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Hubert BLATTERER

Mollusca of the Dahab region

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# Mollusca
## of the Dahab region



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**Umschlag vorne [Cover front]**
Gastropoda silhouette filled with shells from the Dahab region.

**Umschlag hinten [Cover back]**
back Coastline of Dahab with designation of the dive sites.



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## Abstract English

The molluscan fauna of the Dahab region was studied during 13 visits between 2003 and 2018. Initially this effort was to provide students and researchers with a reference collection of this region. In 2009 the macro-molluscan records had reached 470 different species. After taking the first 100 ml sediment sample which was searched for microscopic shells this number increased to almost 600. In total 11.2 litres of sand were sampled from different locations throughout the Dahab region. Altogether 1066 molluscan species including 781 Gastropoda, 250 Bivalvia, 16 Polyplacophora, 12 Cephalopoda and 7 Scaphopoda were found. This accounts for approximately half of the species currently known from the entire Red Sea.

In addition to species identification a comprehensive discussion is given, focusing on difficult families and small species (microshells) which are often neglected in other shell books. Photographic evidence is provided through more than 4570 images on 225 plates and over 320 in situ photographs of living animals and their habitats which makes Dahab the best documented place in the Red Sea concerning the diversity of the molluscan fauna.

## Abstract Arabic (by Gottfried TICHY)

نبذة مختصرة

تمت دراسة حيوانات الرخوية في منطقة دهب خلال ثلاثة عشر زيارة دامت بين عامي ألفين وثلاثة عشر و ألفين وثمانية عشر

في البداية كان هذا الجهد عبارة عن تزويد الطلاب والباحثين بمجموعة من المعلومات والأبحاث عن هذه المنطقة

وفي سنة ألفين وتسعة وصلت السجلات عن الرخويات بأجمعها إلى أربعمائة وسبعون نوعاً مختلفا

بعد أخذ أول عينة من الرواسب من مئة مل غرام والتي تم البحث فيها عن الأصداف المجهرية ارتفع العدد إلى حوالي ستمائة نوعاً

ثم تم أخذ عينات من إحدى عشر فاصلة اثنان لتر من الرمال من مواقع مختلفة من جميع أنحاء منطقة دهب تم العثور على ألف وستة وستون نوعاً من الرخويات بما في ذلك سبعمائة وإحدى وثمانين نوعاً من أنواع الأخطبوط ومئتان وخمسون نوعاً من أنواع الصدف وستة عشر نوعاً من أنواع الحلزون واثنا عشر نوعاً من أنواع رأسيات الأرجل وسبعة نوعاً من أنواع الأصداف النابية

وهذا يمثل حوالي نصف مجموع الأنواع المعروفة في بحر الأحمر بأكمله

بالإضافة إلى تحديد هذه الأنواع يتم إجراء أبحاث شاملة لتلك الرخويات التي لانعرف إلى أي مجموعة تنتمي وإلى الأنواع الصغيرة التي لاتتجاوز حجمها ثمان ميليم التي غالباً مايتم ذكرها في كتب الأصداف الأخرى

يتم توفير الأدلة التصويرية من خلال أكثر من أربع آلاف وسبعون صورة وعلى مئتان وخمس وعشرون لوحة وأكثر من ثلاث مئة وعشرون صورة في موقع للحيوانات الحية وأنواعها وهذا مايجعل دهب من أهم وأفضل المواقع الموثوقة في بحر الأحمر فيما يتعلق بتنوع حيوانات الرخوية.

## Abstract Hebrew (by Jacob DAFNI)

תקציר

הרכיכות (Mollusca) של אזור דהב נחקרו ונדגמו ב-13 ביקורים בשנים 2003-2008. מלכתחילה הייתה הכוונה להציג לסטודנטים אוסף מייצג של אזור המחקר - מזרח סיני, בצפון ים סוף. עד שנת 2009 נרשמו 470 מינים שונים של מה שניתן להגדיר מאקרו-מולוסקה.

לאחר הוספת מדגמים בגודל 100 מ"ל כל אחד של קונכיות מיקרוסקופיות גדל מספרם לכמעט 600 מינים, לאחר שנדגמו בסך הכל 11.2 ליטר של חול ממקומות שונים באזור דהב. בסך הכל נמצאו 1066 מיני רכיכות מהם 781 הם חלזונות (Gastropoda), 250 צדפות (Bivalvia), 16 כיטונים (Polyplacophora)) , 12 ראש-רגליים (Cephalopoda) ו – 7 מיני שנהביות (Scaphopoda), כמחצית מן המינים שנרשמו עד כה מים סוף (Red Sea) כולו.

בנוסף להגדרת המינים מתקיים בספר זה דיון מפורט, תוך התמקדות במשפחות קשות ובעייתיות, ומינים קטנים (Microshells) שלעתים קרובות נזכרים בספרי קונכיות אחרים. עדויות צילומיות מסופקות באמצעות יותר מ- 4570 צילומים על 225 לוחות (plates) ויותר מ- 320 צילומים באתרי המחייה של בעלי החיים ובתי הגידול האופייניים להם, מה שהופך את דהב למקום המתועד ביותר בים סוף, מבחינת המגוון של הרכיכות.

## Introduction

This book comprises molluscs found during thirteen visits to Dahab (Sinai, Egypt, Gulf of Aqaba, Red Sea) on the following dates: 16 February to 2 March 2003, 1 - 12 April 2005, 11 - 25 November 2007, 3 - 16 July 2008, 9 - 23 July 2009, 8 - 22 July 2010, 17 - 31 July 2011, 12 - 26 July 2012, 29 April to 5 May 2015, 16 - 29 July 2015, 15 - 28 July 2016, 8 - 18 April 2017 and from 12 - 26 January 2018.

The collection was initially conceived for the marine biology station SEC (Sinai Environmental Centre) founded by my dear friend Dr. Robert HOFRICHTER (Salzburg, Austria) and colleagues. Our collaboration partner Andy TISCHER was the owner of the diving school "Dive In Dahab" where the collection was initially located. Later the SEC and Andy TISCHER parted paths. HOFRICHTER's nongovernmental institution has since changed to RSEC (Red Sea Environmental Centre) and is still active in science, education and protection of marine life. http://www.fnz.at and http://www.redsea-ec.org/

The shell collection remained at the "DiveIn Company" in Dahab, which offered, among other things, public courses in marine biology, environmental conservation and hosted field courses from European universities and Egyptian academic institutions. The DiveIn Company was incorporated within the Dahab Association for Environmental Development (DAED).



The author in the Classroom of DMRC/DiveIn (July 2011).

About a year after the tragic death of Andy TISCHER on 27 July 2011, DiveIn, DMRC and DAED ended. His former partner Hans LANGE founded the new diving school at the Jawhara (Jewel) Hotel, Dahab called "iDive Dahab". Later the name changed to "Aquanautic Dahab", the basis for the private research centre "Open Ocean Science Centre" (OOSC) and the collection was relocated to this new place. A further non-governmental organization - EECAA (Egyptian Environmental Conservation and Awareness Association) was founded enabeling education, communication, ocean protection and scientific work.
https://aquanautic-dahab.com/
https://www.facebook.com/EECAA1/
https://www.facebook.com/OpenOceanProject/




Jawhara or Jewel Hotel in January 2018.



iDive Dahab which is now called Aquanautic Dahab.



The collection in the classroom of the Open Ocean Science Centre associated with Aquanautic Dahab (December 2012 by Hans LANGE).

The purpose of this effort is to provide students and researchers with a determination tool and reference collection for molluscs of the Dahab region. As only a few monographs were

available at the laboratory and my stay in Dahab was relatively brief, most of the work required by this project was done in Austria. Part of the collection and all micro-shells were transported to Austria to improve and complete determinations using high resolution photography and access to a broad range of literature. Please note that some photographs of shells from the Dahab collection and some collected rare specimens are not of optimal quality. The decision was made to include them rather than to provide no record at all.



Larger shells of the collection in the Open Ocean Science Centre.

Altogether 1066 molluscan species including 781 Gastropoda, 250 Bivalvia, 16 Polyplacophora, 12 Cephalopoda and 7 Scaphopoda were found. Several shells are new discoveries, others could not be identified or confirmed, even by specialists, due to incomplete or worn specimens or high taxonomic confusion especially in difficult and therefore often ignored families.



Smaller shells of the collection in the Open Ocean Science Centre.

### Additional trips to the Red Sea

From 15 - 29 October 1999, I joined a marine biology course to Aqaba (Jordan) which was organised by the Institute of Ecology and Conservation Biology of the University of Vienna, Austria. A previous established list of Mollusca (Blatterer et al. 2000) was incorporated into the present work due to the close geographic location. Determinations during the course in Aqaba were done by several persons, but some uncertainties remain. If a species is also available in my personal Aqaba-collection the corresponding reference is indicated in "Literature" for proof and comparison.

From 9 - 31 May 2007 and 17 April - 7 May 2009 I stayed in the Arkassia Hotel and the laboratory and field station of RSEC, respectively, both located in El Quseir. The molluscan species (100 Gastropoda, 50 Bivalvia, 5 Cephalopoda, 2 Polyplacophora, 1 Scaphopoda) which were recorded in the El Quadim Bay (2009) (Mövenpick Hotel) are provided online in a supplementary list (https://www.zobodat.at/publikation_volumes.php?id=60171).

## Methods

Mollusca were studied in different habitat types at Dahab in the southern Gulf of Aqaba (28°30'N 34°30'E): intertidal hard substrata, sand and seagrass meadows, reef flats, subtidal coral reefs, subtidal sand, subtidal caves and steep drop offs.

Empty shells were mainly collected from the beach or during extensive snorkelling tours around Dahab, especially from the dive sites Masbat Bay (including Bannerfish), Islands (including Suleiman Reef, Imno and Penguin just north of Islands), Lagoon, Seven Pinnacles and Napoleon Reef. Two trips were taken to the Nabq protected area, where remains of shells left behind by Bedouins were collected. Additionally, 25 scuba dives were conducted at the dive site Lagoon, which is located outside of El-Qura Bay (the famous wind surfing place) and 37 at other sites mentioned above. Additional 58 dives and some shell collections at the beach were conducted at the southern sites, El Gahaza, Southern Oasis, Moray Garden, Golden Blocks, Three Pools, Umm (El) Sid, Caves, El Shogharat and Gabr el-Bint. At the northern locations of Bells, Blue Hole, Tigerhouse (Tiger), Rick's Reef, Canyon, Ras Abu Helal, Eel Garden and Lighthouse 32 dives were made. A further 14 dives were made in the most northern sites of Ras Abu Galum and Blue Lagoon. Finally, 5 dives were arranged in Masbat Bay, one dive specially laid out to collect wood inhabiting mussels (Table 1). Five dives at Ras Mohammad (Sharm El Sheikh) in 2003 revealed no additional molluscan records. Of the total of 176 dives, 16 were night dives that started shortly after sunset. During dives, dead and empty shells were collected in a depth range of 0 - 45 m. One shell collection trip at the beach was taken along the coast from Blue Hole to Ras Abu Galum. Most dive sites are described and mapped in Siliotti (2005) and Dvoretski (2014). In a small puddle of a spring in Wadi Gunai (28°27'11.0"N 34°26'27.5"E), the freshwater gastropod *Melanoides tuberculata* was found in 2008, 2011, 2016 and 2017.

**Table 1: Dive sites and sand sample collection sites of the Dahab region, organised from north to south.** Most dive sites were described and mapped according to SILIOTTI (2005) and DVORETSKI (2014). Coordinates refer to the centre of the dive sites. Site IDs are illustrated in the corresponding maps.

| Site ID | Location and coordinates (N,E) | Date | Depth | Sand sample |
|---|---|---|---|---|
| | **NORTH** | | | |
| | **Blue Lagoon - Ras Abu Galum (28.620, 34.568)** | | | |
| | **Bells - Blue Hole (28.572, 34.538)** | | | |
| 41 | Bells - Blue Hole | 2017 | 36 m | 100 ml |
| 42 | Bells - Blue Hole | 2017 | 29 m | 100 ml |
| 43 | Bells - Blue Hole | 2017 | 24 m | 100 ml |
| 44 | Bells - Blue Hole | 2017 | 20 m | 100 ml |
| 45 | Bells - Blue Hole | 2017 | 18 m | 100 ml |
| 46 | Blue Hole, inside | 2017 | 4 m | 100 ml |
| 54 | Blue Hole (collected by M. Hauser) | 09.2017 | 15 m | 100 ml |
| 55 | Blue Hole (collected by M. Hauser) | 09.2017 | 34 m | 100 ml |
| | **Tiger/Tigerhouse (28.567, 34.533)** | | | |
| 20 | Tiger/Tigerhouse, sandslide | 2015 | 7 m | 100 ml |
| | **Rick's Reef (28.557, 34.524)** | | | |
| 12 | (Rick's Reef to) Canyon | 2012 | 11 m | 100 ml |
| | **Canyon (28.553, 34.522)** | | | |
| 13 | Canyon | 2012 | 29 m | 100 ml |
| 14 | Canyon | 2012 | 45 m | 100 ml |
| 39 | Canyon | 2017 | 22 m | 100 ml |
| 40 | Canyon | 2017 | 32 m | 100 ml |
| | **Ras Abu Helal (28.534, 34.517)** | | | |
| | **Eel Garden (28.505, 34.521)** | | | |
| 53 | Eel Garden (collected by F. Scharhauser) | 2017 | 8.5 m | n.a. |
| | **Lighthouse (28.498, 34.521)** | | | |
| 52 | Lighthouse (collected by F. Scharhauser) | 2017 | n.a. | 2000 ml |
| 60 | Lighthouse | 2018 | 34 m | 100 ml |
| | **ISLANDS** | | | |
| | **Masbat Bay (28.497, 34.518)** | | | |
| 22 | Masbat Bay, under Anemone | 2015 | 5 m | 100 ml |
| | **Islands (28.476, 34.513)** | | | |
| 2 | Islands, labyrinth (pinacles) | 2011 | 10 m | 100 ml |
| 3 | Islands, intertidal granite sand beach | 2011 | 0 m | 100 ml |
| 4 | tunnel, coarse sand | 2011 | 0.5 m | 100 ml |
| 6 | Islands (Suleimans Reef), seagrass | 2011 | 18 m | 100 ml |
| 8 | Islands (Suleimans Reef), seagrass | 2012 | 26 m | 100 ml |
| 19 | Islands, reef flat, 3 samples | 2015 | 0.5-2 m | 1500 ml |
| 21 | Islands, sandslide north | 2015 | 10 m | 100 ml |
| 23 | Islands, entrance tunnel, coarse sand | 2016 | 2.5 m | 100 ml |
| 26 | Islands, sandslide outside | 2016 | 14 m | 100 ml |
| 27 | Islands, labyrinth (pinacles) | 2016 | 9 m | 100 ml |
| 50 | Islands, sandslide outside | 2017 | 14 m | 100 ml |
| 51 | Islands, entrance tunnel, coarse sand | 2017 | 2.5 m | 100 ml |
| 58 | Islands, intertidal granite sand beach | 2018 | 0 m | 100 ml |
| | **Napoleon Reef (28.466, 34.504)** | | | |

| Site ID | Location and coordinates (N,E) | Date | Depth | Sand sample |
|---|---|---|---|---|
| | **LAGOON** | | | |
| | **Lagoon (28.470, 34.505)** | | | |
| 1 | Lagoon, coarse sand | 2009 | 12 m | 100 ml |
| 5 | Lagoon, fine sand | 2011 | 13 m | 100 ml |
| 15 | Lagoon, under Anemone | 2012 | 5 m | 101 ml |
| 29 | Lagoon, fine sand | 2016 | 10 m | 100 ml |
| 30 | Lagoon, seagrass | 2016 | 12 m | 100 ml |
| 31 | Lagoon, granite gravel | 2016 | 6-8 m | 700 ml |
| | **Seven Pinnacles (28.475, 34.497)** | 06.2018 | | |
| | **Lagoon surfing area/El-Qura Bay (28.474, 34.502)** | | | |
| 28 | Lagoon, inside surfing area | 2016 | 3 m | 100 ml |
| | **SOUTH** | | | |
| | **El Gahaza (28.453, 34.470)** | | | |
| 62 | El Gahaza, sandeels | 2018 | 17 m | 100 ml |
| 63 | El Gahaza | 2018 | 30 m | 100 ml |
| 64 | El Gahaza, below millepora | 2018 | 3 m | 100 ml |
| 65 | El Gahaza, below millepora + seagrass | 2018 | 3 m | 100 ml |
| | **Umm (El) Sid (28.438, 34.464)** | | | |
| 18 | Umm (El) Sid, sandslide | 2015 | 18 m | 100 ml |
| 25 | Umm (El) Sid | 2016 | 14 m | 100 ml |
| 47 | Umm (El) Sid | 2017 | 13 m | 100 ml |
| 66 | Umm (El) Sid, sea fan (collected by M. Hauser) | 06.2018 | 35 m | 100 ml |
| | **Moray Garden - Golden Blocks (28.436, 34.459)** | | | |
| 16 | Moray Garden, sandpatch between corals | 2015 | 17 m | 100 ml |
| 17 | Moray Garden, sandslide | 2015 | 18 m | 100 ml |
| 48 | Moray Garden, fine sand undeneath table coral | 2017 | 37 m | 100 ml |
| 49 | Moray Garden | 2017 | 2.5 m | 100 ml |
| 61 | Golden Blocks, north | 2018 | 23 m | 100 ml |
| | **Three Pools (28.435, 34.457)** | | | |
| | **Caves (28.416, 34.456)** | | | |
| 7 | Caves, granite sand left cave near entrance | 2011 | 17 m | 100 ml |
| 9 | Caves, granite sand left cave deep end | 2012 | 18 m | 100 ml |
| 10 | Caves, granite sand left cave deep end | 05.2015 | 18 m | 100 ml |
| 11 | Caves, granite sand left cave deep end | 07.2015 | 15 m | 100 ml |
| 24 | Caves, granite sand left cave deep end | 07.2015 | 17-19 m | 1000 ml |
| 32 | Caves, granite sand right cave | 04.2017 | 4 m | 100 ml |
| 33 | Caves, right steep wall | 04.2017 | 33 m | 100 ml |
| 34 | Caves, granite sand left cave | 04.2017 | 20 m | 100 ml |
| 35 | Caves, granite sand left cave | 04.2017 | 18 m | 100 ml |
| 36 | Caves, granite sand left cave | 04.2017 | 16 m | 1000 ml |
| 37 | Caves, granite sand left cave | 04.2017 | 14 m | 100 ml |
| 38 | Caves, granite sand left cave | 04.2017 | 10 m | 100 ml |
| 56 | Caves, outside (collected by M. Hauser) | 09.2017 | 32 m | 80 ml |
| 59 | Caves, granite sand left cave | 01.2018 | 15 m | 1000 ml |
| | **El Shogharat (28.393, 34.449)** | | | |
| | **Gabr el-Bint (28.367, 34.443)** | | | |
| 57 | Gabr el-Bint (collected by M. Hauser) | 09.2017 | 35 m | 90 ml |
| 67 | Gabr el-Bint, Lagoon (collected by M. Hauser) | 06.2018 | 15 m | 100 ml |

In the last two years the species was found in another puddle below the next cascade as well, due to higher amounts of spring water.



Exit of Wadi Gunai in July 2016.



Entrance of Wadi Gunai



The small puddle in Wadi Gunai harbours the freshwater gastropod *Melanoides tuberculata.*

A brief biological description of some of the dive sites depicted is given in ZAUNER & ZUSCHIN (2016). The coastal habitats and zonation of the reef flat of East Sinai are well described from a time before Dahab was growing from a settlement into a city (AYAL & SAFRIEL 1980).

Live molluscs or shells inhabited by hermit crabs were merely photographed, without disturbing the animals. For photography on land I used a Canon EOS 50 in 2003, Canon PowerShot G3 in 2005, Canon PowerShot G7 from 2007 until 2010, Canon PowerShot G11 from 2011 until 2015, Canon EOS 1 DS Mark II since 2016 and Nikon Coolpix P900 since 2018. Under water I used the analogue cameras Nikonos III and V in 2003, the Canon PowerShot G3 within the ewa-marine flexible underwater camera housing in 2005, the Canon PowerShot G7 within the WP-DC11 underwater camera housing from 2007 until 2010, the Canon PowerShot G11 within the WP-DC34 underwater camera housing from 2011 until 2017 and the Olympus Tough TG4 within the PT-056 underwater camera housing since 2015.

In 2009 I started to collect sand samples from various locations. One sample was collected in July 2009, six in July 2011 and three in 2012. The upper 0 - 3 cm of the substrate were transferred to bottles (100 ml). The samples were rinsed with fresh water, filtered through 500 µm plankton nets and subsequently air dried. Further sand samples, taken from 2015 - 2019, were thoroughly drained and air dried only. Small molluscs were collected with the help of different binoculars. Altogether 65 samples were taken, including a 700 ml sample from Lagoon, a 1500 ml sample from Islands reef flat and three 1000 ml samples from Caves, adding up to 11.2 litres of sand which were painstakingly searched for shells at at least at 40x magnification (Table 1). Two additional samples provided by F. SCHARHAUSER were sorted without binoculars.

In the beginning, I photographed the small shells (size 1 - 10 mm) from these samples with a Canon EOS 20D with Tamron SP AF macro objective (90 mm 1:2.8 55 mm diameter) through an ocular of the binocular microscope Wild Heerbrugg M8 with 1x plan zoom-objective 6x - 50x magnification and used artificial illumination by a gooseneck lamp from two sides. The images were taken with the manual settings focus external and aperture 2.8 and 1/20 sec. Some images were built up from several photomicrographic frames using manual stacking technique.

Since February 2013 I have access to a NIKON confocal microscope in the Biologiezentrum Linz. Here stacking technique is operated with the imaging software NIS-Elements D (NIKON). All species were reimaged and measured partly by myself but mainly by my daughter Ines BLATTERER.

The generated images were digitally improved. Most photographs taken in situ are my own, otherwise the name of the photographer is given.

All photographed dead collected specimens are in the Dahab collection or in that of Hubert BLATTERER (St. Valentin, Austria) except the types of *Leiosolenus dahabensis* and *L. parapurpureus*, both types are kept in the collection of Karl KLEEMANN (Vienna, Austria), and *Stomatolina danblumi*, which is kept in the collection of Henk DEKKER (Winkel, Netherlands).

Specimens which may be described as new in future publications are currently kept in the collection of Hubert BLATTERER until type specimens have to be deposited. However, they may be housed in the Biologiezentrum Linz, depending on the strategic development of the Museum.



The author at the Biologiezentrum Linz in November 2016 (by Friedrich RÖBL). https://www.zobodat.at/personen.php?id=1855

The identification and classification of the material is based on observations of external anatomy with reference to previous literature specifically focusing on the Red Sea and the western Indian Ocean as well as reviews and monographs of several families if available.

Initially, I relied on three books which were available in Dahab (VINE 1986, OLIVER 1992 and BOSCH et al. 1995). I soon found out that many of the collected specimens could not be identified. Later input was provided using J. DAFNI's Homepage (URL 1) which I first consulted in 2006. The new release (2014) includes already several of my own finds from Dahab. At first, the systematic order and nomenclature were based mainly on DEKKER & ORLIN (2000), which contains helpful insight concerning synonymies and literature by referring to specimens depicted in other books, for example SHARABATI (1984), OLIVER (1992) and BOSCH et al. (1995). Later, I got hold of the books written by RUSMORE-VILLAUME (2008), YONOW (2008), POPPE (2008a, 2008b, 2010, 2011, 2017a), OKUTANI (2000, 2017) and HUBER (2010, 2015) as well as the papers of ZUSCHIN et al. (2009) and JANSSEN et al. (2011) and completed some determinations with their nomenclature. Over time, a lot of work has been done by many scientists. The World Register of Marine Species (WoRMS) was developed, the Biodiversity Heritage Library (BHL) was making literature openly available to the global biodiversity community and several museum collections made their types available online in high quality pictures. In the scientific social networks "ResearchGate" and "Academia" a worldwide research community is active. This was useful for finding contacts to other scientists and more recent publications (see chapter "Internet references"). Without these improvements the making of this book would not have been possible.

For almost every species literature is provided. These details the resources used to determine the identity of the particular specimen. They include papers or internet sources with distribution patterns, helpful pictures of living or type specimens or other relevant data especially concerning records for specimens from East Sinai or the Red Sea proper. These are mainly contributions from the Israel Malacological Society published in TRITON and the Belgian Society for Conchology in Gloria Maris series (Red Sea Mollusca/Red Sea Malacology). Determinations made by shell dealers in the Gloria Maris "Red Sea Mollusca" series should be treated with caution, as up to 25 % of them concerns shells not found in the Red Sea (e.g. Costellariidae, H. DEKKER pers. comm.). However, if the images match the Dahab material, they may be considered reliable. Literature concerning Lessepsian immigration into the Mediterranean is added as it often contains species which are well depicted.

In this book many remarks on synonyms, alias names or misidentifications are not repeated in the description as they can be found in DEKKER & ORLIN (2000) and DAFNI's homepage (URL 1). Corrections on taxonomy and nomenclature of RUSMORE-VILLAUME (2008) are covered in VAN GEMERT (2008a). Corrections for species in the books of POPPE (2008a, b, 2010, 2011, 2017a) are given in the listing of Philippine Marine Mollusks (POPPE 2017b). As these informations can easily be obtained from WoRMS, they are not specifically discussed here, unless it is required for complex matters to avoid confusion, in case of recent changes, or I have a different opinion.

Furthermore, no taxonomic or nomenclatoric alterations were made, however, some new combinations were necessary in the families Arcidae, Ostreidae and Pyramidellidae. In some cases, synonymised taxa (e.g. WoRMS) are considered separate species and hints are given if synonymy can be considered. Every species was checked to be in accordance with WoRMS. Mismatches found during this process were indicated and are partly updated by taxonomic editors in WoRMS (pers. comm. with P. BOUCHET). However, several discrepancies remain or may have been changed in the meantime.

## The Dahab region in pictures

The dive and collection sites are introduced with maps, and pictures above and below the water surface, organised from north to south. This gives an impression of the diverse habitats of the Dahab region (page 10 - 36).



The Yellowmouth moray (*Gymnothorax nudivomer*) inhabits one of the many patch reefs.

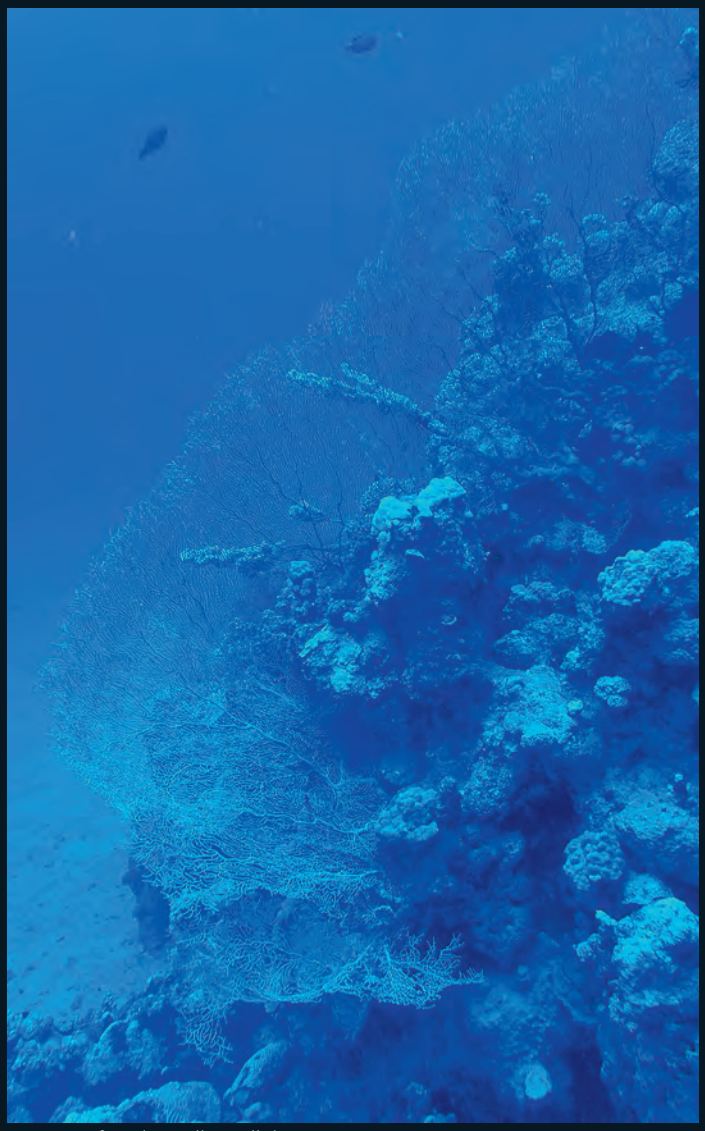


## Blue Lagoon - Ras Abu Galum

Panorama by Ines Blatterer



Tube anemone (*Cerianthus sp.*) in seagrass.



Giant sea fans (*Annella mollis*).






Location and numbers of sample collection sites at Bells- Blue Hole.



The steep drop off at Bells- Blue Hole has numerous little caves.



The most famous dive site in Dahab is the Blue Hole.



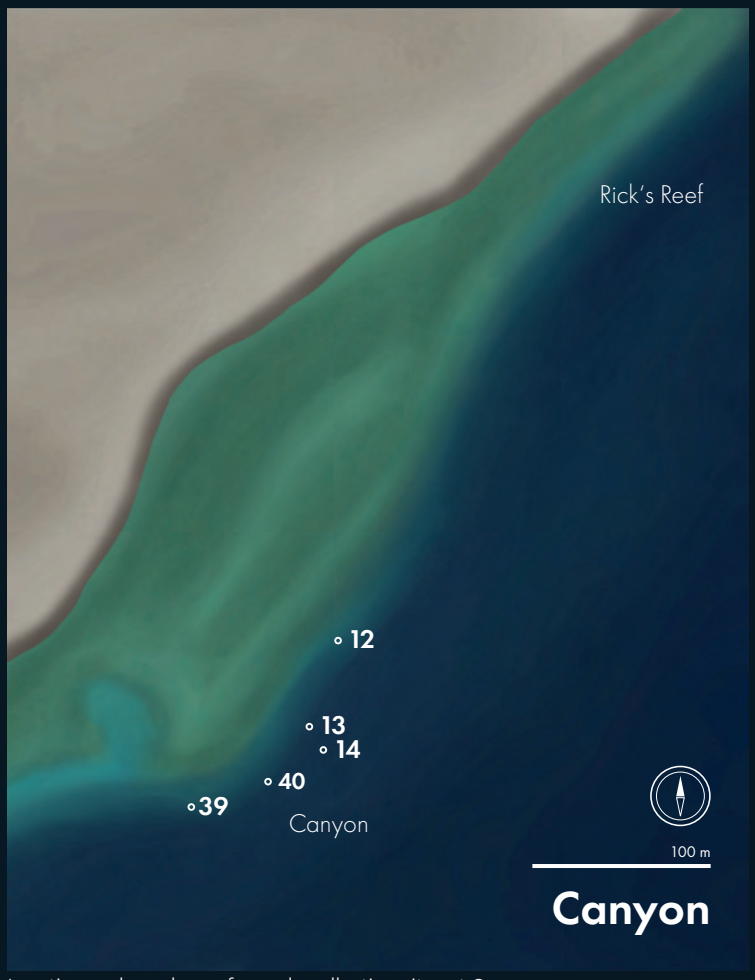
Bells has a rather small fringing reef and a steep drop off.



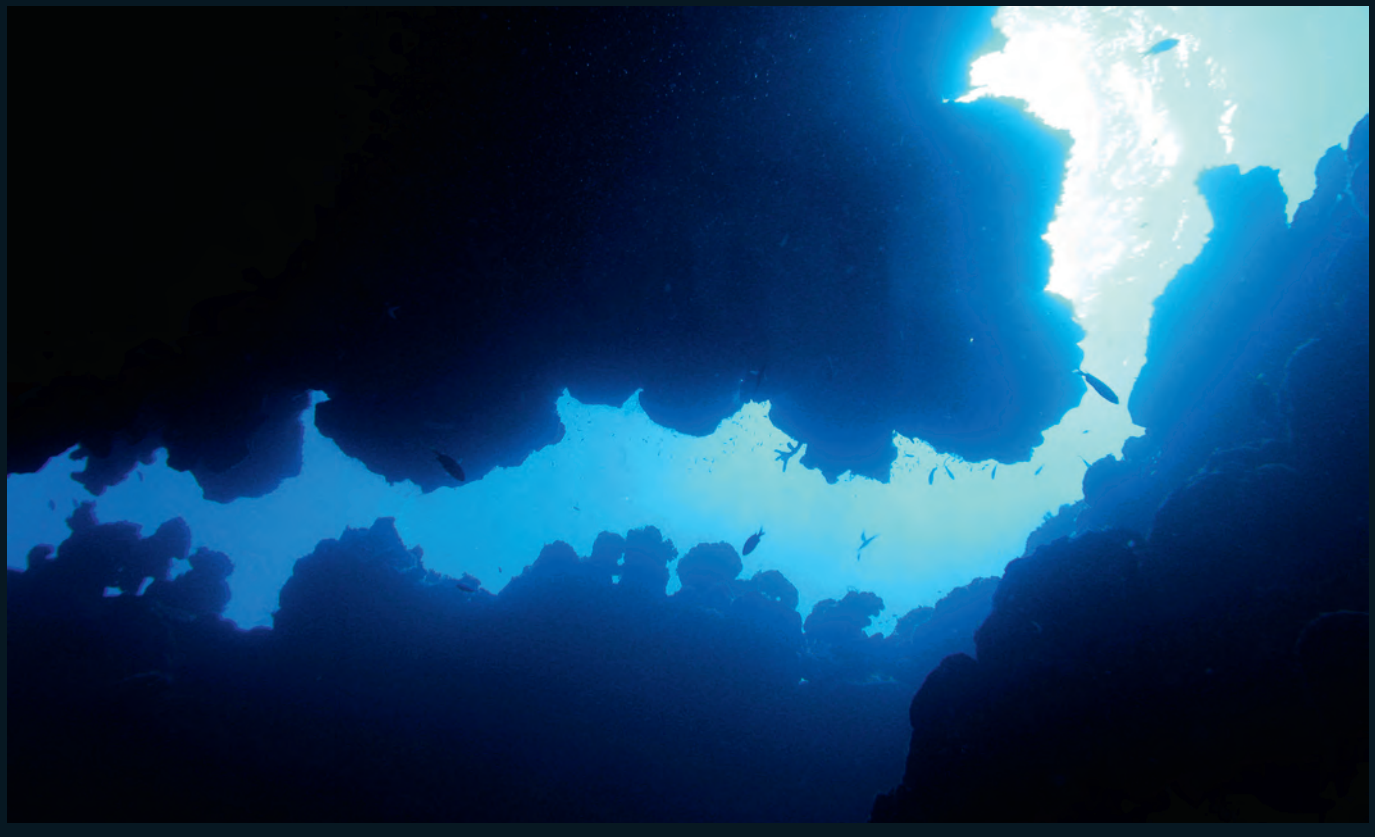
The saddle is connecting the Blue Hole with the open sea.



Shoaling sweepers (*Pempheris*) at Canyon.

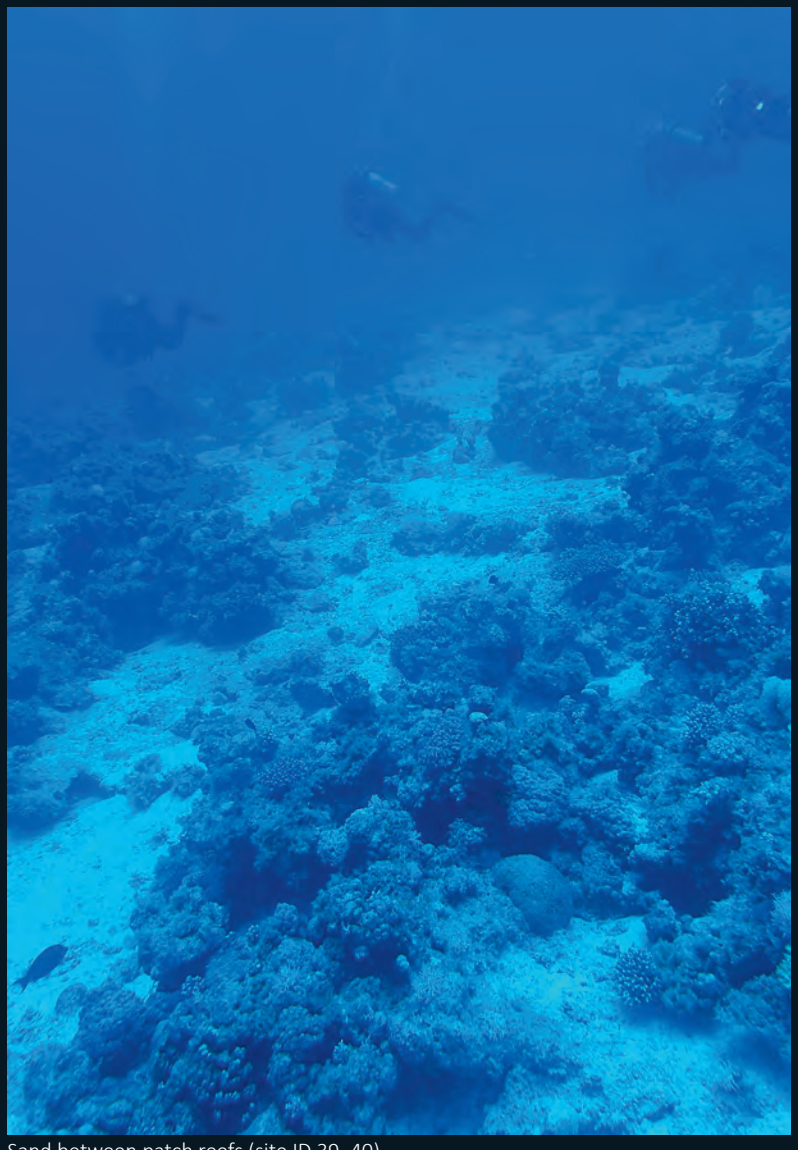



Location and numbers of sample collection sites at Canyon.





A typical sandy slope below the fringing reef at Canyon (site ID 12).



Sand between patch reefs (site ID 39, 40).



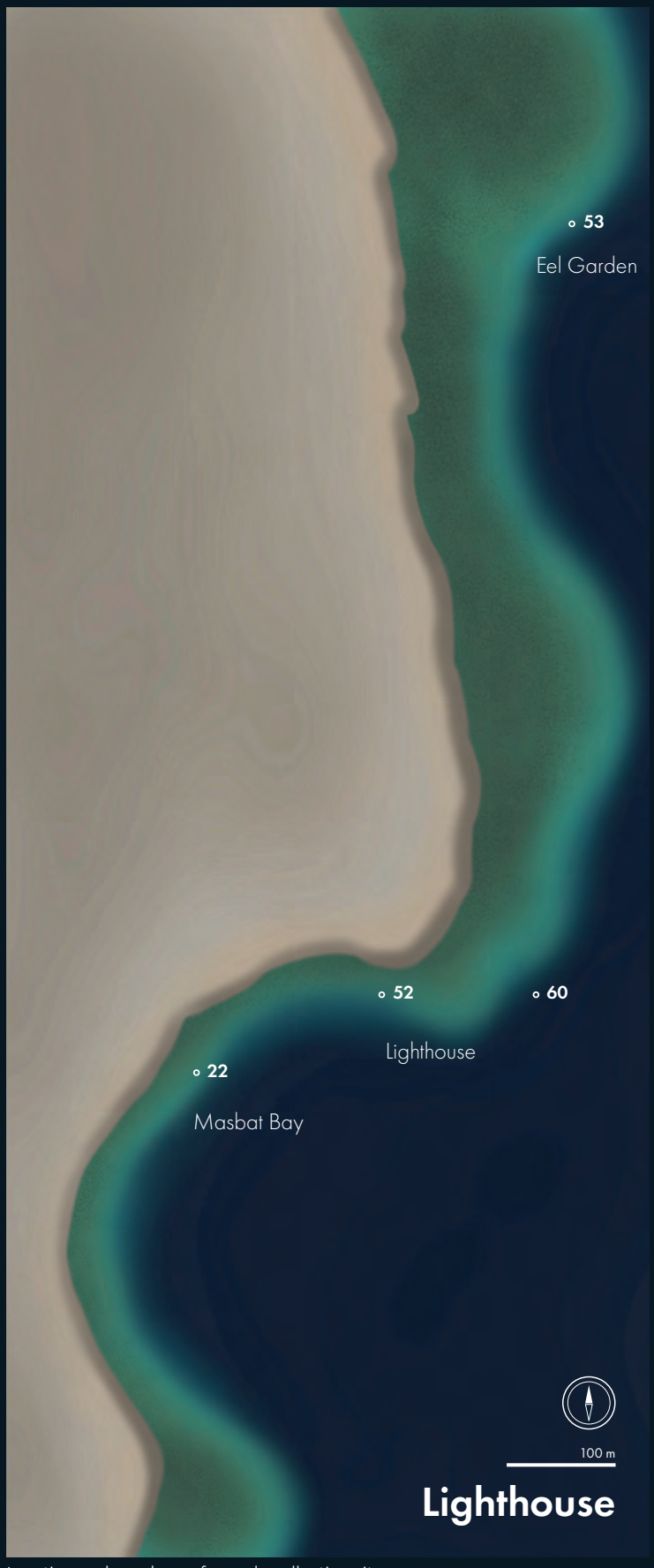
Typical coastline close to dive site Canyon.



Soft coral (*Dendronephthya*) at Canyon.



Air bubbles penetrate through the roof of the canyon.



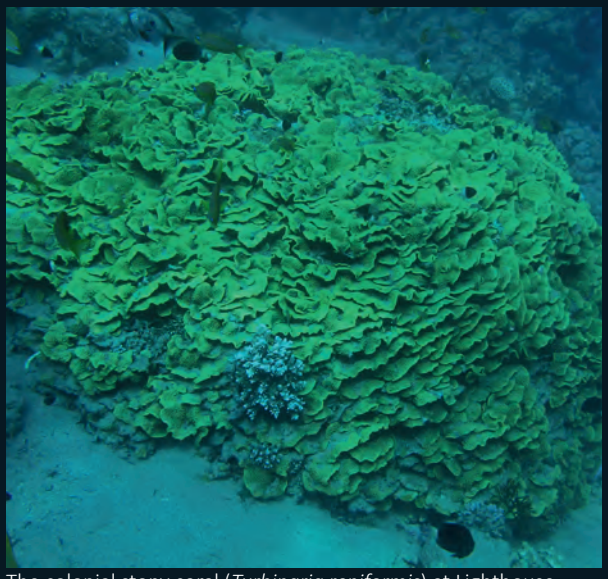

Location and numbers of sample collection sites
Eel Garden, Lighthouse, Masbat Bay.



The sands at Eel Garden with garden eels (*Gorgasia sillneri*).



The reef crest at Lighthouse.



The colonial stony coral (*Turbinaria reniformis*) at Lighthouse.



Masbat Bay seen from Lighthouse during a very rare thunderstorm.



Dive sites Masbat Bay and Lighthouse.



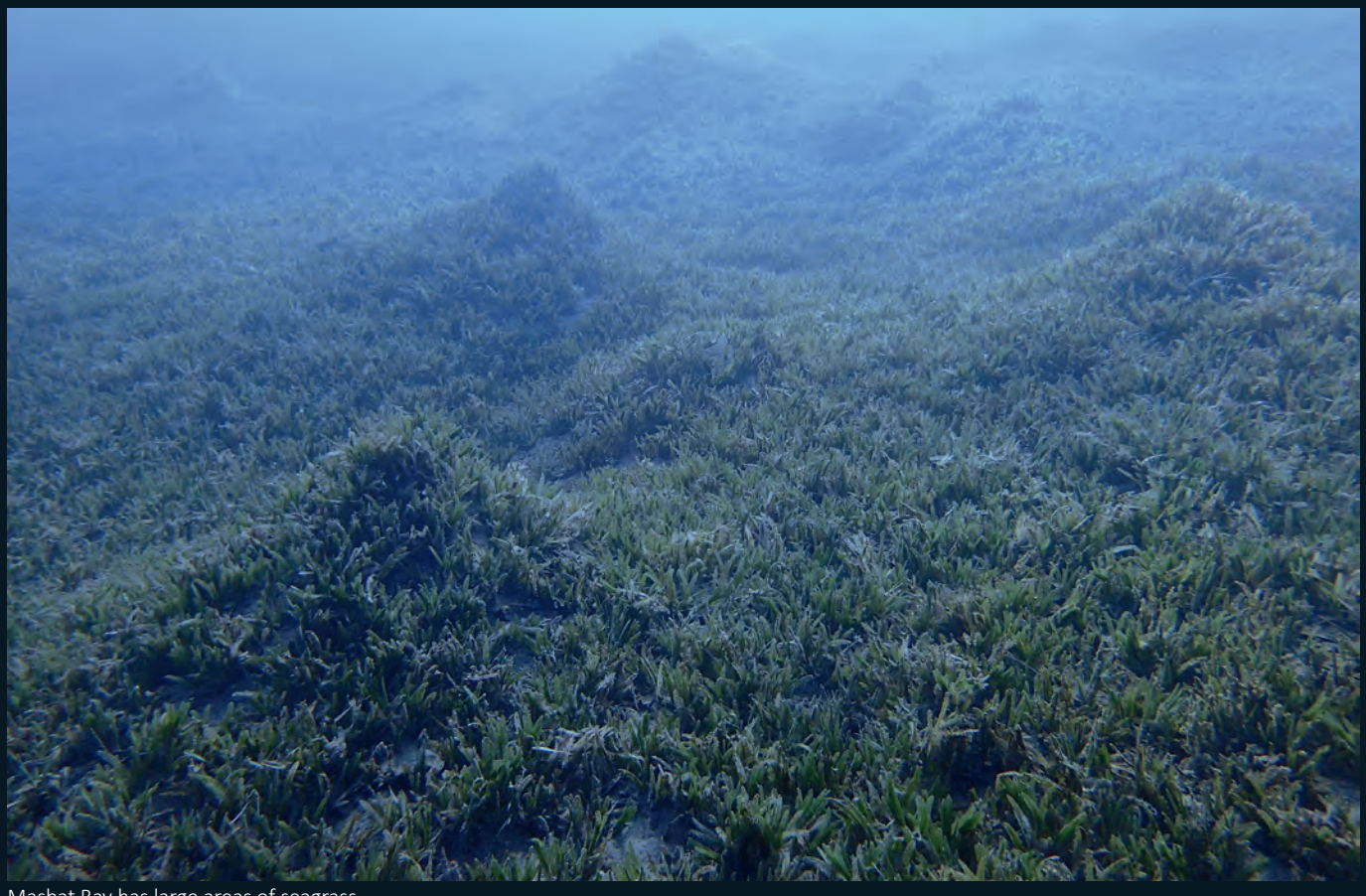
Masbat Bay, the touristic centre of Dahab.



Double-ended pipefish (*Trachyrhamphus bicoarctatus*) in seagrass.



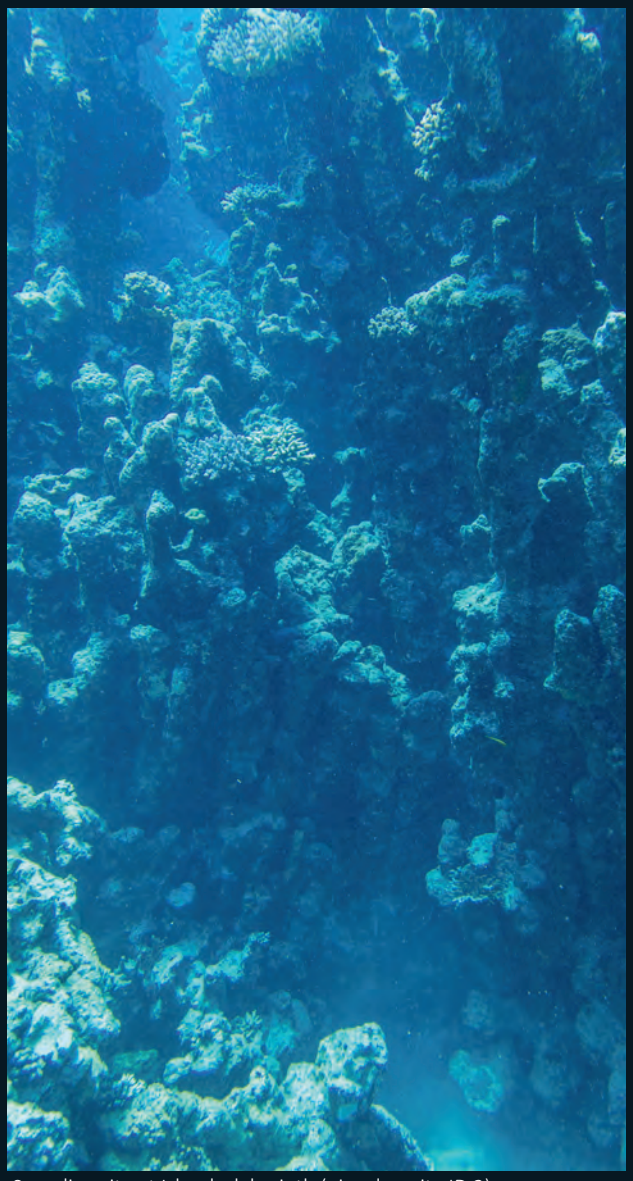
Schooling bannerfish (*Heniochus diphreutes*) at the dive site Bannerfish at the centre of Masbat Bay.



Masbat Bay has large areas of seagrass.



Location and numbers of sample collection sites at Islands.


Sampling site at Islands, labyrinth (pinacles, site ID 2).

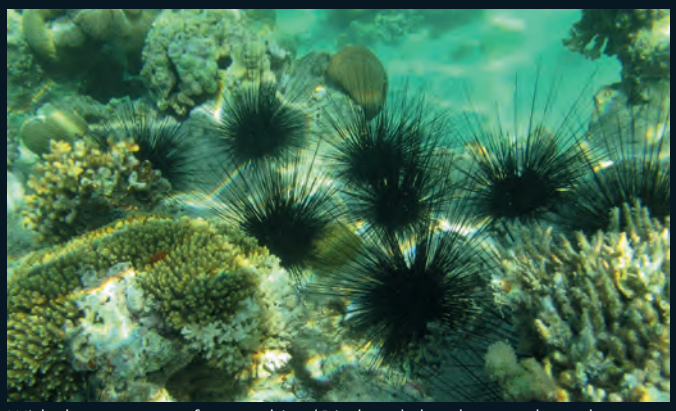

The rather broad fringing reef (reef flat) between Masbat Bay and Islands.



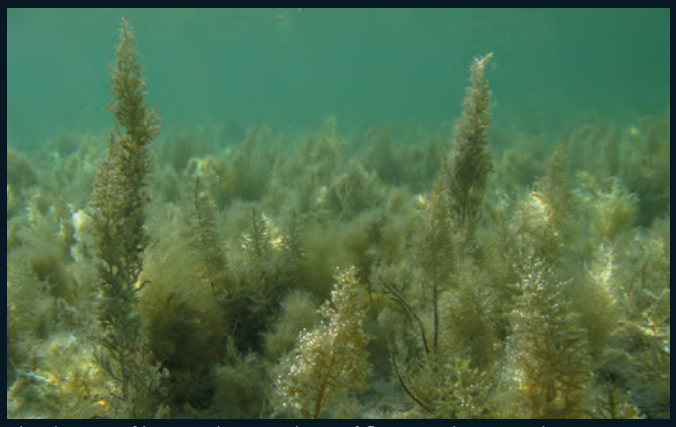
Dive site Islands.



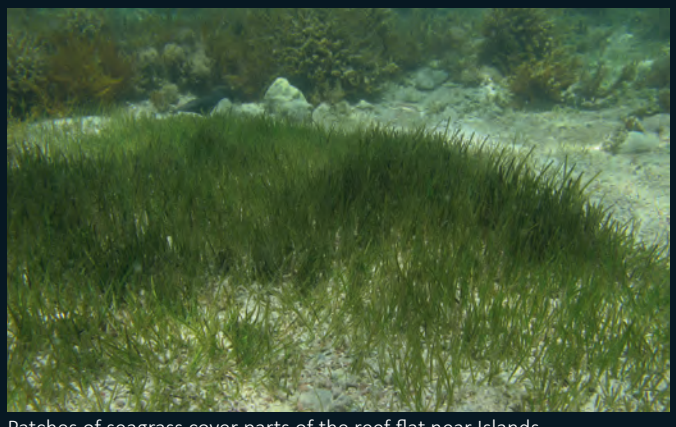
Entrance to the dive site Islands.



With the presence of sea urchins (*Diadema*) the algae are kept short.



The density of brown algae on the reef flat may change within seasons.



Patches of seagrass cover parts of the reef flat near Islands.



The reef crest at Islands is a highly dynamic environment.



Very large hard corals flourish at Islands dive site.



Hard corals form the famous labyrinth at Islands.



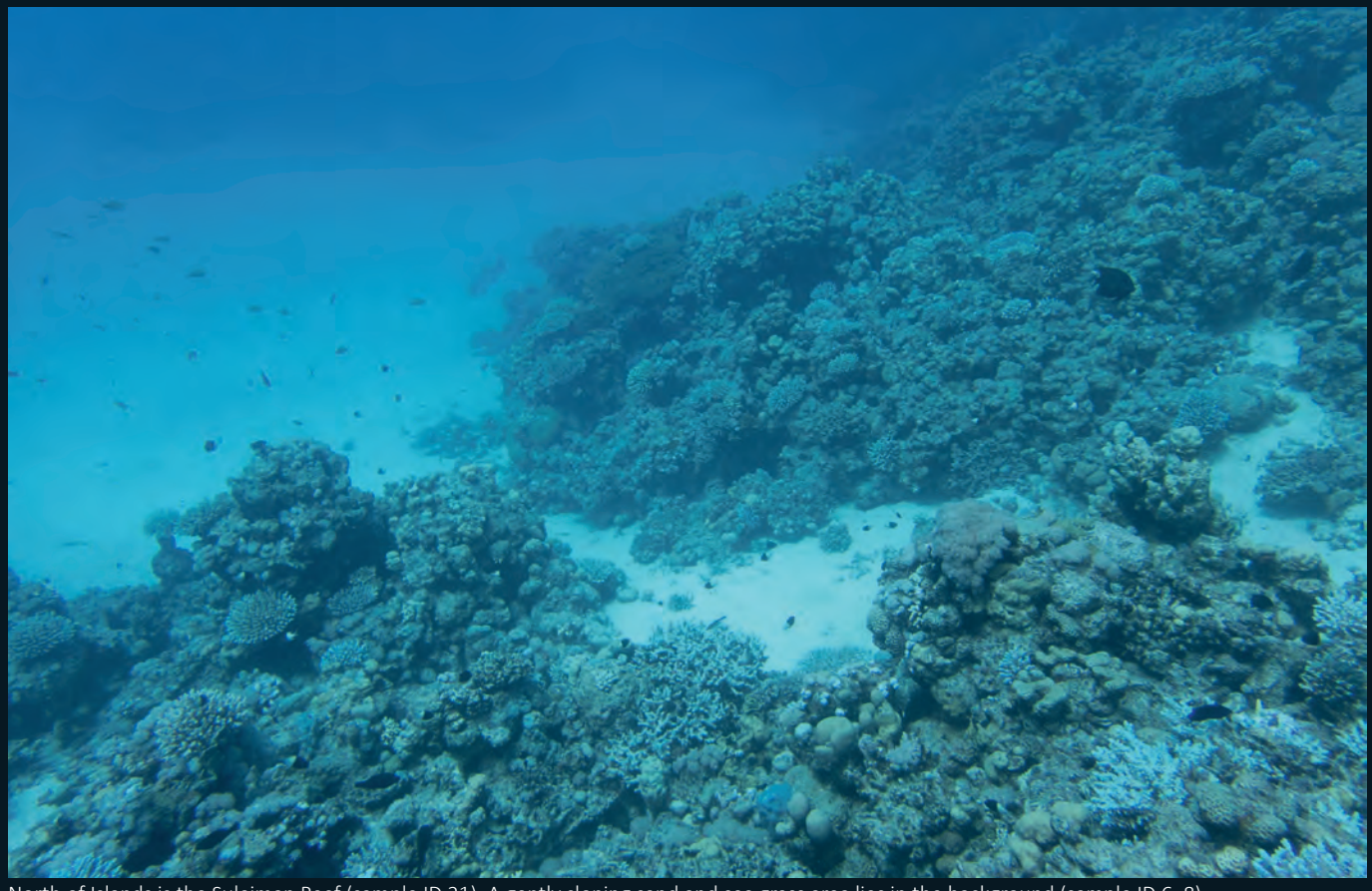
A large coral block at Islands that broke off during an earth quake gets settled again.



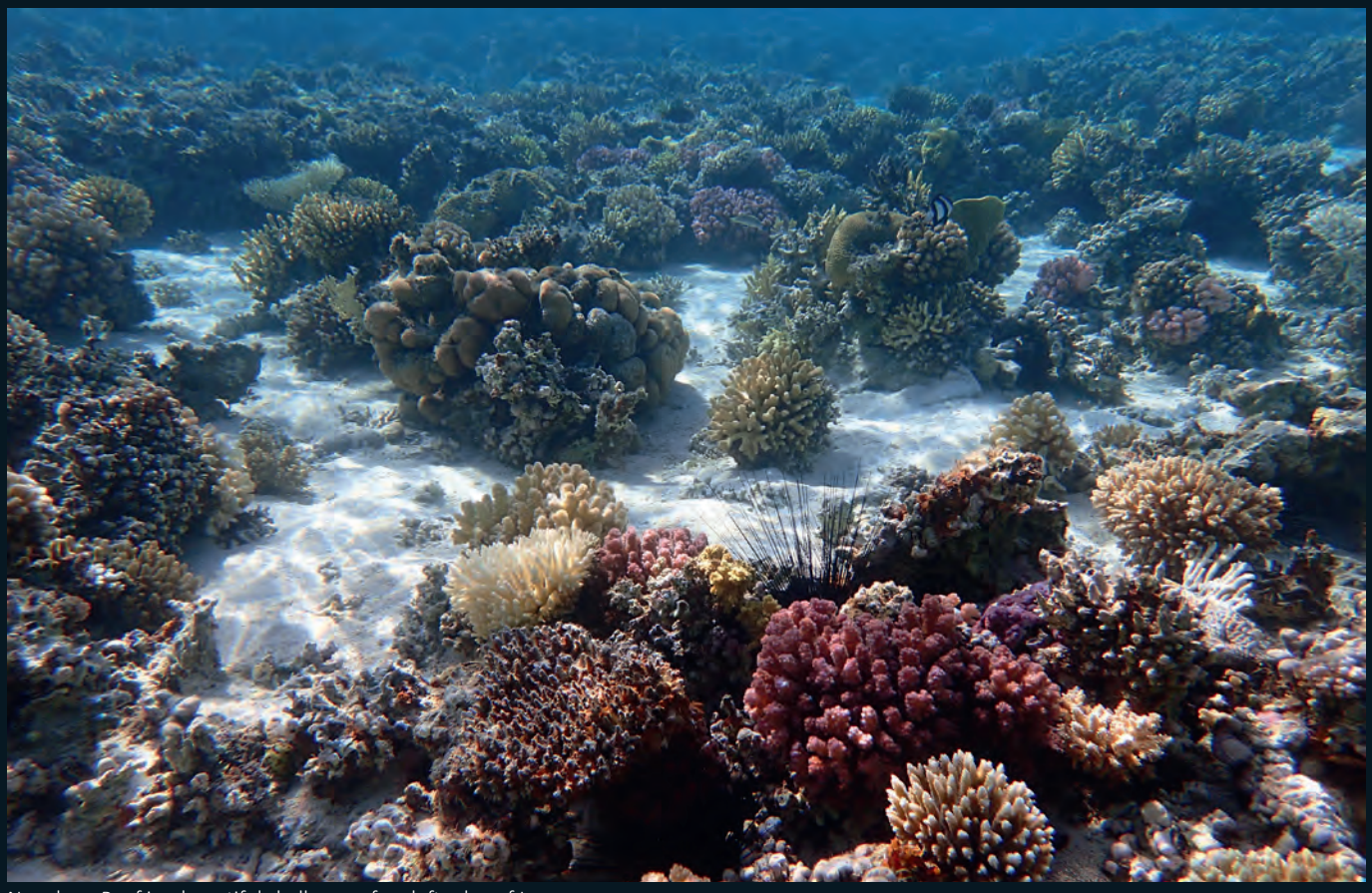
Sand bottom between scattered reef patches at Hidden Islands, a habitat which is frequently present in many other dive sites. A triggerfish (*Pseudobalistes fuscus*) and a Red Sea goatfish (*Parupeneus forsskali*) are searching for food.



The entrance to Islands is through a narrow crack in the reef flat that leads through a small tunnel to the first pool (sample ID 23, 51).



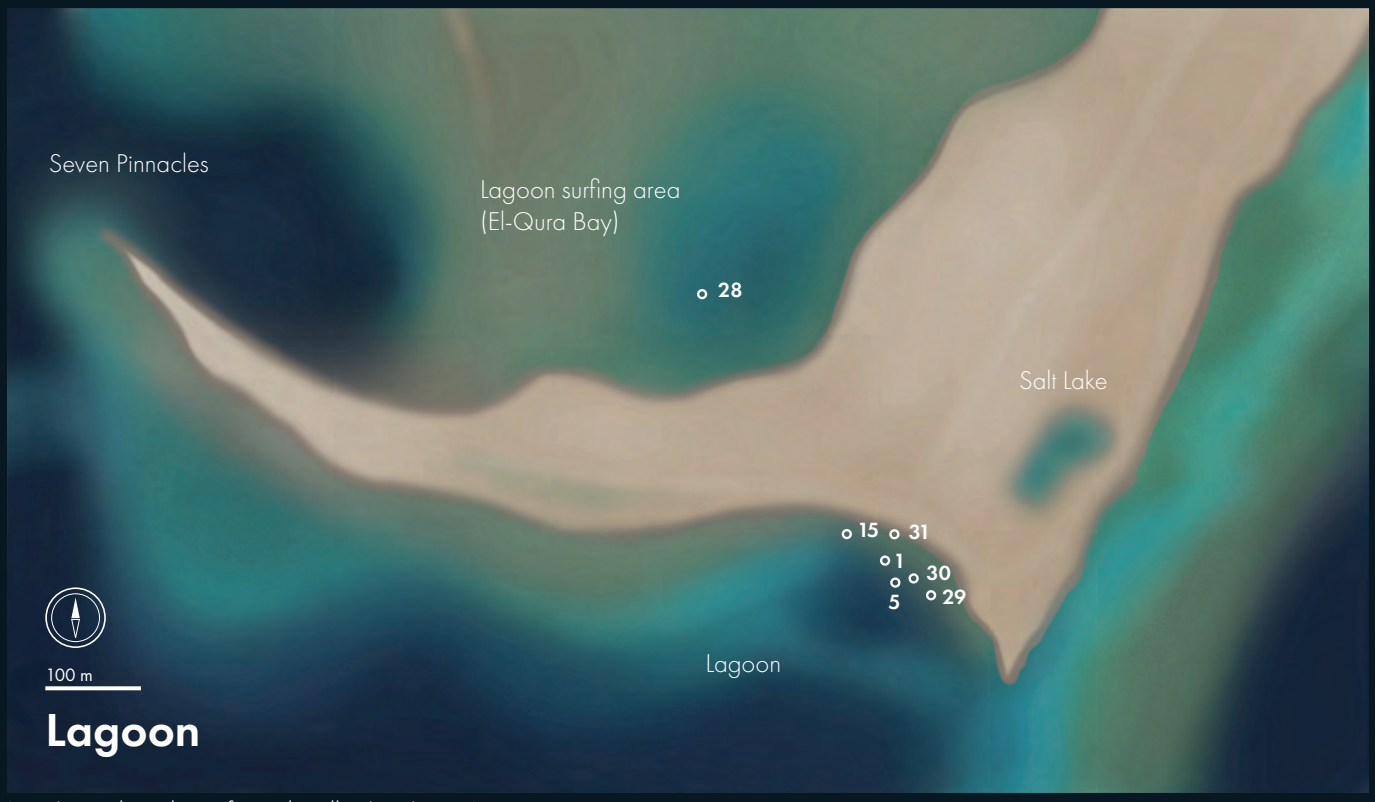
North of Islands is the Suleiman Reef (sample ID 21). A gently sloping sand and sea grass area lies in the background (sample ID 6, 8)



Napoleon Reef is a beautiful shallow reef on left edge of Lagoon



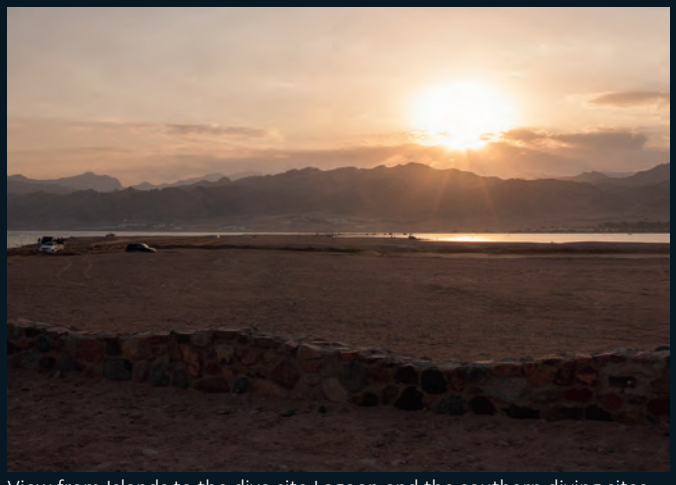
The worm snail (*Ceraesignum maximum*) in fire coral (*Millepora*) at Napoleon Reef.



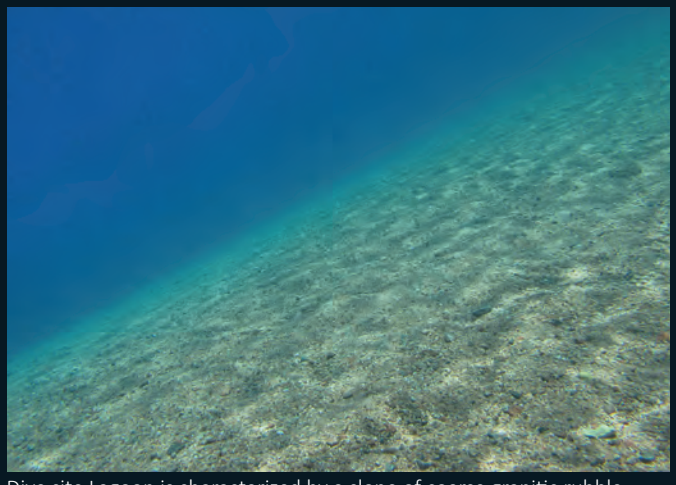

Location and numbers of sample collection sites at Lagoon.



Dive sites Lagoon and Napoleon Reef with Saudi Arabia in the background.



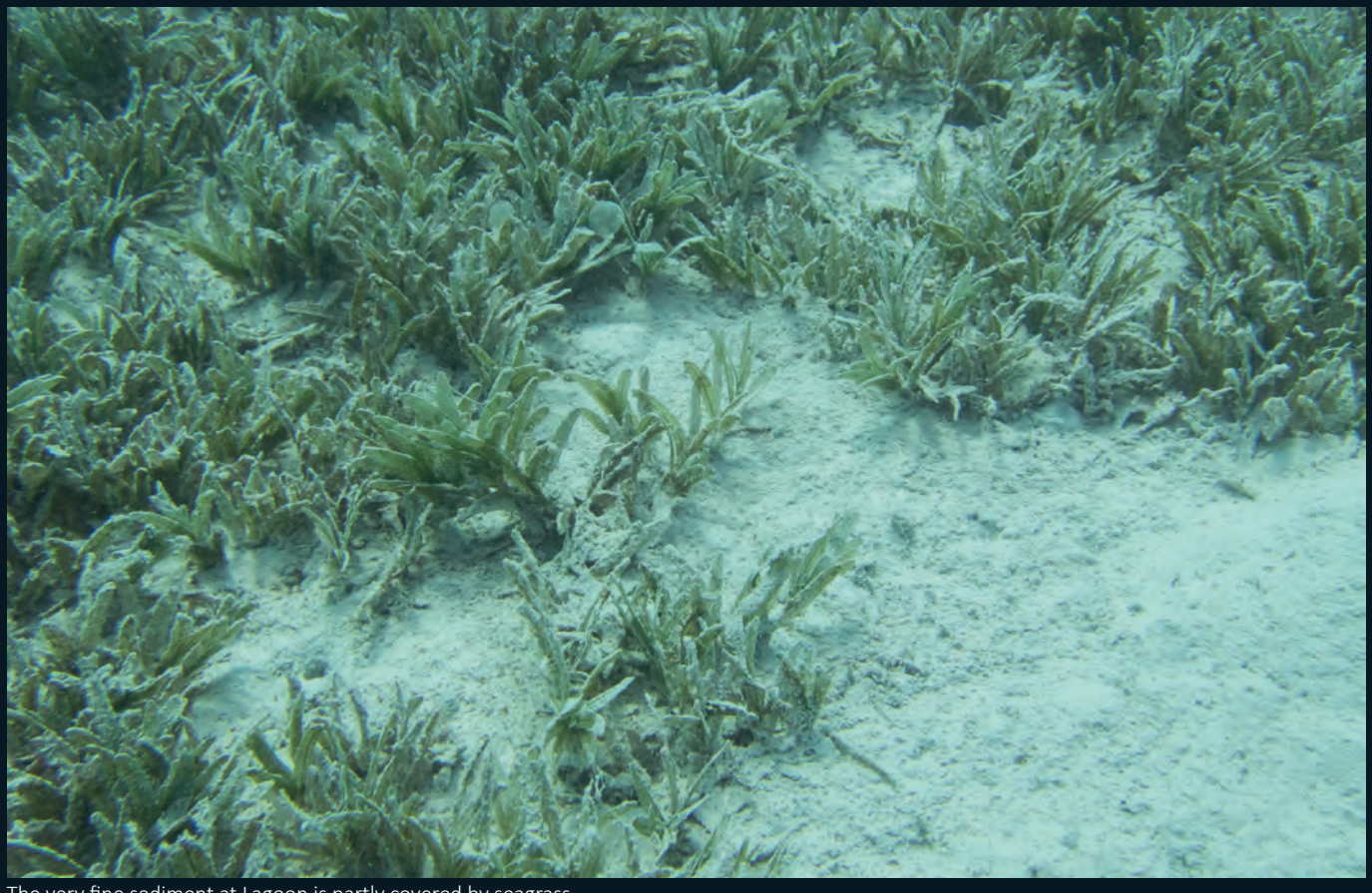
View from Islands to the dive site Lagoon and the southern diving sites.



Dive site Lagoon is characterized by a slope of coarse granitic rubble.



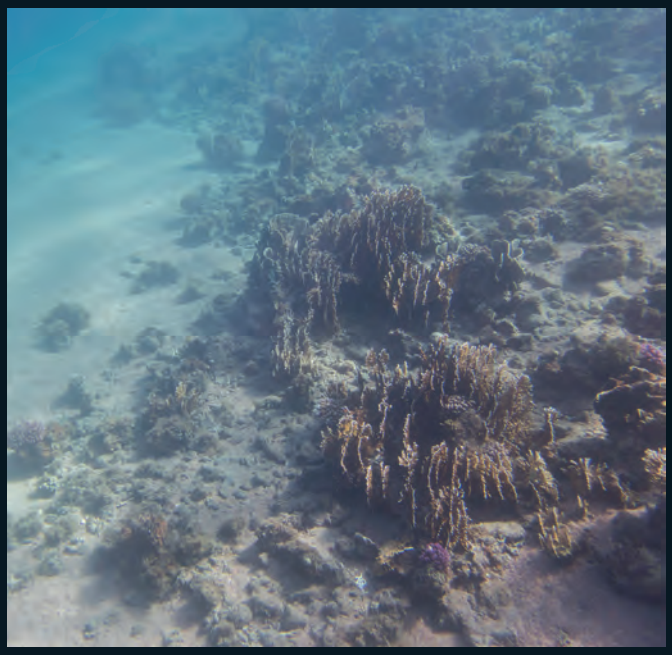
At dive site Lagoon a slope of coarse granitic rubble turns at approximately 11 m depth into a flat area of uncommonly fine sediment.



The very fine sediment at Lagoon is partly covered by seagrass.



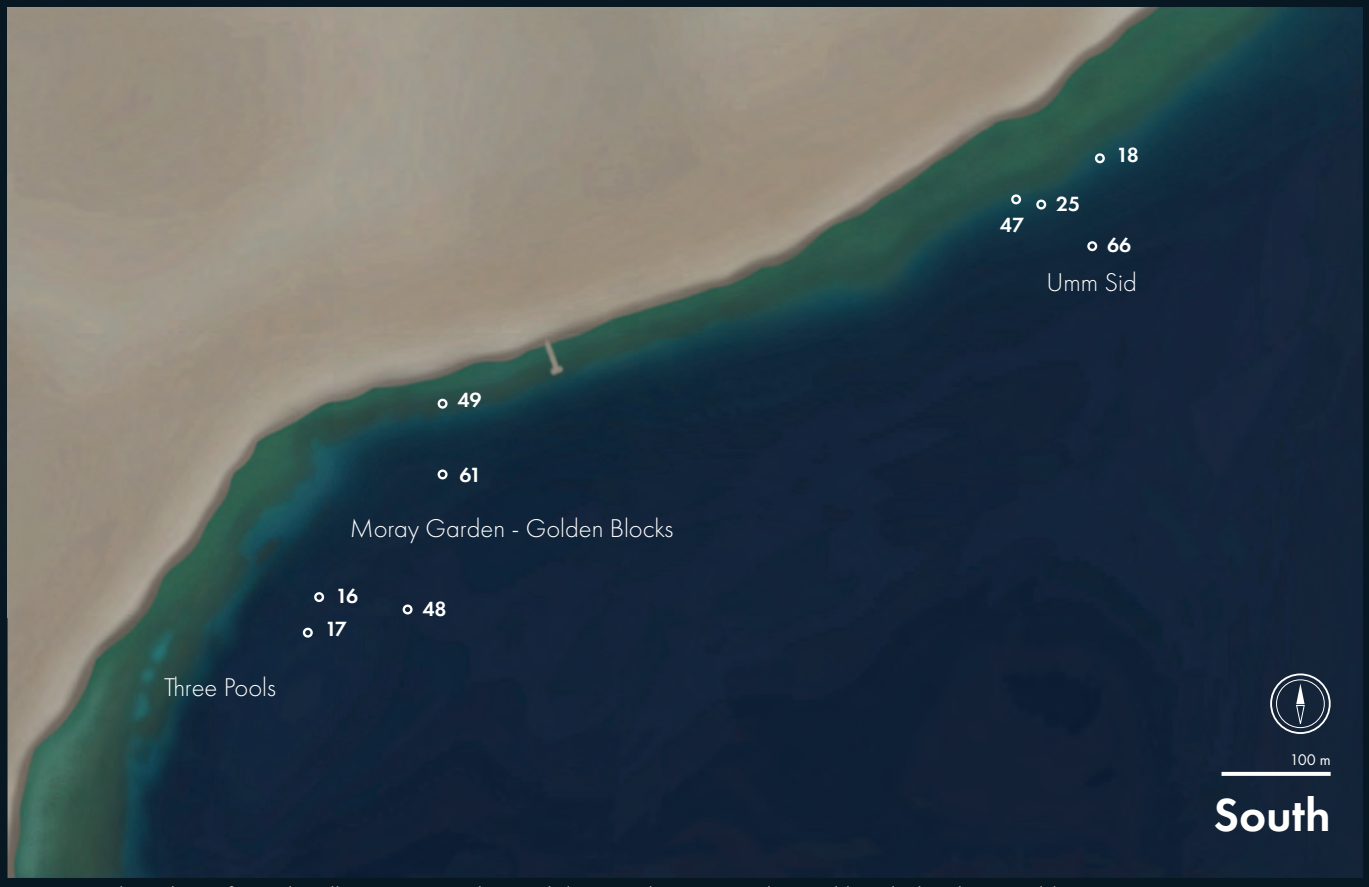
Location and numbers of sample collection sites at El Gahaza.


El Gahaza is dominated by fire corals followed by a fine sandy slope.


More than 50 lion fish (*Pterois volitans*) hunting at a patch reef.


El Gahaza has small scattered reef patches on moderately fine sand.


El Gahaza, the sandy hill.




Location and numbers of sample collection sites in the South (Umm Sid, Moray Garden- Golden Blocks, Three Pools).



Dolphin restaurant is located at Moray Garden, a place to rest between the dives in the South.



Dive sites Umm Sid, Moray Garden and Golden Blocks. The coastal mountains of Saudi Arabia show to the east.



At the southern dive sites the sandy bottom starts shallow below the fringing reef (site ID 49).



Dive site Three Pools.



The outer reef flat at Moray Garden is covered with brown algae (*Turbinaria*).



Golden Blocks has sandy slopes and is covered with seagrass (*Cymodocea*). The coral in the front is *Stylophora* cf. *subseriata*.



View from the inside of the left cave.



Gorgonians are often colonized by bivalves and sponges.




Location and numbers of sample collection sites at Caves.



Large fan-shaped corals are hanging from the roof.



A curious Hawksbill sea turtle (*Eretmochelys imbricata*) approaches.



Several species of gorgonians inhabit the caves.



The bryozoan (*Canda pecten*) lives in caves or under overhangs.



Entrance to Caves, my favourite diving spot harbouring several local peculiarities.



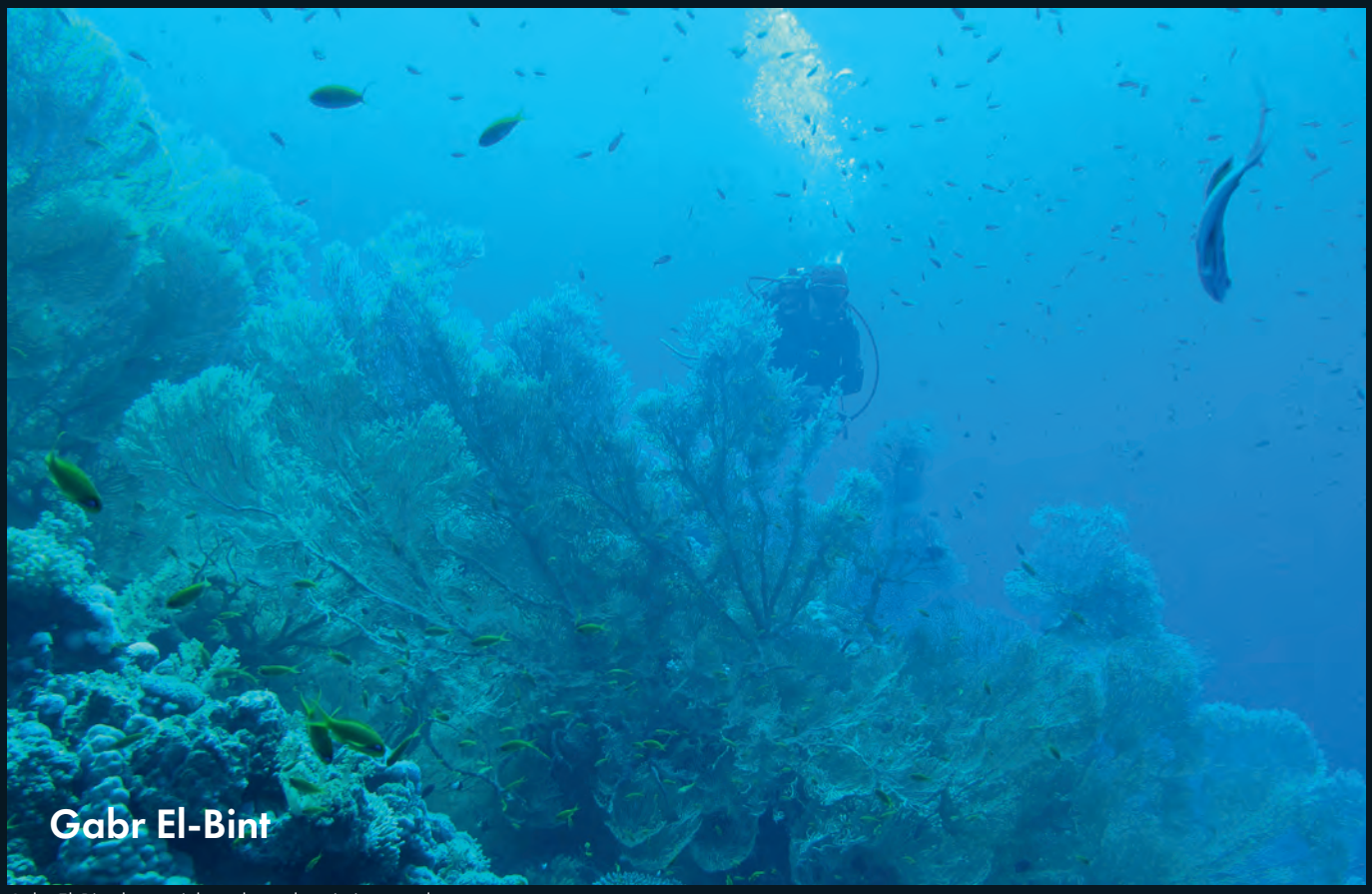

Eurasian spoonbill (*Platalea leucorodia*) on the reef flat in front of the shipwreck "Maria Schröder" at Nabq.



Broad reef flat between the mangrove and the reef crest at Nabq.



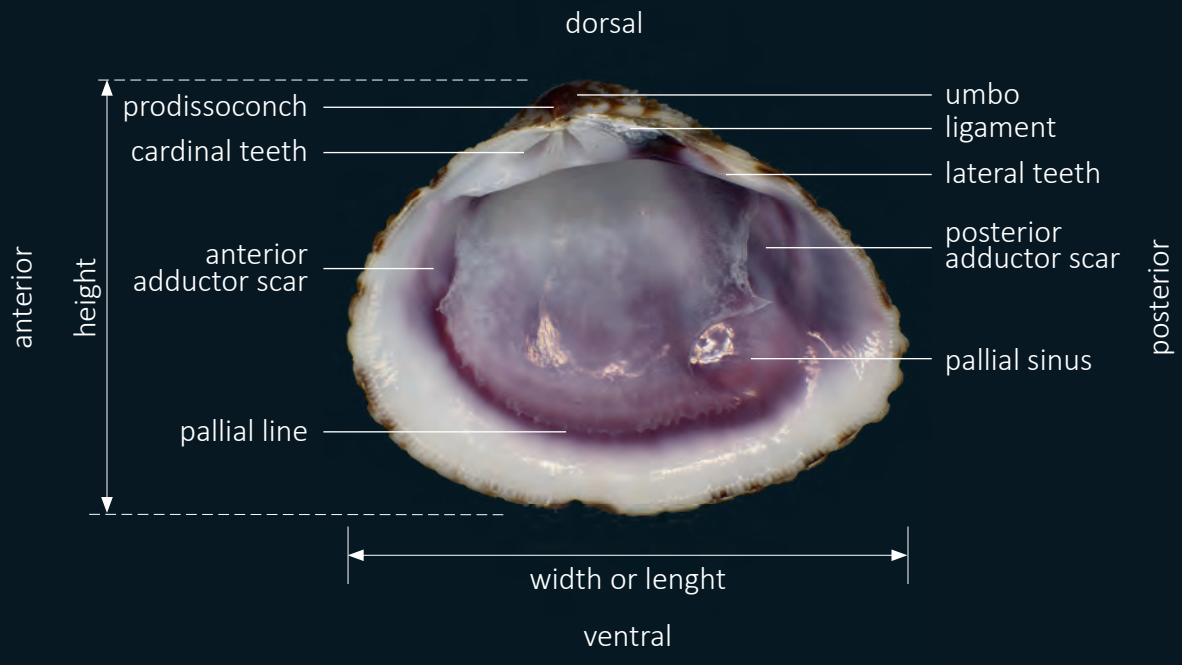
White mangrove (*Avicennia marina*) at Nabq.

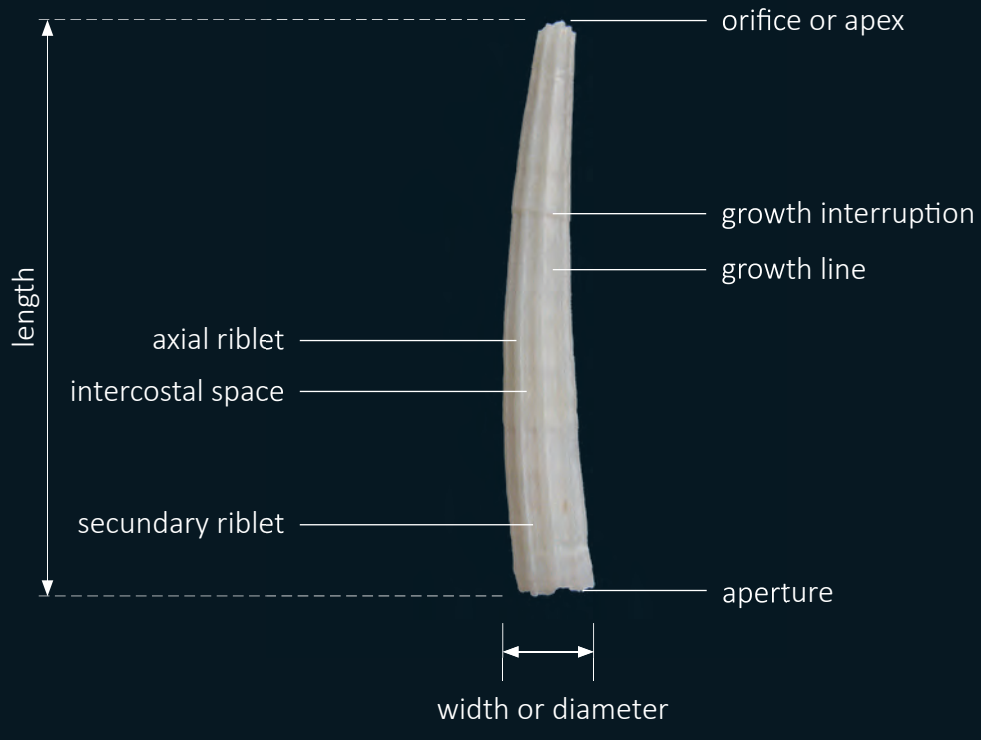



Gabr El-Bint has a rich and nearly pristine coral cover.

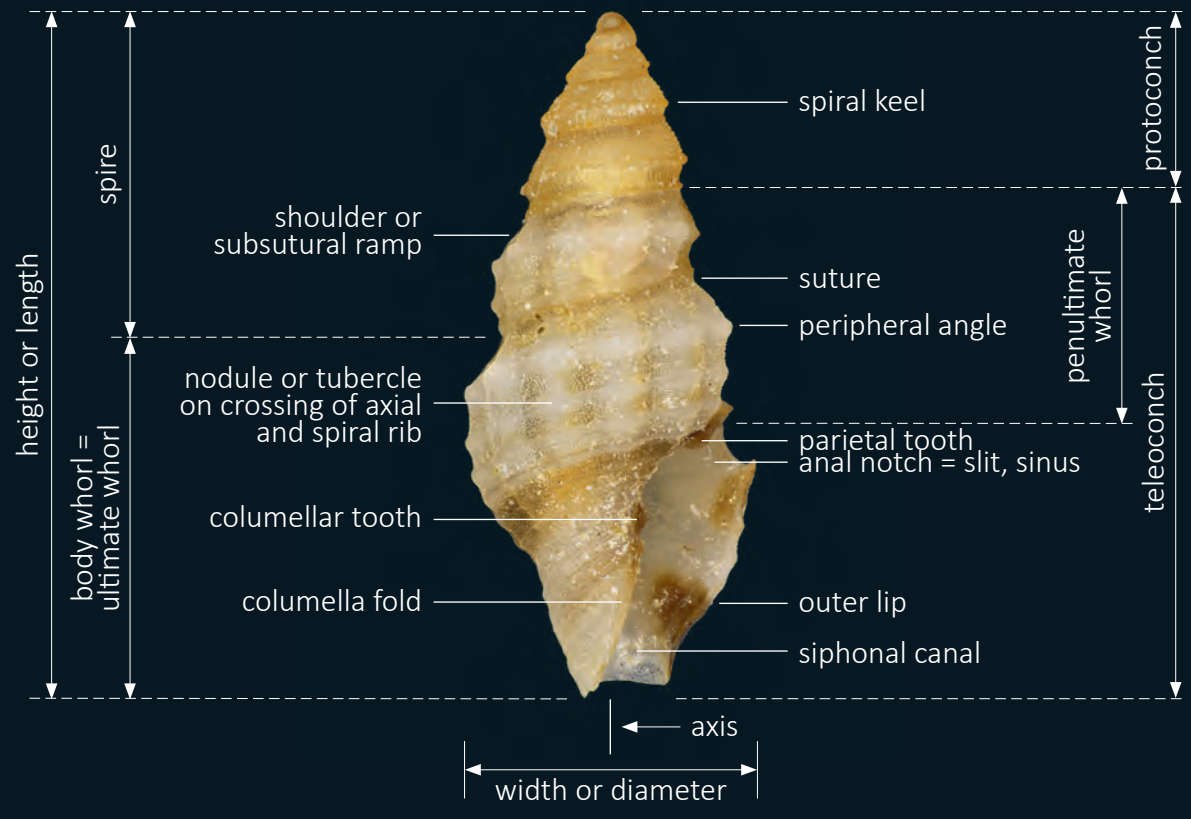


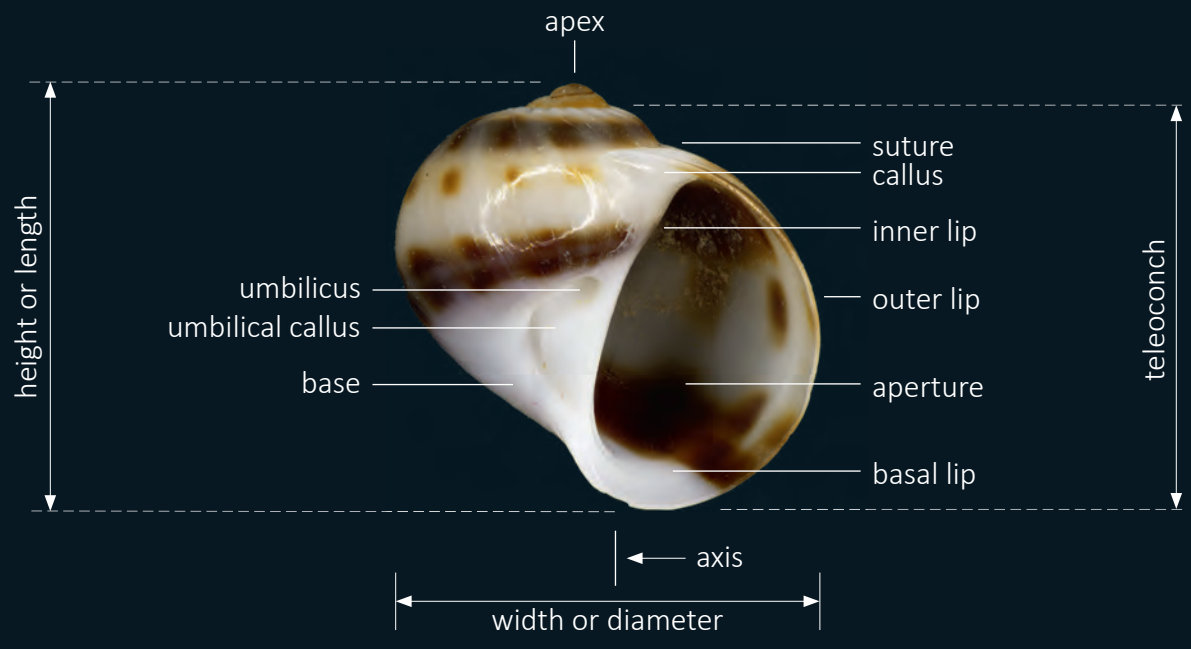
# Terminology Bivalvia and Scaphopoda



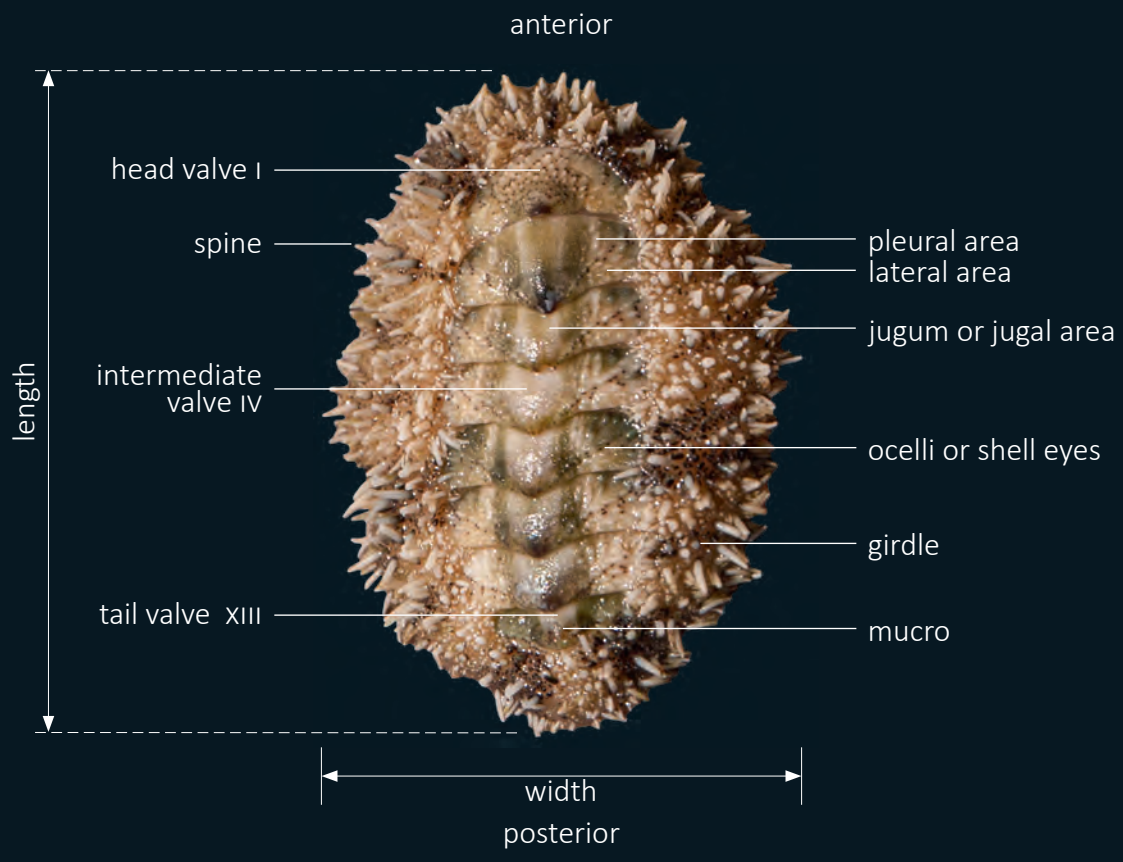



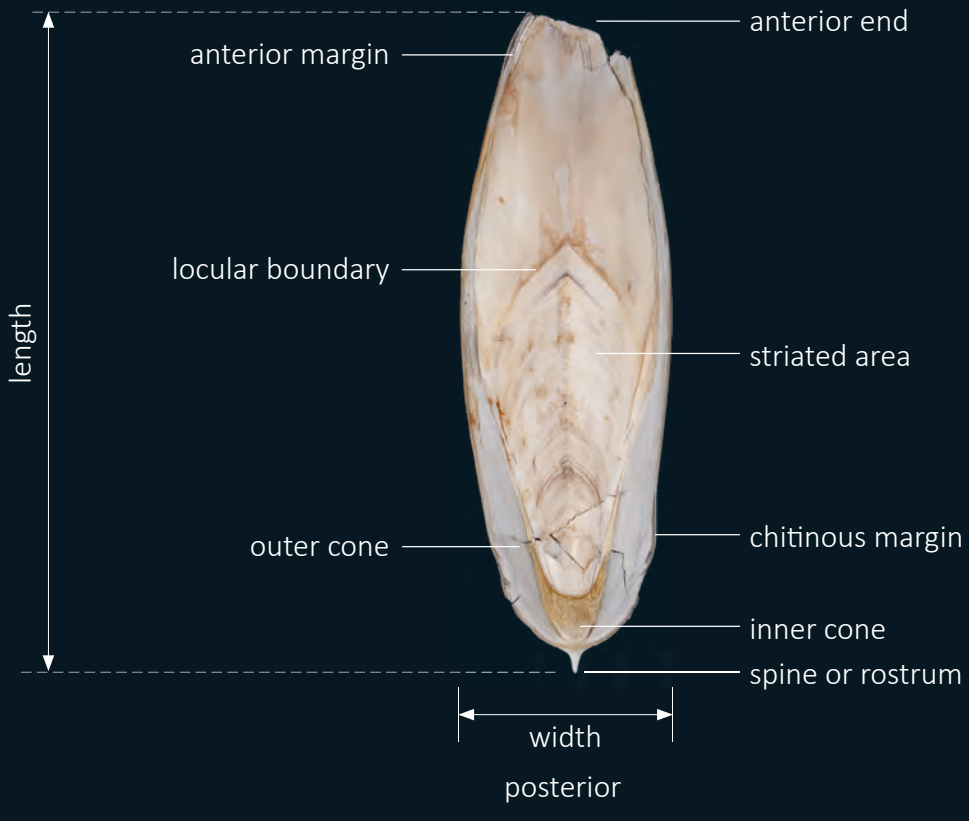
# Terminology Gastropoda



# Terminology Polyplacophora and Cephalopoda



## Discussion

In his book about Red Sea bivalves OLIVER (1992) illustrated several nice, but adventitious museum specimens not originating from the Red Sea. Consequently, some misleading Red Sea distributions occurred which could not be confirmed up to now (e.g. SCHULTZ & HUBER 2013). Also, in SHARABATI (1984) approximately 50 species do not seem to originate from the Red Sea (Henk DEKKER pers. comm.).

Therefore, no pictures from other regions of the Red Sea were included in this book, to keep it a strict regional record of molluscan fauna. The only exception are a few specimens from the Nabq coastline, the northernmost mangrove stands in the Indo-Pacific region just 40 km south of Dahab town (AL-MUFTI 2000) and about 10 km south of the southern border of Dahab's territory. Three additional species (*Littoraria intermedia*, "*Hamarilla*" sp. 2 and *Duplicaria* cf. *morbida*) were found in this unique habitat, which I never found in Dahab.

A basal statistic is provided to get a vague estimation on how much of the supposed species richness in Dahab may have been found. DEKKER & ORLIN (2000) listed 1765 species from the Red Sea being aware of the incompleteness especially concerning the micro-shells, many of which are still undescribed. In their list approximately 120 doubtful records were included which require confirmation. Only three of them could now be confirmed from Dahab viz. *Cerithium interstriatum*, *Rissoina sismondiana* and *Caecum sepimentum*.

HEIMAN (2011) listed a preliminary conclusion on shells of 11 bivalve and 20 gastropod families found in East Sinai. Later other papers concerning the Sinai shells were published in TRITON (Journal of the Israel Malacological Society) which resulted in 507 species (364 Gastropoda and 143 Bivalvia) in 47 examined families (subfamilies). Within these well studied families 68 % of the known species of East Sinai could be confirmed in Dahab. Additionally, ca. 53 Gastropod and 17 Bivalvia species are newly recorded for this region. These are: *Barbatia perinesa*, *B. decussata*, *B.* cf. *hawaia*, *Arcopsis sculptilis*, *Dendostrea folium*, Ostreidae Gen. sp., *Hemipecten* cf. *forbesianus*, *Spondylus* sp., *Tridacna squamosina*, *Clathrotellina tessellata*, *Semelangulus* sp., *Abranda* sp., *Jactellina secunda*, *J. subpallida*, *Nitidotellina lux*, *Hyphantosoma spoori*, *Kyrina kyrina*, [*Lioconcha* & *Periglypta* are excluded from the Veneridae], *Ethminolia degregorii*, *Clydonochilus mariei*, *Synaptocochlea asperulata*, "*Bothropoma*" pentegoniostomum , Bothropoma sp. 1 and 2, *Cerithidium perparvulum*, *C. zebrum*, *Eunaticina linneana*, *Epidendrium aureum*, *Epifungium adgranulosa*, *Epitonium crispatum*, *E. dubium*, *E. gradilis*, *E. kilburni*, *E.* aff. *coutieri*, *E.* aff. *irregulare*, *E. thorssoni*, *Opalia bicarinata*, *O. pupipunctata*, *Opalia* sp., *Aspella producta*, *Aspella* sp., *Phyllocoma convoluta*, *Coralliophila* cf. *fimbriata*, *Leptoconchus cyphastreae*, *Pisania lirocincta*, *Engina* sp., *Nassarius circumcinctus*, *Atlantilux rubra*, *Thala malvacea*, *Vexillum castum*, *V. lucidum*, *V. plurinotatum*, *Eucithara* cf. *bisacchii*, *E.* aff. *euselma*, *E. villaumeae*, *Eucithara* sp. 1 - 3, *Duplicaria* cf. *morbida*, *Terebra cingulifera*, *Bullina* sp., *Retusa* sp. 1, *Diniatys* cf. *dubius*, *Haminoea cyanomarginata*, *H.* aff. *cyanomarginata*, Haminoeidae Gen. sp., *Phanerophthalmus albocollaris*, *P.* aff. *olivaceus*, *Smaragdinella calyculata*, *Philine* sp. 1, *Philine* sp. 2.

These families are compared with the list of DEKKER & ORLIN but was not reviewed for unreliable species. Approximately 48 % have been found in Dahab, and further 26 species are additionally recorded (Table 2). The species in these well studied families account for only one third of all taxa found in Dahab.

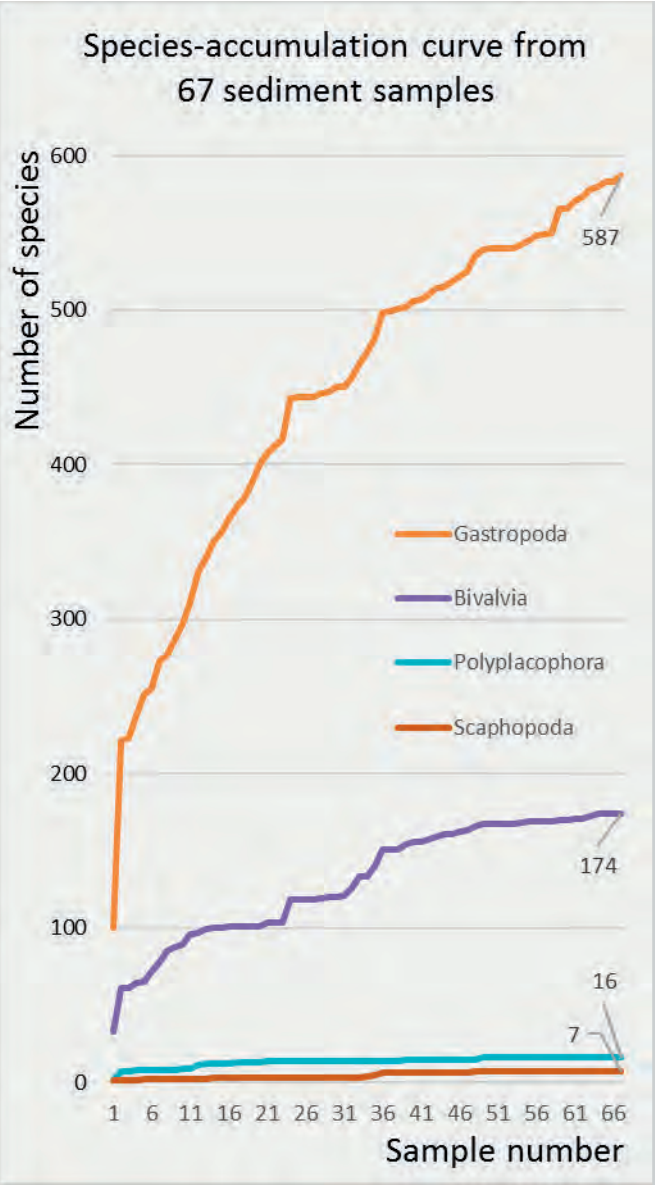
More than 800 Gastropoda have been reported in Eilat (DAFNI 2008). In 2012 J. DAFNI sent me a checklist of his records from the Gulf of Aqaba which also included the finds of EDELMAN-FURSTENBERG & FAERSHTEIN (2010) and the many sea slugs found by Benyamin & Shulamit KORETZ which are also used by YONOW (2008). Approximately 200 Gastropoda, half of them shell-less Opisthobranchia, but only 15 Bivalvia are additional species to the Dahab material. A few of these are probably foreign introductions and some may be hidden synonyms or misidentifications. An unpublished list of the Opisthobranchia found in Eilat (N. YONOW pers. comm.) revealed 192 species, of which 49 % were found in Dahab. Seven to ten additional species, some only identified on genus level, may not have been found in Eilat. This confirms the estimates given above.

ANSEEUW & TERRYN (2004) list 23 Polyplacophora from the Red Sea, including one doubtful species and 4 species only reported from the southern Red Sea. All others, except *Parachiton hylkiae* STRACK, 1993, *Lepidochitona monterosatoi* KAAS & Van BELLE, 1981 and *Onithochiton erythraeus* THIELE, 1909 were also found in Dahab. Additionally, *Ischnochiton sansibarensis* THIELE, 1909 was found, which was under discussion in ANSEEUW & TERRYN. Furthermore, *Choneplax indica* ODHNER, 1919 was recorded from the Red Sea for the first time.

The species-accumulation curves calculated from 67 sand samples show almost no new finds in Scaphopoda and Polyplacophora. Bivalvia show a low increase in species numbers, whereas the Gastropoda species number appears to be still far from its suspected total number (Graphic 1).

Table 2: Comparison of different species records with the Dahab findings.

| Bivalvia | Recorded Red Sea species in Dekker & Orlin (2000) | Recorded East Sinai species in TRITON | Species from Dahab listed in TRITON | % of Red Sea species found in Dahab | % of Eastern Sinai species found in Dahab | New recorded species for Eastern Sinai | New recorded species for the Red Sea |
|---|---|---|---|---|---|---|---|
| Arcidae/Noetidae | 24 | 24 | 13 | 54 | 54 | 4 | 3 |
| Glycymerididae | 3 | 3 | 3 | 100 | 100 | | |
| Ostreidae | 7 | 7 | 4 | 57 | 57 | 2 | 1 |
| Pectinidae | 20 | 13 | 10 | 50 | 77 | 1 | |
| Spondylidae | 8 | 5 | 6 | 75 | 120 | 1 | |
| Chamidae | 13 | 11 | 9 | 69 | 82 | | |
| Carditidae | 7 | 4 | 3 | 43 | 75 | | |
| Cardiidae | 22 | 14 | 12 | 55 | 86 | | |
| Tridacninae | 2 | 2 | 2 | 100 | 100 | 1 | 1 |
| Mactridae | 8 | 6 | 2 | 25 | 33 | | |
| Tellinidae | 35 | 23 | 19 | 54 | 83 | 6 | |
| Trapeziidae | 6 | 4 | 3 | 50 | 75 | | |
| Veneridae | 48 | 27 | 15 | 31 | 56 | 2 | |
| **Total Bivalvia** | **203** | **143** | **101** | **56%** | **71%** | **17** | **5** |
| **Gastropoda** | | | | | | | |
| Haliotidae | 3 | 3 | 3 | 100 | 100 | | |
| Stomatellinae Fossarininae | 10 | 8 | 7 | 70 | 88 | | |
| Trochidae | 35 | 23 | 11 | 31 | 48 | 3 | |
| Tegulidae | 4 | 2 | 2 | 50 | 100 | | |
| Turbinidae | 6 | 4 | 2 | 33 | 50 | | |
| Colloniidae | 5 | 4 | 4 | 80 | 100 | 3 | |
| Neritidae | 10 | 6 | 5 | 50 | 83 | | |
| Cerithiidae | 29 | 23 | 16 | 55 | 70 | 2 | |
| Strombidae | 16 | 16 | 8 | 50 | 50 | | |
| Cypraeidae | 48 | 26 | 20 | 42 | 77 | | |
| Naticidae | 23 | 12 | 7 | 30 | 58 | 1 | |
| Bursidae | 10 | 5 | 4 | 40 | 80 | | |
| Personidae | 2 | 1 | 1 | 50 | 100 | | |
| Cymatiidae | 25 | 14 | 7 | 28 | 50 | | |
| Charoniidae | 1 | 1 | 1 | 100 | 100 | | |
| Epitoniidae | 57 | 20 | 7 | 12 | 35 | 12 | 4 |
| Muricidae | 60 | 35 | 22 | 37 | 63 | 3 | 2 |
| Coralliophilinae | 9 | 8 | 4 | 44 | 50 | 2 | 1 |
| Pisaniidae | 15 | 7 | 3 | 20 | 43 | 2 | 1 |
| Colubrariidae | 5 | 4 | 2 | 40 | 50 | | |
| Nassariidae | 21 | 13 | 10 | 48 | 77 | 1 | 1 |
| Fasciolariidae | 14 | 8 | 5 | 36 | 63 | | |
| Mitridae | 37 | 23 | 17 | 46 | 74 | | |
| Costellariidae | 46 | 25 | 18 | 39 | 72 | 5 | 3 |
| Conidea | 46 | 28 | 21 | 46 | 75 | | |
| Mangeliidae (*Eucithara*) | 4 | 7 | 4 | 100 | 57 | 6 | 3 |
| Terebridae | 34 | 18 | 14 | 41 | 78 | 2 | |
| Aplustridae | 3 | 2 | 1 | 33 | 50 | 1 | |
| Cylichnidae | 2 | 1 | 1 | 50 | 100 | | |
| Retusiidae | 3 | 3 | 2 | 67 | 67 | 1 | |
| Haminoeidae | 12 | 9 | 9 | 75 | 100 | 7 | 6 |
| Tornatinidae | 5 | 2 | 2 | 40 | 100 | | |
| Philinidae | 1 | 1 | 0 | 0 | 0 | 2 | |
| Mnestiidae | 1 | 1 | 1 | 100 | 100 | | |
| Bullidae | 1 | 1 | 1 | 100 | 100 | | |
| **Total Gastropoda** | **603** | **364** | **242** | **45%** | **66%** | **53** | **21** |
| **Bivalvia + Gastropoda** | **806** | **507** | **343** | **48%** | **68%** | **70** | **26** |




**Graphic 1:** species-accumulation curves from 67 sand samples.

## Other records from the Dahab region:

I was unable to review all the literature of the Red Sea to search for other records from the Dahab region. In this respect the check-list of Red Sea Mollusca by DEKKER & ORLIN (2000), the book of RUSMORE-VILLAUME (2008) and an internet update of the check-list by Henk K. MIENIS (National Mollusc Collection; Dept. Evolution, Systematics & Ecology; Hebrew University of Jerusalem) are helpful. A rich collection of literature on Recent shells from the Red Sea was published and later updated by VAN GEMERT (2011b, 2017). A few species recorded earlier from Dahab which I could not find are mentioned in their respective families. Some others are briefly mentioned here.

The Last Interglacial terraces along the Saudi Arabian coast, were studied by Angeletti et al. (2019). Several sites are just on the opposite site of the Gulf of Aqaba which are in sight from Dahab. These former coral reef complexes are also present in the Dahab region (ca. 125000 years old, Pleistocene) which once housed more than 400 mollusk species, although some species-rich groups (e.g., Cerithiopsidae, Triphoridae and Pyramidellidae) are still not well studied. The fossil fauna matches the modern Red Sea fauna in terms of families, genera and often even species. The mollusc biodiversity of these terraces is the most pronounced of this age known so far on a global scale.



Fossil reef at dive site Canyon.



Fossil reef at dive site Canyon.



*Periglypta* sp. in the fossil reef at dive site Canyon.

A habitat mapping and molluscan zonation from the high intertidal to the shallow subtidal zone at the Lagoon (surfing area) in Dahab was done by Gützer (2011). Their number of species per sample increased with depth. In this small area (0.3 km²) 58 gastropod and 35 bivalve species were identified.

Sommerfeldt & Schrödl (2005) described *Hedylopsis ballantinei* from Dahab. This interstitial acochlidian gastropod has no shell. *Epimenia arabica* Salvini-Plawen & Benayahu, 1991, a large-sized (to 21 cm × 1 cm) member of the Solenogastres has been described from shallow eastern Sinai waters (Strait of Tiran). This and other tiny shell-less mollusca e.g. Aplacophora (3 species listed in Dekker & Orlin 2000) require the collection of living material to be detected.

Two samples of deep-water below 400 m were taken by the Austrian Pola-expeditions in the Gulf of Aqaba, one of them near the Dahab region (Sturany 1899, 1900a, b, 1903). My deepest sampling point was at the dive site Canyon in 45 m. Therfore, the deep-sea molluscs of the Dahab region are underrepresented in this book. To date, as many as 262 species (163 Gastropoda, 94 Bivalvia, 4 Scaphopoda and 1 Polyplacophora) are recorded from deep-water of the Red Sea (Janssen & Taviani 2015). At least 40 of these species can be found in shallow habitats of the Dahab region as well, but there is high uncertainty with many species not identified to species level and without a photographic proof. The dive site Caves is remarkable as there live some species which are usually found in deeper waters.

A review of Henk Dekker's private collection from his own samplings in 1992 and 1993, which includes several later acquisitions, revealed ca. 80 additional species from the Dahab region (pers. comm.) which clearly demonstrates the high possibility to find many further species with more effort.

## Environmental aspects

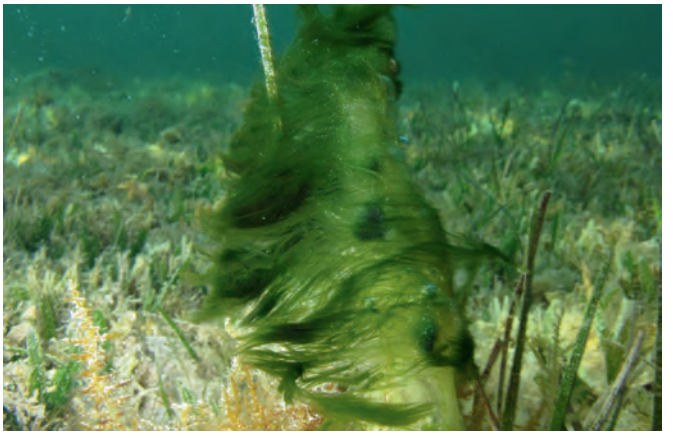


Dahab- Assalah appears rather pristine from this perspective.

50 years ago, only a few Bedouin families inhabited the Dahab region. Back then Dahab had a healthy ecosystem with remarkable biodiversity. Stories of lobsters, turtles, rays, dolphins and a vast variety of big fish roaming the seas around Dahab have been reported. Over the years this once small settlement became a popular tourist destination for Egyptians and people from around the world with consequences on city development and the environment.



The only shark I have ever seen in Dahab. What a shame!



Increased algal growth due to inputs of nutrients and reduction of algae-eating fishes like e.g. surgeon fishes.



Plastic rubbish is dispersed by the wind and blown into the ocean.



Most of the waste is not compostable.



Plastic rubbish on the beach.

The strict environmental laws from 1983 and 1994 were ensuring protection and surveillance of the region. Following political developments these laws were more and more neglected by the growing population leading to creeping destruction of the marine ecosystem. Besides increasing pollution due to oil spillage, plastic waste and sewage effluence, overfishing and destruction of the coral reef can be considered to have the most obvious negative effect on marine life. Net and harpoon fishing have frequently been observed during dives even in Masbat Bay.



The shore of Masbay Bay was formerly a gravel beach. It was replaced by a paved road and restaurants.

Illegally caught fish, juvenile lobster and other sea life is regularly sold to local businesses. Although forbidden these practices are not pursued by local authority. As a consequence, not only big barracuda and tuna are rarely seen but even typical abundant reef fishes like parrot fishes, surgeon fishes, groupers, sea breams and wrasses have been diminished which has severe impact on the marine environment. These changes may appear marginal for each generation but mask the long-term deterioration of the once flourishing coral reef.

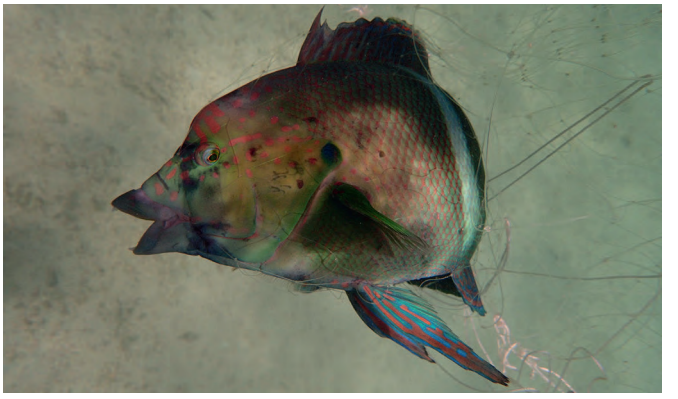


Hundreds of lost fishing lines at the dive site Lagoon.



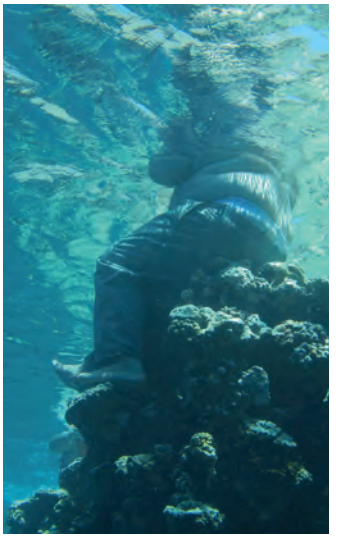
The clown-fish (*Amphiprion*) is unable to reach its host anemone.





Killed in a fishnet at the dive site Lagoon and Islands.



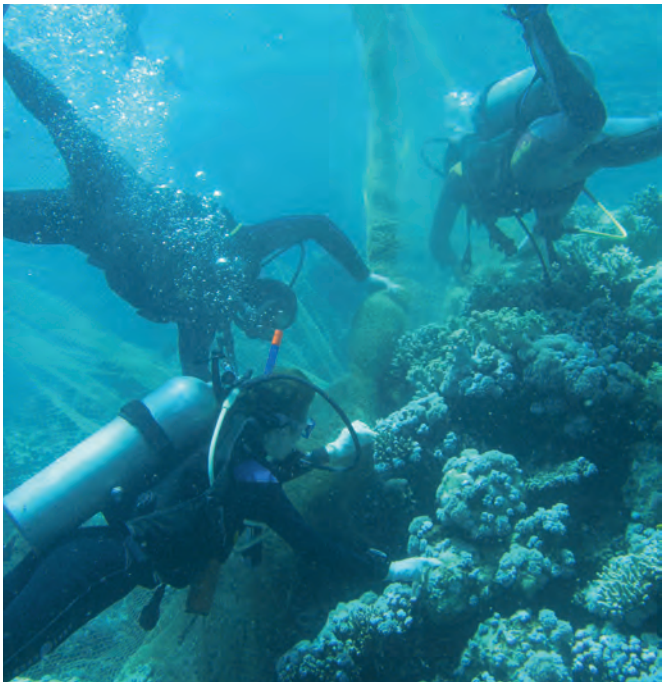


Many tourists are not aware that touching the corals destroys them.



Sitting on corals is unfortunately not an exceptional event.

Several beach cleanings (disposal of abandoned fishnets, rubbish and plastic waste) have been conducted in recent years. However, these actions only deal with the symptoms of environmental neglect and disregard. In order to improve the precious marine environment of Dahab, local businesses (tour operators, dive shops, restaurants, gift shops, etc.) must be educated and in turn educate the tourist in correct environmental preservation behaviours. Enforcement of environment laws would be very helpful. But simple self-interest of businesses can be a powerful motivator. Witness the success of HEPCA's institution of adding buoys to all dive sites in the Hurghada area to prevent coral reef destruction by dive boat anchors (http://www.hepca.org/).



Recovery of a lost fishnet at Islands in June 2009.



Recovery of a lost fishnet at Islands in June 2009. Read the whole story at: https://mare-mundi.org/forum_alt/viewtopic.php?f=18&t=4344





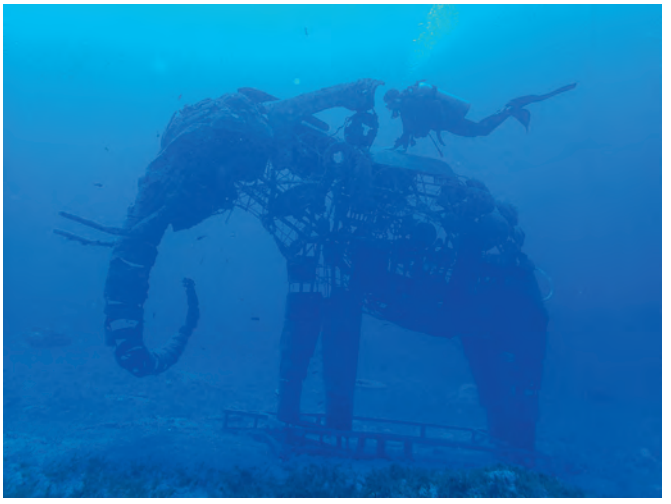
Beach cleaning at Lagoon in 2008 and 2016.



Recovered fishing lines during a beach cleaning at Lagoon in 2008.



Beach cleaning at Lagoon in 2016.



Artificial reef at Masbat Bay. This and other structures may provide a new home for a variety of organisms. They attract and perhaps concentrate divers on certain points leaving other sites less impacted.



Artificial reef at Masbat Bay which soon got settled with sea life (July 2016).







Local initiatives giving hope for changes.

## Abbreviations and acronyms

| | |
|---|---|
| aff. | "affinis" meaning "similar to" - means a specimen is very similar to a regular species but I am quite sure they are different. |
| cf. | "confer" meaning "compare with" or "likely to be" - means I am not confident to confirm an identification without further taxonomical and/or molecular analyses, e.g. because specimens at hand are fragments, in bad condition or are juveniles which do not show a relevant character. |
| DAFNI URL 1 | homepage of Jacob DAFNI<br>URL 1: http://www.dafni.com/mollusca/index.html |
| fig. | figure or figures |
| gen. | "genus" - means a specimen could not be identified to genus level |
| nom. dub. | nomen dubium |
| pers. comm. | personal communication |
| p., pp. | page, pages |
| pl. | plate or plates |
| sp., spp. | one or more "species" - means specimen could not be identified because of lack of knowledge or literature or belongs to a putative undescribed species |
| (sic) | "incorrect subsequent spelling" or misspelling as given in the cited publication |
| syn. | synonym |
| URL | Uniform Resource Locator, the global address of documents on the World Wide Web. |
| vs. | "versus" to compare with something or as opposed to |
| WoRMS | World Register of Marine Species |
| ? | a doubtful identification not related to a similar species or a tentatively placed in situ photograph is marked with "?" |

## Acknowledgements

I would like to thank General Mohamed Yousry DAWOUD, President of the Nature Conservation Sector at the Egyptian Environmental Affairs Agency (NCS/EEAA), Dr. Moustafa FOUDA and Ayman MABROUK, Nabq, from the Nature Conservation Sector at the Egyptian Environmental Affairs Agency for the kind permission to work scientifically in Dahab and one of the South Sinai Protectorates (Nabq MRPA).

I want to thank my dear friend Robert HOFRICHTER, who inspired me to go to Dahab and join his well-guided tour in 2003. Robert und Maruska HOFRICHTER, Gottfried TICHY, Gabi MÜLLER, Thomas EBERL, Roland KAISER and several students along with Ilona and Andreas TISCHER and his team organised an unforgettable Bedouin wedding ceremony for me and my wife Chrissi (died of breast cancer in 2010) in the oasis of Wadi Gunai, which was filmed by Renate WIHAN and Wolfgang LEDL. "Herzlichen Dank dafür!" Andy TISCHER, the owner of the "Dive In Dahab Divecenter" (in 2003 and 2005 partner of SEC), invited me for free diving in 2005, 2007 and additionally welcomed me together with my daughters in 2008, 2009 and 2010.

During our stay on 27 July 2011 Andy had a fatal accident with his motorbike near his diving school. His ashes were scattered into the ocean at the dive site Lagoon. Dear Andy, all the best for your last dive. We wish you a fantastic journey with all the organisms through the reef. When we dive in the oceans you will always be our "buddy".

In the following years Hans LANGE ("iDive Dahab" later "Aquanautic Dahab") and his team welcomed me and my family with friendship and excellent working conditions.

The friendship with the staff members made it easy and comfortable to manage my journeys and expeditions in Dahab. My sincere thanks to Achmed, Ahmed, Alex, Alexander, Andi, David, Diana, Flo, Hatem, Ibbe, Inga, Jan, Jousef, Kathy, Kerstin, Khaled, Kiki, Magdi, Mira, Miriam, Richard, Richy, Salem, Sheikh Salem, Talat. My most heartfelt thanks go to Tom RUTHENBERG for the affiliation with my whole family.

I am especially indebted to Ahmed, Sheik Salem and Kathy for their support as well Dr. HEIKAL Abdel Tawab (Dahab Clinic: http://dahabclinic.com/) for his medical expertise and perfect treatment after a severe barotrauma probably following an infection of the inner ear in January 2018.

I again want to thank Robert HOFRICHTER and the RSEC Team (Nina MILTON and Christian VON MACH) for local assistance, use of staff rooms and laboratory, and for keeping my costs low during my visits. In 2007, Claudia POGOREUTZ, who just finished the coral reef biology course carried out by the University of Vienna, accompanied several of my underwater safaris and contributed to the collection. During this course Karl KLEEMANN joined three of my dives and provided some infaunal bivalves and *Leptoconchus*, Wolfgang WAITZBAUER provided material collected at Rick's Reef. Maruska HOFRICHTER always spreading happiness during our excursions and passionately searched the beach for treasures. She collected the last species added to this collection, *Eunaticina papilla,* which was found at El-Qura Bay in January 2018. From 2008 until 2018, my daughters Jasmin and Ines joined me snorkelling and diving. Both were very enthusiastic in collecting shells and so contributed significantly (see photo with *Tridacna*). Additionally, they helped me to clean, sort and identify the shells. Since 2012 also my son Merlin (see photo with *Lambis*) and my partner Roswita KRONSTEINER joined most of my Dahab visits. For me it was great to show you the reefs, thank you!

For help with formal procedures, as well as for providing local assistance and organizing and joining a trip to Nabq, I thank the

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I am especially indebted to Jacob DAFNI (Israel), who supported my first efforts to get acquainted with the modern nomenclature of the Red Sea malacofauna. In June 2012 Leo VAN GEMERT and Henk DEKKER, both well-known especially for Red Sea malacological studies, started to review the identifications. Difficult and questionable specimens were discussed and partly reviewed with amongst others, Aart DEKKERS, Ed HEIMAN, Henk MIENIS and Robert G. MOOLENBEEK. They significantly contributed to the taxonomical and nomenclatural quality of this work. Leo VAN GEMERT additionally helped with proof reading and long-time support with important Red Sea literature. To them and the other colleagues from the Netherlands Malacological Society the warmest thanks for their valuable contribution.

I corresponded and received support for some families from different malacologists within their special groups – to all of them many thanks: Polyplacophora (Bruno DELL'ANGELO, Bruno ANSEEUW, Enrico SCHWABE), some Arcidae (Solly SINGER, Graham OLIVER), Lithophaginae (Karl KLEEMANN), Pectinidae (Henk DIJKSTRA), Lucinidae (John TAYLOR, Emily GLOVER), Cardiidae (Jan Johan TER POORTEN), Lioconcha (Sancia VAN DER MEIJ, Rob MOOLENBEEK), Haliotidae and Scissurellidae (Daniel GEIGER), Fissurellidae and Chilodontaidae (David HERBERT), Neritimorpha (Tom EICHHORST), Epitoniidae (Bruce NEVILLE & Lenny BROWN), Atlantidae (Debby WALL-PALMER), Littorinidae (David G. REID), Triphoridae (Hannco BAKKER), Vermetidae (Rüdiger BIELER), Rissoidae, Rissoinidae and Zebinidae (Marien FABER), Caecidae (Bret RAINES), Ovulidae and Triviidae (Dirk FEHSE), Strombidae (Gijs KRONENBERG), Cystiscidae and Marginellidae (Franck BOYER), Columbellidae (Kevin MONSECOUR), Fasciolariidae (Martin SNYDER), Pisaniidae (Koen FRAUSSEN), Muricidae without Coralliophilinae (Roland HOUART), Costellariidae and Mitridae (Aart DEKKERS), Conidae (Loïc LIMPALAËR and Eric MONNIER), "Turridae" early version (Peter STAHLSCHMIDT),Terebridae (Yves TERRYN), Opisthobranchia (Nathalie YONOW), Bornellidae (Erwin KOEHLER), Thecosomata (Arie W. JANSSEN), Pyramidellidae - Odostomiinae (Anselmo PEÑAS & Emilio ROLÁN), Scaphopoda (Bernd SAHLMANN, Jordy VAN DER BEEK, Frans de JONG), some problems on family level (Philippe BOUCHET).

I had most valuable, nightly telephone-discussions with the keen observer and excellent specialist in malacology Henk DEKKER during the last months. Thus, several strategies and ideas for species discrimination and identification were developed largely due to his influence. Therefore, I would also like to express my appreciation and utmost gratitude.

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*„I have no time for stress,*
*but of course, I am always in a hurry."*

# Polyplacophora

The polyplacophorans are commonly known as chitons. In 54 out of 61 sediment samples (57 x 100 ml, 2 x 1000 ml, 1 x 1500 ml) valves of 15 different species were found. Additionally, *Acanthopleura vaillantii* was regularly found alive on intertidal beach rocks and was occasionally found beached. The average was 4.1 species per sample. Seven samples were without Polyplacophora. The maximum of eight species was reached in four samples. Just two or three valves of each *Leptochiton nierstraszi, Parachiton jordanensis* and *Ischnochiton yerburyi* were found, all below 16 m of depth. Most frequent were *Acanthochitona penicillata* (n = 39), *Lucilina sueziensis* (n = 36), *Rhyssoplax affinis* (n = 35), *Choneplax indica* (n = 34) and *Lucilina perligera* (n = 31), all in the depth range from the reef flat down to 45 m. *Ischnochiton sansibarensis*, *Acanthopleura vaillantii*, *Lucilina sueziensis*?, *Rhyssoplax maldivensis*?, *Acanthochitona mastalleri* and *Acanthochitona penicillata* were photographed alive, some of them found only by chance on the pictures. The complete shell is available for *Acanthopleura vaillantii*, *Ischnochiton sansibarensis*, *Acanthochitona mastalleri* and one *Leptoplax curvisetosa* which is only 2.5 mm in size.

Terminology of valve structures is according to SCHWABE (2010). Most species are already adequately described in the literature, so descriptions are brief and mainly focus on valve characters, which may be a hint for identification. In some cases, descriptions are supported by personal notes and observations. A key to chitons of Jordan is given by ANSEEUW & TERRYN (2004) which includes girdle characters, not available in dead valves. They found 13 different species by snorkelling down to 6 m depth in the most northern part of the Gulf of Aqaba.

## Leptochitonidae DALL, 1889

***Leptochiton nierstraszi*** (LELOUP, 1981)

**Plate 1: fig. 1 a, b:** 2.06 x 0.79 mm; **c, d:** 2.06 x 0.73 mm; a - d intermediate valves (Moray Garden).

Literature: KAAS & VAN BELLE 1985, STRACK 1993, DEKKER & ORLIN 2000, SLIEKER 2000, DELL'ANGELO et al. 2004.

Only three valves were found. They are coloured white, are elevated and the tegmentum is covered by well separated, almost equally sized granules arranged in quincunx.

***Parachiton jordanensis*** (ANSEEUW & TERRYN, 2004)

**Plate 1: fig. 2 a, b:** tail valve 1.93 x 1.24 mm (Canyon 22 m).

Literature: STRACK 1993, SCHWABE 1997, SLIEKER 2000, ANSEEUW & TERRYN 2004.

Only one tail valve is available. The mucro is situated at about 4/5 of the total length of the tail valve and does not overhang the posterior edge. The antemucronal area is sculptured with 46 longitudinal chains and the postmucronal area shows 56 radiating rows of granules, fewer than given in the original description (50 and 75 respectively). However, there are no further statistics on the variability of these characters. The most similar *Parachiton hylkiae* STRACK, 1993 known from nearby Sharm el Sheikh and Hurgada shows a terminal (almost) overhanging mucro, at the posterior edge and has up to 85 longitudinally arranged rows in the antemucronal area.

## Callochitonidae PLATE, 1901

***Callochiton vanninii*** FERREIRA, 1983

**Plate 1: fig. 3 a, b:** 3.79 x 1.12 mm; **c, d:** 3.43 x 0.97 mm; **e, f:** 2.77 x 0.75 mm; **g, h:** 1.32 x 0.38 mm; **i:** 2.89 x 1.08 mm; **j, k:** 2.1 x 1.3 mm (Islands 14 m); **l, m:** 1.6 x 1.0 mm (Canyon 32 m); a - f Moray Garden; g - i Canyon 45 m; a - h intermediate valves; j - l tail valves; a - f to scale.

Literature: FERREIRA 1983, STRACK 1993, DEKKER & ORLIN 2000, DELL'ANGELO et al. 2004, KAAS et al. 2006.

The tegmentum is very finely granulated; and the colour varies from greyish white with a pale rose tinge, through reddish brown to dark red. The articulamentum is often dark red. A detailed and comprehensive description is given by KAAS et al. (2006).

## Ischnochitonidae DALL, 1889

***Ischnochiton sansibarensis*** THIELE, 1910

**Plate 2: fig. 4 a, b:** head valve 2.99 x 1.43 mm; **c, d:** intermediate valve 3.17 x 1.25 mm; **e, f:** tail valve 1.78 x 0.72 mm (Moray Garden); **g, h**: dorsal and ventral view 3.44 x 2.35 mm; **i**: dorsal view 4.98 x 3.4 mm; **j, k**: living animals at Masbat Bay, **l**: at Lighthouse (by Silke BARON); a - d, g - i Lagoon.

Literature: FERREIRA 1983, KAAS & VAN BELLE 1988, KAAS & VAN BELLE 1990, ANSEEUW & TERRYN 2004, DINAPOLI & JANSSEN 2009.

Longitudinal chains of flat circular or elongated granules along the jugal area can be seen. At the pleural areas the granules are more shingle shaped and are arranged like roof tiles. The lateral areas are almost flat and show a similar microstructure. Three complete animals show this pattern. On careful observation a faint thimble-like sculpture can be found at the pleural area of valves vi-vii. This species has been a synonym of *Ischnochiton yerburyi* (E. A. SMITH, 1891) but may be differentiated based on the much weaker reticulate, thimble-like sculpture (DINAPOLI & JANSSEN 2009). Most specimens have a row of alternating dark and light spots along the posterior margin of valves i-vii.

***Ischnochiton yerburyi*** (E. A. SMITH, 1891)

**Plate 2: fig. 5 a, b:** intermediate valve 2.54 x 1.00 mm (Caves 18 m).

Literature: FERREIRA 1983, KAAS & VAN BELLE 1988, KAAS & VAN BELLE 1990, STRACK 1993, BOSCH et al. 1995, DEKKER & ORLIN 2000, ANSEEUW & TERRYN 2004, DELL'ANGELO et al. 2004, DINAPOLI & JANSSEN 2009.

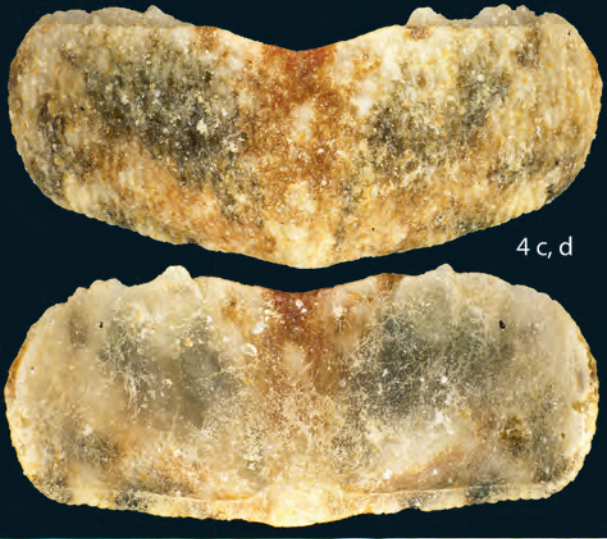
The tegmentum has a reticulate, thimble-like sculpture. Only a few intermediate valves show this clear pattern (see previous species).


1 a, b
1 c, d
2 a, b
3 j, k
3 a, b
3 c, d
3 e, f
3 g, h
3 i
3 l, m


4 a, b


4 l


4 e, f


4 c, d


4 g, h


4 i


4 j


4 k


5 a, b



## Chitonidae Rafinesque, 1815

### *Acanthopleura vaillantii* Rochebrune, 1882

**Plate 3: fig. 6 a - c:** dorsal, ventral and lateral view of beached specimen 36 x 26 mm; **d:** dorsal and **e:** ventral view of valves vii and viii.

Literature: Strack 1993, Schwabe 1997, Dekker & Orlin 2000, Slieker 2000, Anseeuw & Terryn 2004, Dafni URL 1, Kaas et al. 2006, Dinapoli & Janssen 2009.

This is the easiest polyplacophoran species to find because of its large size (almost 10 cm) and its intertidal occurrence on solid rocks. For a list of synonyms see Strack (1993).



**Fig. 3 f:** *Acanthopleura vaillantii* of ca. 10 cm in length found intertidal, on beach rock at Caves.



**Fig. 3 g:** *Acanthopleura vaillantii*? of ca. 4 cm in length found intertidal, underneath a rock at Canyon. The identification is not certain. Perhaps it is a juvenile with uneroded valves which show shell eyes. These are not seen in large *A. vaillantii*.

### *Rhyssoplax affinis* Issel, 1869

**Plate 3: fig. 7 a - l:** dorsal, ventral and frontal view of intermediate valves, al to scale; largest 2.57 x 1.48 mm, smallest 2.31 x 0.86 mm (Moray Garden 15 m); a, b are of the same specimen valve number ii (see remark next species); **m, n:** head valve 2.45 x 1.14 mm; **o, p:** head valve 2.92 x 0.8 mm; **q:** tail valve 1.59 x 1.12 mm; **r:** tail valve 2.15 x 1.16 mm; **s:** detail of bright green tail valve, height 1.21 mm; m - p, r Moray Garden; q, s Canyon 29 m.

Literature: Ferreira 1983, Strack 1993, Bosch et al. 1995, Schwabe 1997, Dekker & Orlin 2000, Slieker 2000, Anseeuw & Terryn 2004, Kaas et al. 2006, Dinapoli & Janssen 2009, Dell'Angelo et al. 2010a.

URL 2: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-5867

This genus has elevated valves (fig. i - l). The central areas and antemucronal area have strong longitudinal grooves, getting broader towards the girdle, without reaching the anterior margin of the valve near jugum. For lectotype see (URL 2).

### *Rhyssoplax maldivensis* (E. A. Smith, 1903)

**Plate 3: fig. 8 a, b:** intermediate valve ii 2.7 x 1.49 mm (Canyon 29 m); **c:** detail of lateral area; **d:** intermediate valve 3.08 x 1.14 mm (Canyon 11 m); **e, f:** tail valve 1.61 x 1.04 mm (Blue Hole 34 m).

Literature: Strack 1993, Schwabe 1997, Dekker & Orlin 2000, Slieker 2000, Anseeuw & Terryn 2004.

The specimens have some similarity concerning microstructure with the pictures in Dell'Angelo et al. (2010) and Sirenko (2012; *Rhyssoplax* cf. *maldivensis*). The lateral areas are variable, ranging from being almost flat to strongly elevated. Just 3 intermediate valves were found, their lateral areas are elevated and in one of them a very faint appearance of radial striation can be recognised with high magnification, therefore, identification is not sure. The main difference between *R. affinis* and *R. maldivensis* is the sculpture of head valve, lateral areas of intermediate valves and postmucronal area of tail valve which is smooth in *R. maldivensis* and radially striated in *R. affinis*. The valve ii (6 c - e, 7 a, b) in chitons is generally slightly different from other intermediate valves iii-vii, usually by having a different shape and a more convex anterior margin. Longitudinal striae in pleural areas are very variable in Chiton species. They can be parallel or oblique, and either reach or not reach the anterior margin (Dell'Angelo pers. comm).

### *Lucilina perligera* (Thiele, 1909)

**Plate 4: fig. 9 a, b:** head valve 4.24 x 1.89 mm; **c, d:** tail valve 1.46 x 0.61 mm; **e:** tail valve 2.96 x 1.99 mm (Caves 20 m); **f - k:** intermediate valves; **f, g:** 8.18 x 3.95 mm; **h, i:** 1.83 x 0.60 mm (Canyon 11 m); **j, k:** 5.04 x 2.13 mm (Umm Sid); a - d, f, g Moray Garden.

Literature: Strack 1993, Dekker & Orlin 2000, Slieker 2000, Anseeuw & Terryn 2004, Kaas et al. 2006.

The tegmentum of all valves is covered with large, well separated, and highly elevated, round to oval granules. Shell eyes (ocelli) are present.

### *Lucilina sueziensis* (Reeve, 1847)

**Plate 4: fig. 10 a, b:** head valve 2.66 x 0.78 mm (Caves 18 m); **c, d:** tail valve 4.76 x 3.08 mm (Moray Garden 2.5 m); **e - n:** intermediate valves; **e, f:** 3.20 x 1.42 mm (Canyon 11 m); **g, h:** 4.40 x 2.08 mm (Tigerhouse); **i, j:** 2.10 x 0.84 mm (Canyon 11 m); **k, l:** 2.91 x 1.76 mm (Islands 2.5 m); **m:** 4.52 x 1.85 mm (Canyon 45 m); **n:** detail showing ocelli (shell eyes).

Literature: Leloup 1960, Ferreira 1983, Strack 1993, Dekker & Orlin 2000, Slieker 2000, Anseeuw & Terryn 2004, Kaas et al. 2006, Dinapoli & Janssen 2009.

(continued after plates)


6 a, b, c
6 d, e
8 a, b
8 c
8 d
8 e, f
7 a, b
7 c, d
7 s
7 e, f
7 g, h
7 i, j, k, l
7 m, n
7 q
7 r
7 o, p


9 a, b
9 c, d
9 e
10 c, d
9 f, g
10 a, b
9 h, i
10 m
10 n
9 j, k
11 a, b
10 e, f
10 g, h
11 e, f
10 i, j
11 c, d
10 k, l



12 a, b



12 c



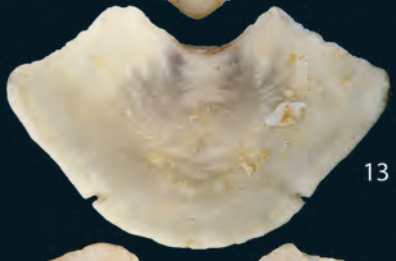
12 d



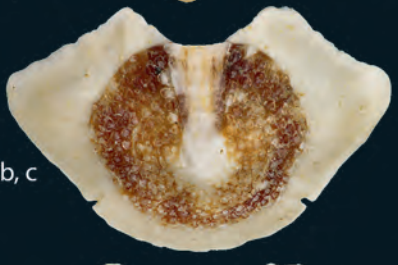
12 e, f

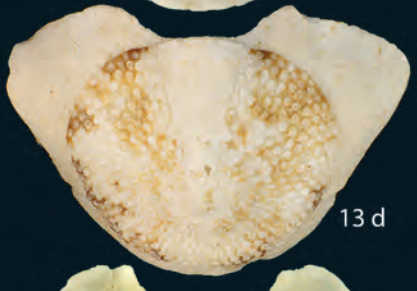


13 a

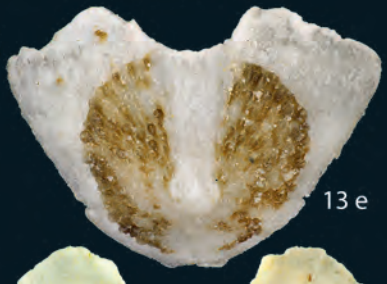


13 b, c

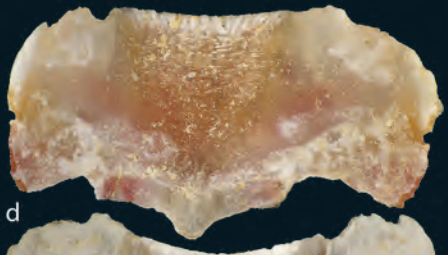




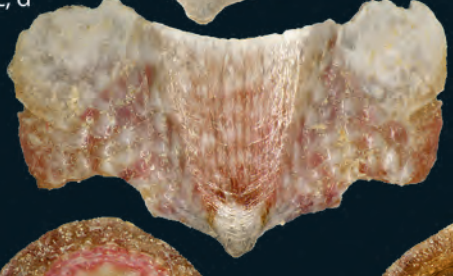
13 d

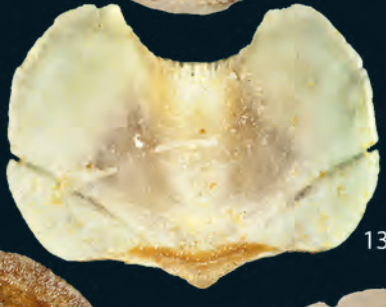


13 e

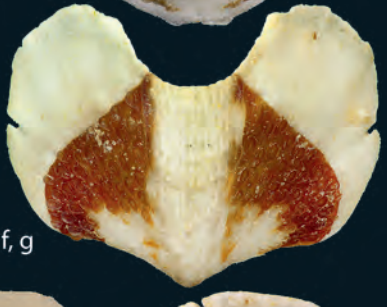


14 c, d





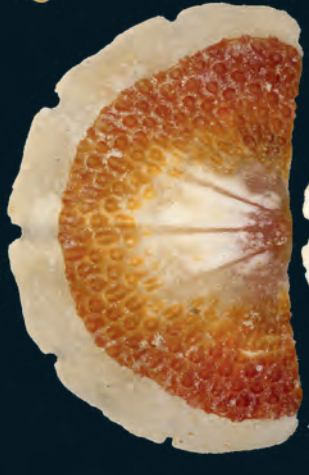
13 f, g





14 a, b





13 h, i



End valves and lateral areas of intermediate valves have many (30 - 40 on valve i) irregular granular ribs and conspicuous shiny shell eyes (STRACK 1993). Head valve and lateral areas have shiny black shell eyes (ocelli) and are ornamented with irregular granular ribs of considerable variability. Granules are sometimes dispersed without forming ribs on the head valve (ANSEEUW & TERRYN 2004).

*Tegulaplax hululensis* (E. A. SMITH, 1903)

**Plate 4: fig. 11 a, b:** head valve 3.11 x 1.57 mm; **c, d:** intermediate valve 4.47 x 1.8 mm; **e, f:** tail valve 4.43 x 3.33 mm; all Caves.

Literature: STRACK 1993, DEKKER & ORLIN 2000, SLIEKER 2000, ANSEEUW & TERRYN 2004, KAAS et al. 2006, DINAPOLI & JANSSEN 2009, DELL'ANGELO et al. 2010a.

The tegmentum is glossy and central areas appear smooth. Lateral areas are pinkish with irregular, wavy, concentric wrinkles.

## Acanthochitonidae PILSBRY, 1893

*Acanthochitona mastalleri* STRACK, 1989

**Plate 5: fig. 12 a, b:** dorsal and ventral view 9.80 x 5.15 mm (South); **c:** detail of anterior end (Moray Garden 2.5 m); **d:** living animal (Moray Garden 2.5 m); **e, f:** intermediate valve 2.02 x 1.04 mm (Golden Blocks 23 m).

Literature: STRACK 1993, SCHWABE 1997, DEKKER & ORLIN 2000, SLIEKER 2000, ANSEEUW & TERRYN 2004.

The overlapping dorsal girdle which is partially covering the valves is typical for this species.

*Acanthochitona penicillata* (DESHAYES, 1863)

**Plate 5: fig.13 a:** 2.61 x 1.26 mm (Caves 15 m); **b, c:** 2.26 x 1.45 mm (Caves 16 m); **d:** 3.49 x 2.05 mm (Caves 15 m); **e:** 2.34 x 1.66 mm (Tigerhouse); **h, i**: head valve 2.54 x 1.60 mm (Caves 32 m); **f, g:** 2.19 x 1.42 mm (Islands north 10 m); a, f, g intermediate valves; b - e: tail valves.

Literature: STRACK 1993, SCHWABE 1997, DEKKER & ORLIN 2000, SLIEKER 2000, ANSEEUW & TERRYN 2004, DELL'ANGELO et al. 2004, 2010a, DINAPOLI & JANSSEN 2009.

It is difficult to reliably evaluate this species-group. The valves are attributed to *A. penicillata* mainly based on the smooth jugal area (except for discrete transversal growth rugae) and the shape of granules which show however some kind of variation from drop-shaped to triangular, on tail valves they appear even circular.

*Leptoplax curvisetosa* (LELOUP, 1960)

**Plate 5: fig. 14 a, b:** dorsal and ventral view 2.45 x 1.68 mm (Islands north 10 m); **c, d:** intermediate valve 2.9 x 1.45 mm (Canyon 45 m).

Literature: STRACK 1993, DEKKER & ORLIN 2000, ANSEEUW & TERRYN 2004, DINAPOLI & JANSSEN 2009.

There are conspicuous polygonal granules in the latero-pleural areas (DELL'ANGELO et al. 2004), the jugum has 12 - 15 striae (STRACK 1993).

***Choneplax*:** Here the two following variants occur. Accurate identification is challenging as no complete specimens were found. If the two variants are conspecific, then there is high variability in shape, colour, proportions of tail valve, size, appearance (pores) of jugal area, and size of granules in the pleural area. Also, *Cryptoplax sykesi* is not easily assignable.

*Choneplax indica* ODHNER, 1919

**Plate 6: fig. 15 a, b:** 1.88 x 1.14 mm (Moray Garden 2.5 m); **c, d:** 2.06 x 1.17 mm (Moray Garden 2.5 m); **e, f:** 1.49 x 1.02 mm (Canyon 11 m); **g, h:** 2.00 x 1.36 mm (Gabr el-Bint); **i, j:** 2.20 x 1.42 mm (Blue Hole 34 m); **k, l:** questionable juvenile 0.88 x 0.71 mm (Canyon 11 m); a - f, i, j intermediate valves; g, h, k, l tail valves; whole plate to scale.

Literature: KAAS 1986, SLIEKER 2000, SIRENKO 2003, DELL'ANGELO et al. 2004, 2010b, DINAPOLI & JANSSEN 2009.

The valve is elongated, the large jugal area is smooth, never granulose, and the arrangement of the aesthetes is clearly visible. The latero-pleural areas are invariably sculptured with well raised, elliptical sometimes coalescing granules, arranged in longitudinal rows diverging forward from the apex (DELL'ANGELO et al. 2004). This is the first record from the Red Sea.

*Choneplax indica* ODHNER, 1919 (variant)

**Plate 6: fig. 16 a, b:** head valve 0.91 x 0.9 mm (Caves 15 m); **c, d:** intermediate valve 1.13 x 0.92 mm (Caves 15 m); whole plate to scale.

Literature: SCHWABE 2004

Intermediate valves are sub rectangular in outline and the posterior margin is obtusely angled. The tegmentum of valve i, latero-pleural areas of intermediate valves, and probably the tail valve consist of relatively small oval or elongate flat-topped pustules (compared to *C. indica* sensu DELL'ANGELO et al. 2004, 2010b, SIRENKO 2003). Valves are coloured yellowish to orange-brown. When eroded, the purple and white colour of the articulamentum is also visible on the upper side. The slits in the head valve are very short. A high variability was found by E. SCHWABE (pers. comm.).

## Cryptoplacidae H. ADAMS & A. ADAMS, 1858

*Cryptoplax sykesi* THIELE, 1909

**Plate 6: fig. 17 a - d:** questionable because somewhat intermediate between *Cryptoplax sykesi* and *Choneplax indica*; **a, b:** 2.42 x 1.21 mm (Canyon 11 m); **c, d:** 2.06 x 1.09 mm (Canyon 11 m); **e, f:** a more typical valve with longitudinal riblets 2.09 x 1.18 mm (Islands reef crest); a - f intermediate valves; whole plate to scale.

Literature: LELOUP 1980, FERREIRA 1983, STRACK 1993, KAAS 1986, DEKKER & ORLIN 2000, Dinapoli & JANSSEN 2009.

Good illustrations of all valves are available in LELOUP (1980) who described the synonym *Cryptoplax enigmaticus*. Intermediate valves have a narrow jugum, which is slightly elevated, smooth and ribbon-like. Lateral and pleural areas have 6 - 7 longitudinal riblets, some are broken up in granules, separated by well-defined furrows.


15 a, b
15 c, d
15 e, f
15 g, h
15 i, j
15 k, l
16 a, b
16 c, d
17 a, b
17 c, d
17 e, f

# Bivalvia

# Protobranchia

## Nucinellidae H. E. Vokes, 1956

***Huxleyia diabolica*** (Jousseaume, 1897)

**Plate 7: fig. 1 a - d:** 3.14 x 2.58 mm (Lagoon 12 m).

Literature: Lamy 1938, Dekker & Orlin 2000, Zuschin & Oliver 2003, Oliver & Taylor 2012, Huber 2015.

*Huxleyia diabolica* (Jousseaume, 1897) mentioned by Bosch et al. (1995) from the Arabian Sea was later described as *Huxleyia habooba* Oliver & Taylor, 2012. It differs only with respect to the outline where the posterior dorsal slope appears longer, resulting in the outline appearing to be wider. Although the shell's outline is more like the Arabian Sea form the older name for the Red Sea species is used.

## Solemyidae Gray, 1840

***Solemya* sp.**

**Plate 7: fig. 2 a, b:** 4.66 x 1.99 mm (Canyon 45 m).

Literature: Oliver 1992, Zuschin & Oliver 2003.

There is high uncertainty of the status of these shells which may be juvenile or a small undescribed species (Zuschin & Oliver 2003).

# Pteriomorphia

## Mytilidae Rafinesque, 1815

***Amygdalum peasei*** (Newcomb, 1870)

**Plate 7: fig. 3 a - d:** 27.5 x 14.2 mm (Lagoon); **e, f:** 27.9 x 12.9 mm (Lagoon); **g - j:** 2.82 x 1.61 mm juvenile (Caves 16 m).

Literature: Oliver 1992, 2001, Dekker & Orlin 2000, Okutani 2000, 2017, Poppe 2010, Huber 2010, Raines & Huber 2012.

The species was identified as *A.* cf. *dendriticum* Megerle von Mühlfeld, 1811 in Oliver (1992) and Zuschin & Oliver (2003). *Amygdalum peasei* was originally described from the Hawaiian Islands, but is also known from the Philippines, Society Islands, Marquesas Islands, Japan and Easter Island (Huber 2010, Raines & Huber 2012). According to Huber (2010) this species is identified as *A. plumeum* in Oliver (2001). In the juvenile prodissoconch and nepioconch are clearly visible which are not that transparent in adults. When specimens have lost their periostracum they are plain white. Larger specimens are more elongated, so they may be closer to *Amygdalum striatum* (Hutton, 1873).

## Brachidontinae F. Nordsieck, 1969

***Brachidontes pharaonis*** (P. Fischer, 1870)

**Plate 7: fig. 4 a - d:** 19.1 x 9.3 mm (Lagoon); **6 e:** 2.4 mm (Lagoon).

Literature: Bouchet & Danrigal 1982, Oliver 1992, 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Safriel 2014, Alf & Haszprunar 2015.

This species was identified as *B. variabilis* in Oliver (1982). *Brachidontes ustulatus* (Lamarck, 1819) has been put forward by Huber (2010) as the valid name to be used for this species. In WoRMS both names are kept as "accepted" until taxonomic clarification. *Brachidontes pharaonis* is a Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007, Safriel 2014).



**Fig. 4 f:** *Brachidontes pharaonis* intertidal at El-Qura Bay near oyster beds.



**Fig. 4 g:** *Brachidontes pharaonis* during sunset at El-Qura Bay.

## Crenellinae Gray, 1840

### Crenellinae Gen. sp.

**Plate 8: fig. 5 a, b:** 1.63 x 1.21 mm (Umm Sid 13 m).

URL 3: https://www.naturamediterraneo.com/forum/topic.asp?TOPIC_ID=133598

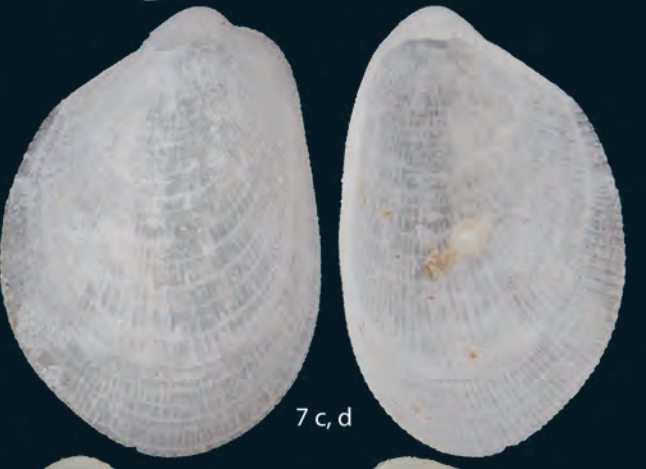
(continued after plates)


1 a - d
2 a, b
4 e
4 a - d
3 e, f
3 a - d
3 g - j

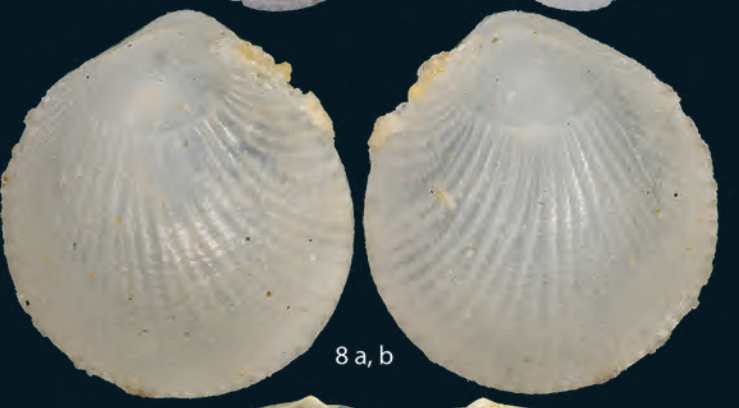

5 a, b

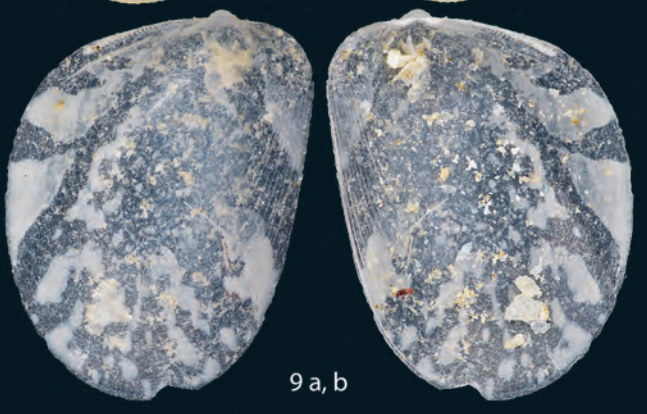

6 a, b


7 a, b


7 c, d


7 e, f


8 a, b


9 a, b


9 c, d

A very similar shell is *Crenella arenaria*? from the Mediterranean Sea depicted in URL 3. However, *Crenella* has strong vertical denticles beneath and above the umbones and a fine radial sculpture (Huber 2010).

*Rhomboidella* sp.

**Plate 8: fig. 6 a, b:** 3.61 x 2.20 mm (Caves 17 - 19 m).

Specimens differ from *R. vaillanti* in shape and microstructure.

*Rhomboidella vaillanti* (Issel, 1869)

**Plate 8: fig. 7 a, b:** 3.16 x 2.26 mm (Caves); **c, d:** 3.4 x 2.4 mm (Caves), **e, f:** 4.66 x 2.77 mm (Umm Sid 13 m).

Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003.

The species has formerly been placed in the genus *Solamen*.

*Solamen striatissima* (G. B. Sowerby III, 1904)

**Plate 8: fig. 8 a, b:** 1.70 x 1.62 mm (Moray Garden 37 m).

Literature: Oliver 1992, Dekker & Orlin 2000, Zuschin & Oliver 2003.

The species has formerly been placed in the genus *Crenella*.

## Dacrydiinae Ockelmann, 1983

*Dacrydium zebra* Hayami & Kase, 1993

**Plate 8: fig. 9 a, b:** 1.84 x 1.35 mm (Caves 17 - 19 m); **c, d:** 3.88 x 2.44 mm (Lighthouse 34 m).

Literature: Hayami & Kase 1993, Oliver & Holmes 2004, Oliver et al. 2004.

The genus is recognised by the primary teeth and the gap for the primary ligament, the convex dorsal margin and a dorsal buttress. Matches the original description concerning transparency, colour pattern and hinge structure. The smaller specimen is much stouter, whereas the second shell is more elongated and similar in shape but is much larger (3.9 mm) than the maximal sizes given by Oliver & Holmes from Rodrigues (2.2 mm) and Hayami & Kase from Japan (2.3 mm).

## Lithophaginae H. Adams & A. Adams, 1857

*Leiosolenus dahabensis* (Kleemann, 2008)

**Plate 9: fig. 10 a - d:** 12 x 6 mm.

Literature: Kleemann 2008.

This species was found inside the host coral *Stylocoeniella guentheri* (Basset-Smith, 1890). The shell is in the collection of K. Kleemann.

*Leiosolenus obesus* (Philippi, 1847)

**Plate 9: fig. 11 a, b:** 61.6 x 23.5 mm.

Literature: Oliver 1995, Dekker & Orlin 2000, Dafni URL 1.

This specimen was added by K. Kleemann to the collection.

*Leiosolenus parapurpureus* (Kleemann, 2008)

**Plate 9: fig. 12 a - c:** 1.45 x 6.0 mm.

Literature: Kleemann 2008.

Specimen was found inside a faviid coral. The shell is in the collection of K. Kleemann.

*Leiosolenus* cf. *pulcher* (Jousseaume, 1919)

**Plate 9: fig. 13 a, b:** 18.5 x 8.0 mm (Islands).

Literature: Oliver 1992, Dekker & Orlin 2000, Huber 2010.

Only a fragment has been found.

*Lithophaga teres* (Philippi, 1846)

**Plate 9: fig. 14 a, b:** 12.4 x 4.1 mm (Golden Blocks).

Literature: Oliver 1992, Dekker & Orlin 2000, Huber 2010.



**Fig. 14 c:** Calcareous tubes of bivalves belonging to Mytilidae or Gastrochaenidae (see also Gastrochaenidae).

## Modiolinae G. Termier & H. Termier, 1950

*Gibbomodiola biradiata* (Hanley, 1843)

**Plate 9: fig. 15 a, b:** 2.88 x 1.89 mm (Caves 17 - 19 m).

Literature: Oliver 1992, Dekker & Orlin 2000.

URL 4: https://gbmolluscatypes.ac.uk/specimens/348

This species is listed as *Modiolus philippinarum* in Dekker & Orlin (H. Dekker pers. comm.). The Syntype of *M. philippinarum* from the Philippines is depicted in URL 4 and can be distinguished by the presence of periostracal bristles. These bristles are missing in the Dahab shells.

*Lioberus ligneus* (Reeve, 1858)

**Plate 9: fig. 16 a, b:** 35 x 18 mm; **c, d:** 12.9 x 7.3 mm (Islands).

Literature: Oliver 1992, Dekker & Orlin 2000, Dafni URL 1, Zuschin & Oliver 2003, Rusmore-Villaume 2008, Huber 2010.

Crocetta et al. (2013) reported the first record of *L. ligneus* in the Mediterranean Sea.

*Modiolus auriculatus* (Krauss, 1848)

**Plate 10: fig. 17 a, b:** 27 x 17 mm; **c, d:** 26.5 x 16.3 mm; **e, f:** 47 x 25 mm; **g, h:** 55 x 26 mm; all from Islands.

Literature: Oliver 1992, 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Rusmore-Villaume 2008, Dafni URL 1.

(continued after plates)


12 a - c
10 a - d
13 a, b
11 a, b
15 a, b
14 a, b
16 a, b
16 c, d


17 a, b
17 c, d
17 e, f
17 g, h
18 a, b
18 e, f
18 c, d
20 e
19 a, b
20 f
20 a - d
20 g, h

Younger shells appear somewhat different in the angulations of the shell margins.



**Fig. 17 i:** *Modiolus auriculatus* at Islands on the reef flat between some Cerithiidae, Trochidae, sea urchins and a flatworm.

## Musculinae Iredale, 1939

### *Gregariella ehrenbergi* (Issel, 1869)

**Plate 10: fig. 18 a, b:** 2.65 x 1.68 mm; **c, d:** 5.04 x 2.76 mm; **e, f:** 3.59 x 2.10 mm; all from Caves.

Literature: Issel 1869, Dekker & Orlin 2000, Rusmore-Villaume 2008, Huber 2010.

Considering some variability in shape, the probably juvenile specimens represent Issel's species. *Gregariella* should have a hairy periostracum on the posterodorsal area (Rusmore-Villaume 2008), however, this is neither seen in our specimen, nor in the picture given in Huber (2010).

### *Gregariella* sp.

**Plate 10: fig. 19 a, b:** 3.05 x 1.65 mm (Canyon).

Literature: Oliver 1995.

The strong secondary teeth as in *Gregariella simplicifilis* Barnard, 1964 in Bosch et al. (1995) are characteristic. However, that species is a synonym of the Mediterranean Sea species *Gregariella petagnae* (Scacchi, 1832) in WoRMS.

## Septiferinae Scarlato & Starobogatov, 1979

### *Septifer cumingii* Récluz, 1849

**Plate 10: fig. 20 a - d:** 11.3 x 5.5 mm (Abu Galum); **e:** 4.29 x 2.60 mm (Blue Hole); **f:** 3.96 x 2.26 mm (Blue Hole); **g, h:** 1.45 x 0.83 mm (South).

Literature: Dekker & Orlin 2000, Dafni URL 1, Zuschin & Oliver 2003, Rusmore-Villaume 2008, Huber 2010, Scaperrotta et al. 2012, Raines & Huber 2012.

Many authors list this species as *S. bilocularis forskalii* Dunker, 1855. According to Huber (2010) *S. cumingii* Récluz, 1849 is the oldest name. This species is a Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007, Scaperrotta et al. 2012).

## Arcidae Lamarck, 1809

The common name for shells of this family is ark clam.

### *Acar plicata* (Dillwyn, 1817)

**Plate 11: fig. 1 a - d:** 19.0 x 11.1 mm (Islands); **e - g:** 11.6 x 10.2 mm (Islands); all to scale.

Literature: Oliver 1992, 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Al-Yamani et al. 2012, Raines & Huber 2012.

The largest shell in the collection is 25.5 mm in length.

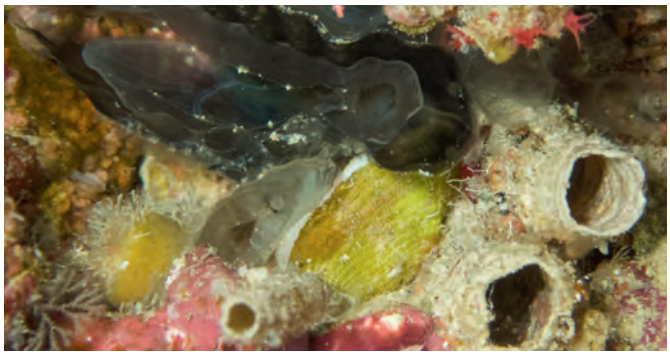


**Fig. 1 h**: *Acar plicata* and *Streptopinna saccata* at Caves.

### *Anadara antiquata* (Linnaeus, 1758)

**Plate 11: fig. 2 a:** 32.5 mm; **b:** 37.8 mm; **c - d:** 12.1 x 15.2 mm (Lagoon).

Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Dafni URL 1, Zuschin & Oliver 2003, Rusmore-Villaume 2008.

Tiny concentric cross bars (strong growth lines?) in the interspaces of the ribs are characteristic. Furthermore, the anterior ribs are bisected but this is not always clearly visible, especially if the periostracum is intact.

### *Anadara uropigimelana* (Bory de Saint-Vincent, 1827)

**Plate 11: fig. 3 a, b:** 38.5 mm; **c - f:** 41 mm.

Literature: Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008.

The species is always smoother than *A. antiquata* and never has strong nodulous cross bars on and between the ribs.

### *Arca volucris* Reeve, 1844

**Plate 11: fig. 4 a - e:** 19.4 x 10.4 mm; **f:** 24.4 x 16.5 x 16.7 mm; both South.

Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Dafni URL 1, Zuschin & Oliver 2003, Rusmore-Villaume 2008, Huber 2010.

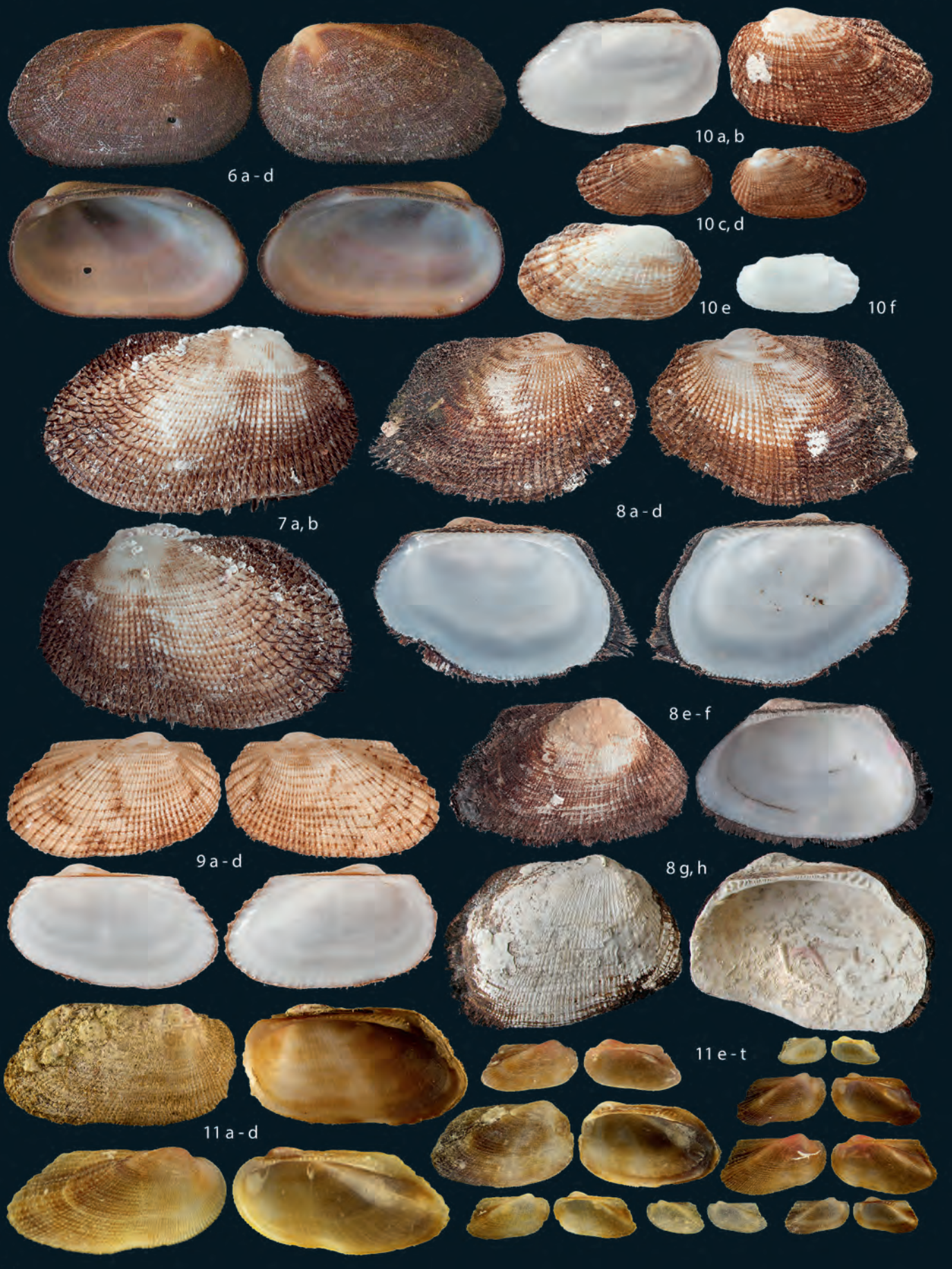
*Arca avellana* Lamarck, 1819 has stronger, darker brown posterior ribs, while *A. volucris* has a dotted colour pattern on these ribs. The form is variable in both species. According to H. Dekker (pers. comm.) *A. volucris* originates from deeper water while *A. avellana*, which I have not found in Dahab, is living intertidally.

### *Arca ventricosa* Lamarck, 1819

**Plate 11: fig. 5 a - f:** 51.4 mm.

Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Huber 2010.


1 a - d
1 e - g
2 a
2 b
2 c - f
3 a, b
3 c - f
4 a - e
4 f
5 a - f


6 a - d
10 a, b
10 c, d
10 e
10 f
7 a, b
8 a - d
8 e - f
9 a - d
8 g, h
11 e - t
11 a - d

***Barbatia amygdalumtostum*** (RÖDING, 1798)

**Plate 12: fig. 6 a - d:** 42 mm.

Literature: OLIVER 1995, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, DAFNI URL 1, RUSMORE-VILLAUME 2008, GARCÍA & OLIVER 2008.

The older name *Arca fusca* BRUGUIÈRE, 1789 is a homonym of *Arca fusca* LIGHTFOOT, 1786 and therefore unavailable.

***Barbatia decussata*** (G. B. SOWERBY I, 1833)

**Plate 12: fig. 7 a, b:** 34.0 mm; to scale with 9 a - d.

Literature: OLIVER 1995, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, DAFNI URL 1, RUSMORE-VILLAUME 2008, GARCÍA & OLIVER 2008, POPPE 2017b.

*Barbatia decussata* is accepted as *B. trapezina* (LAMARCK, 1819) in WoRMS but GARCÍA & OLIVER (2008) discriminate between them. The periostracal bristles of *B. trapezina* are spicate and erect rather than blunt and adpressed compared to *B. decussata*. The specimen in HUBER (2010: 134, upper row right) is also *B. decussata*. See also remarks at *Barbatia foliata*.

***Barbatia foliata*** (FORSSKÅL in NIEBUHR, 1775)

**Plate 12: fig. 8 a - d:** 52.0 mm; **e, f:** 70 mm (Ricks Reef); **g, h:** 78 mm (Islands).

Literature: DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, RUSMORE-VILLAUME 2008, GARCÍA & OLIVER 2008.

The periostracum is very thick especially over the posterior and is foliose rather than spicate (GARCÍA & OLIVER 2008). *Barbatia decussata* can be distinguished from *B. trapezina* by a more anteriorly-reduced shell, compared to a more rectangular shape in the former species, and by a greater number of posterior riblets. *Barbatia trapezina* has only 4 - 5 posterior riblets that remain deeply incised throughout life and are widely spaced (LUTAENKO 2015).

***Barbatia* (*Abarbatia*) cf. *hawaia*** DALL, BARTSCH & REHDER, 1938

**Plate 12: fig. 9 a - d:** 32 mm (South); to scale with 7 a, b.

Literature: DALL, BARTSCH & REHDER 1938, HUBER 2010, SEVERNS 2011.

The species is similar to *B. trapezina* but has very sparse periostracal hairs and very elegant knobs on the dorsolateral portions of the shell. Furthermore, the dentition is more delicate. The valves in SEVERNS (2011: pl. 197, fig. 2) come very close to the Dahab shells. However, the anterior radial rows differ, for they are stronger and prominently bipartite. The specimen depicted by HUBER (2010: 134, upper row middle) as *B. molokaia* (in error) may fit better with the shells in SEVERNS. There are only 3 valves in the collection, therefore no statement can be made about the variability of this species, hence "cf." was added in the determination.

***Barbatia* (*Abarbatia*) *molokaia*** DALL, BARTSCH & REHDER, 1938

**Plate 12: fig. 10 a, b:** 38.0 mm; **c, d:** 21.7 mm; **e:** 29.0 mm; **f:** 19.4 mm; all to scale.

Literature: DALL, BARTSCH & REHDER 1938, SHARABATI 1984, OLIVER 1992, BLATTERER et al. 2000, DEKKER & ORLIN 2000, SINGER & MIENIS 2007, HUBER 2010, SEVERNS 2011.

URL 5: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-3922

Identified as *B.* cf. *bistrigata* (DUNKER 1866) in SHARABATI (1984: pl. 38, fig. 2, 2a) which is *B. cometa* (REEVE, 1844) in DEKKER & ORLIN. OLIVER (1992) has a specimen within *B. foliata* (pl. 2, fig. 1c), and SINGER & MIENIS (2007) picture it probably according to DEKKER & ORLIN as *B. cometa*. HUBER (2010) keeps two very similar species without periostracal bristles separated. *Barbatia revelata* is generally more inflated, stronger noduled and slightly more robust than *B. cometa*. HUBER states that the western most locality recorded for *B. cometa* is Andaman Sea. However, it appears that he mixed up figures. The *B. cometa* shell (134, 2nd row left) does not match the syntype of REEVE which is shown in LAMPRELL & HEALY (1998) but resembles the Dahab shells. The figure named *B. revelata* (134, 2nd row middle) is posteriorly broader. The supposed syntype (URL 5) was obviously collected after its description. SEVERNS (2011: pl. 196, fig. 4) depicts the holotype of *B. molokaia*.

***Barbatia parva*** (G. B. SOWERBY I, 1833)

**Plate 12: fig. 11 a - t:** largest 9.4 mm; smallest 2.0 mm; all to scale from Islands.

Literature: OLIVER 1992, 1995, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, RUSMORE-VILLAUME 2008, HUBER 2010.

***Barbatia perinesa*** OLIVER & CHESNEY, 1994

**Plate 13: fig. 12 a - c:** 14.0 mm (North).

Literature: OLIVER 1995, ZUSCHIN & OLIVER 2003, HUBER 2010.

Brown coloured concentric bars over the posterior angle and pink inner margins are distinctive. Periostracal bristles as shown here have not been represented in any known publication.

***Barbatia setigera*** (REEVE, 1844)

**Plate 13: fig. 13 a - d:** 35.0 mm (North).

Literature: OLIVER 1995, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, DAFNI URL 1, RUSMORE-VILLAUME 2008, AL-YAMANI et al. 2012.

The inside of the shells is brown to purple and not plain white.

***Barbatia trapezina*** (LAMARCK, 1819)

**Plate 13: fig. 14 c - f:** 15.6 mm (Islands).

Literature: DEKKER & ORLIN 2000, DAFNI URL 1, RUSMORE-VILLAUME 2008, GARCÍA & OLIVER 2008, POPPE 2017b.

See the remark in *B. decussata*.

***Hawaiarca sulcata*** (LAMARCK 1819) **nov. comb.**

Basionym: *Arca sulcata* LAMARCK, 1819

**Plate 13: fig. 15 a, b:** 19.4 mm (Lagoon); **c, d:** 4.5 mm (Islands 10 m).

Literature: DALL, BARTSCH & REHDER 1938, SHARABATI 1984, OLIVER 1992, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, DAFNI URL 1, SINGER & MIENIS 2007, RUSMORE-VILLAUME 2008, HUBER 2010, SEVERNS 2011.

*Barbatia reticulata* (GMELIN, 1791) is used by several authors. Unless the CHEMNITZ's type can be found in St. Petersburg *reticulata* is considered a nom. dub. (HUBER 2010).

(continued after plates)


12 a - c
15 a, b
15 c, d
13 a - d
16 a, b
14 a - d


1 a - d
2 a, b
2 c - e
2 f, g
1 e - h
3 a - d
4 a, b
4 c, d
5 a, b
5 c, d
5 e, f
5 g, h
5 i - j
5 k, l

*Hawaiarca rectangula* DALL, BARTSCH & REHDER, 1938 is nearly identical to the Dahab species and may probably be even a synonym. It is the type species of *Hawaiarca* DALL, BARTSCH & REHDER, 1938, which predates the genus *Vitracar* IREDALE, 1939 with its type *Vitracar laterosa* IREDALE, 1939 (synonym of "*sulcata*" in WoRMS). *Hawaiarca rectangula* and *V. laterosa* are congeneric. As a conclusion the genus name for this species becomes *Hawaiarca*.

## Noetiidae STEWART, 1930

***Arcopsis sculptilis*** (REEVE, 1844)

**Plate 13: fig. 16 a, b:** 4.26 x 2.87 mm (Bells - Blue Hole 15 m).

Literature: HUBER 2010, RAINES & HUBER 2012.

## Glycymerididae DALL, 1908 (1847)

Common names of these family are dog cockles or bittersweets.

***Glycymeris arabica*** (H. ADAMS, 1871)

**Plate 14: fig. 1 a - d:** 12.5 x 10.8 mm; **e - h:** 11.5 x 10.0 mm (Lagoon); all to scale.

Literature: DEKKER & ORLIN 2000, DAFNI URL 1, RUSMORE-VILLAUME 2008, HUBER 2010.

In the Red Sea a second species, *Glycymeris adenensis* (JOUSSEAUME in LAMY, 1916), might occur, which is stronger ribbed and beaded, more compressed, inside vividly deep purplish brown and white at the margins (HUBER 2010). The specimens could not be clearly attributed; therefore, the older name is preferred.

***Glycymeris livida*** (REEVE, 1843)

**Plate 14: fig. 2 a, b:** 54.2 x 53.9 mm; **c - e:** juvenile of probably this species enlarged 2.11 x 2.10 mm (Islands seagrass 26 m); **f, g:** 54.2 x 53.9 mm (South); a, b, f, g to scale.

Literature: OLIVER 1992, BLATTERER et al. 2000, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, DAFNI URL 1, RUSMORE-VILLAUME 2008, HUBER 2010, AL-YAMANI et al. 2012.

***Tucetona audouini*** MATSUKUMA, 1984

**Plate 14: fig. 3 a - d:** 34.7 x 31.0 mm.

Literature: OLIVER 1992, BLATTERER et al. 2000, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, DAFNI URL 1, RUSMORE-VILLAUME 2008, HUBER 2010.

The largest shell in this collection measures 44 mm. *Pectunculus audouini* JOUSSEAUME in LAMY, 1916 is an unavailable name under ICZN Art. 11.6 (VAN GEMERT 2008a, BOUCHET 29.09.2013 in WoRMS).

## Limopsidae DALL, 1895

***Limopsis* (*Paracratis*) *marerubra*** OLIVER & ZUSCHIN, 2000

**Plate 14: fig. 4 a, b:** 1.76 x 1.66 mm (Caves 17 - 19 m); **c, d:** 1.80 x 1.79 mm (Islands 14 m); all to scale.

Literature: OLIVER & ZUSCHIN 2000, ZUSCHIN & OLIVER 2003, HUBER 2010.

The specimens are more distinctly subquadrate and the radial sculpture is less visible compared to the type.

***Limopsis multistriata*** (FORSSKÅL in NIEBUHR, 1775)

**Plate 14: fig. 5 a, b:** 13.7 x 13.4 mm; c, d: 12.8 x 12.3 mm; **e, f:** 19.0 x 17.2 mm; a - f to scale; **g, h:** 3.84 x 3.78 mm (El Gahaza 17 m); **i, j:** 4.0 x 3.8 mm; **k, l:** 2.2 mm; i - l from Islands seagrass; g - l juveniles to scale but enlarged against a - f.

Literature: OLIVER 1992, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, RUSMORE-VILLAUME 2008.

## Pteriidae GRAY, 1847 (1820)

Pteriidae are also called the feather oysters.

***Isognomon legumen*** (GMELIN, 1791)

**Plate 15: fig. 1 a - d:** 58 mm (North); **e - h:** 62 mm; **i, j:** 79 mm (North); **k - n:** 36.8 x 28.4 mm (North); all to scale.

Literature: OLIVER 1992, 1995, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, DAFNI URL 1, RUSMORE-VILLAUME 2008, ANGELIDIS & POLYZOULIS 2018.

A few specimens are shaped like *Perna flabellum* PAGENSTECHER, 1877 (e.g. fig. 1 k - n), however, plasticity of crevice-dwelling Pterioida is very high. This species is a Lessepsian immigrant into the Mediterranean Sea (MIENIS et al. 2016, ANGELIDIS & POLYZOULIS 2018, though their specimens are much smaller).

***Isognomon* sp.**

**Plate 15: fig. 2 a, b:** 6.65 x 3.81 mm (Caves); **c - f:** (Islands); all to scale but enlarged to 1 a - n by a factor of approximately 7.4.

These are probably juveniles of *I. legumen*. However, in the smallest specimens only a single ligament is visible (not multivincular) and several radially arranged striae with some small scales can be recognised.

***Isognomon nucleus*** (LAMARCK, 1819)

**Plate 15: fig. 3 a - d:** 9.24 x 8.96 mm; **e, f:** 5.3 x 5.0 mm; all to scale.

Literature: DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, DAFNI URL 1, RUSMORE-VILLAUME 2008, RAINES & HUBER 2012.

The sculpture is variable but the brownish-purple to greyish-black colour is an important diagnostic feature of this species. Non-eroded specimens bear many strong triangular squamae on the outer surface.

***Pinctada margaritifera*** (LINNAEUS, 1758)

**Plate 15: fig. 4 a:** 160 x 130 mm; shell from collection in Dahab; **b - e:** 16.6 x 14.0 mm (Blue Lagoon); b - e to scale with 5 a - d.

Literature: OLIVER 1992, 1995, BLATTERER et al. 2000, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, LIESKE & MYERS 2004, DAFNI URL 1, RUSMORE-VILLAUME 2008, LACROIX & LACROIX 2011.

URL 6: http://doris.ffessm.fr/Especes/Huitre-perliere3

(continued after plates)


1 a - d
1 e - h
1 i, j
1 k - n
2 a, b
2 c, d
2 e, f
3 a - d
3 e, f
4 a
4 b - e
5 a - d
5 e, f
5 g, h
5 i - k



**Fig. 4 f:** *Pinctada margaritifera* at Islands with bright orange mantle and gills. Note the different colour of the animal compared to 4 g.



**Fig. 4 g:** *Pinctada margaritifera*? at Lighthouse (Masbat Bay). Note the different colour of the animal compared to 4 f.

### *Pinctada imbricata radiata* (Leach, 1814)

**Plate 15: fig. 5 a - d:** 19.1 x 15.0 mm (South); **e, f:** 3.20 x 2.35 mm (Bells - Blue Hole 15 m); **g, h:** 2.18 x 2.04 mm (Caves); a, b to scale with 4 b - e; e - h to scale, are juveniles probably of this species.

**Plate 15: fig. 5 i - k:** 6.79 x 6.64 mm (Caves 17 - 19 m); this juvenile was tentatively assigned. However, the ligament scar is not well fitting with this species.

Literature: Oliver 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Scaperrotta et al. 2016.

This is the Indian Ocean subspecies of *Pinctada imbricata* Röding, 1798 (Temkin 2010, WoRMS). *Pinctada vulgaris* (Schumacher, 1817) is a well-known synonym. The juveniles may be pink in colour and develop scales later than *P. margaritifera*. This species is a Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007).

### *Pteria aegyptiaca* (Dillwyn, 1817)

**Plate 16: fig. 6 a - d:** 48 mm (South); all to scale with 7 a - f.

### *Pteria* cf. *aegyptiaca* (Dillwyn, 1817)

**Plate 16: fig. 7 a, b:** 42 mm (South); **c - f:** 33 mm; all to scale with 6 a - d.

Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, Lieske & Myers 2004, Dafni URL 1, Rusmore-Villaume 2008, Huber 2010.

It is easy to treat all Dahab shells as one variable species, but there may be differences. Typical *P. aegyptiaca*, as in the type figure, have an orange base colour with several dark brown concentric bands, which are arranged in a characteristic zigzag pattern (fig. 6 a - d). Variants, like those of Oliver (1992, 1995) identified as *Pteria macroptera* (Lamarck, 1819), are synonyms in Huber. Genetic studies are needed to find out if more than one species is involved (fig. 7 a - f). Further unidentified *Pteria* are depicted on plate 17 (fig. 2 e, 3 a, b).



**Fig. 7 g:** *Pteria aegyptiaca* at Caves. The animal in the front has the typical colour pattern.



**Fig. 7 h:** *Pteria aegyptiaca* at Caves.

(continued after plates)


6 a - d
7 a, b
7 c - f
10 a, b
9 a, b
8 a, b
9 c, d
9 e, f
9 g, h
10 c, d



**Fig. 7 i:** *Pteria aegyptiaca* at Caves.



**Fig. 7 j**: *Pteria* sp. at Lighthouse.

## Pinnidae Leach, 1819

These clams are also known as pen shells. Schultz & Huber (2013) revised the Recent Pinnidae. *Atrina vexillum* (Born, 1778) another species known from the Red Sea was not found. *Atrina pectinata* (Linnaeus, 1767) in Oliver (1992) and Dekker & Orlin (2000) is *Atrina hystrix* (Hanley, 1858) which was never confirmed reliably for the Red Sea (Schultz & Huber 2013).

### *Pinna muricata* Linnaeus, 1758

**Plate 16: fig. 8 a, b:** 121 mm (South).

Literature: Oliver 1992, 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Poppe 2010, Schultz & Huber 2013.

In the early 1990s the species was extremely common in sand in the intertidal zone of Masbat Bay (H. Dekker pers. comm.). This area is now almost entirely occupied by restaurant terraces, but fortunately *P. muricata* can still be found in subtidal areas.



**Fig. 8 c:** *Pinna muricata* at Nabq. The byssus for attachment to the substrate can be seen.



**Fig. 8 d:** Four specimens of *Pinna muricata* at Lagoon.

### *Streptopinna saccata* (Linnaeus, 1758)

**Plate 16: fig. 9 a, b:** 192 mm; **c, d:** 86 mm; **e, f:** 76 mm; **g, h:** 102 mm; all to scale.

Literature: Oliver 1992, 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Okutani 2000, 2017, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Poppe 2010, Lacroix & Lacroix 2011, Schultz & Huber 2013.

A typical crevasse dwelling species which is variable in shape and colouration of the mantle (see also at *Acar plicata*).



**Fig. 9 i**: *Streptopinna saccata* at Caves.

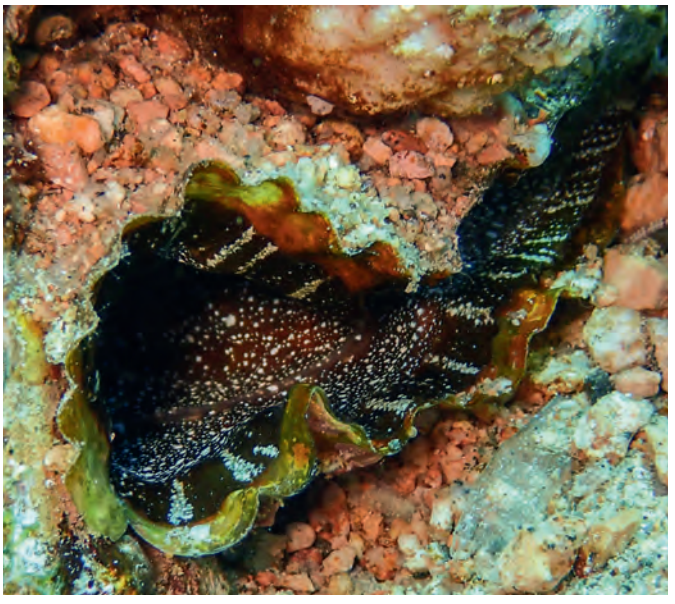


**Fig. 9 i**: *Streptopinna saccata* at Masbat Bay.



**Fig. 1 g:** *Dendostrea folium* on branching black coral (*Antipathes dichotoma*) at Caves.



**Fig. 1 h:** *Dendostrea folium*? lies on the bottom at Caves. It was probably detached by diving activities but is still alive.

## Ostreidae Rafinesque, 1815

Crocetta et al. (2015) studied small invasive oysters in the Mediterranean Sea. Specimens were morphologically so divergent that they could be ascribed a priori to different nominal species, in fact, all recorded from the Mediterranean Sea by different authors. However, genetic studies show that specimens clearly belong to a single, morphologically highly variable species, included in an Indo-Pacific clade very close to a sequence registered under the name *Dendostrea folium*. Thus, most oyster identifications are challenging.

### Ostreida Gen. sp.

**Plate 16: fig. 10 a, b:** 83 mm; **c, d:** 2.6 x 2.6 mm; unidentified juvenile.

Literature: Oliver 1995, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Huber 2010.

This large shell was brought to the collection by students. No shell in the used literature matches, especially in respect to the white and circular muscle scar. The shell may have been attached to a flat surface (e.g. a ship) which is indicated by the evenly flat outer side which was later exposed and colonised secondarily. This may indicate an anthropogenic dispersal of a foreign species not originating from the Red Sea. *Malleus regula* (Forsskål in Niebuhr, 1775) may be a related species.

### *Dendostrea folium* (Linnaeus, 1758)

**Plate 17: fig. 1 a - f:** 56 x 38 mm (South); **g – j:** 61 x 54 mm on *Pteria*.

Literature: Oliver 1992, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Huber 2010, Poppe 2010.

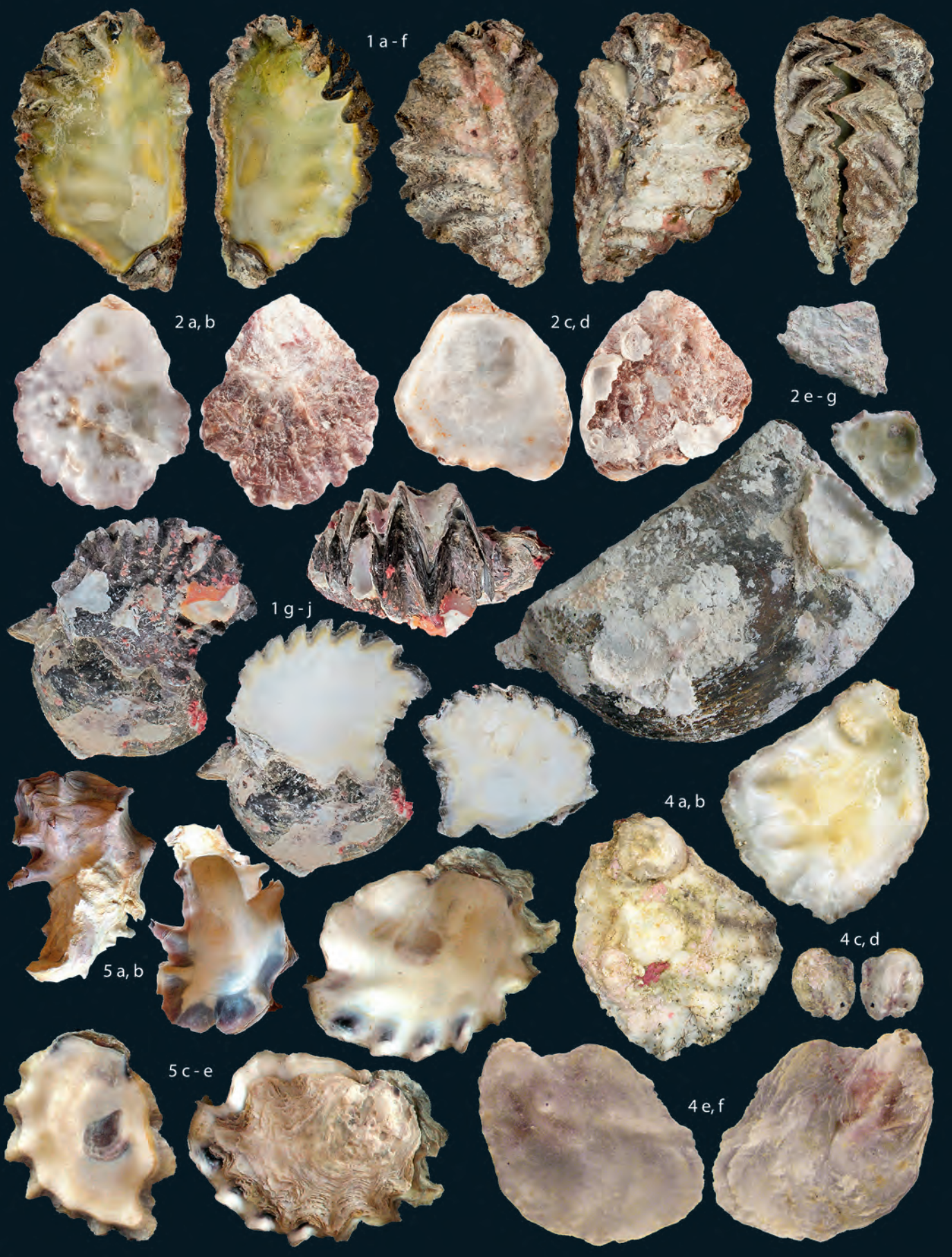
The largest specimen from Dahab is 76 mm in length. *Dendostrea frons* (Linnaeus 1758) is a Caribbean species (Huber 2010).

### *Dendostrea sandvichensis* (G. B. Sowerby II, 1871)

**Plate 17: fig. 2 a, b:** 32 x 26 mm (Lagoon); **c, d:** 30 x 26 mm (Lagoon).

Literature: Dekker & Orlin 2000, Dafni URL 1, Heiman & Mienis 2009, Huber 2010, Mienis et al. 2012.

The shells are similar to *Nanostrea pinnicola*. However, they have a more plicated margin and more irregularly arranged and sometimes slightly elongated chomata. Only two typical upper valves with greenish interior and reddish exterior have been found. They are found attached to corals and other bivalves. *Dendostrea rosacea* (Deshayes, 1836) is very similar and may be an older name. Furthermore, there is resemblance to *Nanostrea exigua* Harry, 1985 in Poppe (2010). *Dendostrea sandvichensis* is a Lessepsian immigrant into the Mediterranean Sea (Mienis et al. 2012). This species was often misidentified as *Alectryonella plicatula* which can grow larger and is distinguished by a characteristic shape, sculpture and internal fingerprint structure (Huber 2010).


1 a - f
2 a, b
2 c, d
2 e - g
1 g - j
4 a, b
4 c, d
5 a, b
5 c - e
4 e, f

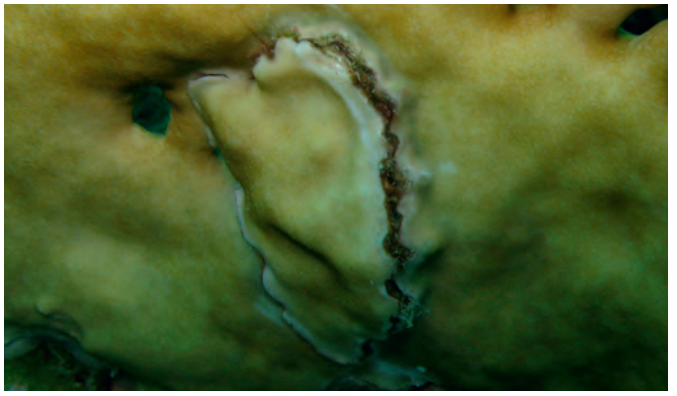


**Fig. 2 e:** *Dendostrea sandvichensis*? in the fire coral *Millepora*. Determination from in situ picture is uncertain.

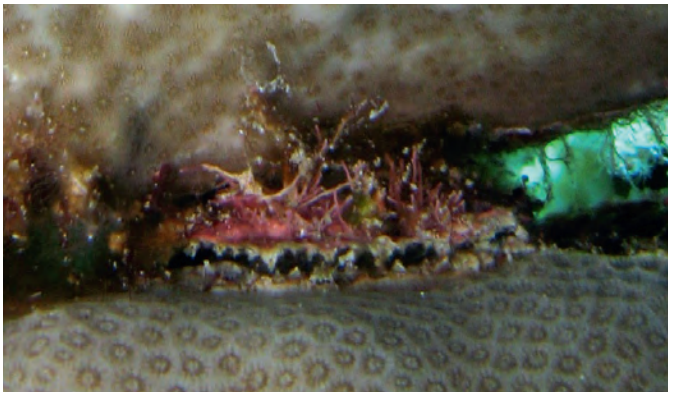


**Fig. 2 f:** *Dendostrea sandvichensis*? between *Porites*. Determination from in situ picture is uncertain.

### *Lopha cristagalli* (Linnaeus, 1758)

**Text figure 3:** not depicted on plate.

Literature: Oliver 1992, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Huber 2010, Poppe 2010.



**Fig. 3:** *Lopha cristagalli* overgrown by a sponge at Caves.

### *Nanostrea pinnicola* (Pagenstecher, 1877) nov. comb.

Basionym: *Ostrea plicatula* var. *pinnicola* Pagenstecher, 1877

**Plate 17: fig. 4 a, b:** 23 x 19 mm; **c, d:** 7.5 x 5.94 mm growing on a, b (Blue Lagoon). **e, f:** 3.3 x 3.8 mm (Islands).

Literature: Pagenstecher 1877, Oliver 1992, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Heiman & Mienis 2009, Huber 2010.

This species has flat valves with slightly undulating, but not plicated, margins. The chomata are arranged in single lines on both sides of the umbo. Furthermore, it is often found on other gastropod shells, especially those inhabited by hermit crabs, and bivalves. The Dahab specimens fit very well with the detailed description and drawings of Pagenstecher, especially in size, colour, occurrence in the Red Sea, marginal nodular chomata and the variability. Within the synonymy for this small oyster are the following taxa:

*Ostrea deformis* Lamarck, 1806, sensu Lamarck, 1819 (misidentification)
*Ostrea plicatula* var. *pinnicola* Pagenstecher, 1877
*Ostrea dolabriformis* Martens, 1899
*Ostrea oniscus* Martens, 1899
*Ostrea cuneola* Jousseaume in Lamy, 1925
*Ostrea fluctiger* Jousseaume in Lamy, 1925
*Ostrea glabra* Jousseaume in Lamy, 1925
*Ostrea pustula* Jousseaume in Lamy, 1925
*Nanostrea exigua* Harry, 1985

Harry (1985) overlooked Pagenstecher's older name when giving a new name to *Ostrea deformis* sensu Lamarck, 1819. *Nanostrea fluctigera* (Jousseaume in Lamy, 1925) is used by Huber 2010. The even older available name for this small Red Sea oyster, however, makes the discussion about several names used later unnecessary. In Oliver (1992) and Zuschin & Oliver (2003) this species is identified as *O. deformis* Lamarck, 1819 and perhaps also *O. stentina* Payraudeau, 1826, the latter being a Mediterranean Sea species. See also remarks at *Dendostrea sandvichensis*.

### *Saccostrea cucullata* (Born, 1778)

**Plate 17: fig. 5 a, b:** 5.4 x 3.0 mm (Lagoon); **c, d:** 36 x 27 mm (Lagoon).

Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Heiman & Mienis 2009, Huber 2010, Poppe 2010, Al-Yamani et al. 2012.



**Fig. 5 f:** *Saccostrea cucullata* intertidal oyster beds at El-Qura Bay.


6 a, b
7 a, b
7 e
7 c, d
7 f, g
7 j, k
7 h, i
7 l, m
7 n - p

## Gryphaeidae Vialov, 1936

Living Gryphaeidae are characterised by their vesicular shell layer.

### *Hyotissa hyotis* (Linnaeus, 1758)

**Plate 18: fig. 6 a - b:** 61 x 54 mm (Islands); note the vesicular shell layer.

Literature: Oliver 1992, Dekker & Orlin 2000, Dafni URL 1, Lieske & Myers 2004, Poppe 2010.

Small shells may only be distinguished from *H. numisma* by the dark colour. A photograph of a living animal in Dafni's homepage looks like *Lopha cristagalli*.



**Fig. 6 c:** *Hyotissa hyotis* at Caves.

### *Hyotissa numisma* (Lamarck, 1819)

**Plate 18: fig. 7 a, b:** 1.92 x 1.82 mm (Caves 4 m); **c, d:** 43 mm (Blue Hole); **e:** specimen 27 x 22 mm attached to *Haliotis* 39 mm; **f, g:** 24.3 mm (South); **h, i:** 37 mm (Lagoon); **j, k:** 32.5 mm (South); **l, m:** 8.52 x 8.19 mm; **n - p:** 13.5 x 9.7 mm; f - k to scale.

Literature: Oliver 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008.

This is an extremely variable species with more than 1000 forms (H. Dekker pers. comm.) and by far the most common Ostreoidea in Dahab. The mostly white colour, a circular muscle scar and prominent elongated chomata are characteristic. The genus *Parahyotissa* has been used but is not accepted (WoRMS).

### *Neopycnodonte* cf. *cochlear* (Poli, 1795)

**Plate 19: fig. 8 a - d:** 51 mm (South).

Literature: Harry 1985, Oliver 1992, Huber 2010, Rusmore-Villaume 2008, Raines & Huber 2012.

According to Huber 2010 this is an Atlantic species, but Raines & Huber (2012) mention a wide distribution range in the Indo-Pacific. However, their juvenile shell has no similarity to this one.

### *Pycnodonte* cf. *taniguchii* Hayami & Kase 1992

**Plate 19: fig. 9 a - d:** 69 x 69 mm (Caves).

Literature: Hayami & Kase 1992, Hayami & Kase 1999.

URL 7: http://www.poppe-images.com/?t=17&photoid=963616

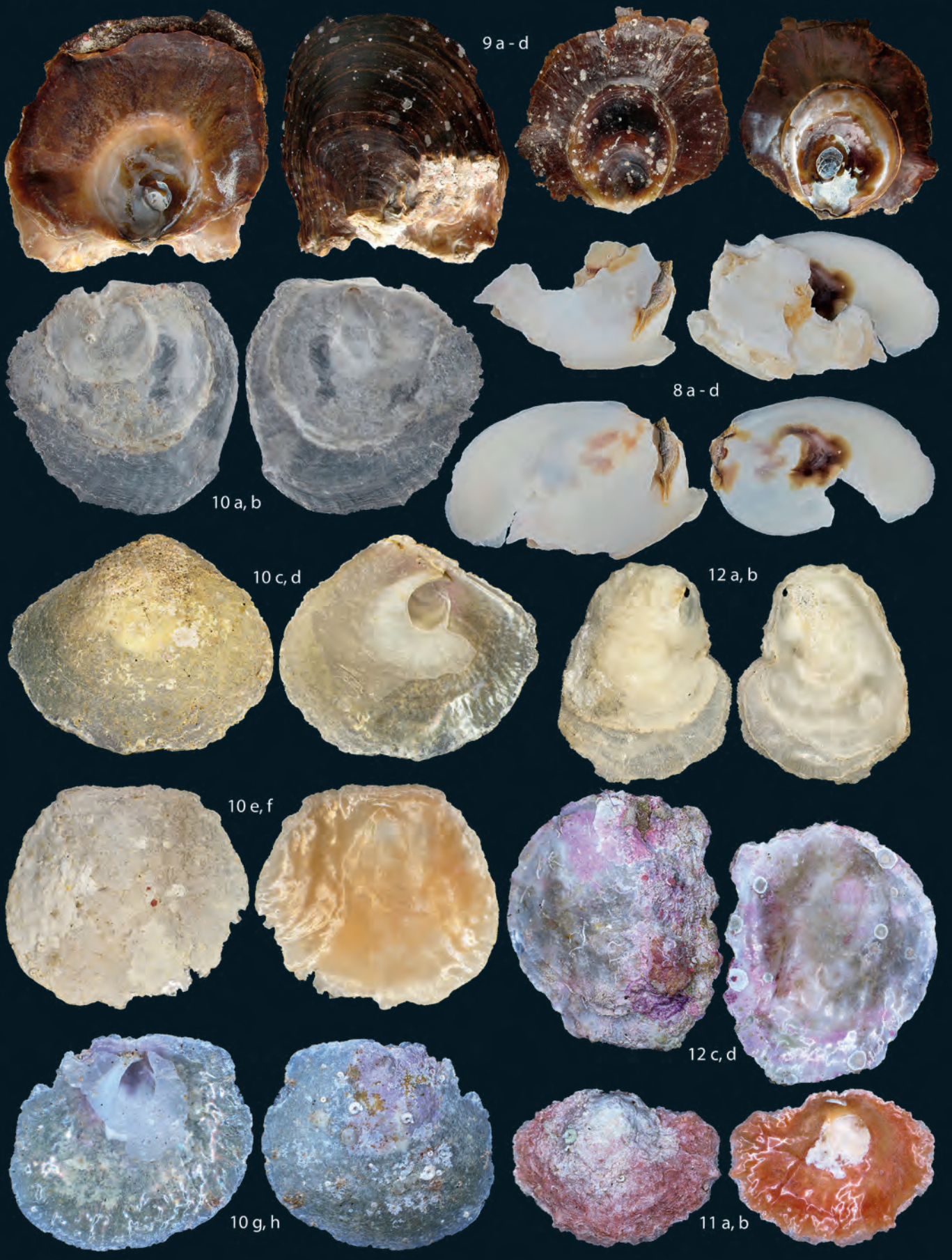
As in the original description dark brown and white specimens occur. This is the first record of this genus in the Red Sea at the dive site Caves. Most specimens were situated in the rear part near the ceiling of both left and right cave. The distribution goes up to 0.5 m water depth, in absence of light! Furthermore, there is a picture from C. von Mach (pers. comm.) from inside the shipwreck Thistlegorm (southern Gulf of Suez). Thus, this is a significant range extension as earlier records were from Japan to Thailand (near Phuket) only. Additionally, I photographed this species inside caves in Indonesia (Barat Daya Islands). It is known from the Philippines as *Hyotissa sinensis* (URL 7). Whether *Pycnodonte* is indeed the correct genus is very doubtful. It seems that a new genus between *Hyotissa* and *Neopycnodonte* is required to properly accommodate *P. taniguchii*. This would leave *Pycnodonte* fossil only (Huber 2010).



**Fig. 9 e:** *Pycnodonte* cf. *taniguchii* at Caves brown specimen.



**Fig. 9 f:** *Pycnodonte* cf. *taniguchii* at Caves white and brown specimen.


9 a - d
8 a - d
10 a, b
10 c, d
12 a, b
10 e, f
12 c, d
10 g, h
11 a, b

## Anomiidae Rafinesque, 1815

### *Anomia achaeus* Gray, 1850

**Plate 19: fig. 10 a, b:** 33.8 mm (Lighthouse); **c, d:** 22.2 x 19.4 mm (South). **e, f:** 20.3 x 18.6 mm (Islands); **g, h:** 20.5 x 17.3 mm (Lighthouse); c - h to scale with 11 a, b and 12 a, b.

Literature: Oliver 1992, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008.

Shells display three muscle scars, one larger and two smaller ones adjacent ventral.

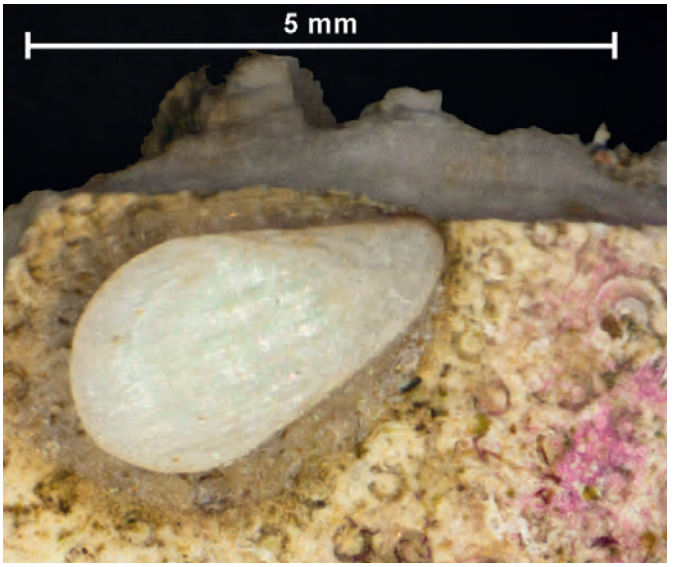



**Fig. 10 i:** *Anomia achaeus* attachment fragment of 10 c, d.

### *Anomia* sp. 2

**Plate 19: fig. 11 a, b:** 16.7 x 12.5 mm (Masbat Bay); to scale with 10 c - h and 12 a, b.

Literature: Dekker & Orlin 2000, Huber 2010.

The shell is dark orange, with one large and probably two smaller adjacent ventral circular muscle scars. The colour and sculpture of the outer surface seem to be different to *A. achaeus*. It does not match the species identified as *Anomia caelata* (Reeve, 1859) in Oliver (1992), Zuschin & Oliver (2003) and Rusmore-Villaume (2008).

### Anomiidae Gen. sp. 3

**Plate 19: fig. 12 a, b:** 18.6 x 14.4 mm (South); **c, d:** 34 x 28.5 mm (Blue Hole); a, b to scale with 10 c - h and 11 a, b.

Literature: Raines & Huber 2012.

The shell is white, with foliate concentric sculpture and faint radial riblets with minute scales. Muscle scars are hard to see but probably two are present. The heavily overgrown shell (c, d) may be conspecific with the white shell (a, b) as radial riblets can be recognised near the ventral margin. Especially the microstructure of the shells' surface is similar to *Monia* sp. in Raines & Huber (2012).

## Pectinidae Rafinesque, 1815

The common name scallop is usually used which is, however, sometimes applied to species from other closely related families as well, including the thorny oysters.

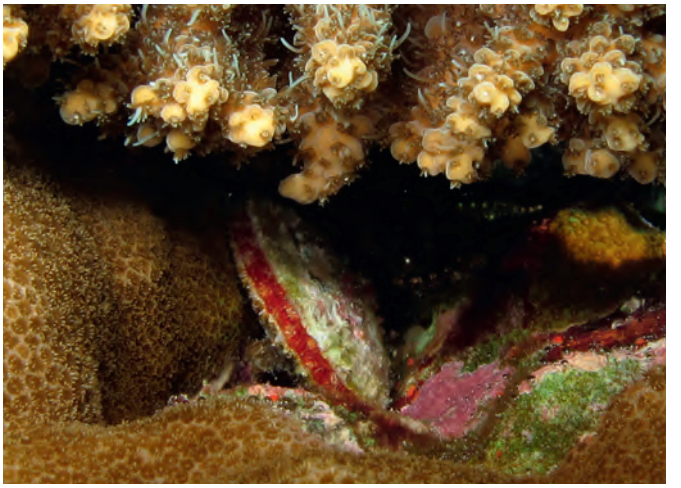


**Fig. 13:** Pectinidae probably *Laevichlamys* or *Gloripallium* at Masbat Bay.

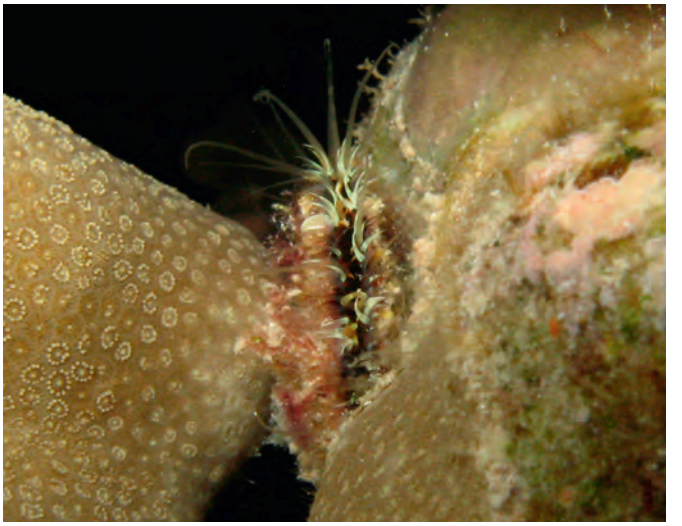


**Fig. 14:** Pectinidae probably subfamily Pedinae at Islands (night dive).



**Fig. 15:** Pectinidae in *Porites* at Islands by Dieter Slacik.


3 a, b
1 a, b
1 c, d
2 a - d
3 c, d
2 e - h
4 e, f
4 a - d
4 g, h
5 a - d

## Pectininae Rafinesque, 1815

### *Excellichlamys spectabilis* (Reeve, 1853)

**Plate 20: fig. 1 a, b:** 25.7 x 25.5 mm; **c, d:** 28.4 x 27.6 mm.

Literature: Oliver 1992, Dijkstra & Knudsen 1998, Dekker & Orlin 2000, Dafni URL 1, Raines & Poppe 2006, Rusmore-Villaume 2008, Huber 2010, Dijkstra & Beu 2018.

### *Gloripallium maculosum* (Forsskål in Niebuhr, 1775)

**Plate 20: fig. 2 a - d:** 32.4 x 28.9 mm (South); **e - h:** 38.3 x 38.0 mm; all to scale.

Literature: Oliver 1992, Dijkstra & Knudsen 1998, Blatterer et al. 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Raines & Poppe 2006, Rusmore-Villaume 2008, Huber 2010.

### *Juxtamusium maldivense* (E. A. Smith, 1903)

**Plate 20: fig. 3 a, b:** 15.5 x 14.0 mm (South); **c, d:** 12.1 x 11.1 mm (North); all to scale.

Literature: Oliver 1992, Dijkstra & Knudsen 1998, Dekker & Orlin 2000, Dafni URL 1, Raines & Poppe 2006, Rusmore-Villaume 2008, Huber 2010, Dijkstra & Beu 2018.

### *Mirapecten yaroni* Dijkstra & Knudsen, 1998

**Plate 20: fig. 4 a - d:** 39.4 x 43.2 mm; **e, f:** 24.7 x 25.0 mm (South); **g, h:** 30.4 x 29.5 mm (South); all to scale with 5 a - d.

Literature: Dijkstra & Knudsen 1998, Blatterer et al. 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Raines & Poppe 2006, Rusmore-Villaume 2008, Huber 2010.

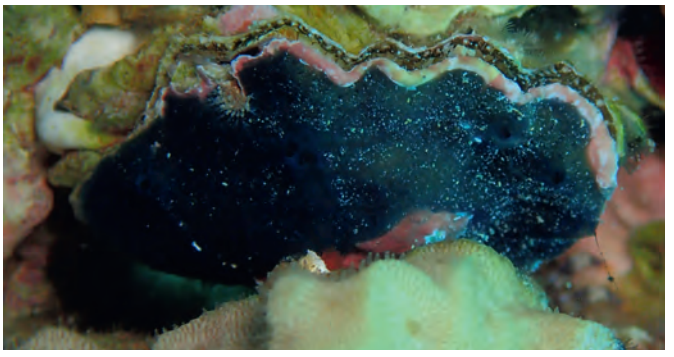


**Fig. 4 i:** Pectinidae? at Masbat Bay, the shape reminds one of *Mirapecten yaroni*, but the massive overgrowth speaks against this determination.

### *Pecten erythraeensis* Sowerby II, 1842

**Plate 20: fig. 5 a - d:** 51 x 55 mm (Lagoon); all to scale with 4 a - h.

Literature: Oliver 1992, Dijkstra & Knudsen 1998, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Raines & Poppe 2006, Rusmore-Villaume 2008.

Only two specimens were found on the very fine sediment of Lagoon at 12 m depth.

## Pedinae Bronn, 1862

### *Laevichlamys andamanica* (Preston, 1908)

**Plate 21: fig. 6 a, b:** 21.0 x 18.9 mm (North); **c, d:** 12.5 x 10.7 mm (North); all to scale.

Literature: Dijkstra & Knudsen 1998, Dekker & Orlin 2000, Zuschin & Oliver 2003, Raines & Poppe 2006, Rusmore-Villaume 2008, Huber 2010, Dijkstra & Beu 2018.

### *Laevichlamys rubromaculata* (Sowerby II, 1842)

**Plate 21: fig. 7 a - d:** 14.6 x 12.5 mm (Abu Galum); **e - h:** 27.5 x 24.4 mm (South); **i, j:** 22.6 x 18.7 mm (Blue Lagoon); all to scale.

Literature: Oliver 1992, Dijkstra & Knudsen 1998, Dekker & Orlin 2000, Dafni URL 1, Raines & Poppe 2006, Rusmore-Villaume 2008, Huber 2010, Lacroix & Lacroix 2011.

*Laevichlamys sauciata* (Gmelin, 1791) is understood as the valid, earlier name for *Pecten rubromaculatus* by Huber (2010). This is not shown in WoRMS.

### *Laevichlamys superficialis* (Forsskål in Niebuhr, 1775)

**Plate 21: fig. 8 a, b:** 45.5 x 42.5 mm; **c, d:** 68 x 59 mm; **e - h:** 33.5 x 30.5 mm; c - h to scale.

Literature: Oliver 1992, Dijkstra & Knudsen 1998, Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Raines & Poppe 2006, Rusmore-Villaume 2008, Huber 2010.

The species has 2 - 6 small smooth ribs between each pair of scaly radial ribs. Colour and other characters seem to be quite variable. The largest Dahab shell is 80 mm in size. *Laevichlamys superficialis* is considered to live in the northern Red Sea and *Azumapecten ruschenbergerii* (Tyron, 1869) in the southern Red Sea and Arabian waters. Raines & Poppe (2006) remarked under *ruschenbergerii*: "This is a difficult species to identify and it may currently be a variation of *L. superficialis*". Specimens from Eilat, Israel connect the extremes well (Huber 2010). Although H. Dijkstra (pers. comm.) confirmed a specimen as *ruschenbergerii* there were other specimens where there was no clear determination. Rombouts (1991) and Rusmore-Villaume (2008) probably identified *L. superficialis* as *ruschenbergerii* thus the latter seems at least not to live in the northern Red Sea. This was confirmed by H. Dekker (pers. comm.) who has typical *ruschenbergerii* from Yemen at hand for comparison. Listed as *Scaeochlamys* in Huber (2010) but not adapted in WoRMS.

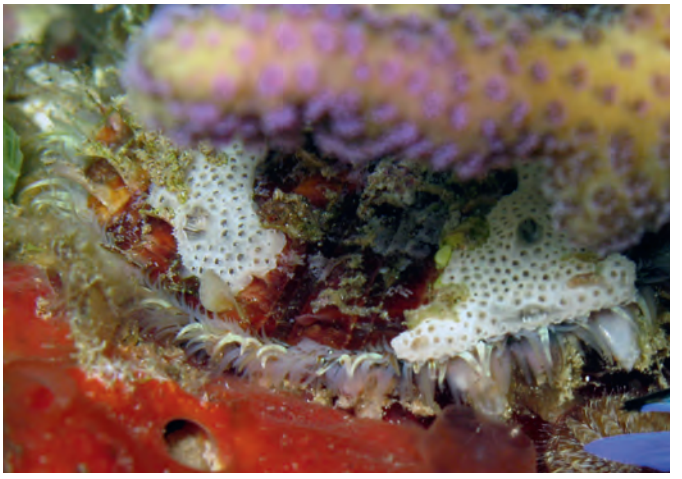


**Fig. 8 i:** *Laevichlamys superficialis* at Bannerfish by Christian Von Mach.


8 a, b
7 a - d
7 e - h
6 a - d
7 i, j
6 e, f
8 c, d
8 e - h



Fig. 7 d: An unknown dancing shrimp (Rhynchocinetidae) is sitting on *Spondylus pickeringae* at Masbat Bay.


9 a, b
9 c, d
9 e, f
10 a - d
10 e, f
11 a - d
11 e
12 a, b
13 a, b
13 c, d

*Hemipecten* cf. *forbesianus* A. Adams & Reeve, 1849

**Plate 22: fig. 9 a, b:** 21.2 x 17.9 mm (Umm Sid 13 m); **c, d:** 12.4 x 11.2 mm (South); **e, f:** 3.99 x 3.79 mm (Canyon 32 m); a - d to scale.

Literature: Reeve 1849, Dijkstra & Beu 2018.

URL 8: http://www.pectensite.com/Hemipecten%20forbesianus.html

A reticulate or radial orange ornamentation, and an almost straight hinge are always present. Very probably it has two muscle scars, an elongated larger and an adjacent smaller one next to its ventral end. The right valves match the coloured form as shown in Reeve (1849). This species has never been reported from the western Indian Ocean (URL 8) therefore the "cf." is kept until more information is available.

*Pedum spondyloideum* (Gmelin, 1791)

**Plate 22: fig. 10 a, b:** 19.3 x 13.8 mm (South); **c, d:** 5.0 x 6.1 mm (Lagoon).

Literature: Oliver 1992, Dijkstra & Knudsen 1998, Blatterer et al. 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Heiman et al. 2004a, Lieske & Myers 2004, Dafni URL 1, Raines & Poppe 2006, Huber 2010, Dijkstra & Beu 2018.

This coral-dwelling species is highly variable in shape, due to xenomorphic development in fissures of massive heads of the coral *Porites* (Dijkstra & Beu 2018).

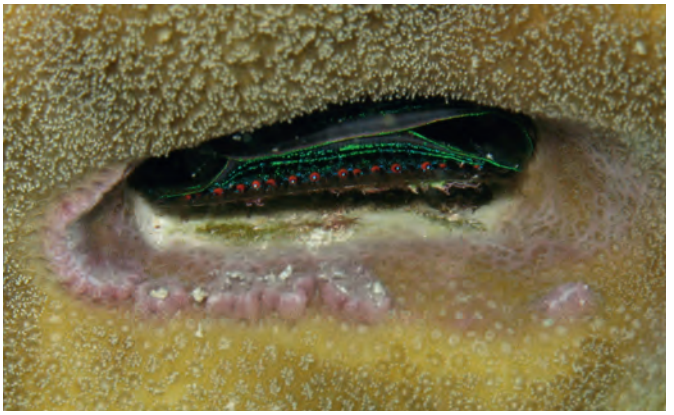


**Fig. 10 e:** *Pedum spondyloideum* in *Porites* at Islands.



**Fig. 10 f:** *Pedum spondyloideum* in *Porites* by Philipp Maitz.



**Fig. 10 g:** *Pedum spondyloideum* in *Porites* at Islands.



**Fig. 10 h:** *Pedum spondyloideum* in *Porites* at Islands.

*Semipallium crouchi* (E. A. Smith, 1892)

**Plate 22: fig. 11 a - d:** 37.2 x 30.9 mm; **e:** 13.5 x 11.9 mm (North).

Literature: Oliver 1992, Dijkstra & Knudsen 1998, Dekker & Orlin 2000, Zuschin & Oliver 2003, Raines & Poppe 2006, Rusmore-Villaume 2008, Huber 2010.

The largest shell in the collection is 45.5 mm in size.

## Propeamussiidae Abbott, 1954

For both species the lower end of Caves (17 - 19 m) is the shallowest discovery of this usually bathyal or abyssal Pectinoidea.

*Parvamussium formosum* (Melvill in Melvill & Standen, 1907)

**Plate 22: fig. 12 a, b:** 4.35 x 3.98 mm (Caves 17 - 19 m); all to scale with 13 a - d.

Literature: Oliver 1992, Dijkstra & Knudsen 1998, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dijkstra & Janssen 2013.

The outline of the shell matches the picture of *Propeamussium* cf. *scitulum* in Oliver (1992: pl. 12, fig. 4) found in 30 m depth in the Gulf of Suez.

*Parvamussium siebenrocki* (Sturany, 1899)

**Plate 22: fig. 13 a, b:** 4.03 x 3.92 mm (Caves 16 m); **c, d:** 2.97 x 2.81 mm (Caves 16 m); all to scale with 12 a, b.

Literature: Oliver 1992, 1995, Dijkstra & Knudsen 1998, Dekker & Orlin 2000, Dafni URL 1, Dijkstra & Janssen 2013.


1 a - d
1 e, f
1 g, h
2 a, b
2 c, d
3 e
3 f, g
3 a, b
3 c, d
4 a, b
5 a, b

## Spondylidae Gray, 1826

They cement themselves to rocks and are known by their common name spiny or thorny oysters.

### *Spondylus avramsingeri* Kovalis, 2010

**Plate 23: fig. 1 a - d:** 38 x 33.5 mm; **e, f:** 42.5 x 33.6 x 26.0 mm (North); **g, h:** 35.4 x 29.0 mm.

Literature: Rusmore-Villaume 2008, Kovalis 2010, Huber 2015.



**Fig. 7 i:** *Spondylus avramsingeri*? at Lagoon.

### *Spondylus candidus* Lamarck, 1819

**Plate 23: fig. 2 a, b:** 28.9 x 28.7 mm (North); **c, d:** 29.1 x 26.5 mm; all to scale.

Literature: Oliver 1992, Lamprell 1998, Blatterer et al. 2000, Dekker & Orlin 2000, Geva et al. 2008, Rusmore-Villaume 2008, Huber 2010.

URL 9: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-4061

The dark red colour with even darker blotches is characteristic. The specimens perfectly match the synonym *S. jubalensis* Lamy, 1938 (URL 9).

### *Spondylus fauroti* Jousseaume, 1888

**Plate 23: fig. 3 a, b:** 45 x 43.8 mm; **c, d:** 36.5 x 34.5 mm; **e:** 31.5 x 28.7 mm; **f, g:** 28.2 x 23.2 mm (North); a - e to scale.

Literature: Lamprell 1998, Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Geva et al. 2008, Rusmore-Villaume 2008, Huber 2010.

URL 10: http://mediaphoto.mnhn.fr/media/1415906877554bK5hWDOtJAJMc3aP

The type is shown in URL 10. *Spondylus* sp. in Zuschin & Oliver (2003: pl. 15, 15.5) is also this species. According to WoRMS *Spondylus smytheae* Lamprell, 1998 is a synonym of *S. fauroti*. The bleached specimens somewhat resemble *Spondylus anacanthus* J. Mawe, 1823 represented in Huber (2010).

### *Spondylus* sp.

**Plate 23: fig. 4 a, b:** 34.2 x 29.9 mm; to scale with 5 a, b.
**Plate 23: fig. 5 a, b:** 32.5 x 28.9 mm; to scale with 4 a, b.

Shells are not attributable to any other species from Dahab but are perhaps related to *S. spinosus*. They are white with weak radial ribs. Almost every third or fourth rib is stronger, sporadically with short reddish spines. The interior is plain white or white with a faint reddish hue at the margin.

### *Spondylus nicobaricus* Schreibers, 1793

**Plate 24: fig. 6 a - d:** 55 mm; **e - g:** 32 x 28 mm (North); **h, i:** 18 x 13 mm.

Literature: Lamprell 1998, Dekker & Orlin 2000, Dafni URL 1, Geva et al. 2008, Rusmore-Villaume 2008, Huber 2010, Lacroix & Lacroix 2011.

There is considerable variability of colour, length of spines and colouration of the inner margin.

### *Spondylus pickeringae* Lamprell, 1998

**Plate 24: fig. 7 a, b:** 47 x 45 mm.

Literature: Lamprell 1998, Dekker & Orlin 2000, Dafni URL 1, Geva et al. 2008, Kovalis 2009, Huber 2010, Lacroix & Lacroix 2011, Avon 2016.

URL 11: http://mediaphoto.mnhn.fr/media/1415906878695h1iBNhjXX8j0z4pB

The type of *S. darwini* Jousseaume, 1882 (URL 11) from an unknown locality is identical to *Spondylus pickeringae* Lamprell, 1998 according to Huber (2010). However, it does not really match specimens from the Red Sea as they have always some reddish between the ribs (H. Dekker pers. comm.). Therefore, this synonymy is not followed and Lamprell's name is used. *Spondylus crassisquamatus* (sic.) depicted in Oliver (1992: pl. 15) appears to be the same. Avon (2016) found this species in Abu Galum north of Dahab.



**Fig. 7 c:** *Spondylus pickeringae* at Masbat Bay.

(continued after plates)


6 a - d
6 e - g
6 h, i
7 a, b
8 a - d
8 e, f
8 g - i



**Fig. 7 d:** *Spondylus pickeringae*? at Moray Garden.

### *Spondylus spinosus* Schreibers, 1793

**Plate 24: fig. 8 a - d:** 125 x 93 mm; **e, f:** 65 x 53 mm; **g - i:** 48 x 35 mm (Lagoon).

Literature: Oliver 1992, Dekker & Orlin 2000, Dafni URL 1, Zuschin & Oliver 2003, Geva et al. 2008, Rusmore-Villaume 2008, Huber 2010.

*Spondylus marisrubri* Röding, 1798 is a synonym.



**Fig. 8 j:** *Spondylus spinosus*? at Lagoon by Christian Von Mach.



**Fig. 8 k:** *Spondylus spinosus*? at Caves. The specimens are often overgrown with sponges, thus hard to identify.

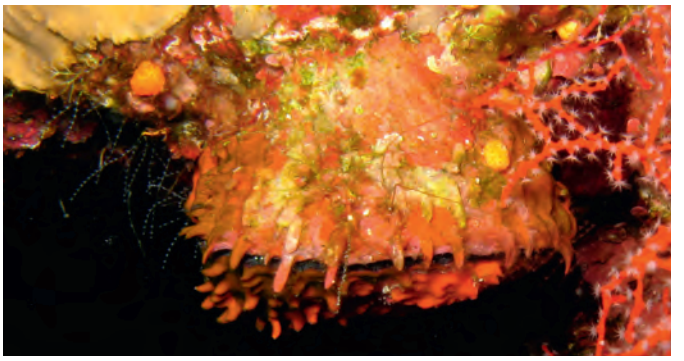


**Fig. 8 l:** *Spondylus spinosus*? at Caves. Some eyes can be recognised.



**Fig. 9:** Juvenile *Spondylus*? at Islands looking at you from underneath a stone.

## Plicatulidae Gray, 1854

### *Plicatula australis* Lamarck, 1819

**Plate 25: fig. 1 a, b:** 4.63 x 4.14 mm; to scale with 3 c - g, 4 e, f and 5 a, b.

Literature: Rusmore-Villaume 2008, Huber 2010

The shell is regularly ovate, flat, many-ribbed, with small brown to blackish spots on a white valve (Huber 2010).

### *Plicatula complanata* Deshayes, 1863

**Plate 25: fig. 2 a, b:** 21 x 19 mm.

Literature: Oliver 1995, Dekker & Orlin 2000, Huber 2010.

The shell is irregular in shape, has many weak ribs, and is whitish with brown or reddish lines and blotches. The crurae in adults are orange-white to orange-brown, whereas those in *P. plicata* are white. The scars are generally more ovate (Huber 2010). This species is conspecific with *Plicatula australis* Lamarck, 1819 sensu Oliver (1995) and Dekker & Orlin (2000).

### *Plicatula* cf. *complanata* Deshayes, 1863

**Plate 25: fig. 3 a, b:** 10.9 x 10.4 mm; **c - g:** 7.57 x 6.47 mm; all to scale with 1 a, b, 4 e, f and 5 a, b.

In contrast to *P. complanata*, the shell is more coloured and has distinct orange-brown striae at the margins.


1 a, b
2 a, b
2 c, d
3 a, b
4 c, d
4 a, b
3 c - g
5 a, b
4 e, f
4 g, h

*Plicatula plicata* (LINNAEUS, 1767)

**Plate 25: fig. 4 a, b:** 20.6 x 16.9 mm; **c, d:** 1.59 x 1.54 mm; **e, f:** 6.55 x 6.07 mm; **g, h:** 2.72 x 1.78 mm; e, f to scale with 1 a, b, 3 c - g and 5 a, b.

Literature: BLATTERER et al. 2000, DEKKER & ORLIN 2000, DAFNI URL 1, RUSMORE-VILLAUME 2008.

According to HUBER (2010) *P. plicata* has 5 to more than 20 marked ribs of varying sculpture. The shells are often white with reddish streaks, whitish, cream, brownish and orange forms may occur. However, all specimens analysed are internally white whith white hinge teeth. The margin is typically bordered with vertical reddish striae, sometimes forming a dense reddish band.

*Plicatula* sp. 5 cf. *plicata*

**Plate 25: fig. 5 a, b:** 8.15 x 6.29 mm; to scale with 1 a, b, 3 c - g and 4 e, f.

This shell resembles *P. plicata* but is internally coloured purple.



**Fig. 6:** *Plicatula*? at Lagoon. This and the following specimens are tentatively placed in this genus. There are not many underwater pictures of living members from this family. Therefore, this may be a start to take a look closer at these shells. Spondylidae and Pectinidae are known to have eyes.



**Fig. 9:** *Plicatula*? at Lighthouse by Christian VON MACH.



**Fig. 7:** *Plicatula*? at Islands.

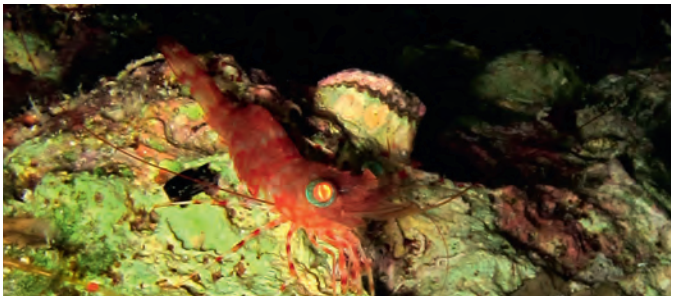


**Fig. 8:** *Plicatula*? at Islands during a night dive seen in the background of the dancing shrimp *Cinetorhynchus*.

## Limidae RAFINESQUE, 1815

The Limidae are commonly known as file shells.

*Ctenoides annulatus* (LAMARCK, 1819)

**Plate 26: fig. 1 a - d:** 31 x 25.5 mm; **e, f:** 26 x 14.5 mm (Islands); **g, h:** 1.38 x 1.33 mm (Caves).

Literature: OLIVER 1992, 1995, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, DAFNI URL 1, RUSMORE-VILLAUME 2008, HUBER 2010, POPPE 2010, KOVALIS 2012a.

Most shells were found inside of caves.

*Ctenoides concentricus* (G. B. SOWERBY III, 1888)

**Plate 26: fig. 2 a, b:** 55.5 x 46.5 mm (South).

Literature: DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, HUBER 2010, POPPE 2010, KOVALIS 2012a.

Only two valves of this species were found.

*Lima paucicostata* SOWERBY II, 1843

**Plate 26: fig. 3 a, b:** 62 mm; **c - f:** 60 mm.

Literature: OLIVER 1992, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, DAFNI URL 1, RUSMORE-VILLAUME 2008, HUBER 2010, KOVALIS 2012a.

Identified as *L. lima* in OLIVER (1982) which is a Mediterranean Sea species.

*Limaria* sp.

**Plate 26: fig. 4 a - d:** 23.5 x 16.0 mm.

Literature: DEKKER & ORLIN 2000, DAFNI URL 1, RUSMORE-VILLAUME 2008, HUBER 2010, POPPE 2010, KOVALIS 2012a.

URL 12: http://131.111.101.189/fmi/iwp/cgi?-db=UMZC%20Catalogues%20%28Web%29&-loadframes

(continued after plate)


1 a - d
1 e, f
1 g, h
2 a, b
3 a, b
3 c - f
4 a - d
5 a, b

ADAM (1870) described this species as *Radula tenuis* from the Red Sea. The type is now depicted in URL 12. According to HUBER (2010) this is a preoccupied name (non *Lima tenuis* LEACH in GRAY, 1852: 348, which is *Limaria hians*). These shells are listed as *Limaria fragilis* by other authors. According to HUBER (2010: 637) true *L. fragilis* is currently not known from the Red Sea. If so, the specimen is most similar to *L.* (*Platilimaria*) *orientalis* (ADAMS & REEVE, 1850) in HUBER (2010: 232) which seems to have coarser ribs. The shell gapes at both sides, the anterior side being more affected. The largest shell is 33.5 mm in size and has 48 - 63 radial ribs (including the intermediary). It is less elongated and has coarser ribs than *L. fragilis* in OLIVER (1995) which is considered to be *L. angustata* (SOWERBY II, 1872).

### *Limaria* cf. *viali* (JOUSSEAUME in LAMY, 1920)

**Plate 26: fig. 5 a, b:** 11.3 x 7.0 mm (North).

Literature: ADAMS 1870, OLIVER 1992, 1995, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, RUSMORE-VILLAUME 2008.

This is a fragile shell that shows no gaping. The holotype of *L. viali* from Suez is (probably?) depicted in STUARDO (1968: pl.7, fig. 9, 10). In a low-quality pdf-file of STUARDO's thesis it can be recognised that the shape does not fit with the Dahab shells.

### *Limatula pusilla* (H. ADAMS, 1871)

**Plate 27: fig. 6 a, b:** 5.03 x 3.17 mm (Islands labyrinth 10 m); **c, d:** 5.99 x 3.68 mm (Lagoon); all to scale.

Literature: ADAMS 1871, OLIVER 1992, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, RUSMORE-VILLAUME 2008, HUBER 2010.

URL 13: http://131.111.101.189/fmi/iwp/cgi?-db=UMZC%20Catalogues%20%28Web%29&-loadframes

The sculpture consists of rounded radial riblets without secondary threads. STUARDO (1968) placed *L. pusilla* described from the Red Sea, in the *aequatorialis*-group with minute (microscopic) pseudotaxodont teeth. The type is depicted in URL 13.

### *Limatula* sp.

**Plate 27: fig. 7 a, b:** 4.82 x 3.10 mm (Caves 17 - 19 m); **c, d:** 3.04 x 1.81 mm (Umm Sid 13 m); **e, f:** 2.60 x 1.55 mm (Canyon 32 m); a, b to scale with 9 a, b; c - f to scale with 8 a, b and 9 c, d.

Literature: ZUSCHIN & OLIVER 2003.

This species has acute radial riblets with raised secondary threads.

### *Limea pectinata* (H. ADAMS, 1870)

**Plate 27: fig. 8 a, b:** 2.74 x 2.30 mm (Caves 18 m); to scale with 7 c - f and 9 c, d.

Literature: ADAMS 1870, OLIVER 1992, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, DAFNI URL 1.

URL 14: http://131.111.101.189/fmi/iwp/cgi?-db=UMZC%20Catalogues%20%28Web%29&-loadframes

The type is depicted in URL 14.

### *Limea* sp.

**Plate 27: fig. 9 a, b:** 5.0 x 3.7 mm (Caves 17 m); **c, d:** 2.81 x 2.05 mm (Caves 17 - 19 m); **e, f:** 1.25 x 0.92 mm; a, b to scale with 7 a, b; c, d to scale with 7 e - d and 8 a, b.

Literature: ZUSCHIN & OLIVER 2003.

This genus was attributed to the subspecies *Notolimea* in ZUSCHIN & OLIVER (2003).



**Fig. 10:** Limidae not identified at Lagoon by Christian VON MACH.

# Palaeoheterodonta

## Iridinidae SWAINSON, 1840

### *Mutela dubia* (GMELIN, 1791)

**Text figure 11 a, b:** not depicted on plate.

URL 15: http://mkohl1.net/AfroUnios.html

This fresh water bivalve belongs to the Unionida and is sold at several restaurants in Dahab. According to a manager these shells come from the Suez Canal.

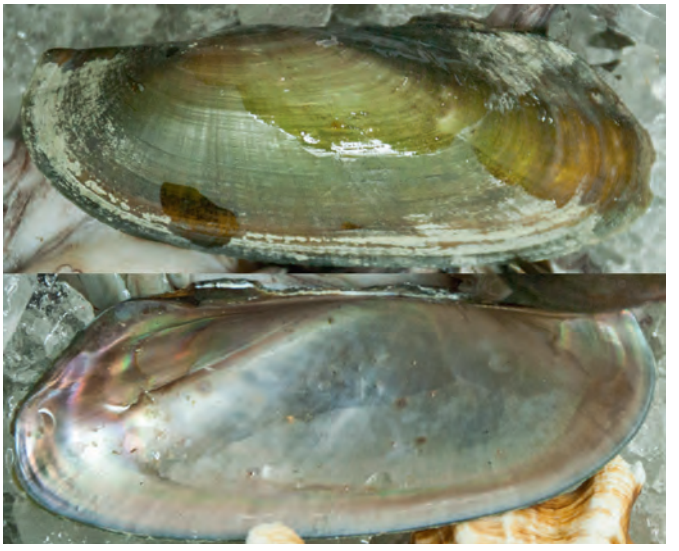


**Fig. 11 a, b:** The fresh water bivalve *Mutela dubia* for sale at a restaurant.


6 a, b
6 c, d
7 a, b
7 e, f
7 c, d
9 c, d
8 a, b
9 a, b
9 e, f


1 a - d
1 i - l
1 m, n
1 e - h
2 a - e
3 a, b
2 f

# Heterodonta

## Lucinidae J. Fleming, 1828

**"*Cavilucina*" *fieldingi*** (H. Adams, 1871)

**Plate 28: fig. 1 a - d:** 15.9 x 15.3 mm (Lagoon 5 m); **e - h:** 13.2 x 12.6 mm (Islands); **i - l:** 12.5 x 10.4 mm (South); **m, n:** 9.7 x 9.5 mm; all to scale.

Literature: Adams 1871, Oliver 1992, Dekker & Orlin 2000, Zuschin & Oliver 2003, Rusmore-Villaume 2008, Huber 2015.

The sculpture is concentric. Some valves are without any visible radial structure, others display very faint radial lines in the interspaces.

***Lamellolucina dentifera*** (Jonas, 1846)

**Plate 28: fig. 2 a - e:** 20.5 x 19.0 mm; **f:** 26.1 x 25.3 mm; detail of an unusual specimen with two sulci; all from Islands.

Literature: Oliver 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Taylor & Glover 2002, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Huber 2015.

The largest specimen in the collection is 34.2 mm in size.

## Leucosphaerinae J. D. Taylor & Glover, 2011

***Leucosphaera salamensis*** (Jaeckel & Thiele, 1931)

**Plate 28: fig. 3 a - e:** 6.7 x 6.0 mm (Lagoon).

Literature: Thiele & Jaeckel 1931, Taylor & Glover 2005.

The species differs from to the similar Pegophyseminae by characters of the hinge, especially by the presence of the tooth-like central knob with anterior flange, and the extremely short, slightly-detached, anterior adductor muscle scar.

## Pegophyseminae J. D. Taylor & Glover, 2011

Taylor & Glover (2005) documented five species of the *Anodontia* complex (Oliver 1992, 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1) from the Red Sea and cleared the *Anodontia edentula* (Linnaeus, 1758) problem. The genus *Anodontia* is now included in the subfamily Leucosphaerinae. The former subgenera were elevated to genus rank (Taylor et al. 2011). Rusmore-Villaume (2008) already listed the three species which are confirmed for Dahab. *Cryptophysema vesicula* (Gould, 1850) and *Pegophysema philippiana* (Reeve, 1850) are known from the Red Sea but were not found.

***Cryptophysema ovulum*** (Reeve, 1850)

**Plate 29: fig. 4 a, b:** 19.3 x 18.3 mm (South); **c, d:** 17.5 x 16.1 mm (South); **e - g:** 15.0 x 14.1 mm (North); all to scale with 7 e, f.

Literature: Blatterer et al. 2000, Taylor & Glover 2005, Rusmore-Villaume 2008.

This is the most inflated of the Red Sea Pegophyseminae species. It is similar to *Pegophysema kora* in shell shape, but it is smaller and has an indistinct, discontinuous pallial line, with elongate attachment sites separated by narrow gaps.

***Euanodontia ovum*** (Reeve, 1850)

**Plate 29: fig. 5 a - d:** 26.0 x 25.9 mm; **e, f:** 12.6 x 11.6 mm; a - d to scale with 8 a - f; e, f to scale with 6 a - g.

Literature: Taylor & Glover 2005, Rusmore-Villaume 2008.

The pallial line is entire and is located relatively close to the shell edge.

***Pegophysema kora*** (Taylor & Glover, 2005)

**Plate 29: fig. 6 a, b:** 37.0 x 34.2 mm (Lighthouse); **c - f:** 32.3 x 27.4 mm; all to scale with 7 a - d.

Literature: Taylor & Glover 2005, Rusmore-Villaume 2008.

A line of secondary pallial attachment scars runs from the anterior pallial angle, to join the pallial line about midway along the ventral margin, where they form irregular lobate extensions to the pallial line.

## Codakiinae Iredale, 1937

***Codakia paytenorum*** (Iredale, 1937)

**Plate 30: fig. 7 a - d:** 36.0 x 35.4 mm.

Literature: Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Huber 2015.

***Codakia tigerina*** (Linnaeus, 1758)

**Plate 30: fig. 8 a - d:** 67.9 x 62.6 mm; **e - h:** 4.3 x 4.0 mm (Islands); e, h to scale with 9 c - h.

Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Huber 2015.

***Ctena divergens*** (Philippi, 1850)

**Plate 30: fig. 9 a, b:** 25.0 x 23.0 mm; **c - h:** largest 3.9 x 3.6 mm (Islands); c - h to scale with 8 e - h.

Literature: Oliver 1992, 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Huber 2015.

The differences to *C. bella* (Conrad, 1837) are discussed in Huber (2015). Unfortunately, *C. divergens* has not been included in the molecular phylogeny and classification by Taylor et al. (2011). However, there is a complex of closely similar species across the Indo-West Pacific and comprehensive genetic studies are required for classification (J. Taylor & E. Glover pers. comm.).

## Lucininae J. Fleming, 1828

***Cardiolucina semperiana*** (Issel, 1869)

**Plate 31: fig. 10 a - d:** 7.13 x 6.65 mm.

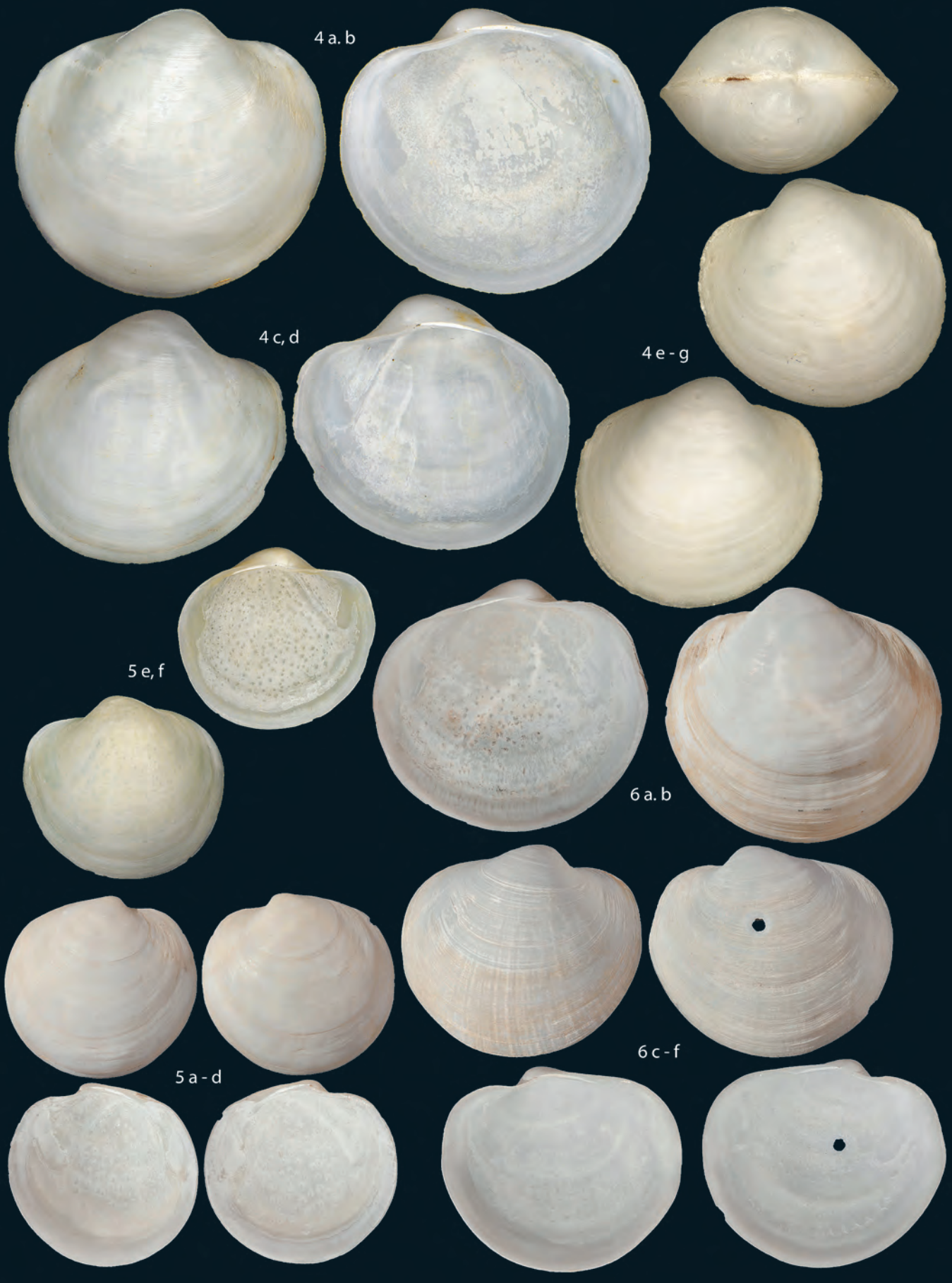
Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Huber 2015.

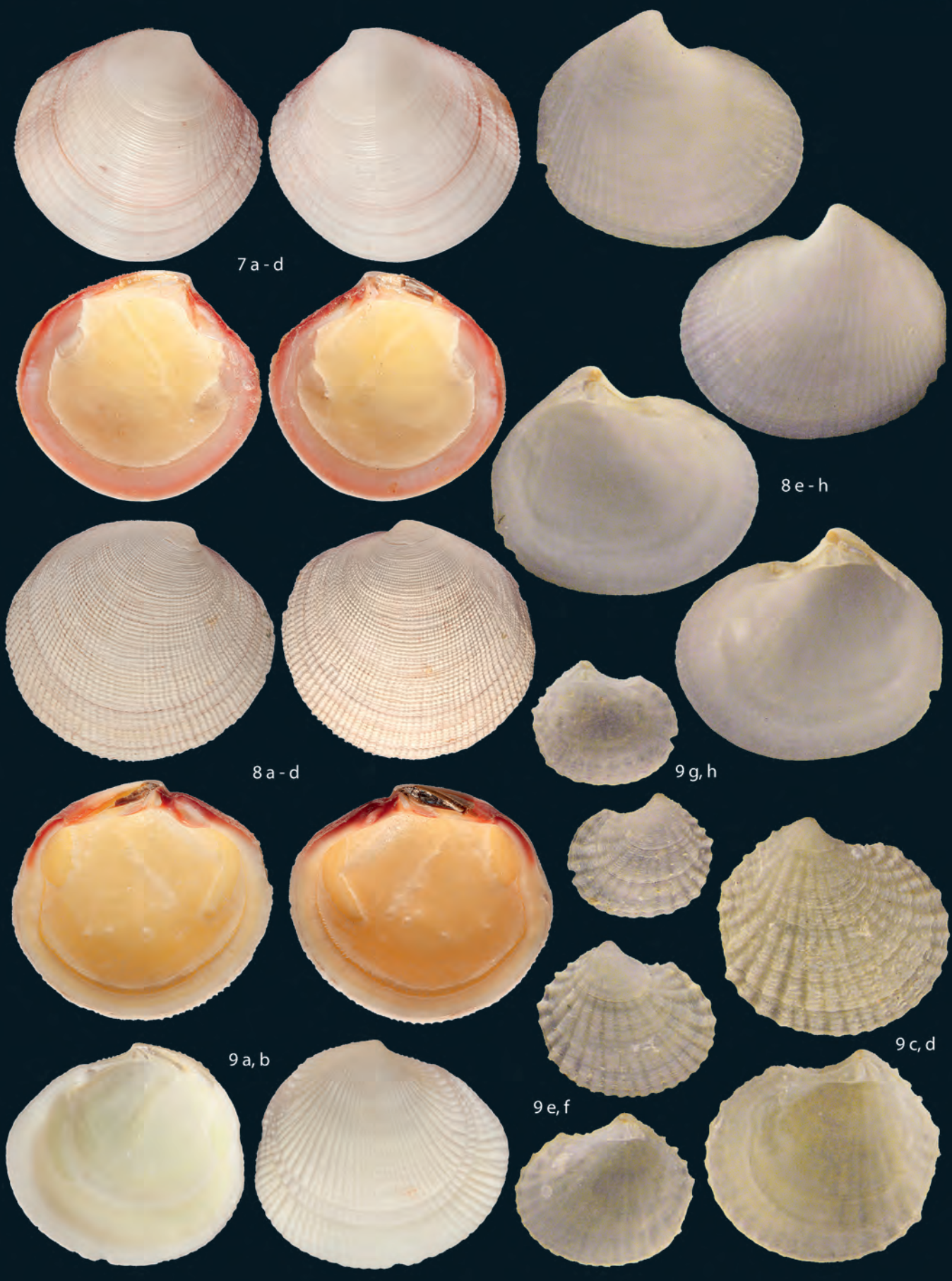
The species has formerly been placed in the genus *Bellucina*.

***Chavania erythraea*** (Issel, 1869)

**Plate 31: fig. 11 a - d:** 8.2 x 8.1 mm (Lagoon).

Literature: Oliver 1992, 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Zuschin & Oliver 2003, Rusmore-Villaume 2008, Huber 2015.


4 a. b
4 c, d
4 e - g
5 e, f
6 a. b
5 a - d
6 c - f


7 a - d
8 e - h
8 a - d
9 g, h
9 a, b
9 c, d
9 e, f


10 a - d
11 a - d
13 e - h
12 c, d
12 a, b
13 a - d

*Divalinga arabica* Dekker & Goud, 1994

**Plate 31: fig. 12 a, b:** 18.1 x 17.0 mm; **c, d:** 16.5 x 15.9 mm; all to scale with 12 a - h.

Literature: Oliver 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Huber 2015.

*Divaricella macandreae* (H. Adams, 1871)

**Plate 31: fig. 13 a - d:** 16.4 x 16.1 mm; **e - h:** 12.4 x 11.8 mm; all to scale with 11 a - d.

Literature: Adams 1871, Oliver 1992, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Huber 2015.

*Funafutia crosseana* (Issel, 1869)

**Plate 32: fig. 14 a, b:** 3.6 x 2.8 mm (Lagoon); **c, d:** 1.49 x 1.27 mm (Blue Hole); a, b to scale with 15 a - d.

Literature: Issel 1869, Zuschin & Oliver 2003.

The species is treated as taxon inquirendum in WoRMS as type material has not been located yet. This species is perhaps conspecific with *F. levukana* (E. A. Smith, 1885) (Huber 2015).

*Liralucina sperabilis* (Hedley, 1909)

**Plate 32: fig. 15 a, b:** 3.48 x 3.27 mm (Canyon 32 m); **c, d:** 3.16 x 2.75 mm (Canyon 32 m); all to scale with 14 a, b.

Literature: Glover & Taylor 2007, Zuschin & Oliver 2003, Huber 2015.

Described as *Parvilucina* cf. *sperabilis* (Hedley, 1909) in Zuschin & Oliver (2003).

*Pillucina vietnamica* Zorina, 1978

**Plate 32: fig. 16 a - d:** 8.6 x 8.6 mm (South); **e - h:** 6.9 x 6.6 mm; all to scale.

Literature: Oliver 1992, Blatterer et al. 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Rusmore-Villaume 2008, Steger et al. 2018.

The Dahab shells have a strong radial sculpture and a short detached anterior adductor muscle scar. *Pillucina concinna* H. Adams, 1871 and *Lucina fischeriana* Issel, 1869 in Oliver (1992) are older preoccupied synonyms. A character to separate the older name *P. angela* is the longer and more detached anterior adductor muscle scar (Glover & Taylor 2001). Glover & Taylor depict syntypes of *P. vietnamica* with weak radial sculpture and *P. angela*, but no type of the synonymised *Divaricella cypselis* Melvill, 1918, which may be an older available name for *P. vietnamica*. A possible synonymy with *P. angela* (Melvill, 1899) is discussed by Huber (2015). He provides several figures of shells varying in shape, ribbing and colour but unfortunately without specification of locations so there still may be hidden species. This species is a Lessepsian immigrant into the Mediterranean Sea (Steger et al. 2018).

*Rasta lamyi* (Abrard, 1942)

**Plate 32: fig. 17 a - d:** 39.8 x 35.0 mm.

Literature: Dekker & Orlin 2000, Zuschin & Oliver 2003, Taylor et al. 2005, Dafni URL 1, Rusmore-Villaume 2008, Huber 2015.

## Carditidae Férussac, 1822

*Cardita variegata* Bruguière, 1792

**Plate 33: fig. 1 a, b:** 20.8 x 13.4 mm; **c, d:** 1.44 x 1.43 mm (Caves 15 m).

Literature: Oliver 1992, Blatterer et al. 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008.

*Cardites rufus* (Deshayes, 1834)

**Plate 33: fig. 2 a - e:** 49 x 38 mm (South).

Literature: Deshayes 1834, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Huber 2010.

The species is similar to *C. bicolor* Lamarck, 1819 in Oliver (1995); see remark in Zuschin & Oliver (2003: 117). The largest specimen is 54 mm in size.

*Centrocardita akabana* (Sturany, 1899)

**Plate 33: fig. 3 a - d:** 2.33 x 2.27 mm (Islands seagrass 18 m); **e, f:** 7.61 x 7.18 mm; a - d to scale.

Literature: Oliver 1992, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008.

It was tentatively assigned to *Centrocardita* by Huber (2010).

## Trapezidae Lamy, 1920 (1895)

*Coralliophaga coralliophaga* (Gmelin, 1791)

**Plate 33: fig. 4 a, b:** 37 mm; **c, d:** 3.56 x 1.86 mm (Caves); **e, f:** 3.07 x 1.56 mm (Caves); c - f to scale.

Literature: Oliver 1992, Dekker & Orlin 2000, Mienis & Ritter (2014a, 2016).

The small specimens from the sediments inside caves have high similarity to *Coralliophaga hyalina* Hayami & Kase, 1993, which was also found in a submarine cave. The Dahab specimens, however, are lacking radial riblets (variable in the Japanese population). Oliver & Holmes 2004 and Huber 2010 consider it to be a synonym.

*Glossocardia obesa* (Reeve, 1843)

**Plate 33: fig. 5 a - d:** 75 mm; **e - h:** 27.3 x 24.8 mm.

Literature: Oliver 1992, Dekker & Orlin 2000, Zuschin & Oliver 2003, Rusmore-Villaume 2008, Poppe 2011.

*Trapezium oblongum* (Linnaeus, 1758)

**Plate 33: fig. 6 a, b:** 49 mm.

Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008.

## Cardiidae Lamarck, 1809

Some members of this family are known as true cockles.

*Frigidocardium kiranum* Sakurai & Habe, 1966

**Plate 34: fig. 7 a - d:** 17 mm (Islands); to scale with 10 e - h and 11 a - c.

Literature: Dafni URL 1, ter Poorten 2009, Singer & Mienis 2009, Huber 2010, ter Poorten & van Gemert 2016.

This find is discussed in ter Poorten & van Gemert (2016).


14 a, b
14 c, d
15 a, b
15 c, d
16 e - h
16 a - d
17 a - d


1 a, b
1 c, d
3 a, b
3 c, d
3 e, f
2 a - e
4 a, b
5 e - h
4 c, d
4 e, f
5 a - d
6 a, b


8 a - c
7 a - d
10 a - d
9 a - e
10 e - h
11 a - c
12 a - d
13 c - i
13 a, b


14 a - d
15 a, b
15 c, d
16 a - d
16 e - j
18 a, b
17 a - d
18 c - e

## Cardiinae Lamarck, 1809

*Fulvia australis* (Sowerby II, 1834)

**Plate 34: fig. 8 a - c:** 23 mm (Lagoon).

Literature: Oliver 1992, Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Zuschin & Oliver 2003, Rusmore-Villaume 2008, Huber 2010, ter Poorten in Poppe 2011.

*Fulvia lineonotata* Vidal, 1994

**Plate 34: fig. 9 a - e:** 9.03 x 8.42 x 2.36 mm (Caves 17 - 19 m); a - d to scale with 10 a - d.

Literature: Vidal 1994, ter Poorten 2009, Huber 2010, ter Poorten in Poppe 2011.

URL 16: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-4002

The species has a distinct 'tent' pattern. The radial sculpture and marginal serration are only seen in anterior and posterior third of the shell.

## Fraginae Stewart, 1930

*Ctenocardia fornicata* (Sowerby II, 1840)

**Plate 34: fig. 10 a - d:** 11.0 x 10.9 mm (Blue Lagoon); **e - h:** 17.2 x 16.5 mm (Masbat Bay); a - d to scale with 9 a - d; e - h to scale with 7 a - d and 11 a - c.

Literature: Oliver 1992, Dekker & Orlin 2000, Dafni URL 1, Zuschin & Oliver 2003, Rusmore-Villaume 2008, Huber 2010, ter Poorten in Poppe 2011.

*Fragum nivale* (Reeve, 1845)

**Plate 34: fig. 11 a - c:** 16.9 x 12.7 mm (Nabq); to scale with 7 a - d and 10 e - h.

Literature: Oliver 1992, Blatterer et al. 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Huber 2010.

The lectotype is depicted in Hylleberg (2004: 931).

*Fragum sueziense* (Issel, 1869)

**Plate 34: fig. 12 a - d:** 6.32 x 5.96 mm (South).

Literature: Oliver 1992, 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Zuschin & Oliver 2003, Rusmore-Villaume 2008, Huber 2010.

Taxonomic classification is based on ter Poorten (2009).

*Lunulicardia orlini* Mienis, 2009

**Plate 34: fig. 13 a, b:** 45 mm; **c - i:** 28 mm; c - i to scale.

Literature: Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Mienis 2009, Huber 2010.

## Laevicardiinae Keen, 1951

*Laevicardium biradiatum* (Bruguière, 1789)

**Plate 35: fig. 14 a - d:** 45 mm; to scale with 16 e - j.

Literature: Dekker & Orlin 2000, Dafni URL 1, Zuschin & Oliver 2003, Rusmore-Villaume 2008, Huber 2010, ter Poorten in Poppe 2011.

Taxonomic classification is based on ter Poorten (2009).

## Orthocardiinae Schneider, 2002

*Afrocardium richardi* (Audouin, 1826)

**Plate 35: fig. 15 a, b:** 1.26 x 1.17 mm (Blue Hole 24 m); **c, d:** 2.57 x 1.98 mm (Bells - Blue Hole 29 m).

Literature: Bouchet & Danrigal 1982, Oliver 1992, 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, Delongueville & Scaillet 2007, Rusmore-Villaume 2008, Huber 2010, ter Poorten in Poppe 2011.

Only juvenile specimens were found. The lectotype is depicted in Hylleberg (2004: 918). This species is a Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007).

*Lyrocardium anaxium* Oliver & Chesney, 1997

**Plate 35: fig. 16 a - d:** 66 mm; **e - j:** 48 mm; e - j to scale with 14 a - d.

Literature: Oliver & Chesney 1997, Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Zuschin & Oliver 2003, Rusmore-Villaume 2008, Huber 2010.

Shells were found with pink and others with dark orange-brown in umbonal cavity, one of the characters which should distinguish the subspecies *L. anaxium dekkeri* Mienis, 2009, which is a synonym in WoRMS.

## Trachycardiinae Stewart, 1930

*Acrosterigma maculosum* (Wood, 1815)

**Plate 35: fig. 17 a - d:** 24 mm.

Literature: Oliver 1992, Dekker & Orlin 2000, Dafni URL 1, Zuschin & Oliver 2003, Rusmore-Villaume 2008, Huber 2010, ter Poorten in Poppe 2011.

*Vasticardium marerubrum* (Voskuil & Onverwagt, 1991)

**Plate 35: fig. 18 a, b:** 84 mm; **c - e:** 60 mm; all to scale.

Literature: Oliver 1992, Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Zuschin & Oliver 2003, Rusmore-Villaume 2008, Huber 2010.

## Tridacninae Lamarck, 1819

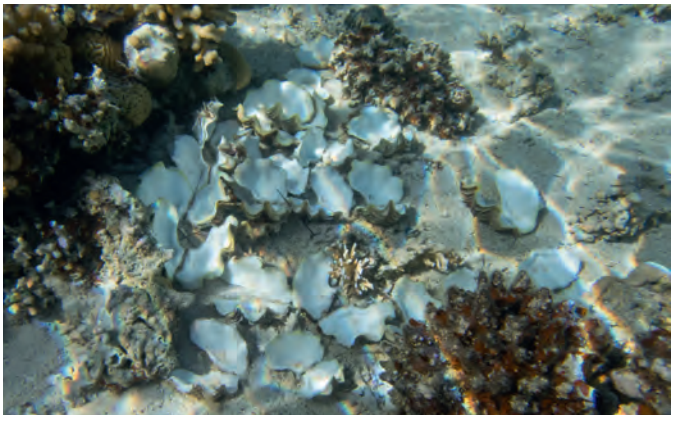


**Fig. 19 g:** Exploitation of the *Tridacna* at Napoleon Reef (January 2018).

*Tridacna maxima* (Röding, 1798)

**Plate 36: fig. 19 a - e:** 45 x 20 mm; **f:** 325 x 205 mm (Islands).

Literature: Oliver 1992, Blatterer et al. 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Lacroix & Lacroix 2011.

(continued after plate)


19 a - e
19 f
22 a, b
21 a - d
20 a - f

The valves are inequilateral with broad and rounded, closely arranged scales variably reaching into the interspaces.



**Fig. 19 h:** *Tridacna maxima* from Islands, retrieved from 10 m depth by my daughters Ines and Jasmin in 2009. This is the largest bivalve in the Dahab collection.



**Fig. 19 i:** *Tridacna maxima* at Abu Galum colour variant.



**Fig. 19 j:** *Tridacna maxima* at Gabr el-Bint colour variant.

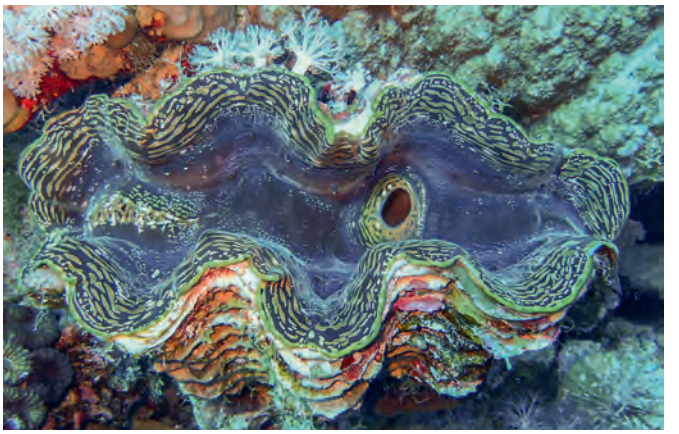


**Fig. 19 k:** *Tridacna maxima* at Abu Galum colour variant.

### *Tridacna squamosa* LAMARCK, 1819

**Plate 36: fig. 20 a - f:** 135 x 80 mm.

Literature: OLIVER 1992, ZUSCHIN & OLIVER 2003, RUSMORE-VILLAUME 2008.

Valves are equilateral with broad and widely spaced rounded scales, which are placed upon the ribs and are not reaching into the interspaces as in *T. maxima*.

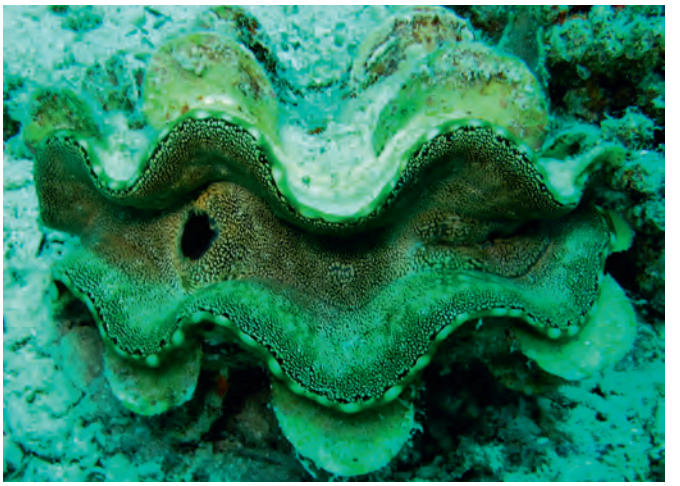


**Fig. 20 g:** *Tridacna squamosa* at Canyon.

### *Tridacna squamosina* STURANY, 1899

**Plate 36: fig. 21 a - d:** 150 mm (South).

Literature: STURANY 1899, DAFNI URL 1, RUSMORE-VILLAUME 2008, RICHTER et al. 2008, HUBER & ESCHNER 2011, LACROIX & LACROIX 2011.

The equilateral valves have erect scales on strong narrow ribs with equal narrow interspaces. According to HUBER & ESCHNER (2011) *T. costata* ROA-QUIAOIT, KOCHZIUS, JANTZEN, ZIBDAH & RICHTER, 2008 is a synonym of *Tridacna squamosina* STURANY, 1899. The species has already been illustrated by SAVIGNY (1817: pl. 10, fig. 1).

(continued after plate)


1 a, b
1 e, f
1 c, d
4 c, d
4 a, b
3 a, b
5 a, b



**Fig. 21 e:** *Tridacna squamosina* at Suleiman Reef in 0.5 m depth (reef flat).

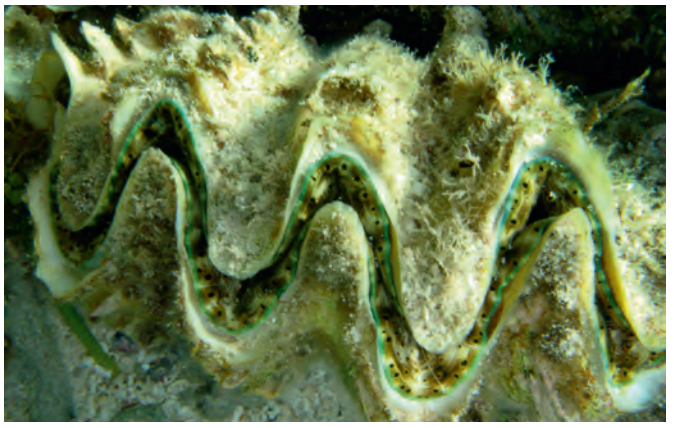


**Fig. 21 f:** *Tridacna squamosina* at Napoleon reef. The species is extremely rare. In all those years only two living specimens were found.

### *Tridacna* sp. juvenile

**Plate 36: fig. 22 a, b:** 1.54 x 1.49 mm (Canyon 11 m).

## Chamidae LAMARCK, 1809

They are known by their common name as the jewel boxes or jewel box clams.

### *Chama asperella* LAMARCK, 1819

**Plate 37: fig. 1 a, b:** 21.8 x 20.8 mm; **c, d:** 13.5 x 12.9 mm (South); **e, f:** 4.69 x 3.77 mm (Caves 15 m); a, b to scale with 4 a, b.

Literature: DELSAERDT 1986, OLIVER 1992, DEKKER & ORLIN 2000, RUSMORE-VILLAUME 2008, HUBER 2010, POPPE 2011, RAINES & HUBER 2012.

The base shape is ovate, and size ranges mostly from 25 to 35 mm; the spines are generally short and numerous. The base colour is white, often with reddish-brown streaks, especially umbonally or on the dorsal slope. Occasionally, brown streaks occur internally, or almost completely brown specimens are found. The margins are crenulate. Very finely spined, medium spined or rougher spined forms occur, which intergrade (HUBER 2010). *Chama aspersa* REEVE, 1846 is a nom. dub. and synonym in HUBER (2010).

### *Chama brassica* REEVE, 1847

**Text figure 2:** not depicted on plate.

Literature: OLIVER 1992, DEKKER & ORLIN 2000, DAFNI URL 1, RUSMORE-VILLAUME 2008.

Shells are usually white but may occasionally be coloured reddish. They have a smooth inner margin, but with radial red lines in furrows on the underside of broad foliated scales. The frequently used name *Chama fragum* REEVE, 1847 is considered a nom. dub. (HUBER 2010). *Chama chinensis* CHENU, 1846 is a nomen oblitum (Desaerdt 2019).



**Fig. 2:** *Chama brassica* at Lagoon (no shell in the collection).

### *Chama croceata* LAMARCK, 1819

**Plate 37: fig. 3 a, b:** 28.0 x 19.4 mm (Islands).

Literature: OLIVER 1992, DEKKER & ORLIN 2000, DAFNI URL 1, RUSMORE-VILLAUME 2008, HUBER 2010, POPPE 2011, RAINES & HUBER 2012.

The shells display characteristic white nodules which are interrupted by orange-brown to purplish-red or dark red ones. They are ovate in shape with smooth margins (HUBER 2010). *Chama croceata* is often erroneously referred to as the preoccupied *C. imbricata* BRODERIP, 1835, or its nom. nov. *C. plinthota* COX, 1927, as well as *C. ratoi* BOSHOFF, 1965 from Mozambique, and *C. savignyi* JOUSSEAUME in LAMY, 1921 from the Red Sea. However, all have proved to be consistent with the type material of *C. croceata*. HUBER (2010: 676) clarified the type locality of *C. croceata* as the Red Sea (RAINES & HUBER 2012: 66).

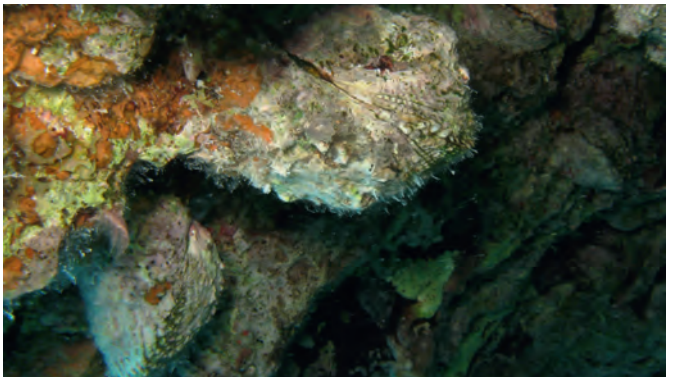


**Fig. 3 c:** *Chama croceata* at Lagoon underneath overhanging corals. Several specimens can be recognised in the background.


7a-d
7e-h
6a-c
6d-f
9a-c

### *Chama lazarus* Linnaeus, 1758

**Plate 37: fig. 4 a, b:** 21.8 mm (South); **c, d:** 16 mm (North); a, b to scale with 1 a, b.

Literature: Oliver 1992, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Huber 2010, Poppe 2011.

Adult specimens are characterised by their larger foliate scales. However, the smaller juvenile shells are tentatively assigned.

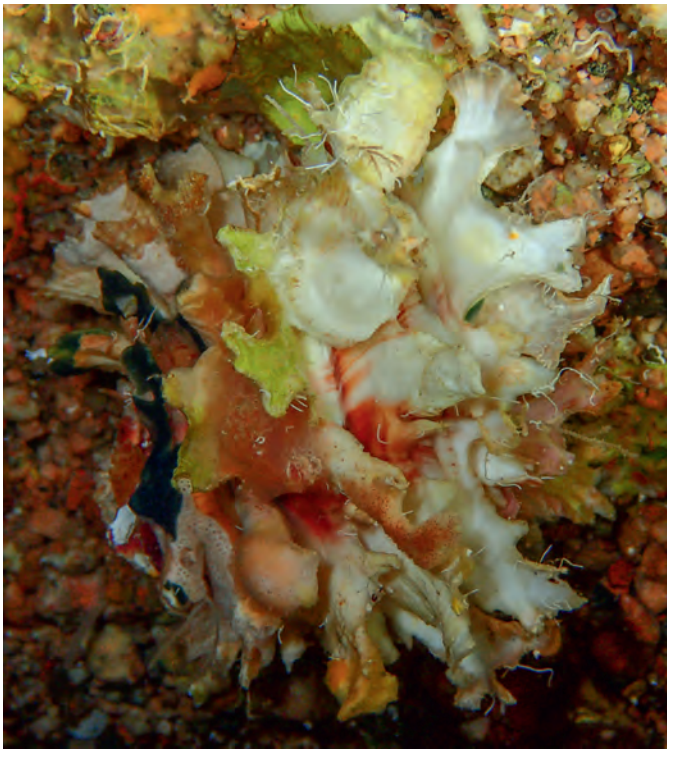


**Fig. 4 e:** *Chama lazarus* at Caves inside the larger cave attached to the beach rock on the ceiling.

### *Chama* sp.

**Plate 37: fig. 5 a, b:** 34.7 mm (Islands).

The specimen is pink inside, almost the colour as shown by Oliver (1992: pl. 25, fig. 4b) for *Pseudochama corbierei* (Jonas, 1846). However, this may be from an external source. It has non-erected scales, thus probably not *C. lazarus*, and bleached purple stripes can be seen in between. It has a smooth inner margin from which long chomata are starting, which could be an indication for *C. pacifica*.

### *Chama limbula* Lamarck, 1819

**Plate 38: fig. 6 a - c:** 38.4 x 27.0 mm; **d - f:** 36 mm (Blue Lagoon); all to scale.

Literature: Oliver 1992, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Huber 2010, Raines & Huber 2012.

This is a difficult and highly variable species, often strongly furrowed, with smooth, purplish margins. It is usually found on the reef flat.

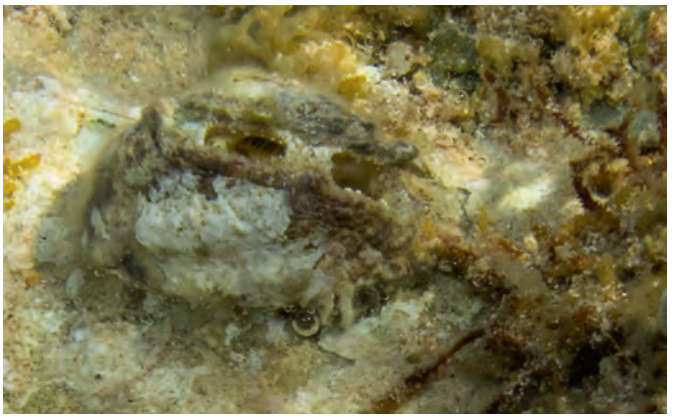


**Fig. 6 g:** *Chama limbula*? at Islands on the reef flat.

### *Chama pacifica* Broderip, 1835

**Plate 38: fig. 7 a - d:** 87 mm; **e - h:** 53 x 41 mm.

Literature: Delsaerdt 1986, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Huber 2010, Kovalis 2012b, Scaperrotta et al. 2016, Poppe & Tagaro in Poppe 2017.

Shells are internally white and usually almost half rose-red with finely crenulated margins and may have spinose spines (whereas *C. brassica* has a smooth margin and broad foliated scales). This species is a Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007, Crocetta & Russo 2013).

### *Chama yaroni* Delsaerdt, 1986

**Text figure 8:** not depicted on plate.

Literature: Delsaerdt 1986, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008.

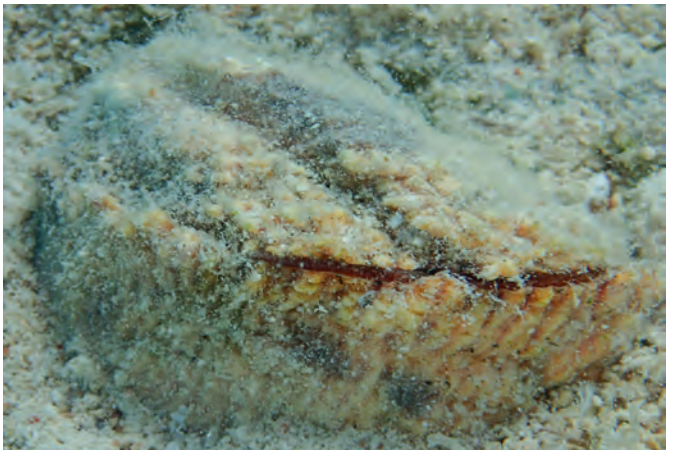


**Fig. 8:** *Chama yaroni* from Lagoon near Seven Pinnacles (no shell in the collection).

### *Pseudochama rianae* Delsaerdt, 1986

**Plate 38: fig. 9 a - c:** 49 mm.

Literature: Dekker & Orlin 2000, Rusmore-Villaume 2008.

Valves are coiled the other way compared to the genus *Chama*.

(continued after plate)


1 a - c
2 a, b
2 c, d
3 a, b
4 a, b
5 a, b
6 a, b
6 c, d
7 a, b



**Fig. 10:** *Chama* sp. at Seven Pinnacles at a depth of 2 m. Several species are living close together. From photographs they are not always identifiable.

## Basterotiidae Cossmann, 1909

### *Basterotia arcula* Melvill, 1898

**Plate 39: fig. 1 a, b:** 7.9 mm (Islands); to scale with 6 a - d.

Literature: Melvill 1898a, Oliver 1995, Dekker & Orlin 2000, Rusmore-Villaume 2008.

URL 17: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-32646

URL 18: http://131.111.101.189/fmi/iwp/cgi?-db=UMZC%20Catalogues%20%28Web%29&-loadframes

The single valve matches the original description and the synonym *B. caledonica* var. *djiboutiensis* H. Fischer, 1901 (URL 17). Evident is the rough pustulose surface. *Basterotia angulata* (H. Adams, 1871) is less triangular and has tiny irregular pustules (Rusmore-Villaume 2008). The type specimen is depicted in URL 18.

### *Basterotia borbonica* (Deshayes, 1863)

**Plate 39: fig. 2 a, b:** 2.94 x 1.99 mm; **c, d:** 3.06 x 1.93 mm; both Caves 18 m; all to scale with 3 a, b.

Literature: Dekker & Orlin 2000, Zuschin & Oliver 2003, Rusmore-Villaume 2008.

### *Basterotia* sp.

**Plate 39: fig. 3 a, b:** 3.36 x 2.05 mm (Islands north 10 m); to scale with 2 a - d.

Literature: Oliver & Holmes 2004.

The shell is slenderer than the former species and comes close to *Basterotia* sp. in Oliver & Holmes (2004: fig. 118 - 121).

## Galeommatidae Gray, 1840

Soft-bottom Galeommatidae are often associated with a wide variety of bioturbating burrowing invertebrate hosts which results in deeper burial (Li et al. 2012). That may explain why they are not usually found in the top layer of sediments.

### *Lepirodes aurantius* (Lamarck, 1818)

**Plate 39: fig. 4 a, b:** 14.4 x 7.4 mm (South); to scale with 5 a, b and 7 a, b.

Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Huber 2015.

### *Scintillula pustula* (Deshayes, 1863)

**Plate 39: fig. 5 a, b:** 9.4 x 7.1 mm (South); to scale with 4 a, b and 7 a, b.

Literature: Oliver 1995, Dekker & Orlin 2000, Huber 2015.

### *Scintillula variabilis* (Sturany, 1899)

**Plate 39: fig. 6 a, b:** 7.8 x 5.5 mm (Islands); **c, d:** 5.42 x 4.45 mm (Blue Hole 4 m); all to scale with 1 a, b.

Literature: Sturany 1899, Oliver 1992, 1995, Dekker & Orlin 2000.

Sturany already describes that the larger specimens are more regular rounded than smaller shells.

### *Scintillula* cf. *variabilis* (Sturany, 1899)

**Plate 39: fig. 7 a, b:** 9.5 x 7.6 mm; to scale with 4 a, b and 5 a, b.

It is relatively broader than the former species and there are some differences in the dentition. Furthermore, there are several interrupted scars parallel to the pallial line.

## Lasaeidae Gray, 1842

These bivalves are sometimes called kelly clams as they have formerly been classified as Kelliidae Forbes & Hanley, 1848.

### *Kellia* sp. 1

**Plate 40: fig. 7 a - e:** 4.05 x 3.93 mm (Islands in beached coral); **f, g:** 16.4 x 16.1 mm (Islands labyrinth 10 m); **h, i:** 15.8 x 15.0 mm (Islands labyrinth 10 m); **j, k:** 2.59 x 2.51 mm (Canyon 32 m); f - i to scale.

Literature: Oliver 1995, Dekker & Orlin 2000, Huber 2015.

This species is similar to young *K. suborbicularis* (Montagu, 1803) from the Mediterranean Sea (Huber 2015). *Kellia leucedra* Melvill & Standen, 1907 from the Arabian Sea is different. It is similar in shape to *K. cycladiformis* (Deshayes, 1850) in Oliver (1992: 109, fig. 15) which is a misidentification according to Huber (2015). The dark specimen was found within cavities of a beached coral.

### Lasaeidae Gen. sp. 1?

**Plate 40: fig. 8 a, b:** 3.19 x 2.39 mm (Caves 4 m); **c, d:** 2.30 x 1.72 mm (Canyon 29 m); **e, f:** 2.27 x 1.69 mm (Caves 16 m); **g, h:** 3.59 x 2.58 mm (Canyon 29 m); **i, j:** 3.87 x 2.79 mm (Canyon 29 m); a - f to scale; g - j to scale.

Literature: Zuschin & Oliver 2003.

Conspecific with Kelliidae sp. indet 2 in Zuschin & Oliver (2003: pl. 28, fig. 28.5) and may be a member of a different family in the Galeommatoidea.

### Lasaeidae Gen. sp. 2?

**Plate 40: fig. 9 a, b:** 1.56 x 1.31 mm (Caves 15 m).

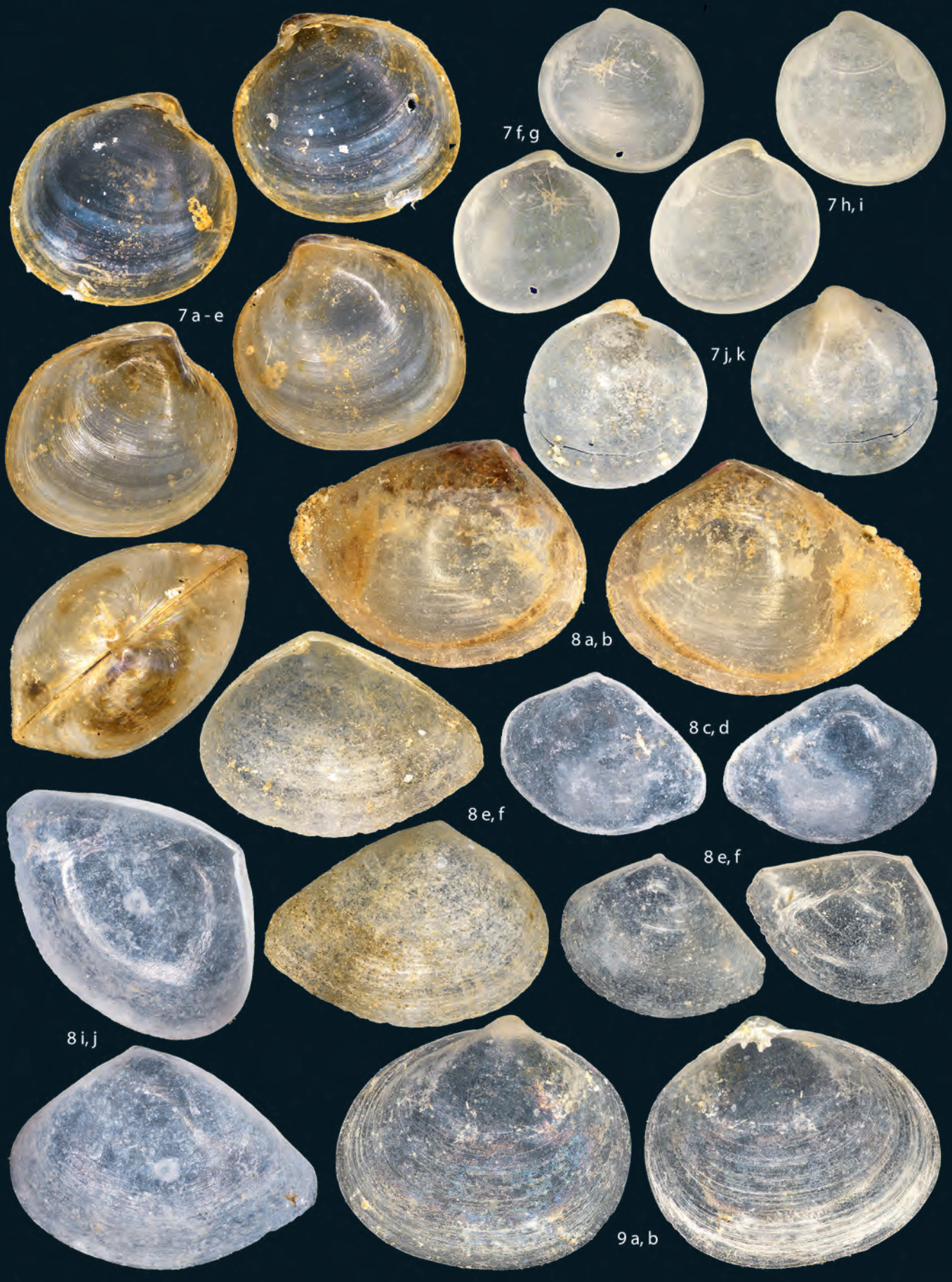
## Montacutinae W. Clark, 1855

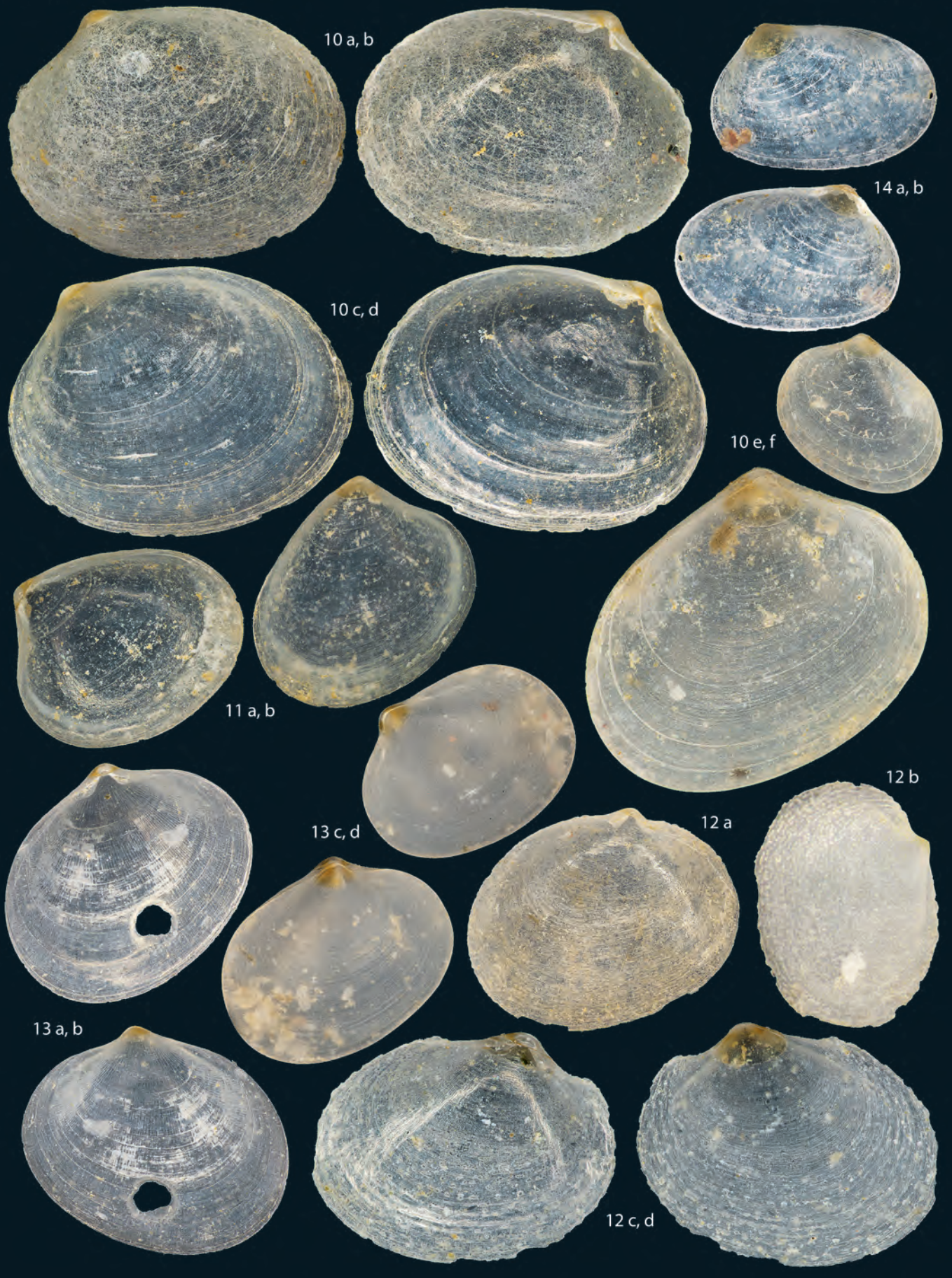
### *Kurtiella* sp. 1

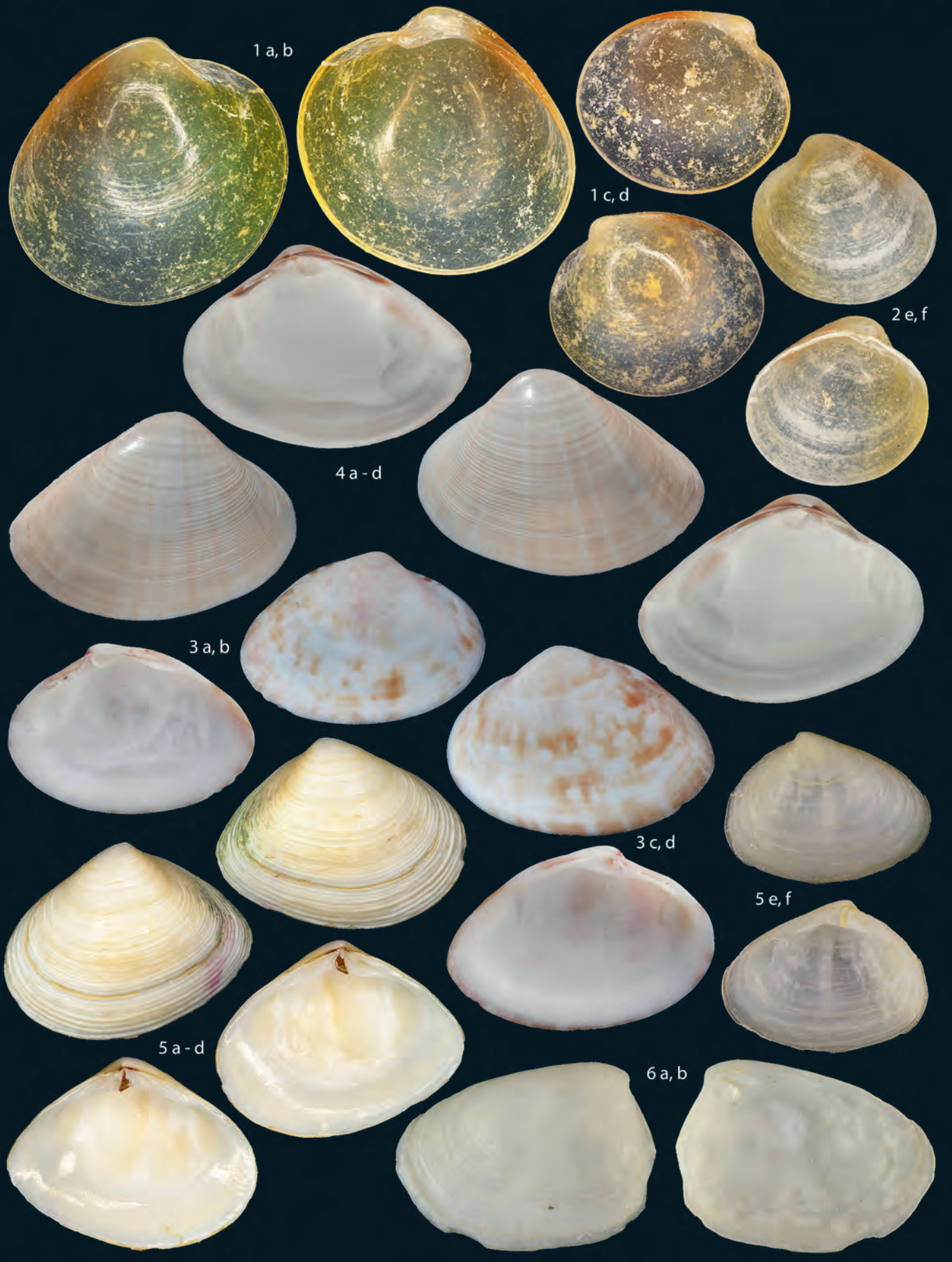
**Plate 41: fig. 10 a, b:** 2.96 x 2.26 mm; **c, d:** 2.93 x 2.42 mm; **e, f:** 1.54 x 1.22; all Caves 17 - 19 m; a - e to scale with 11 a, b and 14 a, b; f enlarged.

Literature: Zuschin & Oliver 2003, Huber 2015.

The valves are smooth, with concentric growth lines.


7 a - e
7 f, g
7 h, i
7 j, k
8 a, b
8 c, d
8 e, f
8 e, f
8 i, j
9 a, b


10 a, b
14 a, b
10 c, d
10 e, f
11 a, b
12 b
13 c, d
12 a
13 a, b
12 c, d


1 a, b
1 c, d
2 e, f
4 a - d
3 a, b
3 c, d
5 e, f
5 a - d
6 a, b

### *Kurtiella* sp. 2

**Plate 41: fig. 11 a, b:** 2.00 x 1.66 mm (Caves 17 - 19 m); to scale with 10 a - e and 14 a, b.

Literature: Zuschin & Oliver 2003, Huber 2015.

The valves are smooth, with concentric growth lines, have a triangular shape and are perhaps identical to Kelliidae sp. indet 2 in Zuschin & Oliver (2003: pl. 28 fig. 28.3).

### *Kurtiella* sp. 3

**Plate 41: fig. 12 a:** 4.00 x 3.34 mm (Blue Hole 4 m); **b:** 3.1 x 2.4 mm (Islands labyrinth 10 m); **c, d:** 1.35 x 1.07 mm (Caves 10 m); to scale with 10 a - d and 14 a, b.

Literature: Huber 2015.

The valves have a coarse concentric sculpture and pustulose surface. They are perhaps identical to Montacutidae sp. indet 1 in Zuschin & Oliver (2003: pl. 28, fig. 28.2).

### *Kurtiella* sp. 4

**Plate 41: fig. 13 a, b:** 2.57 x 1.99 mm; **c, d:** 2.19 x 1.64 mm; both Caves 17 - 19 m; all to scale.

Literature: Huber 2015.

The valves are sculptured with concentric growth lines and fine radial striae.

### *Kurtiella* sp. 5

**Plate 41: fig. 14 a, b:** 1.99 x 1.38 mm (Canyon 22 m); to scale with 10 a - e and 11 a, b.

Literature: Huber 2015.

The valves are smooth, with concentric growth lines, and are more elongated than the other *Kurtiella* species.

## Kelliellidae Fischer, 1887

### Kelliellidae Gen. sp. 1

**Plate 42: fig. 1 a, b:** 1.92 x 1.81 mm; **c, d:** 1.44 x 1.36 mm; both Blue Hole 24 m; all to scale.

Literature: Oliver & Zuschin 2001.

### Kelliellidae Gen. sp. 2

**Plate 42: fig. 2 a, b:** 2.46 x 2.31 mm (El Gahaza 30 m).

Literature: Oliver & Zuschin 2001.

## Mactridae Lamarck, 1809

Their common name is trough shells or duck clams.

### *Mactra achatina* Holten, 1802

**Plate 42: fig. 3 a, b:** 25.8 x 17.2 mm; **c, d:** 23.6 x 16.4 mm; both Islands; all to scale with 5 a - d.

Literature: Oliver 1992, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Poppe 2011, 2017b.



**Fig. 3 e:** *Mactra achatina* at Umm Sid.



**Fig. 3 f:** *Mactra achatina* at Umm Sid umbonal view.

### *Mactra olorina* Philippi, 1846

**Plate 42: fig. 4 a - d:** 39.6 x 55.5 mm (Lagoon).

Literature: Oliver 1992, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Scaperrotta et al. 2015.

## Mesodesmatidae Gray, 1840

### *Atactodea striata* (Gmelin, 1791)

**Plate 42: fig. 5 a - d:** 24.2 x 18.7 mm (Lagoon); **e, f:** 4.5 x 3.4 mm; a - d to scale with 3 a - d.

Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008.

This is *A. glabrata* (Gmelin, 1791) in Oliver (1992) and Bosch et al. (1995).

### *Donacilla* sp.

**Plate 42: fig. 6 a - d:** 7.9 x 5.8 mm (Lagoon).

Literature: Rusmore-Villaume 2008.

This is an undescribed species already depicted by Rusmore-Villaume (2008).


1 a, b
2 c, d
2 a, b
2 c, d
3 a - d
4 a - d
5 a, b
6 a, b

## Tellinidae Blainville, 1814

The commonly known tellins or tellens live deep in soft sediments and have long siphons that reach the surface for respiration.

### Arcopagiinae M. Huber, Langleit & Kreipl, 2015

*Arcopella isseli* (H. Adams, 1871)

**Plate 43: fig. 1 a, b:** 12.4 x 10.2 mm (Lagoon); **c, d:** 2.41 x 1.97 mm (Moray Garden 37 m); to scale with 2 c, d and 3 a - d.

Literature: Adams 1871, Oliver 1992, 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Heiman et al. 2006, Rusmore-Villaume 2008, Huber et al. 2015.

The juveniles are similar to fig. 40.6 in Zuschin & Oliver (2003).

*Clathrotellina tessellata* (Deshayes, 1855)

**Plate 43: fig. 2 a, b:** 19.5 x 16.5 mm (Blue Lagoon); **c, d:** 12.7 x 10.2 mm; to scale with 1 a, b and 3 a - d.

Literature: Dafni URL 1, Rusmore-Villaume 2008, Poppe & Langleit in Poppe 2011, Kovalis 2013, Huber et al. 2015.

Kovalis (2013) mentions a find from Dahab collected in 1984. It is listed as *Clathrotellina* cf. *C. hirasei* (Pilsbry, 1904) in Poppe & Langleit in Poppe (2011: pl. 1161, fig. 1 - 3).

*Pinguitellina pinguis* (Hanley, 1844)

**Plate 43: fig. 3 a - d:** 8.5 x 7.3 mm (Lagoon); to scale with 1 a, b and 2 c, d.

Literature: Oliver 1992, 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Heiman et al. 2006, Rusmore-Villaume 2008, Huber et al. 2015.

A detailed comparison with *Abra fragillima* based on scanning electron microscope images is given in Zuschin & Oliver (2003). The major ligament of *P. pinguis* is located on a shallow nymph but adjacent to the posterior cardinal is a small sunken resilium that does not extend to the hinge plate margin. In *A. fragillima* the resilium extends to the hinge plate margin.

### Moerellinae M. Huber, Langleit & Kreipl, 2015

*Semelangulus* sp.

**Plate 43: fig. 4 a - d:** 6.1 x 3.1 mm (Lagoon).

Literature: Oliver 1992, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Huber et al. 2015.

URL 19: http://131.111.101.189/fmi/iwp/cgi?-db=UMZC%20Catalogues%20%28Web%29&-loadframes

This species is depicted by Oliver (1992), and subsequently by others, as *Tellina* (*Moerella*) *lactea*. The type of *Moerella lactea* (H. Adams, 1871) was not seen by Huber et al., when *M. lactea* was renamed *Semelangulus adamsi* M. Huber, Langleit & Kreipl, 2015. Meanwhile the type is available in URL 19. It clearly depicts a *Jactellina* species with a short posterior part and oblique lines crossing the concentric sculpture. Therefore, *Semelangulus adamsi* should be assigned to *Jactellina* rather than *Semelangulus*. The species depicted probably remains undescribed.

*Semelangulus mesodesmoides* Oliver & Zuschin, 2000

**Plate 43: fig. 5 a, b:** 3.66 x 2.73 mm (Moray Garden 37 m).

Literature: Oliver & Zuschin 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Heiman et al. 2006, Huber et al. 2015.

The generic assignment is probably not resolved yet.

### Tellininae Blainville, 1814

*Abranda* sp.

**Plate 43: fig. 6 a, b:** 8.26 x 6.82 mm (Blue Hole 4 m).

This species seems to be close to *Abranda* sp. 1 from the Red Sea in Huber et al. (2015), especially concerning size, the unusual internal ligament, the commarginal and very faint radial striation. However, the two valves from Dahab appear more asymmetrical and have white speckles in the otherwise opaque transparent shell.

*Exotica triradiata* (H. Adams, 1871)

**Plate 44: fig. 7 a, b:** 9.69 x 5.12 mm; **c, d:** 6.73 x 3.74 mm; **e, f:** 2.96 x 1.69 mm; **g, h:** 6.85 x 4.38 mm; **i:** 6.73 x 3.74 mm; **j:** 6.17 x 3.58 mm; all from Lagoon; a - d and g - j to scale.

Literature: Adams 1871, Oliver 1992, Dekker & Orlin 2000, Zuschin & Oliver 2003, Heiman et al. 2006, Rusmore-Villaume 2008, Huber et al. 2015.

URL 20: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-30852

One specimen matches exactly the lectotype of *Exotica exotica* Jousseaume, 1918 (URL 20), which is a synonym in WoRMS.

*Herouvalia pulchella* (H. Adams, 1870)

**Plate 44: fig. 8 a - d:** 5.2 x 2.8 mm (Islands).

Literature: Lamy 1938, Oliver 1992, Dekker & Orlin 2000, Zuschin & Oliver 2003, Heiman et al. 2006, Rusmore-Villaume 2008, Huber et al. 2015.

URL 21: http://131.111.101.189/fmi/iwp/cgi?-db=UMZC%20Catalogues%20%28Web%29&-loadframes

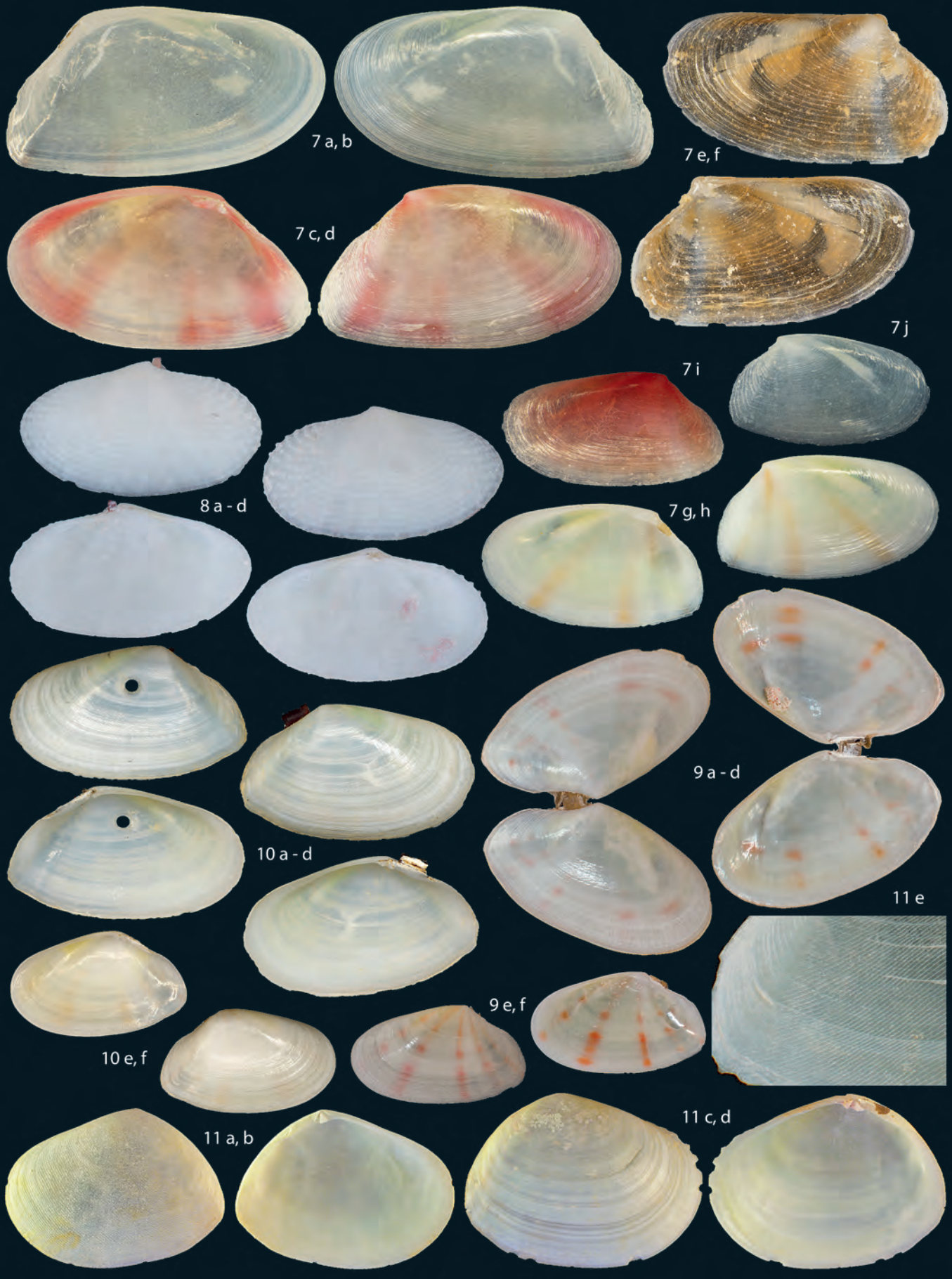
The type is depicted in URL 21. The generic assignment is based according to Raines & Huber (2012). *Gari granulifera* Lamy, 1938 from the Gulf of Suez is a synonym.

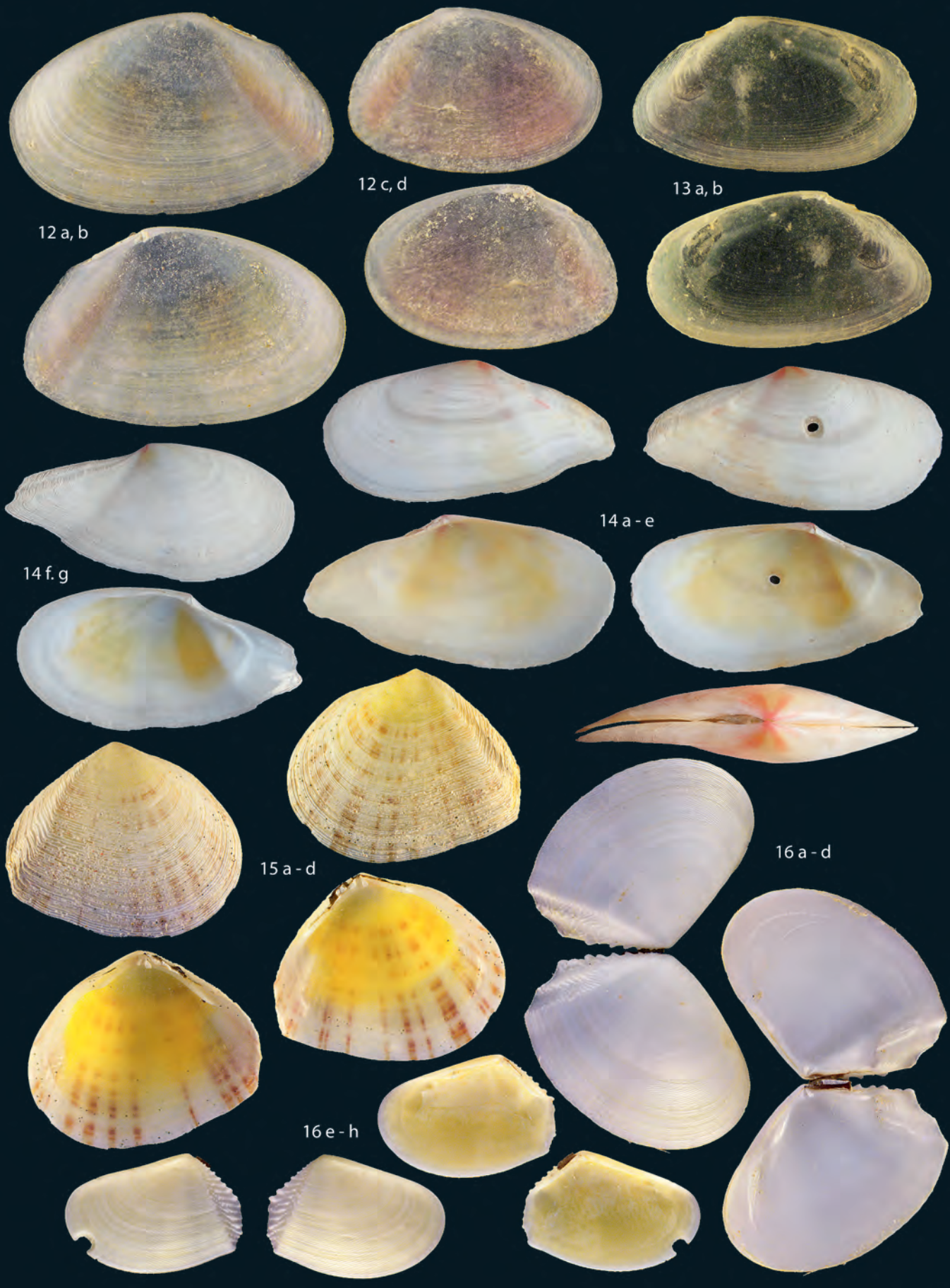
*Jactellina* cf. *clathrata* (Deshayes, 1835)

**Plate 44: fig. 9 a - d:** 18.5 mm; **e, f:** 13.8 mm.

Literature: Oliver 1992, 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Heiman et al. 2006, Rusmore-Villaume 2008, Poppe & Langleit in Poppe 2011, Huber et al. 2015.

Poppe (2017b) writes "Huber considers his *Jactellina clathrata* as a variable species with a range from the Red Sea to the Galapagos and, in our humble opinion, illustrates different species in his 5 figures". H. Dekker (pers. comm.) also compared *Jactellina* specimens from several Indo-Pacific localities and found them to differ in the extend of the oblique sculpture, length of the posterior part and thickness of the shell. *Tellina* (*Peronaea*) *erythraeensis* of Adams (1871: 790, pl.48, fig. 6; not 793) may be the Red Sea species but requires further investigation.


7 a, b
7 e, f
7 c, d
7 j
7 i
8 a - d
7 g, h
9 a - d
10 a - d
11 e
9 e, f
10 e, f
11 a, b
11 c, d


12 a, b
12 c, d
13 a, b
14 a - e
14 f. g
15 a - d
16 a - d
16 e - h


7 f, g
17 a - e
18 e, f
18 a - d
19 a - d
20 a - d
20 e, f
21 a - d

*Jactellina secunda* (BERTIN, 1878)

**Plate 44: fig. 10 a - d:** 20.5 x 11.4 mm (Lagoon); **e, f:** 15.2 x 9.3 mm (Lagoon).

Literature: OLIVER 1992, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, DAFNI URL 1, RUSMORE-VILLAUME 2008, HUBER et al. 2015.

URL 22: http://131.111.101.189/fmi/iwp/cgi?-db=UMZC%20Catalogues%20%28Web%29&-loadframes

The older name *Tellina* (*Peronaea*) *pura* H. ADAMS, 1870 non GOULD, 1853 was replaced by *Tellina secunda*. The type is depicted in URL 22.

*Jactellina subpallida* (E. A. SMITH, 1891)

**Plate 44: fig. 11 a, b:** 27.8 mm (Islands); **c, d:** 25.6 mm (Islands); e: detail of surface sculpture from a shell of 19.5 mm in length.

Literature: SMITH 1891, OLIVER 1992, DEKKER & ORLIN 2000, DAFNI URL 1, RUSMORE-VILLAUME 2008, POPPE & LANGLEIT in POPPE 2011, HUBER et al. 2015.

It matches the description and figure of E. A. SMITH (1891). The maximal size of 27 mm recorded by RUSMORE-VILLAUME 2008 is doubted in HUBER (2015) but the largest specimen from Dahab measures 27.8 mm.

*Nitidotellina lux* (HANLEY, 1844)

**Plate 45: fig. 12 a, b:** 17.3 x 11.0 mm; **c, d:** 13.5 x 9.0 mm; all Islands.

Literature: OLIVER 1992, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, RUSMORE-VILLAUME 2008, AL-YAMANI et al. 2012, COAN & KABAT 2012, HUBER et al. 2015.

This species is often confused with *Tellina vernalis* HANLEY, 1844 (HUBER et al. 2015).

*Nitidotellina* sp.

**Plate 45: fig. 13 a, b:** 9.8 x 5.4 mm (Lagoon).

This shell is slenderer and more transparent than the former species as well as *Nitidotellina unifasciata* (G. B. SOWERBY II, 1867) as depicted in HUBER (2015).

*Pharaonella semilaevis* (MARTENS, 1865)

**Plate 45: fig. 14 a - e:** 56.9 x 26.6 mm; **f, g:** 54.8 x 26.2 mm; all to scale.

Literature: OLIVER 1992, BLATTERER et al. 2000, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, DAFNI URL 1, HEIMAN et al. 2006, RUSMORE-VILLAUME 2008, HUBER et al. 2015.

The identification is based on RUSMORE-VILLAUME (2008) and HUBER et al. (2015).

*Pristipagia adamsii* (BERTIN, 1878)

**Plate 45: fig. 15 a - d:** 23.2 x 19.2 mm (Lagoon); to scale with 16 a - h.

Literature: OLIVER 1992, 1995, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, DAFNI URL 1, HEIMAN et al. 2006, RUSMORE-VILLAUME 2008, HUBER et al. 2015.

The generic assignment is according to RAINES & HUBER (2012).

*Quadrans sericatus* (MELVILL, 1898)

**Plate 45: fig. 16 a - d:** 23.6 x 17.7 mm (Lagoon); **e - h:** 17.3 x 11.4 mm; to scale with 15 a - d.

Literature: MELVILL 1898a, OLIVER 1992, BLATTERER et al. 2000, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, DAFNI URL 1, HEIMAN et al. 2006, RUSMORE-VILLAUME 2008, HUBER et al. 2015.

The species was formerly placed in the subgenus *Obtellina*.

*Quidnipagus palatam* IREDALE, 1929

**Plate 46: fig. 17 a - e:** 52 x 39 mm; to scale with 18 a - f.

Literature: OLIVER 1992, 1995, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, DAFNI URL 1, HEIMAN et al. 2006, RUSMORE-VILLAUME 2008, POPPE & LANGLEIT in POPPE 2011, HUBER et al. 2015.

The largest shell in the collection is 56.7 mm in length.

*Scutarcopagia delicatula* (SELLI, 1974)

**Plate 46: fig. 18 a - d:** 46 x 41 mm (Lagoon); **e, f:** 41 x 39 mm (Islands); to scale with 17 a - e.

Literature: BLATTERER et al. 2000, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, DAFNI URL 1, MIENIS 2006c, HEIMAN et al. 2006, RUSMORE-VILLAUME 2008, HUBER et al. 2015.

The largest shell in the collection is 70 mm in length. According to DEKKER & VAN GEMERT (2008) and RUSMORE-VILLAUME (2008) this is the name for finer sculptured specimens. However, it is still treated as *S. scobinata* (LINNAEUS, 1758) by HUBER et al. (2015). *Scutarcopagia delicatula* (not treated in WoRMS) is clearly different from the image of *S. scobinata* in OLIVER (1992: pl. 30, fig. 1).

*Scutarcopagia pulcherrima* (G.B. SOWERBY I, 1825)

**Plate 46: fig. 19 a - d:** 40.9 x 21.8 mm.

Literature: OLIVER 1992, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, DAFNI URL 1, HEIMAN et al. 2006, RUSMORE-VILLAUME 2008, HUBER et al. 2015.

*Tellinella asperrima* (HANLEY, 1844) is a well-known synonym.

*Serratina fissa* (SPENGLER, 1798)

**Plate 46: fig. 20 a - d:** 18.4 x 12.8 mm (South); **e, f:** 23.7 x 14.3 mm (Lagoon); all to scale.

Literature: OLIVER 1992, DEKKER & ORLIN 2000, ZUSCHIN & OLIVER 2003, HEIMAN et al. 2006, RUSMORE-VILLAUME 2008, HUBER et al. 2015.

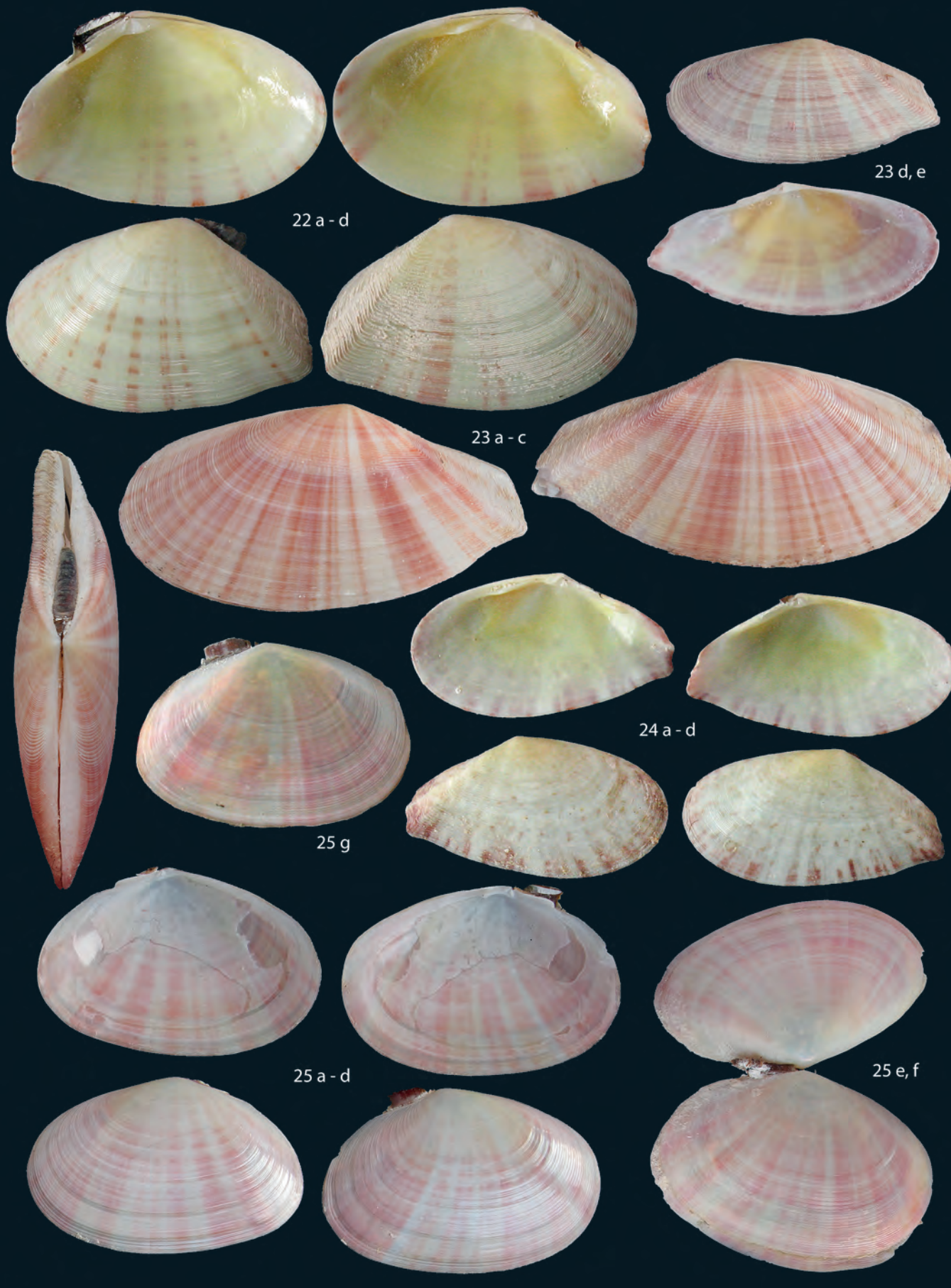
This species was formerly known as *Serratina* or *Tellinella sulcata* (WOOD, 1815).

*Serratina pristis* (LAMARCK, 1818)

**Plate 46: fig. 21 a - d:** 38.4 x 28.0 mm (Lagoon).

Literature: OLIVER 1995, DEKKER & ORLIN 2000, HEIMAN et al. 2006, RUSMORE-VILLAUME 2008, HUBER et al. 2015.

The species is described as *Tellina* (*Serratina*) *capsoides* (LAMARCK, 1818) in OLIVER (1992) and BOSCH et al. (1995). The complicated and confusing name discrepancy is cleared in HUBER et al. (2015).


22 a - d
23 d, e
23 a - c
24 a - d
25 g
25 a - d
25 e, f


1 e, f
1 a - d
1 g, h
2 e - h
2 a - d
3 g
3 a - d
3 e, f


1 a, b
1 c, d
2 e, f
3 a - d
4 a, b
1 e, f
2 a - d
2 g, h
4 c - f
3 e, f

*Tellinella cruciata* (Spengler, 1798)

**Plate 47: fig. 22 a - d:** 40.9 x 21.8 mm.

Literature: Oliver 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Heiman et al. 2006, Rusmore-Villaume 2008, Huber et al. 2015.

*Tellina staurella* Lamarck, 1818 is a well-known synonym.

*Tellinella philippii* (Anton, 1844)

**Plate 47: fig. 23 a - c:** 84.5 x 42.9 mm; **d, e:** 61.0 x 29.6 mm.

Literature: Oliver 1992, 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Heiman et al. 2006, Rusmore-Villaume 2008, Huber et al. 2015.

*Tellina rastellum* Hanley, 1844 is a junior subjective synonym published later in the same year.

*Tellinella tithonia* (A. A. Gould, 1850)

**Plate 47: fig. 24 a - d:** 33.4 x 17.2 mm.

Literature: Rusmore-Villaume 2008, Heiman et al. 2006, Huber et al. 2015.

The species is often confused (e.g. Heiman et al. 2006, Rusmore-Villaume 2008) with the similar *Tellinella crucigera* (Lamarck, 1818) which has a smooth area on the left valve in front of the posterior ridge (Huber et al. 2015).

*Tellinides striatus* (Gmelin, 1791)

**Plate 47: fig. 25 a - d:** 35.2 x 23.0 mm (Lagoon); **e, f:** 23.7 x 14.3 mm (Lagoon); **g:** 34.7 x 23.5 mm (South); all to scale with 22 a - d and 24 a - d.

Literature: Dafni URL 1, Heiman et al. 2006, Rusmore-Villaume 2008, Huber et al. 2015.

The species is also known as *Tellinides ovalis* (Sowerby I, 1825).

## Psammobiidae Fleming, 1828

*Asaphis violascens* (Forsskål in Niebuhr, 1775)

**Plate 48: fig. 1 a - d:** 35.2 x 23.0 mm; **e, f:** 40.6 x 27.2 mm; **g, h:** 36.4 x 23.8 mm; all to scale with 22 a - d and 24 a - d.

Literature: Oliver 1992, 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Al-Yamani et al. 2012, Willan & Tagaro in Poppe 2011.

The lectotype is depicted by Yaron et al. (1986). One of the most common larger bivalves found beached in Dahab from 2003 - 2008. The following years fewer specimens could be found, until 2017 and 2018 when finds became more frequent again.

*Gari insignis* (Deshayes, 1855)

**Plate 48: fig. 2 a - d:** 21.2 x 9.9 mm; **e - h:** 20.4 x 9.8 mm; a - h to scale with 3 a - f.

Literature: Blatterer et al. 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008.

*Gari pennata* (Deshayes, 1855)

**Plate 48: fig. 3 a - d:** 25.9 x 14.5 mm; **e, f:** 22.4 x 11.8 mm; **g:** same as 3 c in different illumination, so sculpture is better visible; a - f to scale with 2 a - h.

Literature: Oliver 1992, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Willan & Tagaro in Poppe 2011.

Identified as *Gari* (*Heteroglypta*) *dispar* in Oliver (1992).

## Semelidae Stoliczka, 1870 (1825)

*Abra aegyptiaca* Oliver & Zuschin, 2000

**Plate 49: fig. 1 a, b:** 2.18 x 2.02 mm (Canyon 22 m); **c, d:** 1.40 x 1.17 mm (Islands seagrass); **e, f:** 3.0 x 2.6 mm; a, b to scale with 2 e, f.

Literature: Oliver & Zuschin 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1.

*Abra fragillima* (Issel, 1869)

**Plate 49: fig. 2 a - d:** 4.2 x 3.1 mm (Lagoon fine sand); **e, f:** 2.09 x 1.63 mm (Blue Hole 4 m); **g, h:** 9.8 x 8.0 mm (Lagoon); e, f to scale with 1 a, b.

Literature: Oliver 1992, Dekker & Orlin 2000, Zuschin & Oliver 2003.

See also the remark at the very similar *Pinguitellina pinguis* (Tellinidae, Arcopagiinae). Generic assignment is according to WoRMS, the species has formerly been placed in the genus *Semele*.

*Cumingia deshayesiana* Vaillant, 1865

**Plate 49: fig. 3 a - d:** 4.66 x 2.95 mm (South); **e, f:** 7.7 x 5.3 mm.

Literature: Oliver 1992, 1995, Dekker & Orlin 2000.

The shells are not fully grown. Therefore, dentition is not as clear as seen in the valve in Oliver (1992). The Dahab specimens are conspecific with *Amphidesma striata* Reeve, 1853, which is listed as *Semele striata* (Reeve, 1853) in WoRMS, and will become a homonym when correctly placed in *Cumingia* due to *C. striata* A. Adams, 1850. Thus, the next available name is *C. deshayesiana* Vaillant, 1865. *Semele macandreae* H. Adams, 1870, *S. fazisa* Gregorio, 1884 (= type of *Elegantula*) and *Cumingia occatilla* Melvill, 1901 are further synonyms according to WoRMS. *Sphenia rueppellii* A. Adams, 1851 is also an epibyssate nestling species and may have a similar external sculpture but shows a considerably different dentition in each of the two valves (Oliver et al. 2018: fig. 4 n).

*Iacra seychellarum* (A. Adams, 1856)

**Plate 49: fig. 4 a, b:** 17.0 x 14.6 mm; **c, d:** 12.7 x 10.6 mm; all Lagoon.

Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Dekker 2001, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008.

Helpful remarks to this genus can be read in Dekker (2001).

*Leptomya bracheon* (Sturany, 1899)

**Plate 50: fig. 5 a - d:** 39.8 x 20.0 mm (Islands); all to scale with 6 a - d.

Literature: Sturany 1899, Oliver 1992, 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, Huber 2010.

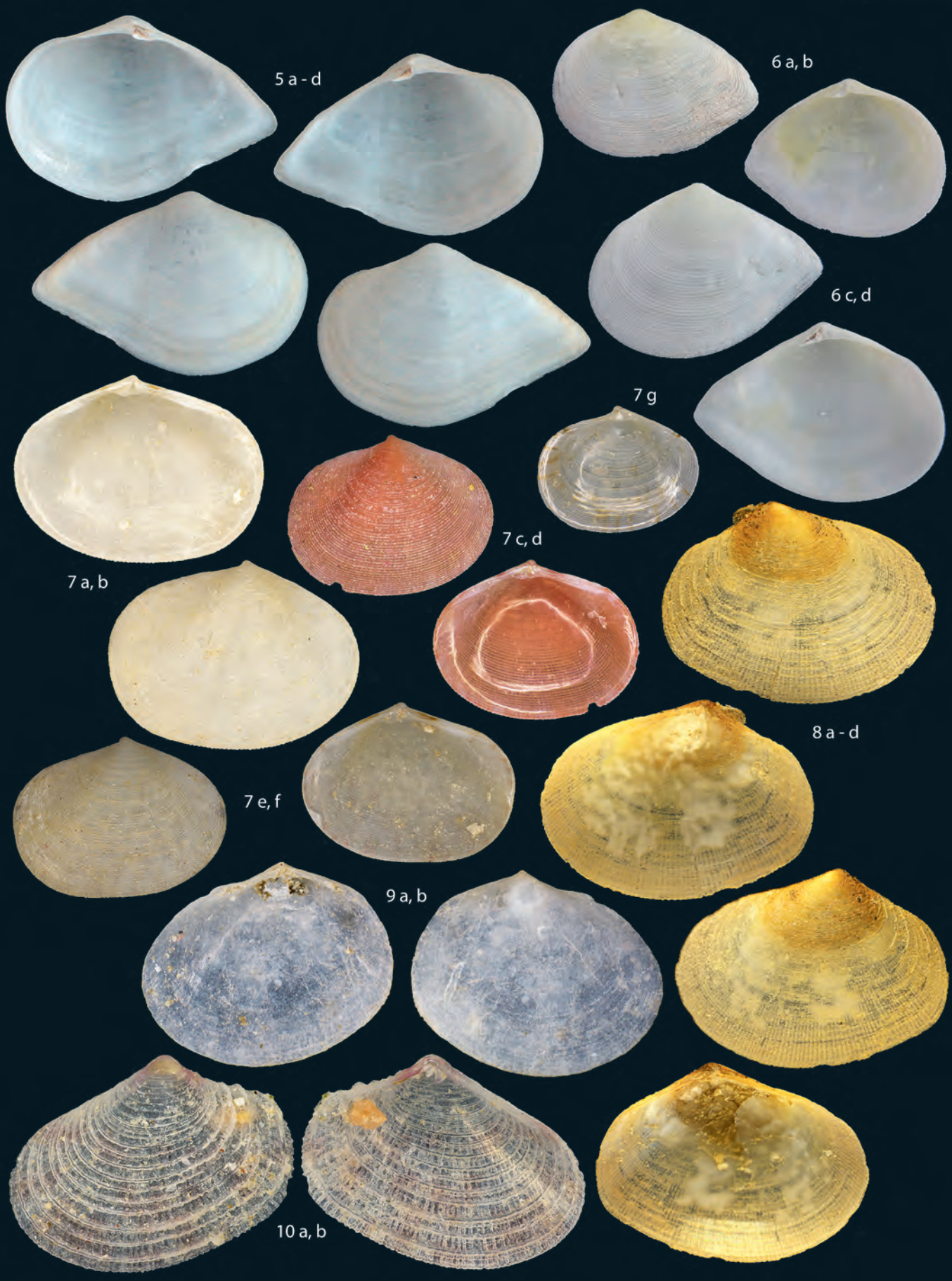
The Red Sea/Arabian species is considered distinct from *L. cochlearis* (Hinds, 1844) by Huber (2010).

*Leptomya rostrata* (H. Adams, 1868)

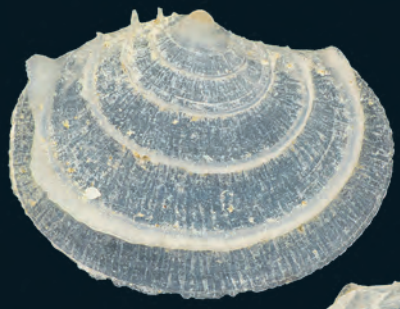
**Plate 50: fig. 6 a, b:** 27.7 x 19.7 mm; **c, d:** 25.7 x 17.0 mm; all from Lagoon; all to scale with 5 a - d.

Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Huber 2010.

According to Huber (2010) *L. subrostrata* (Issel, 1969) is a synonym.


5 a - d
6 a, b
6 c, d
7 g
7 c, d
7 a, b
8 a - d
7 e, f
9 a, b
10 a, b

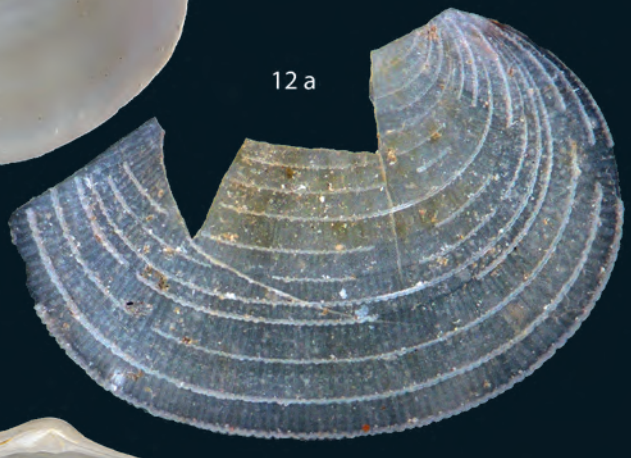

11 e


11 c, d




11 a, b




12 a




13 a, b







15 c, d



15 a, b



14 a, b




16 a - d
16 j, k
16 l, m
16 e - i
17 a, b
16 n, o
17 c

*Rochefortina* cf. *sandwichensis* (E. A. Smith, 1885)

**Plate 50: fig. 7 a, b:** 3.78 x 2.87 mm; **c, d:** 3.13 x 2.44 mm; **e, f:** 3.24 x 2.41 mm; **e:** 2.46 x 1.93 mm; all from Caves; all to scale with 9 a, b.

Literature: Zuschin & Oliver 2003, Oliver & Holmes 2004, Oliver et al. 2004.

It is conspecific with the shell found by Zuschin & Oliver (2003) but questionable compared to the shell shown in Bosch et al. (1995). Matches the description in Hayami & Kase (1993) from a submarine cave were the abundant occurrence of living specimens was remarkable. Most of the Dahab *Rochefortina* spp. were also found in caves. *Rochefortina sandwichensis* (Smith, 1885) in Oliver et al. (2004) has a more pronounced radial sculpture.

*Rochefortina* sp. 2

**Plate 50: fig. 8 a - d:** 2.3 x 1.7 mm (Canyon 45 m); to scale with 10 a, b.

Radial and concentric microstructure is similar to the former species, but the umbo is more subcentral and less pointed and the dentition is less prominent. It is similar to *Abranda* sp., the Tellininae with the unusual internal ligament, but has a pointed umbo and is more elongated.

*Rochefortina* sp. 3

**Plate 50: fig. 9 a, b:** 3.84 x 3.09 mm (Caves 17 - 19 m); to scale with 7 a - g.

This species resembles in outline *Rochefortina* cf. *sandwichensis*, but the microstructure is different.

*Rochefortina* sp. 4

**Plate 50: fig. 10 a, b:** 1.61 x 1.13 mm (Moray Garden 37 m); to scale with 8 a, b.

It is similar to *Rochefortina* sp. 2 but the radial sculpture is more prominent.

*Semele lamellosa* (Reeve, 1853)

**Plate 51: fig. 11 a, b:** 35.5 x 31.4 mm (Islands); **c, d:** juvenile 2.45 x 1.84 mm (Moray Garden 17 m); **e:** enlarged umbo of a.

Literature: Dekker & Orlin 2000, Oliver 1995, Rusmore-Villaume 2008, Huber 2010, Poppe & Tagaro in Poppe 2011, Poppe 2017b.

According to Huber (2010) Sowerby I (1833) published *S. lamellosa* as a nomen nudum, which was validly introduced by Reeve in 1853. This is probably the first record for the Gulf of Aqaba.

*Semele* cf. *carnicolor* (Hanley, 1845)

**Plate 51: fig. 12 a:** 5.5 mm (Caves).

Literature: Oliver 1992, Dekker & Orlin 2000, Huber 2010.

Only a fragment of a juvenile specimen was found. However, the finely frilled lamellae, together with the radial sculpture and colour indicate this species, which is already known from the Red Sea.

## Solecurtidae d'Orbigny, 1846

*Azorinus xyreces* (Melvill, 1898)

**Plate 51: fig. 13 a:** 28.8 x 12.5 mm (Lagoon).

Literature: Sharabati 1984, Melvill 1898b, Oliver 1992, 1995, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Poppe 2011.

Identified as *Azorinus coarctatus* (Gmelin, 1791) by most authors, but it does not fit with the type figure. Furthermore *A. coarctatus* is considered a nom. dub. in Huber (2010). *Azorinus scheepmakeri* (Dunker, 1852) in Poppe (2011) has two oblique radial striae from the umbo to the ventral margin.

*Solecurtus australis* (Dunker, 1862)

**Plate 51: fig. 14 a:** 33.5 x 15.0 mm (Lagoon).

Literature: Sharabati 1984, Dafni URL 1, Rusmore-Villaume 2008, Huber 2010.

This species is reddish, while the confused *S. subcandidus* Sturany, 1899, described from the Red Sea, has a white shell with a yellow periostracum (Oliver 1992, Huber 2010).

## Ungulinidae Gray, 1854

*Transkeia satparaensis* (Preston, 1915)

**Plate 51: fig. 15 a, b:** 16.0 x 14.6 mm (Islands 20 m); **c, d:** 14.2 x 12.9 mm (Islands 20 m).

Literature: Oliver 1992, Dekker & Orlin 2000, van Aartsen & Goud 2006b, Rusmore-Villaume 2008.

The hinge is without nymph but with conspicuous resilifer. It is described as *Diplodonta* sp. 1 in Rusmore-Villaume (2008). *Diplodonta moolenbeeki* van Aartsen & Goud, 2006 is considered a synonym (WoRMS).

*Diplodonta subrotunda* Issel, 1869

**Plate 52: fig. 16 a - d:** 18.7 x 17.4 mm (Islands); **e - i:** 17.8 x 16.3 mm (South); **j, k:** 3.73 x 3.29 mm (Caves); **l, m:** 15.1 x 16.1 mm (North); **n, o:** 10.2 x 9.5 mm.

Literature: Oliver 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, van Aartsen & Goud 2006b, Dafni URL 1, Rusmore-Villaume 2008.

This species has a clearly recognizable external ligament and nymph.

Transkeia sp.

**Plate 52: fig. 17 a, b:** 8.3 x 7.2 mm (Lagoon); **c:** detail of surface sculpture.

Literature: Rusmore-Villaume 2008.

As *Diplodonta* sp. 2 in Rusmore-Villaume (2008). A difference to the other two Red Sea Ungulinidae is the surface sculpture, a very fine punctuation.


1 a - d
1 e - h
1 i
1 j
1 k
1 l
1 m - p
2 a - d
3 a - e
2 e - h

## Veneridae Rafinesque, 1815

*Callista florida* (Lamarck, 1818)

**Plate 53: fig. 1 a - d:** 36 mm; **e - h:** 2.40 x 1.85 mm (Islands seagrass); **i:** 27.5 x 20.3 mm; **j:** 23.1 x 17.2 mm; **k:** 19.9 x 14.8 mm; **l:** 17.8 x 13.2 mm; **m - p:** 24.4 x 17.0 mm; i - l to scale.

Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008.

*Circe rivularis* (Born, 1778)

**Plate 53: fig. 2 a - d:** 45.7 x 42.0 mm; **e - h:** 15.6 x 14.1 mm (Blue Beach).

Literature: Bouchet & Danrigal 1982, Oliver 1992, Blatterer et al. 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008.

*Circe crocea* (Gray, 1838) is a commonly used junior name.

*Circe rugifera* (Lamarck, 1818)

**Plate 53: fig. 3 a - e:** 34.2 x 31.2 mm (Lagoon).

Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008.

The species is identified as *C.* (*Parmulophora*) *corrugata* (Dillwyn, 1817) in Oliver (1992).

*Circenita varia* (Forsskål in Niebuhr, 1775)

**Plate 54: fig. 4 a - l:** largest 34.2 x 31.2 mm; **m, n:** both 2.7 x 2.2 mm; a - l to scale with 6 a - d.

Literature: Oliver 1992, Blatterer et al. 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Scaperrotta et al. 2018.



**Fig. 4 o:** *Circenita varia* at El-Qura Bay.

Huber (2010) selected a lectotype for the Red Sea species *C. varia* and discriminates *C. callipyga* (Born, 1778) from Gulf of Oman and the Persian Gulf. According to him the specimens in Oliver (1995) belong to the real *C. callipyga*. Both species show variation in colour, length to high ratio, and tumidity, but *C. callipyga* seems to have a finer commarginal ribbing. The specimens from Dahab represent the flatter and more elongated form known from the Gulf of Oman and the Persian Gulf but the ribbing is somewhat coarser. Without knowing the locality probably not all forms of a population can be flawlessly attributed (H. Dekker pers. comm.). Unfortunately, genetic studies are not available.



**Fig. 4 p:** A living *Circenita varia* exposed at El-Qura Bay.

*Dosinia erythraea* Römer, 1860

**Plate 54: fig. 5 a, b:** 49.7 x 46.8 mm; **c:** 34.7 x 33.2 mm.

Literature: Oliver 1992, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008.

*Dosinia histrio* (Gmelin, 1791)

**Plate 54: fig. 6 a - d:** 25.2 x 24.0 mm.

Literature: Oliver 1992, Blatterer et al. 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Poppe 2011.

The species is smaller than *D. erythraea* and has a dark brown zigzag pattern.

*Gafrarium savignyi* (Jonas, 1846)

**Plate 54: fig. 7 a, b:** 48.7 x 36.3 mm.

Literature: Bouchet & Danrigal 1982, Oliver 1992, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Huber 2010.

Formerly known in the Red Sea as *Gafrarium pectinatum* (Linnaeus, 1758) which is a different species.

*Globivenus orientalis* (Cox, 1930)

**Plate 54: fig. 8 a - d:** 50.1 x 48.1 mm.

Literature: Dekker & Orlin 2000, Zuschin & Oliver 2003, Rusmore-Villaume 2008.

The species is identified as *Ventricolaria toreuma* (Gould, 1850) in Zuschin & Oliver (2003).

*Hyphantosoma spoori* (Lamprell & Whitehead, 1990)

**Plate 55: fig. 9 a:** 33.3 x 27.0 mm; **b - e:** 19.6 x 16.9 mm; both Lagoon.

Literature: Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Huber 2010.

Typical for *H. spoori* is an unpatterned solid brown colour at the posterior end.


4 i, j
4 k, l
4 m
4 a - d
4 e - h
4 n
5 c
6 a - d
5 a, b
7 a, b
8 a - d


9 a
9 b - e
10 a, b
10 c, d
11 a, b
12 a - d
14 a - d
13 c, d
13 a, b


15 a - d
17 a - d
16 a - d
18 a - d
19 e - h
19 a - d
19 i - l

*Irus macrophylla* (Deshayes, 1853)

**Plate 55: fig. 10 a, b:** 3.89 x 2.31 mm (Blue Hole 24 m); **c, d:** 1.63 x 1.12 mm (Caves).

Literature: Zuschin & Oliver 2003, Oliver et al. 2004, Singer & Mienis 2008.

The species is considered a synonym of *Irus irus* (Linnaeus, 1758) in WoRMS, which is however a Mediterranean Sea species.

*Kyrina kyrina* Jousseaume, 1894

**Plate 55: fig. 11 a, b:** 1.21 x 1.00 mm (Lagoon 3 m).

Literature: Huber 2010.

The identification was only possible because of other specimens at hand by H. Dekker (pers. comm.).

*Lioconcha arabaya* van der Meij, Moolenbeek & Dekker (2010)

**Plate 55: fig. 12 a - d:** 44.6 x 40.5 mm (Lagoon).

Literature: Oliver 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, van der Meij et al. 2010.

*Lioconcha kovalisi* De Prins, 2013

**Plate 55: fig. 13 a, b:** 33.9 x 30.5 mm; **c, d:** 29.7 x 25.3 mm; all to scale with 14 a - d.

Literature: Oliver 1992, 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Zuschin & Oliver 2003, Rusmore-Villaume 2008, De Prins 2013.

The specimens show the typical pattern of this species.

*Lioconcha* cf. *kovalisi* De Prins, 2013

**Plate 55: fig. 14 a - d:** 27.2 x 24.9 mm (Islands); to scale with 13 a - d.

This shell has a different pattern than the typical species.

*Lioconcha ornata* (Dillwyn, 1817)

**Plate 56: fig. 15 a - d:** 29.3 x 23.6 mm (Blue Lagoon); to scale with 17 a - d.

Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Huber 2010.

*Lioconcha philippinarum* (Hanley, 1844)

**Plate 56: fig. 16 a - d:** 22.3 x 20.4 mm.

Literature: Oliver 1992, Blatterer et al. 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Huber 2010, Poppe 2011.

*Lioconcha dautzenbergi* (Prashad, 1932) cannot be ruled out (S. van der Meij pers. comm.), but Lamprell & Healy (2002) mention a lower maximum size (15.8 mm) and fewer, stronger concentric ridges of *L. dautzenbergi*.

*Lioconcha* sp.

**Plate 56: fig. 17 a - d:** 29.3 x 24.4 mm (Islands); to scale with 15 a - d.

This is an undescribed species with a tent pattern, strong concentric ridges and a plain white interior.

*Paratapes textilis* (Gmelin, 1791)

**Plate 56: fig. 18 a, b:** 45.8 x 26.4 mm (from a restaurant at Masbat Bay).

Literature: Dekker & Orlin 2000, Rusmore-Villaume 2008, Singer & Mienis 2008, Huber 2010, 2015, Scaperrotta et al. 2012.

I never saw a valve in the water. Specimens are sold at the restaurants and it was said they originate from the northern Gulf of Suez. This species is a Lessepsian immigrant into the Mediterranean Sea (Scaperrotta et al. 2012).



**Fig. 18 c:** *Paratapes textilis* sold at a restaurant.

*Pitar hebraeus* (Lamarck, 1818)

**Plate 56: fig. 19 a - d:** 23.5 x 19.1 mm; **e - h:** 24.4 x 22.3 mm; **i - l:** 32.2 x 26.6 mm (Lagoon); a - h to scale.

Literature: Oliver 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008.

*Periglypta crispata* (Linnaeus, 1758)

**Plate 57: fig. 20 a, b:** 65.3 x 52 mm; **c, d:** 57.8 x 47.7 mm; both Lagoon; all to scale with 21 a - j.

Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Lacroix & Lacroix 2011.

The dark brown lunulae are characteristic. It is identified as *P. reticulata* in Bosch et al. (1995), Oliver (1992), Zuschin & Oliver (2003) and as *Antigona crispata* (Deshayes, 1853) in Huber 2010.

*Periglypta* sp. 1

**Plate 57: fig. 21 a - d:** 59 mm (a fossil specimen); **e, f:** 47 x 41 mm; **g - j:** 44 x 37 mm; a - j to scale with 20 a - d.

Literature: Oliver 1992, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008.

*Periglypta puerpera* (Linnaeus, 1771) and *P. reticulata* (Linnaeus, 1758) have formerly been used for this species.

*Periglypta* sp. juvenile

**Plate 57: fig. 22 a, b:** 1.98 x 1.69 mm (Caves); **c, d:** 1.98 x 1.94 mm (Caves 33 m); all to scale with 23 a - d and 24 a, b.

The juveniles may belong to *P. crispata* or *Periglypta* sp. 1 as they have only a primary commarginal sculpture. It is identified as *Antigona reticulata* (Linnaeus, 1758) partly in Huber 2010.


20 a, b
20 c, d
21 a - d
21 e, f
21 g - j
23 a, b
22 a, b
22 c, d
23 c, d
23 e, f
24 a, b

### *Periglypta* sp. 2

**Plate 57: fig. 23 a, b:** 1.60 x 1.30 mm; **c, d:** 1.75 x 1.41 mm; **e, f:** 3.56 x 3.19 mm; all from Caves 17 - 19 m; all to scale with 22 a - d and 24 a, b.

These juveniles show a clearly different commarginal sculpture of primary and secondary crispate ribs which is not seen in adults of the two other *Periglypta* species from Dahab.

### Veneridae Gen. sp. 1

**Plate 57: fig. 24 a, b:** 1.8 x 1.25 mm (Canyon 11 m); to scale with 22 a - d and 23 a - d.

This tiny yellow shell may be related to *Periglypta* or *Tapes*.

### *Redicirce sulcata* (Gray, 1838)

**Plate 58: fig. 25 a - d:** 15.5 x 13.8 mm; **e, f:** 12.9 x 11.6 mm; **g, h:** 12.2 x 10.6 mm; all to scale.

Literature: Oliver 1992, 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008.

### *Samarangia lewinsohni* Mienis, 2011

**Plate 58: fig. 26 a - d:** 63.4 x 44.8 mm (Lagoon 15 m); to scale with 27 a - h.

Literature: Oliver 1992, Dekker & Orlin 2000, Zuschin & Oliver 2003, Rusmore-Villaume 2008, Mienis 2011, van Gemert 2011a, Huber 2015.

Living shells were found in patches of sand inside overhanging caves at the drop off outside the Blue Hole. The agglutinated sand and silt cover were heavily eroded, and the exact number of nodular ribs was not visible. It is very likely that *S. lewinsohni* Mienis, 2011 also lives at Réunion. So far, no other finds from the tropical western part of the Indian Ocean have been reported (van Gemert 2011a). Huber (2015) questions the validity of this species and discusses the very probable synonymy to *S. quadrangularis* (A. Adams & Reeve, 1850) but this view is not shared here. In WoRMS both species are valid.

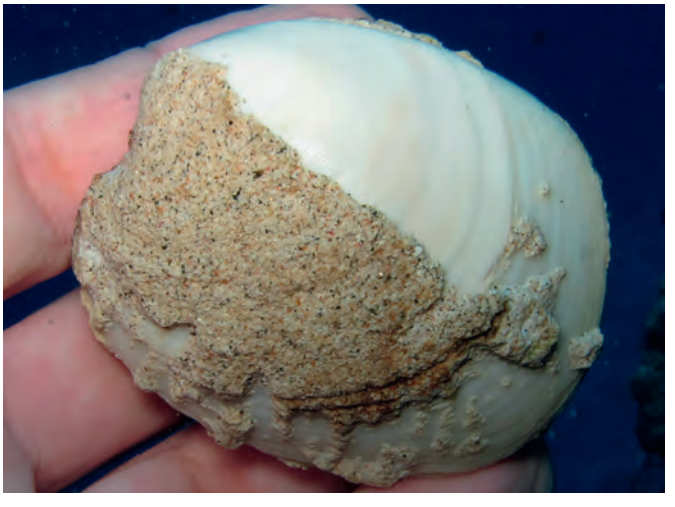


**Fig. 26 e:** *Samarangia lewinsohni* found alive at Bells - Blue Hole.

### *Tapes deshayesii* (Hanley, 1844)

**Plate 58: fig. 27 a - d:** 65.8 x 63.4 mm; **e - h:** 40.5 x 27.1 mm; **i - l:** 20.1 x 11.6 mm (Lagoon); **m, n:** juvenile 12.0 x 7.5 mm (South); a - h to scale with 26 a - d.

Literature: Oliver 1992, 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Singer & Mienis 2008, Poppe 2011, Al-Yamani et al. 2012.

*Tapes deshayesii* is according to Singer & Mienis (2008) the species with the deeper pallial sinus, but Huber (2010) considers it to be a synonym of *T. sulcarius* (Lamarck, 1818). It resembles the shell of unresolved status in Zuschin & Oliver (2003: 50.7a/b). A single juvenile has unusual orange, tent-like lines, like *Tapes literatus* (Linnaeus, 1758) which is not living in the Red Sea.

### *Timoclea hypopta* (Sturany, 1899)

**Plate 59: fig. 28 a - d:** 17.2 x 13.7 mm; **e - h:** 24.8 x 19.7 mm; **i - l:** 19.3 x 15.3 mm; **m, n:** 11.5 x 8.9 mm; whole plate to scale except 30 a, b.

Literature: Sturany 1899, Oliver 1992, 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008.

This species displays a wide range of beautiful colour morphs.

### *Timoclea djiboutiensis* (Jousseaume, 1894)

**Plate 59: fig. 29 a - d:** 19.1 x 15.0 mm; **e - h:** 18.1 x 13.9 mm; whole plate to scale except 30 a, b.

Literature: Dekker & Orlin 2000, Zuschin & Oliver 2003, Dafni URL 1, Rusmore-Villaume 2008, Huber 2015.

*Timoclea djiboutiensis* was formerly considered a synonym of *T. marica* (Linnaeus, 1758), because of a misleading picture (Oliver 1992) of a species from outside the Red Sea (Rusmore-Villaume 2008, Huber 2015: 759).

### *Timoclea* sp.

**Plate 59: fig. 30 a, b:** 0.93 x 0.83 mm (Lagoon 10 m).

This very tiny juvenile is attributed to this genus. The juveniles of a third Red Sea species, *Timoclea roemeriana* (Issel, 1869) are also subcircular in outline (Zuschin & Oliver 2003).

## Petricolinae d'Orbigny, 1840

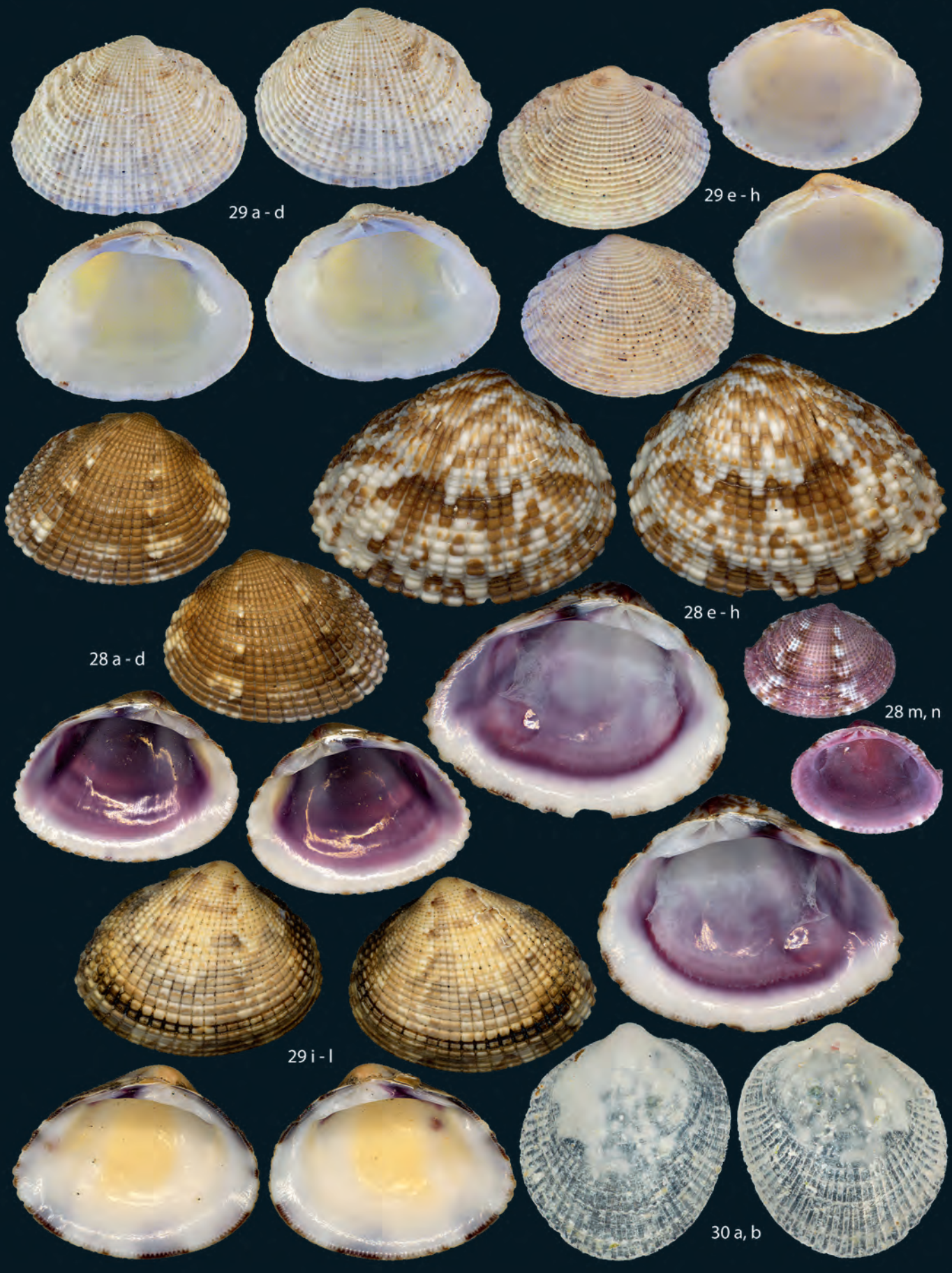
### *Lajonkairia elegans* (H. Adams, 1870)

**Plate 60: fig. 1 a, b:** 17.9 x 16.8 mm (Lagoon); **c:** detail of shell sculpture.

Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Zuschin & Oliver 2003, Rusmore-Villaume 2008, Huber 2010.

Identified as *Phlyctiderma tumida* (H. Adams, 1871) in Oliver (1992). This species has formerly been placed in *Mysia* and other genera.


25 a - d
25 e, f
25 g, h
26 a - d
27 i - l
27 m, n
27 a - d
27 e - h


29 a - d
29 e - h
28 a - d
28 e - h
28 m, n
29 i - l
30 a, b


1 a, b
1 c
2 a, b
2 c, d
2 e, f
2 g, h
2 i, j
2 k, l
2 m, n
3 a, b

## Corbulidae Lamarck, 1818

*Varicorbula rotalis* (Hinds, 1843)

**Plate 60: fig. 2 a, b:** 2.77 x 2.11 mm (Caves); **c, d:** 3.99 x 2.36 mm (Blue Hole 34 m); **e, f:** 4.06 x 3.05 mm (Blue Hole 34 m); **g, h:** 3.52 x 2.44 mm (Caves); **i, j:** 2.56 x 2.21 mm (Bells - Blue Hole 29 m); **k, l:** 3.94 x 3.00 mm (Caves); **m, n:** 1.66 x 1.27 mm (Caves 17 - 19 m); a, b, i, j, m, n to scale; c, d, e, f to scale; g, h, k, l to scale.

Literature: Zuschin & Oliver 2003, Huber 2010, Oliver et al. 2015, Okutani 2017.

This species is strongly inequivalve with the left valves developing radial sculpture, being much smaller and fitting inside the right valve, which has a strong co-marginal sculpture. Dirty white, yellowish and faint reddish colours occur. The Genus is chosen according to Okutani (2017) but it is listed in *Corbula* by WoRMS. *Corbula erythraeensis* Adams, 1871 is inflated, trigonal and posterior narrowly rostrate. *Corbula sulculosa* Adams, 1870 is subovate, posteriorly narrow and subtruncated. Dahab specimens are subquadrate like *C. erythraeensis* in Edelman-Furstenberg & Faershtein (2010) therefore they are considered to be *V. rotalis*. The left valves fig. 51.3 - 51.5 in Zuschin & Oliver (2003) depicted as *C. sulculosa* are conspecific.

## Teredinidae Rafinesque, 1815

The shipworms are notorious to bore into submerged wood.

*Bankia carinata* (J.E. Gray, 1827)

**Plate 60: fig. 3 a, b:** 5.32 x 1.17 mm (Caves 33 m).

Literature: Turner 1966, Cragg et al. 2009, Borges et al. 2014, Huber 2015.

Oliver (1992) and Dekker & Orlin (2000) only report *B. rochi* Moll, 1931 from the Red Sea. Cragg et al. (2009) also report *B. carinata* (J.E. Gray, 1827). The determination is based on the pictures given in Turner (1966) and Borges et al. (2014).

### Teredinidae Gen. sp.

**Text figure 4 a, b:** not depicted on plate.

A sunken palm trunk in Masbat Bay was heavily colonised by shipworms, but no species-specific sculptures were found.



**Fig. 4 a:** Teredinidae on a palm trunk at Masbat Bay.



**Fig. 4 b:** Teredinidae on a palm trunk at Masbat Bay detail.

## Gastrochaenidae Gray, 1840

*Cucurbitula cymbium* (Spengler, 1783)

**Plate 61: fig. 5 a - d:** 4.5 x 2.2 mm (Lagoon).

Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Huber 2010, Scaperrotta et al. 2014.

These shells usually live in an igloo (not found) which is attached to hard substrates. Syntypes are depicted in Carter et al. (2012). This species is a Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007).

*Dufoichaena dentifera* (Dufo, 1840)

**Plate 61: fig. 6 a - d:** 5.57 x 3.54 mm (Caves 18 m); **e - h:** 9.0 mm.

Literature: Oliver 1992, Dekker & Orlin 2000, Huber 2010.

The shells were found inside a coral and are kept in the collection of K. Kleemann.

*Gastrochaena cuneiformis* Spengler, 1783

**Plate 61: fig. 7 a, b:** 22 mm (Lagoon); **c, d:** 10.5 mm; **e - i:** 9.7 x 6.4 mm; a - d to scale.

Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Dafni URL 1, Carter et al. 2008, Huber 2010, Poppe 2011, 2017b.

Shells were found inside a coral. *Gastrochaena ruppellii* Deshayes, 1855 and *Gastrochaena gigantea* Deshayes, 1830 are considered synonyms of *G. cuneiformis* by WoRMS obviously following Carter et al. (2008). However, neither shape of *G. ruppellii* with the broader anterior part, the rostration ventrally and not dorsally, nor the much rougher and irregular sculpture matches (Huber 2010). Both forms were found in Dahab.


5 a - d
6 e - h
6 a - d
7 a, b
7 c, d
7 e - i
8 a, b
8 c - e

*Lamychaena weinkauffi* (Sturany, 1899)

**Plate 61: fig. 8 a, b:** 1.85 x 1.04 mm (Moray Garden 37 m); **c - e:** 1.34 x 0.78 mm (inside of a bleached coral at Islands); all to scale.

Literature: Oliver 1992, Mienis (2006a), Huber 2010, Poppe 2011, 2017b.

Identified as *Gastrochaena inaequistriata* Jousseaume in Lamy, 1923 in Oliver (1992) and Mienis (2006a). The shape and the pedal opening in *L. inaequistriata* do not match *L. weinkauffi*. Both species seem to occur in the Red Sea (Mienis 2006, Huber 2010). However, in WoRMS these species are considered synonyms.



**Fig. 9 a:** Calcareous tubes of bivalves belonging to Mytilidae or Gastrochaenidae (see also Mytilidae).



**Fig. 9 b:** Calcareous tubes of bivalves belonging to Mytilidae or Gastrochaenidae (see also Mytilidae).

## Clavagellidae d'Orbigny, 1844

*Bryopa lata* (Broderip, 1834)

**Plate 62: fig. 1 a, b:** 13.5 x 9.6 mm (South); **c - e:** 24.3 x 12.8 x 9.9 mm (Blue Lagoon); **f, g:** 19.9 x 9.0 mm (South); **h, i:** tentatively assigned, 56 mm (Masbat Bay); a - g to scale.

Literature: Oliver 1992, Dekker & Orlin 2000, Dafni URL 1, Huber 2010.

Shells are cemented into dead corals. Therefore, only calcareous tube and chimney sculptures are depicted. The similar *Bryopa aperta* (G. B. Sowerby, 1823) is living in the Mediterranean Sea.



**Fig. 1 j, k:** *Bryopa lata* calcareous tubes and chimney sculpture.

## Thraciidae Stoliczka, 1870 (1839)

Thracia imperfecta (Lamarck, 1818)

**Plate 62: fig. 2 a, b:** 37.1 x 24.9 mm (South); all to scale with 3 a - d.

Literature: Oliver 1992, Dekker & Orlin 2000, Huber 2010.

*Thracia oblonga* Reeve, 1859 was described from the Red Sea. However, Reeve's original figure is more elongated than the Dahab shell and has a partly concave ventral margin. Furthermore, Reeve's type locality was considered erroneous and the species was synonymised with the northern Australian *T. imperfecta* (Lamarck, 1818) (Huber 2010). The specimens from NW Australia in Huber are similar to the Dahab shells. *Thracia salsettensis* (Melvill, 1893) from Bombay has a wavy comarginal shell sculpture and a different shape, as seen in images of the type specimen from the Natural History Museum of London (sent by Tom S. White). *Thracia adenensis* Melvill, 1898 from Aden is smaller and has a conspicuous oblique keel from the umbones to the lower posterior margin (Bosch & Bosch 1982, Bosch et al. 1995).

## Laternulidae Hedley, 1918 (1840)

*Laternula anatina* (Linnaeus, 1758)

**Plate 62: fig. 3 a, b:** 40.0 x 21.8 mm; **c:** 36.1 x 19.9 mm; **d:** 43.1 x 25.2 mm; all from Lagoon; all to scale with 2 a, b.

Literature: Oliver 1992, 1995, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Poppe 2011.

Specimens were only found in the very fine sediment at Lagoon in 10 - 15 m of depth.


1 a, b
1 c - e
1 f, g
1 h, i
3 a, b
3 c
3 d
2 a, b

# Gastropoda

# Patellogastropoda

The common name of Patellogastropoda is true limpets.

## Nacellidae Thiele, 1891

***Cellana eucosmia*** (Pilsbry, 1891)

**Plate 63: fig. 1 a, b:** 14.0 x 10.4 mm; **c, d:** 26.7 x 21.5 mm; all from Blue Lagoon.

Literature: Christiaens 1987, Coulombel 1994, Bosch et al. 1995, Blatterer et al. 2000, Debelius 2002, Rusmore-Villaume 2008, Zuschin et al. 2009.

The species, which is often identified as *Cellana rota* (Gmelin, 1791), is living intertidal on solid rocks and reaches a size of up to 52 x 46 mm. The shell is variable in relative height, and radial ribs may be prominent or eroded. For taxonomic discussion see van Gemert (2008a) and the following species.



**Fig. 1 e:** The Rockskipper *Istiblennius edentulus* (Combtooth blennie) is sharing the intertidal habitat with a heavily eroded *Cellana eucosmia*.



**Fig. 1 f:** *Cellana eucosmia* exposed to the sun's heat during low tide.

## Eoacmaeidae Nakano & Ozawa, 2007

***Eoacmaea* sp.**

**Plate 63: fig. 2 a:** 2.17 x 1.65 mm (Moray Garden 18 m); **c, d, e:** 2.71 x 2.00 x 0.20 mm (South); **f, g:** 3.64 x 2.59 mm (Islands labyrinth 10 m); dorsal (a, c, f), ventral (b, d, g) and lateral (e) views; a - e to scale.

Literature: Christiaens 1987, Dafni URL 1, Rusmore-Villaume 2008, Zuschin et al. 2009.

URL 23: https://ingokurtz.jimdo.com/mollusca/

This is probably an undescribed species known as *Patelloida profunda* (Deshayes, 1863) by some authors. The colour varies from reddish to yellowish white with occasionally broad white radial rays. Almost always there is a translucent ornamentation of many fine orange radial streaks, which is less prominent in the white areas. However, this pattern is also observed in the larger *Cellana eucosmia*.

## Lottiidae Gray, 1840

***Patelloida rolani*** Christiaens, 1987

**Plate 63: fig. 3 a**: 3.41 x 2.57 mm (Moray Garden 18 m); **b, c:** 2.32 x 1.71 x 0.53 mm (Canyon 45 m); **d:** 2.54 x 1.91 mm (Moray Garden 18 m); dorsal (a, b, d) and lateral (c) views all to scale with 4 a - c.

Literature: Christiaens 1987, Zuschin et al. 2009.

URL 24: https://ingokurtz.jimdo.com/mollusca/

The identification is based on the transparency and the fine concentric striae. Usually the shells have a white chevron-like colour pattern arranged in radial rows. Larger specimens may lose their transparency (fig. 3 a). Zuschin et al. (2009) list this species as *Eoacmaea rolani* (Christiaens, 1987).

***Patelloida* sp.**

**Plate 63: fig. 4 a, b:** 2.26 x 1.63 mm (Moray Garden 18 m); **c:** 1.62 x 1.15 mm (Canyon 45 m); all to scale with 3 a - d.

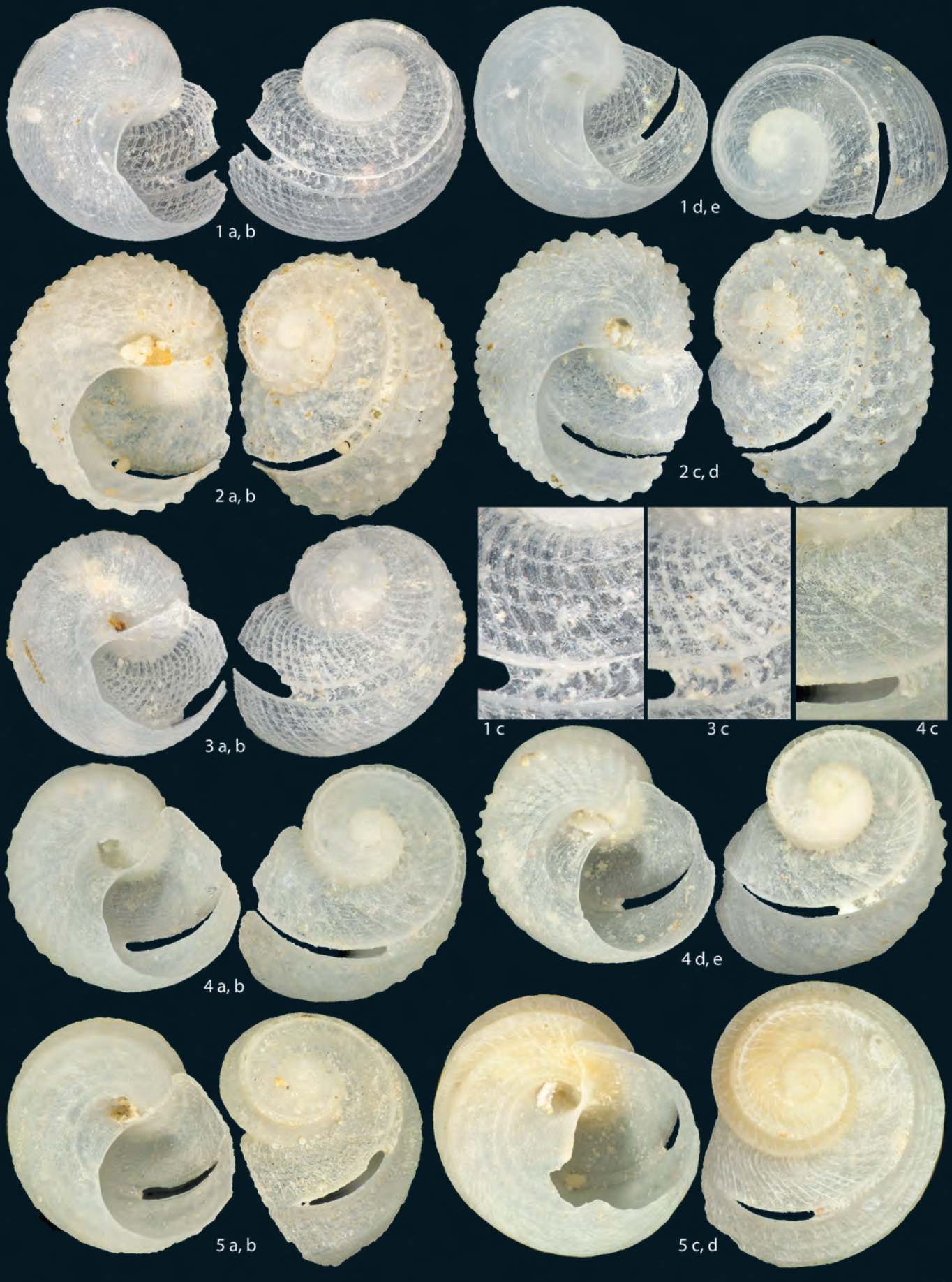
Dubious specimens are found with semi translucent white shells leaving only a few translucent radial rays which may indicate a separate species. Christiaens, (1987: fig. 7, 55) has it as a variant of *Patelloida rolani*.

# Vetigastropoda

## Scissurellidae Gray, 1847

Geiger (2012) perfectly reviewed the little slit shells. They are abundant in coral sands in depths between 2.5 and 45 m. Most species were found between 10 and 20 m, up to all 5 species within one 100 ml sample. In 32 of 46 samples 1 - 5 (average 1.6) species were found. *Scissurella reticulata* was the most frequent (n = 26; 4 - 45 m), followed by *Scissurella rota* (n = 21; 2.5 - 33 m), *Sinezona singeri* (n = 12; 2.5 - 45 m), *Sukashitrochus dorbignyi* (n = 7; 2.5 - 18 m) and *Scissurella sudanica* (n = 6; 10 - 32 m).


1 a, b
1 c, d
3 b, c
4 a, b
2 f, g
4 c
3 d
3 a
2 a, b
2 c, d, e


1 a, b
1 d, e
2 a, b
2 c, d
1 c
3 c
4 c
3 a, b
4 a, b
4 d, e
5 a, b
5 c, d

*Scissurella reticulata* PHILIPPI, 1853

**Plate 64: fig. 1 a, b:** 1.01 x 0.90 mm (Canyon 11 m); **d, e:** 1.35 x 1.07 mm (Canyon 11 m); **c:** detail of sculpture near selenizone, slit and shoulder of a.

Literature: GEIGER 2012.

The shell has an open slit, and a less pronounced constriction below the selenizone. See also *Scissurella sudanica*.

*Scissurella rota* YARON, 1983

**Plate 64: fig. 2 a, b:** 1.33 x 1.16 mm (Caves 18 m); **c, d:** 1.53 x 1.26 mm (Umm Sid 18 m).

Literature: YARON 1983, BOSCH et al. 1995, ZUSCHIN et al. 2010, GEIGER 2012.

The shell has an open slit and only few spirals on the base that form pronounced hollow points at the intersection with the axials.

*Scissurella sudanica* BANDEL, 1998

**Plate 64: fig. 3 a, b:** 0.98 x 0.88 mm (Canyon 11 m); **c:** detail of sculpture near selenizone, slit and shoulder of a.

Literature: DEKKER & ORLIN 2000, ZUSCHIN et al. 2009, GEIGER 2012.

The specimen is very similar to *Scissurella reticulata* but has more (7 vs. 4 - 5) spiral lines between the suture and selenizone as well as a narrower umbilicus. *Scissurella dohrniana* (DUNKER, 1861) an older name used by DEKKER & ORLIN (2000) and H. DEKKER (pers. comm.) is considered a nomen dubium (GEIGER 2012, WoRMS).

*Sinezona singeri* GEIGER, 2006

**Plate 64: fig. 4 a, b:** 1.86 x 1.52 mm (Canyon 11 m); **d, e:** 1.58 x 1.18 mm (Canyon 11 m); **c:** detail of sculpture near selenizone, slit and shoulder of a.

Literature: GEIGER 2012.

The slit is usually closed anteriorly forming a foramen. The base has a strong constriction below the selenizone. Axial spirals start as thin threads at the selenizone, turn into strong elevated costae at the periphery, fade to threads towards transition to the umbilicus and cross over the axials (GEIGER 2012). The type locality is Dahab Blue Hole. The specimen seems to be closely related to *Sinezona ferriezi* (CROSSE, 1867) which has approximately twice as many spiral lines on shoulder and base.

*Sukashitrochus dorbignyi* (AUDOUIN, 1826)

**Plate 64: fig. 5 a, b:** 1.82 x 1.50 mm (Canyon 11 m); **c, d:** 3.01 x 2.50 mm (Canyon 11 m).

Literature: YARON 1983, ZUSCHIN et al. 2009, GEIGER 2012.

The slit is closed anteriorly forming a foramen. There are distinct spiral keels on the base.

## Haliotidae RAFINESQUE, 1815

The shells commonly known as abalones have an open, spiral structure, and several open respiratory pores aligned near the shell's outer edge. The inner layer of the shell is nacreous.

*Haliotis pustulata* REEVE, 1846

**Plate 65: fig. 1 a:** 58.2 x 38.0 mm; **b, c:** 46.2 x 30.1 mm; **d:** 35.8 x 23.5 mm; **e, f:** 35.0 x 22.9 mm; **g:** 34.6 x 22.6 mm; **h:** 33.8 x 22.5 mm; **I, j:** 27.4 x 18.5 mm; **k, l:** 25.9 x 17.8 mm; **m, n:** 24.3 x 16.2 mm; **o, p:** 18.8 x 12.9 mm; **q, r:** 18.0 x 12.3 mm; whole plate to scale.

Literature: BLATTERER et al. 2000, DEKKER & ORLIN 2000, GEIGER & POPPE 2000, HEIMAN 2003c, PICKERY & VERBINNEN 2004, DAFNI URL 1, RUSMORE-VILLAUME 2008, ZUSCHIN et al. 2009, GEIGER & OWEN 2012, OWEN & PAN 2016.

URL 25: http://www.gastropods.com/9/Shell_6209.shtml

Dahab specimens are flat and have numerous small bumps which are usually arranged in spiral cords. The margins of the 4 - 6 holes are only slightly raised. The largest shell is an untypical, probably very old specimen. According to OWEN & PAN (2016) the Red Sea species should be the subspecies *Haliotis rugosa pustulata* REEVE, 1846, however, their fig. 3 E from Egypt does not match. The syntype (= lectotype in URL 25) depicted in PICKERY & VERBINNEN (2004) is close to a Dahab shell (fig. k, l) but has 6 open holes.

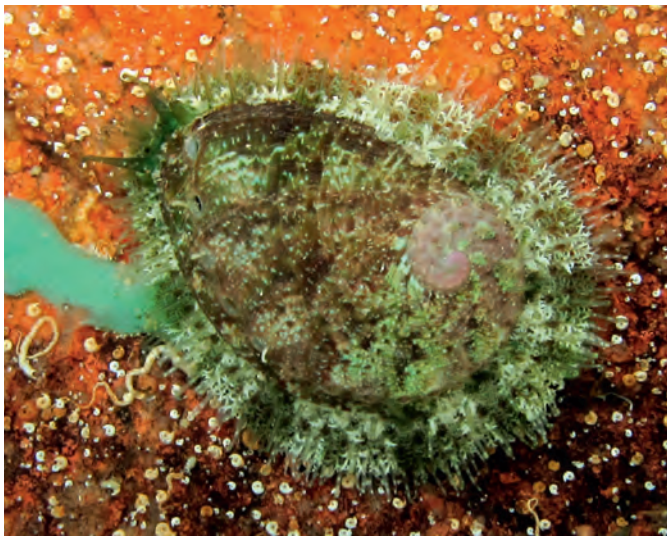


**Fig. 1 s:** *Haliotis* cf. *pustulata* underneath an intertidal rock at Islands reef flat.



**Fig. 1 t:** *Haliotis* cf. *pustulata* in a Petri dish from Islands reef flat through a binocular microscope.


1 a
1 o, p
1 b, c
1 d
1 g
1 e, f
1 i, j
1 k, l
1 h
3 a, b
1 q, r
1 m, n
3 c, d
3 e, f
3 g, h
2 a, b
2 c, d
3 i, j


1 a
2 a, b
2 e
3 c, d
2 c, d
3 a, b
3 e

### *Haliotis unilateralis* Lamarck, 1822

**Plate 65: fig. 2 a, b:** 37.0 x 25.2 mm; **c, d:** 36.8 x 25.8 mm; whole plate to scale.

Literature: Geiger & Poppe 2000, Heiman 2003c, Pickery & Verbinnen 2004, Dafni URL 1, Rusmore-Villaume 2008, Owen 2008, Zuschin et al. 2009, Geiger & Owen 2012, Owen et al. 2016.

There are usually fewer bumps arranged in fewer spiral cords than in *Haliotis* cf. *pustulata*. The margins of the typically 4 holes are elevated. Parallel to the line of holes is a deeply impressed groove followed by a bulging roll at the periphery of the shell which is much more prominent than in the smaller *H. dringii*. No intergrades between these species were found.

### *Haliotis dringii* Reeve, 1846

**Plate 65: fig. 3 a, b:** 21.4 x 15.2 mm; **c, d:** 20.6 x 15.3 mm; **e, f:** 20.0 x 14.7 mm; **g, h:** 18.7 x 13.7 mm; **i, j:** 16.9 x 11.9 mm; whole plate to scale.

Literature: Dekker & Orlin 2000, Heiman 2003c, Rusmore-Villaume 2008.

URL 26: http://www.gastropods.com/3/Shell_26883.shtml
URL 27: http://www.gastropods.com/4/Shell_1044.shtml
URL 28: http://www.gastropods.com/2/Shell_21512.shtml

Shells of this species are depicted, and the differences discussed e.g. in Heiman (2003c) as *Haliotis* sp. 2 and Rusmore-Villaume (2008) under the name *Haliotis venusta* A. Adams & Reeve, 1850. Nevertheless, this species is often not recognised or neglected by other authors, although specimens are recognisably depicted, albeit within *H. unilateralis* or *H. varia* Linnaeus, 1758 (e.g. Sharabati 1984, Geiger & Poppe 2000, Pickery & Verbinnen 2004, Owen 2008, Zuschin et al. 2009, Geiger & Owen 2012). *Haliotis dringii* Reeve, 1846 (types in URL 27) and *H. papulata* Reeve, 1846 (types in URL 26) are even older available names for *H. venusta* which are all considered conspecific and were published within the same paper. The type locality Australia is likely incorect as similar shells have never been recorded from this region. The easternmost known locality are the Maldives, the southernmost is Mozambique (H. Dekker pers. comm.). The name *H. dringii* is chosen as it has page priority and the Dahab specimens match the type perfectly. *Haliotis venusta* is accepted as *H. clathrata* Reeve, 1846 in WoRMS this, however, is a different species with 5 less elevated holes and more spiral cords (paralectotypes in URL 28).

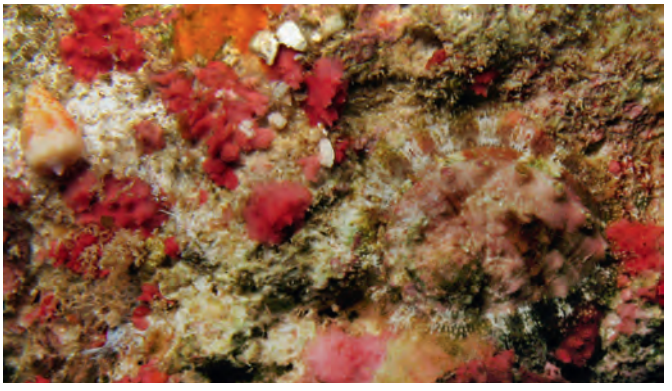


**Fig. 3 k:** *Haliotis dringii* and *Conus parvatus* at Eel Garden.

## Fissurellidae Fleming, 1822

The Fissurellidae are known as keyhole limpets or slit limpets. Most species are herbivorous, feeding primarily on algae, but also on detritus. A few species in the genera *Diodora* and *Emarginella* are carnivorous, feeding on sponges.

### *Diodora imbricata* (G. B. Sowerby II, 1862)

**Plate 66: fig. 1 a:** 8.9 x 6.4 mm (Caves 17 - 19 m).

Literature: G. B. Sowerby II 1862 as listed in Petit 2009, Christiaens 1987, Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1.

The shell fits the original description from the Red Sea with its cancellate sculpture and imbricate ribs. The dark red brown radial stripes mentioned by Sowerby are not observed. This species is not listed in WoRMS.

### *Diodora ruppellii* (G. B. Sowerby I, 1835)

**Plate 66: fig. 2 a, b:** 17.5 x 11.5 mm (Tigerhouse); **c, d:** 9.4 x 5.6 mm; **e:** from collection in Dahab not measured; a - d to scale.

Literature: Sowerby I 1835 as listed in Petit 2009, Christiaens 1987, Dekker & Orlin 2000, Bosch et al. 1995, Rusmore-Villaume 2008.

The rounded and beaded large ribs distinguish this species from others. It is a Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007).



**Fig. 2 f:** *Diodora ruppellii* underneath a rock at dive site Lagoon.

### *Emarginella incisura* (A. Adams, 1852)

**Plate 66: fig. 3 a, b:** 7.87 x 4.28 mm (Caves 4 m); **c, d:** 4.10 x 2.15 mm (Canyon 45 m); **e, f:** 3.63 x 3.02 mm (Caves 17 - 19 m).

Literature: A. Adams 1852, Singer 1998, Dekker & Orlin 2000.

URL 29: http://www.nmr-pics.nl/Fissurellidae/album/slides/Emarginella%20incisura.html

A small elongated shell with crenulated margin is illustrated as *Emarginella* sp. by Singer (1998). *Emarginella incisura* is known from the Philippines (URL 29). *Emarginella cuvieri* (Audouin, 1826) is larger and relatively broader (Thiele 1912 - 1919, Zuschin et al. 2010). One flat specimen with fewer radial ribs is considered an aberrant form.


4 a, b
4 c, d
5 a - c
5 d, e
6 c, d
6 a, b
7 a, b

### *Emarginula costulata* Deshayes, 1863

**Plate 67: fig. 4 a, b:** 3.38 x 2.35 mm (Caves 17 - 19 m); **c, d:** 2.25 x 1.6 mm (Canyon 45 m).

Literature: Drivas & Jay 1985, 1988, Herbert 1987, Singer 1998, Dekker & Orlin 2000, Geiger in Albano et al. 2017.

This greenish shell fits the description of *E. costulata* Deshayes, 1863 in Herbert (1987), Drivas & Jay (1988) and Singer (1998). *Emarginula harmilensis* Sturany, 1903 is a junior synonym (Albano et al. 2017).

### *Emarginula* sp. 1

**Plate 67: fig. 5 a, b:** 2.63 x 1.79 mm (Caves 15 m); **c, d:** 1.23 x 0.74 mm (Canyon 45 m).

Literature: Dafni URL 1, Herbert 2015.

The Dahab specimens resemble *Emarginula* sp. 2 in Singer (1998) and come close to the *Emarginula* sp. 2 in Zuschin et al. (2009). They may be identical with the specimen depicted by Sasaki (2008) as *E.* aff. *concinna* A. Adams, 1852. Herbert 2015 depicts a similar but larger specimen as *E. decorata* Deshayes, 1863. Also similar is *E. apolonia* Pacaud (2015), a replacement name for *E. fenestrella* Deshayes, 1863. In that species the interstices are subcircular and deep. *Emarginula* sp. 1 bears some resemblance to young *E. decorata* Deshayes, 1863, which has curved septa along the selenizone, while the septa of the Dahab specimens is straight.



**Fig. 5 e:** *Emarginula* sp. 1 and *Stomatella callosa* underneath a *Pinctada margaritifera* at Moray Garden.

### *Emarginula* sp. 2

**Plate 67: fig. 6 a, b:** 4.15 x 3.05 mm (Caves 15 m); **c, d:** 1.37 x 1.03 mm (Caves 32 m); all to scale.

The radial ribs are flat and the secondary and tertiary ribs are even more inconspicuous. The concentric sculpture is very weak making the transparent shell look as if there are minute white scales which do not cross the radial ribs. There is no match with any shell of Singer (1998) or Zuschin et al. (2009).

### *Emarginula* sp. 3

**Plate 67: fig. 7 a, b:** 3.14 x 2.00 mm (Caves 17 - 19 m).

The shell is eroded but nevertheless different from other Dahab species. The apex is reaching over the posterior margin, the radial sculpture is weak, and interstices are very shallow.

### *Hemimarginula modesta* (H. Adams, 1872)

**Plate 68: fig. 8 a, b:** 6.69 x 4.5 mm (Moray Garden); **c, d:** 5.88 x 4.33 mm; all to scale.

Literature: Yaron 1981, Christiaens 1987, Dekker & Orlin 2000, Dafni URL 1, Zuschin et al. 2009, McLean 2011.

URL 30: http://131.111.101.189/fmi/iwp/cgi?-db=UMZC%20Catalogues%20%28Web%29&-loadframes

The type is depicted in URL 30. The species has formerly been assigned to the genus *Hemitoma* (McClean 2011; see also *H. simpla*).

### *Hemimarginula simpla* (Christiaens, 1987)

**Plate 68: fig. 9 a, b:** 3.87 x 2.45 mm (Moray Garden); **c, d:** 3.49 x 2.34 mm (Moray Garden); **e, f:** 3.29 x 2.12 mm (Moray Garden); all to scale with 11 a, b.

Literature: Christiaens 1987, Dekker & Orlin 2000, Zuschin et al. 2009, McLean 2011.

URL 31: http://131.111.101.189/fmi/iwp/cgi?-db=UMZC%20Catalogues%20%28Web%29&-loadframes

The species has formerly been assigned to the genus Hemitoma (McClean 2011). It is very similar to the somewhat variable *H. modesta* but considerably flatter. The type specimen is more circular in outline and has a more central apex. *Hemitoma* species are quite variable in shell form and especially in sculpture and degree of sculpture strength. *Hemitoma modesta* (H. Adams, 1872), *H. simpla* Christiaens, 1987 and *H. subrugosa* Thiele, 1916 (a replacement name for *Emarginula rugosa* H. Adams, 1872; the type is depicted in URL 31) conform in shell form and rib arrangement but differ in the strength of development of sculpture. Although it was possible to distinguish several named forms, they may well prove to fall into the range of variability of only one species after examination of a greater number of specimens (Zuschin et al. 2009).

### *Montfortista panhi* (Quoy & Gaimard, 1834)

**Plate 68: fig. 10 a - c:** 21.2 x 15.1 mm (Moray Garden); all to scale.

Literature: Yaron 1981, Christiaens 1987, Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Poppe 2008, McLean 2011.

The species has formerly been assigned to the genus *Hemitoma* (McClean 2011).

### *Octomarginula arabica* (A. Adams, 1852)

**Plate 68: fig. 11 a, b:** 3.63 x 2.79 mm (Islands); all to scale with 9 a - f.

Literature: Christiaens 1987, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Zuschin et al. 2009.

The species has formerly been assigned to the genus *Hemitoma* (McClean 2011).


8 a, b
8 c, d
9 a, b
9 e, f
9 c, d
11 a, b
10 a - c

*Scutus rueppelli* (PHILIPPI, 1851)

**Plate 69: fig. 12 a, b:** 41.4 x 19.4 mm; **c:** 3.00 x 1.78 mm (Islands 14 m).

Literature: DEKKER & ORLIN 2000, DAFNI URL 1, DEBELIUS 2002, RUSMORE-VILLAUME 2008.

The original spelling is *rüppeli* but according to WoRMS *rueppeli* is an incorrect original spelling of specific epithet.



**Fig. 12 d:** *Scutus rueppelli* at Bannerfish by Christian VON MACH.

*Vacerrena nana* (H. ADAMS, 1872)

**Plate 69: fig. 13 a - d:** 1.75 x 1.24 mm (Caves 17 - 19 m; **e:** surface sculpture of a different specimen enlarged); a - d to scale.

Literature: DRIVAS & JAY 1985, DAFNI URL 1, SINGER 1998, DEKKER & ORLIN 2000, EDELMAN-FURSTENBERG & FAERSHTEIN 2010, POPPE & TAGARO in POPPE 2011, HERBERT 2015.

URL 32: http://131.111.101.189/fmi/iwp/cgi?-db=UMZC%20Catalogues%20(Web)&-loadframes

URL 33: http://www.gastropods.com/9/Shell_15819.shtml

The holotype is depicted in URL 32. The species was found by EDELMAN-FURSTENBERG & FAERSHTEIN (2010) in Eilat. *Puncturella* (*Vacerrena*) *christiaensi* KILBURN, 1978 and *Fissurisepta joschristiaensis* DRIVAS & JAY, 1985 are synonyms (URL 33).

*Zeidora nesta* (PILSBRY, 1890)

**Plate 69: fig. 14 a, b:** 3.74 x 1.96 mm (Blue Hole 18 m).

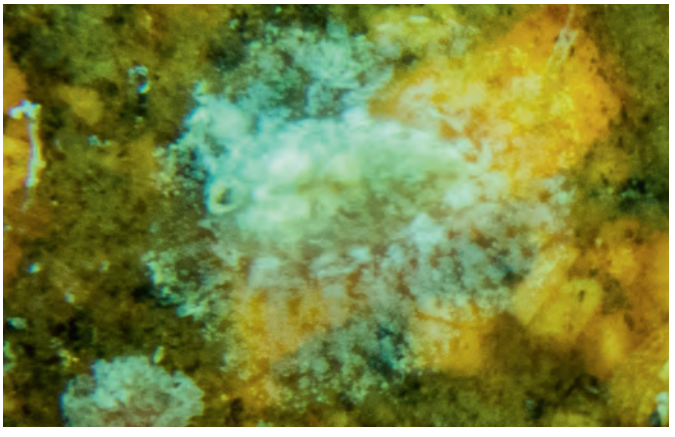


**Fig. 14 c:** The living *Zeidora nesta*? was discovered on a picture besides a small *Ischnochiton sansibarensis* of about 6 mm in size from Masbat Bay. From this the size of the shell can be derived to approximately 2 mm, the soft parts are obviously larger. Identification is not with absolute certainty as there is also *Z. reticulata* in Dahab.

Literature: ADAMS 1870, DEKKER & ORLIN 2000, RUSMORE-VILLAUME 2008, ZUSCHIN et al. 2009, POPPE 2017a.

URL 34: http://131.111.101.189/fmi/iwp/cgi?-db=UMZC%20Catalogues%20%28Web%29&-loadframes

The type of *Nesta candida* H. ADAMS, 1870 a replaced unaccepted junior secondary homonym of *Emarginula candida* A. ADAMS, 1851 (WoRMS) is depicted in URL 34.



**Fig. 14 d:** Another living *Zeidora nesta*? was discovered on a *Pinctada margaritifera* at Lagoon.

*Zeidora reticulata* A. ADAMS, 1862

**Plate 69: fig. 15 a, b:** 1.27 x 0.79 mm (Moray House).

Literature: A. ADAMS 1862, THIELE 1912 - 1919, HERBERT 1987.

This species was often confused with *Zeidora calceolina* A. ADAMS, 1860. But in *Z. reticulata* the radial ribs and concentric threads are much thinner and more close-set than in *Z. calceolina*, resulting in a markedly finer cancellate sculpture. A distinct posterior septum is characteristic of *Z. reticulata*. A weaker smaller horizontal one is found in some specimens of *Z. nesta*. (HERBERT 1987).

## Chilodontaidae WENZ, 1938

*Perrinia stellata* (A. ADAMS, 1864)

**Plate 69: fig. 16 a, b:** 12.5 x 8.5 mm (Islands seagrass 20 m).

Literature: LAMY 1938, BOSCH et al. 1995, DEKKER & ORLIN 2000, DAFNI URL 1, RUSMORE-VILLAUME 2008 HERBERT 2012, VILVENS 2017.

HERBERT (2012) reviewed this species and lists synonyms and findings. VILVENS (2017) depicts a specimen from Dahab.

*Vaceuchelus* cf. *pagoboorum* POPPE, TAGARO & DEKKER, 2006

**Plate 69: fig. 17 a - c:** 1.85 x 1.59 mm (Caves 18 m); b, c to scale.

Literature: BOSCH et al. 1995, POPPE et al. 2006, ZUSCHIN et al. 2009, HERBERT 2012, VILVENS 2017.

(continued after plate)


13 a - d
13 e
12 a, b
12 c
14 a, b
14 c
15 a, b
16 a, b
17 a - c

Identification is based on similarity to adult shells from the Red Sea in coll. H. Dekker. *Vaceuchelus delpretei* (Caramagna, 1888) is a different species because it has more spiral rows on the base. The fragment of *Vaceuchelus* sp. in Zuschin et al. (2009: pl. 6, fig. 1) may be this species.

## Trochidae Rafinesque, 1815

The Trochidae are known by their common name top-snails or top-shells. Most species graze on algae and vegetable detritus on hard substrates. Subgenera are according to the molecular systematics of Williams et al. (2010).

### Cantharidinae Gray, 1857

#### *Agagus* sp.

**Plate 70: fig. 1 a, b:** 1.49 x 1.2 mm (El Gahaza 17 m).

Literature: Herbert 1991, Dekker & Orlin 2000, Rusmore-Villaume 2008, Heiman & Mienis 2003c, Zuschin et al. 2009.

Herbert (1991) described *Agagus stellamaris* from eastern Africa, however Dekker & Orlin (2000), Rusmore-Villaume (2008) and Zuschin et al. (2009) consider the Red Sea species to be a so far undescribed species.

#### *Pagodatrochus variabilis* (H. Adams, 1873)

**Plate 70: fig. 2 a, b:** 3.30 x 2.32 mm; **c, d:** 2.51 x 1.88 mm; **e, f:** 2.24 x 1.74 mm; **g:** 2.24 x 1.78 mm a - g Moray Garden 17 m; **h, i:** 1.91 x 1.79 mm (Blue Hole 36 m); all to scale.

Literature: Herbert 1989, Bosch et al. 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Heiman & Mienis 2003c, Dafni URL 1, Zuschin et al. 2009, Bandel 2010a.

Not only colour but also shape can vary in this species.

#### *Priotrochus obscurus* (W. Wood, 1828)

**Plate 70: fig. 3 a, b:** 12.1 x 10.5 mm; **c, d:** 8.5 x 7.7 mm; **e, f:** 6.5 x 6.0 mm; all to scale.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Heiman & Mienis 2003c, Rusmore-Villaume 2008, Zuschin et al. 2009.

### Stomatellinae Gray, 1840

#### *Calliotrochus marmoreus* (Pease, 1861)

**Plate 70: fig. 4 a, b:** 2.26 x 1.78 mm; **c:** 2.10 x 1.72 mm; both Masbat Bay; all to scale.

Literature: Herbert 1998, Blatterer et al. 2000, Dekker & Orlin 2000, Heiman & Mienis 2003c, Rusmore-Villaume 2008, Zuschin et al. 2009.

The position within this subfamily is according to Uribe et al. (2017).

#### *Stomatella duplicata* (G. B. Sowerby I, 1823)

**Plate 71: fig. 5 a, b:** 17.0 x 12.4 mm (Lagoon); **c, d:** 13.6 x 10.4 mm (Lagoon); all to scale.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Dafni URL 1, Verbinnen & Dirkx 2005a, Singer 2007a, Rusmore-Villaume 2008, Zuschin et al. 2009.

The species was originally described in *Stomatia* and transferred by Bosch et al. (1995), however, with wrong dates and the author without parentheses. The generic position is probably still not settled.

#### *Stomatella callosa* (P. Fischer, 1871)

**Plate 71: fig. 6 a - j:** 19.8 x 11.9 mm the largest (**a, b**); 7.06 x 4.53 mm the smallest (**i, j**); all to scale.

Literature: Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Verbinnen & Dirkx 2005a, Singer 2007a, Rusmore-Villaume 2008, Zuschin et al. 2009.

This species is very variable in colouration (see also fig. 5 e at *Emarginula* sp. 1 and remarks in Dekker & van Gemert 2008 and Zuschin et al. 2009).



**Fig. 6 k:** *Stomatella callosa* at Moray Garden.

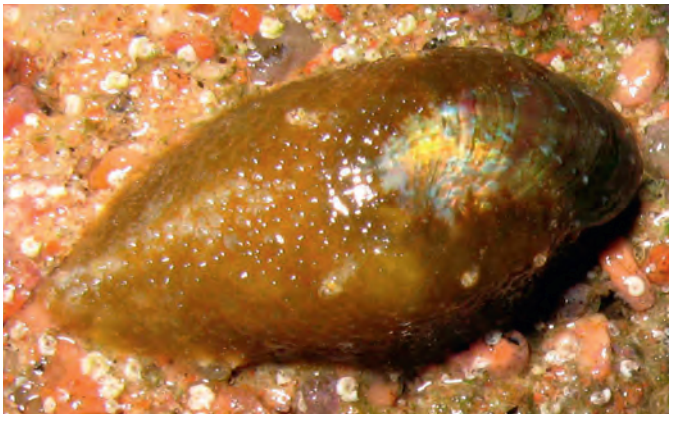


**Fig. 6 l:** *Stomatella callosa* underneath a rock at Masbat Bay.

#### *Stomatella modesta* H. Adams & A. Adams, 1864

**Plate 71: fig. 7 a, b:** 3.93 x 2.97 mm; **c, d:** 3.43 x 2.61 mm; both Lagoon 6 - 8 m; all to scale.

Literature: Dekker & Orlin 2000, Singer 2007a, Rusmore-Villaume 2008, Zuschin et al. 2009.

URL 35: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-31132
URL 36: http://131.111.101.189/fmi/iwp/cgi?-db=UMZC%20Catalogues%20%28Web%29&-loadframes

The type of the synonym *Stomatella doriae* Issel, 1869 is depicted in URL 35. *Stomatella scitula* H. Adams 1872 (URL 36) from the Gulf of Suez is considered to be a new synonym which is not listed in WoRMS.


1 a, b
4 c
4 a, b
2 a, b
2 e, f
2 h, i
2 c, d
2 g
3 e, f
3 a, b
3 c, d


7 a, b
7 c, d
5 a, b
8 b, c
5 c, d
8 a
9 a
9 b - d
6 a, b
6 i, j
6 c
6 d
6 e
6 f
6 g
6 h


10 c, d
12 a, b
10 a, b
12 c, d
11 a, b
13 a, b
14 a, b
15 a, b
14 c, d
15 i, j
15 g, h
15 f
15 c, d
15 e

### *Stomatia phymotis* Helbling, 1779

**Plate 71: fig. 8 a:** 27 x 18 mm (Moray Garden); **b, c:** 11.9 x 7.0 mm (South).

Literature: Helbling 1779, Bosch et al. 1995, Dekker & Orlin 2000, Verbinnen & Dirkx 2005a, Singer 2007a, Rusmore-Villaume 2008, Zuschin et al. 2009.

*Stomatia phymotis* is probably a complex of several species, however, *S. phymotis* is originally described from the Red Sea.

### *Stomatolina danblumi* Singer & Mienis, 1999

**Plate 71: fig. 9 a:** 8.5 x 6.4 x 5.1 mm; **b - d:** 10.1 x 7.7 x 6.6 mm; both Blue Hole by Henk Dekker.

Literature: Dekker & Orlin 2000, Verbinnen & Dirkx 2005a, Singer 2007a.

URL 37: http://www.gastropods.com/6/Shell_15146.shtml

This rare species was originally described from Blue Hole. Although several sand samples were taken at this location it was not found. The depicted specimens are from the type locality and kept in the collection of H. Dekker.

## Umboniinae H. Adams & A. Adams, 1854

### *Ethalia bellardii* (Issel, 1869)

**Plate 72: fig. 10 a, b:** 2.0 mm (Islands seagrass); **c, d:** 6.6 mm (Lagoon).

Literature: Dekker & Orlin 2000, Heiman & Mienis 2003c, Rusmore-Villaume 2008, Zuschin et al. 2009.

URL 38: http://www.gastropods.com/0/Shell_52290.shtml

The species is depicted as *Ethalia* sp. by Zuschin et al. (2009).



**Fig. 10 e:** *Ethalia bellardii* from Lagoon in a Petri dish where it was able to perform a few sudden fast jumps, probably an escape reaction.

### *Ethminolia degregorii* (Caramagna, 1888)

**Plate 72: fig. 11 a, b:** 3.32 x 2.61 mm (Moray Garden 37 m).

Literature: Caramagna 1888, Bosch et al. 1995, Dekker & Orlin 2000, Zuschin et al. 2009.

*Ethminolia durbanensis* (Kilburn, 1977) found from South Africa to Mozambique (Herbert 1992) is similar.

### *Pseudominolia gradata* (G. B. Sowerby III, 1895)

**Plate 72: fig. 12 a, b:** 5.28 x 4.62 mm (Lagoon); **c, d:** 5.36 x 4.95 mm (Lagoon); all to scale.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Heiman & Mienis 2003c, Dafni URL 1, Rusmore-Villaume 2008, Zuschin et al. 2009.

URL 39: https://www.conchology.be/?t=66&species=nedyma

*Pseudominolia nedyma* (Melvill, 1897) (URL 39) is similar and occurs also in the Gulf of Aqaba (Yaron 1984, Heiman & Mienis 2003c, Edelman-Furstenberg & Faershtein 2010).

## Fossarininae Bandel, 2009

### *Broderipia iridescens* (Broderip, 1834)

**Plate 72: fig. 13 a, b:** 2.39 x 1.58 mm (Islands labyrinth 10 m).

Literature: Bosch et al. 1995.

URL 40: http://bioportal.naturalis.nl

A possible syntype is depicted in URL 40. Several specimens smaller than 3 mm were found which have the apex closer to the posterior end and do not show the typical pattern of adults which may reach at least 8 mm.

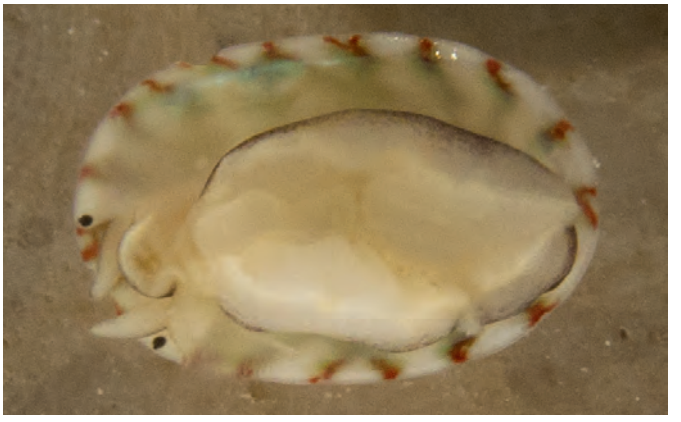


**Fig. 13 c:** *Broderipia iridescens* in a Petri dish from Islands (ventral view).

### *Clydonochilus mariei* P. Fischer, 1890

**Plate 72: fig. 14 a, b:** 1.14 x 0.94 mm (Canyon 11 m); **c, d:** 0.8 mm (Caves); all to scale.

Literature: Dekker & Orlin 2000, Bandel 2009, Zuschin et al. 2009.

This species is a Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007).

### *Synaptocochlea asperulata* (A. Adams, 1850)

**Plate 72: fig. 15 a, b:** 1.49 x 1.1 mm (Islands Entrance); **c, d:** 1.70 x 1.23 mm (Blue Hole 4 m); **e:** 1.63 x 1.34 mm (Islands 14 m); **f:** 1.54 x 1.13 mm (Caves 14 m); **g, h:** 1.13 x 0.80 mm (Tigerhouse); **i, j:** 1.07 x 0.80 mm (Tigerhouse); c - j to scale.

Literature: Poppe & Tagaro in Poppe 2008a; van Gemert 2008b, Bandel 2009.

According to WoRMS *Stomatella asperulata* (A. Adams, 1850) is assigned to Stomatellinae which is not conform with molecular systematics (Williams et al. 2010).


16 c
16 a, b
18 a - c
16 d, e
18 d - f
19 a, b
17 a - c
20 a, b
20 g, h
20 c, d
20 e, f

## Monodontinae Gray, 1857

### *Monodonta nebulosa* (Forsskål in Niebuhr, 1775)

**Plate 73: fig. 16 a, b:** 16 x 18 mm; **c:** 17 x 19 mm; **d, e:** 16 x 16 mm; all from Blue Lagoon; all to scale.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Heiman & Mienis 2003c, Dafni URL 1, Rusmore-Villaume 2008, Al-Yamani et al. 2012.

The type specimen from Tor (Sinai) is depicted by Yaron et al. (1986). *Trochus dama* Philippi, 1848 is a well-known synonym.



**Fig. 16 f:** *Monodonta nebulosa* and *Tenguella granulata* at Abu Helal.

## Trochinae Rafinesque, 1815

### *Clanculus korkosi* Singer, Mienis & Geiger, 2000

**Plate 73: fig. 17 a - c:** 4.4 x 3.6 mm (Moray Garden).

Literature: Dekker & Orlin 2000, Singer et al. 2000, Heiman & Mienis 2003c.

URL 41: http://www.gastropods.com/7/Shell_15387.shtml

The type locality of this species is the Blue Hole.

### *Clanculus pharaonius* (Linnaeus, 1758)

**Plate 73: fig. 18 a - c:** 19.2 x 17.6 mm (Islands); **d - f:** 19.5 x 16.8 mm (South); all to scale.

Literature: Bosch et al. 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Singer et al. 2000, Debelius 2002, Heiman & Mienis 2003c, Rusmore-Villaume 2008, Zuschin et al. 2009, Lacroix & Lacroix 2011.

URL 42: http://www.gastropods.com/5/Shell_25.shtml

Understandably, this is the favourite shell of my daughter Ines.

### *Clanculus tonnerrei* (G. Nevill & H. Nevill, 1874)

**Plate 73: fig. 19 a, b:** 2.8 x 3.1 mm (Islands north 10 m).

Literature: Herbert 1996, Bosch et al. 1995, Dekker & Orlin 2000, Singer et al. 2000, Heiman & Mienis 2003c, Rusmore-Villaume 2008, Zuschin et al. 2009.

The juvenile specimen has many bright purple spots on the early whorls, which was not shown by other authors. Herbert (1996) gives a revision of this species.

### *Rubritrochus declivis* (Forsskål in Niebuhr, 1775)

**Plate 73: fig. 20 a, b:** 15.6 x 14.1 mm; **c, d:** 13.0 x 12.4 mm; **e, f:** 11.5 x 10.0 mm; a - f from South; **g, h:** juvenile 2.44 x 2.05 mm (Lagoon seagrass 12 m); a - f to scale.

Literature: Dekker & Orlin 2000, Heiman & Mienis 2003c, Rusmore-Villaume 2008, Zuschin et al. 2009, Dekker 2018.

The type specimen from the Gulf of Suez is depicted in Yaron et al. (1986). *Rubritrochus* from the Indian Ocean was reviewed by Dekker (2018). The similar *R. moolenbeeki* Dekker, 2018 is known from the southern Red Sea.

### *Trochus erithreus* Brocchi, 1821

**Plate 74: fig. 21a - c:** 13.0 x 11.4 mm; **d:** 18.3 x 15.8 mm; a - c to scale with 23 a - c.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Heiman & Mienis 2003c, Dafni URL 1, Rusmore-Villaume 2008, Zuschin et al. 2009, Al-Yamani et al. 2012, Scaperrotta et al. 2018.

This species is a Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007).

### *Trochus maculatus* Linnaeus, 1758

**Plate 74: fig. 22 a, b:** 43 x 46 mm.

Literature: Dekker & Orlin 2000, Heiman & Mienis 2003c, Dafni URL 1, Rusmore-Villaume 2008, Zuschin et al. 2009, Lacroix & Lacroix 2011.

URL 43: http://www.gastropods.com/4/Shell_244.shtml

### *Trochus submorum* (Abrard, 1942)

**Plate 74: fig. 23 a - c:** 13.1 x 11.3 mm (South); **d:** juvenile 1.15 x 0.95 mm (Caves 17 - 19 m); a - c to scale with 21 a - c.

Literature: Dekker & Orlin 2000, Heiman & Mienis 2003c, Dafni URL 1, Rusmore-Villaume 2008, Zuschin et al. 2009.

Abrard found it as a fossil in Djibouti. *Trochus wilsi* Pickery, 1989 is a synonym.

## Tegulidae Kuroda, Habe & Oyama, 1971



**Fig. 24 e:** *Cardinalia virgata* at Lighthouse was turned to show the operculum.


21 a - c
23 d
23 a - c
21 d
22 a, b
25 e
24 d, e
25 c, d
25 a, b
24 a - c


1 a, b
3 a, b
2 a, b
2 c, d
4 a, b
4 c


1 a - d
2 e
2 c, d
2 a, b
4 a, b
4 c, d
3 a - c
5 a - c

*Cardinalia virgata* (Gmelin, 1791)

**Plate 74: fig. 24 a - c:** 21.8 x 23.6 mm; **c, d:** juvenile 2.7 x 2.8 mm (Islands north 10 m); c, d to scale with 25 c, d.

Literature: Dekker & Orlin 2000, Heiman & Mienis 2003c, Dafni URL 1, Rusmore-Villaume 2008, Zuschin et al. 2009.

In WoRMS it is listed as *Tectus virgatus* (Gmelin, 1791).

*Tectus dentatus* (Forsskål in Niebuhr, 1775)

**Plate 74: fig. 25 a, b:** 89 mm; **c, d:** juvenile 2.4 x 2.4 mm (Islands north 10 m); **e:** juvenile 1.18 x 1.03 mm (Caves 18 m); c, d to scale with 24 c, d.

Literature: Vine 1986, Blatterer et al. 2000, Dekker & Orlin 2000, Debelius 2002, Heiman & Mienis 2003c, Dafni URL 1, Rusmore-Villaume 2008, Zuschin et al. 2009.

The type species from the Red Sea is illustrated by Yaron et al. (1986).

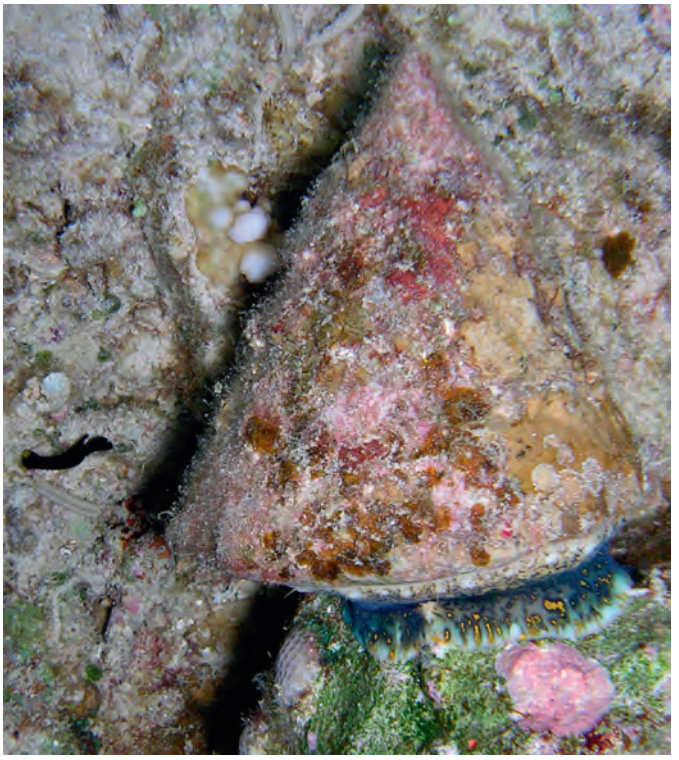


**Fig. 25 f:** *Tectus dentatus* and *Chelidonura flavolobata* by Dieter Slacik.

## Areneidae McLean, 2012

*Arene echinacantha* (Melvill & Standen, 1903)

**Plate 75: fig. 1 a, b:** 4.00 x 3.21 mm (El Gahaza 30 m).

Literature: Melvill & Standen 1903b, Mienis 1993, Bosch et al. 1995, Dekker & Orlin 2000, Heiman et al. 2012.

URL 44: http://www.gastropods.com/8/Shell_21048.shtml

## Skeneidae W. Clark, 1851

Recent molecular evidence suggests that a number of genera in Skeneidae probably belong to other families, therefore, many of these assignments must be regarded as provisional (Haszprunar et al. 2016). Many former Skeneidae genera and species belong to the Tornidae. Typical Skeneidae can be recognised by the perfect circular aperture.

*Cirsonella* sp.

**Plate 75: fig. 2 a, b:** 1.88 x 1.79 mm (Blue Hole 34 m); **c, d:** 1.70 x 1.40 mm (Blue Hole 24 m).

Literature: Zuschin et al. 2009.

This smooth species is depicted by Zuschin et al. (2009) as *Cirsonella* sp. 2, and by Edelman-Furstenberg & Faershtein 2010 as *Leucorhynchia crossei* Tryon, 1888.

*Pondorbis* sp.

**Plate 75: fig. 3 a, b:** 0.78 x 0.66 mm (Moray Garden 37 m).

Literature: Bartsch 1915, Herbert 2015.

*Pondorbis alfredensis* Bartsch, 1915 from South Africa has broader and more orthocline axial ribs. *Liotella* is possibly an older name for this genus (Herbert 2015).

Skeneidae Gen. sp.

**Plate 75: fig. 4 a, b:** 2.29 x 1.92 mm (Caves 20 m); **c:** detail of a specimen which measures 2.06 x 1.69 mm in size (Canyon 32 m).

A similar but more coarsely spirally ribbed species is depicted by Zuschin et al. (2009) as *Cirsonella* sp. 1. The types (not seen) of *Cyclostrema eupoietum* Melvill, 1904 should be compared with this species. Possibly there are fewer spiral ribs.

## Turbinidae Rafinesque, 1815

Turbinidae are known by their common name turban snails. A strong, thick calcareous operculum distinguishes them from the somewhat similar Trochidae.

*Turbo moolenbeeki* Dekkers & Dekker, 2016

**Plate 76: fig. 1 a, b:** 51.5 x 48.5 mm (Islands).

Literature: Vine 1986, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Zuschin et al. 2009, Heiman et al. 2012.

This species was recently described and differentiated from *Turbo petholatus* Linnaeus, 1758 by the smaller maximum size, the consistently rounded whorls (often angulated in adult *T. petholatus*), and the white columella with a thin dark green margin (which in *T. petholatus* is usually broader and stained yellow to greenish).

*Turbo radiatus* Gmelin, 1791

**Plate 76: fig. 2 a, b:** subadult 13.1 x 11.9 mm (Islands); **c, d:** juvenile 1.85 x 1.45 mm (Umm Sid 18 m); **e:** juvenile 2.07 x 1.54 mm (Canyon 11 m).

Literature: Bosch et al. 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Rusmore-Villaume 2008, Zuschin et al. 2009, Heiman et al. 2012.

Juveniles have a strongly bicarinated shell.

(continued after plate)


6 a, b
6 c, d
6 e, f
6 g, h
6 i
7 a, b
8 a, b
8 c, d
9 a, b
10 a, b
11 a, b
11 c, d

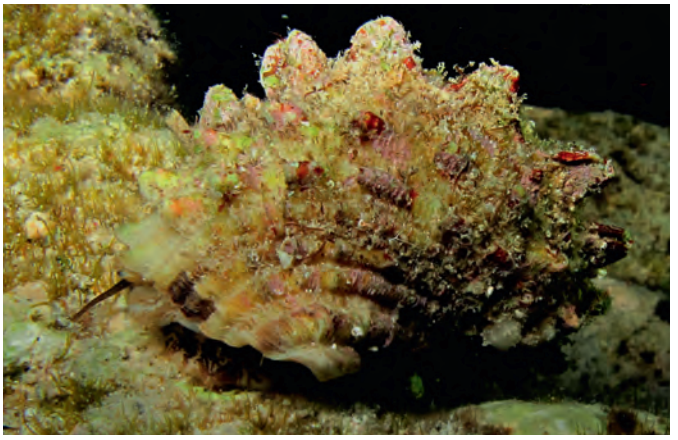


**Fig. 2 f:** *Turbo radiatus* at Islands during a night dive.



**Fig. 2 g:** *Turbo radiatus* at Islands was turned to show the operculum.

## Colloniidae Cossmann, 1917

Colloniidae were elevated to family level by Williams et al. (2008) and are related to the Phasianellidae.

### *"Bothropoma" pentegoniostomum* (Carpenter, 1856)

**Plate 76: fig. 3 a - c:** 2.11 x 1.62 mm (Canyon 29 m).

Literature: Carpenter 1856, Bosch et al. 1995, Zuschin et al. 2009.

URL 45: http://www.gastropods.com/1/Shell_74451.shtml

This species described from the Red Sea is close to *Bothropoma bellula* (H. Adams, 1873) from the Persian Gulf (L. van Gemert pers. comm.). The type of *bellula* is depicted in URL 45. Zuschin et al. (2009) list this species as "*Bothropoma*" *bellula* (H. Adams, 1873)?. It is further listed as *Cyclostrema pentegoniostoma* Carpenter, 1856 (Liotiidae) and is considered to be a taxon inquirendum in WoRMS.

### *Bothropoma isseli* Thiele, 1924

**Plate 76: fig. 4 a, b:** 2.7 mm; **c, d:** juvenile 1.88 x 1.62 mm; both Tigerhouse 7 m; all to scale.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Rusmore-Villaume 2008, Zuschin et al. 2009, Heiman et al. 2012.

URL 46: https://ingokurtz.jimdo.com/mollusca/colloniidae/

This is a small *Bothropoma* species, commonly found in shell grit on the beach. It is very variable in colour, usually with a distinct white-brown dashed rib on the periphery.

### *Bothropoma* sp. 1

**Plate 76: fig. 5 a - c:** 3.65 x 2.77 mm (Islands seagrass 26 m).

Literature: Zuschin et al. 2009.

URL 47: http://www.gastropods.com/4/Shell_69244.shtml

This is an undescribed, strongly ribbed and angular species. Similar is *Bothropoma* cf. *munda* (H. Adams, 1873) in Zuschin et al. 2009. The type of *B. munda* from the Persian Gulf has a different aperture (URL 47).

### *Bothropoma* sp. 2

**Plate 77: fig. 6 a, b:** 4.00 x 3.14 mm; **c, d:** 3.95 x 3.11 mm; **e, f:** 2.39 x 2.04 mm; a - f Umm Sid 13 m; **g, h:** 2.95 x 2.41 mm (Canyon 45 m); **i:** 3.05 x 2.79 mm (Caves 16 m); all to scale with 7 a, b.

**Plate 77: fig. 7 a, b:** operculum of a *Bothropoma* 1.80 x 1.64 mm (Canyon 22 m) see also *Bothropoma* sp. 1; to scale with 6 a - i.

Literature: Zuschin et al. 2009.

This is an undescribed species with several colour morphs, rounded whorls and fine spiral ribs. It is depicted by Zuschin et al. 2009 as *Bothropoma* cf. *pilula* (Dunker, 1860).

### *Collonista arsinoensis* (Issel, 1869)

**Plate 77: fig. 8 a, b:** 3.39 x 2.91 mm (Canyon 11 m); **c, d:** juvenile 1.81 x 1.65 mm; (Umm Sid 13 m).

Literature: Dekker & Orlin 2000, Rusmore-Villaume 2008, Zuschin et al. 2009, Heiman et al. 2012.

URL 48: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-31027

A syntype of this species is depicted in URL 48.

### *Yaronia pustulata* (Brocchi, 1821)

**Plate 77: fig. 9 a, b:** 13.7 x 11.2 mm.

Literature: Sharabati 1984, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Mienis 2011, Heiman et al. 2012.

The shell was brought to the collection by students from an unknown locality. The type material of *Turbo pustulatus* Brocchi, 1821 has not been retrieved (Mienis 2011; H. Dekker, pers. comm.). In WoRMS it is considered a nomen dubium, but the name is frequently used. In the southern Red Sea and Gulf of Aden the smaller species *Y. gestroi* (Caramagna, 1888) is present.

## Conradiidae Golikov & Starobogatov, 1987

### *Conradia eutornisca* (Melvill, 1918)

**Plate 77: fig. 10 a, b:** 1.10 x 0.92 mm (Canyon 29 m).

Literature: Melvill 1918, Janssen et al. 2011.

URL 49: https://naturalhistory.museumwales.ac.uk/molluscatypes/browserecord.php?-recid=432

(continued after plate)



1 a, b



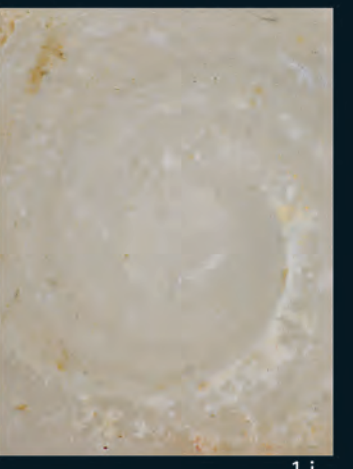
1 c, d, e



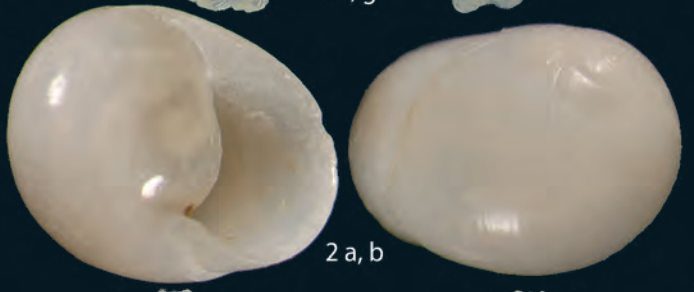
1 f, g



1 h, i



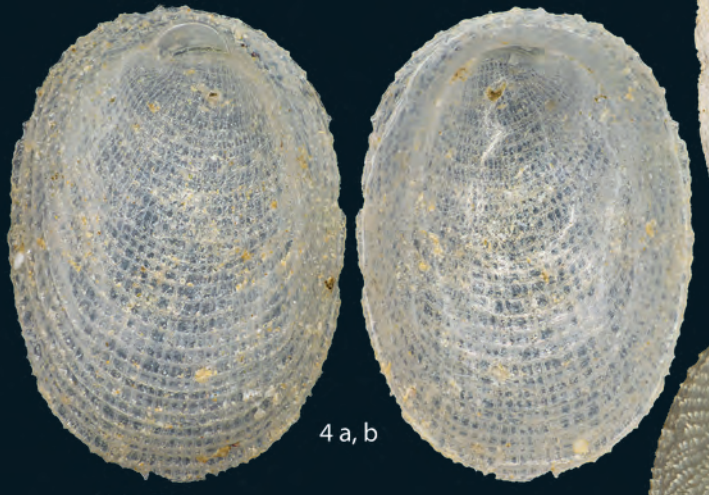
1 j



2 a, b



3 a, b



4 a, b



4 c



4 d



5 a, b

The species was described from Karachi, Pakistan, Arabian Sea, and syntypes are depicted in URL 49. The specimen in JANSSEN et al. (2011) may be different as it has 7 spiral cords on the body whorl instead of 5. The family assignment is still uncertain. RUBIO et al. (2015) assigned it to Vitrinellinae. Some species of Seguenziidae have a similar teleoconch structure, however, these have nacreous layers in the shell. *Fossarus brumalis* HEDLEY, 1907 has a coffee-brown colour and the fine spiral ridge inside the umbilicus is missing. *Lophocochlias minutissimus* (PILSBRY, 1921) matches in size and sculpture but has an outer lip with an external varix (RUBIO & ROLÁN 2015).

## Phasianellidae SWAINSON, 1840

Phasianellidae are known by their common name pheasant shells or pheasant snails.

***Phasianella solida*** (BORN, 1778)

**Plate 77: fig. 11 a, b:** 11.7 x 5.8 mm (Lagoon); **c, d:** operculum 3.93 x 2.78 mm (Caves 32 m).

Literature: BOSCH et al. 1995, BLATTERER et al. 2000, DEKKER & ORLIN 2000, RUSMORE-VILLAUME 2008, ZUSCHIN et al. 2009.

ROBERTSON (2010) calls *Phasianella solida* a "complex" because it comprises perhaps as many as 20 or 30 closely similar subspecies or species occurring singly at each of its localities throughout most of the tropical Indo-West Pacific.

# Neritimorpha

Members of this subclass are treated in two comprehensive volumes by EICHHORST (2016a, b).

## Neritopsidae GRAY, 1847

***Neritopsis radula*** (LINNAEUS, 1758)

**Plate 78: fig. 1 a, b:** 12.5 x 8.6 mm; **c - e:** 2.07 x 1.31 mm (Umm Sid); **f, g:** 1.12 x 0.90 mm (Islands 14 m); **h, i:** Operculum 4.1 x 3.3 mm; **j:** protoconch.

Literature: SHARABATI 1984, DEKKER & ORLIN 2000, RUSMORE-VILLAUME 2008, POPPE 2008a, EICHHORST 2016b.

The Dahab collection contains five intact specimens of *Neritopsis* among which there is some variation. All five specimens have only 1 protoconch whorl. Three of these have an open umbilicus; 2 a closed one. In comparison *N. aqabaensis* BANDEL (2007) described from the Gulf of Aqaba has 2 protoconch whorls. EICHHORST (2016) leaves the validity status of that species in question. MIENIS (2018a) mentions many specimens of *N. aqabaensis* from the Red Sea but not *Neritopsis radula*. His specimens have 2 rounded protoconch whorls and the same adult pattern as the Dahab specimens. This is confusing and deeds more detailed studies.

## Neritiliidae SCHEPMAN, 1908

***Pisulina adamsiana*** G. NEVILL & H. NEVILL, 1869

**Plate 78: fig. 2 a, b:** 4.3 x 3.2 mm (Islands labyrinth 10 m).

Literature: DEKKER 2000, DEKKER & ORLIN 2000, POPPE in POPPE 2008a, ZUSCHIN et al. 2009, MOOLENBEEK & HOENSELAAR 2010, EICHHORST 2016b.

Most finds are from dive sites Caves and Bells - Blue Hole suggesting a preference for overhanging crevices.

## Phenacolepadidae PILSBRY, 1895

*Phenacolepas* is according to CHRISTIAENS (1989) a synonym of *Plesiothyreus*. EICHHORST (2016b) agrees but keeps both genera until genetic studies shed light on the relationship among the various Phenacolepadidae which are commonly known as false limpets.

***Plesiothyreus elongatus*** (THIELE, 1909)

**Plate 78: fig. 3 a, b:** 2.64 x 1.84 mm (Caves 15 m).

Literature: CHRISTIAENS 1988, THIELE 1909, DEKKER & ORLIN 2000.

URL 50: http://vieoceane.free.fr/mollusques/intro_frame.htm

*Phenacolepas elongata* THIELE, 1909 in WoRMS. The specimens in EICHHORST (2016b: Pl. 368, fig. 15) and URL 50 have a more prominent sculpture and are different to the Red Sea species.

***Plesiothyreus osculans*** (C. B. ADAMS, 1852)

**Plate 78: fig. 4 a, b:** 2.82 x 2.00 mm (Caves 16 m); **c:** 2.03 x 1.56 mm (Caves 18 m); **d:** 1.80 x 1.47 mm (Lagoon seagrass 12 m); a - d to scale.

Literature: CHRISTIAENS 1988, 1989, DEKKER & ORLIN 2000, RUSMORE-VILLAUME 2008, EICHHORST 2016.

CHRISTIAENS is followed, who considers specimens from the type locality Panama conspecific with Red Sea specimens although this seems very unlikely. The species is listed as *Phenacolepas osculans* (C. B. ADAMS, 1852) in WoRMS and is identified as *Plesiothyreus elongata* (THIELE, 1909) in ZUSCHIN et al. (2009). The specimen in RUSMORE-VILLAUME (2008) may not be conspecific as the apex is extending over the posterior margin (VAN GEMERT 2008a). It resembles more *Phenacolepas tenuisculpta* (THIELE, 1909) from the Pacific (THIELE 1909, OKUTANI 2000, 2017).

***Plesiothyreus pararabicus*** (CHRISTIAENS, 1988)

**Plate 78: fig. 5 a, b:** 20.5 x 13.2 mm (Lagoon 12 m).

Literature: LAMY 1938, CHRISTIAENS 1988, BOSCH et al. 1995, DEKKER & ORLIN 2000, RUSMORE-VILLAUME 2008, ZUSCHIN et al. 2009.

The species is listed in WoRMS as *Phenacolepas pararabica* CHRISTIAENS, 1988, an intended replacement name for LAMY's nomen nudum.

## Neritidae Rafinesque, 1815

This family in known by their common name nerites. During low tide the genus *Nerita* feeds on the patina of algae and diatoms covering wave-splashed intertidal rocks. They are often found above the water line during the day. *Smaragdia* species are found submersed in shallow eelgrass beds upon which they feed (Eichhorst 2016a). *Nerita quadricolor* Gmelin, 1791, a species I know from El Quseir, was not found in Dahab although it was searched for in its preferred habitat, shaded areas on beach rock well above the high tide line.

### *Nerita orbignyana* Récluz, 1841

**Plate 79: fig. 6 a, b:** 20.2 x 15.3 mm; **c - h:** largest red shell 18.4 x 12.8 mm, smallest red shell 13.3 x 10.0 mm; a, b to scale with 7 a, b; c - h to scale with 7 c - h.

Literature: Blatterer et al. 2000, Dekker 2000, Dekker & Orlin 2000, Dirkx & Verbinnen 2003a, Heiman 2003a, Lacroix & Lacroix 2011, Eichhorst 2016a.

In former versions of WoRMS *Nerita orbignyana* Récluz, 1841 was considered a synonym of *N. litterata* Gmelin, 1791. This is incorrect according to Henk Dekker (see Eichhorst & Neville 2004). The colours and patterns of the polished shells are almost infinitely variable as shown by some examples.

### *Nerita sanguinolenta* Menke, 1829

**Plate 79: fig. 7 a, b:** 20.2 x 15.8 mm; **c - h:** largest black shell 16.4 x 13.4 mm, smallest red shell 13.0 x 11.0 mm; a, b to scale with 6 a, b; c - h to scale with 6 c - h.

Literature: Dekker 2000, Dekker & Orlin 2000, Dirkx & Verbinnen 2003a, Heiman 2003a, Eichhorst 2016a.

This species has low rounded axial spiral cords which are usually eroded and difficult to discern in larger shells. Furthermore, there is less variability in colour and pattern than in *N. orbignyana*. Nevertheless, many shades of black, orange, red and white can occur. This species is a Lessepsian immigrant into the Mediterranean Sea (Eichhorst 2016a).



**Fig. 7 i:** *Nerita sanguinolenta* on intertidal beach rock at Canyon.



**Fig. 7 j:** *Nerita sanguinolenta* gliding over the sand of El-Qura Bay.

### *Smaragdia purpureomaculata* Dekker, 2000

**Plate 79: fig. 8 a, b:** 2.16 x 1.84 mm (Moray Garden 17 m); **c, d:** 3.32 x 2.71 mm (Islands Seagrass 26 m).

Literature: Dekker 2000, Dekker & Orlin 2000, Heiman 2003a, Dafni URL 1, Zuschin et al. 2009, Eichhorst 2016b.

The species is characterised by its spiral bands with small blotches of axial stripes that can appear purple.

### *Smaragdia rangiana* (Récluz, 1842)

**Plate 79: fig. 9 a, b:** 2.68 x 2.25 mm (Islands 2.5 m).

Dekker 2000, Dekker & Orlin 2000, Dirkx & Verbinnen 2003d, Heiman 2003a, Dafni URL 1, Rusmore-Villaume 2008, Eichhorst in Poppe 2008a, Eichhorst 2016b.

Thin dark lines on the leading edge of the spirally arranged white blotches are characteristic for this species.



**Fig. 9 c:** *Smaragdia rangiana* at Masbat Bay by Christian Von Mach.

### *Smaragdia souverbiana* (Montrouzier in Souverbie & Montrouzier, 1863)

**Plate 79: fig. 10 a, b:** 1.83 x 1.41 mm (Lagoon 10 m fine sand).

Literature: Dekker 2000, Dekker & Orlin 2000, Dafni URL 1, Dirkx & Verbinnen 2003d, Rusmore-Villaume 2008, Poppe & Tagaro in Poppe 2011, Eichhorst 2016b.

Shells typically display long parallel brown axial lines. This species is a Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007).


6 a, b
7 a, b
7 c - h
6 c - h
8 a, b
8 c, d
9 a, b
10 a, b

# Caenogastropoda

## Cerithiidae Fleming, 1822

The Cerithiidae known as cerithiids or ceriths are herbivore and detritivore grazers.

### *Cerithidium perparvulum* (Watson, 1886)

**Plate 80: fig. 1 a, b:** 2.71 x 0.89 mm (Moray Garden 17 m); **c, d:** 1.85 x 0.78 mm (Umm Sid 18 m); **e:** 1.53 x 0.69 mm; **f:** 1.37 x 0.62 mm; **g:** 1.60 x 0.87 mm; **h:** protoconch of g enlarged; a - h from Canyon 11 m; a - g to scale.

Literature: Dekker & Orlin 2000, van Aartsen 2006, Janssen et al. 2011, Poppe & Tagaro in Poppe 2011 (pl. 1269, fig. 1, 2), Okutani 2017.

The similar *Cerithidium cerithinum* (Philippi, 1849) may be the oldest available name of a highly variable species. The discussion about this taxon is still ongoing. E.g. it was assigned to the family Scaliolidae by Janssen et al. (2011: 398). *Cerithidium diplax* (R. B. Watson, 1886) has only 2 fine rounded spiral ribs, above which a long conical sloping shoulder gives a pagoda-like aspect to the shell. This species is a Lessepsian immigrant into the Mediterranean Sea (Crocetta et al. 2018).

### *Cerithium adansonii* Bruguière, 1792

**Plate 80: fig. 2 a, b:** 59 mm (Lagoon).

Literature: Verbinnen & Dirkx 1997a, Dekker & Orlin 2000, Dafni URL 1, Heiman & Mienis 2004, van Gemert 2004a, Rusmore-Villaume 2008.

It is listed in WoRMS as subspecies *C. nodulosum adansonii*.

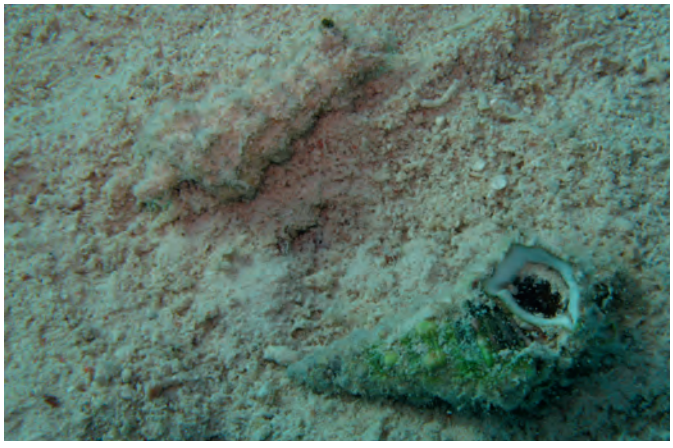


**Fig. 2 c:** Two specimen of *Cerithium adansonii* at Moray Garden, one was turned to show the operculum.

### *Cerithium caeruleum* G. B. Sowerby II, 1855

**Plate 80: fig. 3 a, b:** 34.3 x 19.3 mm (Lagoon); to scale with 4 a - d and 5 a, b.

Literature: Bosch et al. 1995, Verbinnen & Dirkx 1997a, Dekker & Orlin 2000, Dafni URL 1, Heiman & Mienis 2004, van Gemert 2004a, Rusmore-Villaume 2008.

### *Cerithium columna* G. B. Sowerby I, 1834

**Plate 80: fig. 4 a, b:** 34.1 mm; **c, d:** a different form without the prominent knobs 27.3 mm; all to scale with 3 a, b and 5 a, b.

Literature: Bosch et al. 1995, Verbinnen & Dirkx 1997a, Dekker & Orlin 2000, Dafni URL 1, Heiman & Mienis 2004, van Gemert 2004a, Rusmore-Villaume 2008, Okutani 2017.

### *Cerithium echinatum* Lamarck, 1822

**Plate 80: fig. 5 a, b:** 43.6 mm; **c:** juvenile 18.2 x 9.0 mm (South); a, b to scale with 3 a, b and 4 a - d.

Literature: Verbinnen & Dirkx 1997a, Dafni URL 1, Dekker & Orlin 2000, Heiman & Mienis 2004, van Gemert 2004a, Rusmore-Villaume 2008, Poppe et al. in Poppe 2008.

The spines are less developed in juveniles.

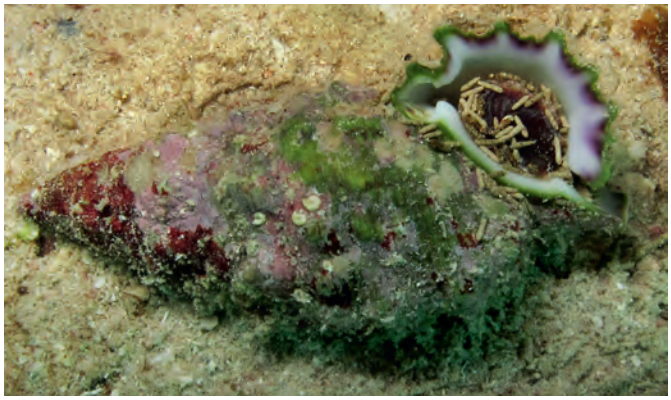


**Fig. 5 d:** *Cerithium echinatum* was turned to show the operculum (South).

### *Cerithium egenum* Gould, 1849

**Plate 81: fig. 6 a, b:** 7.23 x 3.03 mm (Islands 2.5 m); **c, d:** 3.92 x 1.84 mm (Blue Hole 18 m); **e, f:** 3.90 x 2.31 mm (Moray Garden 2.5 m); **g, h:** 3.23 x 1.95 mm (Blue Hole 4 m); **i, j:** 2.04 x 1.25 mm (Caves 20 m); **k:** 2.07 x 1.12 mm (Moray Garden 2.5 m); **l:** protoconch of 6 g enlarged; a - k to scale with 7 a - g, 8 c, d, 9 c, e, f and 15 e - g.

Literature: Bosch et al. 1995, Verbinnen & Dirkx 1997a, Dekker & Orlin 2000, Heiman & Mienis 2004, van Gemert 2004a, Rusmore-Villaume 2008, Poppe et al. in Poppe 2008, Janssen et al. 2011, Okutani 2017.

Some eye-catching juveniles display 2 - 5 weak, and 2 strong spiral cords with white elevated elongated tubercles interrupted by brown colour in between. In the last whorl a smaller row is appearing between the two stronger rows. The small rows are coloured yellow to light brown.

### *Cerithium* cf. *egenum* juveniles

**Plate 81: fig. 7 a, b:** 2.34 x 1.29 mm; **c, d:** 2.07 x 1.20 mm; **e, f:** 1.55 x 0.87 mm; **g:** 1.62 x 0.97 mm; all from Canyon 11 m; a - g to scale with 6 a - k, 8 c, d, 9 c, e, f and 15 e, f.

Shells are white, pink, or white with brown spiral lines, and/or spots, and have a light brown protoconch. They may fall within the variation of *C. egenum*. Possibly more species are involved.

**Plate 81: fig. 15 e, f:** see *Clypeomorus isseli* adults on next plate.

### *Cerithium interstriatum* G. B. Sowerby II, 1855

**Plate 81: fig. 8 a, b:** 10.8 x 3.8 mm (Lagoon); **c, d:** 3.81 x 1.67 mm (Canyon 11 m); c, d to scale with 6 a - k, 7 a - g, 9 c, e, f, and 15 e - g.

Literature: Dekker & Orlin 2000, Heiman & Mienis 2004, van Gemert 2004a, Rusmore-Villaume 2008, Poppe et al. in Poppe 2008, Okutani 2017.


1 a, b
1 c, d
1 h, g
1 f
1 e
4 c, d
4 a, b
3 a, b
5 a, b
5 c
2 a, b


6 k
6 l
6 i, j
6 g, h
6 c, d
6 e, f
6 a, b
15 g
8 c, d
9 c
7 a, b
7 e, f
7 c, d
7 g
15 e, f
8 a, b
9 d
9 e, f
9 a, b

*Cerithium nesioticum* PILSBRY & VANATTA, 1906

**Plate 81: fig. 9 a, b:** 16.0 x 5.4 mm (Blue Lagoon); **c:** 5.04 x 2.42 mm (Moray Garden 2.5 m); **d:** 1.71 x 0.87 mm (Canyon 11 m) enlarged; **e, f:** 1.58 x 0.85 mm (Canyon 11 m); c, e, f to scale with 6 a - k, 7 a - g, 8 c, d and 15 e, f.

Literature: SHARABATI 1984, VERBINNEN & DIRKX 1997a, DEKKER & ORLIN 2000, DAFNI URL 1, HEIMAN & MIENIS 2004, VAN GEMERT 2004a, RUSMORE-VILLAUME 2008, POPPE et al. in POPPE 2008, OKUTANI 2017.

Juveniles have 4 somewhat nodulous spiral teleoconch cords and a white protoconch with axial and spiral sculpture like in juvenile *Cerithium* cf. *egenum*.

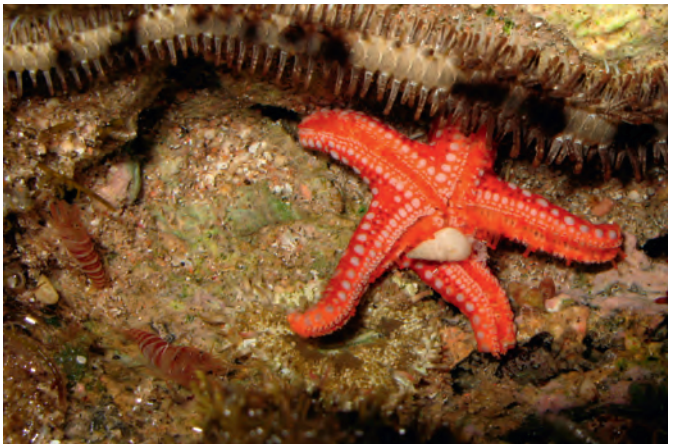


**Fig. 9 g:** *Cerithium nesioticum* inside a tide pool at Masbat Bay probably attacked by a starfish (*Fromia*). There are also two snapping shrimps (*Alpheus*), a brittle star, a crab and a sea anemone.

*Cerithium rostratum* A. ADAMS in G. B. SOWERBY II, 1855

**Plate 82: fig. 10 a, b:** 20.4 x 6.7 mm.

Literature: VERBINNEN & DIRKX 1997a, DEKKER & ORLIN 2000, DAFNI URL 1, HEIMAN & MIENIS 2004, VAN GEMERT 2004a, RUSMORE-VILLAUME 2008, POPPE et al. in POPPE 2008, OKUTANI 2017.

*Cerithium* cf. *rostratum* A. ADAMS in G. B. SOWERBY II, 1855

**Plate 82: fig. 11 a, b:** 4.61 x 1.59 mm (Lagoon); **c, d:** 1.33 x 0.63 mm (Lagoon fine sand); **e:** protoconch of c enlarged.

Looks like *Cerithium rostratum* but is brown in colour. It seems to be conspecific with *Rhinoclavis* sp. from Aqaba in BANDEL (2006: pl. 1, fig. 3).

*Cerithium rueppelli* PHILIPPI, 1848

**Plate 82: fig. 12 a:** 44 mm; **b:** 43 mm; **c:** 36.5 mm (South); a, b to scale.

Literature: BOSCH et al. 1995, VERBINNEN & DIRKX 1997a, DEKKER & ORLIN 2000, DAFNI URL 1, HEIMAN & MIENIS 2004, VAN GEMERT 2004a, RUSMORE-VILLAUME 2008.

*Cerithium zebrum* KIENER, 1841

**Plate 82: fig. 13 a, b:** 6.02 x 1.91 mm (Tigerhouse 7 m).

Literature: DEKKER & ORLIN 2000, VAN GEMERT 2004a, JANSSEN et al. 2011, OKUTANI 2017.

URL 51: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-27737

A syntype from Mauritius is depicted in URL 51.

*Clypeomorus clypeomorus* JOUSSEAUME, 1888

**Plate 82: fig. 14 a, b:** 11.5 x 5.8 mm; **c:** 12.2 x 6.1 mm; **d, e:** 10.4 x 5.3 mm.

Literature: BOSCH et al. 1995, VERBINNEN & DIRKX 1997a, DEKKER & ORLIN 2000, DAFNI URL 1, HEIMAN & MIENIS 2004, VAN GEMERT 2004a, RUSMORE-VILLAUME 2008, POPPE et al. in POPPE 2008.

This species is considered to be a synonym of *Clypeomorus bifasciata bifasciata* (G. B. SOWERBY II, 1855) by HOUBRICK (1985). Based on shell morphology, the Red Sea to Persian Gulf specimens are regarded as the different species *C. clypeomorus*. It co-occurs at certain localities with *C. persicus* HOUBRICK, 1985, so both should be given full species status. Elsewhere, *C. bifasciata bifasciata* fide HOUBRICK (1985) is a yet unresolved species complex (H. DEKKER pers. comm.).

*Clypeomorus isseli* (PAGENSTECHER, 1877)

**Plate 82: fig. 15 a, b:** 22.3 x 9.9 mm; **c, d:** 14.0 x 6.4 mm.

**Plate 81: fig. 15 e, f:** 1.09 x 0.69 mm; **g:** protoconch of 15 f enlarged.

Literature: VERBINNEN & DIRKX 1997a, DEKKER & ORLIN 2000, HEIMAN & MIENIS 2004, VAN GEMERT 2004a, RUSMORE-VILLAUME 2008.

The species used to be a subspecies of *C. petrosa* but is now accepted in WoRMS. *Clypeomorus petrosa gennesi* in HOUBRICK 1985 is a junior synonym (VAN GEMERT 2004a). A supposedly juvenile is depicted on the previous plate (pl. 81, fig. 15 e - g) for comparison with other juvenile Cerithiidae. It fits with the "probably *Clypeomorus*" in BANDEL (2006: pl. 1, fig. 4). The protoconch is much darker than in *Cerithium egenum*.



**Fig. 15 h:** *Clypeomorus isseli* inside a tide pool at Islands, most of them are inhabited by hermit crabs. There are also some other smaller gastropod shells, a fire worm (Polychaeta) and a brittle star (*Ophiocoma scolopendrina*).


11 e
11 c, d
10 a, b
11 a, b
12 a
12 b
14 d, e
14 a, b
13 a, b
12 c
15 a, b
15 c, d
14 c


16 a, b
17 a, b
18 k, l
18 a, b
18 i, j
18 e, f
18 c, d
19 a, b
18 g, h


1 a, b
1 e
2 e
1 c, d
2 c, d
2 a, b
3 a, b
3 c, d
3 e

*Rhinoclavis aspera* (Linnaeus, 1758)

**Plate 83: fig. 16 a, b:** 37.0 x 11.7 mm; to scale with 16 a, b and 18 a - h.

Literature: Verbinnen & Dirkx 1997a, Dekker & Orlin 2000, Heiman & Mienis 2004, van Gemert 2004a, Rusmore-Villaume 2008, Poppe et al. in Poppe 2008, Okutani 2017.

Students brought this specimen to the collection, probably from a fossil reef.

*Rhinoclavis fasciata* (Bruguière, 1792)

**Plate 83: fig. 17 a, b:** 46 x 12 mm; to scale with 15 a, b and 18 a - h.

Literature: Bosch et al. 1995, Verbinnen & Dirkx 1997a, Dekker & Orlin 2000, Dafni URL 1, Heiman & Mienis 2004, van Gemert 2004a, Rusmore-Villaume 2008, Poppe et al. in Poppe 2008.



**Fig. 17 c, d:** *Rhinoclavis fasciata* at Islands.

*Rhinoclavis kochi* (Philippi, 1848)

**Plate 83: fig. 18 a, b:** 35.5 x 10.9 mm; **c, d:** 33.9 x 8.6 mm; **e, f:** 27.7 x 7.9 mm; **g, h:** 30.1 x 8.7 mm; **i, j:** 6.70 x 2.68 mm; **k, l:** juvenile tentatively assigned 4.36 x 1.90 mm (Lagoon 5 m); a - h from Lagoon to scale with 16 a, b and 17 a, b.

Literature: Bosch et al. 1995, Verbinnen & Dirkx 1997a, Dekker & Orlin 2000, Dafni URL 1, Heiman & Mienis 2004, van Gemert 2004a, Rusmore-Villaume 2008, Poppe et al. in Poppe 2008, Okutani 2017.

The lower two pictures of *R. aspera* in Rusmore-Villaume (2008) are *R. kochi*. This species is a Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007).



**Fig. 17 c, d:** *Rhinoclavis kochi* at Bannerfish by Christian von Mach.

*Royella sinon* (Bayle, 1880)

**Plate 83: fig. 19 a, b:** 8.36 x 3.09 mm (Tigerhouse).

Literature: Dekker & Orlin 2000, Dafni URL 1, Heiman & Mienis 2004, van Gemert 2004a, Rusmore-Villaume 2008, Poppe et al. in Poppe 2008, Okutani 2017.

## Dialidae Kay, 1979

*Diala albugo* (R. B. Watson, 1886)

**Plate 84: fig. 1 a, b:** 2.74 x 1.23 mm (Islands 2.5 m); **c, d:** 2.49 x 1.03 mm (Canyon 11 m); **e:** protoconch of 1 a enlarged; a - d to scale with 2 a - d and 3 a - d.

Literature: Ponder & Keyzer 1992, Dekker & Orlin 2000, Bouchet & Strong in Poppe 2008a, Janssen et al. 2011.

*Diala varia* A. Adams, 1861

**Plate 84: fig. 2 a, b:** 3.16 x 1.27 mm; **c, d:** 2.82 x 0.95 mm; **e:** protoconch enlarged; all from Moray Garden; a - d to scale with 1 a - d and 3 a - d.

Literature: Ponder & Keyzer 1992, Bosch et al. 1995, Dekker & Orlin 2000, Bouchet & Strong in Poppe 2008a, Janssen et al. 2011.

A well-known older name for this species is *D. semistriata* (Philippi, 1849), which was originally described as *Rissoa semistriata*. However, the name is preoccupied by the homonyms *R. semistriata* (Lamarck, 1804), assigned to *Rissoa* by Deshayes, (1833), and *R. semistriata* (Montagu, 1808). The oldest available name is therefore *D. varia*. This species is a Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007).

## Litiopidae Gray, 1847

*Styliferina goniochila* A. Adams, 1860

**Plate 84: fig. 3 a, b:** 3.72 x 1.7 mm (Blue Hole 18 m); **c, d:** 2.66 x 1.21 mm (Islands 9 m); **e:** protoconch enlarged; a - d to scale with 1 a - d and 2 a - d.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Bandel 2006, Bouchet & Strong in Poppe 2008a, Janssen et al. 2011.

The shell is translucent with non-translucent white spots above and below the suture. In between the white spots 2 paired translucent pale brown spots or striae are visible.

## Scaliolidae Jousseaume, 1912

*Finella pupoides* A. Adams, 1860

**Plate 85: fig. 4 a, b:** 2.61 x 0.97 mm (Islands 14 m); **c, d:** 2.30 x 1.15 mm (Lagoon seagrass 12 m); **e:** 2.41 x 0.74 mm (Lagoon 10 m fine sand), **f:** 1.78 x 0.65 mm (Islands 14 m); all to scale.

Literature: Hasegawa 1998, Dekker & Orlin 2000, Bandel 2006, Delongueville & Scaillet 2007, Bouchet & Strong in Poppe 2008a.

Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007).

*Scaliola elata* Issel, 1869

**Plate 85: fig. 5 a, b:** 2.60 x 0.91 mm; **c:** 2.17 x 0.83 mm (Lagoon seagrass 12 m); all from Moray Garden; all to scale.

Literature: Issel 1869, Dekker & Orlin 2000, Janssen et al. 2011.

URL 52: http://www.gastropods.com/0/Shell_16530.shtml

*Scaliola arenosa* A. Adams, 1862 may be a junior synonym. The genus requires revision.


4 a, b
4 e
4 f
5 c
4 c, d
5 a, b
9 a, b
8 e, f
8 a, b
8 c, d
7 a, b

## Thiaridae Gill, 1871 (1823)

***Melanoides tuberculata*** (O. F. Müller, 1774)

**Text figure 6 a, b:** not depicted on plate.

Literature: Rusmore-Villaume 2008.

This fresh water snail was discovered in a small puddle of a spring in Wadi Gunai (28°27'11.0"N 34°26'27.5"E) in 2008, 2011, 2016 and 2017. In the last two years it was also found in another puddle below the next cascade due to the presence of more water. The complete freshwater fauna (e.g. dragon flies) observed in 2003 in another spring nearby completely disappeared because of impoundment.



**Fig. 6 a, b:** *Melanoides tuberculata* from Wadi Gunai.

## Siliquariidae Anton, 1838

***Tenagodus* sp.**

**Plate 85: fig. 7 a, b:** 5.46 x 3.31 mm (Caves).

Literature: Poppe 2008a, Janssen et al. 2011.

URL 53: http://www.gastropods.com/6/Shell_5956.shtml

*Siliquaria* Bruguière, 1789 is a junior objective synonym of *Tenagodus* Guettard, 1770 as indicated by Bieler & Petit (2011: 69, 74). The Mediterranean Sea species *Tenagodus obtusus* (Schumacher, 1817) in URL 53 is similar.

## Turritellidae Lovén, 1847

***Turritella maculata*** Reeve, 1849

**Plate 85: fig. 8 a, b:** 55.2 x 14.5 mm; **c, d:** 37.8 x 9.0 mm; **e, f:** juvenile 2.74 x 1.09 mm (Lagoon 3 m); a - d from Blue Lagoon; a - d to scale.

Literature: Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Janssen et al. 2011.

URL 54: http://www.gastropods.com/8/Shell_16558.shtml
URL 55: http://131.111.101.189/fmi/iwp/cgi?-db=UMZC%20Catalogues%20%28Web%29&-loadframes

The largest shell in the collection is 82 mm in length. The holotype of *T. alba* H. Adams, 1872 from the Red Sea depicted in URL 54 and URL 55 as *Gazameda alba* (Adams, H.G., 1872) is conspecific with the Dahab shells. As clearly can be seen (fig. 8 c - f) the second main spiral cord sometimes appears later in certain specimens. This indicates that the Adams species is a juvenile of *T. maculata* but may be the oldest available name if the Red Sea population will ever be separated from Reeve's China Sea population.

***"Turritella" martensi*** Selli, 1974

**Plate 85: fig. 9 a, b:** 7.55 x 2.96 mm (Caves 17 - 19 m).

Literature: Dekker & Orlin 2000, Janssen et al. 2011, Poppe 2017a.

This species was mentioned as *Turritella* (s. lat.) *alba* (H. Adams, 1872) by (Janssen et al. (2011). *Turitella martensi* Selli, 1974 is a replacement name for *T. concava* Martens, 1880, non. Say, 1826. As mentioned in the former species, *T. alba* Adams, 1872 is a juvenile *T. maculata*, therefore, *T. martensi* is used which is not listed in WoRMS. The shell in Martens is slightly larger (16 x 5.5 mm) but the specimens in Selli (up to 6.5 x 3.6 mm) and Poppe (2017a: pl. 1592, fig. 2) fit well. According to Janssen et al. (2011) this species probably does not belong to the genus *Gazameda* as it was listed in Dekker & Orlin (2000), but it does not belong to the genus *Turritella* either.

## Pickworthiidae Iredale, 1917

***Chrystella finckhi*** (Hedley, 1899)

**Plate 86: fig. 1 a, b:** 1.49 x 0.68 mm (Caves 17 - 19 m); to scale with 2 a, b, d, e, 3 a, b, 4 a - d and 5 a - d.

Literature: Hedley 1899, Bouchet & Le Renard 1998, Dekker & Orlin 2000, Kurtz 2015, Alhejoj et al. 2016.

This species was originally described from Funafuti Atoll (Tuvalu) but was also found in the Red Sea by Bouchet & Le Renard (1998) and Alhejoj et al. (2016).

***Clatrosansonia philippina*** (Bandel & Kowalke, 1997)

**Plate 86: fig. 2 a - c:** 1.59 x 1.57 mm (Islands pinnacles); **d, e:** 1.23 x 1.20 mm (Caves 17 - 19 m); a, b, d, e to scale with 1 a, b, 3 a, b, 4 a - d and 5 a - d.

Literature: Bandel & Kowalke 1997, Le Renard & Bouchet 2003, Kurtz 2015, Poppe 2017.

*Mecoliotia aqabaensis* (Alhejoj et al. 2016), while conspecific with *Clatrosansonia philippina*, is an unavailable name (WoRMS). The differences to *C. philippina* are minor and Alhejoj et al. (2016) themselves wrote that *M. aqabaensis* may even represent only a variety to *C. philippina*.

***Mareleptopoma drivasi*** Le Renard & Bouchet, 2003

**Plate 86: fig. 3 a, b:** 1.98 x 1.62 mm (Umm Sid 13 m); to scale with 1 a, b, 2 a, b, d, e, 4 a - d and 5 a - d.

Literature: Le Renard & Bouchet 2003.

*Sansonia shigemitsui* Kase, 1998 has 1 whorl less, thus is smaller (1.1 vs. 1.98 mm) and the peristome is less thickened.


1 a, b
2 a, b
2 d, e
4 a, b
2 c
4 c, d
3 a, b
5 c, d
6 a, b
5 a, b

### *Mareleptopoma iredalei* (Bavay, 1922)

**Plate 86: fig. 4 a, b:** 3.14 x 3.10 mm (Caves 16 m); **c, d:** 1.33 x 0.88 mm (Caves 16 m); to scale with 1 a, b, 2 a, b, d, e, 3 a, b and 5 a - d.

Literature: Bavay 1922, Okutani 2000, 2017, Sasaki 2008, Tröndlé 2010, Janssen et al. 2011, Kurtz 2015, Poppe 2017.

Described as *Mareleptopoma* nov. sp. in Janssen et al. (2011) and assigned to the genus *Sansonia* in Okutani and Sasaki (2008: fig. 7 G). *Sansonia cebuana* Bandel & Kowalke, 1997 appears to be conspecific and Alhejoj et al. (2016) describe the variability of a population in the Gulf of Aqaba.

### *Sansonia* cf. *alisonae* Le Renard & Bouchet, 2003

**Plate 86: fig. 5 a - d:** 1.45 x 0.95 mm (Blue Hole 18 m); all to scale with 1 a, b, 2 a, b, d, e, 3 a, b and 4 a - d.

Literature: Le Renard & Bouchet 2003.

Matches the original description, especially in the round, double aperture and the axial and spiral sculpture. The Dahab specimen is slightly smaller, has approximately 1 whorl less and the spire appears more compressed. These differences may fall within the variability of this species.

### *Sansonia kirkpatricki* (Iredale, 1917)

**Plate 86: fig. 6 a, b:** 4.05 x 2.52 mm (Caves).

Literature: Dekker & Orlin 2000, Okutani 2000, 2017, Le Renard & Bouchet 2003, Tröndlé 2010.

Compared to the original description an umbilicus is present and the flange-like process in the periphery of the last whorl is missing (Tröndlé 2010: fig. 8). A similar shell is depicted as *S. andrei* Jousseaume, 1921 in Okutani (2000). However, Bavay (1922) and Le Renard & Bouchet (2003) list *S. andrei* as a synonym which is adapted by Okutani (2017) but still questioned in Poppe (2017b).

## Planaxidae Gray, 1850

### *Fossarus* aff. *aptus* Melvill, 1912

**Plate 87: fig. 7 a, b:** 1.70 x 1.45 mm (Caves 15 m); **c, d:** 1.49 x 1.42 mm (Caves 16 m); **e, f:** 1.14 x 1.05 mm (Caves 16 m); all to scale.

Literature: Melvill, 1912.

URL 56: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-32511

URL 57: http://www.gastropods.com/1/Shell_78241.shtml

*Iphitus escondida* Poppe & Tagaro 2016 (Epitoniidae) is similar (URL 56, URL 57). The Dahab protoconch is different compared to *Conradia* or *Macromphalus*. Bandel (2006) depicts the protoconch of *Fossarus* from Aqaba which is similar but seems to have more sigmoid axial ribs. Fossarus aptus is unaccepted in WoRMS. The accepted name *F. ambiguus* (Linnaeus, 1758) however, seems to be a different species from the Atlantic Ocean.

### *Hinea punctostriata* (E.A. Smith, 1872)

**Plate 87: fig. 8 a, b:** 3.26 x 1.73 mm (Canyon 11 m); to scale with 9 a, b.

**Plate 87: fig. 9 a, b:** 2.68 x 1.57 mm (Blue Hole 4 m); to scale with 8 a, b.

Literature: Dekker & Orlin 2000, Debelius 2002, Dafni URL 1, Verbinnen & Dirkx 2005c, Bandel 2006, Rusmore-Villaume 2008.

In WoRMS the species is listed as *Angiola punctostriata* (E.A. Smith, 1872). There are two extremely different forms. One is white with prominent spiral cords and a thin brown line, which is seldom (never?) depicted in the literature (fig. 9 a, b), and another (typical?) form which is smooth sometimes with a darker (beige) background colour and more and broader brown bands (fig. 8 a - d). Both forms, smooth or with spiral sculpture, are currently assumed to be conspecific as there are gradual transitions (H. Dekker pers. comm.). However, I have several samples in which only one of the forms occurs at a time. Especially the intertidal populations are dark and smooth perhaps because of erosion as the protoconch is often missing. The shell has been misidentified as *Littorina scabra* in Debelius (2002: 244). The shell morphology of *Angiola lineata* in Houbrick (1987: fig. 14) is comparable. The protoconch of this species is depicted as *Planaxis* (*Angiola*) *lineolatus* (Gould, 1851) in Bandel (2006: pl. 2, fig. 3).



**Fig. 8 c:** *Hinea punctostriata* at Masbat Bay. The species can be very abundant in intertidal environments. Here are also several hermit crabs in shells of Vanikoridae, Strombidae, Trochoidea and Neritidae. A sea anemone and a brittle star are also visible.

(continued after plate)


7 a, b
7 e, f
9 a, b
7 c, d
8 a, b
10 a, b
10 c, d



**Fig. 8 d:** *Hinea punctostriata* at Lighthouse. The specimens are more whitish compared with fig. 8 c, have brown spiral bands, but do not show spiral cords as seen in fig. 9 a, b.

### *Planaxis savignyi* Deshayes, 1844

**Plate 87: fig. 10 a, b:** 13.8 x 8.5 mm; **c, d:** 7.9 x 5.4 mm (Blue Hole 4 m).

Literature: Dekker & Orlin 2000, Debelius 2002, Lieske & Myers 2004, Dafni URL 1, Verbinnen & Dirkx 2005c, Bandel 2006, Rusmore-Villaume 2008.

The specimens fit well to the original description from the Red Sea. The names *Planaxis griseus* (Brocchi, 1821) or *Planaxis sulcatus* (Born, 1780) were sometimes used: the first is a preoccupied synonym (WoRMS); the second a different species.



**Fig. 10 e:** *Planaxis savignyi* at Canyon during low tide.

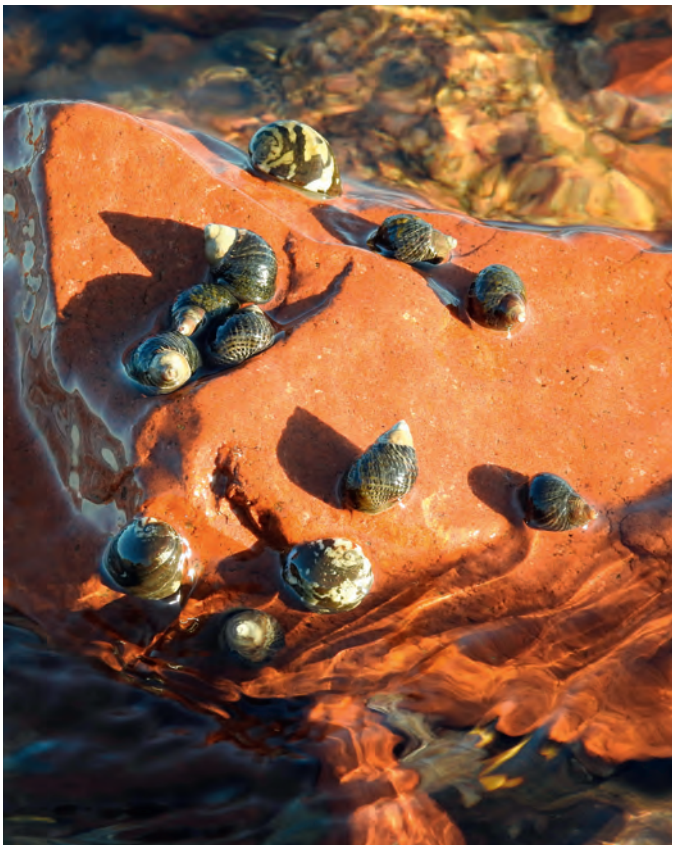


**Fig. 10 f:** *Planaxis savignyi* and *Nerita* start feeding during high tide.

## Modulidae P. Fischer, 1884

### *Indomodulus tectum* (Gmelin, 1791)

**Plate 88: fig. 11 a - c:** 15.8 x 12.0 mm; **d, e:** 12.6 x 10.2 mm; **f, g:** 15.1 x 12.7 mm (South); all to scale.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Rusmore-Villaume 2008, Landau et al. 2014.

This is a very variable shell with or without strong oblique axial ribs at the shoulder. Redescription and generic assignment was done by Landau et al. (2014).

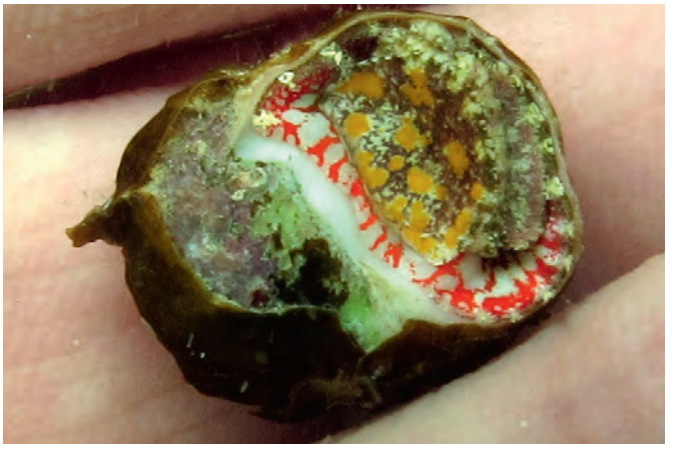


**Fig. 11 h:** *Indomodulus tectum* was turned to show the animal's colour.


12 a
12 b
12 c
12 d
12 e
12 f
11 d, e
11 a - c
13 a
11 f, g


14 a, b
14 c, d
15 c, d
14 e, f
15 e
15 a, b
16 c, d
16 a, b
17 a, b


1 a, b
1 c, d
1 e, f
2 c, d
2 a, b
3 a, b
4 a

## Potamididae H. Adams & A. Adams, 1854

***Pirenella conica*** (Blainville, 1829)

**Plate 88: fig. 12 a:** 22.4 x 7.4 mm; **b:** 15.1 x 5.7 mm; **c:** 11.9 x 4.8 mm; **d:** 10.0 x 4.4 mm; **e:** 5.44 x 2.86 mm; **f:** 5.44 x 2.86 mm (South); all Lagoon; b - d to scale; e, f to scale.

Literature: Bosch et al. 1995, Verbinnen & Dirkx 1997b, Dekker & Orlin 2000, Rusmore-Villaume 2008, Janssen et al. 2011.

This species displays many colour morphs and is a Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007).

***Terebralia palustris*** (Linnaeus, 1767)

**Plate 88: fig. 13 a:** fragment of a fossil shell 75 mm in length.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Angeletti et al. 2019.

A single fragment was found just across the street of the "Dive In Dahab". This species is fossil and extinct in the Red Sea. It is unclear where it came from as there is no fossil reef around.

## Plesiotrochidae Houbrick, 1990

***Plesiotrochus* aff. *acutangulus*** (Yokoyama, 1924)

**Plate 89: fig. 14 a, b:** 3.19 x 1.88 mm (Lagoon); **c, d:** 6.5 x 3.2 mm (Seagrass 12 m); **e, f:** 6.71 x 3.69 mm (Lagoon); a, b to scale with 15 a - e; c - f to scale.

Literature: Dekker & Orlin 2000, Okutani 2000, 2017, Rusmore-Villaume 2008, Janssen et al. 2011.

URL 58: http://umiusagi.s330.xrea.com/shells3image/2006.1.9/plate/acurangulus.html

The Dahab shells have more pronounced axial ribs than the specimens from Safaga (Janssen et al. 2011, see their remarks) and thus, fit better to *P. pagodiformis* (Hedley, 1907) in Strong & Bouchet in Poppe (2008a). In Hedley´s species the lowest part of the whorl above the suture undulates, but there may be more variability than seen in the Dahab shells. The protoconch in the type figure appears more globose but the type specimen itself was not seen.

***Plesiotrochus unicinctus*** (A. Adams, 1853)

**Plate 89: fig. 15 a, b:** 3.20 x 2.03 mm (Islands labyrinth 9 m); **c, d:** 2.32 x 1.19 mm (Moray Garden); **e:** 1.51 x 1.08 mm (Moray Garden); a - e to scale with 14 a, b.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Okutani 2000, 2017, Rusmore-Villaume 2008, Strong & Bouchet in Poppe 2008a.

Depicted as *Plesiotrochus souverbianus* P. Fischer, 1878 in Okutani (2000, 2017) and Poppe (2011).

## Capulidae Fleming, 1822

The Capulidae are known as the cap snails or cap shells.

***Separatista helicoides*** (Gmelin, 1791)

**Plate 89: fig. 16 a, b:** juvenile 2.37 x 1.48 mm (Caves); **c, d:** juvenile 1.28 x 0.94 mm (Caves 17 - 19 m); all to scale with 17 a, b.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Dafni URL 1, Poppe 2008, 2017b, Beu 2010, Okutani 2010, 2017, Janssen et al. 2011.

URL 59: http://seashellsofnsw.org.au/Capulidae/Pages/Separatista_helicoides.htm

Discussions on synonymy can be found in Beu (2010) and URL 59. However, the Dahab specimens seem to have different protoconchs and spire heights than synonymous species.

***Separatista* aff. *flavida*** (Hinds, 1843)

**Plate 89: fig. 17 a, b:** 2.20 x 1.85 mm (Caves 15 m); to scale with 16 a - d.

Literature: Poppe 2008a, 2017, Beu 2010.

URL 60: http://www.gastropods.com/6/Shell_51796.shtml
URL 61: https://seashellsofnsw.org.au/Capulidae/Pages/Sirius_idoneus.htm

A different protoconch and faint axial cords which form nodules on the intersections with the spiral cords separate it from *S. helicoides*. The type of *S. flavida* (URL 60) has a more elevated shell compared to the probable juvenile from Dahab. Poppe (2008a, 2017) lists a similar shell in the genus *Trichotropis*. *Sirius idoneus* (Iredale, 1931) is also similar (URL 60).

## Epitoniidae Berry, 1910 (1812)

The Epitoniidae commonly known as wentletraps, appear to be predators or parasites on sea anemones or corals (Weil et al. 1999). Several subgenus names have been proposed in *Epitonium* but following WoRMS they are not used here. The "?" before the genus name is retained in several species in WoRMS. For bibliography of the descriptive and systematic literature of the Recent Epitoniidae see Brown & Neville (2015).

Within 49 sand samples 14 species with an average of 1.33 species per sample were found. The maximum were 6 different species each in 100 ml at Canyon 11 m and Tigerhouse 7 m. In Caves 16 m (1000 ml) and Blue Hole 4 m (100 ml) 4 species were found each. *Epitonium yemenita* was present 18 times, *C. hyalina* 10 times and *Epitonium kilburni* 8 times. In 19 samples no Epitoniidae were found. *Epifungium adgranulosa*, *Epitonium dubium* and *Epitonium* aff. *irregulare* were collected during dives from the sand surface but were never found in the sediment samples.

***Cycloscala hyalina*** (G. B. Sowerby II, 1844)

**Plate 90: fig. 1 a, b:** 2.53 x 1.34 mm (Islands 14 m); **c, d:**.1.91 x 1.37 mm (Blue Hole 4 mm); **e, f:** 5.43 x 2.38 mm (Lagoon 12 m); a - d to scale.

Literature: Kaicher card (3117), Kilburn 1985, Bosch et al. 1995, Singer 1998, Weil et al. 1999, Blatterer et al. 2000, Dekker & Orlin 2000, Okutani 2000, García 2004a, Dafni URL 1, Rusmore-Villaume 2008, Brown in Poppe 2008a, Singer et al. 2011.

This elegant small species has quite distinct whorls, which do not even come into contact with each other through varices. The varices are distant, laminated, and beautifully fluted (Sowerby II, 1844).


5 a, b
5 c, d
6 a, b
6 c, d
7 c
7 a, b
7 d, e
7 f, g

***Epidendrium aureum*** A. GITTENBERGER & E. GITTENBERGER, 2005

**Plate 90: fig. 2 a, b:** 6.81 x 3.90 mm (Moray Garden 2 m); **c, d:** 3.66 x 2.60 mm (Blue Hole 20 m).

Literature: DEKKER & ORLIN 2000, OKUTANI 2000, 2017, A. GITTENBERGER & E. GITTENBERGER 2005.

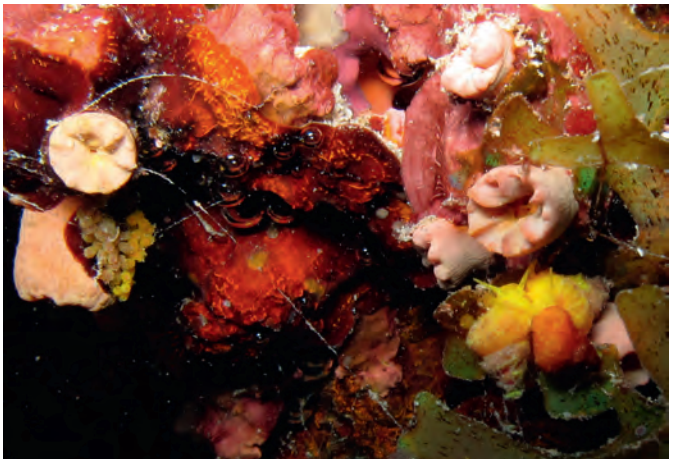


**Fig. 1 e:** Three specimens of *Epidendrium aureum*. The egg-capsules at the left are ovoid, yellowish, with conspicuous protuberances (Moray Garden 2 m).

Before its description the species was misidentified as *Epidendrium billeeanum* (DUSHANE & BRATCHER, 1965). That species differs in having a dark purplish red protoconch instead of a white to yellowish one. It was found alive in a depth of 30 m at a drop off below Caves.

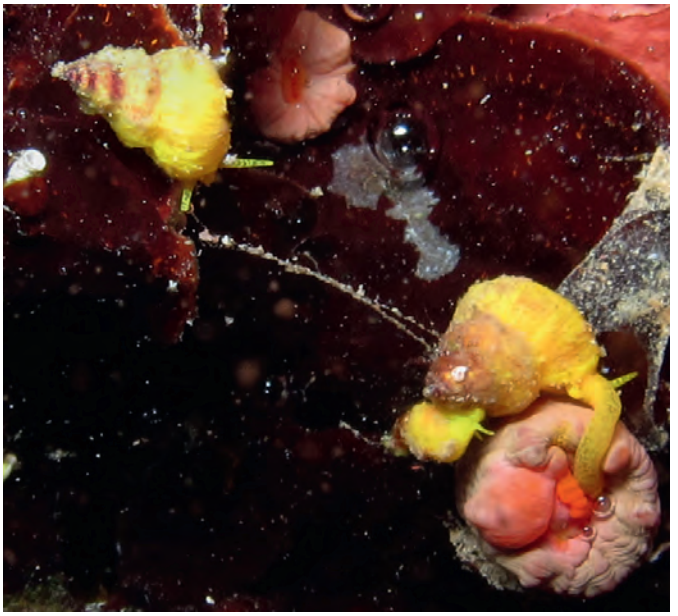


**Fig. 1 f:** Three specimens of *Epidendrium aureum* are in situ brightly yellow coloured (overhanging fringing reef Moray Garden 2 m). The right one is feeding on *Tubastrea* (Dendrophylliidae).

***Epifungium adgranulosa*** A. GITTENBERGER & E. GITTENBERGER, 2005

**Plate 90: fig. 3 a, b:** 6.37 x 3.04 mm (El Gahaza); to scale with 1 e, f and 2 a, b; specimen preserved in Ethanol.

Literature: A. GITTENBERGER & E. GITTENBERGER 2005.

In their early whorls the Dahab specimens are similar to those of *Epitonium dubium*. But in the 7th whorl of that species there are about 30 fine spiral threads whereas in the 7th whorl of *E. adgranulosa* there are only about 14. In the 5th whorl there are 9 or 10 main threads. On careful observation, much finer spirals can be detected within them. Together with fine axial growth lines they form a reticulated (quadrangular) pattern. The Dahab specimen falls within all measurements summarised in A. GITTENBERGER & E. GITTENBERGER (2005: Table 1) and it is known from the Red Sea. It differs from similar species most clearly by its only slightly convex, instead of distinctly convex whorls and by the costal ribs touching the preceding whorls while curving towards the aperture.



**Fig. 3 c:** *Epifungium adgranulosa* in a Petri dish from El Gahaza. It was found alive on *Pleuractis* sp. (Fungiidae).

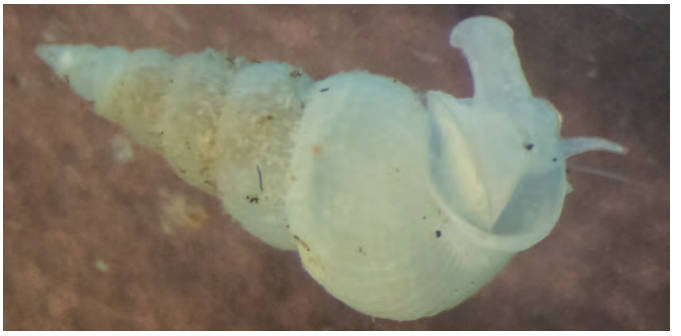


**Fig. 3 d:** *Epifungium adgranulosa* in a Petri dish from El Gahaza. Shell, animal, and operculum are white, eyes are black.

***Epitonium* cf. *amicum*** (JOUSSEAUME, 1894)

**Plate 90: fig. 4 a:** 2.2 x 1.5 mm (Tigerhouse 7 m).

URL 62: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-4174

Only a fragment was found, but it is different to other species collected in Dahab. It comes close to the syntype of *E. amicum* (JOUSSEAUME, 1894) in URL 62. Interestingly, *Epitonium amicum* is certainly the most common member of the family in the Northern Red Sea (M.L. RUSMORE-VILLAUME pers. comm.). There are more spiral cords which are less prominent as e.g. in *Epitonium* cf. *avalites* (JOUSSEAUME, 1912) or *E. kilburni* DRIVAS & JAY, 1989. The costae are more reflected than in these species or e.g. *E. coutieri*.


9 a, b
9 c, d
8 a, b
10 a, b
11 e
11 a, b
11 c, d

*Epitonium audouini* (JOUSSEAUME, 1894)

**Plate 91: fig. 5 a, b:** 2.3 x 1.1 mm (Canyon 45 m); **c, d:** 2.42 x 1.17 mm (Bells - Blue Hole 29 m).

Literature: DEKKER & ORLIN 2000, SINGER et al. 2011.

URL 63: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-4207
URL 64: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-4346

The two specimens have a less prominent spiral sculpture and the axial ribs are thinner (not lamellated) and narrower than in *E. gradilis* (JOUSSEAUME, 1912). They fit to the syntype of *E. audouini* (URL 63), KAICHER card (3117) and the specimen in WEIL et al. (1999) but have only 9 - 10 axial ribs which represents the lower end of the variability observed for this species (10 - 13; WEIL et al. 1999, SINGER et al. 2011). *Epitonium vaillanti* (JOUSSEAUME, 1912), syntype in URL 64 and KAICHER card (3048) is quite similar but appears to have more convex and less crowned axial ribs.

*Epitonium coutieri* (JOUSSEAUME, 1912)

**Plate 91: fig. 6 a, b:** 1.88 x 1.24 mm (El Gahaza 3 m); **c, d:** 2.0 x 1.38 mm (Canyon 11 m).

Literature: SINGER 1998, WEIL et al. 1999, DEKKER & ORLIN 2000, SINGER et al. 2011.

URL 65: https://science.mnhn.fr/taxon/species/innesiscala/coutieri

The specimens have ca. 25 slightly shouldered costae per whorl with prominent spiral cords in between. They match the syntype depicted in URL 65.

*Epitonium crispatum* (PEASE, 1868)

**Plate 91: fig. 7 a, b:** 6.08 x 3.24 mm (Islands 14 m); **c:** 1.45 x 0.94 mm (Canyon 11 m); **d, e:** 3.0 x 1.7 mm (Moray House 17 m); **f, g:** 1.20 x 0.74 mm (Moray House 17 m); c to scale with 5 a - d and 6 a - d; d - g to scale.

Literature: WEIL et al. 1999, DEKKER & ORLIN 2000, NAKAYAMA 2003.

URL 66: http://www.arsint.com/seashells_epitoniidae_amaea.html
URL 67: http://www.animalbase.uni-goettingen.de/zoo-web/servlet/AnimalBase/list/thumbnails?taxon_id=50291&include_synonyms=false

The undulating (frilled) and crenulated costae and the spiral cords in between are characteristic for this species. There are ca. 7 main spiral cords on early whorls. On later whorls there are many finer spiral threads between the main ones. The undulation is not seen in early whorls and juvenile specimens (see following species). The large shell (still a juvenile?) matches the original figure and description but is smaller (20 x 10 mm in PEASE). The lectotype depicted in JOHNSON (1994) measures 16 mm. Two specimens under this name, however, show some variability (URL 67). Another larger (15.3 mm) probably conspecific specimen from the Arabian See with undulating costae is shown as *Amaea aspicienda* (URL 66). The original *A. aspicienda* (MELVILL, 1912) has more axial costae per whorl which are not undulating. The costae of *E. jomardi* (AUDOUIN, 1826) are stronger and not crenulated.

The smaller specimens have some similarity to *E. avalites* (JOUSSEAUME, 1912) in WEIL et al. (1999: fig. 224) but are relatively broader with more costae per whorl. *Epitonium kilburni* DRIVAS & JAY, 1989 has stronger axial costae that appear more crenulated because of the underlying spiral ribs. Furthermore, they always have some brown in the protoconch while that of *E. crispatum* is white.

*Epitonium dubium* (G. B. SOWERBY II, 1844)

**Plate 92: fig. 8 a, b:** 17.5 x 8.8 mm (South).

Literature: SOWERBY II 1844, BROWN & NEVILLE 2015.

URL 68: http://www.gastropods.com/9/Shell_14959.shtml
URL 69: http://www.gastropods.com/4/Shell_9544.shtml
URL 70: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-4282

The specimen matches in size, shape, white colour, fragility, 31 faint axial costae on the last whorl which look partly eroded and spiral sculpture the original figure and description, as well as the picture of the probable holotype (KAICHER card 3036). The number of very fine spiral threads exceeds 60 on the penultimate whorl (not quantified in other descriptions). The umbilicus is open perhaps because of the broken aperture. A juvenile (6.4 mm) was found alive on mushroom coral (Fungiidae). *Epitonium ancillottoi* COSSIGNANI & COSSIGNANI, 1998 was not compared to *E. dubium* in the original description and is very similar (URL 68). The type specimen of *E. irregulare* (SOWERBY II, 1844) (URL 69) lacks spiral threads (see both species in KOKSHOORN et al. 2007). BROWN & NEVILLE (2015) consider *E. ancillottoi* to be a junior subjective synonym of *E. grayi* (NYST, 1871) (= *Scalaria striata* GRAY, 1847). *Amaea aspicienda* (MELVILL, 1912) (syntype in WEIL et al. 1999: fig. 233) is similar but has more axial costae on the last whorl and a basal ridge is present, possibly due to a broken whorl. *Epitonium jomardi* (AUDOUIN, 1826) has more convex whorls and fewer spiral threads between the stronger costae (SINGER 2011, URL 70).

*Epitonium fauroti* (JOUSSEAUME, 1912)

**Plate 92: fig. 9 a, b:** 4.47 x 2.12 mm (Caves 16 m); **c, d:** 2.33 x 1.30 mm (Canyon 29 m); c, d to scale with 11 a - d.

Literature: WEIL et al. 1999, SINGER et al. 2011.

The specimens have ca. 10 strong slightly shouldered costae per whorl and no or faint spiral cords in between. Identification is based on WEIL et al. (1999). The specimens resemble *E. savignyi* (JOUSSEAUME, 1912) in SINGER et al. (2011) but in *E. savignyi* costae are strongly peaked below the suture and almost wing-like (WEIL et al. 1999, RUSMORE-VILLAUME 2008). *Epitonium goniophorum* (MELVILL & STANDEN, 1903) is more elongate (BOSCH et al. 1995, WEIL et al. 1999).

*Epitonium gracile* (G. B. Sowerby II, 1844)

**Plate 92: fig. 10 a, b:** 3.88 x 1.80 mm (Lagoon 12 m).

Literature: Weil et al. 1999, Singer et al. 2011, Bonfitto 2017.

The 7 - 8 axial ribs per whorl of this worn specimen have slight coronations at the shoulder. A faint quadrangular pattern with more pronounced spiral threads forming a cancellate granulose microsculpture can only be perceived at 70x magnification on a few less worn intersections. The similar *E. fucatum* (Pease, 1861) (type from Hawaii) has regular faint quadrangular microsculpture with spiral and axial threads of similar thickness (Bonfitto 2017). The specimen is more elongated than *E. fauroti* (Jousseaume, 1912) with reflected costae and only fine spiral and axial threads in between.

*Epitonium gradilis* (Jousseaume, 1912)

**Plate 92: fig. 11 a, b:** 2.05 x 1.10 mm (Lagoon 13 m); **c:** 2.2 x 1.0 mm (Canyon 45 m); a - d to scale with 9 c, d.

Literature: Dekker & Orlin 2000, Brown in Poppe 2008a, Bonfitto 2017.

URL 71: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-4246

URL 72: http://www.femorale.com/kaicher/species.asp?f=Epitoniidae&c=125

The type specimen of *Avalitiscala gradilis* Jousseaume, 1912 (URL 71) has 10 axial lamellate ribs and the interstices are not reticulate (Bonfitto 2017; *Avatiliscala* [sic.]). In this respect the Dahab specimens fit well, however, they show a more prominent coronation at least on some ribs. For one of the syntypes (Kaicher card 3100) more erect costae per whorl (ca. 12) are mentioned (URL 72).

*Epitonium kilburni* Drivas & Jay, 1989

**Plate 93: fig. 12 a, b:** 2.38 x 1.44 mm (Islands north 10 m); **c, d:** 2.33 x 1.36 mm (Islands labyrinth 10 m); **e, f:** 2.27 x 1.52 mm (Islands north 10 m); **g, h:** 1.45 x 0.97 mm (Islands labyrinth 10 m); **i, j:** 1.45 x 1.03 mm (Canyon 11 m); **k:** 1.7 x 1.2 mm (Caves 18 m); **l, m:** 3.80 x 2.25 mm (Tigerhouse 7 m); a - h to scale; i - k to scale with 13 a, b.

Literature: Drivas & Jay 1989b, Weil et al. 1999.

URL 73: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-4287

Specimens are small, relatively broad, with 17 - 20 strong, crenulated costae per whorl and 4 - 5 prominent spiral cords in between (10 specimens counted). When the last whorl is broken one more spiral cord can be seen above the remaining callus. It appears as if in the subsutural space where one might expect the most posterior spiral cord, that cord is missing or only faintly present. On the outside of the aperture there are up to 7 spiral cords. Shells are partly translucent white with a hint of brown. The paratype in Weil et al. (1999: fig. 174) fits well to most of the smaller specimens (12 a - f). They have the same number of costae (18 in Drivas & Jay 1989b) but may differ in colouration. The type in URL 73 superficially matches the same sized somewhat worn brown specimen (fig. 12 l, m) from Dahab (see also *E. crispatum*).

*Epitonium* aff. *coutieri* (Jousseaume, 1912)

**Plate 93: fig. 13 a, b:** 1.90 x 1.08 mm (Canyon 32 m); to scale with 12 i - k.

This specimen appears to lack the angular shouldered whorls which are characteristic for *E. coutieri* and probably belongs to a different species (L. Brown pers. comm.). It has also some similarity to *E. kilburni,* but the costae are not crenulated.

*Epitonium* aff. *irregulare* (G. B. Sowerby II, 1844)

**Plate 93: fig. 14 a, b:** aperture height 10.6 mm (Islands).

The specimen is too damaged to be identifiable with certainty. It appears to be one of the species that have been referred to the genus/subgenus *Papyriscala* de Boury, 1909. There are approximately 47 costae on the last whorl, the umbilicus is open, the aperture is oval, and no spiral threads are visible. In Sharabati (1984) it is listed as *E. irregulare* (Sowerby, 1844) which was corrected to *Epitonium* sp. by Dekker & van Gemert (2008). *Epitonium malhaensis* (Jousseaume, 1894) is smaller (up to 15 mm), has fewer costae and according to Weil et al. (1999) spiral lines can be seen between the costae. The only confirmed records of *E. irregulare* are from the western Pacific, far from the Red Sea (L. Brown pers. comm.).

*Epitonium thorssoni* DuShane, 1988

**Plate 94: fig. 15 a, b:** 1.55 x 1.07 mm (Golden Blocks 23 m); to scale with 16 c, d, 17 c, d and 19 a, b.

Literature: DuShane 1988, Drivas & Jay 1989b, Weil et al. 1999, Dekker & Orlin 2000, Brown in Poppe 2008a, Poppe 2017a.

URL 74: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-4241

URL 75: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-4253

The specimen matches the original description especially concerning the scalloped costae and the 2 diffused brown bands. It differs in the higher number of costae per whorl (16 vs. 13) and more spiral cords within the intervals between the costae. The proposed synonyms *E. dipterophorum* Drivas & Jay, 1989 and *E. herosae* Drivas & Jay, 1989 fall within this range (URL 74, URL 75).

*Epitonium yemenita* (Bonfitto, 2017)

**Plate 94: fig. 16 a, b:** 4.2 x 1.7 mm (Caves 18 m); **c, d:** 1.95 x 0.94 mm (Caves 17 m); a, b to scale with 17 a, b and 18 a - d; c, d to scale with 15 a, b, 17 c, d and 19 a, b.

Bonfitto described this species in the subgenus *Laeviscala*. Approximately 10 axial ribs are present on the penultimate whorl. They are lamellate, reflexed, and have coronations at the shoulder. The stronger spiral threads are more widely spaced than the faint axial threads, which results in rectangular meshes without granulation at the intersection (Bonfitto 2017). This pattern is hard to see in early whorls. Thus, young specimens are not easy to discern from *E. gradilis*. *Epitonium fucatum* (Pease, 1861) in Rusmore-Villaume (2008) is conspecific with *E. yemenita* according to her description, and the shell in Singer et al. (2011) might be conspecific as well.


12 a, b
12 k
12 g, h
12 i, j
12 l, m
12 c, d
12 e, f
13 a, b
14 a, b

*Opalia bicarinata* (G. B. SOWERBY II, 1844)

**Plate 94: fig. 17 a, b:** 5.49 x 1.70 mm (Caves 18 m); **c, d:** 1.58 x 0.86 mm (Caves 16 m); a, b to scale with 16 a, b and 18 a - d; c, d to scale with 15 a, b, 16 c, d and 19 a, b.

Literature: WEIL et al. 1999, DEKKER & ORLIN 2000, GARCÍA 2004b, BROWN in POPPE 2008a.

The teleoconch whorls are slowly broadening and therefore the specimen is slenderer than *O. pupipunctata*. The width/length ratio of the whole specimen is 0.31. The axial ribs are generally weak, forming a double row of 8 - 10 low nodules on the body whorl, resembling a double keel. The aperture is ellipsoid with a broad margin and is at an oblique angle to the body axis. The subsutural nodules (crenules in WEIL et al. 1999) are flattened. On the early whorls they are separated by shallow pits and on the later whorls by deeper pits. The holes in the intritacalx are arranged along shallow spiral striae. The protoconch consists of ca. 3 whorls and is white with a somewhat darker suture. The operculum is coloured dark brown. SOWERBY illustrated a specimen without a varix and mentions that varices are very scarce, in some specimens altogether wanting. The differentiation of *O. attenuata* (PEASE, 1860) in KILBURN (1985) "intritacalx punctae not associated with spiral striae" is probably a less significant distinctive feature; several authors consider *O. attenuata* to be a synonym (CERNOHORSKY 1978, DUSHANE 1988, GARCÍA 2004b, BROWN & NEVILLE 2015) of *O. bicarinata*. *Opalia bardeyi* ((JOUSSEAUME, 1912) in SINGER et al. (2011) is also similar.

*Opalia pupipunctata* (de BOURY, 1911)

**Plate 94: fig. 18** a**, b:** 3.44 x 1.34 mm (Islands 10 m); **c, d:** 4.51 x 1.81 mm (Tigerhouse 7 m); all to scale with 16 a, b and 17 a, b.

Literature: WEIL et al. 1999, DEKKER & ORLIN 2000, GARCÍA 2004b.

URL 76: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-4385

The first whorls broaden relatively quickly. One specimen has an oblique axis after the varix. The width/length ratios in the two specimens are 0.39 and 0.40 thus relatively broader than in *O. bicarinata*. Subsutural nodules (crenules in WEIL et al. 1999) are flattened and separated by shallow pits. The holes in the intritacalx are arranged along shallow spiral striae. The protoconch has ca. 3 whorls and is dirty white to light brown with a darker suture. *Opalia pupipunctata* is a replacement name for *Nodiscala bouryi* JOUSSEAUME, 1894 (BROWN & NEVILLE 2015). The type from Jeddah, Red Sea is depicted in WEIL et al. (1999: fig. 349) and URL 76. See also pictures of shells with straight axis under this name from Safaga (KURTZ 2015) and New Caledonia (GARCÍA 2004b: 13, fig. 42 - 44). *Opalia crassilabrum* (G. B. SOWERBY II, 1844) is a very similar species, but GARCÍA (2004b) keeps the species separate. The type specimen of SOWERBY´s species is evidently lost (KILBURN 1985). BOSCH et al. (1995) show two specimens of different size (up to 15 mm) with this name. *Opalia crassilabrum* in WEIL et al. (1999: fig. 340) matches neither *O. pupipunctata* from Dahab nor the original description (size 4.8 mm). Its costae are much too regular, reach over the entire whorl and the crenulation of the suture cannot be seen. The protoconch appears to be different as well.

*Opalia* sp.

**Plate 94: fig. 19 a, b:** 1.73 x 0.83 mm (Moray Garden 37 m); to scale with 15 a, b, 16 c, d and 17 c, d.

Only one probably juvenile specimen was found. It has some similarity to *O. mammosa* (MELVILL & STANDEN, 1903) depicted in KURTZ (2015). However, in the original picture the shell appears more pupiform and the protoconch is relatively shorter and broader.

## Hipponicidae TROSCHEL, 1861

The common name of Hipponicidae is hoof shells or hoof snails.

*Antisabia* cf. *imbricata* (G. B. SOWERBY III, 1889)

**Plate 95: fig. 1 a, b:** 2.83 x 1.39 mm (Golden Blocks 23 m).

Literature: JANSSEN et al. 2011, POPPE 2017a, b.

URL 77: https://naturalhistory.museumwales.ac.uk/molluscatypes/browserecord.php?-recid=81&-sortfieldone=TaxonomySort&-sortfieldtwo=&-skip=50

The protoconch is eroded but still more prominent than in the holotype (URL 77). Additionally, the colour is pinkish. *Sabia* sp. in JANSSEN et al. (2011) has a reddish colour but the protoconch appears different (see their remarks). The whitish specimens in POPPE (2017a, b) were assigned to *Amathina imbricata* in the Amathinidae.

*Cheilea cicatricosa* (REEVE, 1858)

**Plate 95: fig. 2 a - c:** 23.7 mm (South); **d - f:** 19.0 x 17.4 mm (Blue Lagoon); all to scale.

Literature: BOSCH et al. 1995, DAFNI URL 1, RUSMORE-VILLAUME 2008, POPPE 2017a.

Specimens have a brown protoconch with ca. 2 whorls.

*Cheilea* sp.

**Plate 95: fig. 3 a - c:** 6.42 x 6.40 mm (Blue Lagoon); **d, e:** 3.41 x 2.98 mm (Caves 16 m); d, e to scale with 4 a, b.

URL 78: http://vieoceane.free.fr/mollusques/Hipponicidae.htm

Two specimens have a white protoconch with ca. 1 whorl.


15 a, b
16 a, b
16 c, d
17 a, b
17 c, d
18 a, b
18 c, d
19 a, b

*Hipponix* cf. *prionocidaricola* (HABE & KANAZAWA, 1991)

**Plate 95: fig. 4 a, b:** 6.24 x 4.58 mm (Umm Sid 13 m); **c, d:** 10.8 x 6.0 mm (from the sea urchin *Phyllacanthus imperialis* at Islands); a, b to scale with 2 d, e and 5 a, b.

Literature: OKUTANI 2000, 2017, DAFNI URL 1, POPPE 2008a.

URL 79: http://www.bagniliggia.it/WMSD/HtmSpecies/1480150060.htm

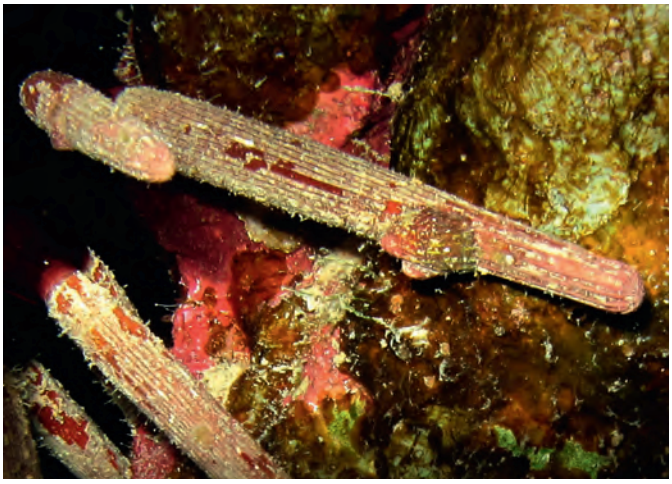


**Fig. 4 e:** *Hipponix* cf. *prionocidaricola* on *Phyllacanthus imperialis* during a night dive at Islands.

Specimens were collected from the spines of the sea urchin *Phyllacanthus imperialis*. HABE & KANAZAWA found it on *Prionocidaris baculosa*, a sea urchin from the same family, which indicates a close relationship.

*Sabia conica* (SCHUMACHER, 1817)

**Plate 95: fig. 5 a, b:** 3.82 x 3.74 mm (Blue Hole 4 m); **c:** 8.5 mm (on *Drupella cornus* of 29.8 mm in length); a, b to scale with 2 d, e and 4 a, b.

Literature: BOSCH et al. 1995, DEKKER & ORLIN 2000, RUSMORE-VILLAUME 2008, POPPE 2008a, SCAPERROTTA et al. 2014.

Specimens were found on different species, e.g. *Cerithium*, *Conus*, *Drupa*, *Harpa*, *Latirus*, *Nassa*, *Turbo* or *Tutufa bufo* (pl. 143, fig. 5 b).



**Fig. 5 d:** *Sabia conica* on *Cerithium adansonii*. Thirteen specimens can be recognised in this image; most juveniles sit on adults and an attachment scar is visible when removed.



**Fig. 5 e:** *Sabia conica* on *Puncticulis aequipunctatus*.

## Littorinidae CHILDREN, 1834

The Littorinidae are commonly known as the winkles or periwinkles. They are common members of the upper intertidal zone on rocky shores, where they graze on algae.

*Echinolittorina marisrubri* REID, 2007

**Plate 96: fig. 1 a, b:** 8.43 x 5.51 mm (North); to scale with 3 a, b.

Literature: BOSCH et al. 1995, DEKKER & ORLIN 2000, VERBINNEN & DIRKX 2005b, REID 2007.

This species is on average smaller than *E. subnodosa*. The spiral threads between the 3 rows of white nodules are granulose.

*Echinolittorina millegrana* (PHILIPPI, 1848)

**Plate 96: fig. 2 a, b:** 4.56 x 4.02 mm (South); **c, d:** 3.13 x 2.22 mm (South).

Literature: DEKKER & ORLIN 2000, VERBINNEN & DIRKX 2005b, REID 2007, RUSMORE-VILLAUME 2008.

It is more globose than the other congeners, has a shiny black protoconch and lighter body whorls.



**Fig. 2 e:** *Echinolittorina millegrana* on intertidal rocks at Caves.

(continued after plate)


2 a - c
3 d, e
3 a - c
2 d - f
4 c, d
4 a, b
1 a, b
5 a, b
5 c



**Fig. 2 e:** *Echinolittorina millegrana* on intertidal rocks at Caves.

***Echinolittorina subnodosa*** (PHILIPPI, 1847)

**Plate 96: fig. 3 a, b:** 7.08 x 5.55 mm (Lagoon); to scale with 1 a, b.

Literature: DEKKER & ORLIN 2000, VERBINNEN & DIRKX 2005b, REID 2007, RUSMORE-VILLAUME 2008.

There are 3 relatively widely spaced spiral rows of nodules on the body whorl, the intervening threads are not granulose and brown lines are connecting the nodules. The confusion of this species with *E. marisrubri* was solved by REID (2007) who lists synonymies. The shell depicted as *E. marisrubri* in RUSMORE-VILLAUME (2008: 46) is *E. subnodosa*.



**Fig. 3 c:** *Echinolittorina subnodosa* exposed during low tide at Islands.

***Littoraria intermedia*** (PHILIPPI, 1846)

**Plate 96: fig. 4 a, b:** 15.5 x 10.5 mm (Nabq).

Literature: VINE 1986, REID 1986, BOSCH et al. 1995, DEKKER & ORLIN 2000, VERBINNEN & DIRKX 2005b, RUSMORE-VILLAUME 2008.

Specimens were only found in the mangrove area at Nabq. VINE (1986) lists it as *Littorina scabra*.



**Fig. 4 c:** *Littoraria intermedia* on mangrove trunk at Nabq.

***Peasiella infracostata*** (ISSEL, 1869)

**Plate 96: fig. 5 a, b:** 1.78 x 1.61 mm (Blue Hole 36 m); **c, d:** 1.40 x 1.20 mm (Tigerhouse); all to scale with 6 a, b.

Literature: BOSCH et al. 1995, REID & MAK 1998, DEKKER & ORLIN 2000, JANSSEN et al. 2011.

Specimens are usually smaller and squatter than the following species (*P. isseli*), with squarish shoulders and without a keel. Taxonomy and distribution of *Peasiella* is discussed in REID & MAK (1998).

***Peasiella isseli*** (SEMPER in ISSEL, 1869)

**Plate 96: fig. 6 a, b:** 1.71 x 1.46 mm (Tigerhouse); **c, d:** 2.60 x 2.28 mm (Lagoon) with operculum inside; a, b to scale with 5 a - d.

Literature: REID & MAK 1998, DEKKER & ORLIN 2000, DAFNI URL 1, VERBINNEN & DIRKX 2005b, RUSMORE-VILLAUME 2008, JANSSEN et al. 2011.

This species has a distinct peripheral keel on the last whorl. It was more frequently found than the former species. Dark brown morphs were found of both *Peasiella* species.

## Naticidae GUILDING, 1834

Naticidae are known by their common name moon snails or necklace shells. They live on sandy substrates and feed mostly on bivalves and other mollusca. Using the radula and an acidic secretion they bore a hole through the victim's shell. Moon snails lay a characteristic stiff egg mass which includes sand and mucus, also known by the common name sand collars.


2 c, d
3 a, b
2 a, b
1 a, b
4 a, b
5 e
5 a, b
5 c, d
6 a, b
6 c, d


1 a, b
3 a, b
2 a, b
4 a - c
2 c, d
4 d, e
4 f, g
5 a, b
6 a, b

## Naticinae Guilding, 1834

### *Natica pseustes* R. B. Watson, 1881

**Plate 97: fig. 1 a, b:** 10.5 x 6.8 mm.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Dafni URL 1, Heiman & Mienis 2004, Hollmann in Poppe 2008a, Verbinnen & Wils 2008.

This species has often been considered a synonym of *N. buriasiensis* Récluz, 1844. *Natica pseustes* is larger (max. ca. 17 mm) and is more widely distributed in the Indo-West Pacific. It shows an intricate pattern of triangles and often a band with darker brown maculations near the suture. The smaller (max. ca. 11 mm) *N. buriasiensis* has a pattern of undulating axial brown lines and lacks the brown maculations near the suture. Additionally, it has a narrower distribution and is mainly found from Japan to the Philippines (H. Dekker pers. comm.).

### *Naticarius onca* (Röding, 1798)

**Plate 97: fig. 2 a, b:** 15.1 x 11.8 mm (Lagoon); **c, d:** operculum 2.57 x 1.60 mm (Caves 10 m).

Literature: Sharabati 1984, Dekker & Orlin 2000, Dafni URL 1, Heiman & Mienis 2004, Hollmann in Poppe 2008a, Rusmore-Villaume 2008, Verbinnen & Wils 2008.

There are clearly separated brown markings on the white shell.

### *Notocochlis cernica* (Jousseaume, 1874)

**Plate 97: fig. 3 a, b:** 12.3 mm.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Heiman & Mienis 2004, Dafni URL 1, Hollmann in Poppe 2008a, Verbinnen & Wils 2008.

URL 80: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-5244

The base of the shell is white and the funiculus more elongated, not half-moon shaped as in *N. gualtieriana*. The syntype is depicted in URL 80.

### *Notocochlis gualtieriana* (Récluz, 1844)

**Plate 97: fig. 4 a - c:** 19 mm; **d, e:** juvenile 4.58 x 4.48 mm (Lagoon); **f, g:** 18 mm; a - c, f, g to scale.



**Fig. 15 h:** *Notocochlis gualtieriana* crawling on sand at El-Qura Bay.

Literature: Sharabati 1984, Bosch et al. 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Heiman & Mienis 2004, Dafni URL 1, Hollmann in Poppe 2008a, Rusmore-Villaume 2008, Verbinnen & Wils 2008.

The species is variable in colour and pattern of the darker blotches or lines. A half-moon shaped funiculus nearly fills the umbilicus. It is the most abundant naticid in Dahab.



**Fig. 15 i:** *Notocochlis gualtieriana* crawling on sand at El-Qura Bay.



**Fig. 15 j:** *Notocochlis gualtieriana* attacking *Mactra achatina* at El-Qura Bay.

### Naticidae Gen. sp. 1

**Plate 97: fig. 5 a, b:** 1.00 x 0.84 mm (Caves 18 m); to scale with 6 a, b.

See the remark in Naticidae sp. 2.

### Naticidae Gen. sp. 2

**Plate 97: fig. 6 a, b:** 0.86 x 0.69 mm (Caves 18 m); to scale with 5 a, b.

Naticidae Gen. sp. 1 and Naticidae Gen. sp. 2 are likely protoconchs of other species recorded from Dahab.


7 a, b
8 c
8 a, b
9 a, b
10 a, b
11 a, b
12 a, b

## Polinicinae Gray, 1847

*Mammilla melanostoma* (Gmelin, 1791)

**Plate 98: fig. 7 a, b:** 44 mm (Blue Lagoon).

Literature: Sharabati 1984, Bosch et al. 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Heiman & Mienis 2004, Rusmore-Villaume 2008, Verbinnen & Wils 2008.

The columellar callus is entirely dark brown.

*Mammilla simiae* (Deshayes, 1838)

**Plate 98: fig. 8 a, b:** 20.0 x 17.2 mm; **c:** 16.4 x 13.7 mm; a - c to scale.

Literature: Bosch et al. 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Heiman & Mienis 2004, Rusmore-Villaume 2008, Verbinnen & Wils 2008.

The columellar callus is dark brown with a white central blotch.



**Fig. 19 d:** *Mammilla simiae* at Masbat Bay turned to show the operculum.

*Polinices mammilla* (Linnaeus, 1758)

**Plate 98: fig. 9 a, b:** 34.1 x 25.8 mm.

Literature: Sharabati 1984, Bosch et al. 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Heiman & Mienis 2004, Rusmore-Villaume 2008, Verbinnen & Wils 2008.

The shell is very robust and entirely white.

## Sininae Woodring, 1928

*Eunaticina linneana* (Récluz, 1843)

**Plate 98: fig. 10 a, b:** 11.6 mm (Islands).

Literature: Dekker & Orlin 2000, Verbinnen & Wils 2008.

This white shell has a deep open umbilicus, a partial periostracum and many narrow spiral grooves.

*Eunaticina papilla* (Gmelin, 1791)

**Plate 98: fig. 11 a, b:** 16.5 x 14.2 mm (Lagoon).

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Beu 2004, Heiman & Mienis 2004, Hollmann in Poppe 2008a, Rusmore-Villaume 2008, Öztürk & Bitlis-Bakir 2013b.

This white shell with partial periostracum has broader ribs and interspaces and a narrower umbilicus then the former species. It was misidentified as the former species *E. linneana* in Heiman & Mienis (2004).

*Sigatica mienisi* (Kilburn, 1988)

**Plate 98: fig. 12 a, b:** 10.0 mm (Islands).

Literature: Dekker & Orlin 2000, Heiman & Mienis 2004, Dafni URL 1, Rusmore-Villaume 2008.

There is a deep open umbilicus with a “tooth” protruding into it from the outside of the columella (Rusmore-Villaume 2008).



**Fig. 13:** Naticidae egg deposit at Lagoon.

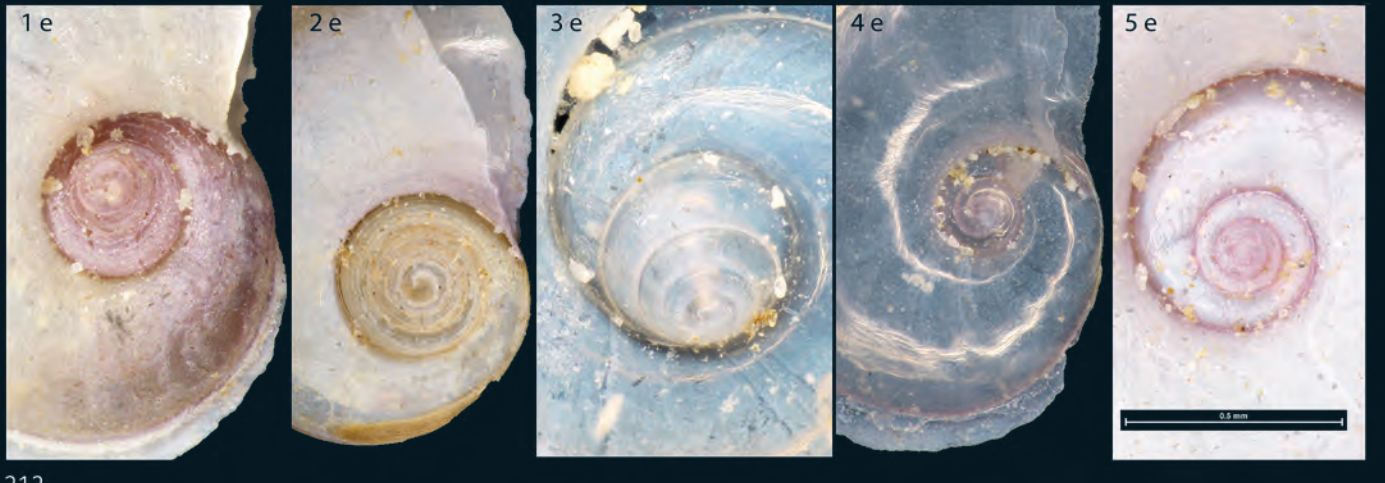


**Fig. 14:** Naticidae egg deposit at Eel Garden.

## Atlantidae Rang, 1829

Atlantidae are small holoplanktonic sea snails, which are adapted to pelagic life and prey on small invertebrates. They can retract into their shell and close it off with a cartilaginous, flexible operculum. I never collected plankton samples in Dahab, but their shells were most abundant in sediments of the dive site Caves. Probably they had been preyed on by various filter feeders and the undigested shells sank to the bottom.


1 a, b
1 c, d
2 a, b
2 c, d
3 a, b
3 c, d
4 a, b
4 c, d
5 a, b
5 c, d


1 e
2 e
3 e
4 e
5 e
0.5 mm

*Atlanta brunnea* J.E. GRAY, 1850

**Plate 99: fig. 1 a, b:** 1.60 x 1.42 mm; **c, d:** 1.71 x 1.47 mm; **e:** protoconch of 1 a; 1 - 5 e to scale, scalebar 0.5 mm.

Literature: DEKKER & ORLIN 2000, BANDEL 2007, JANSSEN 2007, 2012, SCAPERROTTA et al. 2010, WALL-PALMER et al. 2018.

A spiral sculpture is visible on early teleoconch whorls. *Atlanta fusca* SOULEYET, 1852 is a synonym (JANSSEN, 2012).

*Atlanta helicinoidea* J.E. GRAY, 1850

**Plate 99: fig. 2 a, b:** 1.15 x 0.91 mm; **c, d:** 2.1 x 1.4 mm; **e:** protoconch of 2 a; 1 - 5 e to scale, scalebar 0.5 mm.

Literature: BANDEL 2007, JANSSEN 2007, 2012, WALL-PALMER et al. 2018.

The protoconch has many whorls which are spirally striated. *Atlanta helicinoides* SOULEYET, 1852 is a synonym (WoRMS).

*Atlanta inclinata* J.E. GRAY, 1850

**Plate 99: fig. 3 a, b:** 2.90 x 2.11 mm; **c, d:** 1.93 x 1.66 mm; **e:** protoconch of a third specimen; 1 - 5 e to scale, scalebar 0.5 mm.

Literature: DEKKER & ORLIN 2000, JANSSEN 2007, WALL-PALMER et al. 2018.

In this species the protoconch is tilted and the keel base is yellow golden. The species was often attributed to SOULEYET, 1852. There is great morphological similarity between *A. inclinata* and *A. tokiokai* VAN DER SPOEL & TROOST, 1972. The main difference is within the micro-ornamentation. *Atlanta tokiokai* has spiral lines of small tubercles on the surface of the spire. *Atlanta inclinata* has scattered and more sparse tubercles on the surface of the spire and may grow larger (6 - 7 mm vs. 3 mm). Perhaps they are not separate species. A higher genetic diversity was observed within the two species than between them. Probably they interbreed as their populations overlap in many places (WALL-PALMER et al. 2018 and pers. comm.).

*Atlanta plana* RICHTER, 1972

**Plate 99: fig. 4 a, b:** 1.20 x 0.89 mm; **c, d:** 1.46 x 1.14 mm; **e:** protoconch of 4 c; 1 - 5 e to scale, scalebar 0.5 mm.

Literature: DEKKER & ORLIN 2000, JANSSEN 2012, WALL-PALMER et al. 2018.

The protoconch has more whorls which are more elevated compared to *A. oligogyra*. The shell inflates at 3.5 whorls, with a hint of red at the suture and some ornamentation on the second and third whorls (D. WALL-PALMER pers. comm.).

*Atlanta oligogyra* TESCH, 1906

**Plate 99: fig. 5 a, b:** 2.68 x 2.44 mm; **c, d:** 2.12 x 1.67 mm; **e:** protoconch of 5 c; 1 - 5 e to scale, scalebar 0.5 mm.

Literature: BANDEL 2007, JANSSEN 2007, WALL-PALMER et al. 2018.

The protoconch has few whorls and no ornamentation on the spire. It can hardly be destinguished from *A. lesueurii* J.E. GRAY, 1850. They have the same number of whorls in the spire. In *A. oligogyra*, the first 1.5 whorls are globular with very shallow sutures, whereas *A. lesueurii* has deep and clear sutures.

## Triphoridae GRAY, 1847

The majority of species in this family are sinistrally coiled. Additionally, three dextral species from the genus *Metaxia* are recorded in Dahab. Numerous in situ observations indicate a close association with Porifera, but no specific study has been conducted on sponge-triphorid interactions. Taxonomically, the family is regarded as one of the most difficult among gastropods, due to the high number of species and the poorly understood intra- and inter-specific variability (ALBANO et al. 2011, ALBANO & BAKKER 2016). In Dahab at least 53 species were distinguished by shell morphology. Nevertheless, by checking published type material in various reprints (e.g. JAY 2007, ALBANO & BAKKER 2016, ALBANO et al. 2017) and internet sources from e.g. the French National Museum of Natural History (MNHN), appropriate identification was attempted. I could rely on constructive discussion with H. BAKKER (pers. comm.) who has seen much more material in several museums and is preparing a catalogue of the types of Triphoridae in the Natural History Museum in London (NHMUK) (ALBANO et al. in preparation). A valuable bibliography of this family is given by LEE et al. (2014).

To give an estimate on effort and diversity this brief statistic is provided based on 47 sediment samples where Triphoridae were extensively analysed. On average approximately 11 species were found per sample (usually 100 ml). A few samples contained no specimens and the maximum number of at least 25 different taxa in 100 ml was found at Islands labyrinth 10 m. This is a small sand patch of about 1 m² in size, between vertical coral pinnacles about 5 m in height. In 23 of these samples (in total 3700 ml) specimens of Triphoridae were counted as well. Up to 323 specimens (282 of these were protoconchs only) were found at Canyon 29 m. There are approximately 40 specimens within 100 ml of sediment on average. Therefore, in 67 samples an estimated number of 4500 specimens (including the protoconchs) have been seen.

*Bouchetriphora pallida* (PEASE, 1870)

**Plate 100: fig. 1 a, b:** 3.70 x 1.12 mm (Canyon 11 m); to scale with 3 a, b.

Literature: MARSHALL 1983, KAY 1979, SEVERNS 2011.

URL 81: http://www.gastropods.com/4/Shell_12224.shtml
URL 82: http://seashellsofnsw.org.au/Triphoridae/Pages/Bouchetriphora_pallida.htm
URL 83: http://www.gastropods.com/1/Shell_67991.shtml

The identity of this all white (including protoconch) species is discussed in MARSHALL (1983) and it is likely that the list of synonyms could even be longer (URL 81). The lectotype is depicted in JOHNSON (1994). Probably *Triphora shepstonensis* E.A. SMITH, 1906 (URL 83), the type of *Triphora virginalis* THIELE, 1925 depicted in ALBANO & BAKKER (2016) as well as *Nototriphora alba* (KOSUGE, 1961) in THACH (2012) are conspecific.


2 e
2 a, b
2 c, d
1 a, b
3 c
5 a, b
4 a, b
3 a, b

*Cautotriphora hervieri* (KOSUGE, 1962)

**Plate 100: fig. 2 a, b:** 5.40 x 1.44 mm (Caves 17 - 19 m); **c:** 6.43 x 1.97 mm (Islands 2.5 m); **e:** apex 0.9 mm from a specimen of 2.38 x 1.13 mm in total size (Moray Garden 2.5 m).

Literature: KOSUGE 1962, OKUTANI 2000, 2017, CHEN & LEE 2007.

The protoconch is rufous brown and has ca. 4 whorls with 2 spiral keels crossed by axial riblets on the last 2 whorls. The early teleoconch whorls are pinkish in colour. The anterior row turns to white in later whorls, while the posterior row is orange to yellow. *Mastonia servaini* is similar in colouration of the 2 rows of tubercles but does not always show red spots between the whitish tubercles of the anterior row. Additionally, *M. servaini* has only 1 spiral keel on the protoconch.

*Coriophora granosa* (PEASE, 1871)

**Plate 100: fig. 3 a, b:** 3.40 x 1.25 mm (Islands); **c:** 3.09 x 1.02 mm (Caves 15 m); to scale with 1 a, b.

Literature: MARSHALL 1983, OKUTANI 2000, 2017, POPPE 2008a.

URL 84: http://www.gastropods.com/2/Shell_17922.shtml
URL 85: http://seashellsofnsw.org.au/Triphoridae/Pages/Coriophora_granosa.htm

The protoconch has 1 spiral keel which is crossing axial riblets. Especially, the figure of CHENG & YANG (URL 84) fits expecially well with the Dahab specimens. The lectotype is depicted in JOHNSON (1994).

*Euthymella colzumensis* (JOUSSEAUME, 1898)

**Plate 100: fig. 4 a, b:** 5.95 x 1.55 mm (Caves).

Literature: JOUSSEAUME 1898, DEKKER & ORLIN 2000, ANGELIDIS & POLYZOULIS 2018.

URL 86: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-725

The Dahab specimen matches the syntype except for the colour of the protoconch. The former is brown; the latter white. We expect that the museum specimen has faded. This species is a Lessepsian immigrant into the Mediterranean Sea (ANGELIDIS & POLYZOULIS 2018).

*Euthymella elegans* (HINDS, 1843)

**Plate 100: fig. 5 a, b:** 9.2 x 2.5 mm (Islands labyrinth 9 m).

Literature: MARSHALL 1983, POPPE 2008a, DUMRONGROJWATTANA et al. 2016.

URL 87: http://www.gastropods.com/2/Shell_9002.shtml
URL 88: http://www.gastropods.com/4/Shell_8484.shtml
URL 89: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-498

*Euthymella elongata* (LASERON, 1958) is somewhat similar (KAY 1979, POPPE 2008a, URL 88). *Triforis dives* THIELE, 1925 from East Africa and *Euthymia tibialis* JOUSSEAUME, 1884 (URL 89) seem to be related (see ALBANO & BAKKER, 2016).

*Euthymella pyramidalis* (A. ADAMS & REEVE, 1850)

**Plate 101: fig. 6 a, b:** 3.98 x 1.12 mm (Caves 15 m); whole plate to scale.

Literature: DEKKER & ORLIN 2000.

URL 90: http://www.gastropods.com/3/Shell_8993.shtml

The protoconch has 2 spiral keels crossed by axial riblets. There may be a forth granulated keel appearing in later whorls which are missing in the Dahab specimen. It fits well with the pictures in URL 90.

*Iniforis hinuhinu* KAY, 1979

**Plate 101: fig. 7 a, b:** 3.25 mm (Canyon 45 m); whole plate to scale.

Literature: KAY 1979, POPPE 2008a, SEVERNS 2011.

URL 91: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-716

The protoconch has 2 spiral keels crossing axial riblets which makes them look like rows of granules. *Iniforis douvillei* JOUSSEAUME, 1884 (URL 91) is similar but there is no information regarding the protoconch of that species.

*Iniforis poecila* (HERVIER, 1898)

**Plate 101: fig. 8 a:** 3.92 x 1.36 mm (Bells - Blue Hole 15 m); **b:** 4.12 x 1.53 mm (Blue Hole 20 m); **c, d:** 4.79 x 1.68 mm (Moray Garden 2.5 m); whole plate to scale.

Literature: HERVIER 1898a, b, OKUTANI 2000, 2017, CHEN & LEE 2007.

URL 92: http://www.gastropods.com/9/Shell_17859.shtml
URL 93: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-506
URL 94: http://www.gastropods.com/4/Shell_9984.shtml

The specimens figured in CHENG and YANG (URL 92) match the Dahab specimens very well but theirs are slenderer. *Mastonia peanites* (JOUSSEAUME, 1898) is very close but looks glossier and has more beads per whorl (URL 93, URL 94).

*Iniforis* sp.

**Plate 101: fig. 9 a, b:** 3.94 x 1.25 mm (Caves 16 m); **c, d:** 5.11 x 1.38 mm (Caves 16 m); **e, f:** 3.80 x 1.10 mm (Caves); **g, h:** 5.10 x 1.48 mm (Caves 16 m); **i:** 4.04 x 1.18 mm (Islands); **j, k:** 4.78 x 1.40 mm (Islands); **l, m:** 4.72 x 1.73 mm (Canyon 32 m); whole plate to scale.

It is unclear whether these specimens are juveniles of an *Iniforis* or if it is something completely different. The third tube starts to develop on the side of the peristome ca. 90 degrees from the aperture, while *Iniforis* has a full developed third tube ca. 180 degrees from the aperture (H. BAKKER pers. comm.).

*Latitriphora* cf. *granicostata* (KOSUGE, 1962)

**Plate 102: fig. 10 a, b:** 7.94 x 1.69 mm (Caves); to scale with 12 a - d, 13 a, b and 14 a - d.

Literature: KOSUGE 1962, OKUTANI 2000, CHEN & LEE 2007.

URL 95: http://www.gastropods.com/Shell_Images/G-L/Latitriphora_granicostata.jpg

The specimen fits in shape, colour and density of tubercular rows with the figures given by CHEN & LEE (2007), but the Dahab specimen does not show the faint darker colour of the anterior row of tubercles. In this respect it comes close to the specimens in OKUTANI (2000). KOSUGE describes a darker upper row, but this is not seen in his fig. 11. It has some resemblance


6 a
9 a, b
7 c, d
8 a
8 b
8 c, d
9 c, d
9 g, h
9 e, f
9 i
9 j, k
9 l, m

with the types of *L. granicostata* of KOSUGE. However, the type is less elongate and has a more whitish colour on the siphonal canal and the first few teleoconch whorls (H. BAKKER pers. comm.).

### *Mastonia algens* JOUSSEAUME, 1898

**Plate 102: fig. 11 a, b:** 3.70 x 1.11 mm (Islands entrance 2.5 m); to scale with 13 c, d and 15 a, b.

Literature: JOUSSEAUME 1898, DEKKER & ORLIN 2000.

URL 96: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-732
URL 97: http://www.gastropods.com/5/Shell_17805.shtml

The protoconch is brown and starts with 1 spiral keel, thus looking pagodiform. In the last ca. 1.5 whorls 2 spiral keels crossing axial riblets can be seen. The teleoconch starts with 2 rows of tubercles between which a third row emerges in later whorls. A faint microstructure can be seen between these rows. Earlier whorls are whitish to violet, later whorls are light brown to grey in colour. In adults sometimes a hole near the outer side of the aperture can be seen. The more convex forms look like *Mastonia adamsi* (DESHAYES, 1863) (see JAY 2007) but the last whorl is white. There are gradual differences between the Dahab specimens. The similar *Mastonia hindsi* (DESHAYES, 1863) seems to be more elongated (JAY 2007, URL 97).

### *Mastonia peanites* (JOUSSEAUME, 1898)

**Plate 102: fig. 12 a, b:** 5.79 x 2.07 mm (Caves 16 m); **c, d:** 5.06 x 1.6 mm (Islands 10 m); all to scale with 10 a, b, 13 a, b and 14 a - d.

Literature: DEKKER & ORLIN 2000.

URL 98: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-506

The protoconch is light brown and has 2 spiral keels crossing axial riblets at least on the last 2 whorls. The ultimate teleoconch whorl has a darker brown colour and many smaller and lighter tubercles. The spindle is coloured brown. It is originally described from Djibouti and very similar to *Triphora* sp. 1. The protoconch of *Triphora* sp. 1 starts with 1 spiral keel and 2 spiral keels crossing axial riblets in the last 1 - 2 whorls making it look more pagodiform. Additionally, the spindle of that species is white. See also *Iniforis poecila* (HERVIER, 1897). *Iniforis formosula* (HERVIER, 1897) in CHEN & LEE 2007 is similar.

### *Mastonia* aff. *rubra* (HINDS, 1843)

**Plate 102: fig. 13 a, b:** 4.79 x 1.74 mm (Caves); **c, d:** 2.60 x 1.22 mm (Tigerhouse 7 m); a, b to scale with 10 a, b, 12 a - d and 14 a - d; c, d to scale with 11 a, b and 15 a, b.

Literature: DEKKER & ORLIN 2000.

URL 99: http://www.gastropods.com/9/Shell_9349.shtml

The brown protoconch is smooth in early whorls. Later whorls develop two spiral keels crossing radial streaks giving the impression of rows of granules. The clear difference to the typical completely purple populations of *M. rubra* (URL 99) is that the lower row of tubercles changes colour to whitish brown.

### *Mastonia servaini* JOUSSEAUME, 1884

**Plate 102: fig. 14 a, b:** 5.41 x 1.76 mm (Caves 15 m); **c, d:** 6.30 x 1.91 mm (Islands entrance 2.5 m); all to scale with 10 a, b, 12 a - d and 13 a, b.

Literature: JOUSSEAUME 1884, DEKKER & ORLIN 2000, DAFNI URL 1.

URL 100: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-1581?listIndex=8&listCount=17
URL 101: http://www.gastropods.com/4/Shell_17814.shtml
URL 102: http://www.gastropods.com/9/Shell_17809.shtml

The Dahab shells fit perfectly with the type specimen (URL 100, URL 101). And the protoconch has 1 spiral keel crossing axial riblets. *Coriophora monilifera* (HINDS, 1843) has red spots between the anterior row of whitish tubercles while the posterior row is orange or white (URL 102). Synonymy with *C. monilifera* (HINDS, 1843) is possible if colouration is considered variable. See also *Triphora* sp. 1 in DAFNI (URL 1). The specimen is conspecific with *Triphora gemmata* BLAINVILLE, 1828 in BOSCH et al. (1995, misidentification).

### *Mastonia* aff. *tricolor* JOUSSEAUME, 1884

**Plate 102: fig. 15 a, b:** 2.50 x 0.96 mm (Caves 15 m); to scale with 12 a, b and 13 c, d.

Literature: DEKKER & ORLIN 2000, THACH 2012.

URL 103: http://vieoceane.free.fr/mollusques/triphoridae03.htm
URL 104: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-1397

In the Dahab specimens the protoconch has 2 spiral keels crossing axial riblets. The teleoconch starts with 2 rows of tubercles, on the last whorl a third row emerges between them. Colour of early teleoconch whorls is white, later cream. The suture is coloured brown. *Mastonia tricolor* JOUSSEAUME, 1884 in URL 103 is considered conspecific although this specimen has more whorls. The type of *M. tricolor* is similar, but Dahab specimens lack the prominent yellowish colour in the posterior row of tubercles (URL 104). See also *Mastonia cingulifera* PEASE, 1861 in POPPE (2008a). It is probably conspecific with *Mesophora* cf. *gracilis* (PEASE, 1871) in THACH (2012).

### *Mastonia* sp. 1

**Plate 103: fig. 16 a, b:** 3.50 x 1.65 mm (Islands labyrinth 9 m); whole plate to scale except 17 a, b.

URL 105: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-490
URL 106: https://science.mnhn.fr/taxon/species/triphoris/ornatus#deshayes%2C_1832

The protoconch has 1 spiral keel crossing axial riblets, a second spiral keel may be recognised on the last whorl. Although not fully grown, the specimens match the description of *Mastonia funebris* JOUSSEAUME, 1884 from New Caledonia especially in the darker anterior spiral row of tubercles (URL 105). Similar in colouration is the syntype from an unknown locality of *Triphoris ornatus* DESHAYES, 1832 (URL 106). However, the centre of the base is not brown.


10 a, b
11 a, b
12 a, b
13 c, d
12 c, d
13 a, b
14 a, b
14 c, d
15 a, b


17 a, b
18 a, b
16 a, b
19 a, b
19 c, d
19 e, f
21 c, d
20 a, b
20 c
21 a, b


22 a - c
22 d, e
23 c, d
23 a, b
24 c
24 a, b
25 a, b
25 c, d

### *Mastonia* sp. 2

**Plate 103: fig. 17 a, b:** 1.10 x 0.72 mm (Canyon 11 m).

It is as pink as *Mastonia* aff. *rubra*, but the protoconch has only 1 spiral keel crossing the axial riblets.

### *Mastonia* sp. 3

**Plate 103: fig. 18 a, b:** 2.54 x 0.91 mm (Caves 15 m); whole plate to scale except 17 a, b.

The protoconch has 2 spiral keels crossed by axial riblets. The teleoconch is convex, starting with 2 rows of tubercles. Gradually a third row emerges between them. Colouration is light cream to brown with the posterior row being darker. Inside the suture and between the rows of tubercles it is coloured dark brown. The brown form of *Cautor similis* (PEASE, 1871) in KAY (1979) is looking similar.

### *Mastonia* sp. 4

**Plate 103: fig. 19 a, b:** 3.47 x 1.40 mm (Blue Hole 18 m); **c, d:** 3.25 x 1.29 mm (Caves 16 m); **e, f:** 3.00 x 1.55 mm (Caves 14 m); whole plate to scale except 17 a, b.

URL 107: http://www.eurasiashells.net/Triphoridae/Mastonia_sp_4-1.jpg
URL 108: http://seashellsofnsw.org.au/Triphoridae/Pages/Nanaphora_tricolor.htm

The specimen fits well with the shell from the Philippines (URL 107). The protoconch is orange to dark brown and has ca. 4 whorls with 2 spiral keels crossed by axial riblets on the last 2 whorls. *Nanaphora tricolor* LASERON, 1958 has strong similarity but is coloured differently (URL 108). In *Mastonia gracilis* (PEASE, 1871) the dark coloured area of the third row is broader and reaching around the tubercles. In Dahab specimens the dark colour is only seen between the tubercles (e.g. SEVERNS 2011).

### *Mastoniaeforis chaperi* JOUSSEAUME, 1884

**Plate 103: fig. 20 a, b:** 3.70 x 1.29 mm (Moray Garden 17 m); **c:** 3.07 x 1.18 mm (Islands); whole plate to scale except 17 a, b.

Literature: DEKKER & ORLIN 2000, JAY 2007, POPPE 2008a.

URL 109: http://mediaphoto.mnhn.fr/media/1415907734651eVGXAAugEGDBeNOU

The type specimen is depicted in JAY (2007) and URL 109. The protoconch has 1 spiral keel crossing axial riblets. The similar *Mastoniaeforis jousseaumei* (HERVIER, 1898) has a protoconch with 2 spiral keels. *Mastoniaeforis ofuensis* (BAKER & SPICER, 1935) is very similar.

### *Mastoniaeforis* cf. *jousseaumei* (HERVIER, 1898)

**Plate 103: fig. 21 a, b:** 4.14 x 1.27 mm (Masbat Bay 5 m); **c, d:** 3.36 x 1.21 mm (Islands 10 m); whole plate to scale except 17 a, b.

Literature: HERVIER 1898a, b, DEKKER & ORLIN 2000, OKUTANI 2000, 2017.

URL 110: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-1400

This species has a full developed tube ca. 180 degrees from the aperture, while *Iniforis* sp. starts to develop this tube on the side of the peristome ca. 90 degrees from the aperture (H. BAKKER pers. comm.). It is somewhat smaller and stouter than in the original description (URL 110).

### *Mastoniaeforis lifuana* (HERVIER, 1898)

**Plate 104: fig. 22 a - c:** 5.73 x 1.28 mm (Canyon 29 m); **c, d:** 4.11 mm (Moray Garden 17 m); all to scale with 25 c, d.

Literature: HERVIER 1898a, b, JAY 2007.

URL 111: http://www.mnlg.it/mma/gastropoda/triphoridae/PF_2.htm
URL 112: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-1508
URL 113: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-1139

Earlier protoconch whorls have 1 spiral row, later a second spiral row appears, and both are crossed by axial riblets in later protoconch whorls. There is a considerable variation in the number of teleoconch whorls and length of channels in the Dahab specimens. A syntype is depicted in URL 112. The species was originally described as a variety of the very similar *Triphora mirifica* (DESHAYES, 1863) of which a neotype is designated in JAY (2007: fig. 20 - 22, 52). JAY observed more than 200 specimens and found no obvious difference to the syntype of *T. lifuana*, thus *T. mirifica* may be an older name. However, JAY did not mention an interrupted orange-brown colouration on the spirals between the tubercles. Therefore, the junior name is chosen for the Dahab specimens, thereby assigning them to a more appropriate genus. It also comes close to the syntype of *Iniforis malvacea* JOUSSEAUME, 1884 from New Caledonia but Dahab specimens do not show the hint of violet colour and do have long tubular channels (URL 113). Some shells identified as *Iniforis ikukoae* (KOSUGE, 1963) may be conspecific with the Dahab shells (e.g. OKUTANI 2000, DUMRONGROJWATTANA et al. 2016). *Mastoniaeforis lifuana* is distinguished from *Iniforis hinuhinu* and *Mastonia hindsi* by the less convex outline and the lower number of tubercles per whorl.

### *Metaxia* cf. *brunnicephala* KAY, 1979

**Plate 104: fig. 23 a, b:** 2.55 x 0.72 mm (Canyon 11 m); **c, d:** 2.36 x 0.72 mm (Caves 15 m); all to scale with 24 a - c and 25 a, b.

Literature: MARSHALL 1983, DEKKER & ORLIN 2000.

URL 114: http://www.gastropods.com/7/Shell_12217.shtml

In specimens from Hawaii the protoconch is less convex and the axial sculpture of the teleoconch seems to be less well developed than in the Dahab specimens (see KAY 1979 and SEVERNS 2011). The type specimen of *Metaxia fuscoapicata* THIELE, J., 1930 from Australia is depicted in ALBANO & BAKKER (2016). Unfortunately, the scale to their figure 23 A-D is indicated with incorrect dimensions. In the description 2.4 x 0.65 mm are given. Dahab specimens are similar in size but differ in a somewhat broader and more convex orange-brown protoconch. The teleoconch whorls bear more axial ribs and the shells are absolutely and relatively broader.


26 a
26 b, c
26 d
26 e, f
27 a
27 b
27 c
27 d, e
27 f
27 g
27 h, i
28 a, b
29 a, b

### *Metaxia* sp. 1

**Plate 104: fig. 24 a, b:** 2.94 x 0.74 mm (Canyon 11 m); **c:** 2.79 x 0.76 mm (Canyon 11 m); all to scale with 23 a - d and 25 a, b.

URL 115: http://www.ciesm.org/atlas/Metaxiabacillum.html

The protoconch has 2 - 2.5 convex white whorls, with the earliest whorl being a bit broader than the following. The first protoconch whorl is evenly convex and sculptured with 3 or 4 spiral threads arranged from a parallel to almost a zig-zag pattern as described for *Metaxia kermadecensis* MARSHALL, 1977. On later whorls axial striae are visible especially along the suture. Very similar is *Metaxia albicephala* KAY, 1979, which has a white protoconch. *Metaxia bacillum* (ISSEL, 1869) was originally described from the Red Sea based on a figure of SAVIGNY (1817). The type is depicted in BOUCHET & DANRIGAL (1982) and has a more conical protoconch than the Dahab specimens. Thus, *Metaxia* sp. 1 is not conspecific with *Metaxia bacillum*, the Lessepsian immigrant into the Mediterranean Sea (BALENA 2000, DELONGUEVILLE & SCAILLET 2007, URL 115).

### *Metaxia* sp. 2

**Plate 104: fig. 25 a, b:** 1.80 x 0.62 mm (Caves 15 m); **c, d:** 3.24 x 0.82 mm (Caves 16 m); a, b to scale with 23 a - d and 24 a - c; c, d to scale with 22 a - e.

The protoconch starts with spiral punctuate rows, later 1 spiral keel crosses axial riblets. Thus, it is similar to *Metaxia* cf. *brunnicephala* KAY, 1979, but the axial sculpture of the teleoconch is smooth in *Metaxia* sp. 2. The outline of the whorls is strongly convex. Three Dahab specimens have only 4 spiral cords, but the cord along the suture is partly "bipartite". The similar genus *Seilarex*, which has 5 or more smooth spiral cords, is only known from Australia and questionably from Hong Kong MARSHALL (1993).

### *Monophorus monachus* (HERVIER, 1898)

**Plate 105: fig. 26 a:** 4.60 x 1.49 mm (Islands); **b, c:** 3.93 x 1.33 mm (Bells - Blue Hole 36 m); **d:** 3.39 x 1.18 mm (Islands entrance 2.5 m); **e, f:** 3.11 x 1.07 mm (Canyon 32 m); whole plate to scale.

Literature: HERVIER 1898a, b.

URL 116: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-1503

Earlier protoconch whorls have 1, and later have 2 spiral keels crossed by axial riblets. The teleoconch starts with 2 rows of tubercles and gradually a third row emerges between them. The specimens are coloured brown with the posterior row being brighter. Inside the suture and below the median row the colour is darker. The syntype is worn (URL 116) but the Dahab specimens match the drawings of HERVIER.

### *Monophorus* sp. 1

**Plate 105: fig. 27 a:** 3.87 x 1.15 mm (Islands 10 m); **b:** 3.76 x 1.10 mm; **c:** 3.02 x 1.04 mm; **d, e:** 2.86 x 1.02 mm (Canyon 45 m); **f:** 2.58 x 0.87 mm; **g:** 2.23 x 0.99 mm; **h, i:** 2.71 x 0.88 mm (Canyon 11 m); b, c, f, g Islands reef flat; whole plate to scale.

URL 117: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-486

URL 118: http://www.gastropods.com/8/Shell_9988.shtml

The protoconch has 1 spiral keel on early whorls, later 2 spiral keels are crossing axial riblets. The colour of the teleoconch consists of a diffuse orange-brown and whitish pattern. The shells vary quite a bit in convexity. Dahab specimens resemble the syntype of *Triphora* cf. *lamyi* SELLI, 1973 from the Gulf of Suez (URL 117) concerning colour pattern and overall sculpture, which it is much larger (9.7 mm) and the protoconch is missing. The Dahab specimens are similar to *Monophorus tessellatus* (KOSUGE, 1963) in OKUTANI (2000, 2017), CHEN & LEE (2007), DUMRONGROJWATTANA et al. (2016) and URL 118. But the true *M. tessellatus* has a dark base and the nodules are connected by a prominent axial sculpture (H. BAKKER pers. comm.).

### *Monophorus* sp. 2

**Plate 105: fig. 28 a, b:** 3.77 x 1.16 mm (Moray Garden 17 m); whole plate to scale.

Literature: MARSHALL 1983.

URL 119: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-1503

The protoconch of 3.5 whorls, which probably has only 1 spiral keel, is crossed by weak axial riblets. The shell colour is brown except for pink early teleoconch whorls. The last two thirds of the teleoconch are cylindrical, starting with 2 rows of tubercles, gradually a third row emerges between them. Similar is a somewhat larger (5.2 mm) syntype of *Monophorus monachus* (HERVIER, 1898) from Lifou (URL 119). More specimens from both regions are needed to gain further insight.

### *Obesula mus* JOUSSEAUME, 1898

**Plate 105: fig. 29 a, b:** 4.55 x 1.22 mm (Tigerhouse 7 m); whole plate to scale.

Literature: JOUSSEAUME 1898.

URL 120: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-1595

The Dahab specimen has 2 spiral threads on the protoconch. It fits perfectly with the type from Djibouti in size, shape and colour (URL 120). According to MARSHALL (1983) the genus *Obesula* has hemispherical granules on the first whorl, and only 1 spiral thread and uninterrupted axial riblets on subsequent whorls of the planktotrophic larval protoconch.

### *Obesula* cf. *pantherina* JOUSSEAUME, 1898

**Plate 106: fig. 30 a, b:** 2.49 x 1.07 mm (Caves 16 m); **c, d:** 2.45 x 0.99 mm (Canyon 11 m); **e:** 2.02 x 0.89 mm (Bells - Blue Hole 29 m); all to scale with 32 a, b and 34 g, h.

Literature: JOUSSEAUME 1898.

URL 121: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-1596

The syntype depicted in URL 121 has a white protoconch, in contrast to beige of the Dahab specimens. *Opimaphora coralina* LASERON, 1958 has approximately 1 protoconch whorl more.


31 a
30 a, b
30 c, d
30 e
34 a, b
32 a, b
33 a, b
34 c, d
34 e, f
34 g, h

### *Obesula* cf. *turricula* Hervier, 1898

**Plate 106: fig. 31 a:** 3.18 x 1.21 mm (Islands reef flat); to scale with 33 a, b and 34 a - f.

Literature: Hervier 1898a, b, Chen & Lee 2007.

URL 122: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-1319
URL 123: http://www.animalbase.uni-goettingen.de/zoowebservlet/AnimalBase/home/species?id=9602

The brown suture from the original drawing (Hervier 1898b) cannot be seen in the syntype (URL 122) which comes close to the Dahab specimen. However, there are no brown blotches on the posterior spiral row of tubercles. Superficially, similarity to *Euthymella colzumensis* is observed. *Triphora lamyi* by Raymond Huet from Réunion in URL 123 seems to be conspecific.

### *Obesula* sp.

**Plate 106: fig. 32 a, b:** 2.46 x 0.96 mm (Caves 16 m); to scale with 30 a - e and 34 g, h.

URL 124: http://www.gastropods.com/2/Shell_12232.shtml

It is similar to *Obesula* cf. *pantherina* but slenderer, whitish with some faint orange colouration in the last 1,5 whorls and the protoconch has 1 whorl more. The specimen has similarity to *Opimaphora sarcira* Laseron, 1958 (URL 124), but the protoconch in Laseron's drawing shows just 1 spiral keel.

### *Triphora* cf. *fulvescens* Hervier, 1898

**Plate 106: fig. 33 a, b:** 4.64 x 1.40 mm (Caves 16 m); to scale with 31 a and 34 a - f.

Literature: Hervier 1898a, b.

URL 125: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-1501

The syntype in URL 125 is very similar, however, a third row of tubercles is not developed in the specimen from Lifou.

### *Triphora* cf. *subulata* Thiele, 1930

**Plate 106: fig. 34 a, b:** 3.08 x 0.96 mm (Islands 10 m); **c, d:** 4.07 x 1.24 mm (Caves); **e, f:** 4.04 x 1.19 mm (Lagoon 5 m); **g, h:** 2.81 x 1.01 mm (Moray Garden 2.5 m); a - f to scale with 31 a and 33 a, b; g, h to scale with 30 a - d and 32 a, b.

URL 126: https://www.conchology.be/?t=27&family=TRIPHORIDAE&species=Mastonia%20clavata
URL 127: http://www.gastropods.com/7/Shell_17787.shtml

In the Dahab specimens the earliest protoconch whorls have one spiral keel; later ones two, which are crossed by axial riblets. The lectotype is designated and depicted by Albano & Bakker (2016). It is slightly slenderer. *Mastonia clavata* (Pease, 1861) (URL 126) and *Triphora aporema* Rehder, 1980 from the Easter Islands (holotype is depicted in URL 127) seem to be closely related.

### *Triphora lilaceocincta* E. A. Smith, 1903

**Plate 107: fig. 35 a, b:** 4.22 x 2.18 mm (Umm Sid 13 m); **c, d:** 4.31 x 1.66 mm (Blue Hole 4 m); all to scale.

Literature: Smith 1903.

URL 128: http://www.jaxshells.org/27276.htm

The shells fit with the original drawing and description of *Triforis lilaceocinctus* from the Maldives/Laccadives. *Mastonia* cf. *lamberti* (Hervier, 1897) from Tuamotu is similar but appears more reddish (URL 128).

### *Triphora taeniolata* Hervier, 1898

**Plate 107: fig. 36 a, b:** 8.34 x 2.31 mm (Islands reef crest).

Literature: Hervier 1898a, b, Chen & Lee 2007, Dumrongrojwattana et al. 2016.

URL 129: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-1249
URL 130: http://www.gastropods.com/1/Shell_17771.shtml
URL 131: http://vieoceane.free.fr/mollusques/triphoridae05.htm

The syntype in URL 129 is much smaller (3.9 mm) and probably a juvenile. *Triphora eupunctata* Sowerby III, 1907 is within the synonymy in WoRMS.

### *Triphora* sp. 1

**Plate 107: fig. 37 a, b:** 2.65 x 0.89 mm (Islands 10 m); **c, d:** 3.37 x 1.12 mm (Moray Garden 2.5 m); **e, f:** 2.95 x 0.95 mm (Islands seagrass 18 m); all to scale with 38 a, b and 39 a, b.

URL 132: http://www.gastropods.com/5/Shell_15195.shtml

The protoconch has 1 spiral keel on early whorls, later 2 keels are crossing axial riblets. On the teleoconch the posterior row of tubercles is coloured orange-brown. Diffuse light orange-brown speckles are irregularly scattered along the whitish row of tubercles. *Triphora elvirae* de Jong & Coomans, 1988 from the Caribbean is looking superficially similar (URL 132) but in Dahab specimens the posterior row of tubercles is orange.

### *Triphora* sp. 2

**Plate 107: fig. 38 a, b:** 2.57 x 0.97 mm (Blue Hole 4 m); to scale with 37 a - f and 39 a, b.

The colour pattern of the teleoconch is similar to *Triphora* sp. 1 but the protoconch has only 1 spiral keel crossing axial riblets. Perhaps this is a species of *Bouchetriphora,* but the genus cannot be identified without radula morphology.

### *Triphora* sp. 3

**Plate 107: fig. 39 a, b:** 2.49 x 0.88 mm (Moray Garden 17 m); to scale with 37 a - f and 38 a, b.

The shell is similar to *Triphora* sp. 2 concerning the protoconch which has just 1 spiral keel crossing axial riblets, but the teleoconch has no orange-brown row of tubercles.

### *Triphora* sp. 4

**Plate 108: fig. 40 a, b:** 3.71 x 0.89 mm (Canyon 32 m); to scale with 41 a, b, 42 a, b, 43 a, b, 44 a, b and 45 a, b.

This species is similar to *Monophorus* sp. 1 in colour pattern but *Triphora* sp. 4 is more elongated, and he anterior row of tubercles is more prominent and slightly curved towards the apex.


35 a, b
35 c, d
38 a, b
37 a, b
36 a, b
37 c, d
37 e, f
39 a, b


40 a, b
43 a - c
42 a, b
41 a, b
44 a, b
46 e
46 c, d
46 a, b
45 a, b


47 a, b
47 c, d
48 a, b
49 c, d
49 e, f
48 c
49 g, h
49 a, b

### *Triphora* sp. 5

**Plate 108: fig. 41 a, b:** 2.30 x 1.24 mm (Islands 10 m); to scale with 40 a, b, 42 a, b, 43 a, b, 44 a, b and 45 a, b.

This single specimen has a teleoconch pattern similar to *Monophorus* sp. 1 but has a protoconch with only 1 spiral keel crossing axial riblets.

### *Triphora* sp. 6

**Plate 108: fig. 42 a, b:** 1.84 x 0.90 mm (Caves 17 m); to scale with 40 a, b, 41 a, b, 43 a, b, 44 a, b and 45 a, b.

URL 133: http://shells.tw/~seashell2392/Triphoridae/Triphora_africana_BARTSCH,1915.jpg

The protoconch has 2 spiral keels crossing axial riblets. There is similarity in colouration of the teleoconch to a picture of *Triphora africana* BARTSCH, 1915 from Kenya (URL 133) which, however, does not fit with the type depicted in BOUCHET & STRONG (2010).

### *Triphora* sp. 7

**Plate 108: fig. 43 a, b:** 3.95 x 0.91 mm (Caves 17 m); **c:** detail of apex of b; a, b to scale with 40 a, b, 41 a, b, 42 a, b, 44 a, b and 45 a, b.

The protoconch is coloured light brown with 1 spiral keel crossing axial riblets. The teleoconch is elongated and cylindrical. It starts with 2 rows of tubercles, on later whorls a third row emerges between them. The tubercles of the anterior row are larger. The colour of teleoconch whorls is white to cream and the connections between tubercles of early anterior whorls are coloured in light orange to brown. The colouration is fading in later whorls. *Hedleytriphora scitula* (A. ADAMS, 1854) has a similar but more conical teleoconch and the protoconch is less sculptured by axial riblets (MARSHALL 1983).

### *Triphora* sp. 8

**Plate 108: fig. 44 a, b:** 2.59 x 0.87 mm (Moray Garden 2.5 m); to scale with 40 a, b, 41 a, b, 42 a, b, 43 a, b and 45 a, b.

The protoconch is light brown with 2 spiral keels crossing axial riblets. The teleoconch is dark brown to almost black.

### *Triphora* sp. 9

**Plate 108: fig. 45 a, b:** 2.72 x 0.92 mm (Caves 15 m); to scale with 40 a, b, 41 a, b, 42 a, b, 43 a, b and 44 a, b.

URL 134: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-1489

The protoconch is subcylindrical, has ca. 4.5 whorls and is coloured light brown. Two spiral keels are crossing axial riblets. The teleoconch is cream-coloured with 3 spiral rows of tubercles connected by axial and axial riblets. The most posterior row is somewhat weaker and starting from ca. the second teleoconch whorl. The shell is constricted at the base. The sculpture is similar to the one of *Euthymella* sp. 1 in SEVERNS 2011. *Monophorus lucidulus* (HERVIER, 1898) is almost white in colour and the second spiral row appears later (URL 134).

### *Triphora* sp. 10

**Plate 108: fig. 46 a, b:** 5.16 x 0.83 mm (Canyon 32 m); **c, d:** 6.34 x 0.88 mm (Blue Hole 20 m); **e, f:** 7.79 x 0.92 mm (Blue Hole 36 m); all to scale.

Literature: ALBANO & BAKKER 2016.

URL 135: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-1106

The protoconch has approximately 4 whorls, the last 2 show punctuated spiral rows. *Triphora aethiopica* THIELE, 1925 is slenderer. The syntype of *Subulophora rutilans* (HERVIER, 1897) (URL 135) is not as cylindrical as the Dahab specimens.

### *Viriola abbotti* (F. BAKER & SPICER, 1935)

**Plate 109: fig. 47 a, b:** 6.39 x 1.75 mm; **c, d:** 6.33 x 1.75 mm; all from Islands entrance 2.5 m; all to scale with 48 a, b.

Literature: DEKKER & ORLIN 2000.

URL 136: http://www.gastropods.com/6/Shell_11846.shtml

### *Viriola cancellata* (HINDS, 1843)

**Plate 109: fig. 48 a, b:** 7.81 x 2.27 mm; **c:** 2.04 x 0.99 mm; all from Umm Sid 18 m; a, b to scale with 47 a - d.

Literature: DEKKER & ORLIN 2000, DAFNI URL 1, CHEN & LEE 2007, POPPE 2008a, DUMRONGROJWATTANA et al. 2016.

URL 137: http://mediaphoto.mnhn.fr/media/1415907879967eShbhzHgrsAfvcoD

The red spots along the middle spiral row are not as prominent as shown by other authors. The type was not seen. In *Viriola intergranosa* (HERVIER, 1898) from Lifou small tubercles are seen along the suture as well (URL 137).

### *Viriola senafirensis* (STURANY, 1903)

**Plate 109: fig. 49 a, b:** 4.17 x 1.60 mm; **c, d:** 3.51 x 1.11 mm; **e, f:** 3.26 x 1.36 mm (Blue Hole 20 m); **g, h:** 3.29 x 1.22 mm (Moray Garden 18 m); a - f from Islands north 10 m; all to scale.

Literature: STURANY 1903, DEKKER & ORLIN 2000, ALBANO et al. 2017.

URL 138: http://www.gastropods.com/2/Shell_17842.shtml

The type from the Red Sea is depicted by ALBANO et al. (2017). *Viriola abbotti* BAKER & SPICER, 1935 is looking similar (KAY 1979, POPPE 2008a, URL 136). Compare also with *Viriolopsis fallax* (KAY, 1979) in SEVERNS (2011) but that genus has no spiral lirae on the spiral interfaces, and the protoconch has only 1 spiral thread while the Dahab species has 2 threads crossing axial riblets, creating a quadrangular (reticulate) pattern. See also *Viriola intergranosa* (HERVIER, 1897) in CHEN & LEE (2007). *Viriola trilirata* (DESHAYES, 1863) in URL 138 is probably conspecific but the type of DESHAYES' species was not seen. *Mastonia vulpina* HINDS, 1843 is similar and sometimes assigned to *Viriola* (e.g. OKUTANI 2000, DUMRONGROJWATTANA et al. 2016).


50 a, b
50 c
50 d, e
51 a, b
51 c, d
52 a, b
52 c, d
53 a, b

*Viriola morychus* JOUSSEAUME, 1898

**Plate 110: fig. 50 a, b:** 13.2 x 2.8 mm (Islands); **c:** detail of apex of b; **d, e:** 4.69 x 1.76 mm (Caves 16 m); a, b to scale with 51 a, b and 53 a, b; d, e to scale with 51 c, d and 52 a - d.

Literature: JOUSSEAUME 1898.

URL 139: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-484

The given syntype specimen is 8.1 mm in size and probably not fully grown. The protoconch seems to be somewhat eroded. In the original description the size range is 9 - 13 mm. *Viriola* sp. 1 is similar in early whorls but develops a very strong spiral in later whorls. In *Euthymella* there are no small nodules on spiral 4 which distinguishes *Viriola* from *Euthymella* (MARSHALL 1983).



**Fig. 50 f:** *Viriola morychus* from Islands in a Petri dish.

*Viriola* sp. 1

**Plate 110: fig. 51 a, b:** 10.1 x 3.0 mm (South); **c, d:** 3.45 x 1.38 mm (Umm Sid 13 m); a, b to scale with 50 a, b and 53 a, b; c, d to scale with 50 d, e and 52 a - d.

Literature: SHARABATI 1984, DAFNI URL 1.

This species is conspecific with the species depicted in SHARABATI (1984: pl. 5, fig. 2) and DAFNI (URL 1) but has probably not yet been described.

*Viriola* sp. 2

**Plate 110: fig. 52 a, b:** 4.87 x 1.65 mm (Umm Sid 18 m); **c, d:** 3.26 x 1.36 mm (Islands north 10 m); all to scale with 50 d, e and 51 c, d.

URL 140: http://www.gastropods.com/6/Shell_11846.shtml

*Viriola* sp. 2 has white to purple early teleoconch whorls, later irregular white speckles are visible. In contrast, *Viriola abbotti* is coloured yellowish grey without speckles (URL 140).

*Viriola* sp. 3

**Plate 110: fig. 53 a, b:** 10.4 x 2.6 mm (Caves 16 m); to scale with 50 a, b and 51 a, b.

The specimen has a faint axial pattern of orange-brown stripes and, therefore, appears more nodulous than it actually is.

## Cerithiopsidae H. ADAMS & A. ADAMS, 1853

Cerithiopsids are considered a less well studied group, particularly regarding to intrafamilial and intrageneric phylogenetic relationships. Since identifications are based on dead shells only, it is not intended to propose different superspecific taxonomy other than the taxonomy given in the most recent papers or in WoRMS. For genus names the keys given in CECALUPO & PERUGIA (2012, 2013) are followed. The main character to differentiate *Clathropsis* from *Synthopsis* is the slightly constricted base in *Synthopsis*. Therefore, different protoconchs appear within one genus or very similar protoconchs are observed in different genera.

*Cerithiopsis pulvis* (ISSEL, 1869)

**Plate 111: fig. 1 a, b:** 3.28 x 0.98 mm (Bells - Blue Hole 15 m); to scale with 2 a, b, 3 f, h, 4 a, b and 5 a, b.

Literature: DEKKER & ORLIN 2000, DELONGUEVILLE & SCAILLET 2007, CROCETTA et al. 2018.

There are 3 rows of granular beads, the posterior one is coloured brown, the other two white. It was originally described from the Red Sea based on a figure of SAVIGNY (1817: pl. 4, fig. 5). The type is depicted in BOUCHET & DANRIGAL (1982) which is somewhat stouter than the Dahab specimen. It is a Lessepsian immigrant into the Mediterranean Sea (DELONGUEVILLE & SCAILLET 2007, CROCETTA et al. 2018) but there are probably other species involved (*Joculator* sp. 5). The generic position is unclear, however, the name *Nanopsis* CECALUPO & ROBBA, 2010 is invalid, since preoccupied (descriptive notes in WoRMS). *Synthopsis albachiarae* CECALUPO & PERUGIA, 2012 and *S. elegans* CECALUPO & PERUGIA, 2012 are similar.

*Clathropsis* cf. *ellenstrongae* CECALUPO & PERUGIA, 2012

**Plate 111: fig. 2 a, b:** 2.50 x 0.79 mm (Canyon 45 m); to scale with 1 a, b, 3 f, h, 4 a, b and 5 a, b.

Literature: CECALUPO & PERUGIA 2012, CECALUPO & PERUGIA in POPPE 2017a.

URL 141: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-24001

The Dahab specimen is translucent and yellowish, whereas the type is opaque and whitish.

*Clathropsis* cf. *poppearum* CECALUPO & PERUGIA, 2012

**Plate 111: fig. 3 a, b:** 4.59 x 1.25 mm (Islands entrance); **c, d:** 5.0 x 1.3 mm (Islands reef flat); **e:** protoconch of 3 c, d; **d; f,** g: 2.35 x 0.8 mm (Islands reef crest); **h:** protoconch of 3 f, g; a - d to scale with 6 a, b; f, g to scale with 1 a, b, 2 a, b, 4 a, b and 5 a, b.

Literature: POPPE & TAGARO in POPPE 2011, CECALUPO & PERUGIA 2012, CECALUPO & PERUGIA in POPPE 2017, POPPE 2017b.

URL 142: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-30507

The protoconch has subsutural grains, thus may be this species originally described from the Philippines. See also *Clathropsis* sp. 5.

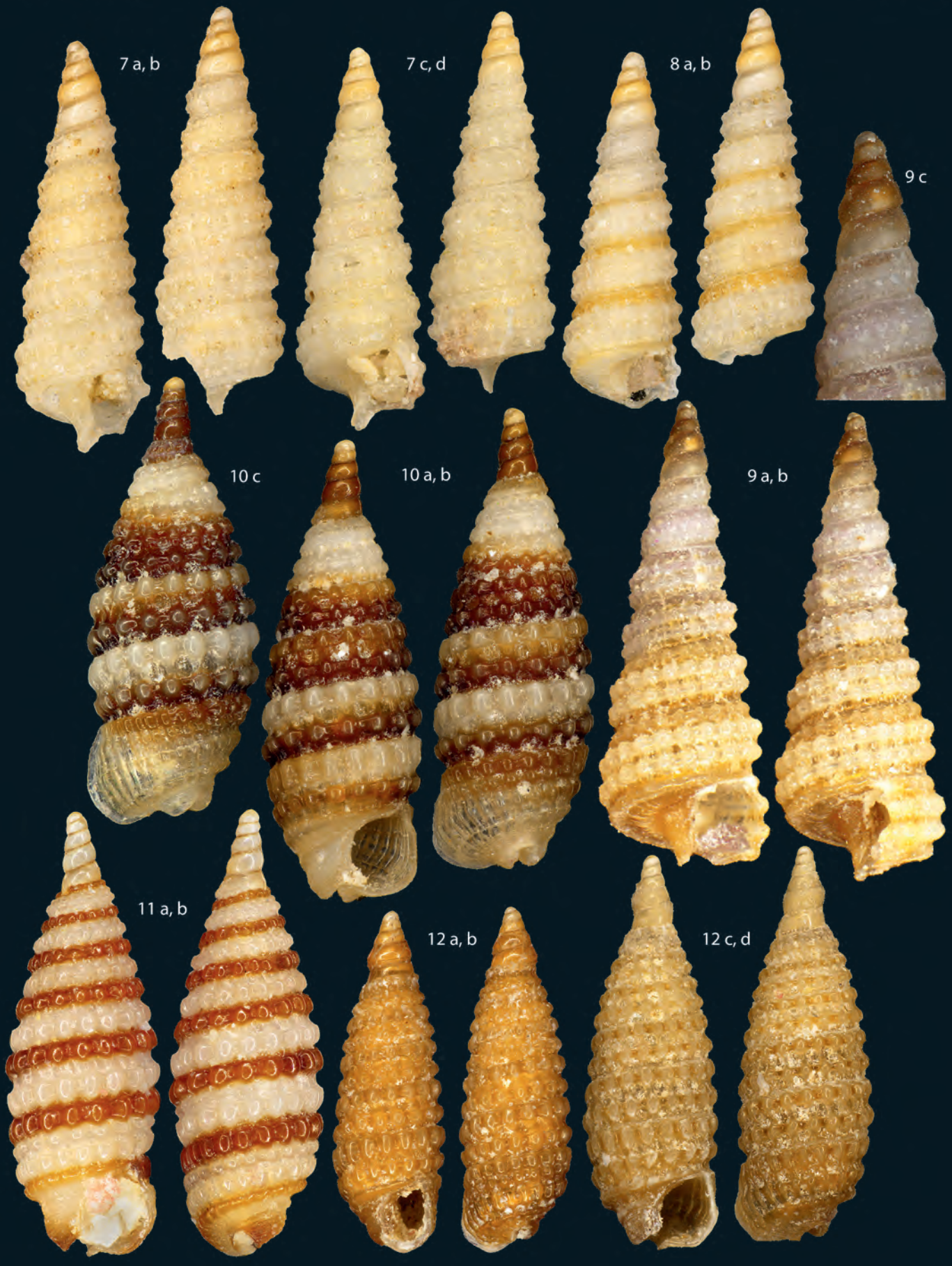
*Clathropsis* cf. *sparacioi* CECALUPO & PERUGIA, 2018

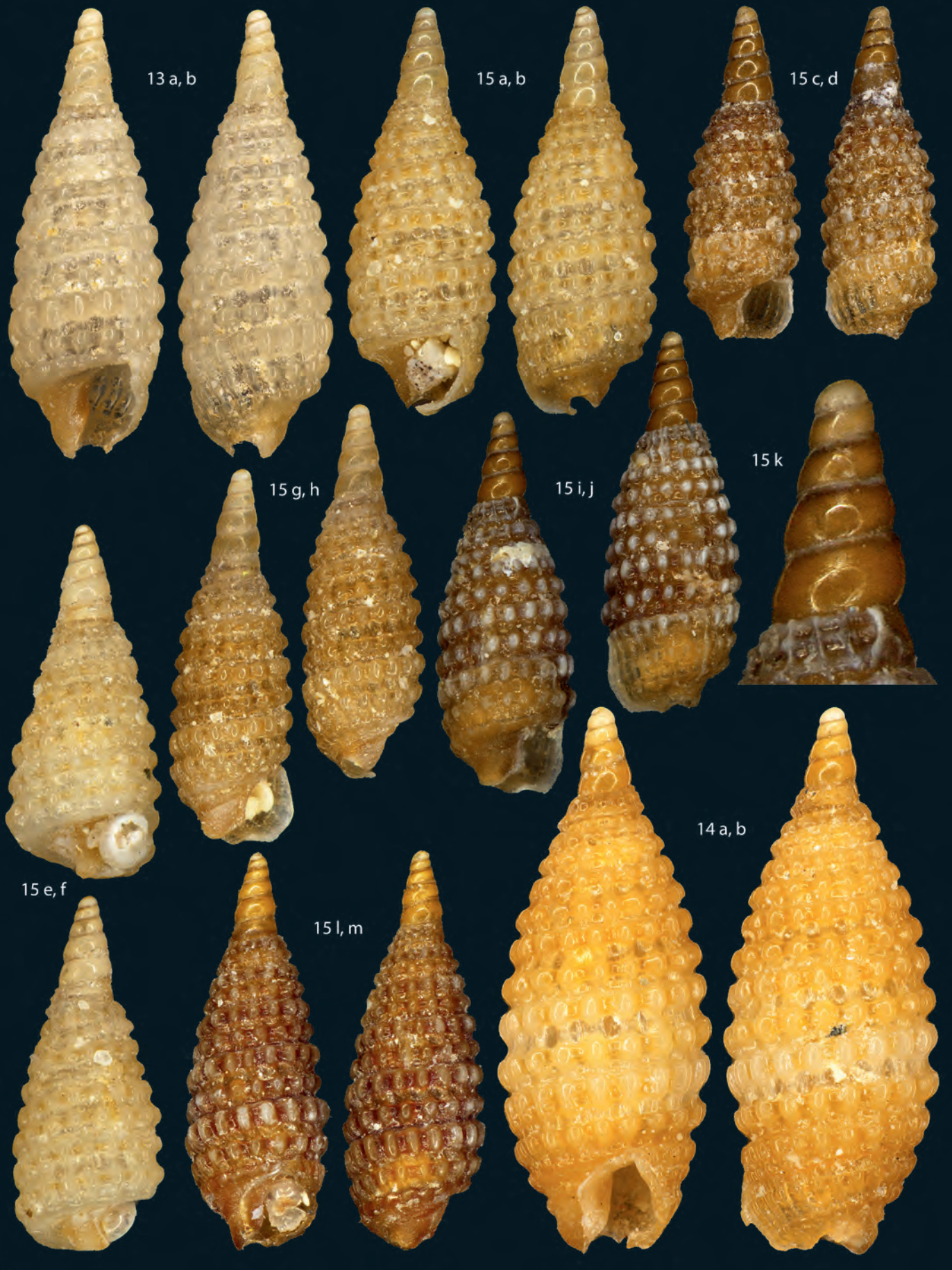
**Plate 111: fig. 4 a, b:** 3.44 x 1.01 mm (Golden Blocks 23 m); to scale with 1 a, b, 2 a, b, 3 f, h and 5 a, b.

URL 143: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-33466?listIndex=2&listCount=5

(continued after plates)


1 a, b
2 a, b
3 a, b
5 a, b
3 f - h
3 c - e
6 a, b
4 a, b


7 a, b
7 c, d
8 a, b
9 c
10 c
10 a, b
9 a, b
11 a, b
12 a, b
12 c, d


13 a, b
15 a, b
15 c, d
15 g, h
15 i, j
15 k
15 e, f
15 l, m
14 a, b

The specimen is coloured light brown with a darker first teleoconch whorl and ca. 3 dirty white protoconch whorls. *Clathropsis sparacioi* Cecalupo & Perugia, 2018 (pl. 6, fig. 2 a - d) fits well but is only known from Papua New Guinea.

### *Clathropsis* sp. 1

**Plate 111: fig. 5 a, b:** 2.49 x 0.67 mm (Canyon 45 m); to scale with 1 a, b, 2 a, b, 3 f, h and 4 a, b.

The specimen has a smooth protoconch. The similar *Clathropsis payriae* Cecalupo & Perugia 2014b has a protoconch of 3 whorls with regular granulation on the second whorl, arranged in 5 lines.

### *Clathropsis* sp. 2

**Plate 111: fig. 6 a, b:** 3.89 x 1.07 mm (Caves 17 - 19 m); to scale with 3 a - d.

The specimen has a smooth white protoconch and white early teleoconch whorls which later turn yellowish.

### *Clathropsis* sp. 3

**Plate 112: fig. 7 a, b:** 2.49 x 0.82 mm (Caves 15 m); **c, d:** 2.35 x 0.76 mm (Caves 17 - 19 m); whole plate to scale except 9 c.

Specimens have a smooth protoconch with probably very minute grains at the suture. The teleoconch whorls are regularly increasing at the same inclination as the protoconch.

### *Clathropsis* sp. 4

**Plate 112: fig. 8 a, b:** 2.17 x 0.73 mm (Caves 16 m); whole plate to scale except 9 c.

The shell is very similar to *Clathropsis* sp. 3 but the posterior row of nodules turns orange-brown in later teleoconch whorls.

### *Clathropsis* sp. 5

**Plate 112: fig. 9 a, b:** 2.9 x 1.1 mm (Islands reef flat); **c:** protoconch of 9; whole plate to scale except 9 c.

Literature: Melvill & Standen 1896, Jay & Drivas 2002, Severns 2011.

URL 144: http://www.gastropods.com/7/Shell_18027.shtml
URL 145: http://vieoceane.free.fr/mollusques/Cerithiopsidae1.htm
URL 146: https://gbmolluscatypes.ac.uk/specimens/288

No visible subsutural grains could be detected with light microscopy. The specimen may be *Cerithiopsis fosterae* Melvill & Standen, 1896 shown in Jay & Drivas (2002), Severns (2011), URL 144 and URL 145. A syntype is lighter in colour (URL 146). According to Cecalupo & Perugia (2012) *C. fosterae* should be assigned to *Clathropsis*. *Clathropsis poppearum* Cecalupo & Perugia, 2012 from the Philippines differs only in the visible subsutural grains on its protoconch.

### *Horologica magnifica* Cecalupo & Perugia, 2012

**Plate 112: fig. 10 a, b:** 2.82 x 0.98 mm (Caves 17 - 19 m); **c:** 2.70 x 1.05 mm (Caves 15 m); whole plate to scale except 9 c.

Literature: Cecalupo & Perugia 2012, 2013.

URL 147: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-23812

Shells are similar to the type population, but the colour pattern of the teleoconch differs slightly. In this respect the shells from the Philippines fit well (Cecalupo & Perugia in Poppe 2017a).

### *Horologica marianii* Cecalupo & Perugia, 2012

**Plate 112: fig. 11 a, b:** 2.72 x 0.92 mm (Umm Sid 18 m); whole plate to scale except 9 c.

Literature: Cecalupo & Perugia 2012, Cecalupo & Perugia in Poppe 2017a.

URL 148: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-23805?listIndex=1&listCount=12

The only difference to the original description is ca. 1 whorl more in the teleoconch where a third row of nodules is emerging between the other rows. The protoconch has ca. 4.5 smooth whorls. In *Horologica splendida* Cecalupo & Perugia, 2012 the row posterior of the suture is coloured red brown.

### *Horologica* cf. *minareta* Laseron, 1956

**Plate 112: fig. 12 a, b:** 2.08 x 0.68 mm (Islands); **c, d:** 2.42 x 0.84 mm (Caves 17 - 19 m); whole plate to scale except 9 c.

Literature: Laseron 1956, Jay & Drivas 2002, Kurtz 2015.

URL 149: http://vieoceane.free.fr/mollusques/Cerithiopsidae3.htm
URL 150: http://www.gastropods.com/8/Shell_68118.shtml

It has a wide and conical protoconch with the penultimate protoconch whorl being the broadest. The specimens are slightly smaller than the holotype of *Horologica minareta* Laseron, 1955 (sic.) (Jay & Drivas 2002 and URL 149). *Horologica glaubrechti* Jay & Drivas, 2001 is described with a white protoconch and a plain dark brown teleoconch in which the upper cord and its beads are darker. However, a brown specimen similar to the Dahab shell is shown from Réunion (URL 149). *Horologica macrocephala* Laseron, 1956 (URL 149) is slightly smaller. Kurtz (2015) lists this species as *H. diffusa* Cecalupo & Perugia, 2012. The brown specimens of *H. diffusa* in URL 150 are also similar to the Dahab shells, but the senior name is preferred.

### *Horologica* cf. *loyaltyensis* Cecalupo & Perugia, 2017

**Plate 113: fig. 13 a, b:** 2.19 x 0.75 mm (Caves 17 - 19 m); whole plate to scale except 15 k.

Literature: Cecalupo & Perugia 2017, 2018.

URL 151: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-30532?listIndex=2&listCount=43
URL 152: https://ingokurtz.jimdo.com/mollusca/cerithiopsidae/

The shell is translucent dirty white with a brown base and has 5 protoconch whorls. The teleoconch has 2 spiral rows of nodules connected by axial sculpture. *Horologica tabanellii* in URL 152 is this species, but it differs from the original description by its brown base (Cecalupo & Perugia 2012).


16 a, b
16 c
17 a, b
17 c, d
17 e, f
18 c
18 d
18 a, b
19 a, b

### *Horologica* sp. 1

**Plate 113: fig. 14 a, b:** 2.69 x 1.04 mm (Moray Garden 2.5 m); whole plate to scale except 15 k.

This large and pupiform shell has a bright orange colour. *Horologica jayi* Cecalupo & Perugia, 2012 in Cecalupo & Perugia in Poppe (2017: pl. 1356, fig. 1) is similar, however, does not fit to the original description.

### *Horologica* sp. 2

**Plate 113: fig. 15 a, b:** 2.0 x 0.73 mm (Caves 18 m); **c, d:** 1.63 x 0.55 mm (Caves 17 - 19 m); **e, f:** 1.75 x 0.77 mm (Caves 18 m); **g, h:** 1.82 x 0.60 mm (Caves 18 m); **i, j:** 1.88 x 0.68 mm (Caves); **k:** protoconch of i enlarged; **l, m:** 1.97 x 0.70 mm (Caves); whole plate to scale except 15 k.

Literature: Jay & Drivas 2001, Cecalupo & Perugia 2014a.

URL 153: http://vieoceane.free.fr/mollusques/Cerithiopsidae3.htm

This is a variable species in terms of shape and colour. Shells are usually yellowish, orange-brown or brown with 5 protoconch whorls and 2 spiral rows of nodules connected by axial sculpture which may appear slightly darker. When somewhat eroded the top of the nodules appear whitish and dull. In some specimens colour suddenly changes from brown to light brown. This group of specimens is perhaps one variable species or may contain several species. *Horologica* cf. *loyaltyensis* may belong here but has a lighter colour. *Horologica glaubrechti* Jay & Drivas, 2001 is described with a white protoconch and a plain dark brown teleoconch with the upper cord and its beads a little darker. However, in URL 153 a brown specimen similar to the Dahab shells is shown. *Horologica gregaria* Cecalupo & Perugia, 2012 from the Philippines, also known from Madagascar (Cecalupo & Perugia 2014a), is very similar. *Horologica nodosa* appears to be highly variable in colour and may be related.

### *Joculator albocinctum* (Melvill & Standen, 1896)

**Plate 114: fig. 16 a, b:** 3.52 x 1.25 mm (Moray Garden 17 m); **c:** 1.35 x 0.97 mm (Moray Garden 17 m); c with whole plate to scale except 16 a, b.

Literature: Melvill & Standen 1896, Jay & Drivas 2002.

URL 154: http://vieoceane.free.fr/mollusques/Cerithiopsidae4.htm

The protoconch is missing in the original figure (Melvill & Standen 1896) and the type was not seen. The specimen from Réunion fits well (URL 154). *Synthopsis enzae* Cecalupo & Perugia, 2012 in Cecalupo & Perugia in Poppe (2017a) is similar.

### *Joculator* cf. *fuscostriatus* Cecalupo & Perugia, 2013

**Plate 114: fig. 17 a, b:** 1.65 x 0.73 mm (Caves 15 m); **c, d:** 1.49 x 0.59 mm (Bells - Blue Hole 36 m); **e, f:** 1.86 x 0.78 mm (Caves 16 m); whole plate to scale except 16 a, b.

Literature: Cecalupo & Perugia 2013, 2017.

URL 155: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-25950

URL 156: http://www.gastropods.com/5/Shell_61975.shtml

This species differs from the original description concerning a darker coloured protoconch and has slightly more axial ribs on the last teleoconch whorl. *Joculator* cf. *minutissimus* is larger, more elongated and has one more protoconch whorl. *Cerithiopsis tenthrenois* (Melvill, 1896) from the Mediterranean Sea has some similarity (URL 156).

### *Joculator* cf. *minutissimus* (Thiele, 1925)

**Plate 114: fig. 18 a, b:** 1.39 x 0.73 mm (Bells - Blue Hole 15 m); **c:** 1.5 x 0.8 mm (Canyon 29 m); **d:** 1.15 x 0.68 mm (Canyon 29 m); whole plate to scale except 16 a, b.

Literature: Thiele 1925, Jay & Drivas 2002.

URL 157: http://vieoceane.free.fr/mollusques/Cerithiopsidae4.htm

URL 158: http://www.nmr-pics.nl/Cerithiopsidae/album/slides/Cerithiopsis%20ladae.html

In Thiele´s drawing the protoconch is missing which challenges identification. *Joculator coffeus* Cecalupo & Perugia, 2013 and *J. olivoideus* Cecalupo & Perugia, 2018 from Papua New Guinea, *J. breviculus* Cecalupo & Perugia, 2017 from Lifou and *Cerithiopsis ladae* Prkic & Buzzurro, 2007 in Romani & Bartolini (2014) and URL 158 are very similar.

### *Joculator mygaki* Jay & Drivas 2002

**Plate 114: fig. 19 a, b:** 1.82 x 0.72 mm (Canyon 11 m); whole plate to scale except 16 a, b.

Literature: Jay & Drivas 2002.

URL 159: https://ingokurtz.jimdo.com/mollusca/cerithiopsidae/

Fits the original description concerning overall sculpture, colour, proportions of protoconch and teleoconch, as well as a wide and ventricose ultimate protoconch whorl. *Joculator lividus* (Cecalupo & Perugia 2018: 144, fig. 1e) looks alike. *Joculator acuminatus* in URL 159 from the Red Sea is coloured differently.

### *Joculator skolix* Jay & Drivas, 2002

**Plate 115: fig. 20 a, b:** 3.22 x 1.02 mm; **c, d:** 3.02 x 0.92 mm; **e, f:** 2.78 x 0.83 mm; **g, h:** 2.03 x 0.80 mm; a - h Caves 17 - 19 m; a - h to scale with 23 a, b and 24 a - d.

Literature: Jay & Drivas 2002.

URL 160: http://vieoceane.free.fr/mollusques/Cerithiopsidae5.htm

The shells fit well to the figures given by Jay & Drivas in size, colour, morphology of protoconch (4 - 5 whorls, brown coloured) and teleoconch (ca. 6 whorls, cream-coloured). According to the key given in Cecalupo & Perugia (2013) this species may belong to the genus *Synthopsis*. Very similar are *Synthopsis prima* Cecalupo & Perugia, 2012 and *Synthopsis ambigua* Cecalupo & Perugia, 2013.

### *Joculator* cf. *variabilis* Cecalupo & Perugia, 2012

**Plate 115: fig. 21 a, b:** 2.12 x 0.80 mm (Caves 17 m); to scale with 22 a, b.

Literature: Cecalupo & Perugia 2012, Cecalupo & Perugia in Poppe 2017a.

URL 161: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-23931

The specimen has only 4 instead of 4.5 whorls in the protoconch and the first teleoconch whorl is paler than *Joculator variabilis* Cecalupo & Perugia, 2012.


20 a, b
20 c, d
20 e, f
20 g, h
21 a, b
22 a, b
23 a, b
24 c, d
24 a, b

### *Joculator* sp. 1

**Plate 115: fig. 22 a, b:** 1.25 x 0.85 mm (North); to scale with 21 a, b.

Literature: Cecalupo & Perugia 2013, 2014.

The specimen was found on a sponge attached to a beached coral. It is similar to *Joculator coffeus* Cecalupo & Perugia, 2013, especially in the very dark colour.

### *Joculator* sp. 2

**Plate 115: fig. 23 a, b:** 2.53 x 0.97 mm (Caves 17 - 19 m); to scale with 20 a - h and 24 a - d.

This pupiform shell has 4 smooth dirty white protoconch whorls and lighter early teleoconch whorls which change to a greyish orange-brown colour later.

### *Joculator* sp. 3

**Plate 115: fig. 24 a, b:** 3.21 x 1.19 mm (Caves); to scale with 20 a - h and 23 a - d.

This common species was found in every fourth sample and is characterised by the orange-brown coloured middle row of spiral nodules. The species is misidentified as *Nanopsis pulvis* in Cossignani & Ardovini (2011: 166). In *Cerithiopsis pulvis* (Issel, 1869) the posterior row of spiral nodules is coloured. *Joculator semipictus* (Gould, 1861) has only one white and one dark row of nodules (types in Johnson 1964).

### *Marshallopsis blanda* Cecalupo & Perugia, 2012

**Plate 116: fig. 25 a, b:** 2.27 x 0.68 mm (Caves 17 - 19 m); **c, d:** 2.18 x 0.70 mm (Caves); **e, f:** 1.80 x 0.64 mm (Islands north 10 m); **g:** detail of apex from e; whole plate to scale except 25 g.

Literature: Cecalupo & Perugia 2012, 2013, Cecalupo & Perugia in Poppe 2017a.

URL 162: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-24152

The specimens fit in size, shape, colour as well as sculpture of teleoconch and protoconch to the original description.

### *Marshallopsis boucheti* Cecalupo & Perugia, 2012

**Plate 116: fig. 26 a, b:** 2.50 x 0.9 mm (Umm Sid 18 m); **c, d:** 2.85 x 0.82 mm (Caves 17 - 19 m); whole plate to scale except 25 g.

Literature: Cecalupo & Perugia 2012, 2013, 2017, Cecalupo & Perugia in Poppe 2017a.

URL 163: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-24144

The specimens are somewhat larger but fit in sculpture of protoconch and teleoconch. Typical is the whitish background colour with 4 pale orange to brown axial blotches crossing the entire spire. Similar is *Joculator* sp. 11 in Severns (2011).

### *Marshallopsis gattellii* Cecalupo & Perugia, 2012

**Plate 116: fig. 27 a, b:** 2.50 x 0.90 mm (Caves 16 m); whole plate to scale except 25 g.

Literature: Cecalupo & Perugia 2012, 2013, 2017.

URL 164: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-24141

The specimens perfectly match the original description in size, shape, colour and sculpture of teleoconch and protoconch.

### *Marshallopsis jolandae* Cecalupo & Perugia, 2013

**Plate 116: fig. 28 a, b:** 2.11 x 0.96 mm (Caves 4 m); whole plate to scale except 25 g.

Literature: Cecalupo & Perugia 2013, 2017, Kurtz 2016.

URL 165: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-25991

URL 166: https://ingokurtz.jimdo.com/mollusca/cerithiopsidae/

The specimens perfectly match the original description in size, shape, colour and sculpture of teleoconch and protoconch.

### *Paraseila* sp. or *Seila* sp.

**Plate 116: fig. 29 a, b:** 2.16 x 1.05 mm (Islands north 10 m); whole plate to scale except 25 g.

Literature: Laseron 1956, Okutani 2000, 2017, Cecalupo & Perugia 2012.

Although the specimen is not complete it may be related to *Paraseila ampulla* Laseron, 1956 depicted by Okutani and Cecalupo & Perugia. However, there are slightly more (2.5 vs. 1.5 given by Laseron) whorls in the protoconch which appear smooth.

### *Synthopsis* cf. *impedita* Cecalupo & Perugia, 2012

**Plate 117: fig. 30 a, b:** 2.58 x 0.78 mm (Islands north 10 m); **c, d:** 3.35 x 0.9 mm (Caves 17 - 19 m); **e:** 1.76 x 0.79 mm (Islands north 10 m); a - d to scale with 34 a, b.

Literature: Cecalupo & Perugia 2012, 2013.

URL 167: http://vieoceane.free.fr/mollusques/Cerithiopsidae1.htm

Like *S. impedita*, the Dahab specimens are variable in colour, but a darker spiral band is visible in the centre of the protoconch whorls which is absent in *S. impedita*. The similar *Synthopsis praeacuta* Cecalupo & Perugia, 2012 and *Synthopsis vaurisi* (Jay & Drivas, 2002) have a different pattern of spiral granules on the protoconch.

### *Synthopsis iohannae* (Cecalupo & Perugia, 2012)

**Plate 117: fig. 31 a, b:** 2.77 x 1.14 mm (Caves 17 - 19 m); **c:** 1.27 x 0.76 mm (Caves 18 m); a, b to scale with 32 a, b, d, e.

Literature: Cecalupo & Perugia 2012, 2013, Cecalupo & Perugia in Poppe 2017a.

URL 168: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-23862

The protoconch is coloured darker than in the holotype.


25 a, b
25 c, d
25 e, f
25 g
26 a, b
26 c, d
27 a, b
28 a, b
29 a, b


30 a, b
30 c, d
30 e
32 c
32 a, b
31 a, b
33 a, b
34 a, b
31 c
33 c, d
32 d, e


1 a, b
1 c
2 a, b
2 c, d
6 a, b
5 a, b
3 a
3 b
3 c
4 c
4 a, b

### *Synthopsis* sp. 1

**Plate 117: fig. 32 a, b:** 3.28 x 1.11 mm (Islands); **c:** 1.78 x 0.79 mm (Caves); **d, e:** 2.34 x 0.85 mm (Islands); a, b, d, e to scale with 31 a, b.

Specimens have 2 broad anterior rows and 1 narrow posterior row of nodules. There are 3 white or translucent protoconch whorls that may have a darker suture in some specimens.

### *Synthopsis* sp. 2

**Plate 117: fig. 33 a, b:** 2.73 x 0.9 mm (Blue Hole 34 m); **c, d:** 1.94 x 0.72 mm (Caves 17 - 19 m); a - d to scale with 30 e.

Specimens have a slightly convex spire and are somewhat constricted at the base with the penultimate whorl being nearly as broad as the body whorl. The teleoconch is white and slightly translucent. Some nodules as well as the columella are orange-brown. The protoconch has approximately 3.5 whorls. There is some similarity to *Synthopsis radix* LASERON, 1956.

## Newtoniellidae KOROBKOV, 1955

### *Retilaskeya* sp.

**Plate 117: fig. 34 a, b:** 4.22 x 1.50 mm (Caves 17 - 19 m); to scale with 30 a - d.

Literature: CECALUPO & PERUGIA 2012, 2013.

Although the protoconch is missing, the teleoconch sculpture is indicating this genus especially as the weaker second of the 3 spiral cords only appears in the later whorls. The most related species may be *R. rufocincta* (CECALUPO & PERUGIA 2013: pl. 77). ROMANI et al. (2018) suggested to move the *Retilaskeya* taxa from the family Cerithiopsidae to the family Newtoniellidae.

## Vermetidae RAFINESQUE, 1815

The Vermetidae are known as worm snails or worm shells as they are extremely irregular. After the typically coiled gastropod protoconch settles, a tubular shell develops which is cemented to the surface.



**Fig. 35:** The tube worm *Spirobranchus* sp. (Polychaeta) may be confused with a Vermetidae species.

### *Cupolaconcha* aff. *maldivensis* GOLDING, BIELER, RAWLINGS & COLLINS, 2014

**Plate 118: fig. 1 a, b:** 1.88 x 1.59 mm (Caves); **c:** 1.07 x 0.87 mm (Moray Garden 2.5 m).

Literature: GOLDING et al. 2014.

Identification is based on the pupoid protoconch without sculpture and without spiral keels at the base. The shells may not be conspecific as diameter and hight of the protoconch in this specimen are much larger (> 500 µm) compared to settled protoconch diameters of 340 - 370 µm with a hight of 380 µm in the Maldives population and a hight of up to 420 µm in the Kenyan population.

### *Cupolaconcha sinaiensis* GOLDING, BIELER, RAWLINGS & COLLINS, 2014

**Plate 118: fig. 2 a, b:** 0.69 x 0.57 mm (Canyon 11 m); shell lost; **c, d:** operculum of probably this species 1.1 x 1.0 mm (Caves 15 m).

Literature: SAFRIEL & HADFIELD 1988, GOLDING et al. 2014.

This species was recently described from the Gulf of Aqaba. Identification of the specimen is based on the typical pupoid protoconch of 2.5 whorls. There is no sculpture on the first phase and the spiral bands are largest near the suture on the second phase. In this specimen only an early feeding tube is developed.

### *Ceraesignum maximum* (G.B. SOWERBY I, 1825)

**Plate 118: fig. 3 a:** 45 mm; **b:** 43 mm; **c:** 53 mm; all to scale.

Literature: VINE 1986, DEKKER & ORLIN 2000, DEBELIUS 2002, DAFNI URL 1, DAFNI 2008, GOLDING et al. 2014.

This is the largest Vermetidae in the region and is best known as *Dendropoma maxima* (SOWERBY, 1825) or great worm shell in many field guides. Empty shells (3 a - c) are tentatively assigned.



**Fig. 3 d:** *Ceraesignum maximum* embedded within the fire coral *Millepora* beached at Southern Oasis.



**Fig. 3 e:** *Ceraesignum maximum* embedded within the fire coral *Millepora* at Moray Garden feeds on plankton with a mucus-net.

### *Dendropoma* sp. 1

**Plate 118: fig. 4 a, b:** 0.99 x 0.73 mm (Caves 18 m); **c:** 1.8 mm (Masbat Bay).

Literature: BANDEL 2006.

The protoconch may be coloured light or dark brown. The teleoconch is white with low growth ribs, coloured dirty white or brown with more prominent growth ribs. The opening is circular. The protoconchs of all colour morphs have 3 spiral rows at the base and strong, sigmoid axial ribs reaching from the posterior spiral row to the suture. Between these ribs ca. 10 very faint spiral riblets are visible. This is the "Undetermined *Dendropoma*" from the Gulf of Aqaba in BANDEL (2006: pl. 12, Fig. 8).




**Fig. 5 d:** *Dendropoma* sp. 1 on *Hyotissa numisma* from Lagoon besides very juvenile bivalves (*Hyotissa*?). This specimen has a less prominent sculpture on the protoconch. The white shell on the right is a polychaete worm; scale bar 1 mm.

### *Thylacodes inopertus* (LEUCKART, 1830)

**Plate 118: fig. 5 a, b:** 56 mm (South).

Literature: DEKKER & ORLIN 2000, DAFNI URL 1, DAFNI 2008.

This species matches the original description from the Red Sea; however, involvement of other species cannot be excluded and a clear distinction from other worldwide *Thylacodes* species from photographs is currently not possible.

Many *Thylacodes* species are polychromatic in their head, foot and mantle edge coloration, which further complicates identification (R. BIELER pers. comm.). The frequently used name *Serpulorbis* SASSO, 1827 is a synonym of *Thylacodes* GUETTARD, 1770 (BIELER & PETIT 2010). Living specimens are much rarer than *C. maximum*.



**Fig. 4 c:** *Thylacodes inopertus* at El Gahaza.

### Vermetidae Gen. sp.

**Plate 118: fig. 6 a, b:** 1.62 x 1.61 mm (Caves 18 m);

This is probably an operculum of a Vermetidae.

## Rissoidae GRAY, 1847

### *Lucidestea pallaryi* (HORNUNG & MERMOD, 1927)

**Plate 119: fig. 1 a, b:** 1.53 x 1.10 mm; **c, d:** 1.43 x 0.99 mm; all Moray Garden 37 m; all to scale with 2 c, d.

Literature: HORNUNG & MERMOD 1927, DEKKER & ORLIN 2000.

In order to describe a new *Pusillina* species type material was loaned by the Museo Civico di Storia Naturale "Giacomo Doria" in Genova. Pictures of the type were taken at the Naturalis Biodiversity Center in Leiden (Netherlands). Although the type specimen is worn, the Dahab shells are clearly conspecific (VAN GEMERT & BLATTERER in preparation).

### *Moerchiella dorbignyi* (A. ADAMS, 1853)

**Plate 119: fig. 2 a, b:** 12.5 x 4.6 mm (Nabq); **c, d:** juvenile 2.11 x 1.17 mm (Canyon 11 m); **e, f:** 5.08 x 2.44 mm (Moray Garden 2.5 m); c, d to scale with 1 a - d.

Literature: SLEURS 1993, DEKKER & ORLIN 2000, DAFNI URL 1, RUSMORE-VILLAUME 2008, POPPE 2008a, b.

URL 169: https://www.biolib.cz/en/taxonimage/id295215/
URL 170: http://www.ciesm.org/atlas/Rissoinaspirata.html

The specimen with the hermit crab (2 g) was not collected. It is considered to be *Moerchiella dorbignyi* because the axial ribs in the early teleoconch whorls are nodose, rounded, closely spaced, and not sharp, distantly spaced as described for *M. artensis* (MONTROUZIER in SOUVERBIE & MONTROUZIER, 1872) in (SLEURS 1993, URL 169). The protoconch looks mammillate and may have more than two whorls. Another possible

(continued after plates)


1 a, b
1 c, d
2 a, b
2 c, d
2 e, f
3 a, b
4 a, b
4 c, d
5 a, b


6 a
6 b, c
6 d, e
7 g, h
7 c, d
7 a, b
7 e, f
8 a, b
9 a, b
10 a, b
9 c, d

identification could be *M. striolata* (A. ADAMS, 1853) but this species lacks the nodose axial ribs on the adapical spire whorls (SLEURS 1993). *Rissoina spirata* SOWERBY I, 1825 in URL 170 is probably conspecific. Two juvenile species from Dahab, like one depicted in JANSSEN et al. (2011), have ca. 18 nodose axial ribs per whorl and several spirals on the base. Otherwise they resemble the early whorls of adults which change their appearance later. In *Phosinella seguenziana* (ISSEL, 1869) there are just ca. 13 axial ribs and the aperture appears different (BOUCHET & DANRIGAL 1982: fig. 82).



**Fig. 2 g:** *Moerchiella dorbignyi* at Masbat Bay housing a hermit crab.

### *Parashiela ambulata* LASERON, 1956

**Plate 119: fig. 3 a, b:** 1.18 x 0.66 mm (Caves 17 - 19 m); to scale with 4 a - d and 5 a, b.

Literature: PONDER 1985, OKUTANI 2000, VAN GEMERT 2016, CRISCIONE et al. 2017, TAGARO in POPPE 2017a.

The species was recently discovered in the Red Sea (VAN GEMERT 2016). It matches *Parashiela* sp. in CRISCIONE et al. (2017). *Parashiela invisibilis* (HEDLEY, 1899) is very similar but has 3 spiral ribs on the last whorl.

### *Parashiela* sp. 1

**Plate 119: fig. 4 a, b:** 1.22 x 0.97 mm (Golden Blocks 23 m); **c, d:** 1.16 x 0.95 mm (Caves 16 m); all to scale with 3 a, b and 5 a, b.

Literature: JANSSEN et al. 2011.

URL 171: https://ingokurtz.jimdo.com/mollusca/seguenzioidea/

The shell is conspecific with *Parashiela* sp. in JANSSEN et al. (2011: pl. 15, fig. 3). KURTZ lists a similar specimen as *Brookula* spec. 1 (URL 171), which is an unassigned genus within Seguenzioidea in WoRMS.

### *Parashiela* sp. 2

**Plate 119: fig. 5 a, b:** 1.11 x 0.68 mm (Caves 15 m); to scale with 3 a - d and 4 a, b.

The specimen has few, inconspicuous axial riblets. Even less visible, very faint spiral lines can be recognised at the base. Therefore, the shell may either belong here or near *Voorwindia*.

### *Pusillina* sp.

**Plate 120: fig. 6 a, b:** 1.26 x 0.73 mm (Canyon 11 m); **c, d:** 1.05 x 0.72 mm (Moray Garden 37 m); all to scale.

URL 172: http://vieoceane.free.fr/mollusques/Rissoidae1.htm
URL 173: https://ingokurtz.jimdo.com/mollusca/rissoidae/

This is an undescribed species. It has some similarity to *P.* (*Haurakia*) *sufflava* CECALUPO & PERUGIA, 2009 from Madagascar which has a weak axial sculpture giving the whorls a more angulated appearance. *Pusillina marmorata* (HEDLEY, 1907) differs in its colour pattern (OKUTANI 2000, URL 172).

### *Rissoina ambigua* (GOULD, 1849)

**Plate 120: fig. 7 a, b:** 6.15 x 2.08 mm (Umm Sid 14 m); **c, d:** 4.47 x 1.60 mm (Lagoon 5 m); **e, f:** 4.11 x 1.55 mm (Masbat Bay); **g, h:** 2.01 x 1.06 mm (Blue Hole 24 m); a - f to scale with 9 a - d and 10 a, b.

Literature: DEKKER & ORLIN 2000, DAFNI URL 1, JANSSEN et al. 2011.

There seems to be high variability in colour, visibility of colour bands and number of axial ribs which is increasing towards the aperture, especially in larger specimens (fig. 7 a, b).

### *Rissoina bertholleti* ISSEL, 1869

**Plate 120: fig. 8 a, b:** 7 mm (Lagoon beached).

Literature: DEKKER & ORLIN 2000, DAFNI URL 1, RUSMORE-VILLAUME 2008, SCAPERROTTA et al. 2015.

A single eroded specimen was found. The holotype is depicted in SLEURS (1992: fig. 147 D). It is a Lessepsian immigrant into the Mediterranean Sea (DELONGUEVILLE & SCAILLET 2007).

### *Rissoina* aff. *pachystoma* MELVILL, 1896

**Plate 120: fig. 9 a, b:** 4.0 x 1.7 mm (Lagoon 12 m); **c, d:** 4.21 x 1.94 mm (Blue Hole 24 m); all to scale with 7 a - f and 10 a, b.

Literature: BOSCH et al. 1995, KURTZ 2015.

URL 174: http://www.marinespecies.org/aphia.php?p=taxdetails&id=598001
URL 175: https://www.jaxshells.org/rise.htm

It is similar to the shell depicted in BOSCH et al. (1995: 132) but MELVILL's drawing and the holotype in SLEURS (1992: fig. 156 A) are more puppiform. A similar shell from Australia is depicted in WoRMS under *Rissoina crassa* ANGAS, 1871. However, it does not match the drawing of Angas (URL 174). *Pandalosia subfirmata* is larger by approximately one third. There is also similarity to *Rissoina turricula* PEASE, 1861 in POPPE (2008a) (= *R. costata* A. ADAMS, 1853) and *Rissoina bilinea* (LASERON, 1956) in FABER & GORI (2016). The oldest name available for *R. turricula* would be *Rissoina costata* A. ADAMS, 1853, which requires the study of type material for conformation. *Rissoina* spec. in KURTZ (2015) is probably conspecific. The larger specimen has a golden-orange band above the suture, is slightly larger but similar in shape. Therefore, it is close to *Rissoina torresiana* (LASERON, 1956) in URL 175.

### *Rissoina sismondiana* ISSEL, 1869

**Plate 120: fig. 10 a, b:** 5.2 x 2.6 mm (Lagoon 5 m); to scale with 7 a - f and 9 a - d.

Literature: ISSEL 1869, DEKKER & ORLIN 2000.

A syntype is depicted in SLEURS (1992: fig. 159 A-B). It is similar to *Rissoina bertholleti* but is smaller and is characterised by the numerous fine spiral striae, which also distinguish it from the smaller *Schwartziella triticea*.


12 a
12 b, c
13 a, b
13 c, d
11 e
11 c, d
15 c
11 a, b
15 d
14 a, b
14 c, d
15 a, b

*Rissoina dimidiata* Jickeli, 1882

**Plate 121: fig. 11 a, b:** 3.6 x 1.5 mm (Caves); **c, d:** 3.32 x 1.28 mm (Caves); **e:** 3.42 x 1.29 mm (Caves); **g, h:** 2.01 x 1.06 mm (Blue Hole 24 m); a - f to scale with 9 a - d and 10 a, b.

Literature: Janssen et al. 2011, Faber & Gori 2016.

URL 176: http://www.marinespecies.org/aphia.php?p=image&pic=99167

Although not drawn in the type figures (Jickeli 1884, URL 176), the spiral sculpture is well described. Identification is further based on Janssen et al. (2011) who have compared their specimen with the holotype of Jickeli. *Rissoina striata* Quoy & Gaimard, 1832 in Poppe (2008a: pl. 198, fig. 9) which is identified as *Zebinella tenuistriata* (Pease, 1868) in Faber & Gori (2016) is similar. However, the ribs are finer and the protoconch seems to be different.

*Voorwindia tiberiana* Issel, 1869

**Plate 121: fig. 12 a:** 1.18 x 0.79 mm (Moray Garden 2.5 m); **b, c:** 1.02 x 0.72 mm (Moray Garden 2.5 m); all to scale with 13 a - d.

Literature: Bosch et al. 1995, Janssen et al. 2011.

URL 177: http://www.marinespecies.org/aphia.php?p=image&tid=141304&pic=70272

This species is similar to *Obtusella intersecta* (S. Wood, 1857) from the eastern Mediterranean Sea (URL 177).

*Voorwindia* sp. 2

**Plate 121: fig. 13 a, b:** 1.19 x 0.77 mm (Canyon); **c, d:** 1.03 x 0.65 mm (Canyon); all to scale with 12 a - c.

URL 178: https://ingokurtz.jimdo.com/mollusca/rissoidae/

This species can be distinguished from *V. tiberiana* by the very prominent suture. Ingo Kurtz misidentified a conspecific specimen from Safaga (Red Sea) as *Lucidestea pallaryi* (URL 178).

## Rissoinidae Stimpson, 1865

*Apataxia cerithiiformis* (Tryon, 1887)

**Plate 121: fig. 14 a, b:** 3.47 x 1.28 mm (Canyon); **c, d:** 3.42 x 1.31 mm (Islands north 10 m); all to scale.

Literature: Sleurs 1993, Bosch et al. 1995, Dekker & Orlin 2000, Janssen et al. 2011, Faber & Gori 2016, Tagaro in Poppe 2017a, b.

It is identified as *Rissoina cerithiiformis* in Janssen et al. (2011). *Rissoina erythraea* Philippi, 1851 is considered a nomen dubium.

*Phosinella digera* (Laseron, 1956)

**Plate 121: fig. 15 a, b:** 2.25 x 0.88 mm (Canyon); **c:** 2.12 x 0.88 mm (Caves 16 m); **d:** 2.01 x 0.80 mm (Umm Sid); all to scale.

Literature: Janssen et al. 2011, Faber & Gori 2016.

The holotype is depicted in Sleurs (1992: fig. 187 C, D).

## Zebinidae Coan, 1964

*Bittinella lochi* (Sleurs, 1996)

**Plate 122: fig. 16 a, b:** 3.87 x 1.55 mm (Island north 10 m); to scale with 18 a, b, 19 a, b and 20 a - d.

Literature: Sleurs 1996, Dekker & Orlin 2000, Janssen et al. 2011.

The species was originally described in the genus *Stosicia*.

*Pandalosia ephamilla* (Watson, 1886)

**Plate 122: fig. 17 a, b:** 2.12 x 0.80 mm (Canyon); **c, d:** 1.85 x 0.72 mm (Canyon); all to scale with 21 c - f.

Literature: Dekker & Orlin 2000, Poppe 2008a, Janssen et al. 2011, Faber & Kaiser 2015.

It is identified as *Schwartziella ephamilla* (Watson, 1886) in Janssen et al. (2011). *Pseudoschwartziella jordanica* Bandel, 2006 is a synonym (Janssen et al. 2011, Faber & Gori 2016).

*Pandalosia subfirmata* (Boettger, 1887)

**Plate 122: fig. 18 a, b:** 2.78 x 1.13 mm (Umm Sid 18 m); to scale with 16 a, b, 19 a, b and 20 a - d.

Literature: Janssen et al. 2011.

This species is very similar to *P. ephamilla* but differs in the larger size, a glossier shell, 1 - 2 more axial ribs per whorl and a more acute apex (Janssen et al. 2011; identified as *Schwartziella subfirmata*). The holotype is depicted in Sleurs (1992: fig. 236 E, F).

*Pandalosia* cf. *subfirmata* (Boettger, 1887)

**Plate 122: fig. 19 a, b:** 3.01 x 1.23 mm (Islands labyrinth 10 m); to scale with 16 a, b, 18 a, b and 20 a - d.

The identity of this specimen is not certain, as the protoconch is slightly different (M. Faber pers. comm.).

*Schwartziella triticea* (Pease, 1861)

**Plate 122: fig. 20 a, b:** 2.74 x 1.22 mm (Islands labyrinth 10 m); **c:** 3.10 x 1.35 mm (Tigerhouse 7 m); **d:** 2.78 x 1.32 mm (Caves); all to scale with 16 a, b, 18 a, b and 19 a, b.

Literature: Sleurs 1992, Poppe 2008a, Janssen et al. 2011.

The holotype is depicted in Sleurs (1992: fig. 233 K). *Rissoina rissoi* Weinkauff, 1885 ex Audouin, described based on the figure in Savigny, is a synonym (depicted in Bouchet & Danrigal 1982).

*Zebina tridentata* (Michaud, 1830)

**Plate 122: fig. 21 a, b:** 9.07 x 4.64 mm (Islands); **c, d:** juvenile 2.01 x 1.18 mm (Tigerhouse); **e, f:** juvenile 1.96 x 1.09 mm (Tigerhouse); c - f to scale with 17 a - d.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Poppe 2008a.


17 c, d
16 a, b
17 a, b
18 a, b
20 d
20 a, b
20 c
19 a, b
21 c, d
21 e, f
21 a, b

## Caecidae Gray, 1850

The adult shell of the Caecidae is a curving tube. The protoconch and shells of early stages are usually cut of and the new shell is closed by a septum at the posterior end. Thus, juveniles may look different to adults and are sometimes even longer.

### *Caecum arabicum* Issel, 1869

**Plate 123: fig. 1 a, b:** 1.89 x 0.43 mm (Canyon 29 m); **c, d:** 1.28 x 0.23 mm (Islands north 10 m); all to scale,

Literature: Issel 1869, Dekker & Orlin 2000, Dafni URL 1.

URL 179: http://www.marinespecies.org/photogallery.php?album=702&pic=112937

The moderately curved, slim tube is translucent with ca. 90 faint concentric rings, blocked by a hemispherical septum. It fits well to the shell in WoRMS (URL 179).

### *Caecum inflatum* de Folin, 1869

**Plate 123: fig. 2 a, b:** 3.35 x 0.75 x 0.65 (posterior) mm (Tigerhouse 7 m).

Literature: Bandel 1996, Pizzini et al. 2013.

URL 180: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-24915

It fits well with the pictures in Pizzini et al. (2013) and the lectotype (URL 180). The shell found in the Red Sea, identified as *C. glabellum* (A. Adams, 1868) by Bandel (1996) is probably conspecific.

### *Caecum neocaledonicum* de Folin, 1868

**Plate 123: fig. 3 a, b:** 2.06 x 0.42 mm (Caves 16 m); **c, d:** 1.88 x 0.40 mm (Masbat Bay 5 m); all to scale.

Literature: Pizzini et al. 2008, 2013, Okutani 2017.

URL 181: https://ingokurtz.jimdo.com/mollusca/caecidae/

Juveniles of the second and third growth stage were found. They are quite different from adult shells, having a unique micro sculpture of a pronounced longitudinal worm-like striation, which is less visible in adults (Pizzini et al. 2008).

### *Caecum sepimentum* de Folin, 1868

**Plate 123: fig. 4 a, b:** 1.91 x 0.41 mm (Canyon); **c, d:** 1.93 x 0.44 mm (Caves 16 m); **e, f:** 2.26 x 0.49 mm (Islands); **g, h:** 1.42 x 0.45 mm (Canyon); all to scale.

Literature: Bandel 1996, Dekker & Orlin 2000, Okutani 2000, 2017, Severns 2011, Pizzini et al. 2013, Ovalis & Mifsud 2014, Poppe 2017.

URL 182: http://www.gastropods.com/4/Shell_17174.shtml

*Caecum maculatum* Habe, 1963 is a synonym. Identified as *Caecum gracile* Carpenter, 1858 in Bandel (1996) which is considered a nomen dubium. The visibility of the micro sculpture has infraspecific variability (Albano & Pizzini 2011). Pizzini et al. (2013) distinguish *C. sepimentum* and *C. vertebrale* Hedley, 1899. The first differs in form of the aperture, is hemmed by an asymmetrical varix, and has rings with a sharp top. *Caecum clarum* Lamy, 1909, known from the Red Sea by the synonym *C. ruggerii* Pizzini, 1997 (Dekker & Orlin 2000), has a denser, strong sculpture consisting of pronounced raised rings.

### *Caecum vertebrale* Hedley, 1899

**Plate 123: fig. 5 a, b:** 4.44 x 0.77 mm (El Gahaza 17 m).

Literature: Pizzini et al. 2013.

This large shell is an intermediate stage and has much more (46) lamellar rings, no swelling at the aperture and a very prominent septum. Subadults are commonly slightly longer than the adult stage (B. Raines pers. comm.).

### *Meioceras sandwichensis* de Folin, 1881

**Plate 123: fig. 6 a, b:** 1.76 x 0.63 mm (Islands north 10 m); **c, d:** 1.31 x 0.62 mm (Caves 18 m); all to scale.

Literature: Kay 1979, Lightfoot 1992, Severns 2011, Pizzini et al. 2013.

The curved tube is 1.5 - 2 mm in length, translucent white with very faint concentric sculpture and blocked by a pointed oblique septum. The type material of *M. sandwichensis* is badly degraded (Pizzini et al. 2013). However, Kay (1979), Lightfoot (1992) and Severns (2011) illustrated much better examples, which appear to be quite close to the Dahab shells. The distribution of *M. sandwichensis* beyond the Hawaiian Islands is poorly known (B. Raines pers. comm.).

### *Meioceras* sp. juvenile *sandwichensis*? de Folin, 1881

**Plate 123: fig. 7 a, b:** 1.53 x 1.08 mm (Caves 15 m); **c, d:** 1.08 x 0.65 mm (Caves 15 m); **e:** enlarged apical view of early stage 0.74 x 0.50 mm (Canyon 29 m); a - d to scale.

The twisting of the protoconch and teleoconch along with the rapid increase in the first stage teleoconch diameter are consistent characteristics with the genus *Meioceras* not *Caecum* (B. Raines pers. comm.). However, juveniles of *C. arabicum* probably have never been illustrated.

## Anabathridae Keen, 1971

### *Afriscrobs saldadinensis* (Hornung & Mermod, 1927)

**Plate 124: fig. 1 a, b:** 1.12 x 0.50 mm (Lagoon 5 m).

Literature: Hornung & Mermod 1927, Ponder 1983b, Dekker & Orlin 2000.

The specimen is slightly slenderer but otherwise fits quite well to the type figure of Hornung & Mermod.

## Elachisinidae Ponder, 1985

### Elachisinidae Gen. sp.?

**Plate 124: fig. 2 a, b:** 1.60 x 1.21 mm (Islands labyrinth 10 m); **c, d:** 1.60 x 1.38 mm (Blue Hole 20 m); all to scale.

URL 183: http://www.gastropods.com/Taxon_pages/TN_Family_ELACHISINIDAE.shtml

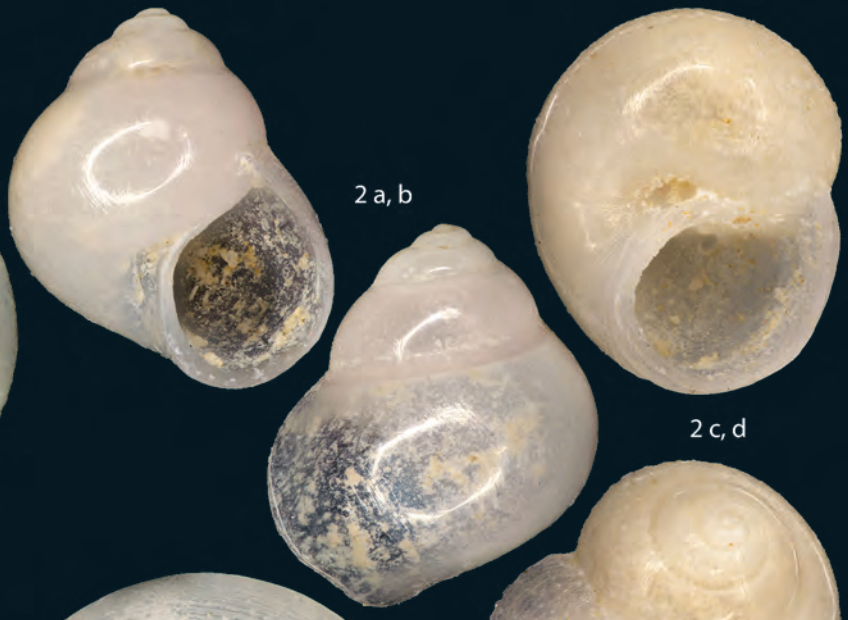
URL 184: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-31037

The Elachisinidae are known mainly from the Atlantic and the Mediterranean Sea (URL 183). They have a characteristic ridge in the umbilicus. A shell from Japan, misidentified as *Dolicrossea bellula* (A. Adams, 1865) also has this ridge (Okutani 2017). However, the syntype of *D. bellula* is different (URL 184).


1 a, b
1 c, d
5 a, b
7 e
7 c, d
7 a, b
2 a,b
6 a, b
3 a, b
3 c, d
6 c, d
4 a, b
4 c, d
4 e, f
4 g, h



1 a, b



2 a, b



2 c, d



3 g





3 a - c







3 d - f





4 a - c






5 a, b
5 g, h
5 e, f
5 c, d
6 c - e
6 a, b
7 a, b
7 g
7 h
7 f
7 c
7 d, e

## Tornidae Sacco, 1896 (1884)

### *Anticlimax* sp.

**Plate 124: fig. 3 a - c:** 1.20 x 1.03 mm; **d - f:** 1.00 x 0.87 mm; **g:** microstructure detail from a; all from Canyon 45 m; a - f to scale.

Literature: Melvill 1906a, Rubio & Rolán 2014a.

URL 185: http://www.gastropods.com/2/Shell_75542.shtml
URL 186: http://www.gastropods.com/7/Shell_60177.shtml
URL 187: http://www.malachia.it/forum/topic.asp?TOPIC_ID=1007

*Anticlimax philsmithi* Rubio & Rolán, 2014 has a faint spiral sculpture with a minute granular structure (URL 185) but the spiral keels are different. *Cyclostremiscus millepunctatus* Pilsbry & Olsson, 1945 (URL 186) has coarser spirals. The spire of *Cyclostrema charmophron* Melvill, 1906 is more elevated, therefore, the first whorls can be seen in aperture view. Some species from Skeneidae like *Skenea catenoides* (Monterosato, 1877) are similar (Scaperrotta et al. 2014, URL 187). *Cyclostrema semisulcatum* Issel, 1869 is larger (3 mm), has more (4) whorls and is considered a taxon inquirendum (WoRMS). *Dikoleps farica* (Bartsch, 1915) in Herbert (2015) is superficially similar but the spiral ornamentation is not interrupted.

### *Episcynia* sp.

**Plate 124: fig. 4 a - c:** 1.65 x 1.40 x 0.58 mm (Moray Garden 17 m); all to scale.

URL 188: http://vieoceane.free.fr/mollusques/vitrinellidae.htm
URL 189: http://www.gastropods.com/6/Shell_51916.shtml

The specimen resembles the less flattened *Episcynia stenomphala* (Melvill, 1910) identified as *Fluxinella stenomphala* (Melvill, 1910) in URL 188. Melvill (1910) described *Fluxina stenomphala* (Seguenziidae in WoRMS) with a denticulate margin. *Circulter acuta* Laseron, 1958 has a narrower umbilicus and a less convex shoulder.

### *Lophocochlias procerus* Rubio & Rolán, 2015

**Plate 125: fig. 5 a, b:** 1.28 x 1.16 mm (Caves 15 m); **c, d:** 1.19 x 0.88 mm (Caves 17 - 19 m); **e:** 1.12 x 0.84 mm (Canyon 11 m); **f:** microstructure detail; **g, h:** 1.02 x 0.81 mm (Caves 16 m); a - e, g, h to scale.

Literature: Rubio & Rolán 2015, Alhejoj, Bandel & Al-Najjar, 2016.

URL 190: https://ingokurtz.jimdo.com/mollusca/tornidae/

The family assignment is still under discussion. "Aqabarellidae" Alhejoj, Bandel & Al-Najjar, 2016 is an unavailable family name, based on an unavailable type genus name. The name of the type species "*Aqabarella urdunensis*" Alhejoj, Bandel & Al-Najjar, 2016 is unavailable under Art. 16.4 (no explicit fixation of name-bearing types). This renders the genus name *Aqabarella* unavailable (Bouchet & Rocroi 2017). It is a synonym of *L. procerus* which is widely distributed in the Indo-Pacific with the type locality Aqaba, Jordan Red Sea (URL 190).

### *Pleuromalaxis* sp.

**Plate 125: fig. 6 a, b:** 1.48 x 1.35 mm (Caves 17 - 19 m); **c - e:** 1.65 x 1.36 x 1.27 mm (Caves 16 m); all to scale with 7 f.

URL 191: http://www.gastropods.com/9/Shell_22929.shtml

A fragment of this species from Eilat is identified as "*Cyclostrema*" sp. 10 in Edelman-Furstenberg & Faershtein (2010). The specimen has some similarity to *Pleuromalaxis pauli* Olsson & McGinty, 1958 from the Caribbean (URL 191). *Lissotesta radiata* (Hedley, 1907) is similar but has a sunken apex.

### *Pseudoliotia* sp.

**Plate 125: fig. 7 a, b:** 2.26 x 1.9 mm (Moray Garden 18 m); **c:** 1.93 x 1.59 mm (Caves 17 - 19 m); **d, e:** 1.92 x 1.6 mm (Moray Garden 18 m); **f**: 1.59 x 1.3 mm (Moray Garden 18 m); **g, h:** microstructure detail from umbonal view (g) and apical view (h); a - e to scale; f to scale with 6 a - e.

The protoconch is smooth comprising ca. 2.5 whorls. The teleoconch has ca. 1.5 - 2 whorls with 3 granulated spiral ridges which increase in number near the aperture. Radial ridges are most prominent and elevated at the ridges which further increases their granular appearance. Sometimes radial structure can only be seen around the upper most ridge and in the deep suture. *Cyclostrema solariellum* Melvill, 1893 is similar but is lacks the radial structure (Melvill 1906a).

### *Teinostoma* sp.

**Plate 126: fig. 8 a, b:** 0.96 x 0.73 mm (Blue Hole 4 m).

Literature: Laseron 1954, 1958a.

URL 192: https://ingokurtz.jimdo.com/mollusca/skeneidae/
URL 193: http://vieoceane.free.fr/mollusques/intro_frame.htm
URL 194: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-31069?listIndex=41&listCount=873

Similar shells are depicted as *Rotostoma* sp. in URL 192 and as *Rotostoma impleta* Laseron, 1958 in URL 193. *Teinostoma carbonnieri* Jousseaume, 1881 is also similar (URL 194).

### Tornidae Gen. sp.

**Plate 126: fig. 9 a, b:** 2.15 x 1.81 mm (Caves 33 m).

There are minute oblique riblets between the spiral ribs. The protoconch has ca. 2.5 smooth whorls.

## Vitrinellidae Bush, 1897

### *Circulus modestus* (Gould, 1859)

**Plate 126: fig. 10 a, b:** 4.56 x 3.79 mm (Lagoon seagrass 12 m); **c, d:** juvenile 1.06 x 0.89 mm (Canyon 11 m); **e:** microstructure detail from d.

Literature: Okutani 2000, 2017, Poppe 2008a.

URL 195: http://www.gastropods.com/9/Shell_17129.shtml

The median spiral rib on the early spire whorls is crenulated, becoming smoother in later whorls. Minute oblique radial striae can be observed between the spiral ribs.


9 a, b
8 a, b
10 a, b
10 e
10 c, d
11 a, b
11 c, d


12 a, b
12 e, f
12 g, h
12 c, d
12 i, j
13 a, b
12 k, l
13 c, d
14 a, b


1 c
1 a, b
2 a, b
1 d
3 a, b
3 e
3 c, d
3 h, i
3 f, g

*Circulus octoliratus* (Carpenter, 1856)

**Plate 126: fig. 11 a, b:** 1.58 x 1.35 mm (Moray Garden); **c, d:** 1.26 x 1.05 mm (Moray Garden).

Literature: Dekker & Orlin 2000, Dafni URL 1, Janssen et al. 2011.

*Vitrinella* sp. 1

**Plate 127: fig. 12 a, b:** 1.1 mm; **c, d:** 1.1 mm; **e, f:** 0.75 mm; **g, h:** 0.86 mm; **i, j:** 0.75 x 0.59 mm (Canyon); a - h Lagoon 13 m; whole plate to scale.

Literature: Janssen et al. 2011, Kurtz 2015.

Similar but smaller (0.46 mm) is *Vitrinella* (s. lat.) sp. in Janssen et al. (2011), while "*Cyclostrema*" *placens* in Bosch et al. (1995) is larger (1.5 mm). The specimen has faint spiral structure on the inner wall of the umbilicus, thus differing from *Tomura aqabaensis* Bandel, 2010.

*Vitrinella* sp. 2

**Plate 127: fig. 13 a, b:** 0.86 x 0.69 mm (Canyon 29 m); **c, d:** 0.9 x 0.7 mm (Moray Garden 17 m); whole plate to scale.

The specimens are similar to *Anticlimax* sp. 1, but smaller and with more prominent spiral sculpture on early teleoconch whorls. The spiral sculpture fades in later whorls and faint interrupted punctuation becomes visible in some parts of the shell. In addition, the spirals on the base are not prominent near the umbilicus. *Vitrinella* sp. 2 and *Vitrinella* sp. 3 are related to *Vitrinella urdunica* Bandel, 2010, but the fading spiral ribs are much less prominent in Bandel´s species.

*Vitrinella* sp. 3

**Plate 127: fig. 14 a, b:** 0.79 x 0.58 mm (Canyon 29 m); whole plate to scale.

The specimen is similar to *Vitrinella* sp. 2 in terms of spiral sculpture on early whorls and base. The aperture and the faint interrupted shell structure appear to be different.

## Vanikoridae Gray, 1840

*Berthais* cf. *egregia* (A. Adams, 1863)

**Plate 128: fig. 1 a, b:** 1.94 x 1.03 mm (Caves 15 m); **c, d:** detail of protoconch and suture from 1 b; a, b to scale with 2 a, b and 3 f, g.

Literature: Okutani 2000, 2017, Poppe 2008a, 2017, Janssen et al. 2011.

URL 196: http://www.gastropods.com/4/Shell_13274.shtml
URL 197: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-30336
URL 198: http://www.gastropods.com/8/Shell_75748.shtml
URL 199: http://www.gastropods.com/9/Shell_16499.shtml

This species is conspecific with *Macromphalus* sp. in Janssen et al. (2011: pl. 27, fig. 1). Very similar or even conspecific is *Zeradina parva* Poppe, Tagaro & Stahlschmidt, 2015 (URL 197, URL 198), identified as *Z. pliciferus* (Nevill, 1863) in Poppe (2008a, 2017b) and *M. pliciferus* (Adams, 1863) in Okutani (2000, 2017). *Macromphalus thelacme* (Melvill, 1904) has a prominent spiral sculpture and is more elongated (Bosch et al. 1995: fig. 220, URL 199). Shells match the description of Adams but the type was not seen.

*Macromphalus* sp.

**Plate 128: fig. 2 a, b:** 2.18 x 1.68 mm (El Gahaza 30 m); a, b to scale with 1 a, b and 3 f, g.

This species has far more inflated whorls than *Berthais* cf. *egregia*.

*Vanikoro acuta* (Récluz, 1844)

**Plate 128: fig. 3 a, b:** 6.3 x 6.5 mm; **c, d:** 6.7 x 5.3 mm; **e:** 4.8 x 3.9 mm; **f, g:** 1.42 x 1.02 mm (Canyon 11 m); **h, i:** 1.02 x 0.77 mm (Canyon 11 m); a - e to scale; f, g to scale with 1 a, b and 2 a, b.

Literature: Drivas & Jay 1989a, Bosch et al. 1995, Dekker & Orlin 2000, Dafni URL 1, Poppe 2017, Mienis 2018b.

URL 200: http://vieoceane.free.fr/mollusques/Vanikoridae.htm
URL 201: http://www.gastropods.com/6/Shell_17416.shtml

Specimens in this genus display a drastic change in the sculpture of the whorls during growth.

*Vanikoro* cf. *distans* (Récluz, 1844)

**Plate 129: fig. 4 a, b:** 0.75 x 0.57 mm (Canyon 11 m).

Literature: Drivas & Jay 1989a.

URL 202: http://vieoceane.free.fr/mollusques/Vanikoridae.htm

Identification is based on the juvenile shell depicted in Drivas & Jay (1989), in which the ribs are less plicated and the distance between them is relatively larger than in *V. acuta*. In contrast to *V. acuta* the Dahab specimen has only ca. 10 ribs on the first teleoconch whorl.

*Vanikoro disparilis* Deshayes, 1863

**Plate 129: fig. 5 a, b:** 2.51 x 2.02 mm (Blue Hole 4 m); **c:** 1.62 x 1.50 mm (Canyon 11 m); **d:** 1.31 x 0.80 mm (Caves); **e, f:** 1.24 x 0.69 mm (Caves); **g:** 0.98 x 0.87 mm (Canyon 11 m); **h:** detail of protoconch from 5 d; d - g to scale; c to scale with 7 a, b.

Literature: Deshayes 1863, Drivas & Jay 1989a.

URL 203: http://vieoceane.free.fr/mollusques/Vanikoridae.htm
URL 204: http://www.gastropods.com/8/Shell_17428.shtml

The specimens match the original description and figure. The axial sculpture is more pronounced in early whorls and later fades to approximately the size of the dense spiral rows.

*Vanikoro plicata* (Récluz, 1844)

**Plate 129: fig. 6 a, b:** 7.45 x 6.60 mm.

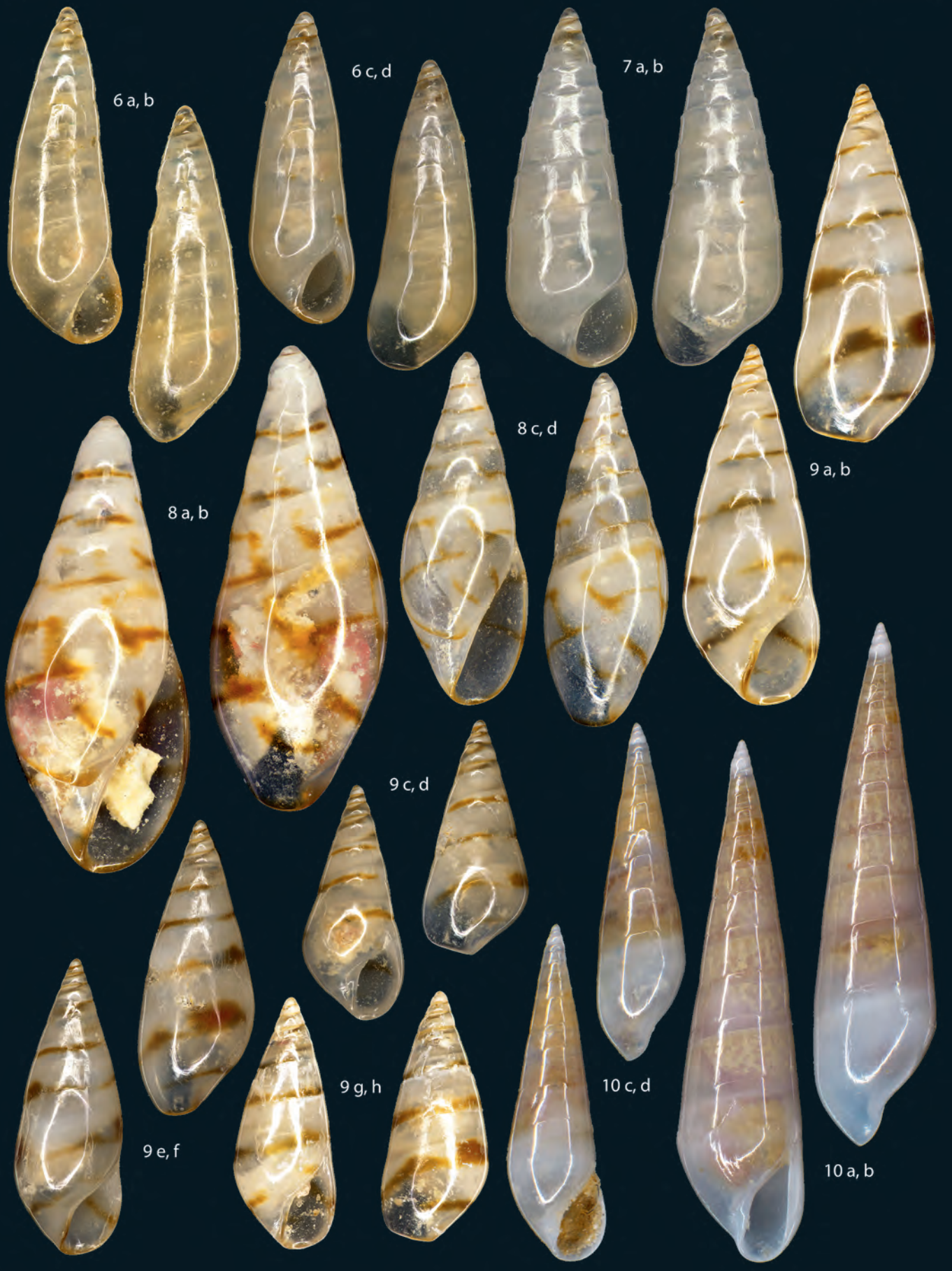
Literature: Drivas & Jay 1988, Drivas & Jay 1989a, Dekker & Orlin 2000, Dirkx & Verbinnen 2003b, Rusmore-Villaume 2008.

URL 205: http://vieoceane.free.fr/mollusques/Vanikoridae.htm

The strong axial ribs lose strength in later whorls. The specimen is similar to *V. gueriniana* (Récluz, 1844) but differs in colouration of the protoconch.


5 a, b
4 a, b
5 h
5 g
5 d
5 e, f
6 a, b
5 c
7 a, b


2 a, b
2 c, d
1 a, b
2 e, f
2 g, h
2 i, j
3 a, b
4 a, b
5 a, b


6 a, b
6 c, d
7 a, b
8 a, b
8 c, d
9 a, b
9 c, d
9 e, f
9 g, h
10 c, d
10 a, b

*Vanikoro* sp.

**Plate 129: fig. 7 a, b:** 1.35 x 1.08 mm (Canyon 11 m); to scale with 5 c.

A juvenile shell with prominent broad and rounded axial ribs. The numerous fine granulose spiral threads are much finer than in the other species from Dahab.

## Eulimidae Philippi, 1853

The family Eulimidae is, with few exceptions, parasitic on echinoderms (Warén 1983a).

*Clypeastericola* sp. Warén et al. 1994

**Plate 130: fig. 1 a, b:** 7.14 x 2.22 mm (South).

The single specimen was found on top of a *Clypeaster* exposed on the sediment. It fits the original description of the genus.



**Fig. 1 c:** *Clypeastericola* sp. on *Clypeaster humilis* at Moray Garden.

*Curveulima* sp. 1

**Plate 130: fig. 2 a, b:** 3.31 x 1.01 mm (Canyon); **c, d:** 2.75 x 1.00 mm; **e, f:** 2.33 x 0.79 mm (Canyon); **g, h:** 2.15 x 0.94 mm; **i, j:** 2.1 x 0.75 mm (Canyon 11 m); c, d e, f Islands north 10 m; all to scale with 3 a, b, 4 a, b and 5 a, b.

Literature: Warén 1983a.

URL 206: http://www.marinespecies.org/aphia.php?p=taxdetails&id=566101

URL 207: http://www.gastropods.com/Taxon_pages/TN_Family_EULIMIDAE.shtml

Shells are more translucent than the type of *Melanella bovicornu* (Pilsbry, 1905) in URL 206. Shape and aperture are different. *Melanella muelleriae* (Sturany, 1903) from the Saudi Arabian Red Sea is larger and the aperture is relatively broader (holotype in Albano et al. 2017). In *Vitreolina* there are similar species mainly described from the Mediterranean Sea (URL 207).

*Curveulima* sp. 2

**Plate 130: fig. 3 a, b:** 3.13 x 1.04 mm (Caves 16 m); to scale with 2 a - j, 4 a, b and 5 a, b.

The specimen looks like *Curveulima* sp. 1 but early whorls are somewhat straight and slender. The aperture is inflated (URL 206).

*Curveulima* sp. 3

**Plate 130: fig. 4 a, b:** 2.40 x 0.86 mm (Islands north 10 m); to scale with 2 a - j, 3 a, b and 5 a, b.

It looks like *Curveulima* sp. 2 but the ultimate whorl is angulated. The aperture is relatively short and the protoconch is different.

*Eulima gentilomiana* Issel, 1869

**Plate 130: fig. 5 a, b:** 2.04 x 0.79 mm (Caves 16 m); to scale with 2 a - j, 3 a, b and 4 a, b.

Literature: Savigny 1817, Issel 1869, Dekker & Orlin 2000.

URL 208: http://www.gastropods.com/0/Shell_78680.shtml

The specimen fits well in shape. However, it is slightly smaller than the type in Bouchet & Danrigal (1982) and the syntype depicted as *Subularia gentiluomiana* (sic.) Issel, 1869 (URL 208) from Suez. The shell is straight and translucent white with occasional faint reddish-brown spots and short bands. The apex is relatively broad (taxon inquirendum in WoRMS).

*Eulima* sp. 1

**Plate 131: fig. 6 a, b:** 2.40 x 0.77 mm (Moray Garden 2.5 m); **c, d:** 2.20 x 0.72 mm (Masbat Bay 5 m); all to scale with 7 a, b, 8 a, b and 9 a - h.

The shell is straight and translucent yellowish white. Its outline is slightly more convex than that of *E. gentilomiana*. The aperture is relatively smaller, with a faint reddish-brown spot at the centre of the outer lip which is sometimes also visible in the former varices. It has a broad apex.

*Eulima* sp. 2

**Plate 131: fig. 7 a, b:** 2.57 x 0.92 mm (Tigerhouse 7 m); to scale with 6 a - d, 8 a, b and 9 a - h.

It is comparable to *Eulima* sp. 1 but is stepped at the suture and more angulated at the base.

*Hemiliostraca metcalfei* (A. Adams, 1853)

**Plate 131: fig. 8 a, b:** 3.23 x 1.28 mm; **c, d:** 4.79 x 1.75 mm; a - d Tigerhouse 7 m; a, b to scale with 6 a - d, 7 a, b and 9 a - h; c, d to scale with 10 a - d.

Literature: Okutani 2000, 2017, Chen & Lee 2007, Rusmore-Villaume 2008, Poppe 2017a.

URL 209: http://www.gastropods.com/5/Shell_10005.shtml

The shell is straight and has a broad apex. It is translucent white with a colour pattern of interrupted spiral and axial reddish-brown lines. It also matches the specimens depicted in URL 209.


11 a, b
11 c, d
11 e, f
11 g
11 h, i
12 a, b
13 a, b
13 c, d
14 a, b
15 a, b
15 c, d

### *Hemiliostraca* aff. *vincta* (A. ADAMS, 1863)

**Plate 131: fig. 9 a, b:** 2.56 x 0.95 mm (Moray Garden 2.5 m); **c, d:** 1.67 x 0.71 mm (Masbat Bay 5 m); **e, f:** 2.09 x 0.80 mm (Masbat Bay 5 m); **g, h:** 1.78 x 0.71 mm (Caves 18 m); all to scale with 6 a - d, 7 a, b and 8 a, b.

Literature: OKUTANI 2000, 2017, POPPE 2017a

This species is identified as *Leiostraca vincta* A. ADAMS, 1864 (taxon inquirendum) in WoRMS. The shell is straight and translucent white with a reddish-brown spiral band on earlier whorls and 2 similar bands on the ultimate whorl. The Dahab specimens are much smaller (largest 2.1 mm) than OKUTANI's (7 mm) or POPPE's (5.9 mm). OKUTANI changed the name in 2017 to *Hemiliostraca fasciata* MATSUDA, UYENO & NAGASAWA, 2013. POPPE (2017a) considers *Hemiliostraca* to be more appropriate as well. *Eulimella arabica* ISSEL, 1869 (pl. II, fig. 5) has similar spiral bands, is 5 mm in size and slenderer.

### *Hypermastus* cf. *epiphanes* (MELVILL, 1897)

**Plate 131: fig. 10 a, b:** 7.05 x 1.71 mm; **c, d:** 4.58 x 1.19 mm; all Islands 13 m; all to scale with 8 c, d.

Literature: BOSCH et al. 1995, DAFNI URL 1, RUSMORE-VILLAUME 2008, AL-YAMANI et al. 2012.

The specimen was found on a black holothurian, partly buried in the sand at a depth of 13 m. The sea cucumber's skin was soft and velvety, probably *Holothuria* (*Halodeima*) *atra* JAEGER, 1833.



**Fig. 10 e:** *Hypermastus* cf. *epiphanes* on a sea cucumber at Suleiman Reef; 12 specimens can be recognised.

### *Melanella* sp. 1

**Plate 132: fig. 11 a, b:** 2.39 x 1.06 mm (Caves 16 m); **c, d:** 2.35 x 0.86 mm (Islands north 10 m); **e, f:** 4.54 x 1.93 mm (Canyon 22 m); **g:** 1.73 x 0.84 mm (Canyon 11 m); **h, i:** 2.48 x 1.05 mm (Caves 18 m); a - d, g - i to scale with 12 a, b, 13 a - d and 14 a, b; 11 e, f to scale with 15 a - d.

Literature: BOSCH et al. 1995, DEKKER & ORLIN 2000, WARÉN in POPPE 2008a, POPPE 2017a.

The gradually tapering spire which is often bent towards the apex indicates that this species could be *Melanella martinii* (A. ADAMS, 1854). The incremental scars are aligned or slightly staggered along the teleoconch. In some probable juveniles the apex appears straight. The *M. martinii* specimens in BOSCH et al. (1995) reach 20 mm while the Dahab and the Philippine specimens measure only up to 5 mm.

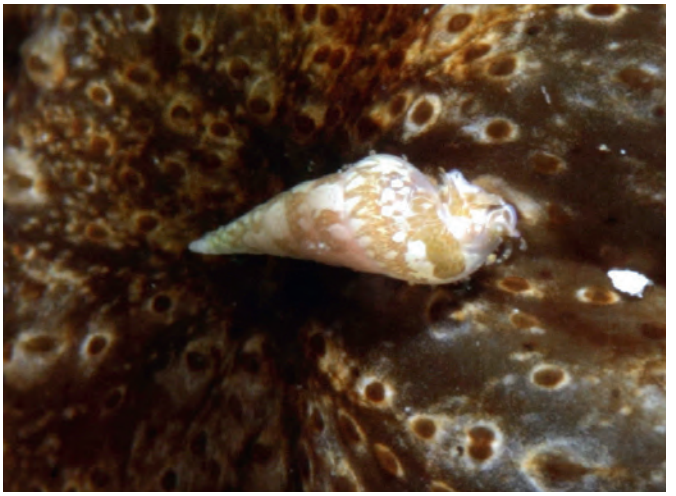


**Fig. 11 c**: *Melanella* sp. on a sea cucumber at Bannerfish (Masbat Bay) by Christian VON MACH.

### *Melanella* sp. 2

**Plate 132: fig. 12 a, b:** 2.74 x 1.68 mm (Caves 17 - 19 m); to scale with 11 a - d, g - i, 13 a - d and 14 a, b.

The specimen is similar to *Melanella* sp. 1 but much broader, thus coming close to *Parvioris styliferoides* (MELVILL & STANDEN, 1901). It may belong to the genus *Echineulima*.

### *Melanella* sp. 3

**Plate 132: fig. 13 a, b:** 2.82 x 1.15 mm (Islands reef crest); **c, d:** 2.93 x 1.11 mm (Islands reef crest); all to scale with 11 a - d, g - i, 12 a, b and 14 a, b.

The small shells with the slightly bent apex and the slightly inflated last whorl are very similar to *Melanella* sp. 1.

### *Melanella* sp. 4

**Plate 132: fig. 14 a, b:** 3.18 x 0.91 mm (Caves 15 m); to scale with 11 a - d, g - i, 12 a, b and 13 a - d.

Literature: POPPE 2017a.

URL 210: http://www.gastropods.com/6/Shell_18226.shtml

Some specimens of *M. acicula* (GOULD 1849) in URL 210 and *M. opalina* (MARSHALL, 1901) in POPPE (2017a) are similar.

### *Melanella* sp. 5

**Plate 132: fig. 15 a, b:** 5.88 x 1.62 mm; **c, d:** 4.91 x 1.1 mm; all Islands reef flat; all to scale with 11 e - f.

URL 211: http://www.gastropods.com/3/Shell_33343.shtml
URL 212: http://www.gastropods.com/1/Shell_27071.shtml

Similar species depicted in POPPE (2017a) are *Hypermastus acutus* (G. B. SOWERBY I, 1834), *Melanella shibana* (YOKOYAMA, 1927) and *M. tortuosa* (A. ADAMS & REEVE, 1850). *Melanella spiridioni* (DAUTZENBERG & H. FISCHER, 1896) from the Mediterranean Sea in URL 211 and *Vitreolina yod* (CARPENTER, 1857) from Pacific Americas in URL 212 are similar.


16 a, b
16 c, d
17 a, b
17 c, d
17 e, f
18 a, b
19 a, b
20 a, b
20 c, d

### *Melanella* sp. 6

**Plate 133: fig. 16 a, b:** 2.06 x 0.52 mm (Caves 17 m); **c, d:** 2.22 x 0.54 mm (Islands 9 m); whole plate to scale except 19 a, b.

This is a small straight and slender species.

### *Melanella* sp. 7

**Plate 133: fig. 17 a, b:** 3.47 x 1.15 mm (Lighthouse 34 m); **c, d:** 2.73 x 0.96 mm (Moray Garden 2.5 m); e, f: 2.00 x 0.65 mm (Blue Hole 18 m); whole plate to scale except 19 a, b.

The shell is small and straight with inflated later whorls.

### *Mucronalia exilis* A. Adams, 1862

**Plate 133: fig. 18 a, b:** 2.99 x 0.84 mm (Masbat Bay 5 m); whole plate to scale except 19 a, b.

Literature: Okutani 2000, 2017, Poppe 2017a.

URL 213: http://vieoceane.free.fr/mollusques/intro_frame.htm
URL 214: http://www.gastropods.com/0/Shell_58180.shtml

The shell matches *M. exilis* A. Adams, 1862 in Poppe (2017a). Some specimens identified as *Mucronalia bicincta* A. Adams, 1860 are similar (Okutani 2000, 2017, URL 213, URL 214, Kurtz 2015), but the syntype of *M. bicincta* in Warén (1983a) is larger, less elongated and is lacking the spiral bands.

### *Pulicicochlea astropyga* Ponder & Gooding, 1978

**Plate 133: fig. 19 a, b:** 1.32 x 0.60 mm (Golden Blocks 23 m).

Literature: Ponder & Gooding 1978, Warén 1983a.

URL 215: http://www.dafni.com/Echinodermata/Aulodonta.htm

The species was described as a parasite of the sea urchin *Astropyga radiata* and was reported from Fiji and Tahiti. The description matches well and the host *A. radiata,* although extremely rare, is known from Eilat (URL 215). *Selma succiniola* A. Adams, 1863 (holotype in Warén 1983a) has a broader protoconch, is larger and the aperture lacks the prominent posterior notch.

### *Pyramidelloides angulata* (Jickeli, 1882)

**Plate 133: fig. 20 a, b:** 2.37 x 0.81 mm (Caves 17 - 19 m); **c, d:** 2.33 x 0.85 mm (Blue Hole 4 m); whole plate to scale except 19 a, b.

URL 216: http://www.marinespecies.org/aphia.php?p=taxdetails&id=566222

Species of that genus are parasites on ophiuroids.

### *Pyramidelloides mirandus* (A. Adams, 1861)

**Plate 134: fig. 21 a, b:** 1.33 x 0.64 mm (Gabr El Bint Lagoon 15 m); whole plate to scale except 22 a - d.

Literature: Dekker & Orlin 2000, Poppe & Tagaro in Poppe 2010, Poppe 2017.

URL 217: http://www.gastropods.com/4/Shell_48254.shtml
URL 218: http://www.gastropods.com/4/Shell_69164.shtml
URL 219: http://vieoceane.free.fr/mollusques/Eulimidae.htm

A long list of synonyms is given in WoRMS.

### *Pyramidelloides viaderi* (Tomlin, 1939)

**Plate 134: fig. 22 a, b:** 4.01 x 1.14 mm (Caves 32 m); **c, d:** 2.96 x 0.82 mm (Caves 18 m).

Literature: Warén 1983b, Tringali & Oliverio 1995, Dekker & Orlin 2000.

URL 220: http://www.marinespecies.org/aphia.php?p=taxdetails&id=536353
URL 221: https://naturalhistory.museumwales.ac.uk/molluscatypes/Browserecord.php?-recid=174&-page=bibliography
URL 222: http://131.111.101.189/fmi/iwp/cgi?-db=UMZC%20Catalogues%20%28Web%29&-loadframes
URL 223: https://ingokurtz.jimdo.com/mollusca/eulimidae/

The type of *Rissoina viaderi* is depicted in URL 221. It is considered to be a synonym of *Pyramidelloides angustus* (Hedley, 1898) in WoRMS because of Warén (1983b) who stated that both holotypes have been examined by W. F. Ponder. However, they may not be conspecific as the protoconch, colour, and other details are different in the drawing (M. Faber pers. comm.). *Rissoa gracilis* A. Adams, 1870 (URL 222) from the Gulf of Suez is conspecific, however, is a homonym of *Rissoa gracilis* MacGillivray, 1843 and *Rissoa gracilis* Pease, 1860.

### *Sticteulima* aff. *lentiginosa* (A. Adams, 1861)

**Plate 134: fig. 23 a, b:** 1.71 x 0.60 mm (Masbat Bay 5 m); **c, d:** 1.75 x 0.57 mm (Canyon); **e, f:** 1.13 x 0.44 mm (Caves); **g, h:** 1.25 x 0.47 mm (Canyon); **i, j:** 1.26 x 0.48 mm (Canyon); whole plate to scale except 22 a - d.

Literature: Okutani 2000, 2017, Warén in Poppe 2008a, Scaperrotta et al. 2011, Poppe 2017a, b.

This species is the most common Eulimidae in Dahab. It is straight and translucent white with scattered rufous-brown dots. Shells are smaller and slenderer than the syntype of *S. lentiginosa* in Warén (1983a) and the specimens identified as *Hemiliostraca lentiginosa* (A. Adams, 1861) in Poppe (2017a, b). This species is a Lessepsian immigrant into the Mediterranean Sea (Campani 1999, Delongueville & Scaillet 2007, Scaperrotta et al. 2011). *Hemiliostraca amamiensis* (Habe, 1961), a taxon inquirendum in WoRMS, fits better in shape but is also larger (Okutani 2000, 2017, Poppe 2017a).

### *Sticteulima* sp. 2

**Plate 134: fig. 24 a, b:** 2.55 x 0.84 mm (Caves 32 m); whole plate to scale except 22 a - d.

The shell is much larger than the former species and appears to be less translucent.


21 a, b
22 a, b
22 c, d
23 i, j
23 g, h
23 e, f
23 a, b
24 a, b
23 c, d

*Thyca* cf. *ectoconcha* P. Sarasin & F. Sarasin, 1887

**Text figure 25:** not depicted on plate.

Literature: Waren 1980, Dekker & Orlin 2000, Dafni URL 1.

URL 224: http://www.gastropods.com/9/Shell_18309.shtml

The species was photographed on the host starfish *Linckia multifora,* suggesting that this shell is *Thyca ectoconcha*.

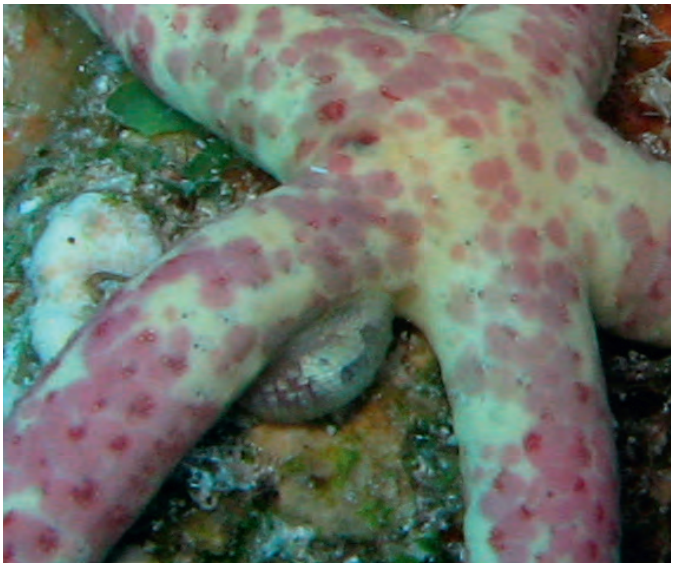


**Fig. 25:** *Thyca* cf. *ectoconcha* on *Linckia multifora* at Eel Garden.

## Cypraeidae Rafinesque, 1815

They are known by the common name cowry (cowries). Shells of live animals are not overgrown as they are almost always completely covered with the mantle when active. Thus, the shell is always smooth and shiny, just like chinaware. The German name is “Porzellanschnecken”, the Italian name is “porcellana”.

*Bistolida erythraeensis* (G. B. Sowerby I, 1837)

**Plate 135: fig. 1 a, b:** 20.5 x 12.4 mm (Masbat Bay); **c, d:** 20.2 x 11.1 mm; all to scale with 4 a - d.

Literature: Lorenz & Hubert 2000, Dekker & Orlin 2000, Heiman 2002b, Heiman & Mienis 2003a, Dafni URL 1, Rusmore-Villaume 2008, Lorenz 2017, 2018.

*Cypraea pantherina* Lightfoot, 1786

**Plate 135: fig. 2 a - c:** 102 x 59 mm (Bells).

Literature: Vine 1986, Debelius 1996, 2002, Lorenz & Hubert 2000, Dekker & Orlin 2000, Heiman & Mienis 2003a, Dafni URL 1, Lorenz 2017, 2018.

Only a single specimen was found at Bells (30 m). Specimens were sold at a Dahab market in 2005 (C. Von Mach pers. comm.). The species is listed in Lorenz as *C. pantherina* Solander, 1786 (see the remark to this publication in WoRMS). *Cypraea pantherina rasnasraniensis* Heiman & Mienis, 2001 has been described from the east coast of Sinai. The northern Red Sea population is considered a forma *syringa* Melvill, 1888 by Lorenz (2017, 2018).

*Erosaria nebrites* (Melvill, 1888)

**Plate 135: fig. 3 a - c:** 33.5 x 22.2 mm (South near boat jetty, police station).

Literature: Bosch et al. 1995, Lorenz & Hubert 2000, Dekker & Orlin 2000, Debelius 2002, Heiman 2002b, Heiman & Mienis 2003a, Lieske & Myers 2004, Dafni URL 1, Rusmore-Villaume 2008, Lacroix & Lacroix 2011, Lorenz 2017, 2018.

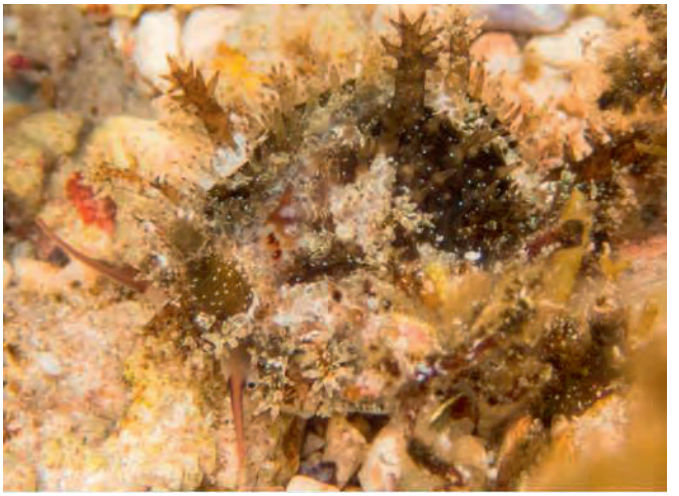


**Fig. 6 c:** *Erosaria nebrites* at Islands on the reef flat.



**Fig. 6 c:** *Erosaria nebrites* at Islands on the reef flat.

*Erronea caurica nabeqensis* Heiman & Mienis, 2000

**Plate 135: fig. 4 a, b:** 49.8 x 31.0 mm (Masbat Bay); **c, d:** 15.2 x 8.2 mm; c, d to scale with 1 a - d.

Literature: Lorenz & Hubert 2000, Dekker & Orlin 2000, Heiman 2002b, 2004, Heiman & Mienis 2003a, Lieske & Myers 2004, Dafni URL 1, Rusmore-Villaume 2008, Lacroix & Lacroix 2011, Lorenz 2017, 2018, Bergonzoni 2018.

This subspecies has not been confirmed by molecular analysis yet and may still fall within *E. caurica quinquefasciata* (Röding, 1798). However, it is more coloured, larger and more calloused and there are intermediate morphs south of Hurgada. According to Lorenz (2017) Mediterranean Sea finds of *E. caurica quinquefasciata* are questionable, but Bergonzoni suggests that additional subspecies might have been introduced. The juvenile specimen was identified using a series of shells in different growth phases in the collection of H. Dekker (pers. comm.).


1 a, b
1 c, d
2 a - c
4 c, d
4 a, b
3 a, b
5 a, b
6 a, b

*Luria isabella* (Linnaeus, 1758)

**Plate 135: fig. 5 a, b:** 33.9 x 19.0 mm.

Literature: Bosch et al. 1995, Lorenz & Hubert 2000, Blatterer et al. 2000, Dekker & Orlin 2000, Heiman & Mienis 2003a, Lieske & Myers 2004, Dafni URL 1, Rusmore-Villaume 2008, Lorenz 2017, 2018.

*Luria pulchra* (Gray, 1824)

**Plate 135: fig. 6 a, b:** 42.2 x 24.2 mm.

Literature: Bosch et al. 1995, Lorenz & Hubert 2000, Dekker & Orlin 2000, Debelius 2002, Heiman & Mienis 2003a, Lieske & Myers 2004, Dafni URL 1, Rusmore-Villaume 2008, Lorenz 2017, 2018.

The subspecies *Luria pulchra sinaiensis* Heiman & Mienis, 2000 is considered to be a form in Lorenz (2018).



**Fig. 6 c:** *Luria pulchra* at Islands during a night dive at a depth of 13 m.

*Lyncina carneola* (Linnaeus, 1758)

**Plate 136: fig. 7 a, b:** 32.8 x 22.3 mm.

Literature: Bosch et al. 1995, Lorenz & Hubert 2000, Dekker & Orlin 2000, Debelius 2002, Heiman 2002b, Heiman & Mienis 2003a, Dafni URL 1, Rusmore-Villaume 2008, Lacroix & Lacroix 2011, Lorenz 2017, 2018.

*Lyncina leviathan titan* Schilder & Schilder, 1962

**Plate 136: fig. 8 a, b:** 54.8 mm.

Literature: Dekker & Orlin 2000, Heiman 2002b, Heiman & Mienis 2003a, Lorenz 2017, 2018.

This species was sometimes regarded as a giant form of *Lyncina carneola* var. *crassa* (Gmelin, 1791). However, there are molecular differences and a shallow groove between the labrum and the dorsum is visible in *L. leviathan* (Lorenz 2017).

*Lyncina lynx* (Linnaeus, 1758)

**Plate 136: fig. 9 a, b:** 41.6 x 26.9 mm.

Literature: Bosch et al. 1995, Debelius 1996, 2002, Lorenz & Hubert 2000, Dekker & Orlin 2000, Heiman 2002b, Heiman & Mienis 2003a, Dafni URL 1, Rusmore-Villaume 2008, Lacroix & Lacroix 2011, Lorenz 2017, 2018.

This is the only cowry with a longitudinal ridge of callus along the base (Lorenz 2017). Only a single specimen was found.

*Mauritia grayana* Schilder, 1930

**Plate 136: fig. 10 a - c:** 47.9 x 30.5 mm (Lighthouse 10 m); **d, e:** 63.0 x 38.8 mm; **f, g:** 53.7 x 32.5 mm; **h, i:** juvenile 37.4 x 27.3 mm; d - g to scale.

Literature: Vine 1986, Bosch et al. 1995, Lorenz & Hubert 2000, Blatterer et al. 2000, Dekker & Orlin 2000, Debelius 2002, Heiman 2002b, Heiman & Mienis 2003a, Lieske & Myers 2004, Dafni URL 1, Rusmore-Villaume 2008, Lacroix & Lacroix 2011, Lorenz 2017, 2018.



**Fig. 10 j:** *Mauritia grayana* during a night dive by Silke Baron.

*Monetaria annulus* (Linnaeus, 1758)

**Plate 136: fig. 11 a, b:** 19.4 x 13.5 mm.

Literature: Dekker & Orlin 2000, Heiman & Mienis 2003a, Dafni URL 1, Lorenz 2017, 2018.

Only a single specimen of this species was found.

*Naria macandrewi* (G. B. Sowerby II, 1870)

**Plate 137: fig. 12 a, b:** 19.2 x 10.4 mm (North); **c, d:** 15.9 x 9.0 mm (North); c, d to scale with 14 a - d, 15 a, b and 16 a - c.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Heiman 2002b, Heiman & Mienis 2003a, Dafni URL 1, Rusmore-Villaume 2008, Lorenz 2017, 2018.

The name was introduced with the spelling "*macandrei*". According to descriptive notes in WoRMS the emended spelling "*macandrewi*" is used.

*Naria turdus* (Lamarck, 1810)

**Plate 137: fig. 13 a, b:** 34.4 x 24.1 mm.

Literature: Lorenz & Hubert 2000, Dekker & Orlin 2000, Debelius 2002, Heiman 2002b, Heiman & Mienis 2003a, Dafni URL 1, Rusmore-Villaume 2008, Kovalis 2009, Lorenz 2017, 2018, Okon 2018.

*Erosaria turdus pardalina* (Dunker, 1852) is a form of *Naria turdus*. This species is a Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007).

(continued after plates)


7 a, b
8 a, b
9 a, b
10 a - c
10 d, e
10 f, g
10 h, i
11 a, b


12 a, b
12 c, d
13 a, b
14 a, b
14 c, d
15 a, b
16 a, b
16 c


17 a, b
18 a, b
19 c, d
19 a, b
20 a, b
20 c, d
20 e, f
20 g, h



**Fig. 13 c:** *Naria turdus* was found during a beach and dive site cleaning inside a plastic bottle at Lagoon.

### *Purpuradusta gracilis notata* (Gill, 1858)

**Plate 137: fig. 14 a, b:** 13.5 x 7.4 mm (South); **c, d:** 13.2 x 7.7 mm; all to scale with 12 c, d, 15 a, b and 16 a - c.

Literature: Bosch et al. 1995, Lorenz & Hubert 2000, Dekker & Orlin 2000, Heiman & Mienis 2003a, Dafni URL 1, Rusmore-Villaume 2008, Lorenz 2017, 2018.

This species is a Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007).

### *Pustularia cicercula tricornis* (Jousseaume, 1874)

**Plate 137: fig. 15 a, b:** 14.7 x 8.7 mm (South); to scale with 12 c, d, 14 a, b and 16 a - c.

Literature: Dekker & Orlin 2000, Heiman & Mienis 2003a, Dafni URL 1, Rusmore-Villaume 2008, Lorenz 2014, 2017, 2018.

### *Pustularia marerubra* Lorenz, 2009

**Plate 137: fig. 16 a, b:** 12.2 x 7.3 mm (North); **c:** 12.4 x 8.1 mm (South); all to scale with 12 c, d, 14 a - d and 15 a, b.

Literature: Lorenz & Hubert 2000, Dekker & Orlin 2000, Heiman & Mienis 2003a, Dafni URL 1, Rusmore-Villaume 2008, Lorenz 2009, 2014, 2017, 2018.

### *Staphylaea staphylaea laevigata* (Dautzenberg, 1932)

**Plate 138: fig. 17 a, b:** 17.2 x 11.0 mm (South); to scale with 19 c, d.

Literature: Bosch et al. 1995, Lorenz & Hubert 2000, Dekker & Orlin 2000, Heiman 2002b, Heiman & Mienis 2003a, Dafni URL 1, Lorenz 2017, 2018.

### *Talostolida teres elatensis* (Heiman & Mienis, 2002)

**Plate 138: fig. 18 a, b:** 36.1 x 18.9 mm.

Literature: Bosch et al. 1995, Lorenz & Hubert 2000, Dekker & Orlin 2000, Heiman 2002b, Heiman & Mienis 2003a, Dafni URL 1, Lorenz 2017, 2018.

### *Talparia talpa* (Linnaeus, 1758)

**Plate 138: fig. 19 a, b:** approximately 7 cm in length; shell disappeared from the collection in Dahab: **c, d:** 13.9 x 6.8 mm; c, d to scale with 17 a, b.

Literature: Bosch et al. 1995, Lorenz & Hubert 2000, Dekker & Orlin 2000, Heiman 2002b, Heiman & Mienis 2003a, Lieske & Myers 2004, Dafni URL 1, Lacroix & Lacroix 2011, Lorenz 2017, 2018.

The juvenile is dark brown except for the white columella.

### Cypraeidae spp.

**Plate 138: fig. 20 a, b:** 2.51 x 1.43 mm (Moray Garden 2.5 m); **c, d:** 3.1 x 2.2 mm (Islands north 10 m); **e, f:** 1.3 5 x 1.1 mm (Blue Hole); g, h: 0.8 mm (Caves 17 m).

The protoconchs of Cypraeidae have a reticulate sculpture.

## Ovulidae Fleming, 1822

The Ovulidae are known by the common name ovulids, cowry allies or false cowries. They are feeding on polyps and tissues of Anthozoa.

### *Calpurnus verrucosus* (Linnaeus, 1758)

**Text figure 1:** not depicted on plate.

Literature: Debelius 1996, 2002, Dekker & Orlin 2000, Lieske & Myers 2004, Dafni URL 1, Lorenz & Fehse 2009.



**Fig. 1:** A single live specimen of *Calpurnus verrucosus* was found on the leather coral *Sarcophyton* (night dive at Lighthouse by Silke Baron).

### *Prosimnia hepcae* Lorenz & Fehse, 2011

**Plate 139: fig. 2 a, b:** 4.71 x 1.53 mm (Caves 15 m); to scale with 3 a, b.

Literature: Lorenz & Fehse 2011.

URL 225: https://ingokurtz.jimdo.com/mollusca/

The species is characterised by its numerous, very fine transverse dorsal striae. The dorsal elevation is highest at the posterior third. Only a single shell was found.

### *Prosimnia* sp.

**Plate 139: fig. 3 a, b:** 5.79 x 1.92 mm (Caves 15 m); to scale with 2 a, b.

Literature: Lorenz & Fehse 2009.

The fragment of an undescribed species was found in the same sample as *P. hepcae*. In contrast to the former species it has longitudinal striae on its surface. *Prosimnia semperi* (Weinkauff, 1881) also has a coarsely undulated outer labral margin but a granulose surface and is probably a complex of species.


2 a, b
4 a, b
5 a - c
3 a, b
6 a - c
7 d, e
7 a - c

## Triviidae Troschel, 1863

Triviidae look like small cowries but are characterised by their transverse ridges. They are known to feed on tunicates. Fehse & Grego (2009) found 20 different species in the Red Sea, 12 of which even originate from the Dahab region.

### *Purpurcapsula rubramaculosa* (Fehse & Grego, 2002)

**Plate 139: fig. 4 a, b:** 3.49 x 2.57 mm (Islands 9 m).

Literature: Dafni URL 1, Rusmore-Villaume 2008, Fehse & Grego 2009, Janssen et al. 2011.

This is the only reddish coloured Triviidae known from the Red Sea (Fehse & Grego 2009).

### *Trivirostra dekkeri* Fehse & Grego, 2009

**Plate 139: fig. 5 a - c:** 7.08 x 4.84 mm (Masbat Bay); all to scale with 6 a - c and 7 a - c.

Literature: Fehse & Grego 2009.

This species is distinguished by its elongated terminals and the broad and deepened dorsal furrow. However, the described keel is not clearly visible in the specimen.

### *Trivirostra triticum* Schilder, 1932

**Plate 139: fig. 6 a - c:** 8.21 x 5.76 mm (Masbat Bay 1.5 m); all to scale with 5 a - c and 7 a - c; same specimen as in fig. 6 d, 6 e.

Literature: Fehse & Grego 2009, Janssen et al. 2011, Fehse 2017.

This species is a common shell in the Red Sea. It is heavily built and has a somewhat broad and deepened dorsal furrow. The Dahab shells have 24 - 25 labral teeth. The shell looks like *T. poppei* in Janssen et al. (2011), but according to Fehse & Grego (2009) *T. poppei* has more (33) labral teeth.



**Fig. 6 d:** *Trivirostra triticum* found on a rock which was covered by algae in a depth of 1.5 m at Masbat Bay.

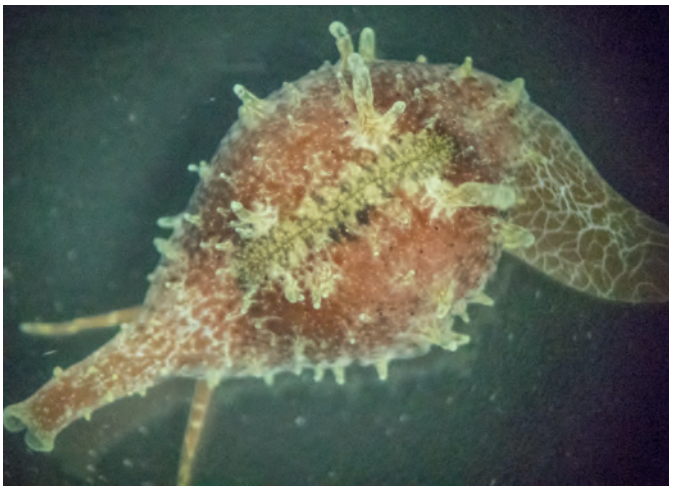


**Fig. 6 e:** *Trivirostra triticum.* This is the same specimen as in fig. 6 d as seen under the binocular microscope. It was killed and eaten by *Vexillum revelatum,* kept in the same Petri dish.

### *Trivirostra turneri* Schilder, 1932

**Plate 139: fig. 7 a - c:** 8.21 x 5.76 mm (beached near Three Pools); **d, e:** juvenile of probable this species 4.95 x 3.81 mm (Caves 4 m); a - c to scale with 5 a - c and 6 a - c; d, e enlarged.

Literature: Blatterer et al. 2000, Dekker & Orlin 2000, Fehse & Grego 2009.

The specimen is lacking dorsal depression which indicates *Trivirostra turneri*. There is a second similar species, *T. natalensis* Schilder, 1932, known from the same region with the dorsum roundly elevated without a dorsal furrow. However, this has at least an indicated dorsal depression. The juvenile shell cannot be identified with certainty but may be conspecific as it is lacking dorsal depression.

## Velutinidae Gray, 1840

The internal shell of these animals is very thin and delicate and completely covered by the mantle. Velutinidae are assigned to Lamellariidae d'Orbigny, 1841, which is accepted as a subfamily in WoRMS, by many authors.

### Lamellariinae d'Orbigny, 1841

#### Lamellariinae Gen. sp.

**Plate 140: fig. 1 a, b:** 2.37 x 1.82 mm (Blue Hole 18 m).

This may be a juvenile of *Coriocella safagae*, but the described adult shells are 11 - 16 mm in length and appear to have an umbilicus (Buijse & Verbinnen 2006).

### *Coriocella safagae* Wellens, 1999

**Text figure 1 c:** not depicted on plate.

Literature: Wellens 1999, Dekker & Orlin 2000, Dirkx & Verbinnen 2003c, Dafni URL 1.

(continued after plate)


1 a, b
2 a
2 b, c
2 d
3 a, b
4 g
4 a, b
4 j
4 h, i
4 f
4 m
4 k, l
6 e
4 e
4 c, d
5 c
6 c, d
5 a, b
6 a, b
5 d



**Fig. 1 c:** *Coriocella safagae* during a night dive at Lighthouse by Christian VON MACH.

## Strombidae RAFINESQUE, 1815

They are commonly known as Strombids or the true conchs and are specialised herbivores and occasional detritivores. Usually these animals inhabit reefs and seagrass meadows.

### *Canarium erythrinum* (DILLWYN, 1817)

**Plate 140: fig. 2 a:** 30.7 x 25.3 mm; **b, c:** 29.8 x 14.1 mm; **d:** 23.5 x 11.2 mm; whole plate to scale except 1 a, b and 6 e.

Literature: BOSCH et al. 1995, PICKERY & WELLENS 1998, KREIPL & POPPE 1999, DEKKER & ORLIN 2000, HEIMAN 2002d, DAFNI URL 1, RUSMORE-VILLAUME 2008.

URL 226: http://www.stromboidea.de/?n=People.ScottJohnson

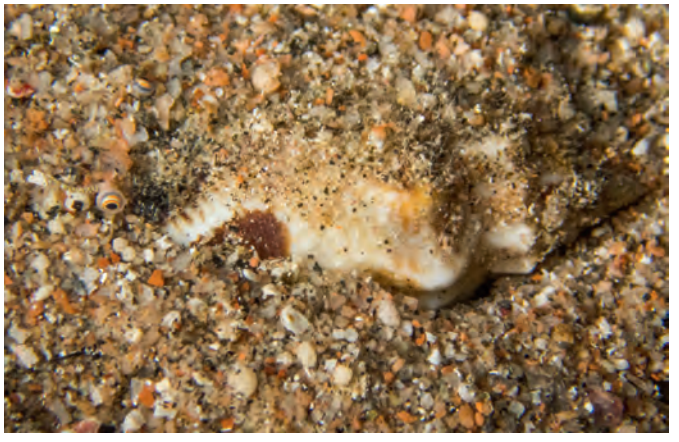


**Fig. 2 f:** *Canarium erythrinum* during a night dive at Moray Garden.

### *Canarium fusiforme* (SOWERBY II, 1842)

**Plate 140: fig. 3 a, b:** 31.2 x 16.0 mm; whole plate to scale except 1 a, b and 6 e.

Literature: BOSCH et al. 1995, PICKERY & WELLENS 1998, KREIPL & POPPE 1999, DEKKER & ORLIN 2000, HEIMAN 2002d, DAFNI URL 1, RUSMORE-VILLAUME 2008.

### *Canarium mutabile* (SWAINSON, 1821)

**Plate 140: fig. 4 a, b:** 29.5 x 16.9 mm; **c, d:** 28.4 x 17.3 mm; **e:** 27.7 x 16.0 mm; **f:** 22.8 x 13.7 mm; **g:** 22.9 x 13.5 mm; **h, i:** 23.5 x 13.6 mm; **j:** 21.4 x 13.0 mm; **k, l:** 21.0 x 12.7 mm; **m:** 20.2 x 10.8 mm; whole plate to scale except 1 a, b and 6 e.

Literature: BOSCH et al. 1995, PICKERY & WELLENS 1998, KREIPL & POPPE 1999, BLATTERER et al. 2000, DEKKER & ORLIN 2000, HEIMAN 2002d, DAFNI URL 1, BANDEL 2007, RUSMORE-VILLAUME 2008.

This is the most commonly found Strombidae in Dahab.

### *Conomurex fasciatus* (BORN, 1778)

**Plate 140: fig. 5 a, b:** 36.5 x 19.9 mm; **c:** 34.2 x 17.8 mm; **d:** 31.9 x 20.5 mm; whole plate to scale except 1 a, b and 6 e.

Literature: DEBELIUS 1996, 2002, PICKERY & WELLENS 1998, KREIPL & POPPE 1999, DEKKER & ORLIN 2000, HEIMAN 2002d, DAFNI URL 1, RUSMORE-VILLAUME 2008, LACROIX & LACROIX 2011.

According to KREIPL & POPPE (1999) the form *Strombus* (*Lentigo*) *fasciatus elegans* are females.

### *Gibberulus gibberulus albus* (MÖRCH, 1850)

**Plate 140: fig. 6 a, b:** 44.5 x 24.4 mm; **c, d:** 41.7 x 25.5 mm; **e:** juvenile 1.85 x 1.32 mm (Lagoon seagrass 12 m); whole plate to scale except 1 a, b and 6 e.

Literature: BOSCH et al. 1995, PICKERY & WELLENS 1998, KREIPL & POPPE 1999, DEKKER & ORLIN 2000, HEIMAN 2002d, DAFNI URL 1, BANDEL 2007, RUSMORE-VILLAUME 2008.

The juvenile was tentatively assigned to this species according to BANDEL (2007: 195). The early ontogenetic shell of most Strombidae is quite similar, and juveniles are difficult to distinguish from each other BANDEL (2007: 193).



**Fig. 9 d:** *Gibberulus gibberulus albus* at Nabq on the reef flat.

### *Lambis truncata sebae* (KIENER, 1843)

**Plate 141: fig. 7 a, b:** 290 mm; **c:** this shell is in the Dahab collection and was not measured.

Literature: VINE 1986, BOSCH et al. 1995, PICKERY & WELLENS 1998, KREIPL & POPPE 1999, DEKKER & ORLIN 2000, DEBELIUS 2002, HEIMAN 2002d, DAFNI URL 1, RUSMORE-VILLAUME 2008, DAFNI 2008, LACROIX & LACROIX 2011.

(continued after plate)


7 a, b
7 c
9 a, b
9 c
8 a, b
8 c, d
10 a, b



**Fig. 7 d:** *Lambis truncata sebae,* unfortunately sold in some tourist-shops in Dahab.



**Fig. 7 e:** My son Merlin joined the dive trips at the age of 11. Here he holds a *Lambis truncata sebae* at Abu Galum.



**Fig. 7 f:** *Lambis truncata sebae* at Lighthouse by Silke Baron.

### *Terestrombus terebellatus* (G. B. Sowerby II, 1842)

**Plate 141: fig. 8 a, b:** 30.1 x 10.4 mm; **c, d:** 28.9 x 11.1 mm.

Literature: Pickery & Wellens 1998, Kreipl & Poppe 1999, Dekker & Orlin 2000, Heiman 2002d, Kronenberg & Vermeij 2002, Dafni URL 1.

### *Tricornis tricornis* ([Lightfoot], 1786)

**Plate 141: fig. 9 a, b:** 150 x 100 mm; **c:** 110 x 70 mm.

Literature: Bosch et al. 1995, Pickery & Wellens 1998, Kreipl & Poppe 1999, Dekker & Orlin 2000, Debelius 2002, Heiman 2002d, Dafni URL 1, Rusmore-Villaume 2008, Lacroix & Lacroix 2011.

In Kreipl & Poppe "Humphrey, 1786" is given as the author. The largest specimen in the collection is 137 mm in length.



**Fig. 9 d:** *Tricornis tricornis* at Islands at a depth of 13 m.

## Seraphsidae Gray, 1853

### *Terebellum terebellum* (Linnaeus, 1758)

**Plate 141: fig. 10 a, b:** 31.4 x 9.0 mm.

Literature: Bosch et al. 1995, Pickery & Wellens 1998, Kreipl & Poppe 1999, Blatterer et al. 2000, Dekker & Orlin 2000, Rusmore-Villaume 2008, Maxwell et al. 2018.

The largest Dahab specimen is 34.7 mm in length.



**Fig. 10 c:** *Terebellum terebellum* during a night dive at Bannerfish by Christian von Mach.

## Tonnidae Suter, 1913 (1825)

### *Malea pomum* (Linnaeus, 1758)

**Plate 142: fig. 1 a, b:** 53.6 x 35.1 mm; **c, d:** 39.0 x 28.9 mm; **e:** 27.6 x 19.8 mm; **f:** 28.8 x 20.6 mm; all to scale with 3 c and 4 a, b.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Verbinnen & Pickery 2001, Dafni URL 1, Vos & Terryn 2007, Rusmore-Villaume 2008.


1 a. b
1 c, d
1 e
1 f
2 a, b
4 a, b
3 a. b
3 c

### *Tonna canaliculata* (Linnaeus, 1758)

**Plate 142: fig. 2 a, b:** 54.0 x 41.4 mm.

Literature: Dekker & Orlin 2000, Verbinnen & Pickery 2001, Dafni URL 1, Vos & Terryn 2007, Vos in Poppe 2008a.

URL 227: http://www.marinespecies.org/aphia.php?p=image&pic=40752

The syntype is depicted in WoRMS (URL 227). *Bulla canaliculata* Linnaeus, 1758 was suppressed in 1958 (Opinion 539) but continues to be used as *Tonna canaliculata* (Linnaeus, 1758) Welter-Schultes (2012).

### *Tonna perdix* (Linnaeus, 1758)

**Plate 142: fig. 3 a, b:** 150 mm (South); **c:** 34.0 x 22.5 mm (Nabq); c to scale with 1 a - f and 4 a, b.

Literature: Vine 1986, Bosch et al. 1995, Dekker & Orlin 2000, Verbinnen & Pickery 2001, Lieske & Myers 2004, Dafni URL 1, Vos & Terryn 2007, Rusmore-Villaume 2008, Vos in Poppe 2008a.

Shells reach up to 150 mm, are light weighted and have a distinct colour pattern. An almost white shell was found at Nabq.



**Fig. 3 d:** *Tonna perdix* juvenile at Lagoon.

### *Tonna* aff. *tenebrosa* (Hanley, 1860)

**Plate 142: fig. 4 a, b:** 42.6 x 32.2 mm; to scale with 1 a - f and 3 c.

Literature: Dekker & Orlin 2000, Vos & Terryn 2007.

This single shell has a secondary cord which is visible in most interspaces of the posterior half of the last whorl. It has a deep suture and a flat spire. *Tonna canaliculata* (Linnaeus, 1758) and *T. galea* (Linnaeus, 1758) are similar. The original description is from the Red Sea, however, the neotype is a relatively large shell with a higher spire (Vos & Terryn 2007).

## Bursidae Thiele, 1925

The Bursidae are known by their common name frog snails or frog shells. They are active predators and seem to feed on bristle worms (Polychaeta).

### *Bursa granularis* (Röding, 1798)

**Plate 143: fig. 1 a, b:** 24.6 x 14.5 mm.

Literature: Cossignani 1994, Bosch et al. 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Heiman 2002c, van Gemert 2004b, Dafni URL 1, Verbinnen & Buijse 2007, Rusmore-Villaume 2008, Lacroix & Lacroix 2011, Sanders et al. 2017 (revision of the species complex).

The largest shell in the collection reaches 45 mm in length.




**Fig. 1 c:** Protoconch of *Bursa granularis* 2.52 x 2.18 mm (Caves 15 m).

### *Bursa paulucciana* (Tapparone Canefri, 1876)

**Plate 143: fig. 2 a, b:** 29.8 x 21.4 mm.

Literature: Cossignani 1994, Beu 1998, Dekker & Orlin 2000, Heiman 2002c, van Gemert 2004b, Dafni URL 1, Verbinnen & Buijse 2007, Dekker & van Gemert 2008, Lacroix & Lacroix 2011.

The species is listed in WoRMS as a synonym of *B. rhodostoma* (G. B. Sowerby II, 1835). For identification Dekker & van Gemert (2008) are followed, as the aperture in the Red Sea species is bright pink, not red as in *B. rhodostoma*. Additionally, the knobs on the columellar callus are different.



**Fig. 2 c, d:** Live *Bursa paulucciana* adult at Masbat Bay (left) and a juvenile at Caves (right).


1 a, b
2 a, b
3 a, b
3 c, d
4 a, b
5 a, b
6 a
7 a, b
8 a, b

### Bursidae? 1

**Plate 143: fig. 3 a, b:** 1.13 x 0.91 mm (Caves 18 m); **c, d:** 1.24 x 1.16 mm (Canyon 22 m); a, b to scale with 4 a, b.

Shells are probably protoconchs of a Bursidae. Comparable examples are shown in BEU (1998: 140, fig. 47).

### Bursidae? 2

**Plate 143: fig. 4 a, b:** protoconch 1.63 x 1.47 mm (Caves 16 m); to scale with 3 a, b.

This is probably another protoconch of a member of this family.

### *Tutufa bufo* (RÖDING, 1798)

**Plate 143: fig. 5 a, b:** 90 mm (on beach at Caves).

Literature: COSSIGNANI 1994, DEKKER & ORLIN 2000, HEIMAN 2002c, VAN GEMERT 2004b, DAFNI URL 1, VERBINNEN & BUIJSE 2007.

This specimen was inhabited by an Anemone Carrier hermit crab *Dardanus* sp. and was overgrown with sea anemones and *Sabia conica* (still attached). The crab was brought ashore by disrespectful people, where it unfortunately died.



**Fig. 5 c:** *Tutufa bufo* at Masbat Bay by Christian VON MACH.

### *Tutufa* cf. *rubeta* (LINNAEUS, 1758)

**Plate 143: fig. 6 a:** 110 mm.

Literature: SHARABATI 1984, COSSIGNANI 1994, DEKKER & ORLIN 2000, HEIMAN 2002c, VERBINNEN & BUIJSE 2007, DAFNI 2008.

This worn, probably fossil specimen was added to the collection by students.

## Cassidae LATREILLE, 1825

The Cassidae are commonly called helmet snails or bonnet snails. They prey on echinoderms, especially sea urchins.

### *Casmaria erinaceus* (LINNAEUS, 1758)

**Plate 143: fig. 7 a, b:** 36 x 21 mm (Blue Lagoon).

Literature: KREIPL 1997, VERBINNEN & PICKERY 2001, DAFNI URL 1, RUSMORE-VILLAUME 2008, KREIPL in POPPE 2008a, BUIJSE et al. 2013, VERBINNEN et al. 2016.

The main differences to *C. unicolor* are the position and direction of the teeth. Additionally, there are no dark brown spots below the suture.

### *Casmaria unicolor* (PALLARY, 1926)

**Plate 143: fig. 8 a, b:** 74 x 45 mm (Napoleon Reef).

Literature: KREIPL 1997, BLATTERER et al. 2000, DEKKER & ORLIN 2000, VERBINNEN & PICKERY 2001, DEBELIUS 2002, LIESKE & MYERS 2004, DAFNI URL 1, RUSMORE-VILLAUME 2008, BUIJSE et al. 2013, VERBINNEN et al. 2016.

Some specimens look like *C. beui* BUIJSE, DEKKER & VERBINNEN, 2013, but it seems that *C. beui* lives outside the Red Sea and *C. unicolor* only in the Red Sea.



**Fig. 8 c:** *Casmaria unicolor* preying on *Diadema* during night dive by Silke BARON.



**Fig. 8 d:** *Casmaria unicolor* during a night dive at Lighthouse by Philipp MAITZ.

## Personidae GRAY, 1854

### *Distorsio anus* (LINNAEUS, 1758)

**Plate 144: fig. 1 a - c:** 38 mm; **d:** 34 mm; **e:** 23 mm; all to scale; **f - g:** protoconch perhaps of *Distorsio anus* 1.65 x 1.01 mm (Canyon 11 m).

Literature: KRONENBERG 1994, WELLENS & WILS 1997, BEU 1998, DEKKER & ORLIN 2000, HEIMAN 2002c, ROBIN 2008, RUSMORE-VILLAUME 2008, KRONENBERG & BEU in POPPE 2008a.

The species has a wide columellar and labial expansions. The identity of the juvenile is uncertain, especially as BEU (1998) describes a peculiar periostracal sculpture.


1 a - c
1 d
1 e
1 f, g
2 a - c
3 a, b
3 c, d
3 e, f
3 g, h
4 a, b
4 c, d

## Charoniidae Powell, 1933

This and the following family have formerly been assigned to Ranellidae Gray, 1854. They are commonly called triton shells or tritons and are small to very large predatory sea snails. A molecular phylogeny and revised family classification of the superfamily Tonnoidea was published by Strong et al. (2018).

### *Charonia tritonis* (Linnaeus, 1758)

**Plate 144: fig. 2 a, c:** 340 mm; **b:** operculum of this specimen to scale.

Literature: Vine 1986, Bosch et al. 1995, Wellens & Wils 1997, Beu 1998, Dekker & Orlin 2000, Debelius 2002, Heiman 2002c, Dafni URL 1, van Gemert 2005, Rusmore-Villaume 2008, Lacroix & Lacroix 2011, Rivera-Posada & Pratchett 2012.

This is the largest gastropod shell and probably a size record for the Gulf of Aqaba (34 cm). The shell was found at Lagoon and is shown in my collection at DMRC in Dahab. Some specimens grew very big during an outbreak (starting in 1998 in Dahab) of their prey, the crown of thorn starfish (*Acanthaster* sp.).



**Fig. 2 d:** *Charonia tritonis* during a night dive by Silke Baron.

## Cymatiidae Iredale, 1913 (1854)

### *Lotoria* sp.

In 2005 I saw a *Lotoria* specimen of ca. 10 cm in size at Seven Pinnacles. I had no slide film left and the next day the specimen was gone. Unfortunately, no picture was taken. *L. grandimaculata* (Reeve, 1844) and *L. lotoria* (Linnaeus, 1758) are known from the Red Sea (Dekker & Orlin 2000).

### *Monoplex aquatilis* (Reeve, 1844)

**Plate 144: fig. 3 a, b:** 9.64 x 5.06 mm; **c, d:** 9.47 x 4.61 mm; **e, f:** juvenile 5.67 x 3.08 mm; **g, h:** the protoconch probably belongs to this species 3.12 x 1.58 mm; a - d juveniles to scale, but enlarged to 4 a - d.

**Plate 144: fig. 4 a, b:** 50 mm; **c, d:** 40 mm; all to scale.

Literature: Wellens & Wils 1997, Beu 1998, Dekker & Orlin 2000, Heiman 2002c, Dafni URL 1, van Gemert 2005, Robin 2008, Rusmore-Villaume 2008.

Juveniles are variable and may be confused with *Linatella caudata* (Gmelin, 1791) due to the regular spiral ribs.

### *Monoplex penniketi* (Beu, 1998)

**Plate 145: fig. 5 a - c:** three views of the same shell 22.3 x 12.9 mm (South).

Literature: Beu 1998, van Gemert 2005.

Just a single shell of this species was found. It is sometimes (e.g. van Gemert 2005) confused with *Monoplex comptus* (A. Adams, 1855).

### *Ranularia exilis* (Reeve, 1844)

**Plate 145: fig. 6 a, b:** 28.2 x 14.5 mm; **c, d:** 30.8 x 13.3 mm; all to scale.

Literature: Beu 1986, Wellens & Wils 1997, Dekker & Orlin 2000, Heiman 2002c, van Gemert 2005, Robin 2008, Rusmore-Villaume 2008.

The largest shell is 45 mm in length.

### *Ranularia trilineata* (Reeve, 1844)

**Plate 145: fig. 7 a - c:** 81 x 38 mm (Blue Lagoon); **d:** juvenile 28 x 16 mm.

Literature: Bosch et al. 1995, Wellens & Wils 1997, Dekker & Orlin 2000, Heiman 2002c, van Gemert 2005, Dafni URL 1, Robin 2008, Rusmore-Villaume 2008, Lacroix & Lacroix 2011.



**Fig. 7 e:** *Ranularia trilineata* at Bannerfish (Masbat Bay) by Christian Von Mach.

### *Septa marerubrum* (Garcia-Talavera, 1985)

**Plate 145: fig. 8 a - c:** 33.4 x 18.2 mm; **d, e:** 29.1 x 15.2 mm.

Literature: Beu 1986, Bosch et al. 1995, Wellens & Wils 1997, Dekker & Orlin 2000, Heiman 2002c, van Gemert 2005, Robin 2008., Rusmore-Villaume 2008

The largest shell reaches a length of 49 mm.



**Fig. 8 e:** *Septa marerubrum* inhabited by a hermit crab (Islands night dive).


5 a - c
6 a, b
6 c, d
7 a - c
7 d
8 a - c
8 d, e
9 a, b

*Turritriton labiosus* (W. WOOD, 1828)

**Plate 145: fig. 9 a, b:** 35.2 x 21.2 mm (Islands).

Literature: BOSCH et al. 1995, WELLENS & WILS 1997, BEU 1998, DEKKER & ORLIN 2000, HEIMAN 2002c, DAFNI URL 1, VAN GEMERT 2005, ROBIN 2008.

Just a single shell of this species was found.

## Xenophoridae TROSCHEL, 1852 (1840)

*Stellaria* sp.

**Plate 146: fig. 1 a, b:** 3.44 x 2.4 mm (Moray Garden 37 m).

Literature: DEKKER & ORLIN 2000, BANDEL 2007.

This species might be *Stellaria chinensis* (PHILIPPI, 1841) but identification is questionable. PONDER (1983a) and VERBINNEN & BUIJSE (2009) record three additional species of Xenophoridae in the Red Sea. *Xenophora cerea* (REEVE, 1845) is recorded from Dahab and *Xenophora solarioides solarioides* (REEVE, 1845) from the Gulf of Aqaba. In *X.* (*Stellaria*) *solaris paucispinosa* KOSUGE & NOMOTO, 1972, accepted as *Stellaria solaris* (LINNAEUS, 1764) (WoRMS), the cemented objects are usually very small and confined to the early whorls (MIENIS 2001).

Xenophoridae Gen. sp.

**Plate 146: fig. 2 a, b:** protoconch 1.26 x 1.0 mm (Caves 15 m).

Literature: DEKKER & ORLIN 2000, BANDEL 2007.

BANDEL (2007: pl. 8, fig. 1 - 13) identified similar juveniles from Jordan as *Xenophora calculifera* (REEVE, 1842), as he found subadults of *X. calculifera* in the same region. However, more different species may occur in the Gulf of Aqaba. *Xenophora culifera* is considered a synonym of *Stellaria chinensis* (KREIPL & ALF 1999). See also the remark in the former species.

## Cystiscidae STIMPSON, 1865

*Gibberula* cf. *savignyi* (ISSEL, 1869)

**Plate 146: fig. 3 a, b:** 3.84 x 2.36 mm (Eel Garden); **c, d:** 2.89 x 1.77 mm (Islands reef flat); all to scale with 4 a - d.

The Dahab shells have a more rounded outline and sometimes 1 - 2 columellar folds more. In this respect they come close to *Gibberula* sp. 1 and 2 from Réunion (COSSIGNANI 2006).

*Gibberula savignyi* (ISSEL, 1869)

**Plate 146: fig. 4 a, b:** 3.76 x 2.30 mm (El Gahaza 3 m); **c, d:** 3.56 x 2.44 mm (Islands reef flat); all to scale with 3 a - d.

Literature: COSSIGNANI 2006, BOYER 2017a.

URL 228: http://www.gastropods.com/7/Shell_11127.shtml

It seems that there are many intermediate forms of *Gibberula sueziensis* as shown for *Cystiscus sandwicensis* PEASE, 1860 in URL 228. The Dahab specimens from just one sampling point may even fall into the morphological range of variability of *C. sandwicensis*. SCAPERROTTA et al. (2013) show the variability during development of some Mediterranean Sea species. Only genetic studies of the different pacific populations may shed light on taxonomic identities. Therefore, the oldest available name for the Red Sea population is used.

*Gibberula sueziensis* (ISSEL, 1869)

**Plate 146: fig. 5 a, b:** 2.34 x 1.33 mm (Islands reef flat); **c, d:** 2.22 x 1.26 mm (Caves 17 m); all to scale with 6 a, b (but enlarged to 3 a - d and 4 a - d).

Literature: DEKKER & ORLIN 2000, OKUTANI 2000, DAFNI URL 1, COSSIGNANI 2006, BOYER 2017a.

URL 229: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-1406

The syntypes (URL 229) resemble the Dahab specimens, especially in the somewhat pointed apex and the straight to concave outline of the outer lip.

## Granulinidae G. A. COOVERT & H. K. COOVERT, 1995

Granulininae G. A. COOVERT & H. K. COOVERT, 1995

*Granulina isseli* (G. NEVILL & H. NEVILL, 1875)

**Plate 146: fig. 6 a, b:** 1.90 x 1.26 mm (Caves 18 m); to scale with 5 a - d.

Literature: BOUCHET & DANRIGAL 1982, DEKKER & ORLIN 2000, COSSIGNANI 2006, BOYER 2017a, b.

This species is reviewed, and types are depicted by BOYER (2017a). It was assigned to Marginellidae FLEMING, 1828, but thereafter BOYER (2017b) established the new family Granulinidae instead of elevating the existing subfamily Granulininae. However, this has not been adapted in WoRMS yet.

## Harpidae BRONN, 1849

*Harpa amouretta* RÖDING, 1798

**Plate 146: fig. 7 a, b:** 33.0 x 21.8 mm; **c:** 24.1 x 15.6 mm; all to scale.

Literature: BOSCH et al. 1995, DEKKER & ORLIN 2000, DEBELIUS 2002, LIESKE & MYERS 2004, RUSMORE-VILLAUME 2008, POPPE 2008b, KOVALIS 2009, 2011.



**Fig. 2 d:** *Harpa amouretta* on seagrass by Christian VON MACH.


1 a, b
1 c, d
7 a, b
7 c
3 c, d
3 a, b
4 a, b
4 c, d
5 c, d
5 a, b
6 a, b

## Colubrariidae Dall, 1904

Some members of this family lack a radula and feed by sucking blood from sleeping fish with the help of a long thin proboscis. Thus, they are also known as vampire snails. The Red Sea *Colubraria* species are reviewed by Monsecour & Dekker (2014).

### *Colubraria muricata* (Lightfoot, 1786)

**Text figure 1 a, b:** not depicted on plate.

Literature: Sharabati 1984, Dekker & Orlin 2000, Dafni URL 1, Mienis 2006b, Rusmore-Villaume 2008, Monsecour in Poppe 2008, Sabourin 2011.



**Fig. 1 a, b:** *Colubraria muricata* 55.4 x 23.4 mm (South).

### *Colubraria gilberti* D. Monsecour & Dekker, 2014

**Text figure 2 a, b:** not depicted on plate.

Literature: Sharabati 1984, Mienis 2006b, Sabourin 2011, Monsecour & Dekker 2014.



**Fig. 2 a, b:** *Colubraria gilberti* 29.0 x 11.8 mm (South).

## Columbellidae Swainson, 1840

The Columbellidae are known by their common name dove snails or dove shells. Most species are herbivores, but also ingest small animals and detritus.

### Columbellidae?

**Plate 147: fig. 1 a:** 1.20 x 0.60 mm (Umm Sid 18 m).

This protoconch has unusually many whorls for a Columbellidae and is thus questionable.

### *Euplica festiva* (Deshayes, 1834)

**Plate 147: fig. 2 a:** 11.1 x 5.9 mm; **b, c:** 7.61 x 3.77 mm; **d:** 7.44 x 3.63 mm; **e:** 6.81 x 3.36 mm; **f, g:** 5.07 x 2.71 mm (Islands labyrinth 9 m); a - e Lagoon; all to scale.

Literature: Deshayes 1834, Bosch et al. 1995, Drivas & Jay 1997b, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008.

This species is identified as *Euplica varians* (Sowerby, 1832) in Bosch et al. (1995).

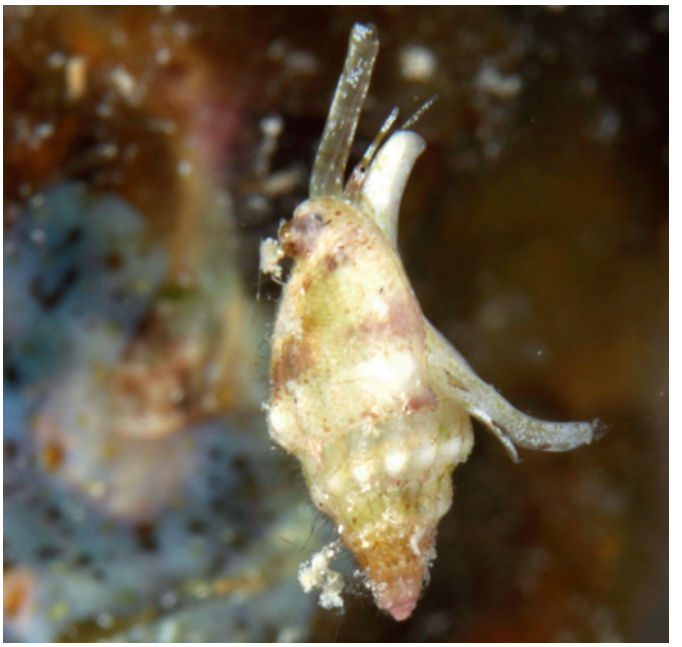


**Fig. 2 e:** *Euplica festiva* during a night dive seems to float but is in fact hanging on a fine thread of mucous at Lighthouse by Christian Von Mach.

### *Graphicomassa adiostina* (Duclos, 1840)

**Plate 147: fig. 3 a, b:** all to scale 12.1 x 5.2 mm; **c, d:** 12.5 x 5.2 mm; **e, f:** 10.8 x 4.3 mm (South); a - d Blue Lagoon; all to scale.

Literature: Bosch et al. 1995, Drivas & Jay 1997a, b, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, deMaintenon 2008, 2016, Monsecour in Poppe 2008.

This species used to be identified as *Mitrella albina* (Kiener, 1841). Recently deMaintenon (2016) recognised this as a synonym of *G. ligula* (Duclos, 1840) and declared the name *G. adiostina* (Duclos, 1840) valid for this species.

(continued after plate)


1 a
2 b, c
2 a
5 a, b
2 e
2 f, g
2 d
3 e, f
5 c
3 a, b
3 c, d
4 a, b
4 c, d
6 a
6 b, c



**Fig. 3 g:** *Graphicomassa adiostina* at Masbat Bay (by Christian VON MACH).

### *Indomitrella conspersa* (GASKOIN, 1852)

**Plate 147: fig. 4 a, b:** all to scale 11.4 x 4.5 mm (Lagoon); **c, d:** 11.0 x 4.4 mm (Lagoon); all to scale.

Literature: STURANY 1903, DRIVAS & JAY 1997b, DEKKER & ORLIN 2000, DAFNI URL 1, DEMAINTENON 2008.

This species either lacks axial ribs or only few weak ribs on the first teleoconch whorls are visible. The similar *I. puella* (G. B. SOWERBY I, 1844), also reported from the Red Sea, has axial ribs on most of the teleoconch whorls.

### *Mitrella nympha* (KIENER, 1841)

**Plate 147: fig. 5 a, b:** all to scale 8.32 x 3.09 mm (Lagoon); **c:** 8.44 x 3.60 mm (Lagoon); all to scale.

Literature: DRIVAS & JAY 1997b, DEKKER & ORLIN 2000, RUSMORE-VILLAUME 2008, DEMAINTENON 2008, MONSECOUR in POPPE 2008.

*Mitrella loyaltyensis* (HERVIER, 1899), a pacific species, is often confused with *M. nympha* (K. MONSECOUR pers. comm.).

### *Zafra savignyi* (MOAZZO, 1939)

**Plate 147: fig. 6 a:** 4.74 x 1.71 mm (Lagoon); **b, c:** 5.16 x 1.66 mm (Lagoon); all to scale.

Literature: DRIVAS & JAY 1997a, DEKKER & ORLIN 2000, DAFNI URL 1, RUSMORE-VILLAUME 2008, SCAPERROTTA et al. 2018.

URL 230: http://www.ciesm.org/atlas/Zafrasavignyi.html

This species is a Lessepsian immigrant into the Mediterranean Sea (DELONGUEVILLE & SCAILLET 2007, URL 230).

### *Zafra obesula* (HERVIER, 1899)

**Plate 148: fig. 7 a, b:** 3.27 x 1.61 mm (Islands 14 m); **c:** 3.17 x 1.51 mm (Islands labyrinth 9 m); all to scale.

Literature: DRIVAS & JAY 1997b, DEKKER & ORLIN 2000, DEMAINTENON 2008, MONSECOUR in POPPE 2008.

URL 231: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-22687
URL 232: http://www.gastropods.com/0/Shell_48010.shtml

It is easily recognized because of its inflated appearance. A white band below the suture and another staggered grey band on the body whorl are visible. No dark brown band on ca. every second rib separates the white band from the straw-coloured areas as seen in e.g. *Z. troglodytes*. The specimens in URL 232 are similar except for the specimen labelled "© 2007 - G. & Ph. POPPE" resembling *Z. troglodytes*. *Seminella comistea* (MELVILL, 1906), a deep-water species also known from the Red Sea, has a very narrow aperture and a ridge along the inside of the outer lip (K. MONSECOUR pers. comm.).

### *Zafra selasphora* (MELVILL & STANDEN, 1901)

**Plate 148: fig. 8 a:** 1.7 x 0.8 mm (Caves 17 m).

Literature: BOSCH et al. 1995, DEMAINTENON 2008, AL-YAMANI et al. 2012, Scaperrotta et al. 2018.

URL 233: http://www.gastropods.com/9/Shell_11569.shtml
URL 234: http://www.ciesm.org/atlas/Zafraselasphora.html

The interrupted brown spiral line posterior of the straw-coloured band is not as pronounced as seen in DEMAINTENON (2008). In the juvenile specimen the denticulation of the aperture is missing. It is a Lessepsian immigrant into the Mediterranean Sea (DELONGUEVILLE & SCAILLET 2007, URL 234). The lectotype of the similar *Z. vercoi* (THIELE, 1930) is depicted in MONSECOUR & KÖHLER (2006). *Zafra vercoi* is known from the Red Sea.

### *Zafra troglodytes* (SOUVERBIE in SOUVERBIE & MONTROUZIER, 1866)

**Plate 148: fig. 9 a, b:** 2.81 x 1.26 mm (Caves 20 m); **c:** 2.65 x 1.22 mm (Blue Hole 18 m); **d:** 2.60 x 1.14 mm (Caves). **e:** protoconch with weak spiral carina; a - d to scale.

Literature: DRIVAS & JAY 1997a, b, DEKKER & ORLIN 2000, DEMAINTENON 2008, MONSECOUR in POPPE 2008.

URL 235: http://www.gastropods.com/9/Shell_12349.shtml
URL 236: http://bigai.world.coocan.jp/pic_book/data37/r003700.html
URL 237: http://www.gastropods.com/6/Shell_47986.shtml

*Zafra troglodytes* has a weak spiral carina on the protoconch, a feature not present in any related *Zafra* (K. MONSECOUR pers. comm.). *Zafra hervieri* (PACE, 1903) is larger and has a different protoconch (URL 237).

### *Zafrona isomella* (DUCLOS, 1840)

**Plate 148: fig. 10 a, b:** 4.24 x 1.76 mm (Caves 20 m), **c, d:** 4.01 x 1.74 mm (Canyon 45 m); **d:** 7.44 x 3.63 mm; **e, f:** 3.56 x 1.73 mm (Islands labyrinth 10 m); all to scale.

Literature: DRIVAS & JAY 1997a, b, DEKKER & ORLIN 2000, DAFNI URL 1, DEMAINTENON 2008, MONSECOUR in POPPE 2008.

URL 238: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-6885
URL 239: http://www.gastropods.com/6/Shell_21046.shtml

This species is, besides *Euplica festiva,* a very common species in the sand samples of Dahab. Variability in colouration of the protoconch and teleoconch is observed.

## Melongenidae GILL, 1871 (1854)

### *Volema nodosa* (LAMARCK, 1822)

**Plate 149: fig. 1 a:** 25.7 x 19.7 mm; **c, d:** 26.7 x 18.0 mm; all El-Qura Bay.

Literature: VINE 1986, COULOMBEL 1994, BOSCH et al. 1995, DEKKER & ORLIN 2000, RUSMORE-VILLAUME 2008.

(continued after plates)

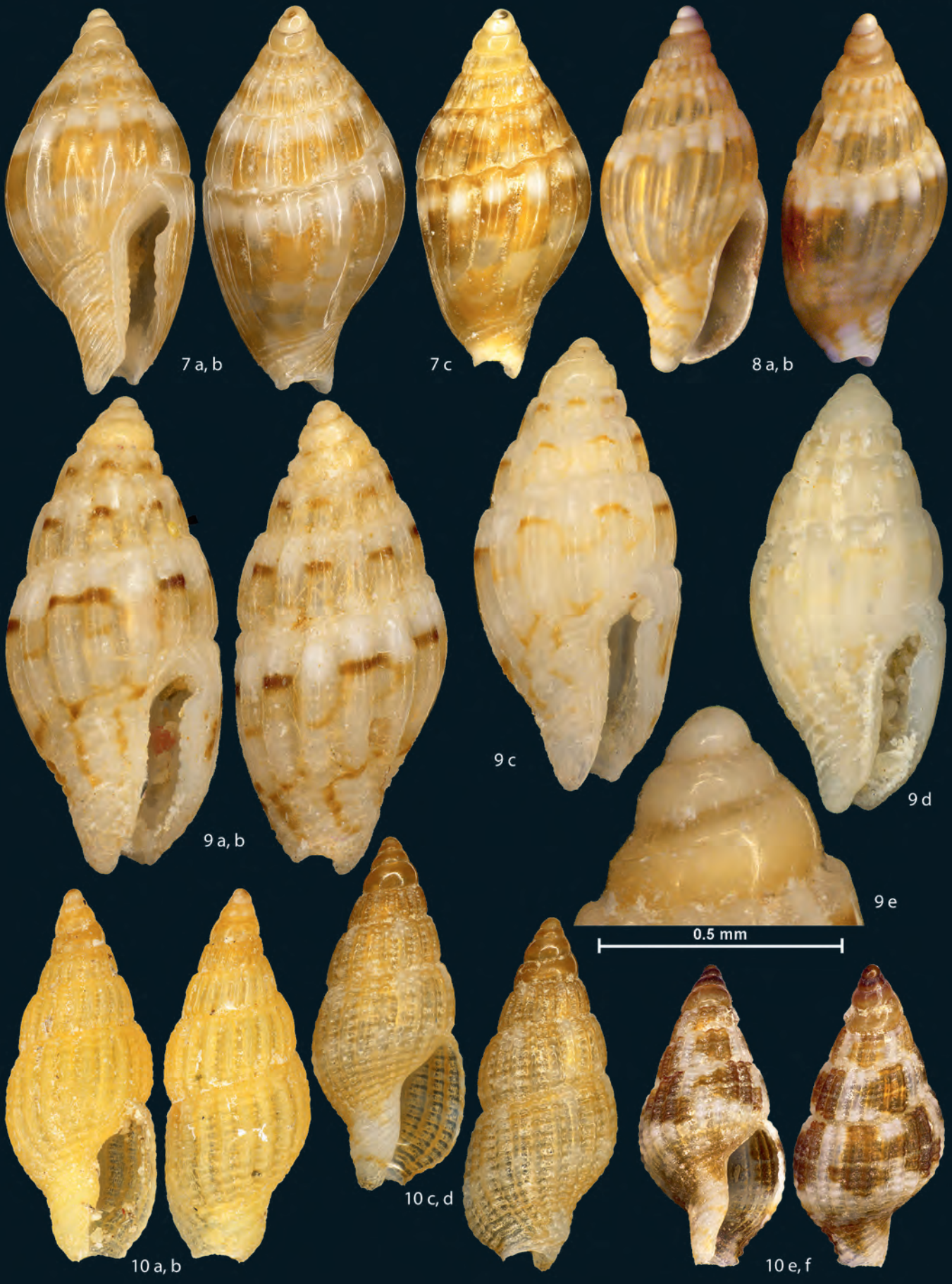

7 a, b
7 c
8 a, b
9 a, b
9 c
9 d
9 e
0.5 mm
10 a, b
10 c, d
10 e, f



Fig. 1 e: *Volema nodosa* at Nabq reef flat (0.00 m).


1a
1 b, c
2 a, b
4 e, f
4 c, d
3 a, b
4 a, b
4 h, i
4 g
6 g, h
6 e, f
6 a, b
5 a, b
6 c, d

This species is considered different from *Volema pyrum* (Gmelin, 1791) because of the distinct nodules on the shoulder, a constant feature within the Red Sea shells. However, it is listed as a synonym in WoRMS. The older name *Murex ficus* Gmelin, 1791 is based on the same type picture as *V. nodosa*, but is a homonym to *Murex ficus* Linnaeus, 1758. Shells from Nabq are larger than shells from the Dahab Lagoon.



**Fig. 1 f:** *Volema nodosa* at Nabq reef flat (0.00 m).

## Fasciolariidae Gray, 1853

***Dolicholatirus maryseae*** D. Monsecour & Lorenz, 2018

**Plate 149: fig. 2 a, b:** 20.9 x 5.6 mm (Islands labyrinth 10 m).

Literature: Sharabati 1984, Monsecour & Lorenz 2018.

URL 240: http://www.femorale.com/kaicher/species.asp?f=Fasciolariidae&c=140

The shell's anterior is very dark with a brown transition zone to the light grey upper quarter. *Dolicholatirus lancea* (Gmelin, 1791), also known from the Red Sea, is slenderer and has a longer siphonal canal (Kaicher card 1762, Mallard & Robin 2005, Singer 2006, Snyder & Callomon in Poppe 2008b, Couto et al. 2016: fig. 3a). In *Polygona infundibulum* (Couto et al. 2016: fig. 4k) the whorls are more inflated and the siphonal canal is open.

***Fusinus leptorhynchus*** (Tapparone Canefri, 1875)

**Plate 149: fig. 3 a, b:** 52.7 x 17.4 mm, to scale with 4 a – f.

Literature: Sharabati 1984, Dekker & Orlin 2000, Singer 2006, Verbinnen & Dirkx 2006, Dafni URL 1, Mallard & Robin 2017.

The shell is slenderer than *F. verrucosus* but may fall within the variability of this species.

***Fusinus verrucosus*** (Gmelin, 1791)

**Plate 149: fig. 4 a, b:** 87.8 x 33.2 mm; **c, d:** 76.5 x 29.5 mm; **e, f:** 48.1 x 21.8 mm; **g:** 20.7 x 9.0 mm; **h, i:** 11.4 x 5.3 mm; a - f to scale with 3 a, b; g - i juveniles to scale but enlarged against a - f.

Literature: Dekker & Orlin 2000, Dafni URL 1, Hoffman et al. 2006, Singer 2006, Snyder 2006, Verbinnen & Dirkx 2006, Rusmore-Villaume 2008, Mallard & Robin 2017.

URL 241: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-6469

*Fusinus polygonoides* (Lamarck, 1822) is a junior synonym (Snyder 2006; neotype from Dahab) of *Fusinus undulatus* (Gmelin, 1791). Delsaerdt (1989) depicts specimens from southern Sinai as *Fusinus acuticostatus* (Sowerby, 1838) which is not listed in WoRMS. Snyder (2006) considers them to be immature specimens of *Fusinus undulatus*. Hoffman et al. (2006) and Rusmore-Villaume (2008) have studied many more specimens and consider *Fusinus verrucosus* a great variable species According to Hoffman et al. (2006: 195, see their comments) this species falls into the variability of *Fusinus verrucosus* (Gmelin, 1791). *Fusinus undulatus* (compare 3 g - i; stouter with shorter siphonal canal) cannot be unequivocally confirmed. *Fusus biangulatus* and *Fusus pauperculus,* both described by Deshayes, 1834, also fall within this range.

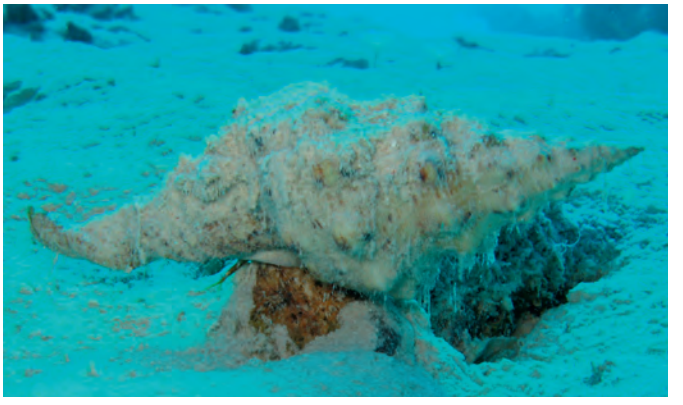


**Fig. 4 j:** *Fusinus verrucosus* at Napoleon Reef-Lagoon on very fine sand (13 m).

***Latirus polygonus*** (Gmelin, 1791)

**Plate 149: fig. 5 a, b:** 78 mm.

Literature: Dekker & Orlin 2000, Singer 2006, Verbinnen & Dirkx 2006, Rusmore-Villaume 2008, Mallard & Robin 2017.

Only one worn, (sub)fossil shell is in the collection.



**Fig. 5 c:** *Latirus polygonus* at Penguin Hotel by Christian Von Mach.


1 a, b
1 c, d
1 e, f
2 a, b
3 a - c
4 a, b
4 c, d
5 a, b
5 c
5 d, e

### *Turrilatirus turritus* (Gmelin, 1791)

**Plate 149: fig. 6 a, b:** 46.9 x 17.5 mm; **c, d:** 38.6 x 16.4 mm; **e, f:** 16.7 x 7.8 mm; **g, h:** 10.9 x 5.5 mm; all to scale.

Literature: Wilson 1994, Blatterer et al. 2000, Dekker & Orlin 2000, Singer 2006, Verbinnen & Dirkx 2006, Dafni URL 1, Vermeij & Snyder 2006, Rusmore-Villaume 2008, Mallard & Robin 2017.

This is the most abundant Fasciolariidae in Dahab. The largest specimen is 57.3 mm in length. Mallard & Robin only give a very restricted distribution in their map (central Indo-Pacific).



**Fig. 6 i:** *Turrilatirus turritus* at Lighthouse (10 m). Usually the shells are heavily overgrown with coralline algae.

## Nassariidae Iredale, 1916 (1835)

Nassariidae are commonly known as Nassa mud snails, or dog whelks. They are mainly found in shallow water on sandy or muddy substrates, often intertidally.

### *Nassarius abyssinicus* (Marrat, 1877)

**Plate 150: fig. 1 a, b:** 5.49 x 3.03 mm; **c, d:** 5.6 x 3.3 mm; **e, f:** juvenile 2.32 x 1.37 mm; all Lagoon fine sand 13 m; a - d to scale with 4 a - d.

Literature: Wills & Dirkx 1999, Okutani 2000, 2017, van Gemert 2006, Heiman et al. 2013a.

The protoconch of this species is carinated. *Nassa abyssinica* Marrat, 1877 is erroneously listed as a synonym of *Nassarius sinusigerus* (A. Adams, 1852) in WoRMS (H. Dekker pers. comm.).

### *Nassarius circumcinctus* (A. Adams, 1842)

**Plate 150: fig. 2 a - c:** 18 x 10 mm (Lagoon).

Literature: Wills & Dirkx 1999, van Gemert & Blatterer 2013, Alf & Haszprunar 2015.

A possible indication of anti Lessepsian migration but up to now only a single dead shell was found (van Gemert & Blatterer 2013).

### *Nassarius coronatus* (Bruguière, 1789)

**Plate 150: fig. 3 a, b:** 17.1 x 10.7 mm (Lagoon).

Literature: Bosch et al. 1995, Wills & Dirkx 1999, Dekker & Orlin 2000, Okutani 2000, 2017, Dafni URL 1, van Gemert 2006, Rusmore-Villaume 2008, Heiman et al. 2013a.

### *Nassarius dekkeri* Kool, 2001

**Plate 150: fig. 4 a, b:** 7.44 x 4.43 mm; **c, d:** 6.95 x 3.91 mm; all Lagoon; all to scale with 1 a - d.

Literature: Wills & Dirkx 1999, Blatterer et al. 2000, Dekker & Orlin 2000, Kool 2001, van Gemert 2006, Rusmore-Villaume 2008, Heiman et al. 2013a.

### *Nassarius fenistratus* (Marrat, 1877)

**Plate 150: fig. 5 a, b:** 14.9 x 8.5 mm (Islands); **c:** 14.3 x 8.5 mm (South); **d, e:** 12.5 x 8.1 mm (South); all to scale.

Literature: Bosch et al. 1995, Wills & Dirkx 1999, Dekker & Orlin 2000, Dafni URL 1, van Gemert 2006, Rusmore-Villaume 2008, Heiman et al. 2013a.

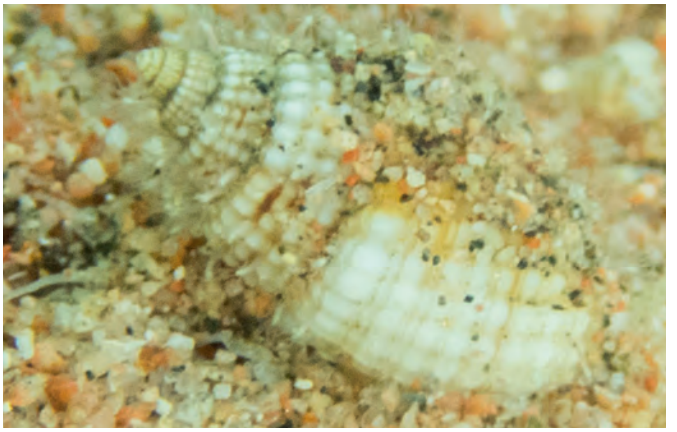


**Fig. 5 f:** *Nassarius fenistratus* overgrown with hydroid polyps (*Cytaeis* sp.) at Moray Garden. The hydroids show fluorescence when illuminated by blue light. I witnessed this phenomenon in 2007 during specially equipped night dives in El Quseir (also offered by RSEC in Dahab). For further details sea Prudkovsky et al. (2015).

### *Nassarius labordei* (Giner Mari, 1929)

**Text figure 6 a, b:** not depicted on plate.

Literature: Wills & Dirkx 1999, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Heiman et al. 2013a.



**Fig. 6 a**: *Nassarius labordei* on intertidal sand at El-Qura Bay.



**Fig. 6 b:** *Nassarius labordei* overgrown with hydroid polyps (*Cytaeis* sp.) by Christian Von Mach.


8 a, b
7 c, d
7 a, b
9 a, b
11 a, b
11 c, d
10 a

*Nassarius obvelatus* (Deshayes, 1834)

**Plate 151: fig. 7 a, b:** 21.8 x 13.6 mm; **c, d:** juvenile of probably this species 1.35 x 0.92 mm (Caves 17 - 19 m).

Literature: Bosch et al. 1995, Wills & Dirkx 1999, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Heiman et al. 2013a.

The species *Buccinum obvelatum* Deshayes, 1834 is erroneously listed as a synonym of *Nassarius arcularia plicatus* (Röding, 1798) in WoRMS (H. Dekker pers. comm.).



**Fig. 7 e:** *Nassarius obvelatus* feeding on dead *Nerita sanguinolenta* at Nabq. The hermit crab is probably already looking for a new home?



**Fig. 7 f:** *Nassarius obvelatus* on intertidal sand at El-Qura Bay.

*Nassarius rufus* (Dunker, 1847)

**Plate 151: fig. 8 a, b:** ca. 25 mm in situ at Lagoon (specimen not collected).

Literature: Bosch et al. 1995, Wills & Dirkx 1999, Dekker & Orlin 2000, Rusmore-Villaume 2008, Heiman et al. 2013a.

*Phos roseatus* (Hinds, 1844)

**Plate 151: fig. 9 a, b:** 23.8 x 10.4 mm.

Literature: Bosch et al. 1995, Debelius 1996, 2002, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Heiman et al. 2013b, Galindo et al. 2016.



**Fig. 9 c:** *Phos roseatus* at dive site Lagoon.

The genus *Phos* has recently been reassigned from Buccinidae to Nassariidae (Galindo et al. 2016).

*Reticunassa neoproducta* (Kool & Dekker, 2007)

**Plate 151: fig. 10 a:** 10.0 x 4.4 mm (Lagoon).

Literature: Kool & Dekker 2007, Dafni URL 1, Rusmore-Villaume 2008, Heiman et al. 2013a, Galindo et al. 2016.

This species was identified as *Nassarius "pauper* (Gould, 1850)" in van Gemert (2006). The primary cords are rounder and lower than in *R. simoni*.

*Reticunassa simoni* (Kool & Dekker, 2007)

**Plate 151: fig. 11 a, b:** juvenile 2.44 x 1.74 mm (Canyon 32 m); **c, d:** 2.06 x 1.60 mm (Moray Garden 2.5 m); all to scale.

Literature: Bosch et al. 1995, Kool & Dekker 2007, Heiman et al. 2013a, Galindo et al. 2016.

In this species strong primary spiral cords are clearly separated from intercord spaces by steep edges.

## Pisaniidae Gray, 1857

The Pisaniidae have been separated from the Buccinidae, which are known as whelks or true whelks. They are carnivores and scavengers or feed on clams, carrion, or detritus. A horn-shaped operculum closes the aperture. The genus *Phos* was moved to Nassariidae by Galindo et al. (2016).

*Clivipollia incarnata* (Deshayes, 1834)

**Plate 152: fig. 1 a, b:** 21.1 x 10.8 mm (Islands); **c, d:** 21.6 x 11.1 mm (South); **e, f:** 17.2 x 9.1 mm (Blue Lagoon).

Literature: Deshayes 1834, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Heiman et al. 2013b, Fraussen & Stahlschmidt 2016.

The specimen with the intact periostracum has a somewhat different appearance. In the smaller specimen no knobs or anal teeth are developed in the aperture. Type locality is the Red Sea. The species is depicted and misidentified as *Benimakia sowerbyi* (Melvill, 1907) in Mallard & Robin (2017).



**Fig. 1 g:** *Clivipollia incarnata* from Gabr el-Bint.


1 a, b
1 c, d
2 a, b
1 e, f
3 a, b
4 a, b
4 c, d
4 e, f
5 a, b

### *Engina spica* Melvill & Standen, 1895

**Plate 152: fig. 2 a, b:** fragment 5.5 x 3.7 mm (Blue Hole 20 m).

Literature: Melvill & Standen 1895, Sharabati 1984, Cernohorsky 1985, Dekker & Orlin 2000, Fraussen in Poppe 2008b, Fraussen & Chino 2011, Poppe 2017b.

The Specimen is identified as *Cantharus lanceolata* in Sharabati (1984: pl. 21, fig. 10) which is listed under the synonym *E. mactanensis* Cernohorsky, 1985 by Dekker & Orlin 2000. *Cantharus lanceolata* is a separate species (WoRMS).

### *Engina* sp.

**Plate 152: fig. 3 a, b:** juvenile 3.00 x 1.49 mm (Caves 20 m).

URL 242: http://www.gastropods.com/0/Shell_9340.shtml

This juvenile shell is similar to *Engina obliquecostata* (Reeve, 1846) (URL 242).

### *Engina mendicaria* (Linnaeus, 1758)

**Plate 152: fig. 4 a, b:** 13.7 x 8.6 mm; **c, d:** 11.6 x 7.1 mm, **e, f:** 7.8 x 4.5 mm (Lagoon); all specimens beached.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Dafni URL 1, Dafni 2008, Rusmore-Villaume 2008, Heiman et al. 2013b.

The species is most similar to *Engina*, but the genus is questionable. van Gemert (2008a) assigned this species to *Enzinopsis*, but this is a different genus with the type from Australia (K. Fraussen pers. comm.).

### *Pisania lirocincta* Sowerby, 1910

**Plate 152: fig. 5 a, b:** 34 mm (South).

Literature: Sowerby 1910, Sharabati 1984, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008.

URL 243: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-6567

URL 244: http://www.gastropods.com/7/Shell_1417.shtml

The species may be confused with *P. ignea* (Gmelin, 1791) (Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008) and *P. fasciculata* (Reeve, 1846) (Sharabati 1984). The spirals in *P. fasciculata* have fine interspaces, while the interspaces in *P. lirocincta* are much wider. The sculpture looks quite more waving rather than well-defined spirals (K. Fraussen pers. comm., URL 243). The spirals of *P. ignea* are weak (URL 244).

## Muricidae Rafinesque, 1815

The Muricidae are known by their common name murex snails or rock snails. Most muricids feed on other gastropods, bivalves and barnacles. Access to the soft parts of the prey is typically achieved by boring a hole through the shell using a softening secretion and the scraping action of the radula.

## Aspellinae Keen, 1971

The subfamily Aspellinae was resuscitated by HOUART (2018).

### *Aspella producta* (Pease, 1861)

**Plate 153: fig. 1 a, b:** 20.3 x 8.9 mm (South).

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Houart in Poppe 2008b, Merle et al. 2011.

### *Aspella* sp.

**Plate 153: fig. 2 a - c:** 4.78 x 2.27 mm (Caves 18 m); **d, e:** 1.46 x 1.00 mm (Golden Blocks 23 m).

These juvenile specimens are different from *Aspella producta*.

## Muricinae Rafinesque, 1815

### *Chicoreus corrugatus* (G. B. Sowerby II, 1841)

**Plate 153: fig. 3 a, b:** 5.3 x 4.7 mm (Bells - Blue Hole 15 m).

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Verbinnen & Dirkx 2000, Heiman 2003b, Heiman & Mienis 2003b, Merle et al. 2011, Houart & Lorenz 2016.

Although only fragments were found, the P1 spine is clearly split, which distinguishes it from *C. teva* Houart & Lorenz, 2016.

### *Chicoreus erythraeus* (P. Fischer, 1870)

**Plate 153: fig. 4 a, b:** approximately 10 cm; the single shell is in the Dahab collection from an unknown location and was not measured.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Verbinnen & Dirkx 2000, Heiman 2003b, Heiman & Mienis 2003b, Rusmore-Villaume 2008, Merle et al. 2011.

URL 245: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-839

*Chicoreus erythraeus* is a synonym of C. *virgineus* (Röding, 1798) in WoRMS. According to Dekker & Gemert (2008) the real *C. virgineus* is living in southern India (Gulf of Mannar) and in Sri Lanka.

### *Chicoreus ramosus* (Linnaeus, 1758)

**Plate 153: fig. 5 a, b:** 62 mm (South); **c:** 98 mm.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Verbinnen & Dirkx 2000, Debelius 2002, Heiman 2003b, Heiman & Mienis 2003b, Rusmore-Villaume 2008, Houart in Poppe 2008b, Merle et al. 2011, Lacroix & Lacroix 2011.



**Fig. 5 d:** *Chicoreus ramosus* at Caves.

(continued after plates)


1 a, b
2 a - c
2 d, e
3 a, b
4 a, b
5 a, b
5 c
6 a, b


7 a - e
8 d, e
7 f, g
8 a - c
9 a, b
10 a - c


11 a - c
11 d, e
12 a, b
13 a, b
14 a, b
14 c, d
15 a, b
15 c, d
15 e, f



**Fig. 5 e:** *Chicoreus ramosus* was turned to show the operculum (Lighthouse).

### *Chicoreus* sp.

**Plate 153: fig. 6 a, b:** juvenile 2.17 x 1.45 mm (Caves 17 - 19 m).

This may be a juvenile shell of a *Chicoreus*.

### *Murex forskoehlii* Röding, 1798

**Plate 154: fig. 7 a - e:** 103 mm with operculum (Lagoon); **f, g:** 122 mm (Lagoon) shell is in the Dahab collection; a - e to scale.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Verbinnen & Dirkx 2000, Heiman & Mienis 2003b, Rusmore-Villaume 2008, Heiman & Mienis 2010, Lacroix & Lacroix 2011, Merle et al. 2011.

The specimens resemble the subspecies *Murex forskoehlii spinifer* Heiman & Mienis, 2010. Holotype locality is Dahab.



**Fig. 7 h:** *Murex forskoehlii* crawling on very fine sand at Lagoon.

### *Phyllocoma convoluta* (Broderip, 1833)

**Plate 154: fig. 8 a - c:** 29.1 x 14.0 mm (South); **d, e:** 3.33 x 1.89 mm (Blue Hole 34 m).

Literature: Coulombel 1994, Wilson 1994, Dekker & Orlin 2000, Dafni URL 1, Houart in Poppe 2008b.

The juvenile specimen is conspecific with the shell in Okutani (2017: pl. 244, fig. 5) misidentified as *P. fimbriatus* (Hinds, 1843) which is a different species belonging to *Daphnellopsis*. Assignment of this species to Muricinae is uncertain (Houart 2018).

### *Pterynotus elongatus* (Lightfoot, 1786)

**Plate 154: fig. 9 a, b:** 53 mm (Golden Blocks 5 m).

Literature: Dekker & Orlin 2000, Houart 2000, Verbinnen & Dirkx 2000, Heiman & Mienis 2003b, Houart in Poppe 2008b, Kovalis 2009, Merle et al. 2011.

The shell has no visible colour, it is probably a fragment of *P. elongatus* known to occur in the Gulf of Aqaba.

## Muricopsinae Radwin & D'Attilio, 1971

### *Homalocantha anatomica* (Perry, 1811)

**Plate 154: fig. 10 a - c:** 45 mm (Blue Lagoon beached).

Literature: Sharabati 1984, Bosch et al. 1995, Dekker & Orlin 2000, Kovalis 2009, Avon 2016, Houart et al. 2017, Poppe 2017a.

The shell is badly worn and was found beached at Blue Lagoon. It seems to be *Homalocantha* sp. in Sharabati (1984: pl. 17, fig. 7). Subfamily assignment is unclear (Merle et al. 2011).

## Rapaninae Gray, 1853

### *Drupa lischkei* (Hidalgo, 1904)

**Plate 155: fig. 11 a - c:** 28 x 33 mm (Caves); **d, e:** 32.5 mm; d, e to scale with 12 a, b and 14 a - d.

Literature: Emerson & Cernohorsky 1973, Blatterer et al. 2000, Dekker & Orlin 2000, Verbinnen & Dirkx 2000, Debelius 2002, Heiman & Mienis 2003b, Dafni URL 1, Rusmore-Villaume 2008.

*Drupa ricinus hadari* Emerson & Cernohorsky, 1973 described from Eilat (Gulf of Aqaba) is a synonym. See also Mienis 2003a. In WoRMS the species is listed as *Drupa ricinus lischkei* (Hidalgo, 1904).

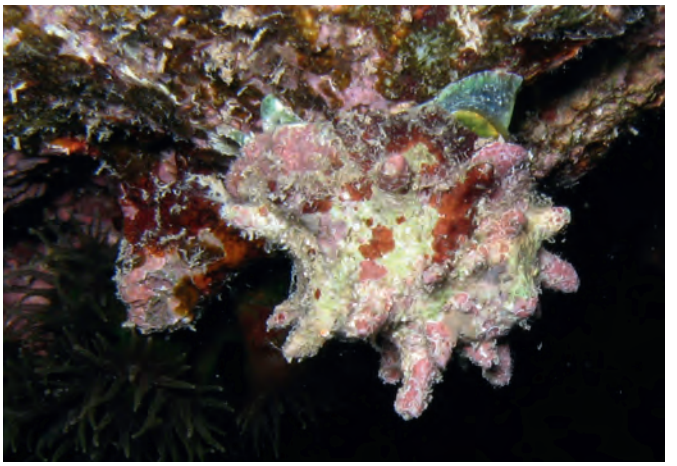


**Fig. 11 f:** *Drupa lischkei* during a night dive at Islands.


16 a, b
16 c, d
17 a, b
18 a, b
18 c, d
18 e, f
17 c, d
18 g, h
19 a, b
20 a, b
20 c, d

*Drupa morum* Röding, 1798

**Plate 155: fig. 12 a, b:** 30.5 mm; to scale with 11 d, e and 14 a - d.

Literature: Emerson & Cernohorsky 1973, Wilson 1994, Dekker & Orlin 2000, Verbinnen & Dirkx 2000, Heiman & Mienis 2003b, Dafni URL 1, Rusmore-Villaume 2008, Houart in Poppe 2008b.

*Drupina lobata* (Blainville, 1832)

**Plate 155: fig. 13 a, b:** 23 mm.

Literature: Emerson & Cernohorsky 1973, Wilson 1994, Blatterer et al. 2000, Dekker & Orlin 2000, Verbinnen & Dirkx 2000, Heiman & Mienis 2003b, Dafni URL 1, Rusmore-Villaume 2008.

Genus assignment is according to Claremont et al. (2012).

*Nassa situla* (Reeve, 1846)

**Plate 155: fig. 14 a, b:** 44.5 mm (Caves); **c, d:** 27 mm; all to scale with 11 d, e and 12 a, b.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Verbinnen & Dirkx 2000, Heiman & Mienis 2003b, Rusmore-Villaume 2008, Lacroix & Lacroix 2011.

In some cases, specimens from the Gulf of Aqaba have been identified as *Nassa francolina* (Bruguière, 1789).



**Fig. 14 e:** *Nassa situla* below intertidal rocks at Masbat Bay.

*Semiricinula chrysostoma* (Deshayes, 1844)

**Plate 155: fig. 15 a, b:** 19.1 x 14.5 mm (Islands); **c, d:** juvenile 5.7 x 4.7 mm (Lagoon); **e, f:** juvenile 3.0 x 2.2 mm (Lagoon).

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Verbinnen & Dirkx 2000, Heiman & Mienis 2003b, Rusmore-Villaume 2008.

URL 246: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-1029

The original description is from the Red Sea.

*Tylothais savignyi* (Deshayes, 1844)

**Plate 156: fig. 16 a, b:** 52.4 mm; **c, d:** 36 mm; all to scale.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Verbinnen & Dirkx 2000, Heiman & Mienis 2003b, Rusmore-Villaume 2008, Gemert 2008a, Lacroix & Lacroix 2011, Al-Yamani et al. 2012.

The species has formerly been assigned to *Thais* or *Thalessa*, the actual classification is based on Houart (2017).

## Ergalataxinae Kuroda, Habe & Oyama, 1971

*Cytharomorula dollfusi* (Lamy, 1938)

**Plate 156: fig. 17 a, b:** 9.70 x 4.56 mm (Caves); **c, d:** juvenile 3.09 x 1.83 mm (Caves 17 - 19 m).

Literature: Lamy 1938, Heiman & Mienis 2003b, Houart in Poppe 2008b, Houart 2013, Poppe 2017b.

URL 247: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-103

URL 248: http://www.gastropods.com/0/Shell_62100.shtml

*Drupella cornus* (Röding, 1798)

**Plate 156: fig. 18 a, b:** 31.5 x 21.5 mm; **c, d:** juvenile 1.57 x 1.01 mm (Bells - Blue Hole 36 m); **e, f:** protoconch 1.04 x 0.84 mm (Caves 10 m); **g, h:** juvenile 2.63 x 1.57 mm (Canyon 11 m); c - f to scale.

Literature: Bosch et al. 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Verbinnen & Dirkx 2000, Heiman & Mienis 2003b, Rusmore-Villaume 2008, Houart in Poppe 2008b.

The snails were most abundant in the shallowest reef zone at a depth of 1 m. Adults were associated with several substrates and coral growth forms, whereas juveniles were highly cryptic and restricted to living branching corals. Corals of the genus *Acropora* were significantly preferred to other acroporid and pocilloporid species (Schoepf et al. 2010, from studies in Dahab).

*Ergalatax martensi* (Schepman, 1892)

**Plate 156: fig. 19 a, b:** 14.6 x 7.8 mm (Blue Lagoon); to scale with 20 a - d.

Literature: Dekker & Orlin 2000, Verbinnen & Dirkx 2000, Houart 2008.

*Maculotriton serriale* (Deshayes, 1834)

**Plate 156: fig. 20 a, b:** 11.2 x 5.1 mm (Lagoon); **c, d:** 10.7 x 4.8 mm (Lagoon); all to scale with 19 a, b.

Literature: Deshayes 1834, Bosch et al. 1995, Dekker & Orlin 2000, Verbinnen & Dirkx 2000, Heiman & Mienis 2003b, Rusmore-Villaume 2008, Houart in Poppe 2008b.

The picture of *Enzinopsis menkeana* (Dunker, 1860) and *M. serriale* in Okutani (2000: 482, fig. 132 and 384, fig. 110), as well as some other misidentified *Engina* species depicted in the internet are conspecific.



**Fig. 20 e:** Living *Maculotriton serriale* from Islands in a Petri dish.


21 c, d
21 e, f
21 a, b
22 a, b
22 e, f
22 c, d
23 d, e
23 b, c
23 a
24 e, f
24 c, d
24 a, b

### *Muricodrupa anaxares* (Kiener, 1835)

**Plate 157: fig. 21 a, b:** 7.23 x 4.36 mm (Blue Lagoon); **c, d:** 7.5 x 5.5 mm; **e, f:** 5.7 x 4.2 mm; a, b to scale with 24 a, b.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Verbinnen & Dirkx 2000, Heiman & Mienis 2003b, Rusmore-Villaume 2008, Houart in Poppe 2008b, Houart et al. 2019.

URL 249: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-35

### *Morula aspera* (Lamarck, 1816)

**Plate 157: fig. 22 a, b:** 16.9 x 10.5 mm; **c, d:** 13.7 x 9.9 mm; **e, f:** Caves 9.5 x 5.6 mm; a - f to scale.

Literature: Dekker & Orlin 2000, Jarrett 2000, Verbinnen & Dirkx 2000, Heiman & Mienis 2003b.

**Plate 157: fig. 23 a:** 16.9 x 10.5 mm; **b, c:** 13.7 x 9.9 mm; **d, e:** 1.61 x 1.08 mm (Canyon 11 m); all to scale with 24 c - f.

The juveniles (23 a - e) probably belong to *Morula aspera*. This species is a Lessepsian immigrant into the Mediterranean Sea (Mienis & Grossmark 2015).



**Fig. 22 g:** *Morula aspera* was turned to show the operculum at Caves.



**Fig. 22 h:** *Morula aspera* at Umm Sid.

### *Morula echinata* (Reeve, 1846)

**Plate 157: fig. 24 a, b:** 6.76 x 3.96 mm (Caves 20 m); **c, d:** 3.32 x 2.33 mm (Canyon 11 m); **d, e:** 2.21 x 1.44 mm (Canyon 11 m); **g:** 2.79 x 1.13 mm (Masbat Bay); a, b: to scale with 21 a - b; c - f to scale with 23 a - e.

Literature: Heiman & Mienis 2003b, Houart in Poppe 2008b.

URL 250: http://www.gastropods.com/8/Shell_7188.shtml

The juveniles (157 c - f) are tentatively assigned to this species.

### *Murichorda fiscellum* (Gmelin, 1791)

**Plate 158: fig. 25 a - d:** 33 mm with operculum.

Literature: Dekker & Orlin 2000, Verbinnen & Dirkx 2000, Heiman & Mienis 2003b, Dafni URL 1, Rusmore-Villaume 2008, Houart in Poppe 2008b.

The genus was recently described by Houart et al. (2019).

### *Spinidrupa euracantha* (A. Adams, 1853)

**Plate 158: fig. 26 a, b:** 6.79 x 5.32 mm (Caves 17 - 19 m).

Literature: Sharabati 1984, Dekker & Orlin 2000, Houart 2017, 2018.

URL 251: https://www.conchology.be/?t=68&u=363994&g=148ac504d9a491989f6921887824f31b&q=9ad1b2510bf280b9380a2f2d14b17634

### *Tenguella granulata* (Duclos, 1832)

**Plate 158: fig. 27 a, b:** 9.17 x 6.46 mm; **c, d:** 9.91 x 6.54 mm; **e, f:** 10.3 x 6.9 mm (Canyon 11 m); **g, h:** 13.1 x 7.8 mm; **i, j:** 19.3 x 11.7 mm; a - f to scale.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Verbinnen & Dirkx 2000, Heiman & Mienis 2003b, Rusmore-Villaume 2008, Houart in Poppe 2008b.

URL 252: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-777

For generic assignment see Claremont et al. (2013).

## Coralliophilinae Chenu, 1859

Members of this subfamily are mainly parasites on Corals, hence the name “lovers of coral – Coralliophilidae”. Coralliophilinae are accepted as a subfamily of Muricidae (WoRMS). These shells have also been documented in the course of the “Reef Check” program to determine the infection rate of coral hosts (e.g. Alter et al. 2008).



**Fig. 28 e:** Coralliophilinae spp. attached to their host *Porites*. Usually the shells are heavily incrusted with coralline algae.

### *Coralliophila costularis* (Lamarck, 1816)

**Plate 159: fig. 28 a, b:** 30.9 x 15.3 mm (Blue Lagoon); **c, d:** beached and eroded specimen 22.6 x 12.8 mm.

Literature: Bosch et al. 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Heiman & Mienis 2003b, Oliverio 2008, Oliverio in Poppe 2008b.

The shells are biconical and more elongated than the other *Coralliophila* species in the region.


25 a - d
26 a, b
27 a, b
27 c, d
27 e, f
27 g, h
27 i, j


28 a, b
28 c, d
29 a, b
30 a, b
30 c, d
31 a, b
31 c, d
31 e
32 a
32 b, c
32 d, e
33 f, g
34 h


1 a, b
1 c, d
2 a, b
3 a, b
3 c, d
3 e
3 f
4 a, b
4 c, d
5 a, b

*Coralliophila* cf. *fimbriata* (Adams, A., 1854)

**Plate 159: fig. 29 a, b:** 3.48 x 2.57 mm (Bells - Blue Hole 29 m).

URL 253: http://www.gastropods.com/7/Shell_10487.shtml

Only a single juvenile specimen has been found, which may belong to *C. fimbriata*. It has been recorded from the Red Sea.

*Coralliophila erosa* (Röding, 1798)

**Plate 159: fig. 30 a, b:** 11.3 x 7.8 mm (Lagoon); **c, d:** 4.13 x 2.99 mm (Caves 33 m).

Literature: Heiman & Mienis 2003b, Dafni URL 1, Rusmore-Villaume 2008, Oliverio 2008, Oliverio in Poppe 2008b.

The shells are slenderer than in Rusmore-Villaume (2008). *Coralliophila squamosissima* (E.A. Smith, 1876) in Bosch et al. (1995) has a more prominent spiral and axial sculpture.

*Coralliophila monodonta* (Blainville, 1832)

**Plate 159: fig. 31 a, b:** 20.7 x 13.4 mm (Lagoon); **c, d:** 4.26 x 3.34 mm (Canyon 11 m); **e:** 1.60 x 1.03 mm (Canyon 11 m).

Literature: Dekker & Orlin 2000, Dafni URL 1, Heiman & Mienis 2003b, Oliverio 2008, Oliverio in Poppe 2008b.

URL 254: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-173

In Gemert (2008a) the species was identified as *Galeropsis madreporarum* (Sowerby, 1832); *Coralliophila madreporarum* (G. B. Sowerby I, 1834) and *Quoyula monodonta* (Blainville, 1832) are synonyms (WoRMS). It is a Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007).

*Coralliophila violacea* (Kiener, 1836)

**Plate 159: fig. 32 a:** 14.1 x 11.9 mm (Islands); **b, c:** 5.4 mm (North); **d, e:** 2.38 x 1.9 mm (Islands Pinnacles); a, b to scale.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Heiman & Mienis 2003b, Dafni URL 1, Rusmore-Villaume 2008, Oliverio 2008, Oliverio in Poppe 2008b, Okutani 2017.

The species was often identified as *C. neritoidea* (Lamarck, 1816) but this is a homonym of *Murex neritoideus* Linnaeus, 1767 (WoRMS).



**Fig. 32 f:** *Coralliophila violacea* was turned on its host coral (*Porites* sp.) to show the operculum; feeding scars can be seen in the background.

*Leptoconchus cyphastreae* Massin, 1983

**Plate 159: fig. 33 a, b:** 8.5 x 5.2 mm (Islands).

Literature: Massin 1983.

The shell was collected from inside its host coral *Cyphastrea* by K. Kleemann.It is not listed in WoRMS.

Coralliophilinae sp.

**Plate 159: fig. 34 a:** 0.80 x 0.75 mm (Caves).

Literature: Bandel et al. 1997, Oliverio 2008, Bandel & Dockery 2012.

Embryonal shells are not identified to species level, but they are quite abundant in sediment samples.

## Costellariidae MacDonald, 1860

The Costellariidae are a group of carnivorous marine molluscs also called the ribbed miters. A taxonomic revision based on molecular and supplementary morphological analyses is given by Fedosov et al. (2017). *Orphanopusia osiridis* is the only Red Sea species included in this study.

*Atlantilux rubra* (Broderip, 1836)

**Plate 160: fig. 1 a, b:** 4.83 x 2.39 mm (Canyon 32 m); **c, d:** juvenile with intact protoconch 1.90 x 1.07 mm (Canyon 29 m).

Literature: Dafni URL 1, Robin & Martin 2004, Fedosov et al. 2017.

A few specimens were found in deeper samples (18 - 32 m).

*Orphanopusia osiridis* (Issel, 1869)

**Plate 160: fig. 2 a, b:** 4 18.0 x 8.7 mm.

Literature: Bosch et al. 1995, Turner 1997, Wils & Verbinnen 2002, Heiman et al. 2004c, Dafni URL 1, Rusmore-Villaume 2008, Al-Yamani et al. 2012, Chino & Herrmann 2016, Fedosov et al. 2017.

This species has a robust shell, that's why even eroded specimens are still easy to recognise.

*Protoelongata xerampelina* (Melvill, 1895)

**Plate 160: fig. 3 a, b:** 17.8 x 6.3 mm (Lagoon); **c, d:** 12.8 x 6.1 mm; **e:** juvenile 3.47 x 1.52 mm; **f:** protoconch 2.02 x 0.68 mm; a - d to scale.

Literature: Turner 1997, Wils & Verbinnen 2002, Heiman et al. 2004c, Robin & Martin 2004, Dafni URL 1, Poppe et al. in Poppe 2008b, Herrmann et al. 2014, Marrow 2017.

URL 255: https://gbmolluscatypes.ac.uk/specimens/1047

Marrow (2017) depicts a specimen from Eilat (Gulf of Aqaba). The species is sometimes listed as *Vexillum* (*Pusia*) *semicostatum* (Anton, 1838) or as aff. *Pusia corallinum* (Reeve, 1845). The juveniles and protoconch were identified using a series of shells in different growth phases. The protoconchs of *Protoelongata loyaltyensis* (Hervier, 1897) have 1 additional whorl (Herrmann et al. 2014: fig. 44, 45).

*Thala malvacea* Jousseaume, 1898

**Plate 160: fig. 4 a, b:** 5.21 x 2.11 mm (Blue Hole 18 m); **c, d:** 4.08 x 1.61 mm (Caves 18 m); all to scale.

(continued after plate)


6 a,b
8 a, b
8 c, d
7 a, b
7 c, d
8 e, f
10 a, b
10 c, d
9 a, b

Literature: Dekker & Turner 1996, Turner 1997, van Gemert 2008b, Rosenberg & Salisbury 2014.

URL 256: http://mediaphoto.mnhn.fr/media/1442584135118xj5Utxpcz4E5I8M2

This is the first record for the Gulf of Aqaba. A syntype is shown in URL 256. *Mitra aliciae* Poppe, Tagaro & Salisbury, 2009 is very similar, however, the shells are slightly larger, and the relative length of the aperture is smaller.

### *Vexillum amabile* (Reeve, 1845)

**Plate 160: fig. 5 a, b:** 10.6 x 4.7 mm (Blue Lagoon).

Literature: Bosch et al. 1995, Turner 1997, Wils & Verbinnen 2002, Heiman et al. 2004c, Robin & Martin 2004, Dafni URL 1, Rusmore-Villaume 2008, Chino & Herrmann 2016.

### *Vexillum angustissimum* (E. A. Smith, 1903)

**Plate 161: fig. 6 a, b:** 3.54 x 1.56 mm (Lagoon).

Literature: Bosch et al. 1995, Wils & Verbinnen 2002, Heiman et al. 2004c, Robin & Martin 2004, Dafni URL 1, Rusmore-Villaume 2008.

Different colours and patterns are reported in other publications. Specimens are already known from Dahab (Turner 1997).

### *Vexillum* sp. 1

**Plate 161: fig. 7 a, b:** 14.0 x 6.3 mm (Lagoon); **c, d:** 20.6 x 8.4 mm (Islands); a - d to scale.

Literature: Turner 1997, Heiman et al. 2004c.

This probably undescribed species was considered a form of *V. bizonale* (Dautzenberg & Bouge, 1923) in Turner (1996: fig. 53) and was identified as such in Heiman et al. (2004c). *Vexillum hemprichi* (Jickeli, 1874) always has a whitish band in the middle (H. Dekker pers. comm., holotype depicted in Poppe et al. 2009). *Vexillum aureolatum* (Reeve, 1845), *V. renatoi* Poppe, Tagaro & Salisbury, 2009 and *V. bizonale* (Dautzenberg & Bouge, 1923) have a more prominent sculpture and a subsutural row of knobs (Poppe et al. 2009).



**Fig. 7 e:** *Vexillum* sp. or *Protoelongata xerampelina* seems to float but is in fact hanging on a fine thread of mucous at Masbat Bay (Bannerfish) by Christian Von Mach.

### *Vexillum blandulum* Turner, 1997

**Plate 161: fig. 8 a, b:** 15.0 x 4.8 mm (Lagoon); **c, d:** 14.0 x 5.7 mm (Islands); **e, f:** 12.3 x 4.5 mm; all to scale.

Literature: Turner 1997, Wils & Verbinnen 2002, Heiman et al. 2004c, Robin & Martin 2004, Dafni URL 1, Rusmore-Villaume 2008.

This species is listed in WoRMS as *Vexillum* (*Costellaria*) *blandulum* Turner, 1997.

### *Vexillum castum* (H. Adams, 1872)

**Plate 161: fig. 9 a, b:** 3.82 x 1.65 mm (Lagoon).

Literature: Adams 1872, Cernohorsky 1988a, Turner 1997, Dekker & Orlin 2000, Robin & Martin 2004, Poppe et al. in Poppe 2008.

URL 257: http://www.jaxshells.org/cast21.htm
URL 258: http://bigai.world.coocan.jp/pic_book/data85/r008454.html

The specimen fits the original description from the Red Sea. It is also conspecific with *V.* (*Costellaria*) *albatum* Cernohorsky, 1988 (a nom. nov. for the species of Adams) as depicted in the original description and in Turner (1997). According to WoRMS (see descriptive notes) this species and *Vexillum* (*Costellaria*) *sagamiense* (Kuroda & Habe, 1971) are synonyms of *Vexillum castum* (H. Adams, 1872). However, other *V. castum* e.g. (URL 257) and *V. sagamiense* (Robin & Martin 2004, Poppe & Tagaro in Poppe 2017a, see also Poppe 2017b, URL 258) show more axial ribs and a less inflated spire. Whereas *V. sagamiense* in Okutani 2017 is similar.

### *Vexillum concentricum* (Reeve, 1844)

**Plate 161: fig. 10 a, b:** 14.9 x 6.2 mm; **c, d:** probably a juvenile of this species 3.16 x 1.51 mm (Moray Garden 37 m); all to scale.

Literature: Turner 1997, Dekker & Orlin 2000, Wils & Verbinnen 2002, Heiman et al. 2004c, Dafni URL 1, Rusmore-Villaume 2008, Poppe et al. in Poppe 2008, 2017b.

*Mitra echinata* A. Adams, 1853 is a well-known synonym. *Vexillum coronatum* (Helbling, 1779) is slenderer and has weaker spines. The specimen in Turner (1997: fig. 20) is another *V. concentricum.* Thus, the existence of *V. coronatum* in the Red Sea has yet to be proved (H. Dekker pers. comm.).

### *Vexillum crocatum* (Lamarck, 1811)

**Plate 162: fig. 11 a, b:** 23.7 x 10.1 mm.

Literature: Turner 1997, Dekker & Orlin 2000, Wils & Verbinnen 2002, Heiman et al. 2004c, Dafni URL 1.

### *Vexillum* (Pusia) *depexum* (Deshayes, 1834)

**Plate 162: fig. 12 a, b:** 13.6 x 5.7 mm (Islands); **c, d:** probably a juvenile of this species 1.30 x 0.60 mm (Umm Sid).

Literature: Deshayes 1834, Bosch et al. 1995, Turner 1997, Wils & Verbinnen 2002, Heiman et al. 2004c, Dafni URL 1, Rusmore-Villaume 2008.

Although not discussed in Fedosov et al. (2017), this is a real *Pusia* according to their definition (H. Dekker pers. comm.).


11 a, b
12 c, d
12 a, b
14 a
14 b
14 c, d
14 e
16 a, b
16 c, d
15 a, b

### *Vexillum intermedium* (Kiener, 1838)

**Text figure 13:** not depicted on plate.

Literature: Wils & Verbinnen 2002, Heiman et al. 2004c, Rusmore-Villaume 2008.

Only one photograph from a single specimen is available.



**Fig. 13 a:** *Vexillum intermedium* at Bannerfish by Christian Von Mach.

### *Vexillum leucozonias* (Deshayes, 1834)

**Plate 162: fig. 14 a:** 11.2 x 4.7 mm (Lagoon); **b:** 10.4 x 4.5 mm (Lagoon); **c, d:** 9.81 x 4.05 mm (Caves); **e:** probably a juvenile of this species 3.27 mm (Islands); a - d to scale.

Literature: Deshayes 1834, Bosch et al. 1995, Turner 1997, Wils & Verbinnen 2002, Heiman et al. 2004c, Robin & Martin 2004, Dafni URL 1.

Most shells are heavily eroded and therefore have a different appearance.

### *Vexillum lucidum* (Reeve, 1845)

**Plate 162: fig. 15 a, b:** 20 x 8.1 mm (Blue Lagoon).

Literature: Sharabati 1984, Turner 1997, Dekker & Orlin 2000, Robin & Martin 2004, Rusmore-Villaume 2008.

The specimen is worn and bleached and therefore does not show the usually sharper spirals and the dark anterior colour. *Vexillum modestum* (Reeve, 1845) has different spiral ribs and does not occur in the Red Sea (H. Dekker pers. comm.).

### *Vexillum michaui wilsi* Buijse & Dekker, 1990

**Plate 162: fig. 16 a, b:** 20.1 x 6.3 mm; **c, d:** 22 x 8 mm; all to scale.

Literature: Buijse & Dekker 1990, Bosch et al. 1995, Turner 1997, Wils & Verbinnen 2002, Heiman et al. 2004c, Dafni URL 1, Rusmore-Villaume 2008, van Gemert 2008a, Buijse et al. 2009.

Shells are often slender and coloured grey in the Indian Ocean population. The subspecies of the northern Red Sea on the other hand is coloured white to yellowish cream, without dark colour inside the aperture and is generally more globose.

### *Vexillum pardale* (Küster, 1840)

**Plate 163: fig. 17 a, b:** 12.9 x 6.9 mm; **c:** 14.7 x 7.2 mm (Blue Lagoon); **d, e:** 4.10 x 2.26 mm; **f, g:** 2.86 x 1.48 mm; **h, i:** 3.56 x 2.02 mm; a - c to scale; d - i: juveniles, all to scale but enlarged against a – c.

**Plate 164: fig. 17 j, k:** 5.65 x 4.09 mm (South).

Literature: Bosch et al. 1995, Turner 1997, Wils & Verbinnen 2002, Heiman et al. 2004c, Dafni URL 1, Rusmore-Villaume 2008, Chino & Herrmann 2016.

The juveniles and protoconchs were identified using a series of shells in different growth phases. The species is already known from Dahab (Turner 1997). The very beach worn specimen (pl. 164: 17 j, k) was a challenge to identify. Many snails build a plug at the base of the protoconch to keep soft parts from being exposed in case of a broken protoconch. In this case the plug itself can be mistaken for the protoconch, leading to the assumption that there are two species differing only in protoconch characteristics (Rosenberg 1999).

### *Vexillum plurinotatum* (Hervier, 1897)

**Plate 163: fig. 18 a, b:** 3.88 x 1.50 mm (Canyon 32 m).

Literature: Okutani 2000, Robin & Martin 2004, van Gemert 2008b, Poppe et al. 2009 and Poppe et al. in Poppe 2011.

URL 259: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-30236
URL 260: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-30235

The species was originally described as the variety *Vexillum goubini* var. *plurinotata* (Hervier, 1897) and therefore listed as *V. goubini* by some authors (Poppe et al. 2009, Poppe et al. in Poppe 2011, Kurtz 2015). In WoRMS it is accepted as a valid species. In contrast to *V. goubini* (Hervier, 1897) which is larger and has 1 row of dark spots, *V. plurinotatum* has 2 rows of dark spots between the costae of each whorl and ca. 4 - 6 rows of spots on the ultimate whorl. Lectotypes of both species are shown in MHNM (URL 259, URL 260). This is the first record for the Gulf of Aqaba.

### *Vexillum revelatum* (Melvill, 1899)

**Plate 163: fig. 19 a, b:** 11.6 x 5.9 mm (Islands); **c, d:** probably a juvenile of this species 2.97 x 1.56 mm (Caves 33 m); c enlarged.

Literature: Wils & Verbinnen 2002, Heiman et al. 2004c, Rusmore-Villaume 2008.

The Dahab specimens are not fully grown thus appear stouter. *Vexillum cadaverosum* (Reeve, 1844) has more prominent axial ribs, becoming more shouldered in the posterior portion of each whorl.



**Fig. 19 e:** *Vexillum revelatum* attacks and kills a *Trivirostra triticum* in a Petri dish.

(continued after plates)


17 c
17 d, e
17 a, b
17 f, g
20 h, i
18 a, b
19 c, d
19 a, b
20 a, b


21 a, b
21 c, d
21 e, f
21 g, h
22 c
22 a, b
24 a, b
17 j, k
23 a, b


1 a, b
1 c, d
1 e
2 a, b
3 a, b
3 c
4 a, b
5 a, b
5 c, d

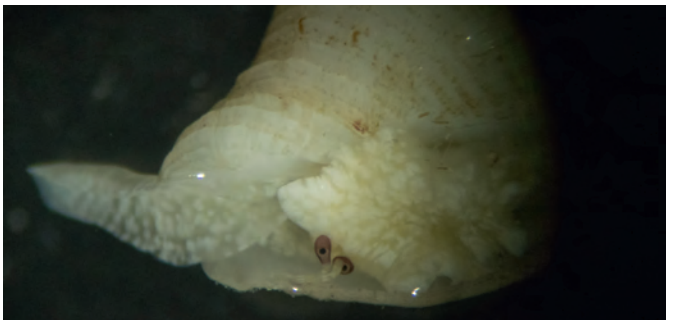


**Fig. 19 f:** *Vexillum revelatum* from Islands in a Petri dish to show eyes and proboscis.

### *Vexillum turben* (Reeve, 1844)

**Plate 163: fig. 20 a, b:** 22.8 x 9.9 mm (Lagoon).

Literature: Coulombel 1994, Heiman et al. 2004c, Robin & Martin 2004, Poppe et al. in Poppe 2008b, Chino & Herrmann 2016.

Fedosov et al. (2017) give the year 1845, but on the page of Reeve's monograph is written December 1844.

### *Vexillum tusum* (Reeve, 1845)

**Plate 164: fig. 21 a, b:** 11.6 x 4.7 mm (Blue Lagoon); **c, d:** 5.66 x 2.56 mm; **e, f:** 4.58 x 2.20 mm; **g, h:** 2.27 x 1.33 mm; c - h juveniles, all to scale but doubled in size against a, b.

Literature: Turner 1997, Heiman et al. 2004c, Rusmore-Villaume 2008, Poppe et al. in Poppe 2008b, Herrmann et al. 2014.

This species is already known from Dahab (Turner 1997).

### *Vexillum unifasciale* (Lamarck, 1811)

**Plate 164: fig. 22 a, b:** 14.2 x 6.2 mm (Lagoon); **c:** 4.56 x 2.28 mm (Moray Garden).

Literature: Bosch et al. 1995, Turner 1997, Wils & Verbinnen 2002, Dafni URL 1, Heiman et al. 2004c, Robin & Martin 2004, Chino & Herrmann 2016.

This species is already known from Dahab (Turner 1997).

### *Vexillum* sp. 2

**Plate 164: fig. 23 a, b:** 2.96 x 1.47 mm (Islands).

Literature: Rusmore-Villaume 2008, Chino & Herrmann 2016

Fits superficially to *Vexillum infaustum* (Reeve, 1845) in Rusmore-Villaume (2008), but early whorls appear slenderer. *Vexillum infaustum* in Chino & Herrmann (2016) does not show the prominent dark brown band above the suture and *V. infaustum* in Fedosov et al. (2017) does not match. It has some resemblance to *Vexillum gorii* Turner, 1997, described from Somalia, and which is supposed to live in the Red Sea. There is similarity to *Vexillum elizae* (Melvill, 1899) which is not listed in WoRMS.

## Turbinellidae Swainson, 1835

Turbinellidae are known to prey on Polychaeta and/or Sipunculidae.

### *Vasum turbinellus* (Linnaeus, 1758)

**Plate 164: fig. 24 a, b:** 59 mm.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Rusmore-Villaume 2008.

The largest shell found at Abu Galum is 73 mm in length.



**Fig. 24 c:** *Vasum turbinellus* is common on reef flats. The shell is usually heavily incrusted.

## Mitridae Swainson, 1831

The Mitridae are known by the common name mitre shells. A major taxonomic revision based on molecular and supplementary morphological analyses is given by Fedosov et al. 2018.

### *Carinomitra typha* (Reeve, 1845)

**Plate 165: fig. 1 a, b:** 8.15 x 2.51 mm (Islands); **c, d:** juvenile 2.5 x 1.0 mm (Canyon 11 m); **e:** an early juvenile probably of this species 1.7 x 0.72 mm (Masbat Bay 5 m); a - d to scale.

Literature: Cernohorsky 1976, Turner 1997, Dekker & Orlin 2000, Heiman et al. 2004b, Dafni URL 1, Rusmore-Villaume 2008, Albano et al. 2017, Poppe & Tagaro in Poppe 2017a, Fedosov et al. 2018.

The type of *Mitra flexilabris* G. B. Sowerby III, 1875 in Cernohorsky (1976: pl. 450) shows clearly the same dark suture but is considered a synonym of *M. typha* Reeve, 1845. Thorsson & Salisbury (2006), van Gemert (2008a) and Poppe & Tagaro in Poppe (2017a) keep *M. flexilabris* separate. Fedosov et al. (2018: fig. 37 c - e) describe variability of *C. typha*. *Mitra tenuis* f. *minor* Sturany, 1903 is conspecific with the Dahab shells (type in Albano et al. 2017).

### *Domiporta carnicolor* (Reeve, 1844)

**Plate 165: fig. 2 a, b:** 22.1 x 8.3 mm; to scale with 3 a - c.

Literature: Cernohorsky 1991, Turner 1997, Dekker & Orlin 2000, Wils & Verbinnen 2002, Heiman et al. 2004b, Dafni URL 1, Rusmore-Villaume 2008, Poppe & Tagaro in Poppe (2008b), Herrmann 2017, Fedosov et al. 2018.

This seems to be a species-complex (A. Dekkers pers. comm.). Herrmann (2017) shows the difference between two forms of

(continued after plate)


6 a, b
7 c, d
7 a, b
8 a, b
9 a, b
10 a, b
11 a, b
12 a, b
12 c, d

*Domiporta carnicolor.* Genetic studies are required to clarify this matter. Recently, *Domiporta* cf. *carnicolor* was sequenced by FEDOSOV et al. (2018).



**Fig. 2 c:** *Domiporta carnicolor* during a night dive at Islands.

### *Domiporta* aff. *circula* (KIENER, 1838)

**Plate 165: fig. 3 a, b:** 17.8 x 5.2 mm (Lagoon); **c:** 19.3 x 5.6 mm (Lagoon); all to scale with 2 a, b.

Literature: CERNOHORSKY 1991, BOSCH et al. 1995, TURNER 1997, DEKKER & ORLIN 2000, WILS & VERBINNEN 2002, HEIMAN et al. 2004b, DAFNI URL 1, FEDOSOV et al. 2018.

Some authors identify this species as *Subcancilla circula* (KIENER, 1838), but it probably is an undescribed species (A. DEKKERS pers. comm.).

### *Domiporta filaris* (LINNAEUS, 1771)

**Plate 165: fig. 4 a, b:** 16.6 x 6.0 mm (South); to scale with 5 a - d.

Literature: CERNOHORSKY 1991, BOSCH et al. 1995, TURNER 1997, DEKKER & ORLIN 2000, WILS & VERBINNEN 2002, HEIMAN et al. 2004b.

This species is listed as *Subcancilla filaris* (LINNAEUS, 1771) in POPPE & TAGARO in POPPE (2008b).

### *Domiporta* aff. *filaris* (LINNAEUS, 1771)

**Plate 165: fig. 5 a, b:** 19.8 x 6.9 mm (Lagoon); **c, d:** 13.9 x 4.6 mm (South); all to scale with 4 a, b.

URL 261: http://mitroidea.eurasiashells.net/images/Domiporta/1248_Domiporta_filaris_16-5.jpg

*Domiporta filaris* in URL 261 is conspecific, but all these shells are slenderer than typical *D. filaris* (A. DEKKERS pers. comm.).

### *Domiporta granatina* (LAMARCK, 1811)

**Plate 166: fig. 6 a, b:** 38.0 x 12.3 mm (Golden Blocks).

Literature: CERNOHORSKY 1991, BOSCH et al. 1995, TURNER 1997, DEKKER & ORLIN 2000, WILS & VERBINNEN 2002, HEIMAN et al. 2004b, DAFNI URL 1.

This species is identified as *Neocancilla granatina* (LAMARCK, 1811) in POPPE & TAGARO in POPPE (2008b). HERRMANN (2017) depicts a living specimen.

### *Imbricaria annulata* (REEVE, 1844)

**Plate 166: fig. 7 a, b:** 29.0 x 10.2 mm; **c, d:** 17.6 x 6.8 mm; all from Lagoon; all to scale with 9 a, b, 10 a, b and 12 a - d.

**Plate 166: fig. 8 a, b:** juvenile 5.11 x 2.37 mm (Blue Hole 24 m); perhaps belonging to this species.

Literature: CERNOHORSKY 1991, SHARABATI 1984, TURNER 1997, DEKKER & ORLIN 2000, WILS & VERBINNEN 2002, HEIMAN et al. 2004b, DAFNI URL 1.

The specimens from Dahab reach 32 mm in size. They belong to a complex of species which require revision (A. DEKKERS pers. comm.).

### *Imbricaria pretiosa* (REEVE, 1844)

**Plate 166: fig. 9 a, b:** 22.4 x 7.7 mm (Lagoon); to scale with 7 a - d, 10 a, b and 12 a - d.

Literature: CERNOHORSKY 1991, BOSCH et al. 1995, TURNER 1997, DEKKER & ORLIN 2000, WILS & VERBINNEN 2002, HEIMAN et al. 2004b.

*Neocancilla antoniae* (H. ADAMS, 1870) in THORSSON & SALISBURY (2004) from the Red Sea is conspecific. ADAMS' species was already synonymised by CERNOHORSKY (1991) which is not indicated in WoRMS.

### *Nebularia ferruginea* (LAMARCK, 1811)

**Plate 166: fig. 10 a, b:** 26.0 x 9.8 mm; to scale with 7 a - d, 9 a, b and 12 a - d.

Literature: CERNOHORSKY 1976, TURNER 1997, DEKKER & ORLIN 2000, WILS & VERBINNEN 2002, HEIMAN et al. 2004b, RUSMORE-VILLAUME 2008, FEDOSOV et al. 2018.

The species is already known from Dahab (TURNER 1997).

### *Pseudonebularia fraga* (QUOY & GAIMARD, 1833) or *P. cucumerina* (LAMARCK, 1811)

**Plate 166: fig. 11 a, b:** largest diameters 4.6 and 3.3 mm, scale bar 2.5 mm (Islands).

Literature: CERNOHORSKY 1976, SHARABATI 1984, TURNER 1997, WILS & VERBINNEN 2002, HEIMAN et al. 2004b, ROBIN & MARTIN 2004, RUSMORE-VILLAUME 2008, POPPE et al. 2009, FEDOSOV et al. 2018.

URL 262: http://www.gastropods.com/3/Shell_1123.shtml
URL 263: http://www.gastropods.com/1/Shell_1121.shtml

Only fragments were found and therefore identification is uncertain. The specimen may be *P. fraga* (URL 262). In *P. cucumerina* (LAMARCK, 1811) the spiral ribs appear more flattened (URL 263). Both species are known from the Red Sea (CERNOHORSKY 1976), *P. cucumerina* even from Dahab (TURNER 1997).

### *Pseudonebularia rueppellii* (REEVE, 1844)

**Plate 166: fig. 12 a, b:** 31 x 11 mm; **c, d:** 19.5 x 7.6 mm; all from Lagoon; all to scale with 7 a - d, 9 a, b and 10 a, b.

Literature: CERNOHORSKY 1976, TURNER 1997, DEKKER & ORLIN 2000, WILS & VERBINNEN 2002, HEIMAN et al. 2004b, DAFNI URL 1, RUSMORE-VILLAUME 2008.

CERNOHORSKY (1976) depicts the lectotype from the Red Sea. Orange and brown coloured specimens were found.

### *Pterygia crenulata* (GMELIN, 1791)

**Plate 167: fig. 13 a, b:** 18.6 x 7.8 mm (Lighthouse); to scale with 15 a, b and 17 a, b.

Literature: CERNOHORSKY 1991, TURNER 1997, DEKKER & ORLIN 2000, WILS & VERBINNEN 2002, HEIMAN et al. 2004b, DAFNI URL 1, RUSMORE-VILLAUME 2008.


13 a, b
17 a, b
16 a, b
14 a, b
15 a, b
16 c, d
18 a, b
18 c
19 g
19 a, b
19 c, d
19 e, f

*Quasimitra bovei* (KIENER, 1838)

**Plate 167: fig. 14 a, b:** ca. 50 mm, a living specimen not collected (Islands).

Literature: CERNOHORSKY 1976, COULOMBEL 1994, TURNER 1997, DEKKER & ORLIN 2000, WILS & VERBINNEN 2002, HEIMAN et al. 2004b, DAFNI URL 1, RUSMORE-VILLAUME 2008.

CERNOHORSKY (1976) depicts the holotype from the Red Sea.

*Scabricola potensis* (MONTROUZIER, 1858)

**Plate 167: fig. 15 a, b:** 15.0 x 7.1 mm (South); to scale with 13 a, b and 17 a, b.

Literature: CERNOHORSKY 1991, BOSCH et al. 1995, TURNER 1997, DEKKER & ORLIN 2000, HEIMAN et al. 2004b, RUSMORE-VILLAUME 2008.

Only a single specimen was found.

*Strigatella aurora floridula* (G. B. SOWERBY II, 1874)

**Plate 167: fig. 16 a, b:** 35 x 13 mm; **c, d:** 32 x 10.5 mm; all to scale with 18 a - c.

Literature: CERNOHORSKY 1976, TURNER 1997, DEKKER & ORLIN 2000, WILS & VERBINNEN 2002, HEIMAN et al. 2004b, DAFNI URL 1, RUSMORE-VILLAUME 2008.

This species is listed as *Nebularia aurora* (DOHRN, 1861) in POPPE & TAGARO in POPPE (2008b: pl. 479).

*Strigatella litterata* (LAMARCK, 1811)

**Plate 167: fig. 17 a, b:** 14.0 x 8.1 mm (Blue Lagoon); to scale with 13 a, b and 15 a, b.

Literature: CERNOHORSKY 1976, TURNER 1997, DEKKER & ORLIN 2000, WILS & VERBINNEN 2002, HEIMAN et al. 2004b, ROBIN & MARTIN 2004, FEDOSOV et al. 2018.

This species is already known from Dahab (TURNER 1997).



**Fig. 17 c:** *Strigatella litterata* in a Petri dish to show eye and proboscis.

*Swainsonia fissurata* (LAMARCK, 1811)

**Plate 167: fig. 18 a, b:** 47.5 x 11.8 mm; **c:** 40.5 x 11.5 mm; all to scale with 16 a - d.

Literature: CERNOHORSKY 1991, TURNER 1997, DEKKER & ORLIN 2000, DEBELIUS 2002, WILS & VERBINNEN 2002, HEIMAN et al. 2004b, DAFNI URL 1, RUSMORE-VILLAUME 2008, POPPE & TAGARO in POPPE 2008b, FEDOSOV et al. 2018.

This species is already known from Dahab (TURNER 1997).

## Ancillariidae SWAINSON, 1840

*Ancilla lineolata* (A. ADAMS, 1853)

**Plate 167: fig. 19 a, b:** 17.7 x 7.7 mm (Islands); **c, d:** 12.2 x 6.1 mm (Lagoon); **e, f:** 10.5 x 5.2 mm (Lagoon); **g:** 9.6 x 4.3 mm (Islands); all to scale.

Literature: KILBURN 1981, DEKKER & ORLIN 2000, STERBA 2003, DAFNI URL 1.

KILBURN (1981) worked on this problematic species-complex in detail. Some of the specimens may be assigned to *Ancilla eburnea* (DESHAYES, 1830) or the form *A. eburnea striolata*. Regarding the identification of this species, it is referred to the statement of KILBURN: "In the Gulf of Aqaba the problem of identification may become overwhelming, and separation of *A. lineolata* from what appears to be the local dwarf form of *Ancilla eburnea* form *striolata*, is sometimes purely arbitrary. The possibility does exist that this intergrading Aqaba population is a hybrid one, but only local ecological studies could provide evidence."



**Fig. 1 h:** *Ancilla lineolata* found intertidal between seaweed at Eel Garden.

## Conidae J. FLEMING, 1822

Three groups of the commonly named cone snails can be distinguished according to their feeding mode. Most species are vermivores, preying on different families of polychaetes, whereas molluscivores and piscivores prefer molluscs or fishes, respectively. ZAUNER & ZUSCHIN (2016) found a highly variable species composition in subtidal reefs around Dahab with usually low densities. The reef flat was the habitat with the highest observed population densities (6.15 individuals/m²), but low species diversity. The concept of MONNIER et al. (2018) is implemented, although it is not currently adopted in WoRMS. Formerly all genera have at least been accepted as subgenera (PUILLANDRE et al. 2014).


2 a, b
3 a, b
3 c, d
1 a, b
5 a, b
5 c, d
4 a, b
6 c
6 d
7 a, b
6 a, b

### Conidae Gen. sp.

**Plate 168: fig. 1 a, b:** juvenile 19.4 x 8.5 mm (Islands labyrinth 10 m).

This juvenile shell could not be assigned to a species.



**Fig. 1 c:** Probably egg deposit of Conidae the juveniles already hatched (Lagoon).

### *Cylinder neovicarius* (Da Motta, 1982)

**Plate 168: fig. 2 a, b:** 96 x 46 mm found outside of Three Pools.

Literature: Vine 1986, Bosch et al. 1995, Röckel et al. 1995, Dekker & Orlin 2000, Debelius 2002, Lieske & Myers 2004, Dafni URL 1, Rusmore-Villaume 2008, Zauner & Zuschin 2016, Monnier et al. 2018.

This species is listed in WoRMS as *Conus textile neovicarius* da Motta, 1982.



**Fig. 2 c:** *Cylinder neovicarius* at Islands during a night dive.

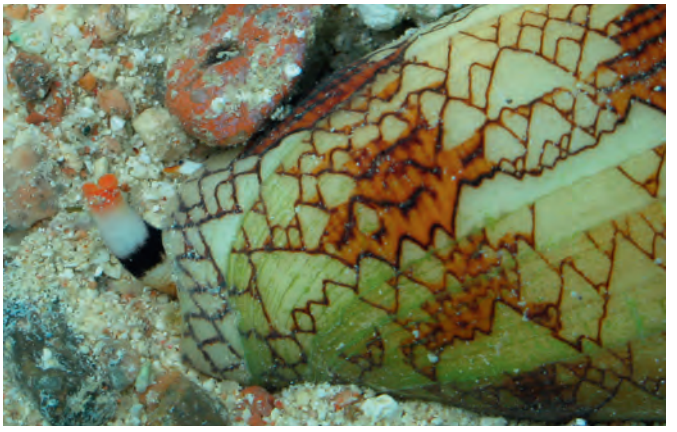


**Fig. 2 d:** *Cylinder neovicarius* at Lagoon was found to burry itself in the sand after its discovery. The eye and proboscis of this molluscivore are visible. The sting causes terrible pain in humans and can result in death.

### *Darioconus* aff. *pennaceus* (Born, 1778)

**Plate 168: fig. 3 a, b:** 34.6 x 18 mm; **c, d:** 42 x 20 mm; all to scale.

Literature: Bosch et al. 1995, Röckel et al. 1995, Dekker & Orlin 2000, Lieske & Myers 2004, Dafni URL 1, Rusmore-Villaume 2008, Lacroix & Lacroix 2011, Monnier et al. 2018.

The Red Sea population is distinct from *Darioconus quasimagnificus* (Da Motta, 1982) by its more variable shape and lighter pattern with larger triangles.

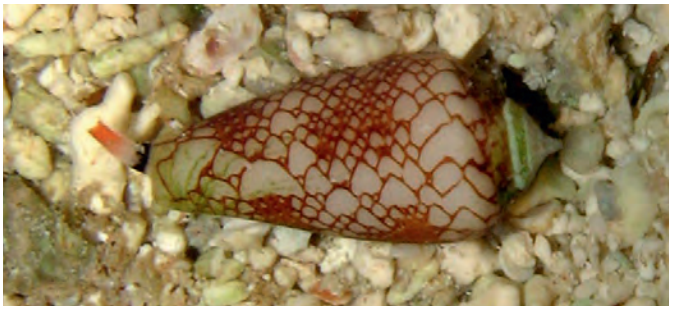


**Fig. 3 e:** *Darioconus* aff. *pennaceus* at Islands during a night dive.

### *Gastridium geographus* (Linnaeus, 1758)

**Plate 168: fig. 4 a - b:** 56 x 27 mm.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Debelius 2002, Lieske & Myers 2004, Dafni URL 1, Rusmore-Villaume 2008, Monnier et al. 2018.

These piscivore species kills their prey with little “harpoons” (the evolved radula). The shell differs from *Gastridium fragilissimum* (Petuch, 1979), known from the southern Red Sea., by its multispiral pink protoconch.

### *Harmoniconus parvatus* (Walls, 1979)

**Plate 168: fig. 5 a, b:** 14.3 x 9.2 mm; **c, d:** 11.5 x 6.8 mm; all to scale.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Zauner & Zuschin 2016, Monnier et al. 2018.

The specimens resemble the Red Sea form *Conus parvatus* f. *sharmiensis* Wils, 1986. This is the smallest and most common cone snail in Dahab.

### *Hermes nussatella* (Linnaeus, 1758)

**Plate 168: fig. 6 a, b:** 35.7 x 12.4 mm; **c:** 35.5 x 13.0 mm, **d:** apex of a shell of 41.6 x 13.9 mm; all to scale.

Literature: Bosch et al. 1995, Röckel et al. 1995, Dekker & Orlin 2000, Lieske & Myers 2004, Dafni URL 1, Lacroix & Lacroix 2011, Monnier et al. 2018.

The elongated shell has spiral lines of brown spots on a white background mottled with orange.

### *Lividoconus akabensis* (G. B. Sowerby III, 1887)

**Plate 168: fig. 7 a, b:** 22.6 x 11.5 mm.

Literature: Röckel et al. 1995, Dekker & Orlin 2000, Dafni URL 1, Lacroix & Lacroix 2011, Monnier et al. 2018.

This juvenile shell still has dark hairlines, which should be missing in adults. The species is listed in WoRMS as a synonym of *Conus quercinus* [Lightfoot], 1786.


8 a, b
8 c, d
8 e, f
8 g, h
9 a, b
9 c
9 d
10 a, b
11 a. b
12 a, b
12 c, d
13 a, b

***Lividoconus sanguinolentus*** (Quoy & Gaimard, 1834)

**Plate 169: fig. 8 a, b:** 31.4 x 19.0 mm; **c, d:** 28.8 x 17.8 mm; **e, f:** 24.1 x 14.6 mm; **g, h:** 18.1 x 10.8 mm; all to scale.

Literature: Röckel et al. 1995, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Lacroix & Lacroix 2011, Monnier et al. 2018.

***Pionoconus nigropunctatus*** (G. B. Sowerby II, 1858)

**Plate 169: fig. 9 a, b:** 34 x 19 mm; **c:** 41.3 x 23.5 mm; **d:** 34.2 x 20.0 mm; all to scale.

Literature: Bosch et al. 1995, Röckel et al. 1995, Dekker & Orlin 2000, Dafni URL 1, Buijse & Verbinnen 2010, Lacroix & Lacroix 2011, Zauner & Zuschin 2016, Monnier et al. 2018.

None of the 5 shells represents the stouter form *Conus nigropunctatus* f. *elatensis* Wils, 1971.



**Fig. 9 e:** *Pionoconus nigropunctatus* trapped in mucus of *Ceraesignum maximum*.

***Pionoconus striatus juliaallaryae*** Cossignani, 2013

**Plate 169: fig. 10 a, b:** 94 x 47.3 mm.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Lieske & Myers 2004, Dafni URL 1, Rusmore-Villaume 2008, Monnier et al. 2018.

The shell differs from *Conus striatus* Linnaeus, 1758 in body shape and its bulging periphery far below the shoulder. However, it is considered a subspecies of *Conus striatus* Linnaeus, 1758 in Monnier et al. (2018) because of missing comparative studies of morphometry, ecology, DNA, radula, preys, egg capsules etc. (L. Limpalaër pers. comm.).



**Fig. 10 c:** *Pionoconus striatus juliaallaryae* during a night dive by Christian Von Mach.

***Puncticulis aequipunctatus*** (Dautzenberg, 1937)

**Plate 169: fig. 11 a, b:** 24.2 x 12.9 mm (South).

Literature: Vine 1986, Bosch et al. 1995, Röckel et al. 1995, Debelius 1996, 2002, Lieske & Myers 2004, Dafni URL 1, Lacroix & Lacroix 2011, Zauner & Zuschin 2016, Monnier et al. 2018.

This species is listed in WoRMS as a synonym of *Conus arenatus* Hwass in Bruguière, 1792.

***Rhizoconus namocanus*** (Hwass in Bruguière, 1792)

**Plate 169: fig. 12 a, b:** 29.0 x 16.5 mm; **c, d:** 24 x 13.8 mm; all to scale.

Literature: Röckel et al. 1995, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Monnier et al. 2018.

The map in Monnier et al. (2018) shows no Red Sea distribution although three specimens from the Red Sea are depicted (580, fig. 1, 5 and 581 fig. 7).

***Rhizoconus rattus*** (Hwass in Bruguière, 1792)

**Plate 169: fig. 13 a, b:** 39.9 x 22.8 mm.

Literature: Dekker & Orlin 2000, Rusmore-Villaume 2008, Monnier et al. 2018.

The map in Monnier et al. (2018) shows no Red Sea distribution, but this is not the case (L. Limpalaër pers. comm.). *Floraconus balteatus* (Sowerby I, 1833) has a small morph in the Red Sea that looks like small *Rhizoconus rattus* (Monnier et al. 2018: 483, fig. 9 from Hurgada).

***Rhizoconus sumatrensis*** (Hwass in Bruguière, 1792)

**Plate 170: fig. 14 a, b:** 57.0 x 34.0 mm; **c, d:** 39.9 x 21.8 mm; all to scale.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Lieske & Myers 2004, Dafni URL 1, Rusmore-Villaume 2008, Lacroix & Lacroix 2011, Monnier et al. 2018.

The species is listed in WoRMS in the synonymy of *Conus vexillum* Gmelin, 1791.

***Strategoconus maldivus*** (Hwass in Bruguière, 1792)

**Plate 170: fig. 15 a, b:** 39.9 x 16.1 mm; **c, d:** juvenile 8.21 x 4.07 mm (Lagoon).

Literature: Bosch et al. 1995, Röckel et al. 1995, Blatterer et al. 2000, Lieske & Myers 2004, Dafni URL 1, Lacroix & Lacroix 2011, Zauner & Zuschin 2016, Monnier et al. 2018.

The largest shell in the collection is 51 mm in size. Formerly *S. maldivus* was considered a subspecies of *Conus generalis* Linnaeus, 1767 by many authors.

(continued after plate)


14 a, b
14 c, d
15 c, d
15 a, b
17 a, b
16 a, b
17 c, d
16 c, d
17 e, f
17 g, h
17 i
17 j, k
17 l, m



**Fig. 15 e:** *Strategoconus maldivus* at Islands during a night dive.

### *Strategoconus striatellus* (Link, 1807)

**Plate 170: fig. 16 a, b:** 43.8 x 24.4 mm; **c, d:** 30.0 x 16.4 mm; all to scale.

Literature: Röckel et al. 1995, Dekker & Orlin 2000, Lieske & Myers 2004, Dafni URL 1, Rusmore-Villaume 2008, Monnier et al. 2018.

The map in Monnier et al. (2018) shows no Red Sea distribution, which is not the case (L. Limpalaër pers. comm.). The closely packed spiral dark brown lines are characteristic. The smaller specimen has similarity to *Kioconus* (*Ongoconus*) *malcolmi* Monnier & Limpalaër, 2015 known from the southern Red Sea, which has an undulated shoulder without channelled sutural ramps.

### *Tesselliconus tessulatus* (Born, 1778)

**Plate 170: fig. 17 a, b:** 40.7 x 23.4 mm; **c, d:** 44.2 x 29.9 mm; all to scale.

Literature: Bosch et al. 1995, Röckel et al. 1995, Dekker & Orlin 2000, Lieske & Myers 2004, Dafni URL 1, Rusmore-Villaume 2008, Lacroix & Lacroix 2011, Zauner & Zuschin 2016, Monnier et al. 2018.

The largest shell in the collection is 45.5 mm in length.



**Fig. 17 e:** *Tesselliconus tessulatus* intertidal on sand at El-Qura Bay producing a slime track.

### *Virgiconus* aff. *virgo* (Linnaeus, 1758)

**Plate 171: fig. 18 a:** the living shell was not collected ca. 120 mm in length.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Lieske & Myers 2004, Monnier et al. 2018.

The white shell is coloured purplish at the anterior end and is covered by a dark brown periostracum when alive. Molecular genetic studies have shown that there is a distinct species, morphologically identical to *Virgiconus virgo* (Linnaeus, 1758). As only living specimen were found there is no shell in the collection.



**Fig. 18 b:** *Virgiconus* aff. *virgo* was turned to show the animal (ca. 100 mm, Islands).

### *Virgiconus flavidus* (Lamarck, 1810)

**Plate 171: fig. 19 a, b:** 56.0 x 31.3 mm; **c, d:** 48.5 x 28.0 mm; all to scale.

Literature: Dekker & Orlin 2000, Rusmore-Villaume 2008, Dafni URL 1, Zauner & Zuschin 2016, Monnier et al. 2018.

This is one of the most common cone snails in Dahab besides *Harmoniconus parvatus* and *Lividoconus sanguinolentus*.

### *Virroconus coronatus* (Gmelin, 1791)

**Plate 171: fig. 20 a, b:** 13.9 x 9.1 mm; **c, d:** 17.4 x 10.6 mm; all to scale.

Literature: Dekker & Orlin 2000, Dafni URL 1, Lacroix & Lacroix 2011, Monnier et al. 2018.

The species has rounded sides and is coloured with brown blotches and clouds.

### *Virroconus sinaiensis* (Petuch & Berschauer, 2016)

**Plate 171: fig. 21 a, b:** 21.7 x 14.4 mm; **c, d:** 22.3 x 14.3 mm; **e, f:** 18 x 13 mm in this eroded shell the zig zag pattern is clearly visible; all to scale.

Literature: Röckel et al. 1995, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Petuch & Berschauer 2016, Zauner & Zuschin 2016, Monnier et al. 2018.

Before its new description as *Miliariconus sinaiensis* Petuch & Berschauer, 2016, "*Conus miliaris* Hwass in Bruguière, 1792" from the Red Sea was considered a synonym of *Conus fulgetrum* Sowerby II, 1834.

### *Virroconus taeniatus* (Hwass in Bruguière, 1792)

**Plate 171: fig. 22 a, b:** 25.4 x 19.0 mm; **c, d:** 13.0 x 8.5 mm; **e, f:** 23.5 x 15.2 mm; all to scale.

Literature: Bosch et al. 1995, Röckel et al. 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Lacroix & Lacroix 2011, Zauner & Zuschin 2016, Monnier et al. 2018.

The species has a characteristic pattern of wide greyish bands with spiral lines of alternating white and black dashes.


18 a
19 a, b
19 c, d
20 a, b
20 c, d
21 a, b
21 c, d
21 e, f
22 a, b
22 c, d
22 e, f

## "Turridae"

The former family name Turridae was originally assigned to numerous species that were considered to be closely related. Their common name turrids is still informally used to refer to this polyphyletic group. They were resolved into 13 monophyletic families by Bouchet et al. (2011). "Turrids" are carnivorous, predatory gastropods. Most species have a poison gland to prey on invertebrate animals (e.g. polychaete worms).

## Clathurellidae H. Adams & A. Adams, 1858

*Etrema cratis* Kilburn & Dekker, 2008

**Plate 172: fig. 1 a, b:** 4.35 x 1.61 mm (Blue Hole 20 m); **c, d:** 3.47 x 1.55 mm (Caves 10 m); all to scale.

Literature: Kilburn & Dekker 2008.

URL 264: http://www.gastropods.com/4/Shell_59444.shtml

The holotype is shown in URL 264 and fits well. *Clathurella fuscobasis* Rehder, 1980 is similar but appears stouter.

*Nannodiella acricula* (Hedley, 1922)

**Plate 172: fig. 2 a, b:** 2.71 x 1.27 mm (Caves 16 m); **c, d:** 1.12 x 0.64 mm (Canyon 11 m).

Literature: Hedley 1922, Dekker & Orlin 2000, Sysoev in Poppe 2008b.

URL 265: http://www.gastropods.com/8/Shell_19538.shtml
URL 266: http://www.biolib.cz/cz/taxonimage/id281912/

This species was identified as *Clathurella* cf. *acricula* (Hedley, 1922) in Sysoev in Poppe (2008b). *Lienardia obtusicostata* E.A. Smith, 1882 has a similar colour but is 8 mm in size and has 1 whorl more (URL 266). *Etrema royi* (Sowerby III, 1913) in Chen & Lee 2007 seems to be conspecific but matches just superficially the original drawing of Sowerby.

## Drilliidae Olsson, 1964

*Clavus glaucozona* Kilburn & Dekker, 2008

**Plate 172: fig. 3 a, b:** 5.44 x 2.70 mm (Canyon 32 m).

Literature: Dekker & Orlin 2000, Verbinnen & Dirkx 2004, Kilburn & Dekker 2008.

The specimens are similar to the small dark morph from Dahab in Kilburn & Dekker (2008: fig. 3). Kilburn et al. (2014) prefer to regard *Tylotiella* as a synonym of *Clavus*.

*Splendrillia* sp.

**Plate 172: fig. 4 a, b:** 7.3 x 2.9 mm; **c, d:** 5.1 x 2.2 mm; **e, f:** 4.4 x 1.9 mm; all Islands reef flat; all to scale.

Literature: Sysoev in Poppe 2008b.

The axial ribs are parted by a subsutural incision. Thus, a prominent knob is left in the subsutural region. *Clavus candidulus* Hedley, 1922 (pl. 45, fig. 47), listed as *Splendrillia candidula* in WoRMS, is similar but has a concave base.

## Horaiclavidae Bouchet, Kantor, Sysoev & Puillandre, 2011

*Carinapex minutissima* (Garrett, A., 1873)

**Plate 172: fig. 5 a, b:** 2.08 x 0.98 mm (Islands labyrinth 10 m).

Literature: Dekker & Orlin 2000, Sysoev in Poppe 2008b, Wiedrick 2015.

A revision of the genus was done by Wiedrick (2015). The specimens have the typical small white protoconch and sometimes a white blotch on the last whorl.

## Mangeliidae P. Fischer, 1883

*Eucithara* cf. *bisacchii* Hornung & Mermod, 1928

Literature: Hornung & Mermod 1928.

**Plate 173: fig. 1 a, b:** 3.80 x 1.89 mm (Lagoon seagrass 12 m); **c, d:** 2.36 x 1.16 mm (Islands). a - c to scale with 3 a, b.

This species has many strong spiral lirae with faint threads in between. On approximately every third strong lirae a faint brown linear blotch is on top of each axial rib. This is observed in 1 lirae in the lower third of a whorl and altogether in 3 - 4 lirae on the body whorl. The holotype of *E. bisacchii* is depicted in Kilburn (1992: fig. 150, 151). The Dahab specimens are smaller, have more convex whorls and appear more shouldered.

*Eucithara capillaris* Kilburn & Dekker, 2008

**Plate 173: fig. 2 a, b:** 5.19 x 2.59 mm (Lagoon 12 m); **c, d:** 5.34 x 2.50 mm (Lagoon 12 m); **e:** detail from a; a - d to scale.

Literature: Kilburn & Dekker 2008, Singer 2013.

URL 267: http://www.gastropods.com/5/Shell_19065.shtml
URL 268: http://www.gastropods.com/1/Shell_19081.shtml
URL 269: http://clade.ansp.org/malacology/collections/imgview.php?img=085/85975_Mangilia_hirasei_dor.jpg

The protoconch is described to be domed and paucispiral, but the holotype is a somewhat worn specimen. Singer (2013) mentions nearly 3 whorls. In this and other aspects the specimens resemble *E. capillata* (Hervier, R.P.J., 1897) (for syntypes see Kilburn 1992: fig. 133 and URL 267). Probably the main difference given by Kilburn & Dekker are the presence of 9 - 13 denticles on the outer edge of the columella compared to 6 - 8 (8 denticles in all 7 specimens from Dahab). Additionally, *E. capillaris* has more angulated whorls, and the shell is more biconical. It is similar to *E. hirasei* (Pilsbry, 1904) (URL 268), but the syntype appears to have more rounded whorls and more axial ribs. The similar *E. typica* (E. A. Smith, 1884) (lectotype in Kilburn 1992: fig. 154) has 12 main spiral lirae and a few, fine narrow spiral threads in each interval. Often a single intermediary thread with a weaker one on either side can be observed.

*Eucithara coronata* (Hinds, 1843)

**Plate 173: fig. 3 a, b:** 4.51 x 2.11 mm (Lagoon); **c:** detail from a; a, b to scale with 1 a - c.

Literature: Kilburn 1992, Dekker & Orlin 2000, Verbinnen & Dirkx 2004, Dafni URL 1, Singer 2013.

(continued after plates)


1 a, b
1 c, d
2 a, b
2 c, d
3 a, b
5 a, b
4 a, b
4 c , d
4 e, f


1 d
1 a, b
1 c
2 e
2 a, b
3 a, b
3 c
2 c, d


4 e
4 c, d
4 a, b
5 a, b
5 e
5 c, d
7 a, b
6 a, b
8 a, b

This somewhat broad specimen represents the typically uniformly fine sculptured form without the stronger lirae (Kilburn 1992). Specimens with stronger spiral threads at regular intervals are discussed below. Singer (2013) lists both forms as *E. coronata* within the *coronata/zonata/bisacchii* complex. Rusmore-Villaume (2008) depicts a slender form.

### *Eucithara* aff. *euselma* (*Gingicithara*?) (Melvill & Standen, 1896)

**Plate 174: fig. 4 a, b:** 2.47 x 0.96 mm (Bells - Blue Hole 29 m); **c, d:** 3.04 x 1.13 mm (Moray Garden 2.5 m); **e:** 2.87 x 1.05 mm (Canyon 32 m); c - e to scale with 5 a - d, 6 a, b, 7 a, b and 8 a, b.

Literature: Chen & Lee 2007

This species is synonymised by Kilburn (1992) with *Pleurotoma notabilis* E. A. Smith, 1888 and assigned to the genus *Gingicithara* (see also WoRMS). However, this species has only a single, granular thread between each pair of main spirals while Dahab specimens have intervals occupied by 3 - 4 microscopic spiral threads. Thus, the synonymy may not be justified (type not seen).

### *Eucithara gevahi* Singer, 2012

**Plate 174: fig. 5 a, b:** 3.25 x 1.36 mm (Blue Hole 4 m); **c, d:** 3.33 x 1.37 mm (Canyon 45 m); **e:** detail from a; a - d to scale with 4 c - e, 6 a, b, 7 a, b and 8 a, b.

Literature: Singer 2012b, 2013.

The shells fit to the original description, but the protoconch appears more pointed in the holotype (Singer 2012a: fig. 5). In this respect the Dahab specimens come closer to a larger specimen depicted in Singer (2013).

### *Eucithara makadiensis* Kilburn & Dekker, 2008

**Plate 174: fig. 6 a, b:** 5.38 x 2.09 mm (Lagoon 12 m); to scale with 4 c - e, 5 a - d, 7 a, b and 8 a, b.

Literature: Sysoev in Poppe 2008b, Singer 2013.

### *Eucithara villaumeae* Kilburn & Dekker, 2008

**Plate 174: fig. 7 a, b:** 3.75 x 2.18 mm (Lagoon 12 m); to scale with 4 c - e, 5 a - d, 6 a, b and 8 a, b.

Literature: Kilburn & Dekker 2008, Singer 2013.

This worn specimen is much broader than other Dahab specimens belonging to this family. It may belong to *E. villaumeae*, as an abnormally thick-shelled and angular individual from Makadi Bay is mentioned in the original description. *Eucithara perhumerata* Kilburn & Dekker, 2008 is slenderer (ratio of height-width = 0.42 - 0.46 versus 0.56) and has an almost transparent shell. *Eucithara pallida* (Reeve, 1846) in Sysoev in Poppe (2008b) is similar but not as shouldered.

### *Eucithara* sp. 1

**Plate 174: fig. 8 a, b:** 4.5 x 1.7 mm (Lagoon 12 m); to scale with 4 c - e, 5 a - d, 6 a, b and 7 a, b.

Literature: Kilburn 1993.

It is most similar to *Pseudorhaphitoma epistomifer* Kilburn, 1993. The Dahab specimens are slenderer, have ca. 1 axial rib less per whorl, and the second main spiral keel below the median keel is located farther from the suture.

### *Eucithara* sp. 2

**Plate 175: fig. 9 a, b:** 3.20 x 1.49 mm (Caves 17 - 19 m); **c, d:** 2.68 x 1.38 mm (Canyon 22 m); all to scale.

URL 270: http://www.gastropods.com/1/Shell_19341.shtml

It has some similarity in microstructure to *Eucithara* cf. *bisacchii*, but the whorls appear less shouldered and the spiral lirae in mid whorl and to the anterior are stronger. Therefore, they look somewhat angled. See also *Heterocithara erismata* Hedley, 1922 in URL 270.

### *Eucithara* sp. 3

**Plate 175: fig. 10 a, b:** 4.1 x 2.0 mm (Lagoon 12 m).

Two worn specimens are broader than *Eucithara* sp. 1 and come close to the body dimensions of *Pseudorhaphitoma epistomifer* Kilburn, 1993.

### *Pseudorhaphitoma perplexior* Kilburn & Dekker, 2008

**Plate 175: fig. 11 a - c:** 5.61 x 2.23 mm, c is the same specimen but with different illumination without stacking, the sculpture is better visible; **d, e:** 4.32 x 1.83 mm; **f:** detail from c; all from Lagoon seagrass 12 m; a - e to scale with 12 a - d.

Literature: Hornung & Mermod 1928, Dekker & Orlin 2000, Öztürk & Bitlis-Bakir 2013a.

*Pseudorhaphitoma iodolabiata* (Hornung & Mermod, 1928) has stronger primary spiral cords, resulting in more angulated spire whorls. The axial ribs tend to bend at the suture, whereas in *P. perplexior* they keep straight. *Pseudorhaphitoma perplexior*, the more common species in Egypt, often has a pinkish apex, which gradually changes to brownish or has a completely brown teleoconch. In this respect the pinkish holotype is exceptional. The ratio of height-width is variable in this species, resulting in more elongated or stubbier shaped shells (H. Dekker, who keeps one *P. iodolabiata* from the Hurgada area in his collection, pers. comm.). *Lienardia perplexa* (G. & H. Nevill, 1875) has more prominent spiral ridges (type specimen is depicted in Kilburn & Dekker 2008).

### *Pseudorhaphitoma kilburni* Morassi & Bonfitto, 2001

**Plate 175: fig. 12 a, b:** 5.0 x 2.0 mm (Islands reef flat), **d, e:** 5.0 x 2.0 mm (Islands reef flat); **f, g:** 4.5 x 1.8 mm (Lagoon 12 m); a - d to scale with 11 a - e.

Literature: Morassi & Bonfitto 2001.

*Pseudorhaphitoma ethekwini* Kilburn, 1993 is similar but is coloured brownish-white to light orange-brown. Apex and columella are tinged with darker orange. *Pseudorhaphitoma agna* (Melvill & Standen, 1896) is distinguished by its 7 axial ribs per whorl, instead of 6 (Kilburn 1993). *Pseudorhaphitoma drivasi* Kilburn, 1993 is coloured pale buff to orange-brown.


9 a, b
9 c, d
11 f
11 c
10 a, b
11 a, b
11 d, e
12 a, b
12 c, d
12 e, f


1 a, b
1 c, d
3 c, d
3 a, b
4 a, b
2 a, b
3 e, f
5 a, b


1 a, b
1 c, d
1 e, f
1 g, h
2 c
2 a, b
4 a, b
3 a, b
3 c, d

## Mitromorphidae Casey, 1904

### *Anarithma stepheni* (Melvill & Standen, 1897)

**Plate 176: fig. 1 a, b:** 3.82 x 1.58 mm (Islands labyrinth 9 m); **c, d:** 3.3 x 1.5 mm (Caves 15 m); all to scale with 2 a, b and 3 c - f.

Literature: Melvill & Standen 1897, Cernohorsky 1988b, Dekker & Orlin 2000, Sysoev in Poppe 2008b, Severns 2011.

URL 271: https://gbmolluscatypes.ac.uk/specimens/512
URL 272: http://www.gastropods.com/9/Shell_11009.shtml
URL 273: http://vieoceane.free.fr/mollusques/mangeliidae1.htm

Syntypes from Loyalty Islands are depicted in URL 271. The species has been considered to be a synonym of *Anarithma metula* (Hinds, 1843) by Cernohorsky, but this opinion is not shared in WoRMS. The holotype in URL 272 is slenderer and has a relatively shorter aperture. However, there seems to be considerable variability (URL 273).

### *Anarithma* sp. 1

**Plate 176: fig. 2 a, b:** 2.82 x 1.60 mm (Caves 16 m); to scale with 1 a - d and 3 c - f.

Literature: Chino & Stahlschmidt 2009

URL 274: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-6380

This probably juvenile specimen is lacking the small spiral ribs between the axial ribs, at least on the shoulder of the later whorls. The outline is biconical and there are nearly indistinct labral and columellar teeth. The protoconch has ca. 1 whorl less than *A. stepheni*. There is some similarity to *A. sublachryma* (Hervier, 1900) (URL 274) and *Mitromorpha flammulata* Chino & Stahlschmidt, 2009.

### *Mitromorpha fischeri* (Hervier, 1900)

**Plate 176: fig. 3 a, b:** 5.22 x 2.13 mm (Moray Garden 2.5 m); **c, d:** 2.01 x 1.16 mm (Caves 16 m); **e, f:** 3.77 x 1.70 mm (Caves); c - f to scale with 1 a - d and 2 a, b.

Literature: Chen & Lee 2007.

URL 275: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-6970
URL 276: http://www.animalbase.uni-goettingen.de/zooweb/servlet/AnimalBase/home/picture?id=10147
URL 277: http://vieoceane.free.fr/mollusques/mangeliidae1.htm
URL 278: http://www.gastropods.com/6/Shell_60446.shtml

The type from Réunion is depicted in URL 275, other specimens are shown in URL 276 and URL 277. Similar and probably misidentified is *Anarithma alba* (Pallard, 1889) in (Chen & Lee 2007, URL 278). The description of Pallard's species was not found. However, *Mitromorpha alba* (Petterd, 1879) has a shiny white shell, which is faintly tinged with chestnut and has regularly transversely striate all over.

### *Mitromorpha* sp. 2

**Plate 176: fig. 4 a, b:** 3.09 x 1.63 mm (Caves 15 m).

Literature: Chino & Stahlschmidt 2009

It is similar to *Mitromorpha fischeri* but of white colour. Weak axial sculpture and overriding spiral sculpture give the specimen a nodulous appearance. The outline is biconical with nearly indistinct labral and columellar teeth. *Mitromorpha nigricingulata* Chino & Stahlschmidt, 2009 has a brown pattern on the body whorl but the early whorls are also plain white.

### Mitromorphidae?

**Plate 176: fig. 5 a, b:** 5.81 x 2.80 mm (Lagoon).

This specimen is perhaps close to *Anarithma*.

## Pseudomelatomidae J. P. E. Morrison, 1966

### *Funa* sp.

**Plate 177: fig. 1 a, b:** 20.2 x 6.7 mm (South); **c, d:** 21.7 x 0.7 mm (Lagoon): **e, f:** 4.16 x 2.01 mm (El Gahaza 17 m); **g, h:** 10.3 x 3.9 mm (Lagoon); a - d to scale.

Literature: Dekker & Orlin 2000, Dafni URL 1.

URL 279: http://www.gastropods.com/4/Shell_18814.shtml
URL 280: http://www.gastropods.com/2/Shell_18532.shtml

One white and three yellowish brown speckled specimens were found. A shell identified as *Ptychobela baynhami* (E.A. Smith, 1891) from Aden, Sudan (URL 279) is conspecific. The type was not seen. Compared to the Dahab shells, *P. baynhami* is larger (29 mm) and has a more angulated outline of the whorls. *Inquisitor* sp. in Sharabati (1983) may be conspecific. The specimens come close to *Inquisitor* sp. in Bouchet et al. (2011), which has a more pronounced spiral sculpture. *Funa laterculoides* (Barnard, 1958) has a protoconch of 3 - 3.5 whorls (Barnard 1958, Verbinnen & Dirks 2004a), while the Dahab specimens have ca. 1.5 - 2 whorls. *Funa fraterculus* Kilburn, 1988 in URL 280 is also similar. *Pleurotoma (Drillia) jousseaumei* Melvill, 1895 is similar but the type specimen was not seen.

## Raphitomidae Bellardi, 1875

### *Daphnella radula* Pilsbry, 1904

**Plate 177: fig. 2 a, b:** 13.7 x 4.7 mm (Lagoon); **c:** protoconch enlarged.

Literature: Pilsbry 1904, Dekker & Orlin 2000, Dafni URL 1, Okutani 2000, 2017, Sysoev in Poppe 2008b.

The specimen fits well to the original description and figure. *Daphnella interrupta* Pease, 1860 in Cernohorsky (1978: pl. 56, fig. 10) and *Daphnella pilsbryi* (Kuroda, 1947) in Okutani (2000: pl. 331, fig. 229) are the same species, both have a dark protoconch. Kay (1965) selected a lectotype and paratypes of *Daphnella interrupta*. These shells are smaller (6.0 - 7.5 mm) and have white protoconchs, which consist of 1.5 whorls, while the Dahab specimen has a brown protoconch of ca. 3 whorls.


5 a, b
6 a, b
7 a, b
8 a, b
8 c
9 e, f
9 c, d
9 a, b

### *Daphnella* sp. 1

**Plate 177: fig. 3 a, b:** 2.24 x 1.04 mm (Bells - Blue Hole 15 m); **c, d:** 1.68 x 0.83 mm (Canyon 32 m); all to scale.

The teleoconch structure has some similarity to *Diaugasma olyra* but the protoconch resembles *Daphnella*. The lighter specimen has approximately 1 protoconch whorl more, perhaps they are even two different species.

### *Diaugasma olyra* (Reeve, 1845)

**Plate 177: fig. 4 a, b:** 7.73 x 2.79 mm (Caves 17 - 19 m).

Literature: Chang 1999, Chen & Lee 2007.

URL 281: http://www.gastropods.com/4/Shell_18574.shtml
URL 282: https://www.conchology.be/?t=5002&year=1999&volume=8&hsn=10517

The original description fits only suboptimally. Reeve mentions a thin, somewhat transparent snowy white shell, with a rose-coloured apex. Additionally, the aperture measures approximately half of the shell length. There may be considerable variability (URL 281) or different species are involved. The specimen from Taiwan in Chang (1999, URL 282) fits best. The type has not been seen.

### *Eucyclotoma* sp.

**Plate 178: fig. 5 a, b:** 5.30 x 1.91 mm (Caves 33 m); a, b to scale with 8 a, b.

The spiral ribs are prominent and whitish, the interstices are orange. A second, stronger spiral rib appears in the ultimate whorl, thus the outer lip is angulated twice. The axial structure is usually weaker, but ribs emerge irregularly, giving the appearance of a broader white varix. A larger 15 mm specimen from Dahab (Lagoon) is in the collection of H. Dekker were the spirals become even more prominent.

### *Exomilus* aff. *edychrous* (Hervier, 1897)

**Plate 178: fig. 6 a, b:** 2.92 x 1.03 mm (Islands north 10 m).

Literature: Kilburn & Dekker 2008, Fedosov & Puillandre 2012.

URL 283: http://www.gastropods.com/9/Shell_18649.shtml

The holotype of *E. edychrous* (Hervier, 1897) is depicted in Fedosov & Puillandre (2012). The colour seems to be faded. It is slightly larger, appears more elongated and has slightly more axial ribs per whorl. Another larger specimen depicted in Kilburn & Dekker (2008) from Lifou, New Caledonia, comes very close. *Kermia benhami* W. R. B. Oliver, 1915 (URL 283) is darker coloured and has slightly more axial ribs (20) on the body-whorl (Raines 2007). *Kermia aegyptiaca* Kilburn & Dekker, 2008 has no flattened outer lip and no distinct basal keel. *Kermia cavernosa* (Reeve, 1845) in Li & Li (2014) is similar. The specimen differs from *E. compressus* Fedosov & Puillandre, 2012 in colour and has 1 - 2 axial ribs more on the last whorl.

### *Glyphostoma tigroidellum* Hervier, 1896

**Plate 178: fig. 7 a, b:** 6.82 x 2.57 mm (Caves 17 - 19 m).

Literature: Hervier 1896, Kurtz 2015.

URL 284: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-3277
URL 285: http://www.jaxshells.org/tur90.htm

Although no lip is developed the convincing character in this species is the unique pattern of yellowish bands obliquely crossing the axial and spiral sculpture. A syntype is shown in URL 284. The protoconch is originally described as smooth. However, another probably conspecific specimen shows similar axial riblets on the protococh as the Dahab shell (URL 285). Kurtz (2015) depicts this species as *Kermia* spec. 9. The generic assignment is unclear. *Austrodaphnella yemenensis* Bonfitto, Sabelli & Morassi, 2001 and *A. alcestis* (Melvill, 1906) have fewer whorls in protoconch and teleoconch and less pronounced shoulders (Bonfitto et al. 2001).

### *Hemilienardia* cf. *rubicunda* (A.A. Gould, 1860)

**Plate 178: fig. 8 a, b:** 4.01 x 1.86 mm; **c:** 1.96 x 1.38 mm; all Moray Garden 2.5 m; a, b to scale with 5 a, b.

Literature: Dekker & Orlin 2000, Dafni URL 1, Verbinnen & Dirkx 2004, Rusmore-Villaume 2008, Okutani 2017.

The type specimen was not seen. *Hemilienardia rubicunda* is probably not a synonym of *H. malleti* (Récluz, 1852).

### *Hemilienardia* aff. *calcicincta* (Melvill & Standen, 1895)

**Plate 178: fig. 9 a, b:** 4.12 x 1.95 mm (Caves 18 m); **c, d:** 3.52 x 1.65 mm (Caves 18 m); **e, f:** 2.58 x 1.48 mm (Blue Hole 34 m).

Literature: Bouchet et al. 2011.

URL 286: http://www.biolib.cz/cz/taxonimage/id281384/?taxonid=605742
URL 287: https://gbmolluscatypes.ac.uk/specimens/226
URL 288: http://www.jaxshells.org/tur20.htm

*Hemilienardia goubini* (Hervier, 1896) has a different protoconch and the whorls are less shouldered (URL 286). The Holotype of *H. calcicincta* is shown in URL 287, other specimens are depicted in URL 288.

### *Kermia drupelloides* Kilburn, 2009

**Plate 179: fig. 10 a, b:** 3.9 x 1.52 mm (Islands north 10 m); to scale with 11 e, f.

Literature: Kilburn 2009.

This species is listed as *Kermia drupelloides* Kilburn, 2009 in WoRMS and identified as *Pseudodaphnella drupelloides* in Fedosov & Puillandre 2012.

### *Kermia producta* (Pease, 1860)

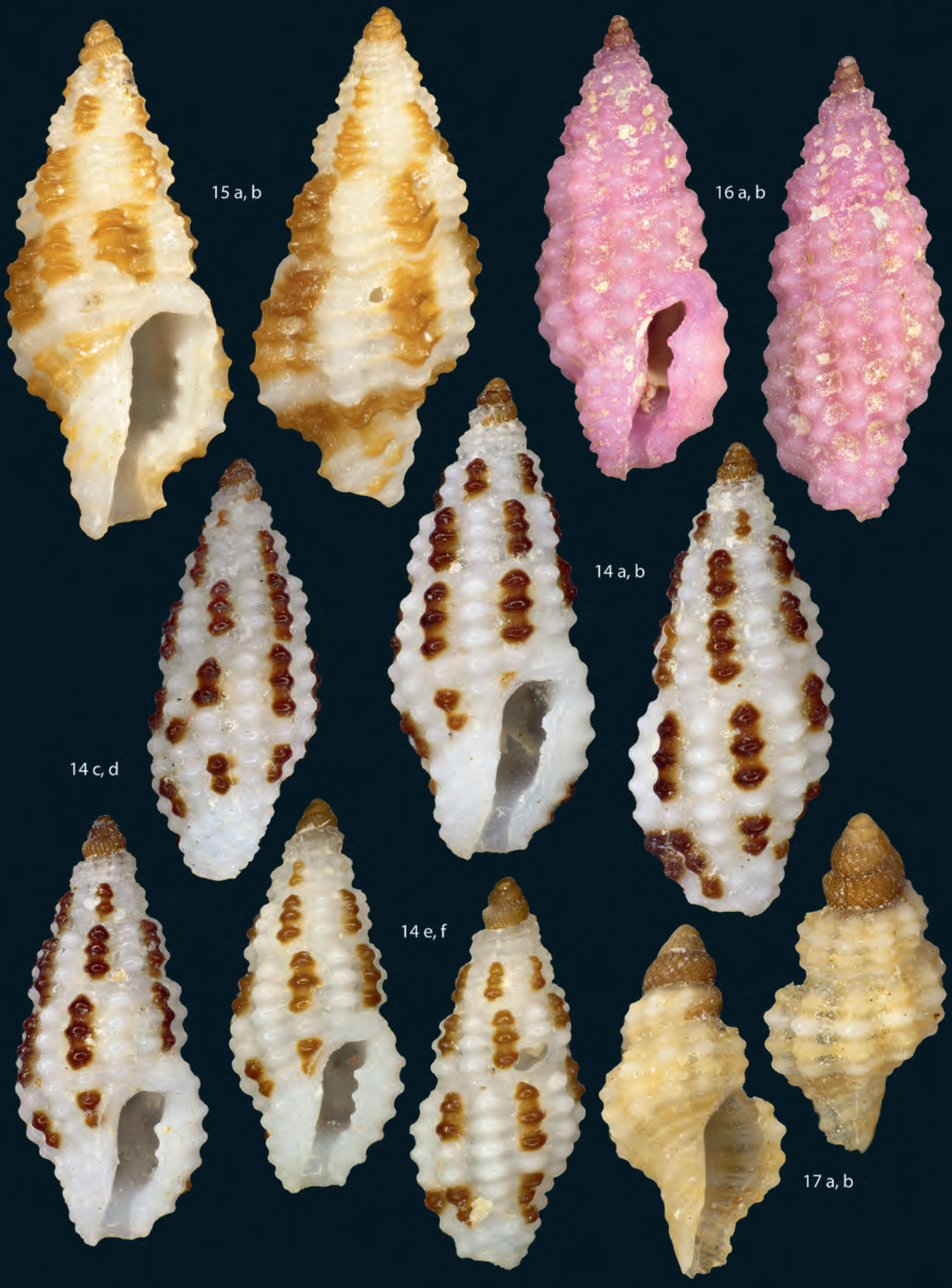
**Plate 179: fig. 11 a, b:** 5.1 x 1.7 mm (Moray Garden 17 m); **c, d:** juvenile 1.60 x 0.85 mm (Canyon 11 m); **e, f:** 3.93 x 1.36 mm (Caves 17 - 19 m); **g, h:** juvenile 2.09 x 0.96 mm (Caves 18 m); e, f to scale with 10 a, b.

Literature: Hedley 1922, Dekker & Orlin 2000, Dafni URL 1, Kilburn 2009, Poppe 2017a.

This species is very similar to *Kermia tessellata* (Hinds, 1843), which differs in its shouldered whorls, finer sculpture, flatter outer lip and strongly contracted base (Kilburn 2009).

(continued after plates)


10 a, b
11 c, d
11 e, f
11 a, b
11 g, h
13 c, d
12 a, b
13 a, b


15 a, b
16 a, b
14 a, b
14 c, d
14 e, f
17 a, b


18 a, b
18 c, d
19 a, b
20 a, b
22 a, b
23 a, b
21 a, b

*Kermia daedalea* (Garrett, 1873) may prove to be an extreme variant of *K. producta*, from which it apparently differs in its coarser sculpture and sharper lip denticles only (Kilburn 2009). *Mangilia* (*Glyphostoma*) *epicharis* Sturany, 1903 (type in Albano et al. 2017) is conspecific with the Dahab specimen, however some specimens appear to be slenderer.

### *Kermia* sp.?

**Plate 179: fig. 12 a, b:** 5.85 x 3.66 mm (Moray Garden 2.5 m).

This fragment differs from the other Dahab Raphitomidae.

### *Microdaphne trichodes* (Dall, 1919)

**Plate 179: fig. 13 a, b:** 2.65 x 1.34 mm (Canyon 11 m); **c, d:** 2.19 x 1.32 mm (Caves 17 - 19 m); all to scale.

Literature: Dekker & Orlin 2000, Chen & Lee 2007.

URL 289: http://www.gastropods.com/6/Shell_14156.shtml
URL 290: http://www.gastropods.com/0/Shell_18750.shtml

*Microdaphne morrisoni* Rehder, 1980 is similar. Both species are accepted in WoRMS (Sysoev in Poppe 2008b, URL 290).

### *Pseudodaphnella dichroma* (Sturany, 1903)

**Plate 180: fig. 14 a, b:** 3.86 x 1.63 mm (Islands); **c, d:** 3.44 x 1.33 mm (Islands); e, f: 3.13 x 1.40 mm (Canyon 11 m); all to scale.

Literature: Dekker & Orlin 2000, Dafni URL 1, Chen & Lee 2007, Fedosov and Puillandre 2012, Albano et al. 2017.

URL 291: http://www.jaxshells.org/27190.htm

Albano et al. (2017) depict the type specimen of *Clathurella dichroma* Sturany, 1903 from the Red Sea. *Kermia maculosa* (Pease, 1863) and *P. barnardi* (Brazier, 1876) are older available names in this species-complex (URL 291). See also Hedley (1922), Chen & Lee (2007), Okutani (2017) and Poppe (2017). *Kermia chichijimana* (Pilsbry, 1904) and *P. phaeogranulata* Fedosov & Puillandre 2012 are alike, but the authors of the latter found genetic differences between morphologically related shells. Red Sea specimens were not included in this study.

### *Pseudodaphnella lineata* Fedosov & Puillandre, 2012

**Plate 180: fig. 15 a, b:** 5.62 x 2.33 mm (Blue Hole 34 m); to scale with 16 a, b.

Literature: Fedosov & Puillandre 2012.

A difference to the type population is the more prominent brown colour, which extends more on the strong undulating spiral cords. In *Clathurella maculosa* Pease, 1863 (assigned to *Kermia* in WoRMS) the brown spiral folds are dotted, and the interstices between nodules are white (assigned to *Pseudodaphnella* by Fedosov & Puillandre 2012). Thus, the brown colouration increases from *P. maculosa* from the Pacific Ocean to *P. lineata* from the the Dahab region.

### *Pseudodaphnella* cf. *martensi* (G. Nevill & H. Nevill, 1875)

**Plate 180: fig. 16 a, b:** 5.08 x 1.88 mm (Islands entrance); to scale with 15 a, b.

Literature: Verbinnen & Dirkx 2004, Kilburn 2009, Fedosov & Puillandre 2012.

Kilburn (2009) and Fedosov & Puillandre (2012) depict the syntype, which is coloured whitish-orange-brown in contrast to the lilac specimen in the genetic tree. In the original description it is of dark brown colour with bright lilac granules and columella. The deep mauve coloured *Paramontana blanfordi* (G. Nevill & H. Nevill, 1875) from Erythraea apparently has a smooth protoconch (depicted and studied by Kilburn 1979).

### *Pseudodaphnella* sp. 1

**Plate 180: fig. 17 a, b:** 1.92 x 1.0 mm (Caves 18 m).

Literature: Fedosov & Puillandre 2012.

The protoconch is dark brown. The rows of nodules on the teleoconch are coloured alternately white and light brown. A darker band is visible on the base.

### *Pseudodaphnella* sp. 2

**Plate 181: fig. 18 a, b:** 2.64 x 1.21 mm (Canyon 32 m); **c, d:** 2.32 x 1.04 mm (Caves 18 m); all to scale with 21 a, b, 22 a, b and 23 a, b.

Literature: Fedosov & Puillandre 2012.

The protoconch is coloured light orange-brown. The teleoconch whorls are shouldered, white except of a light brown band above the prominent suture.

### *Pseudodaphnella* sp. 3

**Plate 181: fig. 19 a, b:** 3.59 x 1.60 mm (Umm Sid 14 m).

Literature: Fedosov & Puillandre 2012.

The protoconch and teleoconch are white. It is similar to *Pseudodaphnella* cf. *fallax*.

### *Pseudodaphnella* sp. 4

**Plate 181: fig. 20 a, b:** 4.76 x 2.28 mm (Islands entrance).

Literature: Fedosov & Puillandre 2012.

The protoconch and teleoconch are pink. The protoconch is perhaps finely sculptured but too worn to see details.

### *Pseudodaphnella* sp. 7

**Plate 181: fig. 21 a, b:** 2.72 x 1.09 mm (Moray Garden 2.5 m); to scale with 18 a - c, 22 a, b and 23 a, b.

Literature: Kilburn 2009, Fedosov & Puillandre 2012.

The shell comes close to *Kermia drupelloides* or *K. aegyptiaca* Kilburn & Dekker, 2008 but is coloured differently and has a darker protoconch.

### *Pseudodaphnella* sp. 8

**Plate 181: fig. 22 a, b:** 2.41 x 1.29 mm (Blue Hole 34 m); to scale with 18 a - c, 21 a, b and 23 a, b.

The teleoconch whorls are shouldered and prominent nodulous, almost spicate at the intersections of axial and spiral ribs.


24 a, b
25 a, b
25 c, d
25 e, f
26 a, b
26 c, d
26 e, f

*Pseudodaphnella* sp. 9

**Plate 181: fig. 23 a, b:** 2.6 x 1.4 mm (Gabr el-Bint 15 m); to scale with 18 a - c, 21 a, b and 22 a, b.

The teleoconch whorls are shouldered and prominent nodulous at the intersections of axial and spiral ribs. The protoconch is different than in *Pseudodaphnella* sp. 8.

*Pseudodaphnella* cf. *fallax* Fedosov & Puillandre, 2012

**Plate 182: fig. 24 a, b:** 3.06 x 1.52 mm (Canyon 45 m); to scale with 25 a, b.

Literature: Fedosov & Puillandre 2012.

The specimen has a white protoconch and comes close to *Pseudodaphnella fallax* Fedosov & Puillandre, 2012.

*Pseudodaphnella* cf. *kilburni* Fedosov & Puillandre, 2012

**Plate 182: fig. 25 a, b:** juvenile 2.35 x 1.15 mm (Caves 15 m); **c, d:** 4.26 x 1.75 mm (Canyon 45 m); **e, f:** 3.79 x 1.49 mm (Canyon 32 m); a, b to scale with 24 a, b; c - f to scale with 26 a - f.

Literature: Fedosov & Puillandre 2012.

One specimen is not fully developed. The protoconch and early teleoconch whorls come very close to *P. kilburni* Fedosov & Puillandre, 2012. Another worn adult specimen is also comparable with this species but has a different colouration.

*Thetidos* aff. *globulosa* (Hervier, 1896)

**Plate 182: fig. 26 a, b:** 4.31 x 2.26 mm (Blue Hole 24 m); **c, d:** 4.53 x 2.41 mm (Tigerhouse); **e, f:** 4.62 x 2.14 mm (Tigerhouse); all to scale with 25 c - f.

Literature: Hervier 1896, Fedosov & Puillandre 2012.

URL 292: http://www.gastropods.com/5/Shell_19155.shtml
URL 293: http://www.jaxshells.org/27114.htm
URL 294: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-2974?listIndex=7&listCount=164

The specimen identified as *Lienardia* (*Thetidos*) *morsura* (Hedley, C., 1899) from Mozambique (URL 292) resembles the Dahab shells. However, *T. morsura* is different (Fedosov & Stahlschmidt 2014). *Lienardia compta* (Reeve, 1845) in URL 293 and in Chen & Lee (2007) are also similar but the type has not been seen. Hervier (1896) described this species in *Glyphostoma*, but it was assigned to the genus *Thetidos* by Fedosov & Puillandre (2012). The Dahab specimens differ in the somewhat smaller size, colour and number of axial ribs. The protoconch is missing in the type (URL 294).

## Turridae H. Adams & A. Adams, 1853 (1838)

*Gemmula monilifera* (Pease, 1861)

**Plate 183: fig. 1 a, b:** 20.0 x 6.6 mm (Lagoon); to scale with 2 e, f.

Literature: Powell 1964, Sharabati 1984, Dekker & Orlin 2000, Verbinnen & Dirkx 2004, Dafni URL 1, Rusmore-Villaume 2008, Severns 2011.

*Iotyrris cingulifera* (Lamarck, 1822)

**Plate 183: fig. 2 a, b:** 34.7 x 11.4 mm (South); **c, d**: 32.7 x.10.9 mm (Lagoon); **e, f:** 19.8 x 6.5 mm (Lagoon); **g:** protoconch 1.92 x 1.13 mm (Caves 15 m); a - d to scale; e, f to scale with 1 a, b.

Literature: Powell 1964, Wilson 1994, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Bouchet et al. 2011.

In later whorls the spiral in the upper sinus cord divides in two, the siphonal canal is short. The species was confirmed by DNA analysis from the Red Sea (Abdelkrim et al. 2018).

*Lophiotoma jickelii* (Weinkauff, 1875)

**Plate 183: fig. 3 a, b:** 45.1 x 13.0 mm (Masbat Bay).

Literature: Weinkauff 1875, Powell 1964, Bosch et al. 1995, Dekker & Orlin 2000, Verbinnen & Dirkx 2004, Rusmore-Villaume 2008, Olivera & Sysoev in Poppe 2008b, Puillandre et al. 2017.

A somewhat darker coloured neotype of *L. jickelii* is designated in Puillandre et al. (2017), unfortunately not from the original type locality Red Sea. The original description matches the Dahab specimen. *Lophiotoma acuta* (Perry, 1811) can be distinguished by the dominating upper sinus cord (neotype and discussion in Puillandre et al. 2017). Several authors did not distinguish between *L. acuta* and *L. jickelii.* Both species are depicted in Verbinnen & Dirkx (2004).

*Turridrupa erythraea* (Weinkauff, 1875)

**Plate 183: fig. 4 a, b:** 19.4 x 8.1 mm; **c, d:** 19.4 x 8.2 mm; all to scale.

Literature: Weinkauff 1875, Powell 1964, Sharabati 1984 (pl. 33, fig. 17), Dekker & Orlin 2000, Verbinnen & Dirkx 2004, Dafni URL 1, Rusmore-Villaume 2008, Janssen et al. 2015.

Janssen et al. (2015) clarified the generic position.

*Xenuroturris* sp.

**Plate 183: fig. 5 a, b:** 37.7 x 10.7 mm (Masbat Bay).

Literature: Sharabati 1984 (pl. 33, fig. 17a).

The shell is very similar to *Iotyrris cingulifera* but has only 1 spiral in the upper sinus cord. Additionally, the siphonal canal is longer and its anterior part is brown. It is assigned provisionally to this genus as unpublished DNA data places this species closer to *X. legitima* than *I. cingulifera* (Puillandre pers. comm. to H. Dekker).

## Terebridae Mörch, 1852

The Terebridae known as terebras, auger shells or auger snails are sand-dwelling carnivores. They use a complex venom apparatus to immobilise and capture polychaetes and acorn worms (Enteropneusta). An oblong or elliptical operculum closes the aperture. *Myurella affinis*, *Myurella nebulosa*, *Terebra babylonia* and *Terebra erythraeensis* are the most abundant species. Due to their large size and the easily visible tracks in the sand, *Oxymeris crenulata* and *Oxymeris maculata* have also been found in many places. The non-monophyly of most terebrid genera indicates that the current genus-level classification of the group requires further taxonomic investigations (Castelin et al. 2012).


1 a, b
2 a, b
2 c, d
2 g
3 a, b
2 e, f
5 a, b
4 c, d
4 a, b


1 a, b
1 c, d
3 a
3 b, c
4 a, b
2 a, b
2 c
2 d
5 a, b
6 a, b
7 a, b
8 a, b


9 a, b
12 a, b
11 a, b
13 a, b
10 a, b
14 a
15 a, b
16 a, b
17 a, b
17 c, d

*Cinguloterebra insalli* (Bratcher & Burch, 1976)

**Plate 184: fig. 1 a, b:** 56 mm; **c, d:** 65 mm.

Literature: Bratcher & Cernohorsky 1987, Wils & Wellens 2000, Dekker & Orlin 2000, Heiman 2002e, Dafni URL 1, Terryn 2007, Rusmore-Villaume 2008.

*Duplicaria* cf. *morbida* (Reeve, 1860)

**Plate 184: fig. 2 a, b:** 14.7 x 4.4 mm; **c:** 12.8 x 4.0 12 mm; **d:** 12.5 x 4.1 mm: all from Nabq; all to scale.

Literature: Bratcher & Cernohorsky 1987, Wils & Wellens 2000.

Three dead specimens of *Duplicaria* cf. *morbida* were found on the reef flat near the shipwreck Maria Schröder. The type of *Duplicaria morbida* depicted in Bratcher & Cernohorsky (1987) is very similar. Especially the white shells are striking, however, some doubt remains as the Nabq shells are slenderer and have more ribs.

*Myurella affinis* (Gray, 1834)

**Plate 184: fig. 3 a:** 37 mm (Blue Lagoon); **b, c:** 20.1 x 5.1 mm (Islands).

Literature: Bratcher & Cernohorsky 1987, Wils & Wellens 2000, Dekker & Orlin 2000, Heiman 2002e, Dafni URL 1, Terryn 2007, Rusmore-Villaume 2008.



**Fig. 3 d:** *Myurella affinis*? at Islands. Shell and red proboscis are different compared to the specimen from Canyon (fig. 3 e).

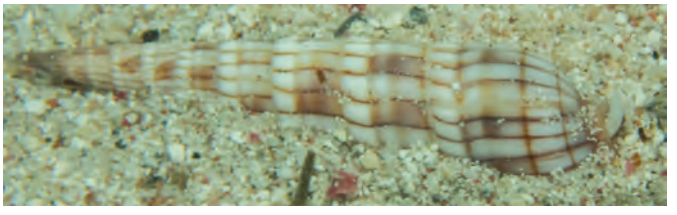


**Fig. 3 e:** *Myurella affinis* with white proboscis at Canyon during a night dive.



**Fig. 3 f:** *Myurella affinis* from Masbat Bay was turned to show the operculum.

*Myurella columellaris* (Hinds, 1844)

**Plate 184: fig. 4 a, b:** 36 mm (South).

Literature: Bratcher & Cernohorsky 1987, Wils & Wellens 2000, Dekker & Orlin 2000, Heiman 2002e, Terryn 2007, Rusmore-Villaume 2008.

*Myurella flavofasciata* (Pilsbry, 1921)

**Plate 184: fig. 5 a, b:** 34 x 5.6 mm.

Literature: Bratcher & Cernohorsky 1987, Wils & Wellens 2000, Dekker & Orlin 2000, Heiman 2002e, Dafni URL 1.

*Myurella nebulosa* (G. B. Sowerby I, 1825)

**Plate 184: fig. 6 a, b:** 41 mm (South).

Literature: Bratcher & Cernohorsky 1987, Bosch et al. 1995, Wils & Wellens 2000, Dekker & Orlin 2000, Heiman 2002e, Terryn 2007, Rusmore-Villaume 2008.

*Myurella parkinsoni* (Cernohorsky & Bratcher, 1976)

**Plate 184: fig. 7 a, b:** 43 mm (South).

Literature: Bratcher & Cernohorsky 1987, Wils & Wellens 2000, Dekker & Orlin 2000, Heiman 2002e, Dafni URL 1, Terryn 2007.

*Myurella kilburni* (Burch, 1965) is similar but has straight axial ribs and a reddish-brown colour pattern.

*Myurella* cf. "*Terebra*" *textilis* Hinds, 1844

**Plate 184: fig. 8 a, b:** 29.0 x 5.3 mm (Masbat Bay).

Literature: Bratcher & Cernohorsky 1987, Dekker & Orlin 2000, Heiman 2002e, Terryn 2007.

This is a species-complex which requires revision.

*Oxymeris cerithina* (Lamarck, 1822)

**Plate 185: fig. 9 a, b:** 23 mm (Blue Lagoon).

Literature: Bratcher & Cernohorsky 1987, Sharabati 1984, Wils & Wellens 2000, Dekker & Orlin 2000, Heiman 2002e, Terryn 2007, Rusmore-Villaume 2008.

*Oxymeris crenulata* (Linnaeus, 1758)

**Plate 185: fig. 10 a, b:** 92 mm (Islands).

Literature: Bratcher & Cernohorsky 1987, Wils & Wellens 2000, Dekker & Orlin 2000, Jarrett 2000, Heiman 2002e, Lieske & Myers 2004, Terryn 2007, Rusmore-Villaume 2008.



**Fig. 10 c:** *Oxymeris crenulata* is usually hidden in the sand during the day but was found hunting at night at Islands.

*Oxymeris dimidiata* (LINNAEUS, 1758)

**Plate 185: fig. 11 a, b:** 21 mm (South).

Literature: BRATCHER & CERNOHORSKY 1987, WILS & WELLENS 2000, DEKKER & ORLIN 2000, HEIMAN 2002e, TERRYN 2007, RUSMORE-VILLAUME 2008, LACROIX & LACROIX 2011.

Only a small fragment of this rare species was found in 2012.

*Oxymeris maculata* (LINNAEUS, 1758)

**Plate 185: fig. 12 a, b:** 138 mm (Islands Suleiman reef).

Literature: BRATCHER & CERNOHORSKY 1987, BOSCH et al. 1995, WILS & WELLENS 2000, DEKKER & ORLIN 2000, HEIMAN 2002e, LIESKE & MYERS 2004, TERRYN 2007, RUSMORE-VILLAUME 2008.

*Terebra babylonia* LAMARCK, 1822

**Plate 185: fig. 13 a, b:** 35.7 mm (Blue Lagoon).

Literature: BRATCHER & CERNOHORSKY 1987, BOSCH et al. 1995, WILS & WELLENS 2000, DEKKER & ORLIN 2000, HEIMAN 2002e, DAFNI URL 1, TERRYN 2007, RUSMORE-VILLAUME 2008.

There are specimens with 2 or 3 incised spiral lines. The largest specimen is 62 mm long.

*Terebra* sp.

**Plate 185: fig. 14 a:** 2.35 x 0.92 mm (Canyon 29 m).

This juvenile may belong to *Terebra babylonia*.

*Terebra cingulifera* LAMARCK, 1822

**Plate 185: fig. 15 a, b:** 69 mm (South).

Literature: BRATCHER & CERNOHORSKY 1987, WILS & WELLENS 2000, DEKKER & ORLIN 2000, TERRYN 2007.

*Terebra consobrina* DESHAYES, 1857

**Plate 185: fig. 16 a, b:** 66 mm.

Literature: BRATCHER & CERNOHORSKY 1987, BOSCH et al. 1995, WILS & WELLENS 2000, DEKKER & ORLIN 2000, HEIMAN 2002e, DAFNI URL 1, TERRYN 2007, RUSMORE-VILLAUME 2008.

*Terebra erythraeensis* TERRYN & DEKKER, 2017

**Plate 185: fig. 17 a, b:** 37.7 mm; **c, d:** 36.7 mm (South).

Literature: BRATCHER & CERNOHORSKY 1987, WILS & WELLENS 2000, DEKKER & ORLIN 2000, HEIMAN 2002e, DAFNI URL 1, TERRYN 2007, RUSMORE-VILLAUME 2008, TERRYN & DEKKER 2017.

This has always been considered an "*amanda*" variant of the Red Sea but has only recently been described.



**Fig. 17 e:** *Terebra erythraeensis* during a night dive at Moray Garden.

# Heterobranchia

## Orbitestellidae IREDALE, 1917

*Anatola* aff. *humboltii* AUDOUIN, 1826

**Plate 186: fig. 1 a, b, c:** 0.96 x 0.73 mm (Caves); a, b to scale.

Literature: SAVIGNY 1817, BOUCHET & DANRIGAL 1982.

The shell agrees with the picture of SAVIGNY (1817: pl. 5, fig. 1) in shape, number of spirals, and number of axial structures. The size is not known. However, a faint spiral line along the second spiral row of humps on the last third of the ultimate whorl is not seen in the Dahab shell. Additionally, it appears not as symmetrical in aperture view. It is missing the teeth in the inner lip, but it may be a somewhat younger shell. AUDOUIN defined the genus and species based on SAVIGNY'S figure and it has never been recorded again. According to BOUCHET & DANRIGAL (1982) no material is left. The species is not listed in WoRMS and family assignment is uncertain.

*Boschitestella donaldi* MOOLENBEEK, 1994

**Plate 186: fig. 2 a, b:** 0.96 x 0.79 mm (Caves); **c, d:** 0.96 x 0.79 mm (Moray House); **e, f:** 0.97 x 0.80 mm (Islands labyrinth 10 m); all to scale.

Literature: MOOLENBEEK 1994, BOSCH et al. 1995.

The species is known from East Sinai (MOOLENBEEK 1994).

*Orbitestella bermudezi* (AGUAYO & BORRO, 1946)

**Plate 186: fig. 3 a, b:** 0.6 x 0.5 mm (Caves).

Literature: MOOLENBEEK 1994, BOSCH et al. 1995.

The species is known from East Sinai (MOOLENBEEK 1994).

## Architectonicidae GRAY, 1850

Members of this family are distributed worldwide, mainly in tropical and subtropical waters. They all feed on coelenterates, *Psilaxis radiatus* feeds on coral polyps, while members of *Heliacus* feed on zoanthinarians (colonial sea anemones; BIELER 1993).

Architectonicidae Gen. sp.

**Plate 186: fig. 4 a, b:** 0.93 x 0.69 mm (Canyon 29 m).

The shell may belong to *Granosolarium asperum* (HINDS, 1844) which has a prominent peripheral keel and is reported for the northern Red Sea (BIELER 1993). The protoconch measures 0.75 mm and falls within the protoconch diameter range of the *Pseudotorinia gemmulata*-Group (upper range), *Heliacus variegatus* (lowest range) and *Architectonica perspectiva* (0.66 - 1.0 mm), which is known from the Red Sea.


1 a, b
1 c
2 a, b
2 e, f
2 c, d
3 a, b
5 a, b
4 a, b
6 a, b


1 a, b
2 a, b
4 a, b
4 c, d
3 a, b
3 c

*Heliacus variegatus* (GMELIN, 1791)

**Plate 186: fig. 5 a, b:** 9.35 x 8.09 mm (Lagoon).

Literature: BIELER 1993, BOSCH et al. 1995, DEKKER & ORLIN 2000, RUSMORE-VILLAUME 2008, VERBINNEN & WILS 2010.

The shell is weakly domed. The upper-side sculpture consists of 3 almost identical ribs with more or less flattened nodules. A rounded double keel is formed by 2 almost identical ribs. The basal sculpture consists of 5 very regular spiral ribs. The protoconch is ca. 0.85 mm in size.

*Psilaxis oxytropis* (A. ADAMS, 1855)

**Plate 186: fig. 6 a, b:** 11.5 x 10.1 mm (Islands).

Literature: BIELER 1993, BOSCH et al. 1995, DEKKER & ORLIN 2000, DAFNI URL 1, RUSMORE-VILLAUME 2008, VERBINNEN & WILS 2010.

Specimens from the Pacific usually have a larger protoconch than the Dahab specimens (1.5 - 1.7 mm vs. ca. 1.1 mm) which represents the lower range (1.1 - 1.5 mm) of *P. radiatus* (RÖDING, 1798) (BIELER 1993). ROBERTSON (1970: 81) already remarked this curious fact, which may cause confusion within these species. *Psilaxis oxytropis* can be distinguished from *P. radiatus* by a partly brown staining on the protoconch, slightly darker spiral lines on the teleoconch and a wider umbilicus.

## Murchisonellidae CASEY, 1904

*Ebala communis* BANDEL, 2005

**Plate 187: fig. 1 a, b:** 1.82 x 0.42 mm (Lagoon 3 m); to scale with 2 a, b, 3 a, b and 4 a - d.

It fits well with the holotype from the fringing reefs of Aqaba (Jordan). However, BANDEL (2005: fig. 37) describes strong variability and includes a specimen with an ornament of spiral lines. This ornamented shell may be a different species and is kept separate here due to the lack of comparable specimens (see the following species).

*Ebala* sp.

**Plate 187: fig. 2 a, b:** 1.48 x 0.47 mm (Lagoon fine sand 10 m); to scale with 1 a, b, 3 a, b and 4 a - d.

The specimen is smaller and more inflated than *E. communis* and is ornamented by a spiral sculpture.

*Murchisonella arabica* BANDEL, 2005

**Plate 187: fig. 3 a, b:** 1.80 x 0.57 mm (Moray Garden 37 m); **c:** 1.34 x 0.59 mm enlarged fragment to show sculpture which is not seen in all specimens; a, b to scale with 1 a, b, 2 a, b and 4 a - d.

Literature: BANDEL 2005, PEÑAS & ROLÁN 2013.

URL 295: https://ingokurtz.jimdo.com/mollusca/murchisonellidae/

It fits well with the original description from the fringing reefs of Aqaba (Jordan).

## Cimidae WARÉN, 1993

*Graphis infans* (LASERON, 1951)

**Plate 187: fig. 4 a, b:** 1.21 x 0.38 mm (Canyon 29 m); **c, d:** 0.99 x 0.4 mm (Moray Garden); all to scale with 1 a, b, 2 a, b and 3 a, b.

Literature: OKUTANI 2000.

The specimen in LASERON (1951) has almost 1 whorl more and is larger (2 mm). The shell in OKUTANI (2000) fits better but is larger (1.8 mm). The protoconch of *G. pacifica* BANDEL 2005 from the Gulf of Aqaba has ca. 1 whorl less. The differences to *G. barashi* VAN AARTSEN, 2002 from the Mediterranean Sea are minimal e.g. protoconch shape and a slightly higher number of axial ribs. *Graphis* sp. in BOSCH et al. (1995) may be conspecific.

# Acteonimorpha

Some members of the subterclass Acteonimorpha are known by their common name the barrel bubble snails.

## Acteonidae D'ORBIGNY, 1843

*Pupa solidula* (LINNAEUS, 1758)

**Plate 188: fig. 1 a, b:** 3.84 x 2.03 mm (Lagoon); to scale with 2 a, b.

Literature: DEKKER & ORLIN 2000, DAFNI URL 1, RUSMORE-VILLAUME 2008, WILLAN & TAGARO in POPPE 2010.

## Aplustridae GRAY, 1847 (syn. Hydatinidae PILSBRY, 1895)

*Bullina* sp.

**Plate 188: fig. 2 a, b:** 3.33 x 1.67 mm (Caves 15 m); to scale with 1 a, b.

*Rictaxiella choshiensis* HABE, 1958 has some similarity in shape and shell structure, but it is larger and coloured pale purple (WILLAN in POPPE 2010, OKUTANI 2010, 2017). Additionally, *Rictaxiella* is differentiated by its simple columella without a fold, whereas *Bullina* has a folded columella.

*Hydatina physis* (LINNAEUS, 1758)

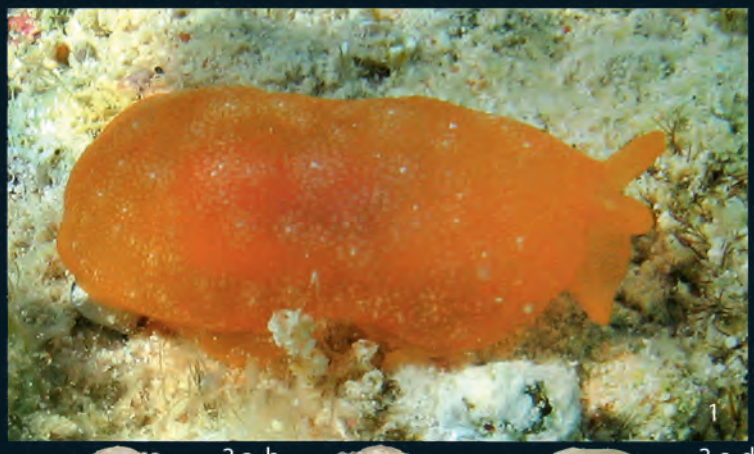
**Plate 188: fig. 3 a, b:** 28.6 x 20.8 mm; **c, d:** 15.3 x 10.8 mm.

Literature: BOSCH et al. 1995, DEKKER & ORLIN 2000, DEBELIUS 2002, LIESKE & MYERS 2004, DAFNI URL 1, RUSMORE-VILLAUME 2008, Yonow 2008, SINGER 2014.



**Fig. 3 e:** *Hydatina physis* at Lighthouse during a night dive by Silke BARON.


1 a, b
2 a, b
5 c, d
3 a, b
4 c, d
3 c, d
4 a, b
5 a, b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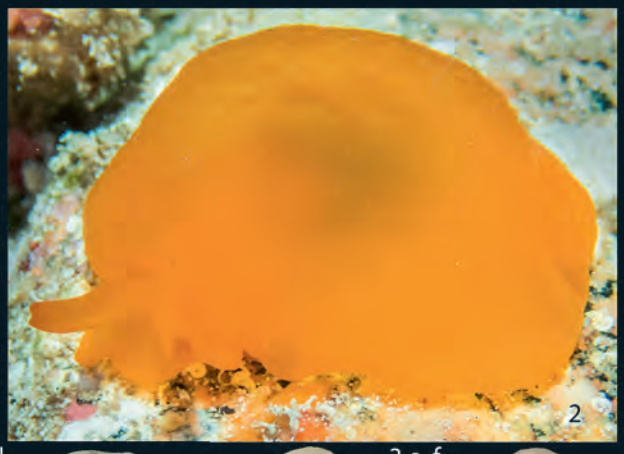
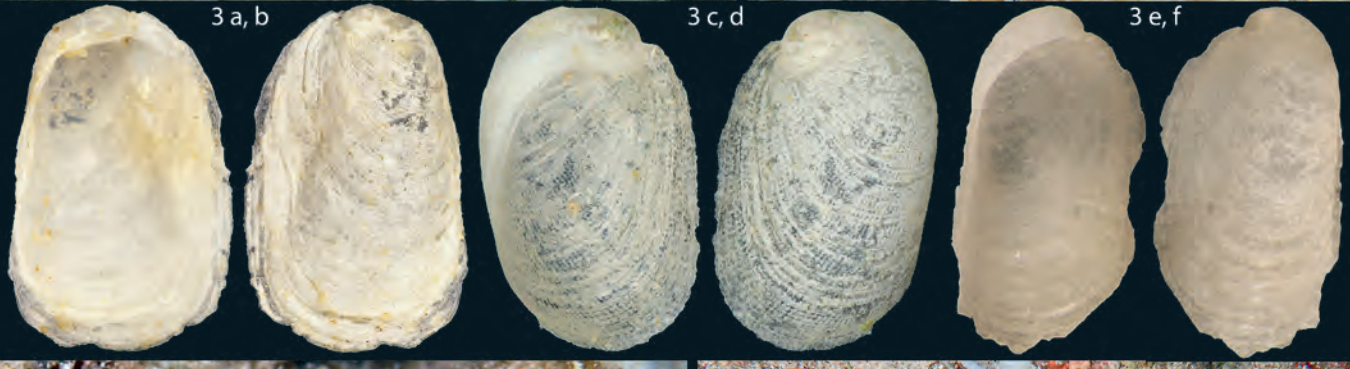

2


3 a, b

3 c, d

3 e, f


4


5 a


5 b


5 c


5 d


1


2 a


2 b


3


4 a


5


4 b


6 a


6 b

# Ringiculimorpha

## Ringiculidae Philippi, 1853

*Ringicula acuta* Philippi, 1849

**Plate 188: fig. 4 a, b:** 2.88 x 1.73 mm (Lagoon); **c, d:** 1.10 x 0.79 mm (Lagoon); a, b to scale with 5 a, b; c, d to scale with 5 c, d.

Literature: Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Singer 2012a.

According to Singer (2012a) there are two species in the Red Sea. He distinguishes *R. minuta* Adams, 1872 by the size and spiral lines all over the shell. As seen in this specimen, these lines disappear near the suture as the shell grows. Therefore, juveniles may show spiral lines on the entire shell and cannot be separated by this character. The adult specimen fits well with the syntype of *R. savignyi* Morlet, 1878, originally described from Suez as depicted in Bouchet & Danrigal (1982) and Valdés & Héros (1998).

*Ringicula minuta* H. Adams, 1872

**Plate 188: fig. 5 a, b:** 2.66 x 1.46 mm (Lighthouse 34 m); **c, d:** 1.00 x 0.68 mm (Lagoon); a, b to scale with 4 a, b; c, d to scale with 4 c, d.

Literature: Adams 1872, Singer 2012a.

Singer describes his shells as small, slender and covered with spiral lines. In the original description *R. minuta* is smaller and broader than the Dahab shell, but has 1 whorl less and therefore may have been a juvenile.

# Pleurobranchida

## Pleurobranchidae Gray, 1827

*Berthellina citrina* (Rüppell & Leuckart, 1828)

**Plate 189: fig. 1:** at Lagoon.

Literature: Rüppell & Leuckart 1828, Dekker & Orlin 2000, Trainito 2005.

URL 296: http://www.medslugs.de/E/Ind-NW/Berthellina_citrina/Selection.htm

The dorsal surface has a pattern of dense white speckles as in the original description. It is very similar to a specimen from the Mediterranean Sea identified as *Berthella stellata* in Trainito (2005).

*Berthellina* cf. *citrina* (Rüppell & Leuckart, 1828)

**Plate 189: fig. 2:** at Islands.

Literature: Debelius 1996, 2000, Dekker & Orlin 2000, Trainito 2005, Yonow 2008, Willan & Poppe in Poppe 2010, Moustafa et al. 2014.

URL 297: http://www.medslugs.de/E/Ind-NW/Berthellina_citrina/Selection.htm

The forsal surface shows no dense white speckles. It is identified as *B. citrina* in most of the literature. If specimens with white speckles, as described by Rüppell & Leuckart (1828) (former species), are conspecific, B. citrina would be the correct name. The white speckled form is rarely found or depicted.

*Berthellina* sp.

**Plate 189: fig. 3 a, b:** 2.16 x 1.37 mm (Caves 15 m); **c, d:** 1.41 x 0.9 mm (Islands); **e, f:** 2.20 x 1.13 mm (Blue Hole 4 m).

The small, perhaps juvenile, shells from sand samples with low length/width ratio (1.7 - 1.75) fit better with the red coloured *Berthellina delicata* (Pease, 1861) than with shells of *B. citrina* (2.2 - 2.4) given in Moustafa et al. (2014, 2016).

*Pleurobranchus albiguttatus* (Bergh, 1905)

**Plate 189: fig. 4:** at Light House by Christian Von Mach.

Literature: Yonow 2008.

URL 298: http://www.medslugs.de/E/Ind-NW/Pleurobranchus_albiguttatus/Selection.htm

*Pleurobranchus grandis* Pease, 1868

**Plate 189: fig. 5 a, b, d:** at Abu Galum (a); Golden Blocks - Moray Garden (b, d) during night dives; **c:** a large egg deposit of probably this species which was observed a few meters away; see finger for size comparison (Blue Hole).

Literature: Vine 1986, Debelius 1996, 2002, Dekker & Orlin 2000, Lieske & Myers 2004, Yonow 2008, Willan & Poppe in Poppe 2010.

URL 299: http://www.medslugs.de/E/Ind-NW/Pleurobranchus_grandis/Selection.htm

The species is very variable in pattern and colouration.

# Nudibranchia

## Polyceridae Alder & Hancock, 1845

*Analogium striatum* (Eliot, 1908)

**Plate 190: fig. 1:** at Islands by Christian Von Mach.

Literature: Debelius 1996, 2002, Dekker & Orlin 2000, Lieske & Myers 2004, Yonow 2008.

URL 300: http://www.medslugs.de/E/Ind-NW/Gymnodoris_striata/Selection.htm

The species is listed as *Gymnodoris striata* (Eliot, 1908) in WoRMS.

*Gymnodoris ceylonica* (Kelaart, 1858)

**Plate 190: fig. 2 a:** at Moray Garden. **b:** at Lagoon by Christian Von Mach.

Literature: Debelius 1996, 2002, Dekker & Orlin 2000, Lieske & Myers 2004, Dafni URL 1, Debelius & Kuiter 2007, Yonow 2008, Willan & Poppe in Poppe 2010.

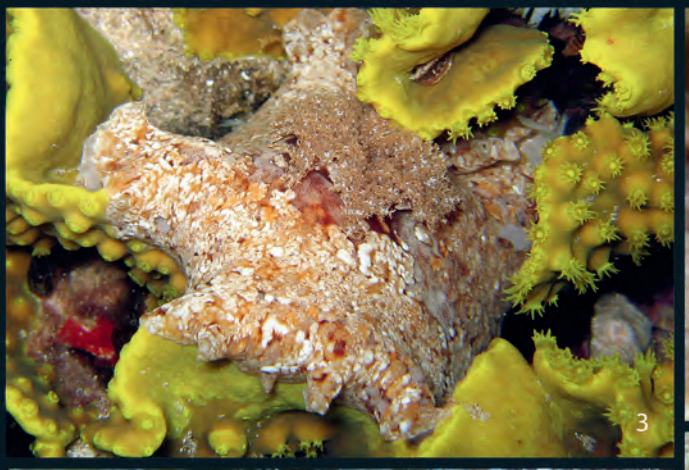

1


2 c


2 d


2 a


2 b


3


4


5


6

### *Gymnodoris* cf. *okinawae* Baba, 1936

**Plate 190: fig. 3:** at Bannerfish by Christian Von Mach.

Literature: Coleman 2015, Gosliner et al. 2015.

URL 301: https://www.meerwasser-lexikon.de/tiere/5716_Gymnodoris_citrina.htm
URL 302: https://www.meerwasser-lexikon.de/tiere/10445_Gymnodoris_alba.htm

Species of *Gymnodoris* are difficult to distinguish and require further investigation as specific variability is not yet understood and complicates identification. The identification is based on the photographed individual in Yonow (2015: fig. 13). The ground-colour of the body is described as pale yellow, the upper surface is ornamented with orange-yellow spots and short lines. The perfoliated portions of the rhinophores are tinged orange-yellow (Baba 1936). In contrast, the Dahab specimen is coloured grey or whitish, and shows only spots. The perfoliated portions of the rhinophores are plain white. See also Coleman (2015: 247) and Gosliner et al. (2015: 152). *Gymnodoris plebeia* (Bergh, 1877) in Debelius & Kuiter (2007: 86, right figure) looks similar but has orange spots on the gills. The internet depicts individuals of *G. citrina* and *G. alba*, which also look very similar (URL 301, URL 302).

### *Martadoris limaciformis* (Eliot, 1908)

**Plate 190: fig. 4 a:** at Masbat Bay seagrass; **b:** from Masbat Bay in a Petri dish.

Literature: Dekker & Orlin 2000, Dafni URL 1, Debelius & Kuiter 2007, Yonow 2008.

URL 303: http://www.medslugs.de/E/Ind-NW/Martadoris_limaciformis/Selection.htm

### *Nembrotha megalocera* Yonow, 1990

**Plate 190: fig. 5:** at Eel Garden by Dieter Slacik.

Literature: Debelius 2000, Dekker & Orlin 2000, Dafni URL 1, Yonow 2008.

URL 304: http://www.medslugs.de/E/Ind-NW/Nembrotha_megalocera/Selection.htm

### *Tambja affinis* (Eliot, 1904)

**Plate 190: fig. 6 a, b:** specimen on ceiling of a small cave at Bells - Blue Hole.

Literature: Dekker & Orlin 2000, Lieske & Myers 2004, Yonow 2008.

URL 305: http://www.seaslugforum.net/find/14564
URL 306: http://www.medslugs.de/E/Ind-NW/Tambja_affinis/Selection.htm

The same colour morph is depicted in Debelius & Kuiter (2007: 75) as *Tambja* sp. 7. Their *T. affinis* fits better with the specimen in Yonow 2008 which has more green stripes and broader rings around the rhinophores.

## Aegiridae P. Fischer, 1883

### *Aegires villosus* Farran, 1905

**Plate 191: fig. 1:** at Bannerfish by Christian Von Mach.

Literature: Dafni URL 1, Yonow 2008, Willan & Poppe in Poppe 2010.

URL 307: http://www.medslugs.de/E/Ind-NW/Aegires_villosus/Selection.htm

This tiny juvenile specimen is probably less than 10 mm in size.

## Hexabranchidae Bergh, 1891

### *Hexabranchus sanguineus* (Rüppell & Leuckart, 1830)

**Plate 191: fig. 2 a:** at Lagoon during a night dive; **b:** at Islands; **c, d:** egg deposits at Umm Sid (c) and Abu Galum (d).

Literature: Vine 1986, Debelius 1996, 2002, Dekker & Orlin 2000, Dafni 2008, Yonow 2008, Willan & Poppe in Poppe 2010.

URL 308: http://www.medslugs.de/E/Ind-NW/Hexabranchus_sanguineus/Selection.htm

*Hexabranchus praetextus* Ehrenberg, 1828 is unaccepted as Rüppell & Leuckart's (1830) name (the junior synonym) has been used more often in the literature (reversal of precedence).

## Discodorididae Bergh, 1891

### *Platydoris inframaculata* (Abraham, 1877)

**Plate 191: fig. 3:** at Lighthouse during a night dive by Christian Von Mach.

Literature: Yonow 2015.

URL 309: http://www.medslugs.de/E/Ind-NW/Platydoris_inframaculata/Selection.htm

### Discodorididae Gen. sp.

**Plate 191: fig. 4:** at Bannerfish by Christian Von Mach.

Literature: Debelius & Kuiter 2007, Yonow 2008.

This specimen is mimicking sponges and is probably a juvenile of either *Thordisa*, *Atagema* (*ornata*) or *Sclerodoris* (*tuberculata*).

## Chromodorididae Bergh, 1891

### *Cadlinella ornatissima* (Risbec, 1928)

**Plate 191: fig. 5:** underneath coral rubble at Lagoon.

Literature: Debelius 1996, 2000, Yonow 2008, 2012, Willan & Poppe in Poppe 2010, Gosliner et al. 2015.

URL 310: http://www.medslugs.de/E/Ind-NW/Cadlinella_ornatissima/Selection.htm

### *Chromodoris aspersa* (Gould, 1852)

**Plate 191: fig. 6:** at Lagoon.

Literature: Debelius 1996, 2002, Dekker & Orlin 2000, Lieske & Myers 2004, Yonow 2008, Gosliner et al. 2015, Nimbs & Smith 2016.

URL 311: http://www.medslugs.de/E/Ind-NW/Chromodoris_aspersa/Selection.htm

### *Chromodoris africana* Eliot, 1904

**Plate 192: fig. 1a, b:** by Philipp Maitz.

Literature: Debelius 1996, Dekker & Orlin 2000, Lieske & Myers 2004, Yonow 2008, 2018, Gosliner et al. 2015.

URL 312: http://www.medslugs.de/E/Ind-NW/Chromodoris_africana/Selection.htm

The ground colour of this species is black with 2 white stripes down the centre.


1a


1 b


2 d

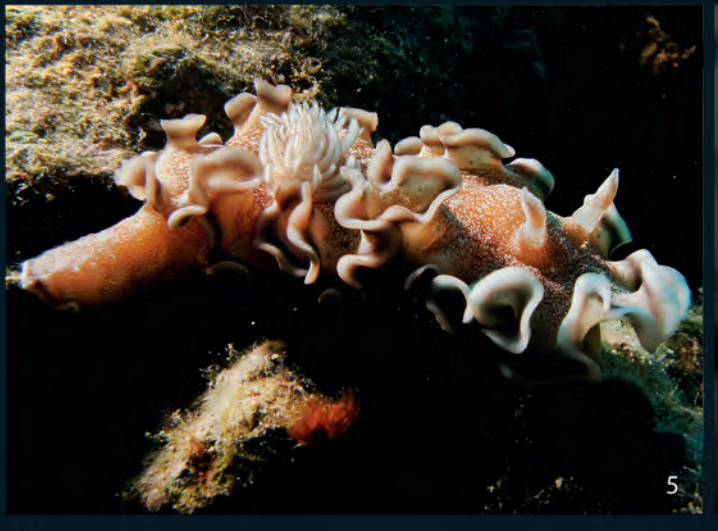

2 a


2 b


2 c


3


4 a


5


6

*Chromodoris quadricolor* (Rüppell & Leuckart, 1830)

**Plate 192: fig. 2 a:** at Golden Blocks - Moray Garden; **b:** at Lighthouse on fire sponge *Negombata magnifica*, its prey; **c:** Eel Garden; **d:** Lagoon during a night dive.

Literature: Vine 1986, Debelius 1996, 2000, Dekker & Orlin 2000, Lieske & Myers 2004, Yonow 2008, 2018, Gosliner et al. 2015.

URL 313: http://www.medslugs.de/E/Ind-NW/Chromodoris_quadricolor/Selection.htm

The 3 longitudinal black and 2 blue bands on the dorsum are characteristic but occur with some variability. This is the typical pyjama nudibranch and the most common Chromodorididae in Dahab.

*Doriprismatica kyanomarginata* Yonow, 2018

**Plate 192: fig. 3:** at Islands by Christian Von Mach.

Literature: Vine 1986, Dekker & Orlin 2000, Lieske & Myers 2004, Debelius & Kuiter 2007, Yonow 2008, 2018.

URL 314: http://www.medslugs.de/E/Ind-NW/Doriprismatica_kyanomarginata/Selection.htm

This species is rarely recorded in the Red Sea and was considered a colour form of *Glossodoris cincta*. *Doriprismatica rossi* Matsuda & Gosliner, 2018 from the Red Sea is superficially similar because of its black-blue-mustard coloured undulating mantle edge. Externally it is tuberculate, certainly greyer and patchier and differs greatly in radular formula.

*Glossodoris andersonae* Matsuda & Gosliner, 2018

**Plate 192: fig. 4 a:** at Golden Blocks - Moray Garden.

Literature: Dekker & Orlin 2000, Dafni URL 1, Yonow 2008, 2018, Gosliner et al. 2015, Matsuda & Gosliner 2018.

URL 315: http://www.medslugs.de/E/Ind-NW/Glossodoris_cincta/Selection.htm

The species has been considered to be *Glossodoris cincta* (Bergh, 1888) but has recently been separated. While the margins are alike, the Dahab specimens do not have the darker patches behind the rhinophores. Three *G. cincta* in Yonow (2008: 189) match *G. andersonae*, the other two are *Doriprismatica kyanomarginata*.



**Fig. 4 b:** *Glossodoris andersonae* at Penguin by Christian Von Mach.

*Glossodoris hikuerensis* (Pruvot-Fol, 1954)

**Plate 192: fig. 5:** at Bannerfish by Silke Baron.

Literature: Lieske & Myers 2004, Debelius & Kuiter 2007, Yonow 2008, 2018, Willan & Poppe in Poppe 2010, Gosliner et al. 2015.

URL 316: http://www.medslugs.de/E/Ind-NW/Glossodoris_hikuerensis/Selection.htm

URL 317: http://www.dafni.com/mollusca/Spec_11.htm#chromodorid

The specimen is depicted in URL 316 and URL 317. This was the first record for the Gulf of Aqaba.

*Goniobranchus annulatus* (Eliot, 1904)

**Plate 192: fig. 6:** at Bannerfish by Christian Von Mach.

Literature: Debelius 2000, Dekker & Orlin 2000, Lieske & Myers 2004, Dafni URL 1, Yonow 2008, Gosliner et al. 2015.

URL 318: http://www.medslugs.de/E/Ind-NW/Goniobranchus_annulatus/Selection.htm

*Goniobranchus charlottae* (Schrödl, 1999)

**Plate 193: fig. 1:** juvenile in a Petri dish from Imno House reef by Sabrina Bleidißel.

Literature: Debelius 1996, 2000, Schrödl 1999, Dekker & Orlin 2000, Lieske & Myers 2004, Yonow 2008, Gosliner et al. 2015.

URL 319: http://www.medslugs.de/E/Ind-NW/Goniobranchus_charlottae/Selection.htm

This species is identified as *Chromodoris* sp. in Debelius (1996: 215) and Yonow (2008: 275). Adult and juvenile are depicted in Gosliner et al. (2015: 218).

*Goniobranchus pseudodecorus* Yonow, 2018

**Plate 193: fig. 2:** in a Petri dish from Imno House reef by Sabrina Bleidißel.

Literature: Debelius & Kuiter 2007, Yonow 2008, 2018, Gosliner et al. 2015.

URL 320: http://www.medslugs.de/E/Ind-NW/Goniobranchus_pseudodecorus/Selection.htm

Depicted as *Chromodoris* sp. 6 in Debelius & Kuiter (2007: 149) and *Goniobranchus* sp. 29 in Gosliner et al. (2015: 227).

*Hypselodoris infucata* (Rüppell & Leuckart, 1830)

**Plate 193: fig. 3 a, b:** at Masbat Bay.

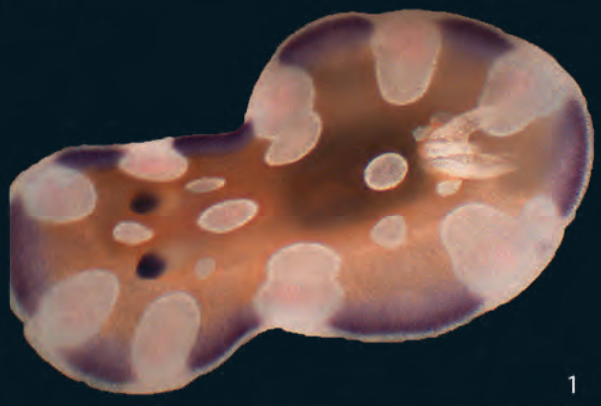
Literature: Debelius 1996, 2000, Dekker & Orlin 2000, Lieske & Myers 2004, Yonow 2008, Dafni 2008, Gosliner et al. 2015.

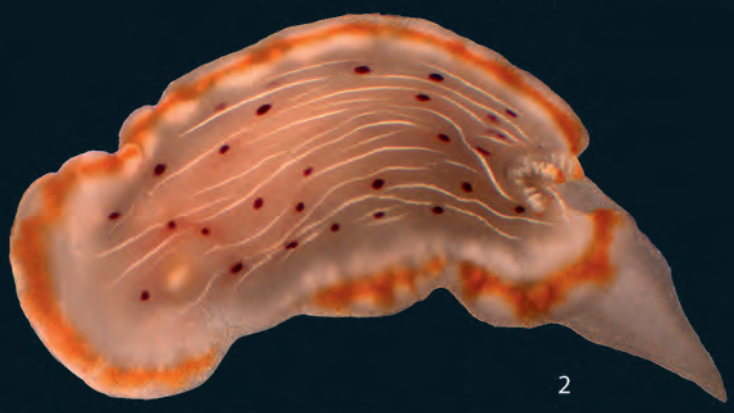
URL 321: http://www.medslugs.de/E/Ind-NW/Hypselodoris_infucata/Selection.htm

*Hypselodoris* sp. (Rüppell & Leuckart, 1830)

**Plate 193: fig. 4:** at Lagoon by Christian Von Mach.

Although similar to *Hypselodoris infucata* this animal is an undescribed species (N. Yonow pers. comm.).


1

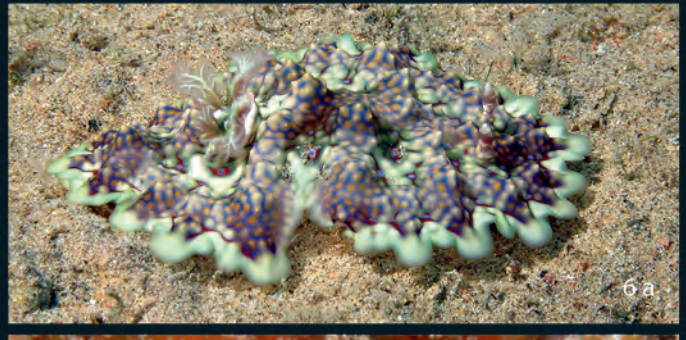

2

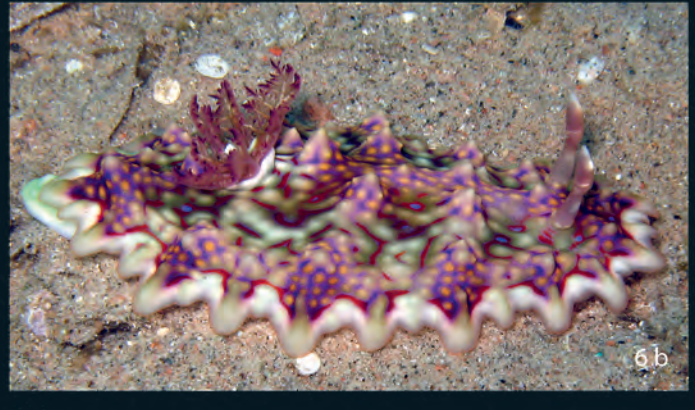

3 a


3 b


4


5


6 a

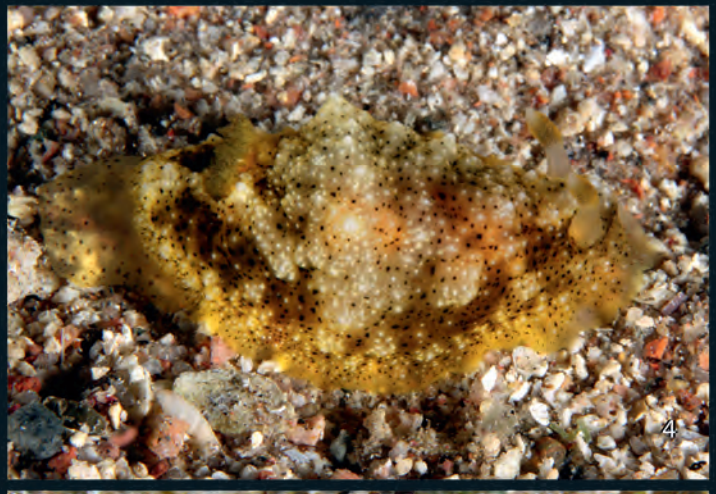

6 b

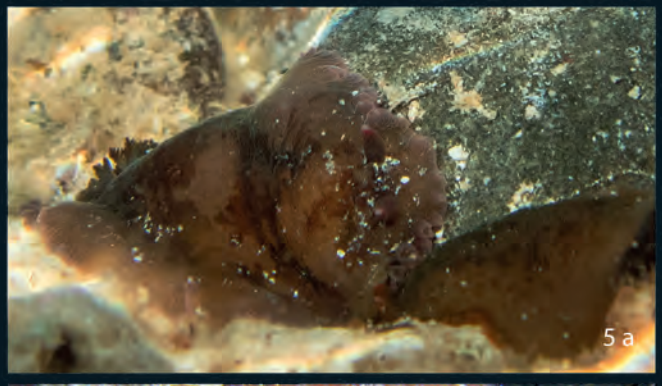

6 c


1

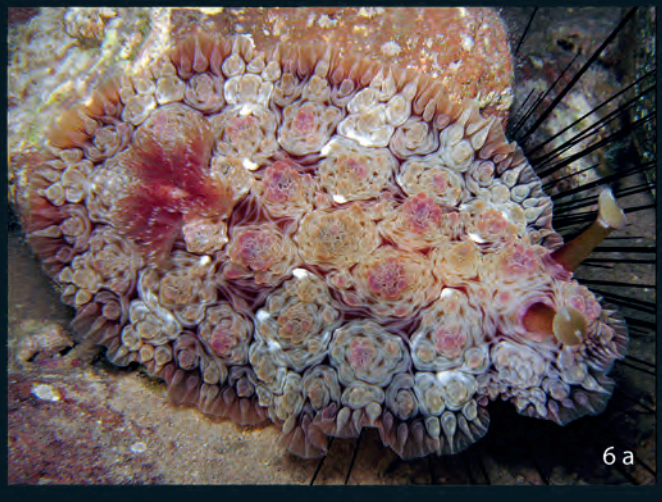

2

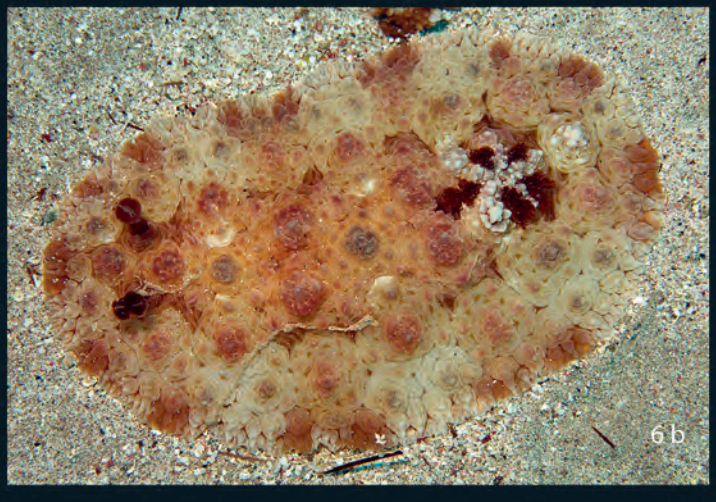

3


4


5 a


5 b


6 a


6 b


1


2


3


4


5


6 a


7


6 b


8 a


8 b

### *Mexichromis katalexis* Yonow, 2001

**Plate 193: fig. 5:** at Bannerfish by Silke Baron.

Literature: Dekker & Orlin 2000, Dafni URL 1, Yonow 2008.

URL 322: http://www.medslugs.de/E/Ind-NW/Mexichromis_multituberculata/Selection.htm

Remark in Tibiriçá et al. (2017): "The identification of this species was based on the external similarity and geographic proximity with the species described by Yonow (2001). It is not clear if *M. katalexis* is a valid species, a junior synonym of *M. multituberculata* (Baba, 1953) (Rudman 2006) or *M. mariei* (Crosse, 1872)."

### *Miamira* (*Orodoris*) *miamirana* (Bergh, 1875)

**Plate 193: fig. 6 a - c:** all by Christian Von Mach at Bannerfish.

Literature: Debelius 1996, 2002, Dekker & Orlin 2000, Lieske & Myers 2004, Debelius & Kuiter 2007, Yonow 2008, Willan & Poppe in Poppe 2010, Gosliner et al. 2015.

URL 323: http://www.medslugs.de/E/Ind-NW/Miamira_miamirana/Selection.htm

URL 324: http://www.starfish.ch/c-invertebrates/nudibranchs-chromodoridae2.html

This is probably a very variable species (URL 324) which is listed as *Miamira miamirana* in WoRMS.

### *Hypselodoris* (*Risbecia*) *pulchella* (Rüppell & Leuckart, 1830)

**Plate 194: fig. 1:** at Golden Blocks.

Literature: Vine 1986, Debelius 1996, 2000, Dekker & Orlin 2000, Lieske & Myers 2004, Yonow 2008, 2012, 2018, Willan & Poppe in Poppe 2010, Gosliner et al. 2015.

URL 325: http://www.medslugs.de/E/Ind-NW/Hypselodoris_pulchella/Selection.htm

The species is listed as *H. pulchella* (Rüppell & Leuckart, 1828) in WoRMS. Yonow (2018) is maintaining the genus *Risbecia*.

### *Thorunna africana* Rudman, 1984

**Plate 194: fig. 2:** at Bannerfish by Christian Von Mach.

Literature: Dekker & Orlin 2000, Yonow 2008, Gosliner et al. 2015.

URL 326: http://www.medslugs.de/E/Ind-NW/Thorunna_africana/Selection.htm

## Goniodorididae H. Adams & A. Adams, 1854

### *Okenia* sp.

**Plate 194: fig. 3:** at Lighthouse by Silke Baron.

Literature: Dafni URL 1, Debelius & Kuiter 2007, Yonow 2008, Gosliner et al. 2015.

URL 327: http://www.medslugs.de/E/Ind-NW/Okenia_rhinorma/Selection.htm

The species is probably conspecific with Goniodorid sp. 2 in Debelius & Kuiter (2007: 29). The tiny juvenile specimen (ca. 3 mm) has obviously less yellow and purple colour than adults. *Okenia rhinorma* Rudman, 2007 may be a close relative (Gosliner et al. 2015: 135).

## Dendrodorididae O'Donoghue, 1924 (1864)

### *Dendrodoris coronata* Kay & Young, 1969

**Plate 194: fig. 4:** at Bannerfish by Christian Von Mach.

Literature: Lieske & Myers 2004, Yonow 2008, Gosliner et al. 2015.

URL 328: http://www.medslugs.de/E/Ind-NW/Dendrodoris_coronata/Selection.htm

### *Dendrodoris fumata* (Rüppell & Leuckart, 1830)

**Plate 194: fig. 5 a:** red-brown specimen from reef flat at Islands; **b:** grey specimen at Penguin Hotel by Christian Von Mach.

Literature: Dekker & Orlin 2000, Yonow 2008, 2012, Gosliner et al. 2015.

URL 329: http://www.medslugs.de/E/Ind-NW/Dendrodoris_fumata/Selection.htm

### *Dendrodoris tuberculosa* (Quoy & Gaimard, 1832)

**Plate 194: fig. 6 a:** at Bannerfish night dive by Christian Von Mach; **b:** at Lighthouse by Silke Baron.

Literature: Debelius 1996, 2002, Dekker & Orlin 2000, Debelius & Kuiter 2007, Yonow 2008, Willan & Poppe in Poppe 2010, Gosliner et al. 2015.

URL 330: http://www.medslugs.de/E/Ind-NW/Dendrodoris_tuberculosa/Selection.htm

## Phyllidiidae Rafinesque, 1814

### *Phyllidia* (*Fryeria*) *rueppelii* Bergh, 1869

**Plate 195: fig. 1:** at Caves.

Literature: Debelius 1996, 2002, Dekker & Orlin 2000, Lieske & Myers 2004, Yonow 2008.

URL 331: http://www.medslugs.de/E/Ind-NW/Phyllidia_rueppelii/Selection.html

### *Phyllidia multifaria* Yonow, 1986

**Plate 195: fig. 2:** at Islands; **3:** at Caves with a different colouration indicating high variability or different species?

Literature: Dekker & Orlin 2000, Debelius & Kuiter 2007, Yonow 2008.

*Phyllidia schupporum* Fahrner & Schrödl, 2000 and *Phyllidia multifaria* Yonow, 1986, both described from the Red Sea are erroneous synonyms of *Phyllidia elegans* in WoRMS.

### *Phyllidia ocellata undula* Yonow, 1986

**Plate 195: fig. 4:** at Lagoon.

Literature: Debelius 1996, 2002, Lieske & Myers 2004, Dafni URL 1, Dafni 2008, Yonow 2008.

Yonow (1986) originally described it as subspecies and subsequently raised it to species level (Yonow 1996). In WoRMS it is a synonym of *P. ocellata* Cuvier, 1804.

### *Phyllidia varicosa* Lamarck, 1801

**Plate 195: fig. 5:** at Moray Garden by Christian Von Mach.

Literature: Dekker & Orlin 2000, Lieske & Myers 2004, Debelius & Kuiter 2007, Yonow 2008, Willan & Poppe in Poppe 2010, Stoffels et al. 2016.

URL 332: http://www.medslugs.de/E/Ind-NW/Phyllidia_varicosa/Selection.htm


3 a


3 b


2


1


4


5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***Phyllidiella pustulosa*** (CUVIER, 1804)

**Plate 195: fig. 6 a:** at Canyon; **b:** A questionable specimen by Christian VON MACH.

Literature: DEBELIUS 1996, 2002, DEKKER & ORLIN 2000, LIESKE & MYERS 2004, YONOW 2008, WILLAN & POPPE in POPPE 2010.

URL 333: http://www.medslugs.de/E/Ind-NW/Phyllidiella_pustulosa/Selection.htm

Recent molecular studies showed that *P. pustulosa* is likely to be a species complex with up to four molecular operational taxonomic units in the Pacific (STOFFELS et al. 2016). Therefore, this putative species complex and its geographic distribution requires further investigation (TIBIRIÇÁ et al. 2017).

***Phyllidiopsis cardinalis*** BERGH, 1876

**Plate 195: fig. 7:** at Three Pools.

Literature: DEBELIUS 2002, DAFNI URL 1, DEBELIUS & KUITER 2007, YONOW 2008.

URL 334: http://www.medslugs.de/E/Ind-NW/Phyllidiopsis_cardinalis/Selection.htm

*Phyllidiopsis cardinalis* the type species of the genus does not cluster with its congeners, but instead forms a separate lineage in the Phyllidiidae.Thus further morphological analyses are required (STOFFELS et al. 2016).

***Phyllidiopsis sinaiensis*** (YONOW, 1988)

**Plate 195: fig. 8 a:** at Canyons; **b:** at Bells - Blue Hole.

Literature: DEKKER & ORLIN 2000, YONOW 2008, LACROIX & LACROIX 2011.

URL 335: http://www.medslugs.de/E/Ind-NW/Phyllidiopsis_sinaiensis/Selection.htm

## Bornellidae BERGH, 1874

***Bornella stellifera*** (A. ADAMS & REEVE [in A. ADAMS], 1848)

**Plate 196: fig. 1:** from Islands in a Petri dish.

Literature: DEKKER & ORLIN 2000, LIESKE & MYERS 2004, DEBELIUS & KUITER 2007, YONOW 2008, 2017.

URL 336: http://www.medslugs.de/E/Ind-NW/Bornella_stellifera/Selection.htm

## Tritoniidae LAMARCK, 1809

***Tritonia bollandi*** SMITH & GOSLINER, 2003

**Plate 196: fig. 2:** at Lighthouse by Silke BARON.

Literature: SMITH & GOSLINER 2003.

URL 337: http://www.seaslugforum.net/find/12283
URL 338: http://www.medslugs.de/E/Ind-NW/Tritonia_bollandi_cf/Selection.htm
URL 339: https://www.flickr.com/photos/silke-baron/24970994216/in/photostream/

The species was originally described from Japan and was later found in Indonesia (URL 337). It was first discovered in the Red Sea on the whip coral *Ellisella* sp. at Lighthouse (32 m). Additional pictures of this specimen are available inURL 338.

## Dotidae GRAY, 1853

***Doto orcha*** YONOW, 2000

**Plate 196: fig. 3 a, b:** from Lighthouse (5 m) in a Petri dish.

Literature: DEBELIUS 1996, DEKKER & ORLIN 2000, DAFNI URL 1, YONOW 2008.

URL 340: http://www.medslugs.de/E/Ind-NW/Doto_orcha/Selection.htm

## Tethydidae RAFINESQUE, 1815

***Melibe engeli*** RISBEC, 1937

**Plate 196: fig. 4:** at Lagoon by Christian VON MACH.

Literature: DEBELIUS 2002, DAFNI URL 1, DEBELIUS & KUITER 2007, YONOW 2008, BURGHARDT & WÄGELE 2014, GOSLINER et al. 2015, TIBIRIÇÁ et al. 2017.

URL 341: http://www.medslugs.de/E/Ind-NW/Melibe_engeli/Selection.htm

Feeding experiments with specimens from Dahab suggest an advanced state of mutualistic symbiosis with zooxanthellae that enables *M. engeli* to survive times of food shortage (BURGHARDT & WÄGELE 2014). It is depicted as *M. engeli* in DEBELIUS & KUITER (2007: 310), as *M. bucephala* BERGH, 1902 in DEBELIUS (2002: 257) and GOSLINER et al. (2015: 318).

## Arminidae IREDALE & O'DONOGHUE, 1923 (1841)

***Dermatobranchus ornatus*** BERGH, 1849

**Plate 196: fig. 5:** at Caves.

Literature: DEBELIUS 1996, 2002, DEKKER & ORLIN 2000, DEBELIUS & KUITER 2007, YONOW 2008, WILLAN & POPPE in POPPE 2010.

## Samlidae KORSHUNOVA, MARTYNOV, BAKKEN, EVERTSEN, FLETCHER, MUDIANTA, SAITO, LUNDIN, SCHRÖDL & PICTON, 2017

***Samla bicolor*** (KELAART, 1858)

**Plate 196: fig. 6:** at Penguin Hotel by Christian VON MACH.

Literature: DEKKER & ORLIN 2000, DAFNI URL 1, YONOW 2008, WILLAN & POPPE in POPPE 2010, KORSHUNOVA et al. 2017.

URL 342: http://www.medslugs.de/E/Ind-NW/Samla_bicolor/Selection.htm

## Facelinidae BERGH, 1889

***Caloria indica*** (BERGH, 1896)

**Plate 196: fig. 7:** at Golden Blocks by Christina STEMMER.

Literature: LIESKE & MYERS 2004, DEBELIUS & KUITER 2007, YONOW 2008, WILLAN & POPPE in POPPE 2010.

URL 343: http://www.medslugs.de/E/Ind-NW/Caloria_indica/Selection.htm

This species was identified as *Phidiana indica* (BERGH, 1896) in WILLAN et al. in POPPE (2010).

***Favorinus tsuruganus*** BABA & ABE, 1964

**Plate 196: fig. 8:** in a Petri dish by Sabrina BLEIDIßEL.

Literature: DAFNI URL 1, DAFNI 2008, YONOW 2008.

URL 344: http://www.medslugs.de/E/Ind-NW/Favorinus_tsuruganus/Selection.htm


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6


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9


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***Pteraeolidia semperi*** (BERGH, 1870)

**Plate 197: fig. 1:** by Christian VON MACH.

Literature: VINE 1986, DEKKER & ORLIN 2000, DAFNI URL 1, LIESKE & MYERS 2004, YONOW 2008, WILLAN & POPPE in POPPE 2010, WILSON & BURGHARDT 2015.

*Pteraeolidia ianthina* (ANGAS, 1864) is endemic to New South Wales, Australia. *Pteraeolidia semperi* (BERGH, 1870) is assigned to the Pacific species, which may be a species complex. However, no Red Sea or Indian Ocean specimens were included in the analysis (WILSON & BURGHARDT 2015).

## Myrrhinidae BERGH, 1905

***Phyllodesmium hyalinum*** EHRENBERG, 1831

**Plate 197: fig. 2:** at Lagoon by Christian VON MACH.

Literature: DEKKER & ORLIN 2000, YONOW 2008, MARTYNOV et al. 2019.

## Aeolidiidae GRAY, 1827

***Cerberilla annulata*** (QUOY & GAIMARD, 1832)

**Plate 197: fig. 3:** at Islands by Christian VON MACH.

Literature: QUOY & GAIMARD 1832, DAFNI URL 1, YONOW 2008, GOSLINER et al. 2015.

URL 345: http://www.medslugs.de/E/Ind-NW/Cerberilla_annulata_cf/Selection.htm
URL 346: http://www.fnz.at/fnz/forum/phpBB2/viewtopic.php?f=2&t=4627

The species was identified as *Cerberilla* cf. *annulata* (QUOY & GAIMARD, 1832) in (COLEMAN 2015: 95). A form with a yellow orange mark on its head from El Quseir is depicted in URL 346 and as *Cerberilla* sp. 1 in GOSLINER et al. (2015: 393).

***Cerberilla*** **sp.**

**Plate 197: fig. 4:** at Bannerfish by Christian VON MACH.

Literature: GOSLINER et al. 2015.

A sister species to *Cerberilla* sp. 4 in GOSLINER et al. (2015: 393).

***Limenandra barnosii*** CARMONA, POLA, GOSLINER & CERVERA, 2014

**Plate 197: fig. 5:** at Islands by Christian VON MACH.

Literature: YONOW 2015.

## Eubranchidae ODHNER, 1934

***Dunga ocellatus*** (ALDER & HANCOCK, 1864)

**Plate 197: fig. 6:** at Lighthouse.

Literature: DEBELIUS & KUITER 2007, YONOW 2008.

It is accepted in WoRMS as *Eubranchus ocellatus* (ALDER & HANCOCK, 1864) but N. YONOW prefers the genus *Dunga* (pers. comm.).

***Eubranchus*** **aff.** ***rubropunctatus*** EDMUNDS, 1969

**Plate 197: fig. 7:** in a Petri dish by Sabrina BLEIDIßEL.

Literature: DEBELIUS & KUITER 2007, YONOW 2008.

Although red spots are visible the cerata are thinner and their tips look different as they have no bands.

## Trinchesiidae F. NORDSIECK, 1972

***Phestilla melanobrachia*** BERGH, 1874

**Plate 197: fig. 8 a:** at Penguin Hotel by Christian VON MACH; **b:** at Caves (25 m).

Literature: DEKKER & ORLIN 2000, LIESKE & MYERS 2004, DEBELIUS & KUITER 2007, YONOW 2008, WILLAN & POPPE in POPPE 2010.

URL 347: http://www.medslugs.de/E/Ind-NW/Phestilla_melanobrachia/Selection.htm

The synonymy of *Phestilla* BERGH, 1874 with *Tenellia* A. COSTA, 1866, as proposed by CELLA et al. (2016), is unaccepted in WoRMS and was redressed by KORSHUNOVA et al. (2017).

# Cephalaspidea

The Cephalaspidea are known as the headshield slugs, bubble snails or bubble shells as many have thin bubble-like shells.

***Noalda*** **sp.**

**Plate 198: fig. 1 a, b:** 1.33 x 0.92 mm (El Gahaza 17 m).

Literature: HEDLEY 1912

URL 348: http://www.seaslugforum.net/find/noalexig

This tiny shell has one brown spiral band, a dense and faint crenulated axial sculpture, and no spiral lines. *Noalda exigua* (HEDLEY, 1912) (URL 348) has 2 spiral bands. *Noalda* is listed as an unassigned Cephalaspidea in WoRMS.

## Bullidae GRAY, 1827

***Bulla arabica*** MALAQUIAS & REID 2008

**Plate 198: fig. 2 a, b:** 37 mm; **c, d:** 28 x 21 mm.

Literature: BLATTERER et al. 2000, DEKKER & ORLIN 2000, LIESKE & MYERS 2004, DAFNI URL 1, MALAQUIAS & REID 2008, SINGER 2014.

URL 349: http://www.medslugs.de/E/mssmain.htm

This is a common species in the Red Sea. It has formerly been known as *B. ampulla* LINNAEUS, 1758 and is a Lessepsian immigrant into the Mediterranean Sea (DELONGUEVILLE & SCAILLET 2007, BOGI & GALIL 2013b).

## Retusidae THIELE, 1925

***Retusa desgenettii*** (AUDOUIN, 1826)

**Plate 198: fig. 3 a, b:** 1.92 x 0.97 mm; **c, d:** 0.93 x 0.50 mm; **e, f:** 1.05 x 0.51 mm; all to scale (Rick's Reef to Canyon).

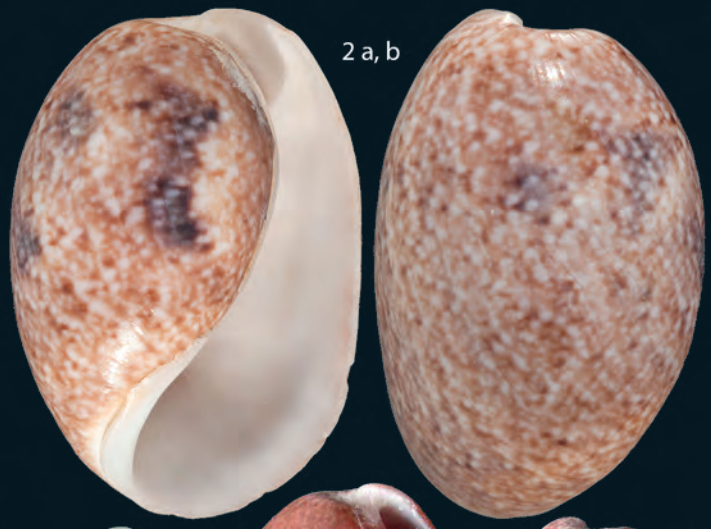
Literature: DEKKER & ORLIN 2000, SINGER 2014.

The shell's axial ribs and spiral sculpture give the shoulder a crenulated appearance. The tip of the protoconch in the sunken apex is not visible in lateral view of adult specimens. Protoconchs (170 - 200 µm in diameter) can be seen in juveniles up to a size of ca. 1.6 mm. One specimen was seen with a protococh measuring 1.9 mm with the tip of the protoconch in the virtual line of the shoulder of the last whorl. This species

(continued after plates)



1 a, b



2 a, b



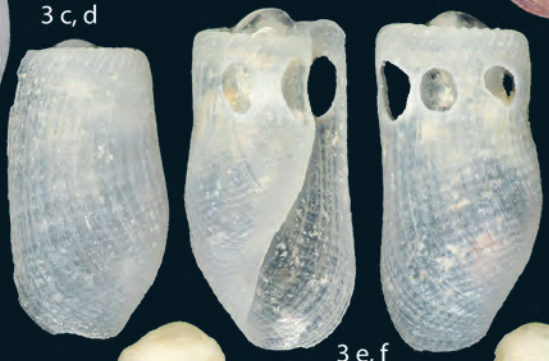
3 a, b



3 c, d



2 c, d



3 e, f



4 a, b



5 a, b


6 a, b
7 a, b
6 c, d
8 c
6 e, f
8 a, b
7 c, d
9 a, b


1 a, b
2 a, b
3 a, b
3 c, d
3 e, f
4 a, b
4 c, d

is a Lessepsian immigrant into the Mediterranean Sea (Bogi & Galil 2013b, Crocetta & Tringali 2015). *Retusa waughiana* Hedley, 1899 has a protoconch of ca. 150 µm and a pale brown colour (Valdés 2008). However, many specimens depicted on the internet are close to *R. desgenettii*. *Retusa mammillata* from the Mediterranean Sea depicted in Scaperrotta et al. (2011) is different but comparable growth stages are nicely shown.

***Retusa tarutana*** Smythe, 1979

**Plate 198: fig. 4 a, b:** 2.65 x 1.26 mm (Moray Garden 37 m).

Literature: Smythe 1979, Bosch et al. 1995, Singer 2014.

The specimen is somewhat slenderer than Smythe´s Saudi Arabian shells. The protoconch is heterostrophic, ca. 180 µm in diameter and not fully covered by the body whorl. The columellar fold is very weak.

***Retusa* sp. 1**

**Plate 198: fig. 5 a, b:** 1.68 x 0.85 mm (Rick's Reef to Canyon).

The protoconch measures ca. 280 µm in diameter but it cannot be excluded that there are incrustations. It may be an aberrant form of *R. desgenettii*.

## Tornatinidae P. Fischer, 1883

***Acteocina fusiformis*** A. Adams, 1850

**Plate 199: fig. 6 a, b:** 4.87 x 1.95 mm (Lagoon); **c, d:** 1.85 x 0.78 mm (Caves); **e, f:** 4.21 x 1.53 mm (Caves); all to scale with 7 c, d and 9 a, b.

Literature: van Aartsen et al. 1990, Dekker & Orlin 2000, Singer 2014.

URL 350: http://www.gastropods.com/9/Shell_30949.shtml

A lectotype was selected and depicted by van Aartsen et al. (1990). Additionally, the decision is followed that *Acteocina olivaeformis* (Issel, 1869), originally assigned to *Tornatina*, is a synonym (syntypes in Bouchet & Danrigal 1982 and Valdés & Héros 1998). The posterior part of the columella is opening more gradually than in *A.* aff. *simplex*. One specimen still has the periostracum, showing a dense ornamentation of orange lines as seen e.g. in *Acteocina decorata* (Pilsbry, 1904) (URL 350).

***Acteocina* aff. *simplex*** (A. Adams, 1850)

**Plate 199: fig. 7 a, b:** 6.08 x 2.50 mm (Lagoon); **c, d:** 2.95 x 1.28 mm (Islands labyrinth 9 m); c, d to scale with 6 a - f and 9 a, b.

Literature: van Aartsen et al. 1990, Dekker & Orlin 2000, Rusmore-Villaume 2008, Singer 2014 (as *T. involuta*).

In this species most of the posterior part of the columella is parallel to the outer lip and opens abruptly, whereas in *A. fusiformis* this opening starts earlier and more gradually. The specimens fit with Rusmore-Villaume's pictures, but the type pictured in van Aartsen et al. (1990) is less elongated with a less elevated spire. The spires of the juvenile shells are less elongated, however, there is considerable variation.

## Cylichnidae H. Adams & A. Adams, 1854

***Cylichna villersii*** (Audouin, 1826)

**Plate 199: fig. 8 a, b:** 2.57 x 0.95 mm (Islands 14 m); **c:** 1.64 x 0.66 mm (Moray Garden 37 m); all to scale.

Literature: Dekker & Orlin 2000, Singer 2014, Scaperrotta et al. 2016.

This species is a Lessepsian immigrant into the Mediterranean Sea (Bogi & Galil 2013b) and similar to the somewhat larger (3 mm) *C. collyra* Melvill, 1906 found in the Gulf of Oman (Bosch et al. 1995, Al-Yamani et al. 2012).

## Mnestiidae Oskars, Bouchet & Malaquias, 2015

***Ventomnestia girardi*** (Audouin, 1826)

**Plate 199: fig. 9 a, b:** 3.18 x 1.64 mm (Canyon 32 m); all to scale with 6 a - f and 7 c, d.

Literature: Dekker & Orlin 2000, Rusmore-Villaume 2008, Willan & Tagaro in Poppe 2010, Singer 2014.

The holotype is depicted in Bouchet & Danrigal (1982). This species is a Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007, Bogi & Galil 2013b).

## Haminoeidae Pilsbry, 1895

***Aliculastrum cylindricum*** (Helbling, 1779)

**Plate 200: fig. 1 a, b:** 19.5 x 8.7 mm (Blue Lagoon).

Literature: Bosch et al. 1995, Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Willan & Tagaro in Poppe 2010, Singer 2014, Too et al. 2014.

URL 351: http://www.nmr-pics.nl/Haminoeidae_new2/album/slides/Aliculastrum%20cylindricum.html

For identification the original description of Helbing and his figure is followed. Most large adult shells by other authors and shells depicted on the internet fit well (e.g. URL 351). However, the specimens in Too et al. (2014: fig. 2 A, B) have a slight angulation in the body whorl.

***Aliculastrum* aff. *debilis*** (Pease, 1860)

**Plate 200: fig. 2 a, b:** 8.19 x 4.09 mm (Blue Lagoon).

Literature: Singer 2014, Too et al. 2014.

The species fits with the description of *Aliculastrum debilis* in Too et al. (2014), although the paratype of Pease depicted therein does not fit. Pease probably confused different localities (species?) for the description. Shells are milky white, semi-opaque, moderately robust and thick, cylindrically ovate and narrowed towards both ends. However, the anterior end is not truncated and there are many more very fine spiral grooves on both ends (anterior ca. 40, posterior more than 20). These grooves become indistinct towards the middle. *Atys angustatus* E.A. Smith, 1872 is within the synonymy of *A. debilis* in Too et al. (2014). The species is considered similar, especially because of the nearly vertical columella. "Although the differences between *A. angustatus* and juveniles of *A.*

*cylindricus* are few, two of these are constant enough to separate the two taxa. In the first place the number of spiral incisions around the apex is almost equal to the number of spirals at the base (both approximately 12) in *A. angustatus* whereas in *A. cylindricus* there are only 5 - 7 spirals (juveniles) around the apex and double that number around the base. Secondly the columella of juvenile *A. cylindricus* is always oblique whereas in *A. angustatus* it is nearly vertical" (VAN AARTSEN & GOUD 2006a). *Bulla succisa* EHRENBERG, 1831 from the Red Sea was described as a thin shell with very fine spiral grooves at both ends. This species is considered a taxon inquirendum in WoRMS (type not seen).

### *Atys ehrenbergi* (ISSEL, 1869)

**Plate 200: fig. 3 a, b:** 13.5 x 8.9 mm (Blue Lagoon); **c, d:** 3.19 x 2.00 mm (Moray Garden 37 m); **e, f:** 1.77 x 1.12 mm (Islands labyrinth 10 m).

Literature: DEKKER & ORLIN 2000, RUSMORE-VILLAUME 2008, SINGER 2014.

PILSBRY (1895) mentioned that *A. semistriata* PEASE, 1860 is identical to *A. ehrenbergi* ISSEL, 1869, a fossil found in the Red Sea. The conspecificity of these species remains to be confirmed (TOO et al. 2014). A paratype of *A. semistriata* is pictured in Too et al. (2014) and it is evident that the middle area without spirals covers considerably more than 50 % of the shell's length. In contrast, this is far less in the Dahab species. I am not sure if the very young shell with few spirals is conspecific, but the number of spirals obviously increase with age (fig. 3 e, f). SINGER (2014) depicts *A. angustatus* from the Gulf of Aqaba. A similar shell is found in Dahab, which is considered to be a slender juvenile of *A. ehrenbergi*.

### *Diniatys dentifer* (A. ADAMS in SOWERBY, 1850)

**Plate 200: fig. 4 a, b:** 4.53 x 3.11 mm; **c, d:** 3.20 x 2.04 mm; all to scale (Moray Garden).

Literature: BOSCH et al. 1995, BLATTERER et al. 2000, DEKKER & ORLIN 2000, DAFNI URL 1, RUSMORE-VILLAUME 2008, WILLAN & TAGARO in POPPE 2010, SINGER 2014, TOO et al. 2014.

URL 352: http://www.medslugs.de/E/Ind-NW/Diniatys_dentifer/Selection.htm

Listed by DEKKER & ORLIN (2000) as *Diniatys dentiferus* (A. ADAMS in SOWERBY, 1850). The dent at the anterior columella is characteristic and was eponymous for this species.

### *Diniatys dubius* (SCHEPMAN, 1913)

**Plate 201: fig. 5 a, b:** 4.16 x 2.71 mm (Lagoon); **c, d:** 3.13 x 2.09 mm (Lagoon); all to scale with 5 e.

Literature: SCHEPMAN 1913, YONOW 2008, TOO et al. 2014.

URL 353: http://www.medslugs.de/E/Ind-NW/Diniatys_dubia/Selection.htm

URL 354: http://www.seaslugforum.net/message/15003

The species fits with the original description and the description in TOO et al. (2014) as *Diniatys dubia* (SCHEPMAN, 1913). See also a picture in a comment of CARLSON & HOFF (URL 354). BHARATE et al. (2018) illustrate the very similar types of *Diniatys callosa* (PRESTON, 1908) which may be an earlier name if genetic studies reveal no difference between Andaman Islands and Red Sea populations.

### *Diniatys* cf. *dubius* (SCHEPMAN, 1913)

**Plate 201: fig. 5 e:** 1.66 x 1.12 mm; **f:** enlarged to show the reticulated surface (Lagoon fine sand 13 m); e to scale with 5 a - d.

It is similar to the larger *Diniatys dubius,* which lacks the spiral striae in the middle of the whorl. The reticulated surface may also be guessed in the picture of the considered holotype of *Bulla mongii* AUDOUIN, 1826 in BOUCHET & DANRIGAL (1982: fig. 58), but this shell appears less inflated. The juveniles of *Liloa mongii* in MICALI (2014) from the Great Bitter Lake (Suez Canal) are slenderer.

### *Haminoea cyanomarginata* HELLER & THOMPSON, 1983

**Text figure 6 a, b:** not depicted on plate.

Literature: HELLER & THOMPSON 1983, DEKKER & ORLIN 2000, DAFNI URL 1, YONOW 2008, GOSLINER et al. 2015, FERNÁNDEZ-VILERT et al. 2018.

URL 355: http://www.ciesm.org/atlas/Haminoeacyanomarginata.html

URL 356: http://www.medslugs.de/E/Ind-NW/Haminoea_cyanomarginata/Selection.htm

URL 357: http://nmr-pics.nl/Haminoeidae_new2/album/slides/Haminoea%20cyanomarginata.html

The animals in fig. 6 a, b have not been collected, therefore a picture of the shell is not available. This species is a Lessepsian immigrant into the Mediterranean Sea as far as Italy (CROCETTA & VAZZANA 2009, BOGI & GALIL 2013b, URL 357).



**Fig. 6 a:** *Haminoea cyanomarginata* at Islands at a depth of 2 m.



**Fig. 6 b:** *Haminoea cyanomarginata* with finger to show size (13 mm).


5 f, e
5 a, b
5 c, d
8 a, b
7 a, b
9 a, b
10 a, b
10 c, d


12 a, b
12 e, f
12 c, d
11 a, b
11 c, d
14 a, b
13 a, b

### *Haminoea* aff. *cyanomarginata* Heller & Thompson, 1983

**Plate 201: fig. 7 a, b:** 1.76 x 1.32 mm (Caves).

Literature: Heller & Thompson 1983, Dafni URL 1, Fernández-Vilert et al. 2018.

URL 358: http://www.gastropods.com/2/Shell_32802.shtml

The shells (probably juveniles) are more globular than in the type figure. Additionally, the posterior outer lip is less pronounced. There is some similarity to the picture given in URL 358 which does not match with *H. cyanomarginata* as its shell is translucent and colourless (Heller & Thompson 1983, Crocetta & Vazzana 2009).

### *Haminoea* cf. *pemphis* (Philippi, 1847)

**Plate 201: fig. 8 a, b:** 11.4 x 7.3 mm (Blue Lagoon).

Literature: Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Singer 2014.

URL 359: http://vieoceane.free.fr/mollusques/cephalaspidea2.htm

The comparatively large shells are distinctly orange-yellow and match with the figures in Rusmore-Villaume. However, it is not listed in WoRMS and the type specimen was not seen. They are probably conspecific with *Haminoea* cf. *vitrea* (in Bosch et al. 1995 and Singer 2014) and *H. galba* Pease, 1861 in URL 359.

### Haminoeidae Gen. sp.

**Plate 201: fig. 9 a, b:** 4.26 x 2.05 mm (Caves 32 m).

URL 360: http://131.111.101.189/fmi/iwp/cgi?-db=UMZC%20Catalogues%20%28Web%29&-loadframes

The shell is without spiral striae and the aperture is broadening distinctly from approximately mid-shell. The type of *Atys* (*Alicula*) *isseli* H. Adams, 1872, depicted in URL 360, has spiral striae at the anterior end.

### *Liloa porcellana* (Gould, 1859)

**Plate 201: fig. 10 a, b:** 10.4 x 5.5 mm (Caves); **c, d:** 10.0 x 4.9 mm (Lagoon).

Literature: Dekker & Orlin 2000, Dafni URL 1, Rusmore-Villaume 2008, Yonow 2008, Too et al. 2014.

Identification is based on the description of Too et al. (2014). The shell is elongated-cylindrical, both anterior and posterior ends are truncated with the anterior end being narrower. The spire is sunken, and the outer lip is thin. Spiral grooves, which come closer towards the ends, are covering the entire shell of adults.

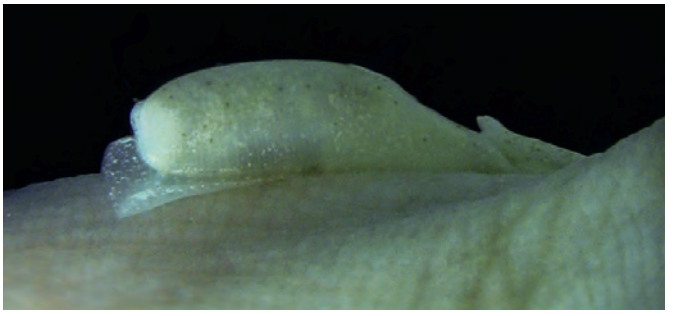


**Fig. 10 e:** *Liloa porcellana*? at Lagoon (ca. 13 mm) crawling on my finger.

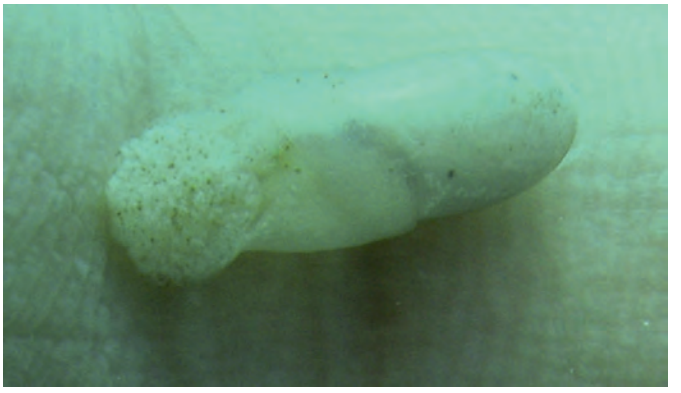


**Fig. 10 f:** *Liloa porcellana*? at Lagoon (ca. 13 mm), the living animal seems to fit with the description of Too et al. (2014).

Micali (2014) considers *Liloa curta* (A. Adams, 1850) to be a synonym of *Liloa mongii* (Audouin, 1826). Bouchet & Danrigal (1982: fig. 58) and Valdés & Héros (1998: fig. 4A) depict the holotype, which is a juvenile shell with an open umbilicus. Micali's identification of *L. mongii* from Great Bitter Lake (Suez Canal) seems to be correct. Micali (2014) is not followed concerning the synonymy with *Bulla curta* A. Adams, 1850. Adams' shell is cylindrical with almost straight sides and has spiral lines on the entire shell. The name *Liloa curta* (A. Adams in Sowerby, 1850) is used by Too et al. for somewhat stouter shells from the Philippines and by Rusmore-Villaume for shells like these from Dahab, however, none of them are straight sided.

### *Phanerophthalmus albocollaris* Heller & Thompson, 1983

**Plate 202: fig. 11 a, b:** 2.70 x 1.37 mm (Caves 32 m); **c, d:** 1.68 x 0.88 mm (Moray Garden); all to scale.

Literature: Ehrenberg 1828, Rüppell & Leuckart 1830, Dekker & Orlin 2000, Yonow 2000, 2008, Austin et al. 2018.

The shells come very close to those in Austin et al. (2018) but are slenderer.

### *Phanerophthalmus* aff. *olivaceus* (Ehrenberg, 1828)

**Plate 202: fig. 12 a, b:** 2.34 x 1.42 mm (Tigerhouse 7 m); **c, d:** 1.35 x 0.81 mm (Rick's Reef to Canyon); **e, f:** 1. 0.93 x 0.62 mm (Caves); c - f to scale.

In these specimens the shoulder is not as pronounced as in *P. albocollaris*. *Phanerophthalmus olivaceus* is the only other species known from the Red Sea. The Dahab shells neither match the original description and the shell of the synonym *P. smaragdinus* (Rüppell & Leuckart, 1830), nor the shells of any species given in Austin et al. (2018). Too little is known about the variability of shell characters, therefore identification remains questionable. The largest shell is similar to *Phanerophthalmus* cf. *cylindricus* (Pease, 1861) in Severns 2011 from Hawaii. A more pointed and even recurved posterior aperture is described for the shell (3.5 x 2 mm) of *P. collaris* Eales, 1938, with growth lines running longitudinally. According to Austin et al. (2018) this is most likely a junior synonym of *P. minikoiensis* (E.A. Smith, 1903), also known from the Indian Ocean.


1 a, b
2 a, b
3 a, b
4 a, b
5 a
5 b
6 a
6 b
7
8
9

*Smaragdinella calyculata* (Broderip & G. B. Sowerby I, 1829)

**Plate 202: fig. 13 a, b:** 3.66 x 2.51 mm (Caves 15 m).

Literature: Dekker & Orlin 2000, Dafni URL 1, Okutani 2000, 2017, Chen & Lee 2007.

*Smaragdinella sieboldi* A. Adams, 1864

**Plate 202: fig. 14 a, b:** 1.97 x 1.41 mm (Caves 33 m).

Literature: Adams 1864, Dekker & Orlin 2000, Chaban & Chernyshev 2016.

In contrast to the similar *Philine vaillanti* Issel, 1869 there is a spiral ridge on the columella.

## Philinidae Gray, 1850 (1815)

*Philine* sp. 1

**Plate 203: fig. 1 a, b:** 1.25 x 0.86 mm (Moray Garden 37 m).

Literature: Okutani 2000, 2017.

Although slightly smaller, the shell fits with *Philine rubrata* Gosliner, 1988 in Okutani (2000: pl. 373, fig. 7). However, in Gosliner (1988) the shell is described as similar to *P. orca* with a finely punctuate sculpture.

*Philine* sp. 2

**Plate 203: fig. 2 a, b:** 6.04 x 4.92 mm (El Gahaza 30 m).

URL 361: http://www.gastropods.com/9/Shell_11429.shtml
URL 362: http://www.gastropods.com/5/Shell_20175.shtml

There is a characteristic crenulated spiral structure. Therefore, it comes close to *P. orientalis* in URL 361, Price et al. (2011) and *P. japonica* in URL 362. It is probably conspecific with *P. vaillanti* in Edelman-Furstenberg & Faershtein (2010: fig. 248). However, *Philine vaillanti* Issel, 1869 has no spirals (Rusmore-Villaume 2008).

## Aglajidae Pilsbry, 1895 (1847)

*Chelidonura* sp.

**Plate 203: fig. 3 a, b:** 3.07 x 2.27 mm (El Gahaza 30 m).

**Plate 203: fig. 4 a, b:** 2.55 x 1.52 mm (Islands reef crest).

Literature: Scaperrotta et al. 2018.

Shells probably belong to one of the Aglajidae species.

*Biuve fulvipunctata* Baba, 1938

**Plate 203: fig. 5 a**: at Islands by Christian Von Mach; **b:** at Lagoon with finger for size estimation (9 mm).

Literature: Dafni URL 1, Yonow 2008, Zamora-Silva & Malaquias 2017.

URL 363: http://www.medslugs.de/E/Ind-NW/Biuve_fulvipunctata/Selection.htm

This species is a lessepsian immigrant into the Mediterranean Sea (Bogi & Galil 2013b). Shells are depicted by Herrero-Barrencua et al. (2016). The new generic assignment is according to Zamora-Silva & Malaquias (2017).

*Chelidonura flavolobata* Heller & Thompson, 1983

**Plate 203: fig. 6 a**: at Canyon, **b:** black form by Philipp Maitz.

Literature: Heller & Thompson 1983, Debelius 1996, 2002, Dekker & Orlin 2000, Yonow 2000, 2008, Lieske & Myers 2004, Dafni URL 1.

URL 364: http://www.medslugs.de/E/Ind-NW/Chelidonura_flavolobata/Selection.htm

The most abundant form in Dahab is dark midnight blue with yellow lobes (fig. 6 a). In the original description they were described as pitch black. A black specimen with white lobes was found (fig. 6 b). Compare to *Chelidonura* sp. in Yonow (2008). Another specimen from Dahab is mentioned by Yonow (2000).

*Chelidonura livida* Yonow, 1994

**Plate 203: fig. 7**: at Islands.

Literature: Debelius 1996, 2002, Dekker & Orlin 2000, Lieske & Myers 2004, Yonow 2008, Willan & Poppe in Poppe 2010.

URL 365: http://www.medslugs.de/E/Ind-NW/Chelidonura_livida/Selection.htm

*Mariaglaja tsurugensis* (Baba & Abe, 1959)

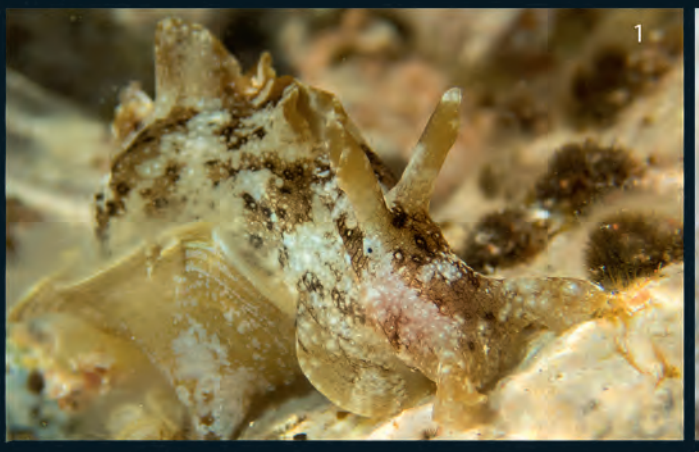
**Plate 203: fig. 8**: in a Petri dish from Caves.

Literature: Debelius 1996, Dekker & Orlin 2000, Yonow 2008, 2012, Willan & Poppe in Poppe 2010, Zamora-Silva & Malaquias 2017.

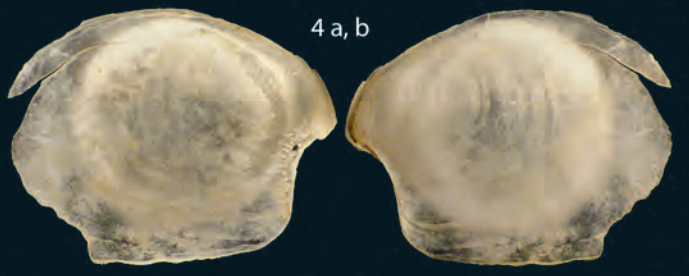
The generic assignment and synonymy with *Chelidonura sandrana* Rudman, 1973) are accepted in WoRMS. Debelius (1996: 136) depicts both taxa. His C. *sandrana* Red Sea specimen has a different colour, but his *C. tsurugensis* from western Australia resembles those found in Dahab. Turner & Wilson (2012) conducted mating experiments between different colour forms within the *C. tsurugensis–sandrana* species complex in Sulawesi. They suggested that the distribution of *C. tsurugensis* is possibly restricted to Japan. However, clarification may only be achieved by conducting mating experiments or genetic studies in different parts of the Indo-Pacific.



**Fig. 8 b:** *Mariaglaja* cf. *tsurugensis* from Mashraba Poseidon (between Lighthouse and Eel Garden) by Silke Baron. This specimen is differently coloured compared to the one depicted on the plate.

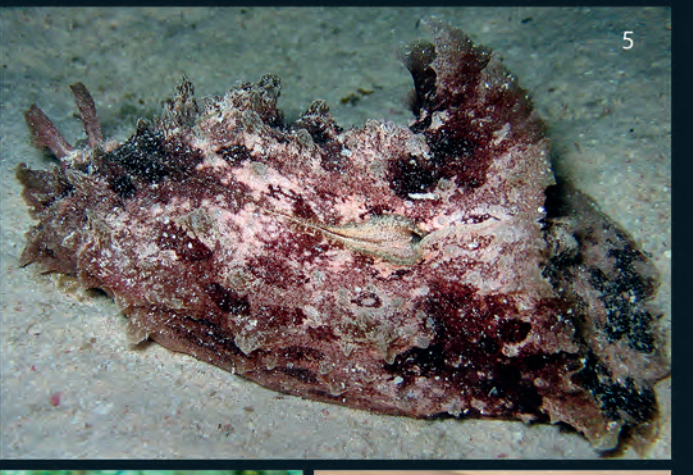

1


3

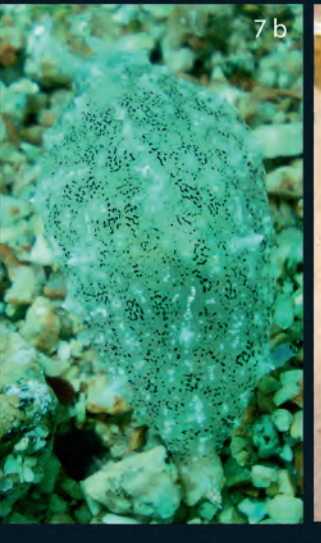

4 a, b


2


6 a

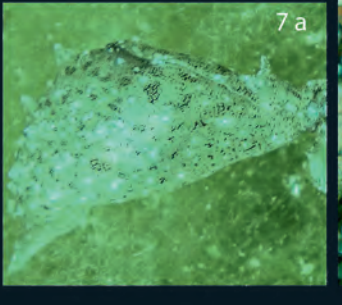

5


6 b, c


7 b


8


6 d, e


7 a

### *Philinopsis speciosa* Pease, 1860

**Plate 203: fig. 9**: at Lagoon in coarse granite rubble at a depth of 4 m.

Literature: Dekker & Orlin 2000, Yonow 2008, 2012, Willan & Poppe in Poppe 2010.

URL 366: http://www.medslugs.de/E/Ind-NW/Philinopsis_speciosa/Selection.htm

### *Spinoaglaja* sp.

**Text figure 10:** not depicted on plate.

Literature: Yonow 2008, Zamora-Silva & Malaquias 2017.

URL 367: http://www.medslugs.de/E/Ind-NW/Spinoaglaja_%20sp_01/Selection.htm

URL 368: https://seaslug.world/species/spinoaglaja_sp._1

This species is known from Israel identified as *Spinoaglaja* sp. 01 in URL 367. Very similar is a specimen from Japan identified as *Spinoaglaja* sp. 1 in URL 368. Yonow (2008) had a similar specimen as "Aglajid 12 mm" in "Incertae sedis".



**Fig. 10:** *Spinoaglaja* sp. at Umm Sid by Christian Von Mach.

## Aplysiida

The Aplysiida commonly known as sea hares usually have a soft internal shell made of protein, but some have no shell at all. They are herbivorous and are typically found on seaweed.

## Aplysiidae Lamarck, 1809

### *Aplysia oculifera* A. Adams & Reeve, 1850

**Plate 204: fig. 1**: at Islands, ca. 45 mm in size.

Literature: Dekker & Orlin 2000, Yonow 2008.

URL 369: http://www.medslugs.de/E/Ind-NW/Aplysia_oculifera/Selection.htm

### *Aplysia parvula* Mörch, 1863

**Plate 204: fig. 2**: at Bannerfish by Christian Von Mach.

Literature: Dekker & Orlin 2000, Dafni URL 1, Yonow 2008, Willan & Poppe in Poppe 2010.

URL 370: http://www.medslugs.de/E/Ind-NW/Aplysia_parvula/Selection.htm

### *Aplysia* sp. 1

**Plate 204: fig. 3**: at Bannerfish by Christian Von Mach.

Literature: Yonow & Hayward 1991, Yonow 2000, 2008, Dafni URL 1, Gosliner et al. 2015.

URL 371: http://www.medslugs.de/E/Ind-NW/Aplysia_parvula/Selection.htm

The species is sometimes listed as the black form of *Aplysia parvula* Mörch, 1863 or doubtfully identified ("cf."). Molecular evidence suggests that this is a species complex. A new name is required for the Indo-Pacific species (Gosliner et al. 2015).

### *Aplysia* sp. 2

**Plate 204: fig. 4**: 10.7 x 8.3 mm (Masbat Bay).

The shell may belong to one of the *Aplysia* species photographed alive. Similar but smaller shells are depicted in Yonow & Hayward (1991) and Yonow (2000).

### *Dolabella auricularia* (Lightfoot, 1786)

**Plate 204: fig. 5**: at Islands by Christian Von Mach.

Literature: Dekker & Orlin 2000, Lieske & Myers 2004, Yonow 2008, Willan & Poppe in Poppe 2010.

URL 372: http://www.medslugs.de/E/Ind-NW/Dolabella_auricularia/Selection.htm

### *Dolabrifera dolabrifera* (Cuvier, 1817)

**Plate 204: fig. 6 a**: at Islands by Christian Von Mach; **b, c:** 2.99 x 1.75 mm (Rick's Reef to Canyon); **d, e:** 1.15 x 0.66 mm (Ricks reef).

Literature: Dekker & Orlin 2000, Dafni URL 1, Yonow 2008, Willan & Poppe in Poppe 2010, Valdés et al. 2017.

URL 373: http://www.medslugs.de/E/Ind-NW/Dolabrifera_dolabrifera/Selection.htm

Two similar shells are depicted in Yonow (2000). Valdés et al. (2017) reviewed the genus and genetically confirmed the species for the Red Sea.

## Notarchinae Mazzarelli, 1893

Accepted as subfamily of Aplysiidae in WoRMS.

### *Notarchus indicus* Schweigger, 1820

**Plate 204: fig. 7 a, b:** at Lagoon by Inga Dehnert.

Literature: Vine 1986, Debelius 1996, 2002, Dekker & Orlin 2000, Lieske & Myers 2004, Dafni URL 1, Yonow 2008, Willan & Poppe in Poppe 2010.

URL 374: http://www.medslugs.de/E/Ind-NW/Notarchus_indicus/Selection.htm

### *Stylocheilus striatus* (Quoy & Gaimard, 1832)

**Plate 204: fig. 8:** in a Petri dish from Islands by Marc Steinegger.

Literature: Dekker & Orlin 2000, Lieske & Myers 2004, Dafni URL 1, Yonow 2008, Willan & Poppe in Poppe 2010.

URL 375: http://www.medslugs.de/E/Ind-NW/Stylocheilus_striatus/Selection.htm

# Pteropoda

Pteropoda are small, pelagic swimming sea snails. Members of all families are also known as sea butterflies. I never collected plankton samples in Dahab, but their shells were most abundant in sediments of the dive site Caves. Probably they had been preyed on by various filter feeders and the undigested shells sank to the bottom.

## Limacinidae Gray, 1840

Janssen (2012) clarified some confusion about the taxa and gives a detailed list of synonymies.

### *Heliconoides inflatus* (d'Orbigny, 1835)

**Plate 205: fig. 1 a, b:** 0.85 x 0.68 mm (Caves); **c, d:** 1.05 x 0.81 mm (Caves).

Literature: Dekker & Orlin 2000, Janssen 2007, 2012, Willan et al. in Poppe 2010, Scaperrotta et al. 2013.

### *Limacina bulimoides* (d'Orbigny, 1835)

**Plate 205: fig. 2 a, b:** 1.31 x 0.73 mm (Caves 18 m).

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Janssen 2007, 2012, Willan et al. in Poppe 2009, Scaperrotta et al. 2013.

### *Limacina trochiformis* (d'Orbigny, 1835)

**Plate 205: fig. 3 a - c:** 0.8 x 0.7 mm (Caves 18 m).

Literature: Dekker & Orlin 2000, Janssen 2007, 2012, Willan et al. in Poppe 2009, Scaperrotta et al. 2013.

## Cavoliniidae Gray, 1850 (1815)

### *Cavolinia* sp.

**Plate 205: fig. 4 a, b:** protoconch 41 x 3.62 mm (Blue Hole 24 m); **c, d:** protoconch 1.88 x 1.16 mm (Caves 16 m). **e, f:** protoconch enlarged 1.98 x 1.12 mm (Caves 16 m); a - d to scale.

The protoconch can be assigned to *Cavolinia* but identification to species level might not be possible. However, *Cavolinia uncinata* (d'Orbigny, 1835) was found in the Gulf of Aqaba by Blatterer et al. (1999; specimens in the collection of H. Blatterer) and Janssen (2007).

### *Clio convexa* (Boas, 1886)

**Plate 205: fig. 5 a, b:** 2.76 x 1.95 mm; **c, d:** 5.52 x 3.77 mm; all from Caves).

Literature: Rampal 2002, Janssen 2007.

Most of the shells are small or broken. The hump-back shape of the dorsal side in lateral view could not be verified, which would characterise the Red Sea subspecies *Clio convexa cyphosa* Rampal, 2002.

### *Diacria erythra* van der Spoel, 1971

**Plate 205: fig. 6 a, b:** protoconch 1.91 x 0.65 mm (Caves 10 m).

**Plate 206: fig. 6 c, d:** adult 3.10 x 2.57 mm; **e, f:** adult 3.10 x 2.61 mm; all to scale from Caves.

Literature: Blatterer et al. 2000, Dekker & Orlin 2000, Dafni URL 1, Janssen 2007.

The species was described as *Diacria quadridentata erythra* f. *crassa* by van der Spoel (1971). Janssen (2007) clarified the status of the taxon. The protoconch probably belongs to this species (A. Janssen pers. comm.). Rampal (2017) proposed the genus *Telodiacria* for this species. However, this is not mentioned in WoRMS.

## Creseidae Rampal, 1973

### *Creseis acicula* (Rang, 1828)

**Plate 206: fig. 7 a, b:** 5.66 x 0.36 mm (Caves 15 m); **c, d:** 3.37 x 0.22 mm (Caves 15 m); **e, f:** 7.53 x 0.55 mm (Moray Garden 37 m).

Literature: van der Spoel 1972, Dekker & Orlin 2000, Janssen 2007, 2012, 2018, Willan et al. in Poppe 2010, Scaperrotta et al. 2018.

Shell-morphological evidence recently demonstrated that *C. clava* (Rang, 1828) and *C. acicula* (Rang, 1828) in fact represent a single species (Gasca & Janssen 2013). *Creseis acicula* is now accepted as the valid name for this taxon (Rampal 2017, Janssen 2018, WoRMS).



**Fig. 7 g:** *Creseis acicula* is captured by *Tubastrea* at Blue Hole.

### *Creseis chierchiae* f. *constricta* (Boas, 1886)

**Plate 206: fig. 8 a, b:** 2.32 x 0.56 mm (Caves 10 m); **c:** 1.88 x 0.45 mm; **d:** 0.80 x 0.27 mm; c, d to scale from Caves 17 m.

Literature: Gasca & Janssen 2013.

This species was not found in the Gulf of Aqaba by Janssen (2007). It is listed as *Boasia chierchiae* in Rampal (2017) but is accepted as *C. chierchiae* (Boas, 1886) in WoRMS.

### *Creseis virgula* (Rang, 1828)

**Plate 206: fig. 9 a:** 2.53 x 0.76 mm; **b:** 1.96 x 0.66 mm; **c:** 1.47 x 0.54 mm; all to scale from Caves 17 m.

Literature: Dekker & Orlin 2000, Janssen 2007, Gasca & Janssen 2013.

*Creseis conica* and *C. virgula* were often confused, however, both represent independent species (Gasca & Janssen 2013).


1 a, b
1 c, d
2 a, b
3 a - c
4 a, b
4 c, d
4 e, f
6 a, b
5 a, b
5 c, d



Fig. 7 h: Many *Creseis acicula* captured by the polyps of the brain coral *Platygyra*, during a night dive (by Christian VON MACH).

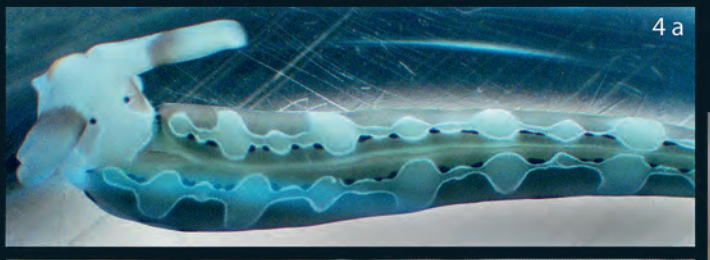


Fig. 7 i: *Creseis acicula* captured by the gorgonian wrapper anemone *Nemanthus* (at Lighthouse by Silke BARON).


6 c, d
6 e, f
11 a, b
8 a, b
8 c
8 d
7 a, b
7 c, d
7 e, f
10 a-c
9 a
9 b
9 c

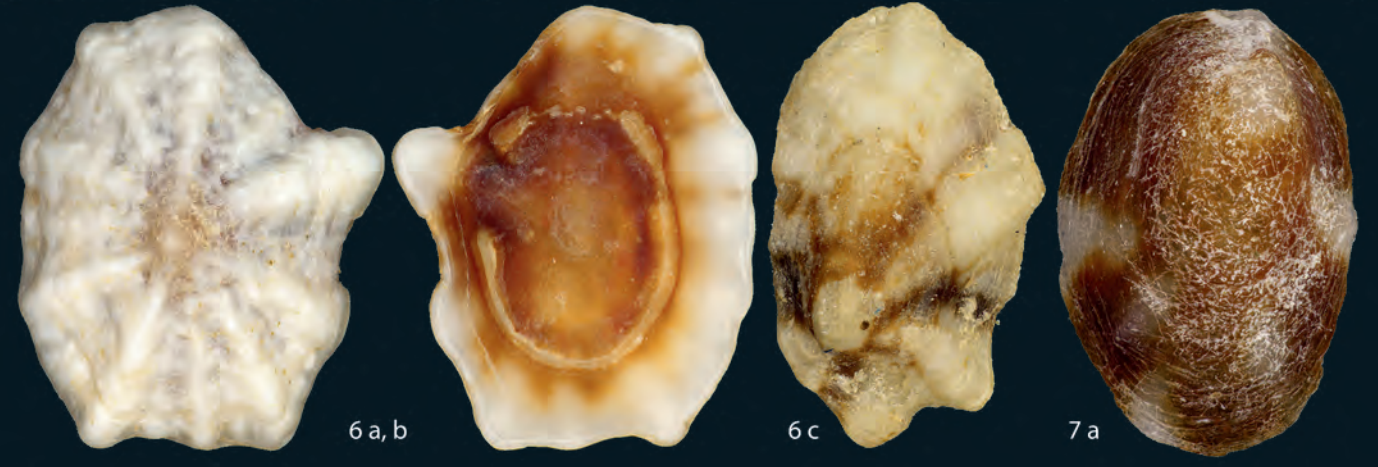

1 a - c
2 e
2 c, d
2 f
2 a, b
3 a, b


5 b


4 a


4 b


5 a


6 a, b
6 c
7 a

*Hyalocylis striata* (RANG, 1828)

**Plate 206: fig. 10 a - c:** three different views 3.91 x 1.41 mm (Caves 15 m).

Literature: JANSSEN 2012, SCAPERROTTA et al. 2013, OKUTANI 2017.

The species was not found in the Gulf of Aqaba by JANSSEN (2007). A syntype is depicted by VALDÉS & HÉROS (1998). *Hyalocylis* is not considered a member of Creseidae and is declared as incertae sedis by RAMPAL (2017).

### Peraclidae TESCH, 1913

*Peracle reticulata* (D'ORBIGNY, 1835)

**Plate 206: fig. 11 a, b:** 1.55 x 1.06 mm (Caves 16 m).

Literature: JANSSEN 2012, OKUTANI 2017.

This species was not found in the Gulf of Aqaba during the studies of JANSSEN (2007).

## Sacoglossa

Sacoglossa, are commonly known as the sacoglossans or the sap-sucking sea slugs, as they suck the cellular contents of algae. Some "solar-powered sea slugs" sequester chloroplasts from their prey and use them within their own tissues.

### Cylindrobullidae THIELE, 1931

*Cylindrobulla* cf. *systremma* MELVILL, 1918

**Plate 207: fig. 1 a, b:** 4.6 x 2.5 mm (Islands reef flat); **c:** spire view enlarged.

Literature: MELVILL 1918.

This is the first record for the Red Sea. *Ascobulla japonica* (HAMATANI, 1969) in OKUTANI (2010) looks similar. Accordig to LAETZ et al. (2014) genetic and morphological differences of similar shells occur. However, C. *systremma* was excluded from their study because of a lack of data. It is referred to as taxon inquirendum in WoRMS, probably because JENSEN (2007) lists this species as *Ascobulla*? *systremma* (MELVILL, 1918).

### Juliidae E. A. SMITH, 1885

*Julia exquisita* GOULD, 1862

**Plate 207: fig. 2 a, b:** 1.57 x 1.25 mm (Umm Sid 18 m); **c - f:** 1.05 - 1.2 mm (Murray Garden 17 m).

Literature: DEKKER & ORLIN 2000, DAFNI URL 1, Yonow 2008, WILLAN in POPPE 2010.

The paratype (5 mm) and lectotype (4.5 mm) from Hawaii are depicted in JOHNSON (1964) but the Dahab specimens are smaller.

*Julia zebra* KAWAGUCHI, 1981

**Plate 207: fig. 3 a, b:** 1.99 x 1.38 mm (Islands 14 m).

Literature: OKUTANI 2000, 2017, WILLAN in POPPE 2010, SEVERNS 2011, GOSLINER et al. 2015.

The specimen fits with the description and figure given in OKUTANI.

### Plakobranchidae GRAY, 1840 (= Elysiidae FORBES & HANLEY, 1851)

*Thuridilla decorata* (HELLER & THOMPSON, 1983)

**Plate 207: fig. 4 a:** in a Petri dish by Sabrina BLEIDIßEL; **b:** at Lighthouse by Christian SCHILLER.

Literature: DEKKER & ORLIN 2000, LIESKE & MYERS 2004, DAFNI URL 1, YONOW 2008.

URL 376: http://www.medslugs.de/E/Ind-NW/Thuridilla_decorata/Selection.htm

### Limapontiidae GRAY, 1847

*Stiliger ornatus* EHRENBERG, 1828

**Plate 207: fig. 5 a:** in a Petri dish from Imno House reef by Sabrina BLEIDIßEL; **b:** at Eel Garden on finger nail to estimate size (7.8 mm).

Literature: EHRENBERG 1828, DEKKER & ORLIN 2000, YONOW 2008.

The specimen was found on the algae *Codium* at Eel Garden. This appears to be the first photographic record of this endemic Red Sea species. Other non-Red Sea records differ from the original description and illustration e.g. COLEMAN (2015: 65) or NIMBS & SMITH (2016: 97). The species depicted in GOSLINER et al. (2015: 77) is in fact a species of *Costasiella* (K.R. JENSEN pers. comm.). However, their *Stiliger* sp. 10 is more similar to the Red Sea species.

## Siphonarimorpha

### Siphonariidae GRAY, 1827

*Siphonaria crenata* BLAINVILLE, 1827

**Plate 207: fig. 6 a, b:** 12.0 x 10.2 mm; **c:** 4.58 x 2.82 mm (Caves 17 - 19 m); **d:** 2.36 x 1.57 mm (Lagoon seagrass 12 m).

Literature: DEKKER & ORLIN 2000, SCAPERROTTA et al. 2016.

The synonyms *Siphonaria savignyi* KRAUSS, 1848 and *S. kurracheensis* REEVE, 1856 are discussed in HOFFMAN et al. (2006).

*Pugillaria* sp.

**Plate 207: fig. 7 a:** 2.36 x 1.57 mm (Lagoon seagrass 12 m).

Literature: JENKINS 2018.

Although this genus is currently only known from Australia the Dahab shells may belong to this genus. Juvenile *Pugillaria* have an undulating and thin shell lip, apical shell colour banding and no clear difference in tissue colouration of the animal. *Siphonaria* juveniles generally have a lower shell profile and a more central and less laterally offset apex. The distinct shell ribbing starts to appear on the shell lip and there is a distinguishable siphonal ridge (JENKINS 2018).

# Pylopulmonata

## Pyramidellidae Gray, 1840

The chapter Pyramidellidae is authored by
**Hubert Blatterer & Jasmin Blatterer**

Pyramidellidae are ectoparasites that mainly fed on sedentary bristleworms, sea anemones and molluscs. They suck their food from the host with a proboscis. The heterostrophic protoconchs are characteristic for members of this family.

### *Megastomia* cf. *broti* (Hornung & Mermod, 1924)

**Plate 208: fig. 1 a, b:** 2.86 x 1.40 mm (Lagoon 12 m); **c, d:** 2.65 x 1.33 mm (Lagoon 12 m); all to scale with 2 a, b.

Literature: Hornung & Mermod 1924.

Identification is based on the thick shell and the suture, as well as the prominent columellar tooth and internal spiral cords. However, this shell is slightly larger. Compared to *M.* cf. *lorioli* this species is smaller and has a less prominent suture. The specimen may fall within the variability described for *Odostomia eutropia* Melvill, 1899 (see remark in *M.* cf. *lorioli*), but the name for the Red Sea species is preferred due to the high endemicity of the region.

### *Megastomia* cf. *lorioli* (Hornung & Mermod, 1924)

**Plate 208: fig. 2 a, b:** 3.76 x 1.52 mm (Lagoon 12 m); to scale with 1 a.

Literature: Hornung & Mermod 1924, Öztürk et al. 2013.

URL 377: http://www.ciesm.org/atlas/Odostomialorioli.html
URL 378: http://www.gastropods.com/4/Shell_11414.shtml

Identification is based on Hornung & Mermod (1924: 290, fig. IV) from the Red Sea. This species is currently assigned to *Odostomia*. However, the shells are larger than the type figure. Buzzurro & Greppi (1995) depict a type specimen not fitting with the original illustration. There are specimens showing more whorls and an angulation in the terminal whorl (URL 377). This species is a Lessepsian immigrant into the Mediterranean Sea (Bogi & Cuneo 1999, Delongueville & Scaillet 2007, Öztürk et al. 2013). It is similar to *M. gea* (Bartsch, 1915) from South Africa. The specimen falls within the variability described for *O.* (*Eulimastoma*) *eutropia* Melvill, 1899 from Karachi, Pakistan (Saurin 1959, Bosch et al. 1995, URL 378). However, the original type figure shows a prominent angle of the last whorl.

### *Megastomia* sp.

**Plate 208: fig. 3 a, b:** 1.41 x 0.87 mm (Tigerhouse 7 m).

Literature: Hornung & Mermod, 1924.

There are 4 very faint lirae inside the posterior outer lip and no brown colour is visible. It resembles *Syrnola charpentieri* Hornung & Mermod, 1924 concerning shape, axial sculpture of early teleoconch whorls and spiral striae on later whorls. However, the original description mentions a brown band near the suture but no internal spiral cords. *Odostomia dorica* Melvill, 1904 is larger.

### *Moerchia deformata* Rubio & Rolán, 2014

**Plate 208: fig. 4 a, b:** 1.6 x 1.2 mm (Canyon 45 m); specimen lost when handling during photography.

Literature: Bosch et al. 1995, Rubio & Rolán 2014b.

URL 379: http://www.gastropods.com/5/Shell_70565.shtml

The identification is based on the marked axial ribs on the base and the approximately 80 very small prominences on the peripheral carina. *Moerchia biplicata* P. Fischer (1877), described without figure, fits in size, should have a less thickened aperture and may therefore be the habitus of not fully developed shells. In WoRMS it is listed as "taxon inquirendum". *Morchiella moreleti* (sic.) (Fischer, 1877) in Bosch et al. (1995) and URL 379 are similar. However, *Moerchia morleti* has fewer (41 - 57) small prominences on the peripheral carina.

## Pyramidellinae Gray, 1840

### *Longchaeus halaibensis* (Sturany, 1903)

**Plate 209: fig. 5 a, b:** 13.4 x 4.0 mm; to scale with 6 a, b.

Literature: Bosch et al. 1995, Dafni URL 1, Rusmore-Villaume 2008, Albano et al. 2017.

The type specimen is depicted in Albano et al. (2017).

### *Longchaeus turritus* (A. Adams, 1854)

**Plate 209: fig. 6 a, b:** 10.6 x 3.9 mm (Lagoon); to scale with 5 a, b.

Literature: Dafni URL 1, Rusmore-Villaume 2008, Poppe & Tagaro in Poppe 2010, Robba 2013.

*Obeliscus teres* A. Adams, 1854, *Pyramidella pratii* Bernardi, 1858 and *Obeliscus turritus* A. Adams, 1854 have a prominent peripheral groove. They belong to the genus *Longchaeus* Mörch, 1875, and are considered synonyms (Robba 2013). The specimens pictured as *Longchaeus insularum* (Pilsbry, 1922) by Poppe & Tagaro (in Poppe 2010) may also be conspecific. Several similar or conspecific specimens which have the strong peripheral groove are misidentified as *Pyramidella sulcata* (A. Adams, 1854). *Pyramidella sulcata* belongs to a different genus without the groove and is considered to be a synonym of *Pyramidella maculosa* Lamarck, 1822.

### *Otopleura mitralis* (A. Adams, 1854)

**Plate 209: fig. 7 a, b:** 17.8 x 7.5 mm (Lagoon); **c, d:** 15.1 x 6.9 mm (Lagoon); all to scale.

Literature: Bosch et al. 1995, Rusmore-Villaume 2008.

This species is variable in shape and strength of sculpture.

### *Pyramidella maculosa* Lamarck, 1822

**Plate 209: fig. 8 a, b:** 20.6 x 7.9 mm; **c, d:** 24.4 x 8.4 mm; all to scale.

Literature: Bosch et al. 1995, Dafni URL 1, Rusmore-Villaume 2008.

The syntypes of the synonym *P. sulcata* (A. Adams, 1854) are illustrated in Robba (2013). See remarks in *Longchaeus turritus*.


1 a, b
2 a, b
1 c, d
4 a
3 a, b


5 a, b
8 a, b
8 c, d
6 a, b
7 a, b
7 c, d


9 a, b
9 c, d
11 a, b
10 a, b
11 c, d
13 a, b
12 a, b

## Odostomiinae Pelseneer, 1928

### *Costabieta horrida* (Garrett, 1873)

**Plate 210: fig. 9 a, b:** 2.86 x 1.31 mm (Caves 16 m); **c, d:** 2.42 x 1.21 mm (Islands 14 m); all to scale with 11 c, d, 12 a, b and 13 a, b.

Literature: Garrett 1873, Hornung & Mermod 1925, Laseron 1956, Ponder 1985, Dekker & Orlin 2000, Peñas & Rolán 2017.

URL 380: http://vieoceane.free.fr/mollusques/pyramidellidae3.htm

The holotype from Fiji is depicted in Sleurs (1992: fig. 262 A, B) and fits well with the Dahab specimens. It is the oldest available name for this misinterpreted and variable species. Ponder (1985) considers Laseron's *Costabieta paucina* (redrawn) and Garret's *Rissoina horrida* as conspecific after examining both holotypes, but obviously mixed up the legends of the figures of *C. horrida* (Garrett, 1873) and *Herewardia kesteveni* (Hedley, 1907). *Pyrgulina* (*Ividella*?) *favrei* Hornung & Mermod, 1925 from the Red Sea is considered a doubtful synonym of *C. horrida* (Garrett, 1873) by Peñas & Rolán (2017) and in WoRMS. Generic position of similar species is discussed in Peñas & Rolán (2017: 282, 283). Nevertheless, when describing the very similar *C. portentosa* Peñas & Rolán, 2017, *P. favrei* was unfortunately not taken into consideration (Peñas & Rolán pers. comm.). If genetic studies reveal significant differences between populations, *P. favrei* is the oldest available name for the Red Sea specimens.

### *Helodiamea* sp.

**Plate 210: fig. 10 a, b:** 3.21 x 1.56 mm (Lagoon).

Literature: Peñas & Rolán 2017.

The specimen is worn and therefore cannot be identified with certainty. It appears that there is no fine spiral sculpture between the ribs. *Helodiamea attracta* Peñas & Rolán, 2017 is similar but only 1.7 mm in size. *Pyrgulina ductaspiralis* Peñas & Rolán, 2017 is similar in shape, columellar tooth and the spiral threads inside the aperture, but it clearly exhibits a spiral sculpture. *Pyrgulina melvilli* Hornung & Mermod, 1924 looks superficially like this specimen, also without spiral sculpture. However, their illustration shows a worn specimen. Additionally, the name is a homonym of *Pyrgulina melvilli* Dautzenberg & Fischer, 1907 and is not listed in WoRMS.

### *Herviera gliriella* (Melvill & Standen, 1896)

**Plate 210: fig. 11 a, b:** 3.33 x 1.26 mm (Islands 2.5 m); **c, d:** 1.88 x 0.82 mm (Islands reef crest), the smaller specimen shows variability of thickness of axial sculpture within one shell probably caused by injury; c, d to scale with 9 a - d, 12 a, b and 13 a, b.

Literature: Melvill & Standen 1896, Kay 1979, Schander et al. 1999, Lee & Wu 2007, Severns 2011.

URL 381: https://gbmolluscatypes.ac.uk/specimens/290
URL 382: http://vieoceane.free.fr/mollusques/pyramidellidae2.htm
URL 383: http://www.gastropods.com/0/Shell_30720.shtml

The shells match the original description and syntype (URL 381) except for the pink grey colour, which is dark orange or brown in Dahab specimens. A high variation in colour is described by Kay (1979), whereas Schander et al. (1999) mention only pale pink to pinkish purple colouration. Several species of *Herviera* are listed in URL 382 e.g. *Odostomella* cf. *opaca* (Hedley, 1906) which fits with the large specimen and *H. gliriella* (Melvill & Standen, 1896) which looks like most of the other specimens. *Odostomella doliolum* (Philippi, 1844) is interestingly described both as fossil and living in the Gulf of Suez. Compared to the type figure it is similar in shape, sculpture and the brown colour. The only difference may be a fading of the axial sculpture on the last whorl near the columella as seen on the figure. The type specimen is not known and differentiation between *Herviera* and *Odostomia* is not clear, although Schander et al. (1999) keep the genera separate. Many authors list white *Odostomella doliolum* with thin brownish bands (see remark in *O. opaca*). This confusing situation among some other species is also described by Odé (1993). Perhaps genetic studies may bring clarity to this matter.

### *Miralda protogalea* Peñas & Rolán, 2017

**Plate 210: fig. 12 a, b:** 2.15 x 0.97 mm (Caves 15 m); to scale with 9 a - d, 11 c, d and 13 a, b.

Literature: Savigny 1817, Bosch et al. 1995, Edelman-Furstenberg & Faershtein 2010, Scaperrotta et al. 2014.

URL 384: http://www.ciesm.org/atlas/Oscillajocosa.html

The specimens match the original description from the Philippines in size (1.85 mm) and protoconch morphology of type B. This species has been confused with the similar *Miralda scopulorum* (Watson, 1886). The specimens from Hawaii and the Marquesas are smaller (1.2 - 1.4 mm) and have a different protoconch of type C (Peñas & Rolán 2017). *Cingulina* (*Odetta*) *nodulosa* Hornung & Mermod, 1924 (not listed in WoRMS) is described from the Red Sea. However, their drawing shows no spiral sculpture at the base (type not seen). The Dahab shells are conspecific with *Miralda nodulosa* in Edelman-Furstenberg & Faershtein (2010: fig. 226a, b) and the Mediterranean Sea immigrant *Oscilla jocosa*, which is probably misidentified (Scaperrotta et al. 2014, URL 384). The shell is depicted in Savigny (1817: pl. 3, fig. 37a, b).

### *Odostomella opaca* (Hedley, 1906)

**Plate 210: fig. 13 a, b:** 5 m 1.85 x 0.78 mm (Islands 2.5 m); to scale with 9 a - d, 11 c, d and 12 a, b.

Literature: Hedley 1909, Okutani 2000, Severns 2011.

URL 385: http://vieoceane.free.fr/mollusques/pyramidellidae2.htm

Illustrated without description in Savigny (1817: pl. 3 fig. 42a, b) but later identified and described as a new species named *Pyrgulina doliiformis* Pallary, 1926 (Bouchet & Danrigal 1982). The species is often considered a synonym of the similar *Odostomella chorea* (Hedley 1909), which has 1 coloured band less. The original description of *Odostomia opaca* mentions

(continued after plates)


14 a, b
14 c, d
15 a, b
16 a, b
16 c, d


17 a, b
17 c, d
18 a, b
19 a, b
19 c, d

the specimen to be of brownish colour. However, Hedley (1906, 1909) also mentions variations with white colour and orange bands. This is analogous with the Mediterranean Sea species *Odostomella doliolum* (Philippi, 1844) and *O. bicincta* (Tiberi, 1868) (van der Linden & Eikenboom 1992, Schander et al. 1999, Scaperrotta et al. 2009). Concerning the lack of clarity of *O. doliolum* see remarks in *Herviera gliriella*. *Herviera patricia* Pilsbry, 1918 in URL 385 from Réunion seems to be conspecific. Schander et al. (1999) compared type material from different species and already mentioned Red Sea findings for *Odostomella opaca* (Hedley, 1906) in the private collection of Pasquale Micali.

### *Odostomia* sp.

**Plate 211: fig. 14 a, b:** 1.02 x 0.56 mm (Lagoon); **c, d:** 0.90 x 0.54 mm (Lagoon); all to scale.

URL 386: http://vieoceane.free.fr/mollusques/pyramidellidae4.htm

No dent is visible inside the aperture. *Odostomia bullula* Gould, 1861 (Robba et al. 2004) and *Odostomia* cf. *syrnoloides* Melvill, 1896 in URL 386 are similar but larger.

### *Odostomia juliae* (Hornung & Mermod, 1924)

**Plate 211: fig. 15 a, b:** 2.47 x 1.06 mm (Islands reef flat); to scale with 16 c, d.

Literature: Hornung & Mermod, 1924.

The specimen fits well with the original description but is not listed in WoRMS.

### *Odostomia* cf. *picteti* Hornung & Mermod, 1924

**Plate 211: fig. 16 a, b:** 4.91 x 1.89 mm (Lagoon 12 m); **c, d:** 2.88 x 1.29 mm (Lagoon 12 m); c, d to scale with 15 a, b.

Literature: Poppe & Tagaro in Poppe 2010.

URL 387: http://131.111.101.189/fmi/iwp/cgi?-db=UMZC%20Catalogues%20%28Web%29&-loadframes

Considering that Hornung & Mermod described a juvenile shell, these much larger specimens may be conspecific due to similar shell structure. The species is not listed in WoRMS. The type of *Syrnola lucida* A. Adams, 1870 from the Gulf of Suez depicted in URL 387 may be conspecific and therefore an older name.

### *Oscilla appeliusi* (Hornung & Mermod, 1925)

**Plate 212: fig. 17 a, b:** 2.18 x 0.93 mm (Caves 17 m); **c, d:** 0.9 x 0.6 mm (Islands).

Literature: Hornung & Mermod 1925, Dekker & Orlin 2000, Mienis 2003a.

Shells have 2 spiral cords on the first teleoconch whorl which later increase up to 5. The posterior spiral cord is dividing, and the initial 2 chords stay closer together compared to the other spirals. It is listed in WoRMS as *Odetta appeliusi* (Hornung & Mermod, 1924) and in Dekker & Orlin (2000) as *Oscilla appeluisi* (sic.) (Hornung & Mermod, 1925). *Oscilla multifuniculi* and *O. gemella* both described by Peñas & Rolán (2017) are similar. *Oscilla ficara* (Bartsch, 1915) from South Africa is larger (3.3 mm) and has an additional teleoconch whorl. This may be an older available name (type not seen). Mienis (2003a) identified similar specimens as *O. jocosa* Melvill, 1904, which are probably parasitising on *Trochus erithreus*.

### *Oscilla bellardii* (Hornung & Mermod, 1924) nov. comb.

Basionym: *Cingulina bellardii* Hornung & Mermod, 1924

**Plate 212: fig. 18 a, b:** 1.59 x 0.88 mm (Blue Hole 4 m).

Literature: Hornung & Mermod 1924, Dekker & Orlin 2000.

Has a length/wide ratio of 1.8 and comes close to the original description from the Red Sea (l/w = 1.7). According to the definition in Peñas & Rolán (2017 and pers. comm.) it must be assigned to *Oscilla*. *Oscilla jocosa* Melvill, 1904 from the Gulf of Oman may be an older name but the l/w ratio is approximately 2.0 (syntypes in Peñas & Rolán 2017).

### *Oscilla* sp.

**Plate 212: fig. 19 a, b:** 1.52 x 0.82 mm (South); **c, d:** 1.09 x 0.73 mm (Bells - Blue Hole 15 m).

Literature: Peñas & Rolán 2017.

URL 388: http://vieoceane.free.fr/mollusques/pyramidellidae4.htm

The specimens are probably conspecific with the green coloured shell identified as *Oscilla beccarii* (Hornung & Mermod, 1924) in URL 388. *Oscilla jocosa* Melvill, 1904 (syntypes pictured in Peñas & Rolán 2017) is most similar. However, *Oscilla jocosa*, *O. beccarii* in the original description, as well as *O. koheii* (Nomura, 1937) in Tagaro in Poppe 2017, *Hinemoa voorwindei* (Laseron, 1959) in Okutani, 2017 and *H. gumia* (Hedley, 1909) have broader furrows and less flattened spiral ribs.

### *Parthenina cossmanni* (Hornung & Mermod, 1924) nov. comb.

Basionym: *Pyrgulina cossmanni* Hornung & Mermod, 1924

**Plate 213: fig. 20 a, b:** 2.58 x 1.07 mm (Lagoon); **c, d:** 1.98 x 0.89 mm (Lagoon fine sand 10 m); **e, f:** 1.65 x 0.85 mm (Lagoon fine sand 10 m); a - d to scale; e, f to scale with 22 a, b.

Literature: Hornung & Mermod 1924, Micali et al. 2012.

URL 389: http://mediaphoto.mnhn.fr/media/1415909583839XDumpdoX7CNnyAN1

This species is listed as *Besla cossmanni* (Hornung & Mermod, 1924) in WoRMS because of Saurin (1959). According to Peñas & Rolán (2017) *Besla* has a protoconch of type B and the spiral structure does not cover the entire whorl. Therefore, *P. cossmanni* must be assigned to *Parthenina*. One specimen with less convex whorls, and slightly angular base is questionable (fig. e, f), but there seems to be a high variability within the whorls of a single specimen (fig. a, b). *Parthenina assimilis* Peñas & Rolán 2017 is similar. In *Parthenina alesii* Micali, Nofroni & Perna, 2012 (URL 389) from the Mediterranean Sea the sculpture appears more flattened.


20 a, b
20 c, d
20 e, f
21 a, b
21 c
22 a, b

### *Parthenina* sp.

**Plate 213: fig. 21 a, b:** 2.92 x 0.82 mm; **c:** detail of apex from a different specimen; all from Lagoon seagrass 12 m.

Literature: Peñas & Rolán 2017.

This undescribed species was discovered in very fine sand covered by a few plants of seagrass. The shell is elongate cylindrical, milky white to semi-translucent and glossy. It has a protoconch type C with a diameter of ca. 270 µm. The teleoconch has 4 - 6 slightly convex whorls (h/H = 0.44 - 0.59). The axial sculpture is formed by up to 20 well-marked, flexuous ribs, which are very opisthocline sigmoidal and ca. twice as narrow as their interspaces. The ribs are prolonged on the base but slightly fade to the aperture. The spiral sculpture occupying the lower two thirds of the whorl, is formed by 2 strong cords in the first teleoconch whorl, increasing to 3 and subsequently to 4 spiral chords in the penultimate whorl. One of 4 chords located on the base forms some sort of keel bordering the columellar tooth. The intersections of the ribs are slightly elevated as the axial structure is crossing over the spiral structure. The aperture is small and sub oval to pyriform (24 - 33 % of total height of the shell). There is no continuous peristome and it is not umbilicate. The outer lip follows the opisthocline sigmoidal ribs, forming a notch near the suture if undamaged. Similar sigmoid ribs are also found in *P. dissensa* Peñas & Rolán, 2017 and *P. canalesi* Peñas & Rolán, 2017. *Parthenina dissensa* is much smaller and, considering proportions, has fewer and larger whorls. In *P. canalesi* the sigmoid character of the axial ribs is present only in later whorls where the ribs are denser, and it has no visible columellar tooth.

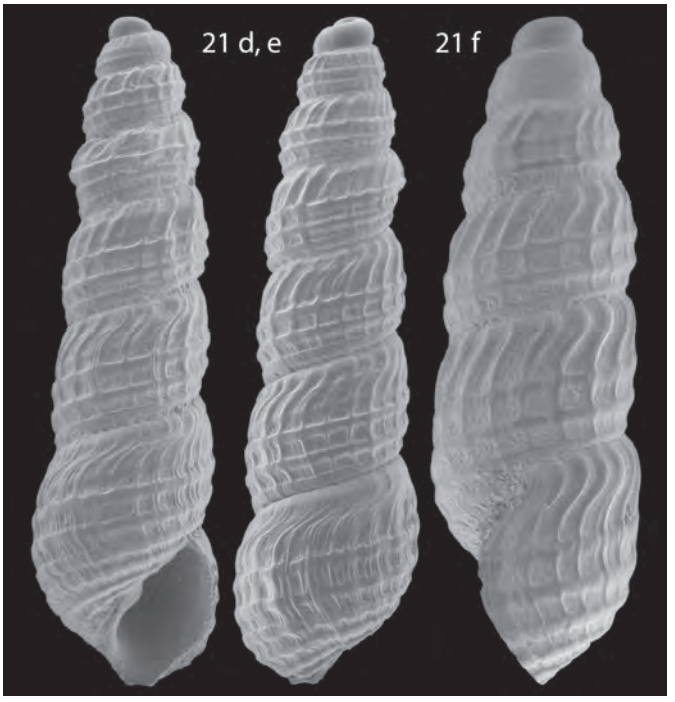



**Fig. 21:** *Parthenina* sp.; Scanning electron microscope image (SEM); **d, e:** 2.92 x 0.82 mm; **f:** 1.88 x 0.61 mm.

### *Polemicella* sp.?

**Plate 213: fig. 22 a, b:** 2.80 x 1.27 mm (Caves 18 m); to scale with 20 a, b.

Literature: Peñas & Rolán 2017.

URL 390: http://www.gastropods.com/7/Shell_70947.shtml

*Polemicella polemica* (Melvill, 1910) in URL 390 is similar in respect to the strong ribs and the stepped teleoconch whorls but it does not match Melvill's original description. In high magnification some spiral sculpture between the ribs is visible, but the specimen is too worn to draw more conclusions.

### *Pyrgulina* cf. *alicae* Hornung & Mermod, 1924

**Plate 214: fig. 23 a, b:** 0.89 x 0.58 mm (Islands labyrinth 10 m); to scale with 24 a, b and 25 a, b.

Literature: Hornung & Mermod 1924.

The specimen is smaller but fits with this species originally described from the Red Sea. However, the protoconch is more prominent in the Dahab specimen. Listed as *Egilina alicae* (Hornung & Mermod, 1924) in WoRMS according to Saurin (1959). Peñas & Rolán (2017) use the original genus *Pyrgulina* for this species.

### *Pyrgulina* aff. *congressa* Peñas & Rolán, 2017

**Plate 214: fig. 24 a, b:** 1.04 x 0.50 mm (Caves 17 - 19 m); to scale with 23 a, b and 25 a, b.

Literature: Melvill 1910, Peñas & Rolán 2017.

*Pyrgulina congressa* Peñas & Rolán, 2017 has more and fainter spiral ribs than the Dahab specimen. *Pyrgulina pirinthella*, Melvill, 1910 is larger and has a more oblique suture.

### *Pyrgulina fischeri* Hornung & Mermod, 1925

**Plate 214: fig. 25 a, b:** 3.60 x 1.16 mm (Lagoon, below sea anemone 5 m).

Literature: Hornung & Mermod 1925, Buzzurro & Greppi 1995, Dekker & Orlin 2000.

A type specimen is depicted in Buzzurro & Greppi (1995). There are several species in the complex of *Pyrgulina pupaeformis* (Souverbie, 1865) which is described as a variable species by Peñas & Rolán 2017. This species is slender compared to other similar species from Dahab.

### *Pyrgulina* aff. *pirinthella* Melvill, 1910

**Plate 214: fig. 26 a, b:** 1.04 x 0.49 mm (Islands labyrinth 10 m); to scale with 23 a, b and 24 a, b.

Literature: Melvill 1910.

URL 391: https://ingokurtz.jimdo.com/mollusca/pyramidellidae/

*Pyrgolina pirinthella* fits in number of axial ribs and spiral cords and especially the oblique suture. However, the Dahab shell (juvenile?) has fewer whorls and the axial ribs appear somewhat crenulated because of the slightly crossing over spiral cordlets. Melvill describes these ribs as smooth. *Pyrgulina columna* Laseron, 1959 differs in the more prominent crossing over spiral cordlets, thus, the axial ribs are more crenulated

(continued after plates)


23 a, b
24 a, b
25 a, b
26 a, b
27 a, b
27 c


28 a, b
28 g, h
28 c, d
28 e, f
30 a, b
29 a, b
30 c


31 a, b
31 c, d
33 a, b
34 a, b
32 a, b
35 a, b

(Peñas & Rolán 2017). *Pyrgulina pirinthella* in Scaperrotta et al. (2018) appears to have a less oblique suture and more spiral cords.

### *Pyrgulina tenerrima* (Melvill, 1906)

**Plate 214: fig. 27 a, b:** 2.39 x 0.80 mm (Caves 32 m); **c:** 2.27 x 0.82 mm (Caves 17 - 19 m); all to scale.

Literature: Melvill 1906b, Peñas & Rolán 2017.

URL 392: https://ingokurtz.jimdo.com/mollusca/pyramidellidae/

Melvill's figure shows a juvenile with only 3 whorls. The specimens depicted in Peñas & Rolán (2017) are smaller.

### *Pyrgulina pupaeformis* (Souverbie, 1865)

**Plate 215: fig. 28 a, b:** 2.69 x 1.18 mm (Caves 14 m); **c, d:** 3.01 x 1.38 mm (Moray Garden 2.5 m); **e, f:** 1.57 x 0.95 mm (Lagoon seagrass 12 m); **g, h:** 1.40 x 0.82 mm (Islands labyrinth 10 m); all to scale.

Literature: Hornung & Mermod 1924, Scaperrotta et al. 2014, Peñas & Rolán 2017.

The shells match the description of *Pyrgulina maiae* Hornung & Mermod, 1924 (holotype in van Aartsen 2004) which is considered a synonym in Peñas & Rolán (2017). This species is a Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007). Illustrated without description in Savigny (1817: p. 3, fig. 39) (= *Odontostomia craticulata* Issel in Bouchet & Danrigal 1982 and not listed in WoRMS).

### *Pyrgulina* cf. *venuste* Peñas & Rolán, 2017

**Plate 215: fig. 29 a, b:** 1.10 x 0.66 mm (Gabr el-Bint, Lagoon 15 m); to scale with 30 a, b.

Literature: Peñas & Rolán 2017.

The shell fits well with the original description from the Solomon Islands. Although not visible in the figure, the specimen has an inconspicuous internal columellar tooth. However, the fine spiral cordlets on the shoulder cannot be detected in this specimen by light microscopy.

### *Pyrgulina* sp.

**Plate 215: fig. 30 a, b:** 1.23 x 0.64 mm (El Gahaza 30 m); **c:** detail of micro structure on base; a, b to scale with 29 a, b.

Literature: Peñas & Rolán 2017.

This undescribed species has ca. 20 irregularly arranged axial ribs with intermediate growth lines and approximately 30 spiral striae on the penultimate whorl. Electron microscopy revealed that the striae are faint furrows (grooves) between much broader spiral bands, which may still match the definition of the genus (compare e.g. *Pyrgulina partimcostae* Peñas & Rolán, 2017).




**Fig. 30:** *Pyrgulina* sp.; Scanning electron microscope image (SEM); **d, e:** 1.23 x 0.64 mm.

## Syrnolinae Saurin, 1958

### *Syrnola* cf. *cinctella* A. Adams, 1860

**Plate 216: fig. 31 a, b:** 4.7 x 1.3 mm (Lagoon 13 m); **c, d:** 3.68 x 1.04 mm (Lagoon 13 m); all to scale with 33 a, b.

Literature: Okutani 2000, 2017, Poppe & Tagaro in Poppe 2010, 2017.

URL 393: http://www.ciesm.org/atlas/Syrnolacinctella.html
URL 394: https://www.poppe-images.com/?t=17&photoid=500381

The shape of whorls changes from straight to slightly more convex during growth and the orange-golden spiral band gets more detached from the suture. It is identified as *S. subcinctella* in Poppe & Tagaro in Poppe (2010: 84 living specimen) but as *S. cinctella* on Poppe's homepage (URL 394). The specimen in Tagaro in Poppe (2017a) has a broader and darker spiral band. Concerning the orange-golden spiral band it fits with *S. subcinctella* Nomura, 1936 and *S. callembryon* Dautzenberg & P. Fischer, 1906 in Poppe & Tagaro in Poppe (2010: pl. 733, fig. 3 and 8). The latter is actually assigned to *Puposyrnola* (WoRMS). It has more convex whorls than the Dahab *S.* cf. *cinctella* but is less convex than *Tiberia* sp. 1, which has one additional orange-golden band in the last whorl.

### *Syrnola lendix* (A. Adams, 1863)

**Plate 216: fig. 32 a, b:** 2.07 x 0.76 mm (Islands entrance 2.5 m); to scale with 34 a, b and 35 a, b.

Literature: Öztürk & Bakir 2013c, Scaperrotta et al. 2014.

URL 395: http://www.ciesm.org/atlas/Styloptygmabeatrix.html

*Agatha vestalis* Melvill, 1910 is similar but larger. A syntype is depicted in van Aartsen & Goud (2006c). This species is a Lessepsian immigrant into the Mediterranean Sea, depicted in Öztürk & Bakir (2013c: fig. 13, Scaperrotta et al. (2014: 108) and URL 395.


37 c
36 a, b
37 a, b
38 a, b
36 c, d
39 a, b

*Syrnola mekranica* Melvill & Standen, 1901

**Plate 216: fig. 33 a, b:** 4.07 x 1.03 mm (Islands reef flat); to scale with 31 a - d.

Literature: Melvill & Standen 1901.

Although the specimens are smaller (4.1 vs. 7 mm) and have approximately 1 whorl less, they match the original description and drawing. They show a slight convexity, an attenuation of the body whorl and 2 orange-golden spiral bands on the last whorl. A pale orange spiral band appears beneath the suture on later whorls. This can also be seen in the drawing of the original description.

*Tiberia* sp. 1

**Plate 216: fig. 34 a, b:** 3.24 x 1.22 mm (Lagoon 12 m); to scale with 32 a, b and 35 a, b.

The species differs from *Syrnola* spp. in the more convex whorls and a deeper suture. *Tiberia fasciata* (Jickeli, 1882) in Edelman-Furstenberg & Faershtein (2010) is conspecific.

*Tiberia* sp. 2

**Plate 216: fig. 35 a, b:** 1.99 x 1.03 mm (Islands entrance 2.5 m); to scale with 32 a, b and 34 a, b.

Literature: Hornung & Mermod 1924.

The specimen resembles *Megastomia gestroi* (Hornung & Mermod, 1924 (289: fig. III) concerning the prominent protoconch and the angulation of the terminal whorl. However, in this smaller (juvenile?) specimen only 3 internal spiral cords are visible. A relationship to the Pyramidellinae cannot be excluded.

## Turbonillinae Bronn, 1849

*Cingulina cingulata* (Dunker, 1860)

**Plate 217: fig. 36 a, b:** 2.63 x 0.91 mm (Blue Hole 4 m); **c, d:** 4.15 x 1.18 mm (Islands entrance); a, b to scale with 37 a, b and 38 a, b; c, d to scale with 37 c.

Literature: Dunker 1860, Okutani 2000, 2017.

URL 396: http://www.gastropods.com/6/Shell_11486.shtml

In contrast to *Cingulina isseli* there is a thin elevated thread within the suture (URL 396). *Cingulina circinata* A. Adams, 1860 is considered a senior synonym in Okutani (2017) but Dunker published his description in January and Adams in December 1860.

*Cingulina isseli* (Tryon, 1886)

**Plate 217: fig. 37 a, b:** 2.3 x 0.87 mm (Rick's Reef to Canyon); **c:** 3.75 x 1.08 mm (Islands entrance); a, b to scale with 36 a, b and 38 a, b; c to scale with 36 c, d.

Literature: Savigny 1817, Issel 1869, Tryon 1886.

URL 397: http://www.gastropods.com/4/Shell_65894.shtml
URL 398: http://www.ciesm.org/atlas/Cingulinaisseli.html

There is no elevated thread within the suture (Bouchet & Danrigal 1982: fig. 73) compared to *C. cingulata* (URL 397). The species is a Lessepsian immigrant into the Mediterranean Sea (URL 398). *Oscilla faceta* Melvill (1904: pl. 8, fig. 10) is similar.

*Hamarilla* sp. 1

**Plate 217: fig. 38 a, b:** 1.91 x 0.6 mm; to scale with 36 a, b and 37 a, b.

Literature: Peñas & Rolán 2016.

The whorls are concave in the centre and convex near the suture. Some microscopic orthocline spiral ribs are visible in the convex groove. An orange-golden band above the suture is fading towards the apex.

*"Hamarilla"* sp. 2

**Plate 217: fig. 39 a, b:** 2.59 x 1.30 mm.

Literature: Peñas & Rolán 2016.

The fragment from Nabq is much larger than the former species but seems to be related to this genus. A touch of a darker spiral band is visible in the penultimate whorl. As seen in *Hamarilla* sp. 1 there are some microscopic orthocline spiral ribs in the convex groove. In November 2006 ca. 20 specimens of this species were collected by L. van Gemert at Soma Bay (Safaga), a few with a faint coloured line on the final whorl (pers. comm.). There are a few shells without a coloured line, in the collection of H. Dekker (pers. comm.). They come from several sandy beaches near Hurgada 1989, Masbat Bay Dahab 1992, Safaga 2001, and Ayun Mûsa Gulf of Suez 2006. The Dahab shells have a more pronounced subsutural spiral rib, fading towards the aperture when fully grown. The aperture is not complete and there is a columellar tooth. Therefore, the species is closer to the *Syrnola* group (Syrnolinae) than to the *Eulimella* group, in which *Hamarilla* also belongs.

*Pyrgiscus* cf. *asmundinus* (Saurin, 1959)

**Plate 218: fig. 40 a, b:** 2.49 x 0.87 mm (Islands); to scale with 41 a, b and 42 a - d.

Literature: Saurin 1959.

The specimen has 12 - 15 axial ribs on the first whorl and 18 on the last which are wing-like and shouldered. The axial ribs end at 2 spiral cords at the base. *Pyrgiscus asmundinus* (Saurin, 1959) has numerous strong spiral striae between the ribs and this specimen has only a few weaker ones.

*Turbonilla* cf. *indenta* (Laseron, 1959)

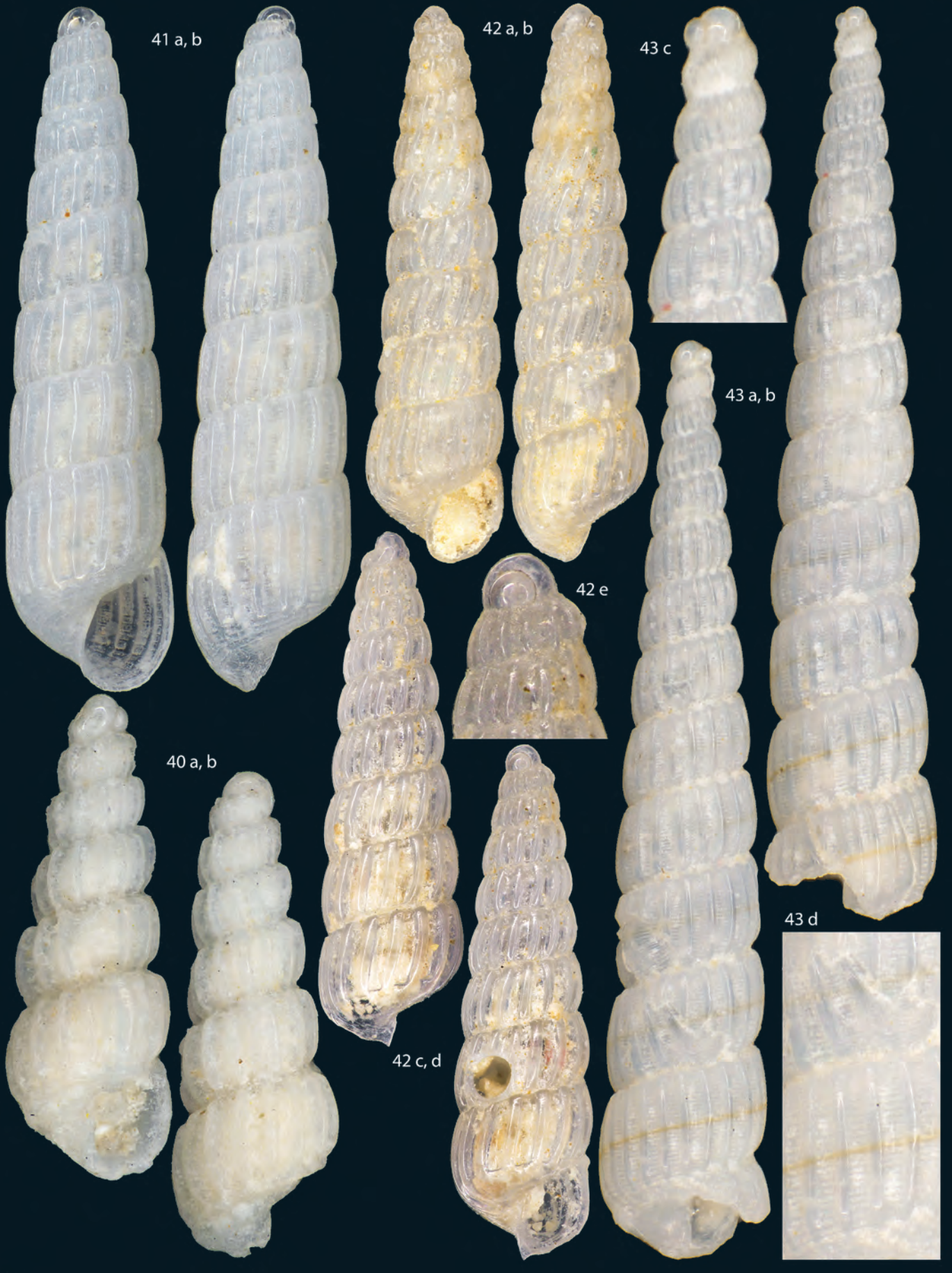
**Plate 218: fig. 41 a, b:** 3.52 x 0.85 mm (Murray Garden 18 m); to scale with 40 a, b and 42 a - d.

Literature: Laseron 1959, Peñas & Rolán 2010.

URL 399: http://www.gastropods.com/6/Shell_11416.shtml

This shell has spiral sculpture within the interspaces on the entire whorl. The ribs are interrupted at the periphery of the last whorl. It fits into section 6 of Peñas & Rolán (2010). This specimen is characterised by its fine axial ribs and

(continued after plate)


41 a, b
42 a, b
43 c
43 a, b
42 e
40 a, b
42 c, d
43 d

very fine spiral sculpture in between. In this respect is like *T.* cf. *unicincta* but relatively broader especially in the early teleoconch whorls. No coloured spiral band is visible. LASERON's figure has a more stepped appearance in the later whorls. *Turbonilla* (*Pyrgiscus*) *erica* (THIELE, 1925) in POPPE & TAGARO (2010: pl. 735) and URL 399 is similar but misidentified, as the original figure of THIELE (p 127, pl. 16, fig. 14) has a knobbed shoulder. *Turbonilla* (*Pyrgiscus*) *infelix* THIELE 1925 (127: pl. 16, fig. 15) has fewer spiral striae per whorl and is not listed in WoRMS. *Turbonilla infelix* NOMURA, 1936 is a homonym.

### *Turbonilla tantilla* HORNUNG & MERMOD, 1924

**Plate 218: fig. 42 a, b:** 2.83 x 0.70 mm (Bells - Blue Hole 29 m); **c, d:** 2.62 x 0.77 mm (Blue Hole 4 m); **e:** enlarged apex of d; a - d to scale with 40 a, b and 41 a, b.

Literature: HORNUNG & MERMOD 1924.

The shell is without spiral sculpture and the interspaces of the ribs terminate at the periphery of the last whorl. It fits into section 2 of PEÑAS & ROLÁN (2010). The specimens are larger (2.6 - 2.8 mm) than in the original description but appear proportionally identical. Ribs are opisthocline and slightly slimmer than the smooth interstices. In *Costosyrnola nitidissima* (ISSEL, 1869) the axial ribs are orthocline (ISSEL 1869, HORNUNG & MERMOD 1924). *Chemnitzia darnleyensis* (BRAZIER) in LASERON (1959), now assigned to *Nisiturris*, is larger, has more whorls and the protoconch has 3 whorls.

### *Turbonilla* cf. *unicincta* MELVILL, 1910

**Plate 218: fig. 43 a, b:** 5.86 x 1.14 mm (Lagoon 12 m); **c:** enlarged apex of b; **d:** enlarged last whorl of a.

Literature: MELVILL 1910, HORNUNG & MERMOD 1924.

This specimen has a spiral sculpture on the entire whorl, restricted to the interspaces within the acial ribs. The ribs extend onto the base. It fits into section 5 of PEÑAS & ROLÁN (2010). On the penultimate whorl of the Dahab specimen there are numerous very fine axial ribs (ca. 20) and spiral threadlets between them (ca. 21 each). A golden-orange spiral band occurs on the seventh whorl. In the original drawing of MELVILLE's *T. unicincta* the whorls are more convex. *Turbonilla villi* PEÑAS & ROLÁN, 2010 has no coloured band in the middle of the whorls. The protoconch and early whorls also match the figure of *Pyrgulina sibyllae* HORNUNG & MERMOD, 1924 from the Red Sea. However, they observed ca. 24 axial ribs on the fifth teleoconch whorl, whereas in this specimen 16 are recognised. The species is not listed in WoRMS.

### *Turbonilla* sp. 1

**Plate 219: fig. 44 a, b:** 6.94 x 1.48 mm (Lagoon 12 m); **c, d:** 5.51 x 1.42 mm (Lagoon 12 m); **e:** 3.77 x 1.05 mm (Lagoon 12 m); **f:** enlarged apex of e in different view; a - e to scale.

Literature: POPPE & TAGARO in POPPE 2010.

URL 400: http://www.gastropods.com/1/Shell_60191.shtml

These are shells with spiral sculpture over the whole whorl, restricted to the interspaces between the ribs. The ribs are interrupted at the periphery of the last whorl. It fits into section 6 of PEÑAS & ROLÁN (2010). In the smallest specimen (fig. 44 e, f) the spiral structure is almost absent and only visible on early whorls. Irregularly there are prominent thickenings like varices. The syntype of *Turbonilla varicifera* PILSBRY, 1901 (URL 400) is similar but considered as taxon inquirendum in WoRMS. Additionally, it is a homonym of *Turbonilla varicifera* TATE, 1898, which is larger, the axial ribs reach over to the base and belongs in Section 5.

### *Turbonilla* sp. 2

**Plate 219: fig. 45 a, b:** 4.26 x 1.03 mm (Blue Hole 36 m); to scale with 46 a, b.

Literature: HORNUNG & MERMOD 1924, PEÑAS & ROLÁN 2010.

The specimen probably has no spiral sculpture and the interspaces of the ribs terminate at the periphery of the last whorl. It fits into section 2 of PEÑAS & ROLÁN (2010). The shell has 9 convex whorls with almost equally broad ribs and interstices. A faint brown spiral band is barely visible and terminates in a brown spot in the periphery of the thickened outer lip of the aperture. *Syrnola* (*Elusa*?) *latonae* HORNUNG & MERMOD, 1924 may be this species, but that protoconch shows an unusual acute angle and orthocline axial ribs. *Turbonilla* sp. 2 and *S. latonae* are very similar to *T. neocaledonica* PEÑAS & ROLÁN, 2010.

### *Turbonilla* sp. 3

**Plate 219: fig. 46 a, b:** 4.06 x 1.04 mm (Moray Garden 37 m); to scale with 46 a, b.

Literature: MELVILL 1910, PEÑAS & ROLÁN 2010.

The shell is without spiral sculpture and the interspaces of the ribs terminate at the periphery of the last whorl. It fits into section 2 of PEÑAS & ROLÁN (2010). The specimen is similar to *T. tantilla* but larger and has slimmer sigmoid ribs. *Turbonilla dakoi* PEÑAS & ROLÁN, 2010 (fig. 47) fits best, but the ribs appear to be more orthocline. *Turbonilla candida* (ADAMS, 1855) in OKUTANI (2017: pl. 412, fig. 12) and in PEÑAS & ROLÁN (2010: fig. 155) look alike but interspaces between ribs are smaller. *Turbonilla basilica* MELVILL, 1898 from the Persian Gulf (MELVILL 1910: pl. IV, fig. 10) is relatively broader but fits in overall appearance.

### "*Turbonilla*" sp. 4

**Plate 219: fig. 47 a, b:** 2.98 x 1.01 mm (Canyon 32 m); **c:** 1.68 x 0.61 mm (Canyon 29 m); **d:** enlarged apex of c in different view.

This species was tentatively assigned to *Turbonilla* but is different because of its extraordinary protoconch. It starts with a simple smooth hemisphere followed by 4 - 5 fine sculptured and only slightly broadening early "teleoconch (?)" whorls which broaden and change to a coarser pattern later. The very faint spiral striae between the orthocline axial ribs are barely visible with light microscopy. Axial ribs terminate at the base at 1 - 2 spiral cords. The aperture is subquadrate and the base is smooth without a columellar tooth. It does not match any of the 7 sections distinguished by PEÑAS & ROLÁN (2010).


44 a, b
44 c, d
44 e, f
47 c, d
45 a, b
46 a, b
47 a, b


1 a, b
1 c, d
3 c
3 a, b
2 a, b
3 d, e
4 a, b
4 c
5 a, b


1 a, b
2 a, b
3 c, d
4 a, b
5 a, b
6 a, b
7 a, b

## Amathinidae Ponder, 1987

### *Amathina tricarinata* (Linnaeus, 1767)

**Plate 220: fig. 1 a, b:** 4.34 x 2.40 mm (Caves 16 m); **c, d:** 2.94 x 1.97 mm (Islands); all to scale.

Literature: Bosch et al. 1995, Dekker & Orlin 2000, Delongueville & Scaillet 2007, Scaperrotta et al. 2012, Tan & Low 2014.

This gastropod prospers on the shells of living bivalves from different families and is probably a parasite (Tan & Low 2014). It is a Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007). Poppe (2011) assigned this species to the family Capulidae as *Capulus tricarinata* (Linnaeus, 1767). Other superficially similar shells can be found in the family Hipponicidae.

### *Monotygma amoena* (A. Adams, 1853)

**Plate 220: fig. 2 a, b:** 3.90 x 1.53 mm (Lagoon 12 m).

Literature: Adams 1853, Okutani 2000, 2017, Beu 2004, Robba et al. 2004, van Aartsen & Hori 2006, Delongueville & Scaillet 2007, Poppe in Poppe 2010.

URL 401: http://www.ciesm.org/atlas/Adelactaeonamoenus.html

*Monotygma amoena* seems to be an earlier name for the species identified in older Japanese books as *Leucotina adamsi* Kuroda & Habe, 1971 (Beu 2004). The specimen fits with the syntype shown in van Aartsen & Hori (2006). They consider it to be a possible synonym of *Monotygma lauta* (A. Adams, 1853). This opinion is not followed here as the spiral ribs of *M. amoena* seem to be not as smooth as in *M. lauta*. This species is a Lessepsian immigrant into the Mediterranean Sea (Delongueville & Scaillet 2007, URL 401). *Monotygma* and *Leucotina* have been used inconsistently in the literature. The main difference between the genera seems to be the more convex whorls and less elongated shape of the latter. According to WoRMS the genera are even in different families. *Monotygma* is assigned to Pyramidellidae, while *Leucotina* is assigned to Amathinidae.

### *Leucotina* sp.

**Plate 220: fig. 3 a, b:** 2.79 x 1.32 mm (Islands north 10 m); **c:** 0.73 x 0.51 mm; **d, e:** 0.74 x 0.51 mm; c - e to scale (Caves).

Literature: Sasaki 2008, Robba 2013.

URL 402: http://www.nmr-pics.nl/pyramidellidae/album/slides/Gurmatia%20pulchrior.html

Pronounced, slightly rounded, almost uniform spiral ribs form the sculpture of these shells. The interspaces between the ribs are allmost as wide as the ribs and are crossed by slightly prosocline axial lamellae. Spiral structure is also present on the rounded base. The aperture is approximately half the height of the shell, the last whorl ca. 85 %. *Gurmatia pulchrior* Melvill, 1904 is quite similar. It was originally described in *Actaeon* and is not listed in WoRMS. A specimen depicted in URL 402 has indistinct axial lamellae, but fine axial threads, which override the spiral sculpture, are described by Melvill and in Bosch et al. (1995). *Leucotina rebjongensis* Robba, 2013 from Middle Miocene Indonesia is similar but looks more elongated (not listed in WoRMS). *Leucotina* sp. in Sasaki (2008: fig. 12 E) from Japan is likewise more elongate. The Vanikoridae genus *Macromphalus* is similar but has no heterostrophic protoconch. The Mediterranean Sea immigrant from the Red Sea *Monotygma watsoni* (Hornung & Mermod, 1927) has an aperture of one third and the last whorl of just half of the total height of the shell (Bogi & Galil 2013a).

## Ellobiidae L. Pfeiffer, 1854 (1822)

### *Melampus* cf. *castaneus* (Megerle von Mühlfeld, 1816)

**Plate 220: fig. 4 a, b:** 12.8 x 6.4 mm; **c:** 12.0 x 5.8 mm; all to scale with 5 a, b; all beached.

Literature: Bosch et al. 1995.

URL 403: http://bigai.world.coocan.jp/pic_book/data43/r004233.html
URL 404: http://www.gastropods.com/7/Shell_72407.shtml

The specimens are somewhat variable in shape and superficially resemble those depicted in Bosch et al. (1995: fig. 853). Bosch et al. and Megerle von Mühlfeld (1816) describe more (up to 13) pronounced columellar teeth in the aperture. See URL 403 for variability of this taxon in Japan. *Melampus lividus* is smaller and cone shaped. *Melampus variabilis* Gassies, 1863 in URL 404 is similar.

### *Melampus* cf. *lividus* (Deshayes, 1830)

**Plate 220: fig. 5 a, b:** 8.1 x 5.3 mm (beached, Blue Lagoon - Ras Abu Galum); to scale with 4 a - c.

Literature: Dekker & Orlin 2000, Rusmore-Villaume 2008.

URL 405: https://science.mnhn.fr/institution/mnhn/collection/im/item/2000-5092

There are fine spiral striae visible on the shoulder in this cone-shaped specimen. The syntype from La Réunion is smooth and has more pronounced columellar teeth in the aperture (URL 405). In *Melampus nucleolus* Martens, 1865 the length of the aperture is relatively shorter (Groh in Poppe 2010).

## Uncertain families

### Ostreidae? or gastropod operculum?

**Plate 221: fig. 1 a, b:** 12.7 x 7.5 mm.

There seem to be very faint comarginal growth lines and there is no visible spiral structure. A prodissoconch or protoconch cannot be identified with certainty. Thus, although the general appearance resembles an operculum it may fit better with a bivalve. Obviously, the shell has been drilled by a predator.

### Rissoidae?

**Plate 221: fig. 2 a, b:** 2.25 x 1.48 mm (Caves 15 m).

This single shell is different from all others found in Dahab. It seems to be related to the Rissoidae, but it is too worn to draw more conclusions.

### Tonnoidea?

**Plate 221: fig. 3 a, b:** protoconch 1.56 x 1.02 mm (Caves 14 m).

This is probably a protoconch of a Cymatiidae.

### Tonnoidea? or Muricidae?

**Plate 221: fig. 4 a, b:** 2.25 x 1.51 mm (El Gahaza 30 m).

This is probably a juvenile of a Cymatiidae or a Muricidae.

### Muricidae?

**Plate 221: fig. 5 a, b:** 1.33 x 0.98 mm (Islands labyrinth 10 m).

This protoconch matches the shell identified as a possible Muricidae in SASAKI (2008: fig. 22e). KAY (1979: fig. 85b) shows a similar protoconch attributed to *Vexilla fusconigra* PEASE, 1860. This is considered to be *Usilla avenacea* (LESSON, 1842) in WoRMS, a species of Ergalataxinae which is not known from the Red Sea so far.

### Columbellidae?

**Plate 221: fig. 6 a, b:** 1.2 x 0.8 mm (Gabr el-Bint 15 m).

This is probably a protoconch of a Columbellidae.

### aff. *Colpodaspis*?

**Plate 221 – 7 a, b:** 2.04 x 1.44 mm (Bells Blue Hole 15 m).

URL 406: http://seaslugsofhawaii.com/species/Colpodaspis-thompsoni-a.html

Genus and family remain doubtful, however, a similar shell identified as *Colpodaspis thompsoni* BROWN, 1979 (family Colpodaspididae OSKARS, BOUCHET & MALAQUIAS, 2015) is depicted on the Hawaii website (URL 406). The real species was described from Tanzania and is also reported in the Red Sea (DEKKER & ORLIN 2000) but has a different shell with the aperture just slightly shorter than the spire (BROWN 1979, HELLER & THOMPSON 1983). It was recorded with photographs only in YONOW (2008). The similar *Succinea aegyptiaca* found by SAVIGNY (1817: pl. 2, fig. 24) is 6.5 mm in size (BOUCHET & DANRIGAL 1982). However, Succineidae are fresh water or swamp species. Therefore, this identification is highly unlikely considering the dry rocks around the Blue Hole.

### unidentified Gastropoda

**Text figures 8 a, b:** not depicted on plate.



**Fig. 8 a:** Unidentified Gastropoda at Bannerfish by Christian VON MACH.

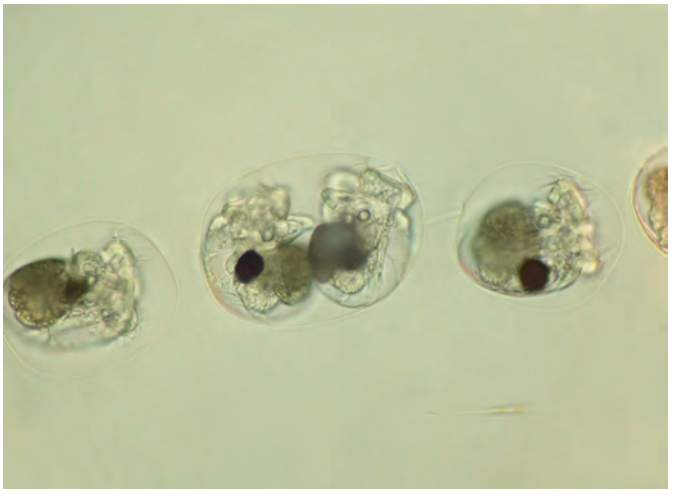


**Fig. 8 b:** Unidentified gastropods inside an egg deposit collected at Lighthouse by Florian SCHARHAUSER. The eggs are connected by a thin mucous thread.

# Scaphopoda

Scaphopoda are commonly known as tusk shells or tooth shells. They all live exclusively in marine sediments. The catalog of species-group names of Recent and fossil Scaphopoda helps to gain more information on their distribution (STEINER & KABAT 2004).

## Dentaliidae CHILDREN, 1834

*Dentalium bisexangulatum* G. B. SOWERBY II, 1860

**Plate 222: fig. 1 a, b:** 87 x 7.5 x 2.9 mm; **c, d:** 62 x 6.2 x 1.4 mm; all to scale with 2, 3 and 4 all letters except aperture views which are slightly enlarged.

Literature: G. B. SOWERBY II 1860, BLATTERER et al. 2000, Singer 2003.

A few specimens with 12 or 13 ribs were found. The ribs may be distinct or flattened towards the anterior but without riblets in between. One specimen from Blue Lagoon has just 11 ribs.

*Dentalium clavus* COOKE, 1885

**Plate 222: fig. 2 a, b:** 51 x 5.9 x 3.9 mm (Masbat Bay); **d, e:** 25.4 x 4.2 x 1.1 mm (South); **g, h:** 28.8 x 4.4 x 1.1 mm (South); **i, j:** 24.5 x 3.6 x 1.2 mm (South); **c, f, k:** slightly enlarged aperture views; a, b, d, e, g - j to scale with 1, 3 and 4 all letters except aperture views.

Literature: BLATTERER et al. 2000, SINGER 2003.

This species usually has 11 ribs and/or double ribs and riblets in between. Two specimens with 12 and two with 10 ribs were found.

*Dentalium clavus* (different form with riblets but no ribs)

**Plate 222: fig. 3 a, b:** 32.1 x 4.6 x 3.1 mm (Lagoon); **d, e:** 32.0 x 4.7 x 2.2 mm (Lagoon); **c, f:** slightly enlarged aperture views; a, b, d, e: to scale with 1, 2 and 4, all letters except aperture views.

A few specimens have no ribs but just riblets, so their anterior aperture appears more circular.

*Dentalium reevei* P. FISCHER, 1871

**Plate 222: fig. 4 a, b, d, e:** the largest 49.7 x 5.8 x 2.3 mm (Islands); **g, h:** 33 x 4.6 x 2.4 mm (Lagoon); **d, f, i:** slightly enlarged aperture views; a, b, d, e, g, h to scale with 1, 2 and 3 all letters except aperture views.

Literature: BOSCH et al. 1995, SCARABINO 1995, BLATTERER et al. 2000, SINGER 2003, DAFNI URL 1, RUSMORE-VILLAUME 2008.

This species has 9 ribs and sometimes riblets in between.



**2 l:** Tusk hermit crab in *Dentalium clavus* at Three Pools.


1 a, b
1 c, d
4 a
4 b
4 c, d
4 e, f
4 g - i
3 a - c
3 d - f
6 d, e
6 a, b
6 c
2 d - f
2 a - c
2 i - k
2 g, h
9 a, b
8 a, b
8 c, d
5 a, b
7 a, b

## Gadilinidae Chistikov, 1975

*Dischides minutus* (H. Adams, 1872)

**Plate 222: fig. 5 a, b:** 5.05 x 0.68 mm (Caves 18 m); to scale with 8 a - d and 9 a, b.

Literature: Adams 1872, Scarabino 1995.

The specimen is broken at the apex but fits in size and shape. *Cadulus minutus* Adams, 1872 was originally described from the Red Sea.

*Episiphon subtorquatum* (P. Fischer, 1871)

**Plate 222: fig. 6 a, b:** 21.3 x 1.69 mm (Blue Lagoon); **c:** 17 x 1.8 mm (Lagoon); **d, e:** detail of apex, scale bar 10 mm; a - c to scale with 7 a, b.

**Plate 222: fig. 7 a, b:** 7.41 x 0.61 x 0.17 mm (Canyon 45 m); to scale with 6 a - c.

Literature: Pilsbry & Sharp 1897-1898, Bosch et al. 1995, Dafni URL 1, Rusmore-Villaume 2008.

URL 407: http://data.nhm.ac.uk/dataset/collection-specimens/resource/05ff2255-c38a-40c9-b657-4ccb55ab2feb/record/3499322

The shell in fig. 7 a, b appears to be different. It has obliquely striated prominent growth lines along the whole shell increasing in distance from apex to aperture. The diameter is perfectly circular without any longitudinal structure. In the given picture it looks ribbed because of the illumination of the ring light. It is similar to *Dentalium tornatum* Watson, 1879 from Fiji (syntype in URL 407), which is not listed in WoRMS. However, the Dahab shell appears opaquer and the growth lines are more prominent anterior.

## Gadilidae Stoliczka, 1868

*Gadila* aff. *clavata* (Gould, 1859)

Literature: Pilsbry & Sharp 1897-1898, Scarabino 1995, Dekker & Orlin 2000.

**Plate 222: fig. 8 a, b:** 4.66 x 0.88 mm (Caves 17 - 19 m); **c, d:** 4.10 x 0.75 mm (Islands 14 m); all to scale with 5 a, b and 9 a, b.

URL 408: https://ariefransdejong.wordpress.com/scaphopoda/
URL 409: http://www.bagniliggia.it/WMSD/HtmSpecies/6440350387.htm

The shell is broadest approximately at the anterior third. The aperture and apex are subcircular, slightly compressed dorsoventrally. The species has been found in 9 samples from a depth between 12 and 45 m. "*Gadila* cf *clavata* (Gould, 1859)" from the Red Sea in URL 408 is conspecific, but Gould's species from Hong Kong is much larger (10 x 2 mm). *Gadila minutalis* Scarabino, 1995 is smaller (2.9 mm) and has a circular aperture. *Cadulus euloides* Melvill & Standen, 1901 in URL 409 is very similar but misidentified. *Cadulus euloides* is much larger and not constricted at the mouth.

"*Gadila*" sp.

**Plate 222: fig. 9 a, b:** 4.78 x 0.88 mm (Caves 16 m); to scale with 5 a, b and 8 a - d.

The shell is broadest approximately at the posterior third and therefore does not even match the genus diagnosis given in Scarabino (1995). The aperture is rounded and the apex is circular. *Gadila minutalis* Scarabino, 1995 is smaller (2.9 mm) and broadest at the anterior half.

# Polychaeta

*Ditrupa arietina* (O. F. Müller, 1776)



**Fig. 10:** *Ditrupa arietina* shells (22 x 1.4 mm) may easily be confused with scaphopods but they belong to a bristle worm (Polychaeta).

# Cephalopoda

The Cephalopoda are sometimes called ink fish (in German Tintenfisch), referring to their common ability to squirt ink.

# Coleoidea

## Decapodiformes

### Sepiidae Keferstein, 1866

Nine species of Sepiidae have been reported from the Red Sea, but only three of them, *Sepia elongata*, *S. dollfusi* and *S. gibba*, seem to be endemic in the highly saline waters of the northern part (Adam & Rees 1966).

#### *Sepia gibba* Ehrenberg, 1831

**Plate 223: fig. 1 a - c:** ventral, dorsal and lateral view of cuttlebone 66 mm.

Literature: Adam 1941, Adam & Rees 1966, Blatterer et al. 2000, de Bruyne 2004, Mienis 2008.

This is the most abundant beached cuttlebone, easily recognizable because of its ventral hump. It is probably identical to *Sepia* cf. *gibba* Ehrenberg, 1831 in Robin (2011). The living animal, to which the cuttlebone can be assigned, is currently not known. It may even be the one seen most often under water and has been traditionally called *Sepia prashadi* (see plate 223: fig. 3 a - c). Riad (2015) gives an anatomical study, but clearly misidentified this species as *Sepia dollfusi* Adam, 1941. The type cuttlebones of both species are depicted in Adam (1941).

#### *Sepia pharaonis* Ehrenberg, 1831

**Plate 223: fig. 2 a, b:** ventral and dorsal view of adult cuttlebone 205 mm; **c, d:** juvenile cuttlebone 32 x 16 mm; **e:** tentacular clubs from restaurant specimen; **f, g:** same specimen swimming and hiding on the sand.

Literature: Adam 1960, Adam & Rees 1966, Bosch et al. 1995, Debelius 2002, Norman 2003, Dafni URL 1, Lieske & Myers 2004, Reid et al. in Jereb & Roper 2005, Riad et al. 2016.

The small cuttlebone fits the picture of a juvenile given in Adam (1960). Four cuttlebones (17 - 23 cm) were obtained from a restaurant which received the catch from a local fisher. These resemble *Sepia pharaonis* in Bosch et al. (1995). The cuttlebone illustrated in Jereb & Roper (2005) has a less pointed end of the zone of striae. A morphological study of a population in the Gulf of Suez is given by Riad et al. (2016).

#### *Sepia* cf. *prashadi* Winckworth, 1936

**Plate 223: fig. 3 a - c:** ventral, dorsal and lateral view of cuttlebone 86 mm; **d - g:** backwards swimming (d) and hovering specimens showing different colouration and presence (e, g) or absence (d, f) of mantle papillae.

**Plate 224: fig. 1 a:** *Sepia* sp. attacking with its tentacles at Masbat Bay (by Silke Baron).

Literature: Adam & Rees 1966, Schmid & Paschke 1987, Debelius 2002, Dafni URL 1, Lieske & Myers 2004, Dafni 2008.

In-situ the fins are slightly shorter than the mantle and the anterior margin of the mantle ends between the middle and the posterior margin of the eye. This is seen in a dead specimen of a misidentified *S. gibba* by Riad (2015). Therefore, identification of living squids is not always certain. *Sepia aculeata* Van Hasselt [in Férussac & d'Orbigny], 1835 is often mentioned in the Red Sea literature (e.g. Dafni 2008). The cuttlebones described by Adam (1941) and depicted in Reid et al. in Jereb & Roper (2005) are slightly slenderer than the one from Dahab. Additionally, the spine at the posterior end is not keeled as described by Adam & Rees (1966). The 3 ridges on the dorsal surface with minute tubercles along the growth lines and a strong inner cone are clearly visible (see *S. aculeata* in Adam 1941 & Jereb & Roper 2005). *Sepia savignyi* Blainville, 1827 from the Red Sea was described based on pictures in Savigny (1817) but no type material is left (Bouchet & Danrigal 1982). According to Adam & Rees (1966) that cuttlebone has a very short spine and the ventral striated zone is different.



**Fig. 4 a:** *Sepia* sp. egg deposit inside Blue Lagoon (Abu Galum) deposited intertidally underneath a rock half a meter from the shore line.

### Loliginidae Lesueur, 1821

#### *Sepioteuthis lessoniana* d'Orbigny, 1826

**Plate 224: fig. 1 b:** hovering specimen; **c, d:** mating behaviour (by Philipp Maitz); **e, f:** cladius of a large (320 mm) and a small (35 mm) specimen; **g:** specimen with gladius put in place from restaurant caught by local fisher.

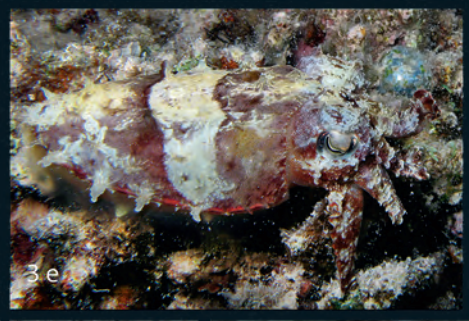
Literature: Lesson 1831: Vine 1986, Schmid & Paschke 1987, Allen & Steene 1996, Debelius 2002, Lieske & Myers 2004, Dafni URL 1, Dafni 2008, Kuiter & Debelius 2009, Jereb et al. in Jereb & Roper 2010, Poppe & De Prins in Poppe 2011, Poppe 2017b.

URL 410: http://www.wikiwand.com/en/Gladius_(cephalopod)

(continued after plates)


1 a-c


3 d


3 e


3 a-c


3 f


3 g

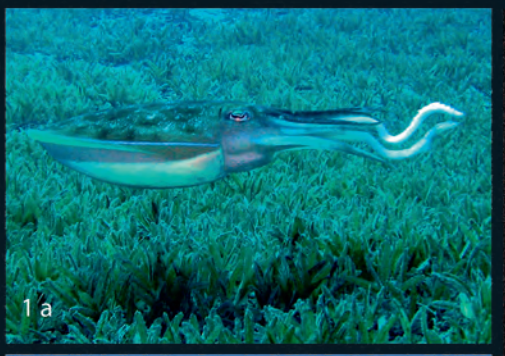

2 a, b


2 c, d


2 e


2 f


2 g

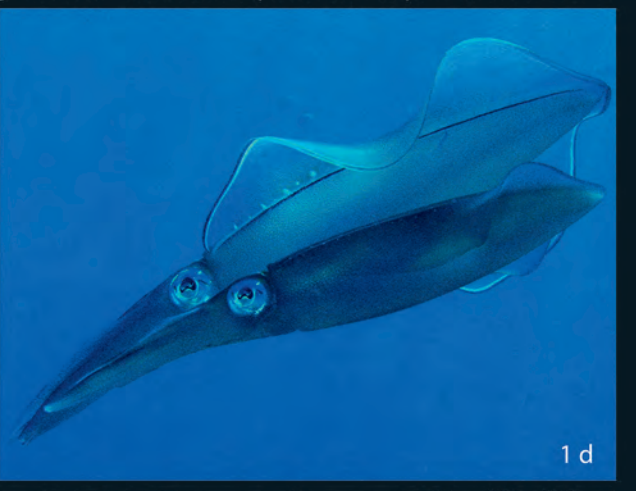

1 a


1 b


1 c


1 e


1 f


1 d


1 g


2 a


2 b


3 a


3 b

There is confusion concerning the authorship. D'ORBIGNY (1826: 155) describes this species in only one sentence. FÉRUSSAC [in LESSON], 1831 gives full description and figures. The large cladius, perhaps of a specimen which reached its maximum growth range looks less lanceolate than the type figure. This may be due to drying (URL 410). *Uroteuthis duvaucelii* (D'ORBIGNY [in FÉRUSSAC & D'ORBIGNY], 1835) reaches the same maximal length and is known from the Red Sea, but the fins are gently rhombic, broad, and approximately 50 % of mantle length (JEREB et al. in JEREB & ROPER 2010). The similar *Sepioteuthis loliginiformis* (RÜPPELL & LEUCKART, 1828) from the Red Sea is considered a taxon inquirendum in WoRMS. This species is a Lessepsian immigrant into the Mediterranean Sea (CROCETTA et al. 2014).

## Ommastrephidae STEENSTRUP, 1857

***Sthenoteuthis oualaniensis*** (LESSON, 1830)

**Plate 224: fig. 2 a, b:** specimen sold in a restaurant.

Literature: DAFNI URL 1, ROPER et al. in JEREB & ROPER 2010.

Specimens of this species were sold at several restaurants. They got them from local fishers.



**Fig. 2 c:** *Sthenoteuthis oualaniensis* detail of succers.

## Thysanoteuthidae KEFERSTEIN, 1866

***Thysanoteuthis rhombus*** TROSCHEL, 1857

**Plate 224: fig. 3 a:** drifting egg deposit reaching a length of approximately 1.5 m; **b:** detail of the spirally arranged jelly mass, a few eggs are visible.

Literature: DAFNI URL 1, ROPER et al. in JEREB & ROPER 2010, POPPE & DE PRINS in POPPE 2011.

During one stay in Dahab drifting egg deposits were found.

# Octopodiformes

## Octopodidae D'ORBIGNY, 1840

***Abdopus horridus*** (D'ORBIGNY, 1826)

**Plate 225: fig. 1 a:** at Lighthouse by Silke BARON.

Literature: BOUCHET & DANRIGAL 1982, NORMAN et al. in JEREB et al. 2016.

The octopus matches the picture in SAVIGNY (1817) and even more so the coloured one in BOUCHET & DANRIGAL (1982). Especially the dark reddish-brown background with white spots on the mantle and arms is convincing. During a dive in Dahab the poorly known octopus was interacting with the photographer and was suddenly displaying the white pattern around the eyes probably mimicking the diver with her mask and regulator (S. BARON pers. comm.).

***Amphioctopus* cf. *marginatus*** (TAKI, 1964)

**Plate 225: fig. 2 a, b:** from dive site Lagoon in a depth of 7 m; a probably juvenile specimen is hiding in *Glycymeris arabica* of ca. 2 cm in length.

Literature: DAFNI URL 1, DAFNI 2008, POPPE & DE PRINS in POPPE 2011, NORMAN et al. in JEREB et al. 2016.

Identification from the pictures alone is uncertain. *Amphioctopus marginatus* hides in coconut and bivalve shells and is known from the Red Sea. According to JEREB et al. (2016) this species has been confused regularly with the related species *Amphioctopus aegina* (GRAY, 1849).

***Callistoctopus* sp. 1**

**Plate 225: fig. 3 a-e:** from dive site Lagoon 15 m (a), Islands reef flat 0.5 m (b), Lagoon 13 m (c, e), Moray Garden 7 m (d).

Literature: DEBELIUS 2002, DAFNI URL 1, KUITER & DEBELIUS 2009.

This species was only seen during night dives. It is frequently incorrectly identified as *Octopus macropus* RISSO, 1826 (= *Callistoctopus macropus*), a Mediterranean Sea and Atlantic Ocean species. KUITER & DEBELIUS (2009) distinguish two species of *Callistoctopus* (sp. 3 and sp. 5) from Hurgada (Red Sea).

***Callistoctopus* sp. 2**

**Text figure 4:** not depicted on plate.

Literature: DAFNI URL 1, KUITER & DEBELIUS 2009.



**Fig. 4:** The small *Callistoctopus* sp. 2 at Lighthouse (during a night dive by Silke BARON) shows raised long supra-ocular tentacles which are not seen in *Octopus cyanea*, *Callistoctopus* sp. 1 or in specimens depicted in KUITER & DEBELIUS (2009).


1 a


2 a


2 b


3 a


3 b


3 c


3 d


3 e


5 a


5 b

### *Octopus cyanea* Gray, 1849

**Plate 225: fig. 5 a:** at Three Pools 15 m; **b:** at Blue Hole;

Literature: Vine 1986, Allen & Steene 1996, Debelius 2002, Norman 2003, Lieske & Myers 2004, Dafni URL 1, Dafni 2008, Kuiter & Debelius 2009, Norman et al. in Jereb et al. 2016.

De Luca et al. (2014) discuss the occurrence of the similar *Octopus vulgaris* in the Red Sea. It might be possible that the species is rare in the Red Sea, where it could have migrated from the Mediterranean Sea (i.e. anti-Lessepsian migrant). It is preferred to identifiy the specimens based on the available pictures as *Octopus cyanea*. Sometimes a ringed ocellus on each side between eye and arms III and IV can be seen. Not only colour can be changed, but also the skin may appear smooth or verrucous within seconds.

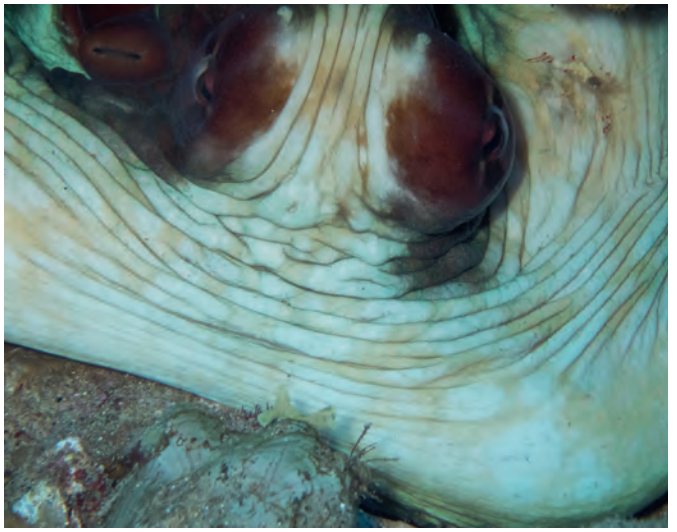


**Fig. 5 c:** *Octopus cyanea* at El Gahaza accompanied by a cleaner shrimp.



**Fig. 5 d:** *Octopus* sp. egg deposit at Canyon.



**Fig. 5 e:** Octopus cyanea at Lighthouse during a night dive.



**Fig. 5 f** *Octopus cyanea?* juvenile at Lighthouse by Philipp Maitz.

### *Thaumoctopus* cf. *mimicus* Norman & Hochberg, 2005

**Text figure 6:** not depicted on plate.

Literature: Dafni URL 1, Dafni 2008, Kuiter & Debelius 2009, Poppe & De Prins in Poppe 2011, Norman et al. in Jereb et al. 2016.



**Fig. 6:** *Thaumoctopus* cf. *mimicus* photographed in the early morning at Masbat Bay in front of the Restaurant Nemo by Ahmed (from Nemo).

The photograph is not detailed enough to allow definitive identification. It may also have been seen during night dives in the southern dive site Moray Garden (Khaled Hamed pers. comm. who sent the picture). The species is known from Eilat (Dafni 2008) and probably from Nuweiba (M. Tresch pers. comm.).

# Internet references

A selection of useful internet pages which were used frequently during the preparation of this book is listed here as an addition to the references given in the species descriptions.

The Homepage of Jacob DAFNI is dealing with marine life of the Gulf of Aqaba and has been very helpful, especially in the early days when very few books and papers from the Red Sea were available.

http://www.dafni.com/jdafni/

http://www.dafni.com/mollusca/index.html

Eddie HARDY's Internet Guide to Marine Gastropods (& Near Classes) eased the finding of many species or related species, sometimes also type specimens are depicted.

http://www.gastropods.com/

Maurice JAY's Mollusques de l'île de la Réunion, administrated by Philibert BIDGRAIN, has several shells very close to the Dahab specimens. Version du 15 juin 2018.

http://vieoceane.free.fr/mollusques/intro_mollusque.htm

The museum homepages are of great importance, especially those depicting type specimens.

Muséum national d'Histoire naturelle (MNHN - Paris, France):
https://science.mnhn.fr/institution/mnhn/collection/im/item/search?full_text=andrei&result=search.result.zero

Natural History Museum, London:
http://data.nhm.ac.uk/dataset/collection-specimens/resource/05ff2255-c38a-40c9-b657-4ccb55ab2feb

Mollusca Types in Great Britain, National Museums Liverpool, Manchester Museum, National Museum Wales, Cardiff:
https://gbmolluscatypes.ac.uk/collections

https://gbmolluscatypes.ac.uk/analysis

http://131.111.101.189/fmi/iwp/cgi?-db=UMZC%20Catalogues%20%28Web%29&-loadframes

Naturalis Biodiversity Center Leiden:
http://bioportal.naturalis.nl

Academy of Natural Sciences of Philadelphia:
http://clade.ansp.org/malacology/collections/search.php

Natural History Museum Rotterdam:
http://www.nmr-pics.nl/

The following websites offer easy access to literature which is available for download:

https://www.biodiversitylibrary.org/

http://www.vliz.be/en/catalogue

https://www.researchgate.net/

https://www.academia.edu/

https://ci.nii.ac.jp/

https://www.conchology.be/?t=900

http://www.animalbase.org/

https://www.societaitalianadimalacologia.it

Sally KAICHER Cards are digitally available at
http://www.femorale.com/kaicher/

Examples for booksellers dealing with mollusc literature:

https://www.conchbooks.de/

http://www.strackbooks.nl/

Additional sources which include Red Sea shells or literature:

Nederlandse Malacologische Vereniging:
http://www.spirula.nl/

http://natuurtijdschriften.nl/natuur

Private collection of literature by Klaus BANDEL:
http://www.paleoliste.de/bandel/

Heidis Fossilien Fotos:
http://fffotos.de/index.php/quartaer/quartaer-mikrofossilien/quart%C3%A4r-mikrofossilien-schnecken

National Natural History Collections of the Hebrew University of Jerusalem:
http://nnhc.huji.ac.il/?lang=en

List of publications by Henk K. MIENIS:
https://nnhc.huji.ac.il/mollusca/?stuff=%D7%94%D7%A0%D7%A7-%D7%A7-%D7%9E%D7%99%D7%A0%D7%99%D7%A1

Israel's Nature Site
http://israel-nature-site.com/?page_id=4138

http://israel-nature-site.com/?page_id=1872

High quality images of micro-mollusca:
https://ingokurtz.jimdo.com/mollusca/

Identification of the Opisthobranches has been aided by the Sea Slug forum of Bill RUDMAN and sea slugs of the world webpage of Erwin KÖHLER.

http://www.seaslugforum.net/

http://www.medslugs.de/E/mssmain.htm

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World Register of Marine Species:
http://www.marinespecies.org/

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