis) lucifera (Fabricius, 1798)	-	-	+
	Scylla quamos (Forskål, 1775)	-	-	+
	Portunus (Portunus) segnis (Forskål, 1775)	-	-	+
	Portunus (Portunus) convexus De Haan, 1833	-	-	+
	Cycloachelous granulatus (H. Milne Edwards, 1834)	+	-	-
	Portunus (Portunus) sanguinolentus (Herbst,	-	-	+

	1783)			
	Thalamita crenata Rüppell, 1830	-	-	+
	Thalamita dakini Montgomery, 1931	-	-	+
Tetraliidae	*Tetralia cavimana* Heller, 1861	-	+	+
Trapeziidae	*Trapezia cymodoce* (Herbst, 1801)	-	+	+
	Trapezia tigrina Eydoux & Souleyet, 1842	-	+	+
Pseudoziidae	*Pseudozius caystrus* (Adams & White, 1849)	+	+	+
Goneplacidae	*Litocheira integra* Miers, 1884	-	-	+
Xanthidae	*Atergatis latissimus* (H. Milne Edwards, 1834)	-	-	+
	Xanthias sinensis (A. Milne-Edwards, 1867)	-	+	+
	Leptodius exaratus (H. Milne Edwards, 1834)	+	+	+
	Leptodius gracilis (Dana 1852)	-	+	-
	Lachnopodus subacutus (Stimpson 1858)	-	+	+
	Macromedaeus quinquedentatus (Krauss, 1843)	-	-	+
	Macromedaeus crsssimsnus (A. Milne Edwards 1867)	-	+	-
	Macromedaeus quinquedentatus (Krauss, 1843)	-	+	-
	Medaeops neglectus (Balss 1922)	-	+	+
	Nanocassiope alcocki (Rathbun 1902)	-	+	-
	Zozymodes cavipes (Dana, 1852)	-	+	+
	Zozymodes xanthoides (Krauss 1843)	-	+	+
	Nanocassiope alcocki (Rathbun, 1902)	-	-	+
	Cymo andreossyi (Audouin, 1826)	-	+	+
	Cymo melanodactylus Dana, 1852	-	+	+
	Lophozozymus anaglyptus (Heller, 1861)	+	+	+
	Psaumis cavipes (Dana, 1852)	-	+	+
	Luniella spinipes (Heller, 1861)	-	+	+
	Lybia quamos Barnard, 1946	-	+	+
	Cyclodius granulatus (Targioni-Tozzetti, 1877)	-	+	+
	Actaea polyacantha (Heller, 1861)	-	-	+
	Liomera cinctimsna (White 1847)	-	+	+
	Liomers mgsts (H. Milne Edwards 1834)	-	+	-
	Liomera rugata (H. Milne Edwards, 1834)	-	-	+
	Actses polyscsnths (Heller 1861)	-	+	-
	Actaeodes tomentosus (H. Milne Edwards, 1834)	-	+	+
	Paractaea rufopunctata (H. Milne Edwards 1834)	-	+	+
	Chlorodiella nigra (Forskål, 1775)	-	+	-
	Chlorodiella cytherea (Dana, 1852)	-	+	+
	Pilodius areolatus (H. Milne Edwards, 1834)	-	+	+
	Gaillardiellus orientalis (Odhner, 1925)	-	-	+
	Etisus laevimanus Randall, 1840	-	-	+
	Etisus anaglyptus H. Milne Edwards, 1834	-	-	+
	Etisus snaglyptus H. Milne Edwards 1834	-	+	-
	Etisus electra (Herbst 1801)	-	+	+

	Epiactaea margaritifera (Odhner, 1925)	-	+	+
Grapsidae	*Grapsus albolineatus* Latreille in Milbert, 1812	+	-	+
	Grapsus tenuicrustatus (Herbst, 1783)	+	-	-
	Hemigrapsus longitarsis Dana, 1851	-	-	+
	Metopograpsus messor (Forskål, 1775)	-	-	+
	Geograpsus stormi De Mann, 1895	-	-	+
Varunidae	*Cyclograpsus integer* H. Milne Edwards, 1837	-	-	+
	Thalassograpsus harpax (Hilgendorf, 1892)	-	-	+
Sesarmidae	*Nanosesarma minutum* (De Man, 1887)	-	-	+
Gecarcinidae	*Cardisoma carnifex* (Herbst, 1796)	-	-	+
Plagusiidae	*Plagusia quamosal* (Herbst, 1790)	+	-	+
Dotillidae	*Dotilla sulcata* (Forskål, 1775)	+	-	-
Macrophthalmidae	*Macrophthalmus (Mareotis) depressus* Rüppell, 1830	-	-	+
	Chaenostoma boscii (Audouin, 1826)	-	-	+
	Macrophthalmus (Macrophthalmus) indicus Davie, 2012	+	-	-
Ocypodidae	*Ocypode jousseaumei* (Nobili, 1906)	-	-	+
	Ocypode saratan (Forskål, 1775)	+	-	+
	Ocypode platytarsis H. Milne Edwards, 1852	-	-	+
	Ocypode rotundata (Miers, 1882)	-	-	+
	Ocypode cordimana Latreille, 1818	-	-	+
	Austruca albimana (Kossmann, 1877)	+	-	-
	Cranuca inversa (Hoffmann, 1874)	-	-	+
Pinnotheridae	Pinnotheridae gen. sp.	-	-	+

Table 14: Shows all brachyuran crabs which were recorded in Yemeni coastal waters (Red Sea, Gulf of Aden, Arabian Sea, Socotra Islands) in the present study* compared to records from previous studies** as listed in tables 10-13. Present (+) and absent (-).

Family	Taxon	*	**
Dromiidae	*Lauridromia dehaani* (Rathbun, 1923)	+	-
	Epigodromia granulata (Kossman, 1878)	+	-
	Cryptodromia fallax (Latreille in Milbert, 1812)	+	-
	Cryptodromia hilgendorfi De Man, 1888	-	+
	Cryptodromia pentagonalis (Hilgendorf, 1879)	-	+
	Ascidiophilus caphyraeformis Richters, 1880	+	-
	Lewindromia unidentata (Rüppell, 1830)	+	-
Raninidae	*Notosceles serratifrons* (Henderson, 1893)	+	-
Carpiliidae	*Carpilius convexus* (Forskål, 1775)	+	-
Calappidae	*Calappa hepatica* (Linnaeus, 1758)	+	-
	Calappa capellonis Laurie, 1906	+	-
	Calappa gallus (Herbst, 1803)	+	-
	Calappa philargius (Linnaeus, 1758)	+	-
	Calappa dumortieri Guinot, 1962	-	+
	Mursia bicristimana Alcock & Anderson, 1894	+	-
Matutidae	*Ashtoret lunaris* (Forskål, 1775)	+	-
	Ashtoret picta (Hess, 1865)	+	-
	Matuta victor (Fabricius, 1781)	-	+
Dorippidae	*Dorippe frascone* (Herbst, 1785)	+	-
Eriphiidae	*Eriphia smithii* MacLeay, 1838	+	-
	Eriphia sebana (Shaw & Nodder, 1803)	+	-
Oziidae	*Epixanthus frontalis* (H. Milne Edwards, 1834)	+	-
	Epixanthus corrosus A. Milne-Edwards, 1873	+	-
	Lydia tenax (Rüppell, 1830)	+	-
	Lydia annulipes (H. Milne-Edwards 1834)	-	+
Menippidae	*Menippe rumphii* (Fabricius, 1798)	+	-
Leucosiidae	*Coleusia biannulata* Tyndale-Biscoe & George, 1962	+	-
	Coleusia signata (Paul'son, 1875)	-	+
	Leucosia anatum (Herbst, 1783)	+	-
	Leucosia corallicola Alcock, 1896	-	+
	Hiplyra variegata (Rüppell, 1830)	+	-
	Hiplyra platycheir (De Haan, 1841	-	+
	Philyra granigera Nobili, 1906	+	-
	Ebalia abdominalis Nobili, 1906	+	-
	Nobiliella jousseaumei (Nobili, 1906)	+	-
	Nucia tuberculosa A. Milne-Edwards, 1874	-	+
	Ryphila cancellus (Herbst, 1783)	+	-
	Philyra cf. globus (Fabricius, 1775)	+	-

	Nursilia dentata Bell, 1855	+	-
	Cryptocnemus cf. pentagonus Stimpson, 1858	+	-
	Leucisca rubifera (Müller, 1887)	+	-
	Arcania gracilis Henderson, 1893	+	-
	Ixa holthuisi Tirmizi, 1970	+	-
	Urnalana pulchella (Bell, 1855)	-	+
	Myra subgranulata Kossmann, 1877	+	-
	Arcania cf. tuberculata Bell, 1855	+	-
	Arcania undecimspinosa de Haan, 1841	+	-
Epialtidae	*Acanthonyx limbatus* A. Milne-Edwards, 1862	+	-
	Cyphocarcinus minutus A. Milne Edwards, 1868	-	+
	Stilbognathus cervicornis (Herbst, 1803)	+	-
	Stilbognathus erythraeus von Martens, 1866	-	+
	Tylocarcinus styx (Herbst, 1803)	+	-
	Huenia heraldica (De Haan, 1837)	+	-
	Huenia grandidierii A. Milne-Edwards, 1865	-	+
	Simocarcinus simplex (Dana, 1851)	+	-
	Simocarcinus pyramidatus (Heller, 1861)	-	+
	Hyastenus hilgendorfi De Man, 1887	+	-
	Hyastenus brockii de Man, 1887	+	-
	Menaethius monoceros (Latreille, 1825)	+	-
	Menaethius orientalis (Sakai, 1969)	-	+
	Menaethiops contiguicornis (Klunzinger, 1906)	-	+
	Menaethiops nodulosa (Nobili)	-	+
	Menaethiops sp. [aff. fascicularis (Krauss, 1843)]	-	+
Majidae	*Schizophrys aspera* H. Milne Edwards, 1834	+	-
	Micippa platipes Rüppell, 1830	+	-
	Micippa thalia (Herbst, 1803)	-	+
	Pseudomicippe griffini Kazmi & Tirmizi, 1999	-	+
	Seiitaoides cf. stimpsonii (Miers, 1884)	+	-
	Cyclax spiniciactus Heller, 1861	+	-
	Majidae.gen. sp. 1	+	-
Inachidae	*Sunipea indicus* (Alcock, 1895)	+	-
	Cyrtomaia cf. goodridgei McArdle, 1900	+	-
	Camposcia retusa (Latreille, 1829)	+	-
	Macropodia formosa Rathbun, 1911	+	-
	Inachus dorsettensis (Pennant, 1777)	+	-
Pseudoziidae	*Pseudozius caystrus* (Adams & White, 1849)	+	-
Parthinopidae	*Daldorfia horrida* (Linnaeus, 1758)	+	-
	Aethra scruposa (Linnaeus, 1764)	+	-
	Daldorfia spinosissima (A. Milne-Edwards, 1862)	+	-
	Parthenope longimanus (Linnaeus, 1758)	+	-
	Furtipodia petrosa (Klunzinger, 1906)	+	-

	Rhinolambrus longispinus (Miers, 1879)	+	-
	Rhinolambrus pelagicus (Rüppell, 1830)	-	+
	Aulacolambrus granulosus (Miers, 1879)	+	-
	Aulacolambrus hoplonotus (Adams & White, 1849)	+	-
Pilumnidae	*Eurycarcinus orientalis* A. Milne-Edwards, 1867	+	-
	Eurycarcinus integrifrons de Man, 1879	+	-
	Pilumnus vespertilio (Fabricius, 1793)	+	-
	Pilumnus minutus De Haan, 1835	+	-
	Pilumnus eudaemoneus Nobili, 1906	-	+
	Pilumnus propinquus Nobili, 1906	+	-
	Glabropilumnus levimanus (Dana, 1852)	+	-
	Pilumnopeus convexus (Maccagno, 1936)	+	-
	Pilumnus incanus (Forskål, 1775)	+	-
	Planopilumnus spongiosus (Nobili, 1906)	-	+
	Pseudactumnus pestae Balss, 1933	-	+
	Heteropilumnus trichophoroides de Man, 1895	-	+
	Heteropilumnus lanuginosus (Klunzinger, 1913)	-	+
	Actumnus tesselatus Alcock, 1898	+	-
	Actumnus asper (Rüppell, 1830)	+	-
	Actumnus setifer (De Haan, 1835)	-	+
	Pilumnus savignyi Heller, 1861	+	-
	Echinoecus pentagonus (A. Milne-Edwards, 1879)	+	-
	Calocarcinus africanus Calman, 1909	-	+
Galenidae	*Halimede tyche* (Herbst, 1801)	+	-
Portunidae	*Charybdis (Goniohellenus) smithii* MacLeay, 1838	+	-
	Charybdis (Goniohellenus) omanensis Leene 1938	-	+
	Charybdis (Charybdis) feriata (Linnaeus, 1758)	+	-
	Charybdis (Charybdis) natator (Herbst, 1794)	+	-
	Charybdis (Charybdis) orientalis Dana, 1852	+	-
	Charybdis (Charybdis) annulata (Fabricius, 1798)	+	-
	Charybdis (Charybdis) hellerii (A. Milne-Edwards, 1867)	+	-
	Charybdis (Goniohellenus) longicollis Leene, 1938	+	-
	Gonioinfradens giardi (Nobili, 1906)	-	+
	Podophthalmus vigil (Weber, 1795)	-	+
	Lissocarcinus laevis Miers 1886	-	+
	Lupocyclus tugelae Barnard 1950	-	+
	Portunus (Portunus) segnis (Forskål, 1775)	+	-
	Portunus (Xiphonectes) alcocki (Nobili, 1906)	-	+
	Portunus (Xiphonectes) iranjae Crosnier, 1962	-	+
	Portunus (Xiphonectes) tenuicaudatus Stephenson, 1961	-	+
	Portunus (Xiphonectes) arabicus (Nobili, 1906)	+	-
	Portunus (Xiphonectes) tuberculosus (A. Milne-Edwards, 1861)	-	+

	Cycloachelous orbitosinus (Rathbun, 1911)	+	-
	Cycloachelous granulatus (H. Milne Edwards, 1834)	+	-
	Xiphonectes alcocki (Nobili, 1906)	-	+
	Portunus argentatus (A. Milne-Edwards 1861)	-	+
	Portunus convexus De Haan, 1833	-	+
	Portunus pubescens (Dana 1852)	-	+
	Portunus (Monomia) euglyphus (Laurie, 1906)	-	+
	Portunus (Xiphonectes) hastatoides Fabricius, 1798	-	+
	Portunus (Portunus) sanguinolentus (Herbst, 1783)	+	-
	Portunus (Xiphonectes) longispinosus (Dana, 1852)	+	-
	Portunus (Xiphonectes) guinotae Stephenson & Rees, 1961	+	-
	Portunus (Achelous) dubius (Laurie, 1906)	-	+
	Scylla serrata (Forskål, 1775)	+	-
	Carupa tenuipes Dana, 1852	+	-
	Thalamita crenata Rüppell, 1830	+	-
	Thalamita prymna (Herbst, 1803)	+	-
	Thalamita cf. integra Dana, 1852	-	+
	Thalamita iranica Stephensen, 1946	-	+
	Thalamita spinifera Borradaile, 1902	-	+
	Thalamita admete (Herbst, 1803)	+	-
	Thalamita auaensis Rathbun 1906 ssp. margaritimana Rathbun 1911	-	+
	Thalamita philippinensis Stephenson & Rees 1967 ssp.	-	+
	Thalamita poissonii (Audouin, 1826)	+	-
	Thalamita mitsiensis Crosnier, 1962	+	-
	Thalamita sexlobata Miers, 1886	+	-
	Thalamita bandusia Nobili, 1906	+	-
	Thalamita gatavakensis Nobili, 1906	+	-
	Thalamita cf. crosnieri Vannini 1983	+	-
	Thalamita quadrilobata Miers, 1884	+	-
	Thalamita savignyi A. Milne-Edwards, 1861	+	-
	Thalamita foresti Crosnier, 1962	-	+
	Thalamita indistincta Apel & Spiridonov, 1998	-	+
	Thalamita sp.	+	-
	Thalamita cf. stephensoni Crosnier 1962	+	-
	Thalamita aff. exetastica Alcock 1899	-	+
	Thalamita chaptalii (Audouin, 1826)	+	-
	Thalamita woodmasoni Alcock, 1899	+	-
	Thalamitoides tridens A. Milne Edwards, 1869	-	+
Potamidae	*Socotrapotamon socotrensis* (Hilgendorf, 1883)	+	-
	Socotrapotamon nojidensis Apel & Brandis, 2000	-	+
	Socotra pseudocardiosoma Cumberlidge & Wranik, 2002	-	+
Hexapodidae	*Hexapinus simplex* Rahayu & Ng, 2014	+	-

Trapeziidae	*Trapezia cymodoce* (Herbst, 1801)	+	-
	Trapezia tigrina Eydoux & Souleyet, 1842	+	-
	Trapezia rufopunctata (Herbst, 1799)	-	+
	Quadrella coronata Dana, 1852	+	-
	Calocarcinus africanus Calman, 1909	-	+
Tetraliidae	*Tetraloides nigrifrons* (Dana, 1852)	+	-
	Tetralia cavimana Heller, 1861	+	-
	Tetralia glaberrima (Herbst, 1790	-	+
	Tetralia muta (Linnaeus, 1758)	-	+
Euryplacidae	*Eucrate crenata* (De Haan, 1835)	-	+
Xanthidae	*Atergatis integerrimus* (Lamarck, 1818)	+	-
	Atergatis latissimus (H. Milne Edwards, 1834)	+	-
	Atergatis granulatus de Man, 1889	-	+
	Atergatopsis granulata A. Milne-Edwards, 1865	+	-
	Atergatopsis alcocki (Laurie 1906)	-	+
	Paractaeopsis quadriareolatus (Takeda & Miyake, 1968)	-	+
	Demania mortenseni (Odhner, 1925)	+	-
	Etisus laevimanus Randall, 1840	+	-
	Etisus anaglyptus H. Milne Edwards, 1834	-	+
	Etisus electra (Herbst, 1801)	-	+
	Xanthias sinensis (A. Milne-Edwards, 1867)	+	-
	Xanthias punctatus (H. Milne Edwards, 1834)	-	+
	Xanthias cf. canaliculatus Rathbun, 1906	+	-
	Paraxanthodes cumatodes (Macgilchrist, 1905)	-	+
	Lybia plumosa Barnard, 1946	+	-
	Platypodia cf. pseudogranulosa Serène, 1984	+	-
	Platypodia cristata (A. Milne-Edwards, 1865)	-	+
	Leptodius exaratus (H. Milne Edwards, 1834)	+	-
	Leptodius sanguineus (H. Milne-Edwards 1834)	-	+
	Leptodius gracilis (Dana, 1852)	-	+
	Macromedaeus crassimanus (A. Milne-Edwards 1867)	-	+
	Macromedaeus voeltzkowi (Lenz, 1905)	+	-
	Forestiana depressa (White, 1848)	+	-
	Hypocolpus diverticulatus (Strahl, 1861)	-	+
	Hypocolpus cf. guinotae Vannini, 1982	+	-
	Neoliomera sabaea (Nobili, 1906)	+	-
	Neoliornera nobilìi Odhner, 1925	-	+
	Neoliomera pubescens (H. Milne Edwards, 1834)	-	+
	Pseudoliomera granosimana (A. Milne-Edwards, 1865)	-	+
	Neoxanthops lineatus (A. Milne-Edwards, 1867)	+	-
	Neoxanthias impressus (Lamarck 1818)	-	+
	gen. sp. 1	+	-
	gen. sp. 2	+	-

	gen. sp. 3	+	-
	Chlorodiella laevissima (Dana, 1852)	+	-
	Chlorodiella nigra (Forskål, 1775)	+	-
	Liocarpilodes harmsi (Balss 1934)	-	+
	Cyclodius granulatus (Targioni-Tozzetti, 1877)	+	-
	Cyclodius paumotensis (Rathbun, 1907)	-	+
	Cyclodius nitidus (Dana, 1852)	-	+
	Cyclodius drachi (Guinot, 1964)	-	+
	Cyclodius ungulatus (H. Milne Edwards, 1834)	-	+
	Zosimus aeneus (Linnaeus, 1758)	+	-
	Psaumis cavipes (Dana, 1852)	-	+
	Zozymodes pumilus (Jacquinot 1852)	-	+
	Zozymodes xanthoides (Krauss, 1843)	-	+
	Zozymodes cavipes (Dana, 1852)	-	+
	Glyptoxanthus meandrinus (Klunzinger, 1913)	+	-
	Actaea cf. bocki Odhner, 1925	+	-
	Actaea savignii (H. Milne Edwards, 1834)	+	-
	Actaea jacquelinae Guinot, 1976	+	-
	Actaea cf. spinosissima Borradaile 1902	-	+
	Actaea sabae Nobili, 1906	-	+
	Actaea flosculata Alcock, 1898	-	+
	Banareia banareias (Rathbun, 1911)	-	+
	Gaillardiellus rueppelli (Krauss, 1843)	-	+
	Actaeodes hirsutissimus (Rüppell, 1830)	+	-
	Actaeodes tomentosus (H. Milne Edwards, 1834)	+	-
	Paractaea rufopunctata (H. Milne Edwards, 1834)	+	-
	Epiactaea margaritifera (Odhner, 1925)	+	-
	Lophozozymus anaglyptus (Heller, 1861)	+	-
	Lophozozymus dodone (Herbst 1801)	-	+
	Lophozozymus guezei Guinot 1977	-	+
	Pilodius areolatus (H. Milne Edwards, 1834)	+	-
	Cymo andreossyi (Audouin, 1826)	+	-
	Cymo quadrilobatus Miers, 1884	+	-
	Cymo melanodactylus Dana, 1852	+	-
	Cymo deplanatus A. Milne Edwards 1873	-	+
	Liomera rubra (A. Milne-Edwards, 1865)	+	-
	Liomera margaritata (A. Milne-Edwards, 1873)	-	+
	Liomera rugata (H. Milne Edwards, 1834)	-	+
	Liomera laevis (A. Milne-Edwards, 1873)	-	+
	Pseudoliomera speciosa (Dana 1852)	-	+
	Pseudoliomera helleri (A. Milne-Edwards 1865)	-	+
	Pseudoliomera remota (Rathbun, 1907)	-	+
	Lachnopodus subacutus (Stimpson 1858)	-	+

	Luniella spinipes (Heller, 1861)	+	-
Grapsidae	*Grapsus albolineatus* Latreille in Milbert, 1812	+	-
	Grapsus tenuicrustatus (Herbst, 1783)	+	-
	Grapsus granulosus H. Milne Edwards, 1853	+	-
	Grapsus longitarsus Dana, 1851	-	+
	Metopograpsus messor (Forskål, 1775)	+	-
	Metopograpsus thukuhar (Owen, 1839)	+	-
	Geograpsus crinipes (Dana, 1851)	+	-
	Pachygrapsus minutus A. Milne-Edwards, 1873	-	+
Varunidae	*Thalassograpsus harpax* (Hilgendorf, 1892)	+	-
Plagusiidae	*Percnon planissimum* (Herbst, 1804)	+	-
	Percnon guinotae Crosnier, 1965	-	+
	Plagusia squamosa (Herbst, 1790)	+	-
Gecarcinidae	*Cardisoma carnifex* (Herbst, 1796)	-	+
Sesarmidae	Perisesarma guttatum (A. Milne-Edwards, 1869)	+	-
Macrophthalmidae	*Ilyograpsus paludicola* (Rathbun, 1909)	+	-
	Macrophthalmus (Macrophthalmus) sulcatus H. Milne Edwards, 1852	+	-
	Macrophthalmus (Macrophthalmus) grandidieri A. Milne-Edwards, 1867	+	-
	Macrophthalmus (Mareotis) depressus Rüppell, 1830	+	-
	Macrophthalmus (Macrophthalmus) graeffei A. Milne-Edwards, 1873	+	-
	Macrophthalmus (Macrophthalmus) serenei Takeda & Komai, 1991	+	-
	Macrophthalmus (Macrophthalmus) brevis (Herbst, 1804)		+
	Macrophthalmus (Macrophthalmus) indicus Davie, 2012	+	-
	Chaenostoma boscii (Audouin, 1826)	+	-
	Macrophthalmus (Mareotis) laevis A. Milne-Edwards, 1867	+	-
	Chaenostoma sinuspersici (Naderloo & Türkay, 2011)	+	-
Dotillidae	*Dotilla sulcata* (Forskål, 1775)	+	-
Camptandriidae	*Serenella leachii* (Audouin, 1826)	+	-
Ocypodidae	*Ocypode saratan* (Forskål, 1775)	+	-
	Ocypode cordimana Latreille, 1818	+	-
	Ocypode jousseaumei (Nobili, 1906)	+	-
	Ocypode ryderi Kingsley, 1880	-	+
	Ocypode cf. rotundata Miers, 1882	-	+
	Austruca albimana (Kossmann, 1877)	+	-
	Cranuca inversa (Hoffmann, 1874)	+	-
	Gelasimus hesperiae (Crane, 1975)	+	-
	Gelasimus tetragonon (Herbst, 1790)	-	+
Pinnotheridae	*Arcotheres borradailei* Nobili, 1906	-	+

Appendix IV: The figures

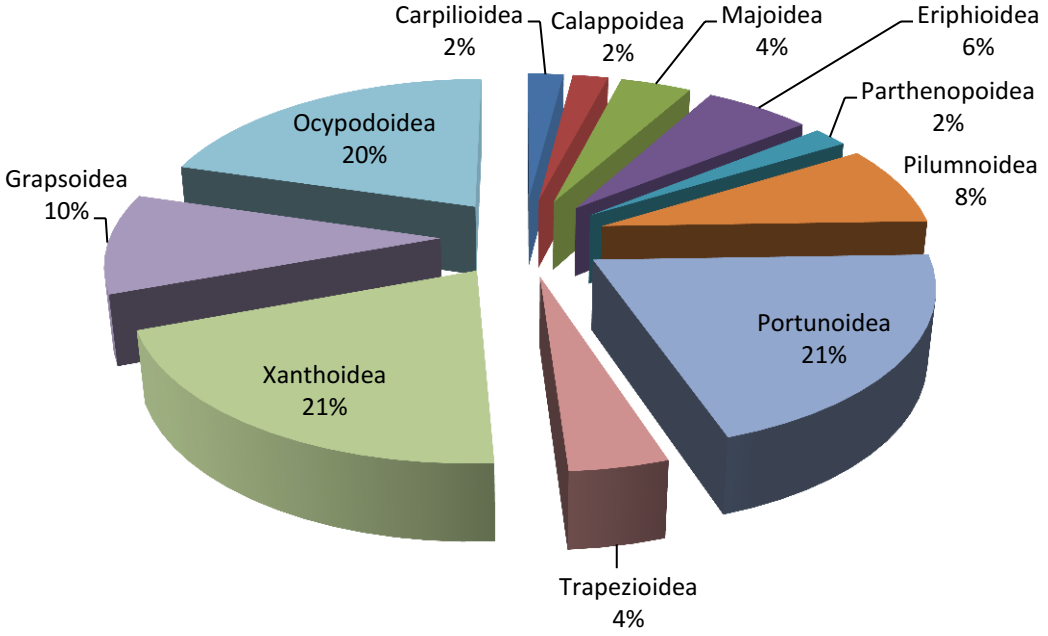

Fig. 34: Shows all the superfamilies with percentage of the number of species in the Red Sea by Krupp et al (2006) study.

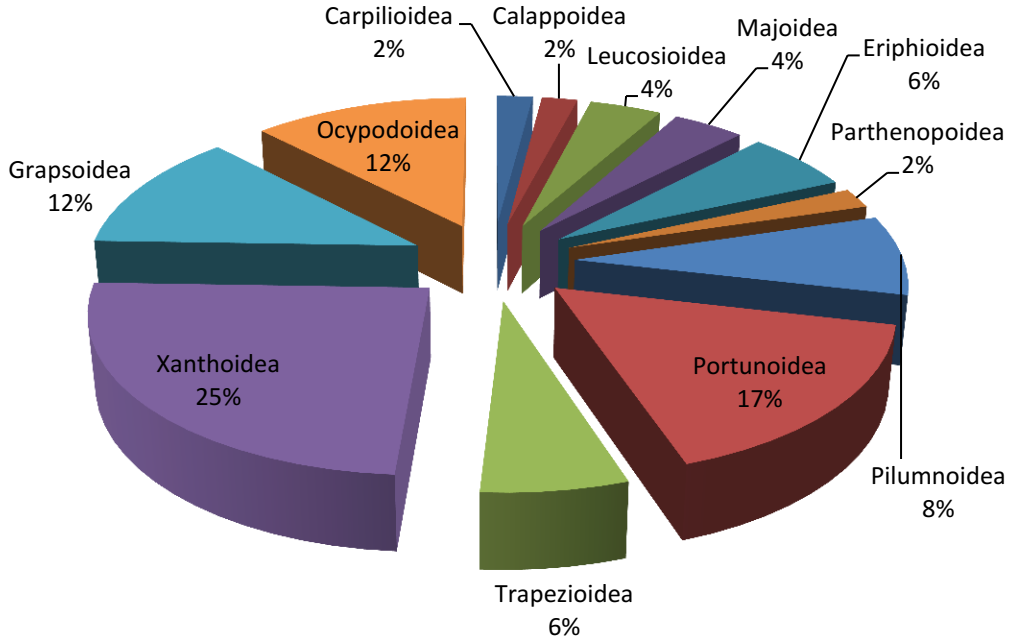

Fig. 35: Shows all the superfamilies with percentage of the number of species in the Red Sea by the present study.

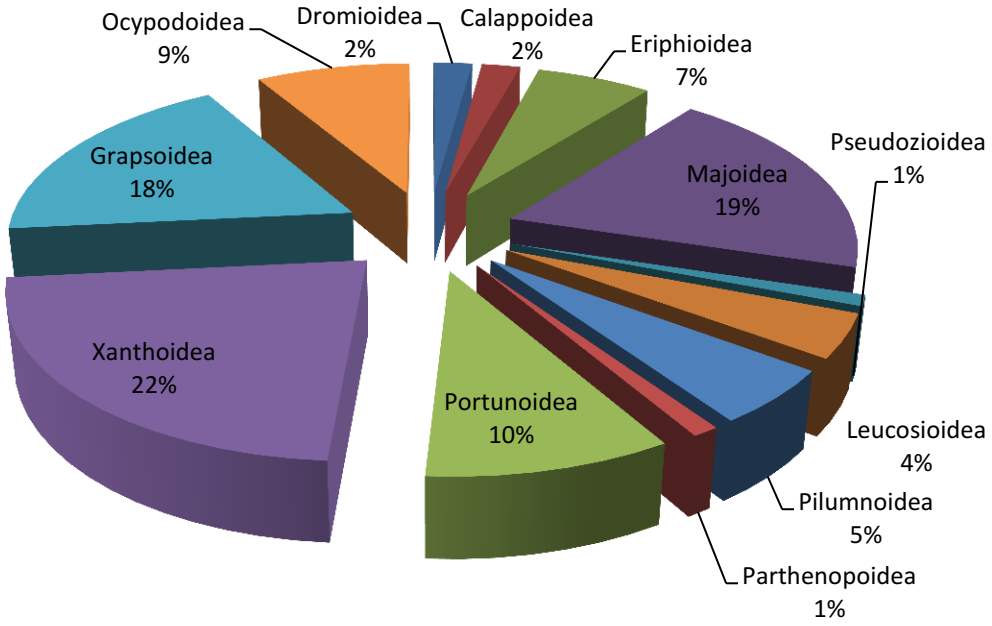

Fig. 36: Shows all the superfamilies with percentage of the number of species in Socotra Island by Simões *et al* (2001) study.

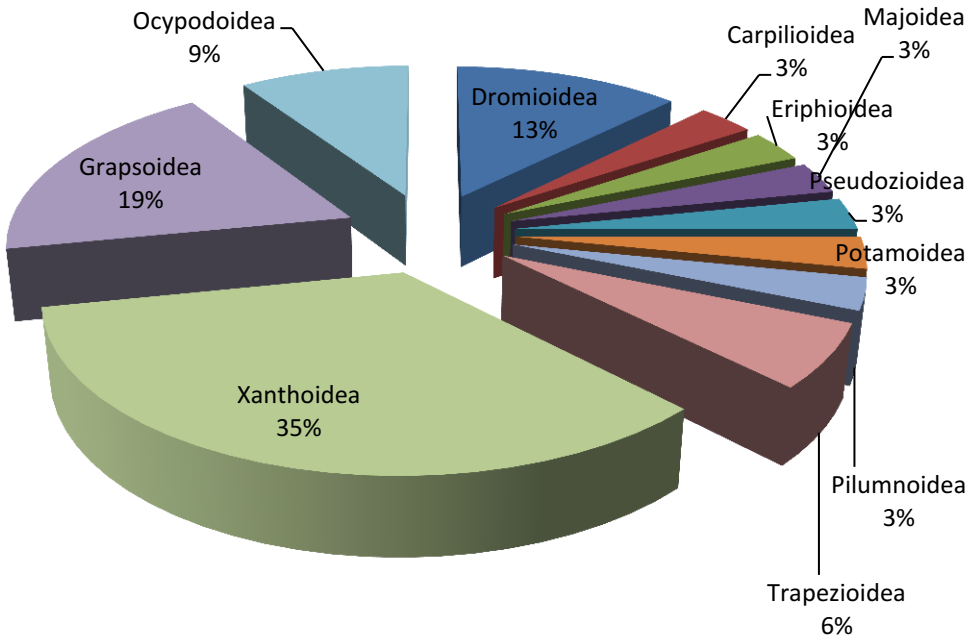

Fig. 37: Shows all the superfamilies with percentage of the number of species in Socotra Islands by the present study.

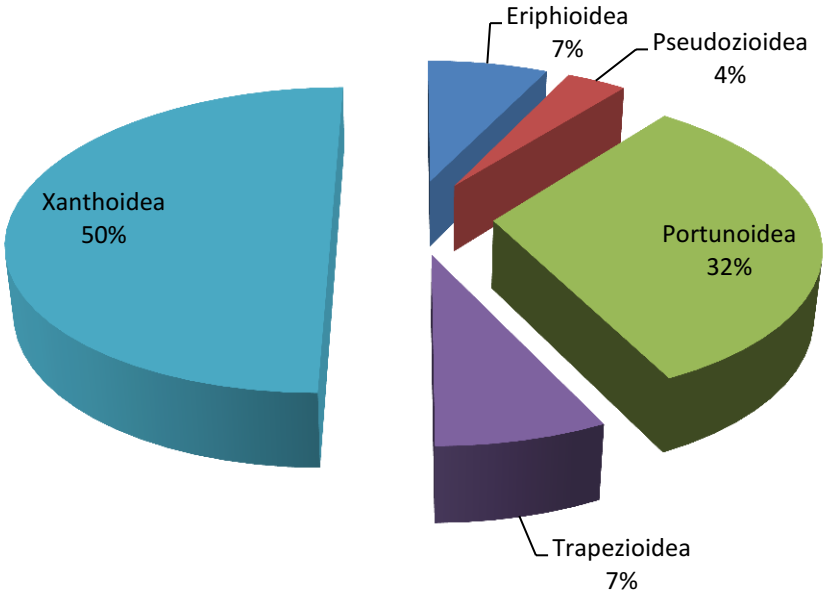

Fig. 38: Shows all the superfamilies with percentage of the number of species in Gulf of Aden by Neumann & Spiridonov (1999).

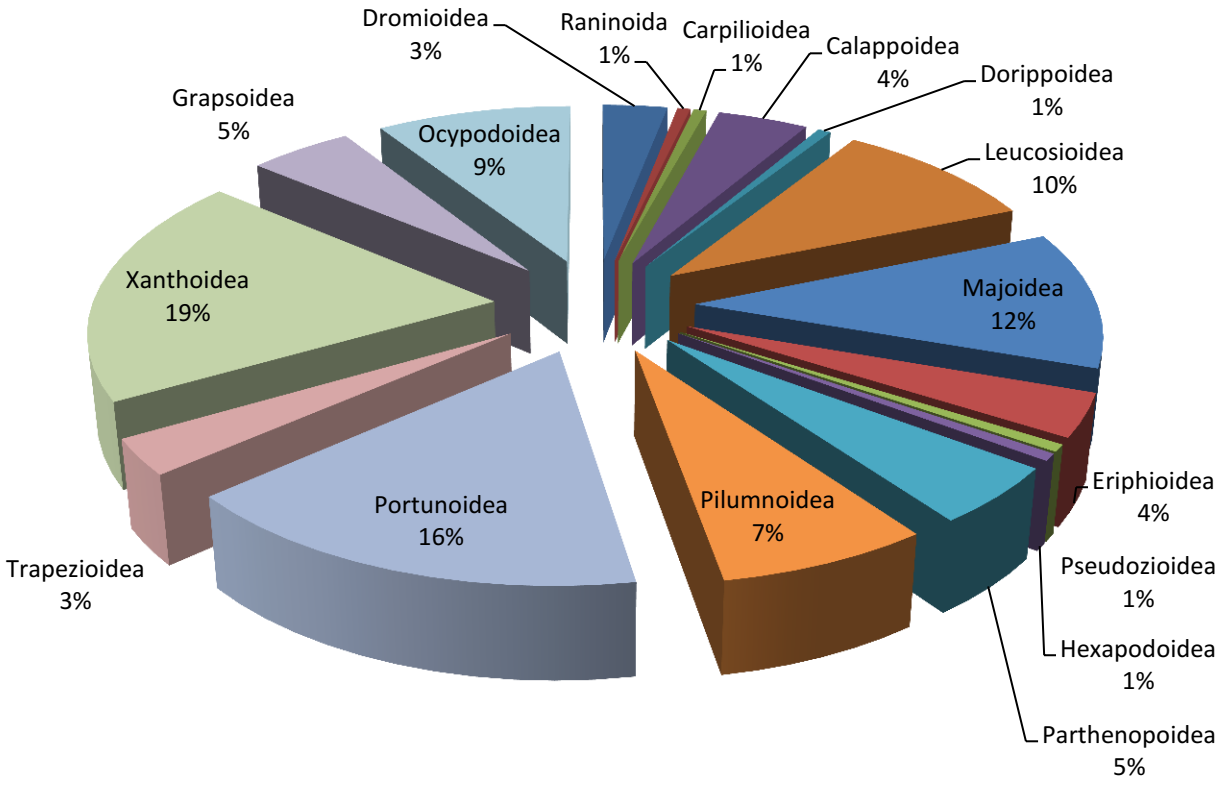

Fig. 39: Shows all the superfamilies with percentage of the number of species in Gulf of Aden by the present study.

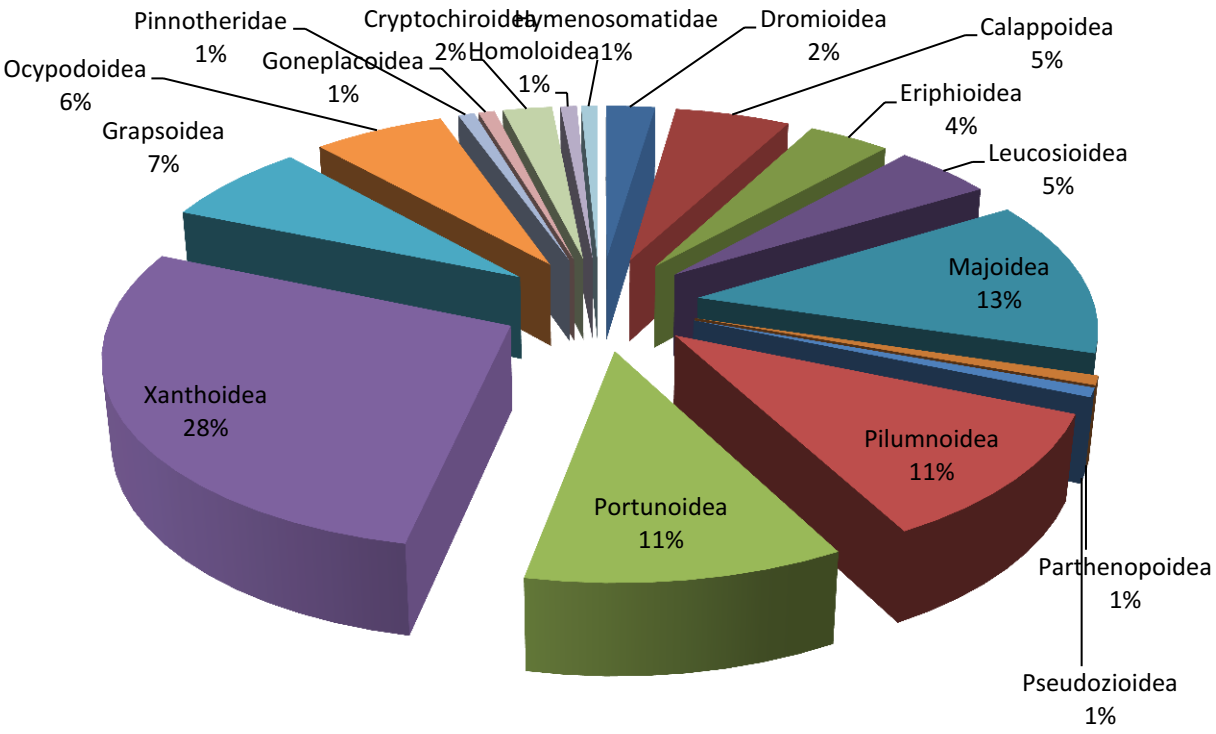

Fig. 40: Shows all the superfamilies with percentage of the number of species in Arabian Sea coasts in Dhofar Province, southern Oman by Hogarth (1994) and Khvorov *et al.* (2012) studies.

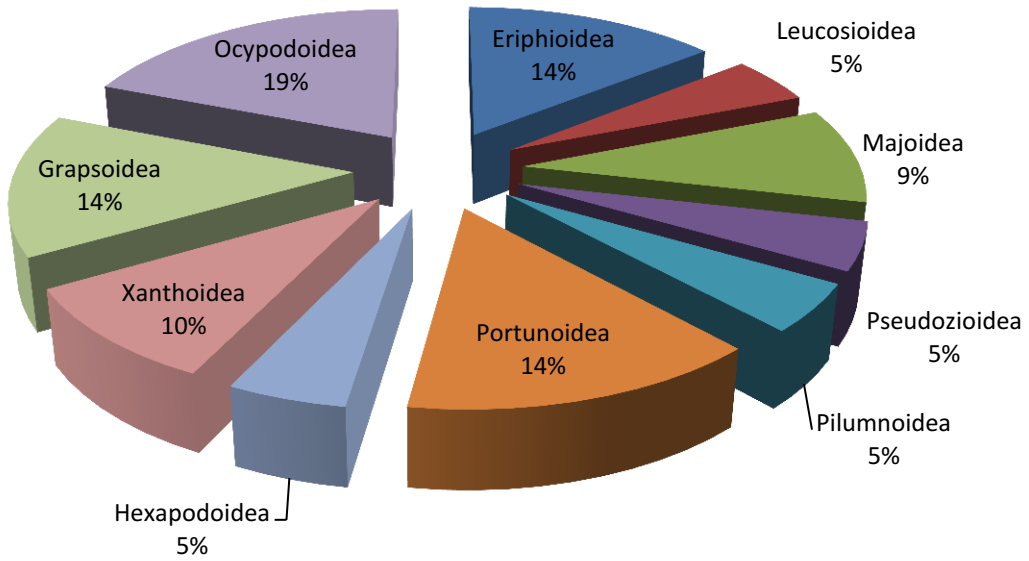

Fig. 41: Shows all the superfamilies with percentage of the number of species in Yemeni coasts at Arabian Sea in the present study.