



**PHOTOGRAPHIC IDENTIFICATION GUIDE FOR  
BENTHIC MACROINVERTEBRATES OF ROEBUCK  
BAY AND EIGHTY MILE BEACH (NW AUSTRALIA)**

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## I

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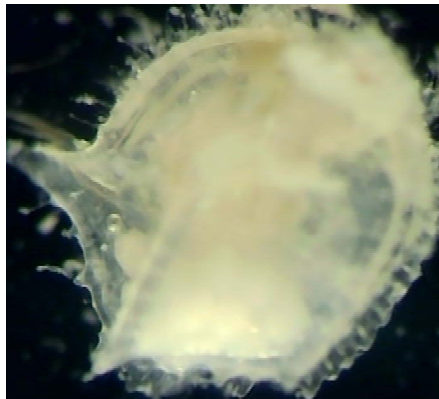
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Photo amphipod Emma Thillainath, WRM.






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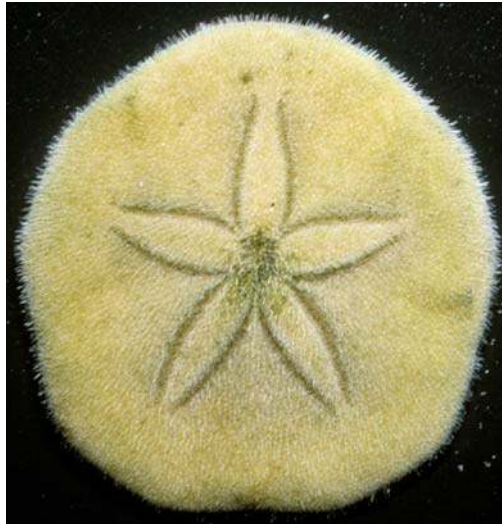
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## INTRODUCTION

The photographic identification guide for benthic macroinvertebrates of Roebuck Bay and Eighty Mile Beach (NW Australia) is one of the outcomes of the project “Development of a Monitoring Program for Benthic Infauna at Roebuck Bay and Eighty Mile Beach” carried out by Wetlands Research and Management (WRM) and researchers from the Royal Netherlands Institute of Sea Research (NIOZ).

This guide contains pictures from the most common benthic infauna taxa found in Roebuck Bay (RB) and Eighty Mile Beach (EMB) during the six large-scale benthic infauna surveys led by the NIOZ and the Department of Biodiversity, Conservation and Attractions (DBCA) (formerly Department of Environment and Conservation and Department of Parks and Wildlife) since 1997. During the large scale benthic surveys, samples of benthic macroinvertebrates were collected from sampling stations located on a 200 m x 200 m grid. In Roebuck Bay the northern intertidal area was sampled in each expedition while in Eighty Mile Beach samples were taken from the 200 m grid pattern in blocks spaced at 15 km intervals. Over the years more than 4400 samples were collected and analysed by scientists and volunteers.

The other long term program that has provided a source of information for this guide is MONROEB (MONitoring ROEBuck Bay). MONROEB was established in 1996 in Roebuck Bay by NIOZ and DBCA researchers. Samples were collected nearly every month from two locations in Roebuck Bay by volunteers, the Broome Bird Observatory wardens and DPaW Yawuru Rangers. Over the years more than 1200 samples were collected and have now been analysed by scientists from the NIOZ and WRM.

To the best of our knowledge the large-scale benthic infauna surveys of Roebuck Bay and Eighty Mile Beach, combined with MONROEB, represent the best data set of benthic macroinvertebrates for any tropical intertidal system in the world.

This photographic voucher guide has been compiled to assist experienced and inexperienced persons to more readily identify benthic infauna specimens from the area. The authors have attempted to include representatives of all major taxonomic groups recorded from each system, using the same level of taxonomic resolution as used in the various surveys of each system.

## PHYLUM ANNELIDA

The phylum Annelida contains all the segmented worms such as leeches, oligochaetes and polychaetes. Annelids have adapted to innumerable habitats such as terrestrial, intertidal, deep sea vents, parasitic etc, thus presenting a diverse morphology and behaviour.

Annelids are soft bodied animals that have bilateral symmetry and segmented bodies. Each segment often contains the same organs, although polychaetes may have specialized body regions. They have circulatory, respiratory and nervous systems, as well as a mouth and anus.

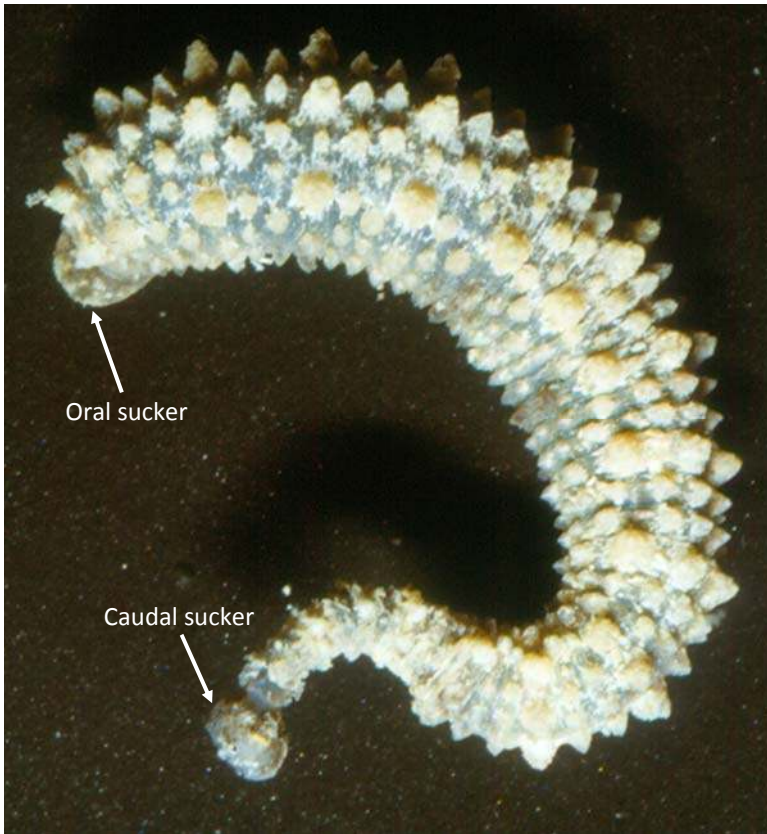
Annelids play an important role in marine and terrestrial habitats enabling aeration and nutrient enrichment of terrestrial soils, whilst in marine habitats they facilitate oxygenation and nutrient exchange through water circulation in sediments.

### Phylum Annelida

Subclass Hirudinea

Subclass Oligochaeta

Class Polychaeta



Subclass: **Hirudinea**

Description: Leeches are usually ectoparasitic. They have a muscular body and possess two suckers, the oral sucker and the caudal sucker. The external segmentation does not correspond with the internal segmentation. They lack bristles.

Photo: Marc Lavaleye.



Subclass: **Oligochaeta**

Description: Oligochaetes have serially segmented bodies. The head is lobe or cone shaped without sensory organs (i.e. eyes or palps as in polychaetes). The following segments lack any appendages, although they possess a few bristles.

Photo: Glenn Carter. NOAA, Great Lakes Environmental Research Laboratory.

## CLASS POLYCHAETA

Morphologically, polychaetes possess a segmented body and generally a well differentiated head with feeding and sensory appendages. Usually they possess a pair of parapodia carrying bristles in each segment, but their morphology may broadly differ depending on their lifestyle. Polychaetes are found in nearly all trophic levels of the food chain and present a broad variety of feeding strategies that range from deposit feeders, suspension feeders, herbivores, predators, parasitic, commensal and even containing symbiotic chemoautotrophic bacteria.

Polychaetes occur in all marine habitats and are the most common infaunal macro-invertebrate in marine environments.



Family: **Amphinomidae** (Errantia: Amphinomida)

Description: Also known as “fireworms”. Normally short and flattened body with “furry” appearance due to long chaeta.

Remarks: **Caution** when handling tropical Amphinomidae, the chaetae easily penetrate the skin and can produce irritation and allergic reactions.

Photo: Marc Lavaleye.



Family: **Eunicidae** (Errantia: Eunicida)

Description: Long muscular body. Many species possess five appendages on the prostomium. Often species have iridescent colours.

Photo: Marc Lavaleye.



Family: **Lumbrineridae** (Errantia: Eunicida)

Description: No appendages on the prostomium. Often species have iridescent colours. They resemble earthworms.

Photos: Top Marc Lavaleye, below Chris Glasby.



Family: **Oeononidae** (Errantia: Eunicida)

Description: Long worms, often with flattened heads.

Photo: Chris Glasby.



Family: **Onuphidae** (Errantia: Eunicida)

Description: Onuphids live in tubes and often in colonies. The tubes may consist of sand and shells encrusted around the tube, which may protrude from the sediment. All onuphids possess five long head appendages (antennae) in the prostomium with ringed bases.

Photos: Left Marc Lavaleye, right Chris Glasby.



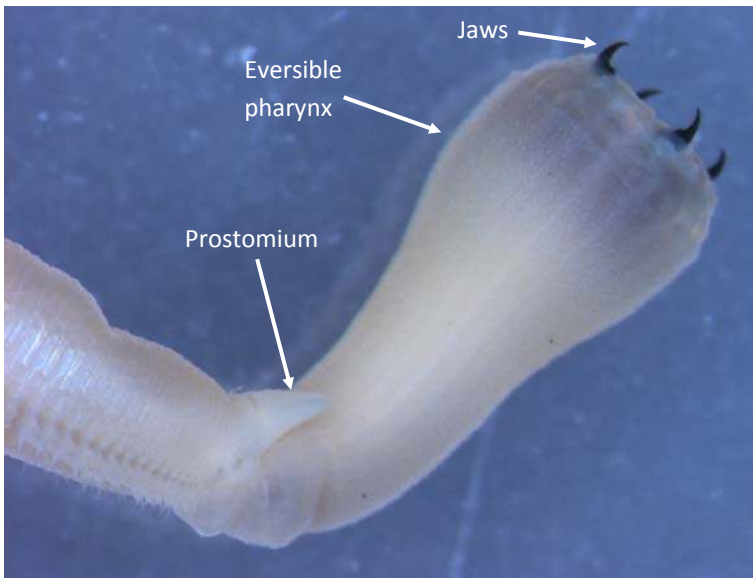
Family: **Polynoidae** (Errantia: Phyllodo-cida)

Description: Generally polynoids are short bodied polychaetes. They possess two dorsal rows of scales (elytrae) that commonly cover most of the body. Two lateral antennae and normally a central antenna are present on the head.

Remarks: The elytra of polynoids detach easily when handling the specimens (lower photo).

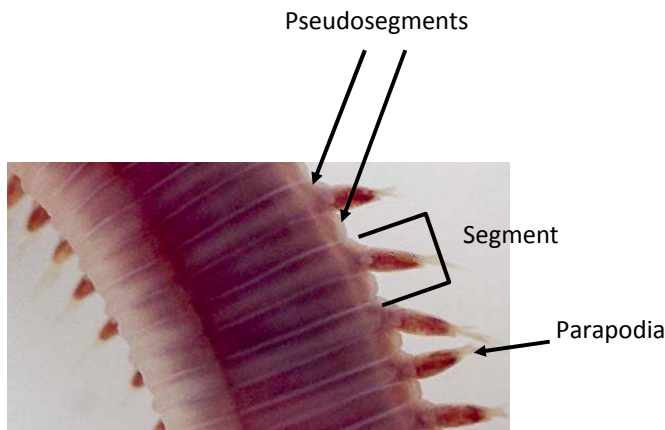
Photos: Top Marc Lavaleye, below Chris Glasby.

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Family: **Glyceridae** (Errantia: Phyllodocida)

Description: Glycerids are muscular polychaetes with a conical ringed prostomium that ends in four small appendages. Likely to be confused with goniadids, but glycerids possess four jaws in the eversible pharynx. If the pharynx is not protuded the jaws can still be visible through the body wall, far behind the mouth. Each segment is divided into two-three pseudosegments.



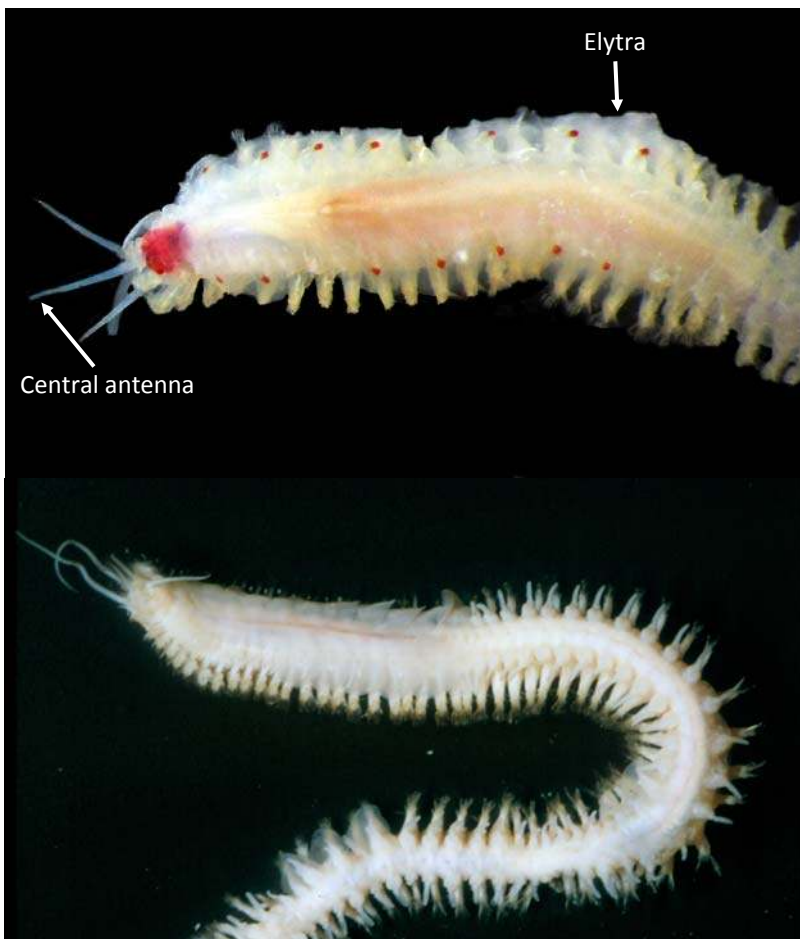
Photos: Top Marc Lavaleye, middle and below Chris Glasby.



Family: **Goniadidae** (Errantia: Phyllodocida)

Description: Goniadids usually possess iridescent bodies and always a conical segmented prostomium that ends in four small appendages. Unlike glycerids, goniadids present a single pair of jaws, or multiple jaw elements or jaws are absent.

Photo: Chris Glasby.



Family: **Sigalionidae** (Errantia: Phyllodocida)

Description: Like polynoids, sigalionids have elytra, but their body is long and slim, showing a higher number of elytra. Usually they possess a central and two lateral antennae.

Photos: Top Chris Glasby, below Marc Lavaleye.



Family: **Hesionidae** (Errantia: Phyllodocida)

Description: Hesionids possess numerous cirri, but usually they are lost in preserved specimens. They may be confused with syllids, but hesionids have 4 to 8 pairs of tentacular cirri at the side of the head, whereas syllids usually have only 2 pairs.

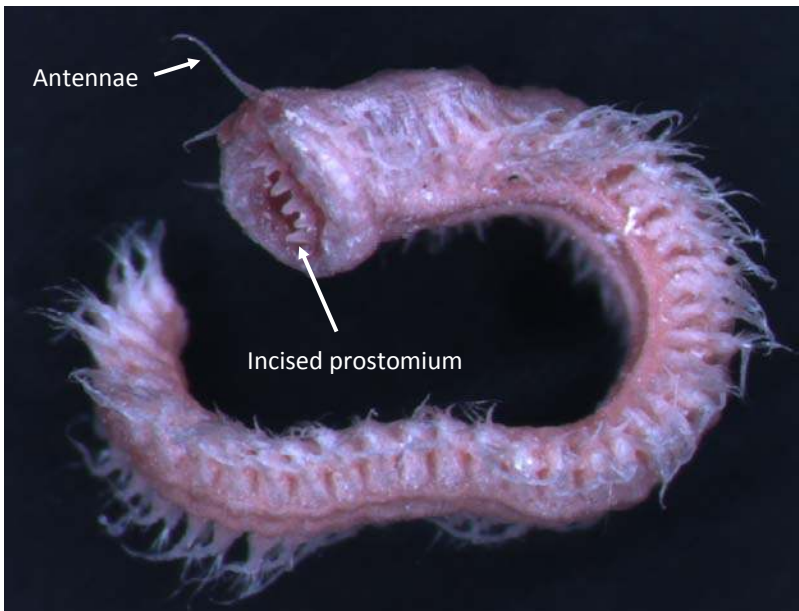
Photo: Chris Glasby.



Family: **Nereididae** (Errantia: Phyllodocida)

Description: On their heads nereididae possess four eyes, four pair of tentacles and two thick palps. If the pharynx is protruded, two jaws are visible.

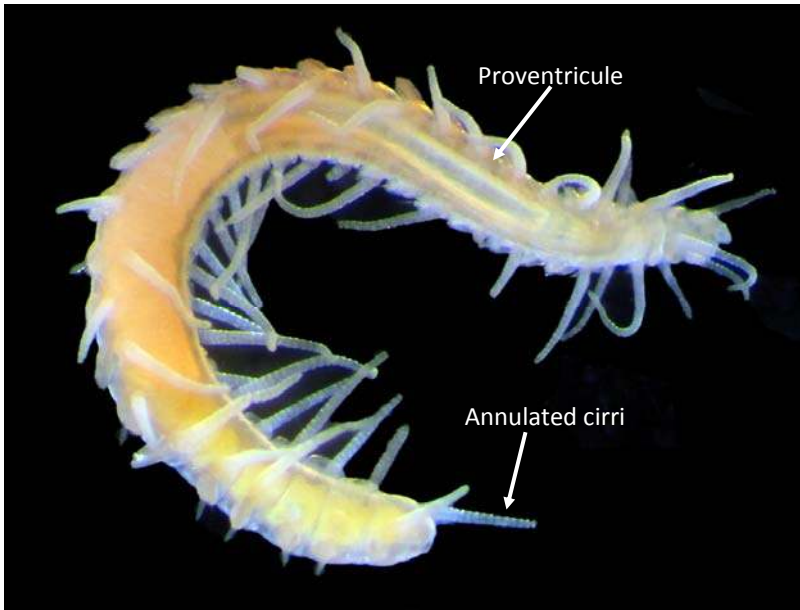
Photo: Marc Lavaleye.



Family: **Pilargidae** (Errantia: Phyllodocida)

Description: In pilargids the prostomium could be incised and normally possess two to three antennae or none. They may exhibit a large curved spine in the dorsal section of the parapodium.

Photo: Marc Lavaleye.



Family: **Syllidae** (Errantia: Phyllodocida)

Description: Often small sized polychaetes with clearly visible cirri that may be annulated. The proventricule, the anterior region of the digestive tract, a barrel-shaped structure, is usually visible through the body wall.

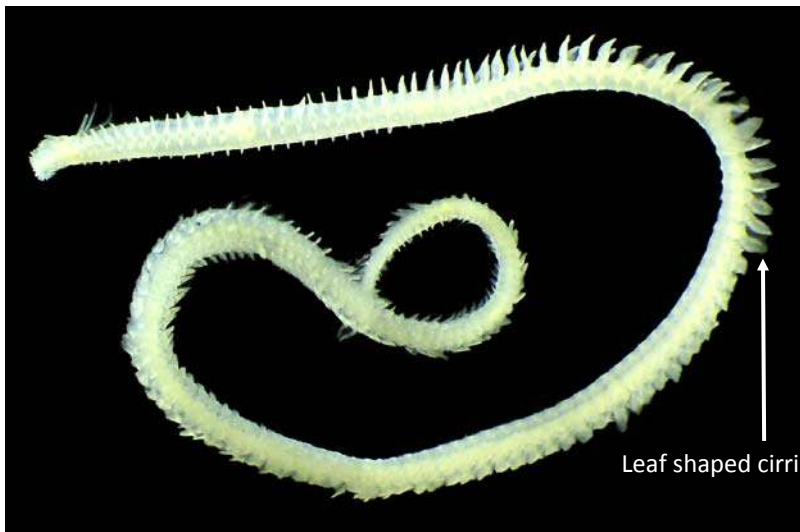
Photo: Chris Glasby.



Family: **Nephtyidae** (Errantia: Phyllodocida)

Description: Nephtyidae have compact white-creamy muscular bodies and do not possess highly distinctive features. They lack long tentacles, but some have a small pair of eyes. Relatively rectangular in cross section.

Photo: Marc Lavaleye.



Family: **Phyllodocidae** (Errantia: Phyllodocida)

Description: Normally bright coloured specimens, usually bright yellow or green, phyllodocids possess one pair of eyes and four antennae on their head. The most conspicuous feature of this family is their flattened leaf-like dorsal cirri. If the pharynx is protruded many small papillae are visible on its surface (top photo).

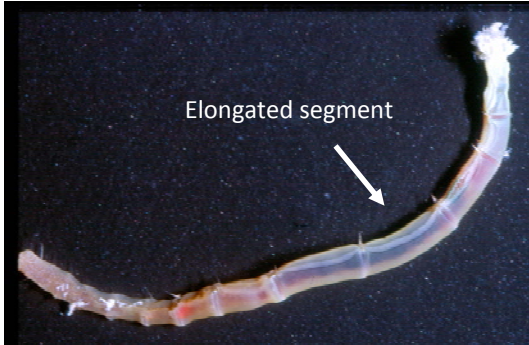


Photos: Top Chris Glasby, below Marc Lavaleye.



Family: **Oweniidae** (Sedentaria: Sabellida)

Description: Oweniidae are present in tough sand encrusted tubes that taper at both ends. Around the head is a crown of short branched tentacles although in some members the tentacular crown is absent. They possess elongated segments in the thorax. The long segments and tough sand tube are the main diagnostics for the family.



Photos: Top Chris Glasby; middle and below Marc Lavaleye.



Family: **Sabellariidae** (Sedentaria: Sabellida)

Description: Sabellariidae live in tubes made of sand grains. Their head possess golden thick chaetae circling the mouth, which function as an operculum (lid) at the entrance to the tube.

Photo: Marc Lavaleye.



Family: **Sabellidae** (Sedentaria: Sabellida)

Description: Sabellidae (feather duster worms) possess a branchial crown of feeding tentacles. They live in tubes made of sediment.

Photo: Chris Glasby.



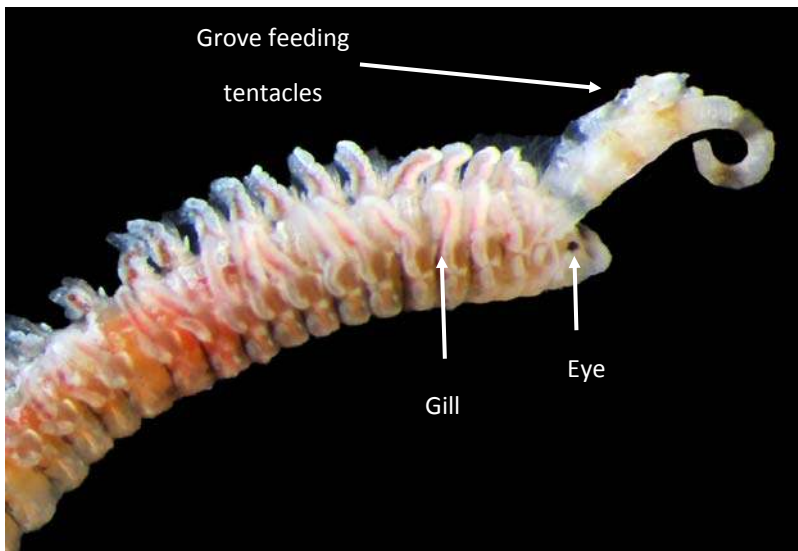
Shovel-shaped  
prostomium

Palp

Family: **Magelonidae** (Sedentaria: Spionida)

Description: Magelonidae possess an unlikely flattened shovel-shaped prostomium. They possess a pair of long papillated palps behind the prostomium.

Photo: Chris Glasby.



Groove feeding  
tentacles

Gill

Eye

Family: **Spionidae** (Sedentaria: Spionida)

Description: Prostomium varied in shape from rounded to truncate, horned or pointed. The prostomium is prolonged posteriorly. Pairs of eyespot are usually present on the prostomium. They possess a pair of grooved feeding palps that may be lost during collection. They usually possess branchiae on most segments or limited to a few anterior segments.

Photo: Chris Glasby.



Family: **Cirratulidae** (Sedentaria)

Description: Cirratulidae often have very long branchiae and cirri that may cover many segments. The prostomium is pointed or rounded. Cirratulidae are often red, orange or yellow in colour.

Photo: Chris Glasby.



Family: **Flabelligeridae** (Sedentaria)

Description: Flabelligeridae are short-bodied, sand encrusted or papillated bodies and have very long chaetae on either side of the head.

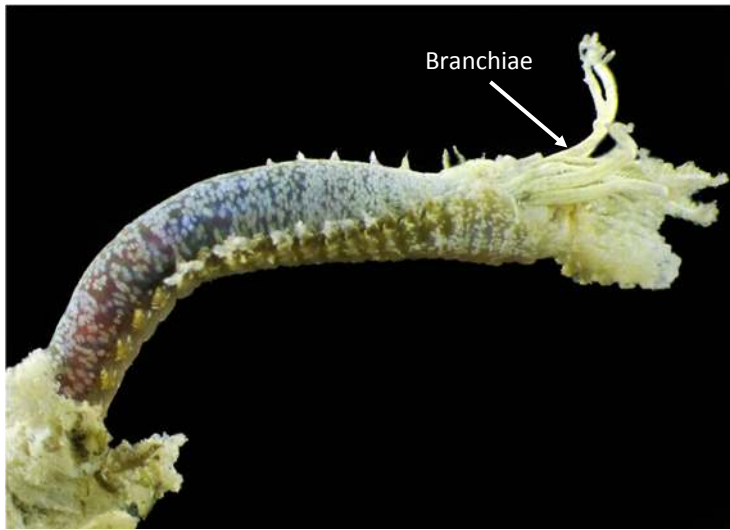
Photo: Marc Lavaleye.



Family: **Sternaspidae** (Sedentaria: Terebellida)

Description: Sternaspidae are distinct polychaetes with a short swollen body. They possess a large plate surrounded by chaetae in the posteroventral region.

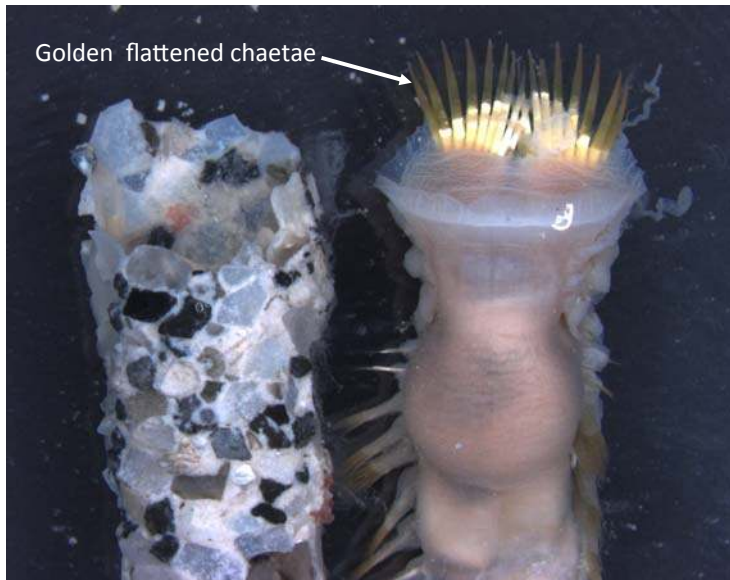
Photo: Marc Lavaleye.



Family: **Ampharetidae** (Sedentaria: Terebellida)

Description: Ampharetidae usually possess a well defined thorax and abdomen. Branchiae are present in a posterior position to the prostomium. Ampharetids are similar to Terebellidae and Trichobranchidae but have more slender and muscular bodies. Compared to terebellids, ampharetids do not possess branching branchiae.

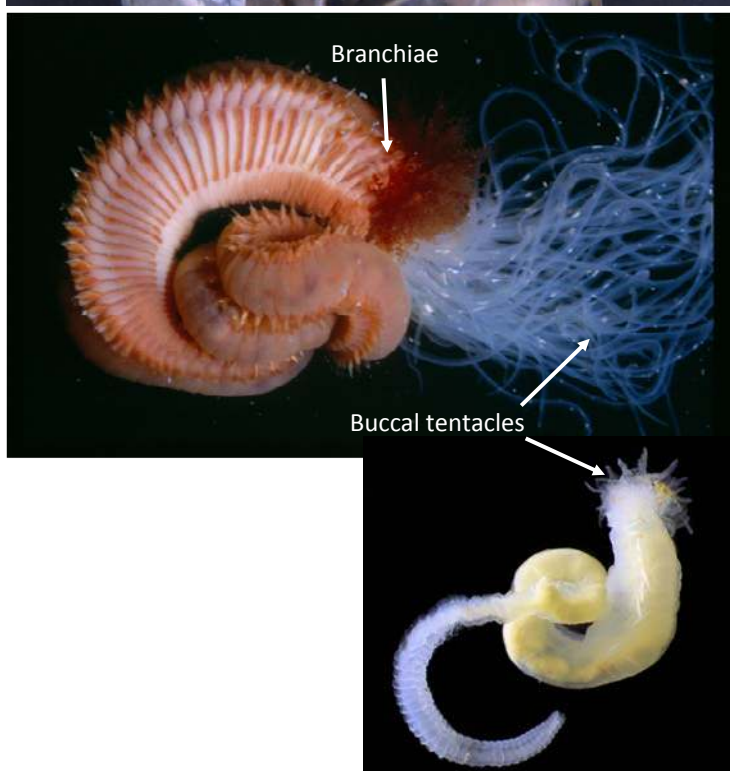
Photo: Chris Glasby.



Family: **Pectinariidae** (Sedentaria: Terebellida)

Description: Pectinariidae live in ice-cream cone shape tubes made of cemented coarse sand. They possess distinctive golden-coloured, large flattened chaetae which surround the mouth.

Photo: Marc Lavaleye.



Family: **Terebellidae** (Sedentaria: Terebellida)

Description: Terebellids generally possess numerous very long buccal tentacles that are non-retractable. Usually there are complex branched branchiae. Most species have red coloured branchiae and live in tubes, but some (below) lack branchiae and live naked in the sediment.

They can be confused with Trichobranchidae.

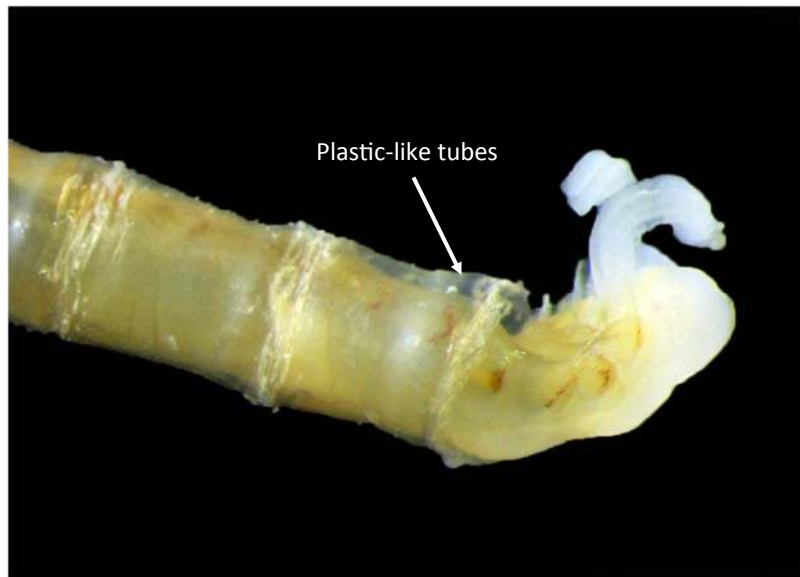
Photos: Top Marc Lavaleye; below Chris Glasby.



Family: **Trichobranchidae** (Sedentaria: Terebellida)

Description: Trichobranchidae have a distinct thorax and abdomen. They possess buccal tentacles that are not retractable. Their branchiae occur on segments 2 to 4 with a diverse morphology of either single filaments or partially fused lamellate lobes. They can be confused with Terebellidae, although the shape of the branchiae of Trichobranchidae is distinctive.

Photo: Chris Glasby.



Family: **Chaetopteridae** (Sedentaria)

Description: Some species live in clear plastic-like tubes (shown here), and others in opaque tubes. They are similar to Spionidae having a pair of grooved palps, but differ in having a much longer body (Spionidae: 3-43 mm; Chaetopteridae: 1-170 mm).



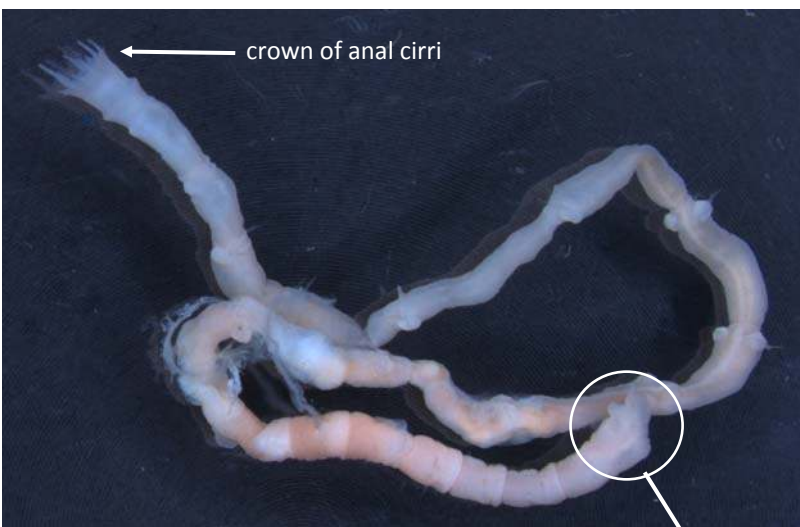
Photos: Top Chris Glasby, below Marc Lavaleye.



Family: **Capitellidae** (Sedentaria: Capitellida)

Description: Distinctive round head lacking appendages and segments and having poorly-developed parapodia. Often reddish coloured. Resemblance to earthworms.

Photo: Chris Glasby.



Family: **Maldanidae** (Sedentaria: Cossurida)

Description: Maldanids possess elongated segments like oweniids, but the head lacks appendages and normally possesses a circular oblique shield. The pygidium (last segment) usually possesses a crown of anal cirri of different lengths.



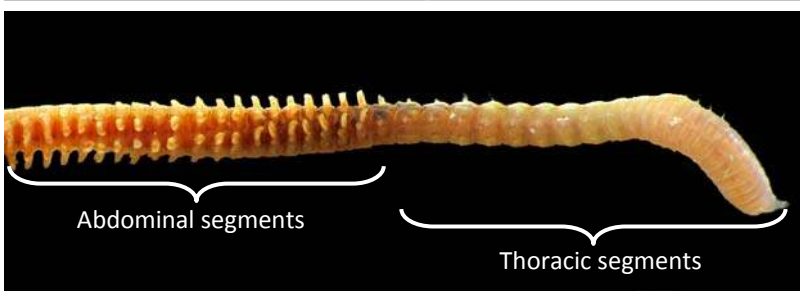
Photos: Top Marc Lavaleye, below Chris Glasby.



Family: **Opheliidae** (Sedentaria: Opheliida)

Description: Opheliids are distinctive polychaetes with a lancelet fusiform body with indistinct segments.

Photos: Top Chris Glasby, below Marc Lavaleye.



Family: **Orbiniidae** (Sedentaria: Orbiniida)

Description: Orbiniids have a distinctive division of the body with thoracic segments with poorly developed, lateral parapodia. The abdominal segments have more well-developed dorsal parapodia and adjoining branchiae.

Photo: Chris Glasby.



Family: **Paraonidae** (Sedentaria: Orbiniida)

Description: Paraonids possess a conical prostomium that may display a single antenna. The anterior and posterior regions of the body lack branchiae, while branchiae are usually present in the mid-anterior region over a variable number of segments.

Photo: Chris Glasby.

## PHYLUM ARTHROPODA

Arthropods are invertebrate animals that have an exoskeleton (external skeleton), a segmented body, and a pair of jointed appendages at each segment. The exoskeleton is made of chitin and often mineralised with calcium carbonate (e.g. crabs). Their heads are comprised of fused segments. Because the exoskeleton is not flexible enough to allow growth, arthropods replace the exoskeleton periodically by moulting. Arthropods normally possess well developed sensory organs.

Arthropoda is the most species-rich phylum with more than one million species. Insects, crustaceans and arachnids all belong to this phylum. They are present in most environments.

### Phylum Arthropoda

#### Class Pycnogonida

#### Subphylum Crustacea

#### Class Ostracoda



Class: **Pycnogonida**

Description: Sea spiders are marine arthropods found world-wide. They have exceptionally long legs and a small thin body. They normally have eight pairs of legs. Due to their thin body, gas exchange by diffusion and they lack a respiratory system. The cephalothorax is larger than the abdomen and their exoskeleton is not mineralised. Food is obtained by sucking body fluids of their prey through the proboscis.

Photo: Marc Lavaleye.

## SUBPHYLUM CRUSTACEA

Crustacea are bilaterally symmetrical invertebrates with a hard exoskeleton, a segmented body and more than four pairs of jointed appendages. Their bodies are comprised of head, thorax and abdomen, although the head and thorax may be fused together to form a cephalothorax. Crustacean circulatory system is open. They normally have eyes on stalks. Gills are used for respiration.

Most Crustacea are aquatic, although there are some terrestrial species.



Class: Malacostraca

Order: Decapoda

Infraorder: Anomura

Superfamily: **Paguroidea**

Description: Hermit crabs live in empty shells from gastropods that protect their curved and soft abdomen.

Photo: Marc Lavaleye.



Class: Malacostraca

Order: Decapoda

Infraorder: Brachyura

Family: **Hexapodidae**

Description: Crabs of this family possess six walking legs instead of eight.

Photo: Marc Lavaleye.



Class: Malacostraca

Order: Decapoda;

Infraorder: Brachyura

Family: Hymenosomatidae

Species: ***Halicarcinus australis***

Description: These small spider crabs possess a flattened carapace, with fine legs which are longer than the carapace. They possess chelipeds that are long and slender.

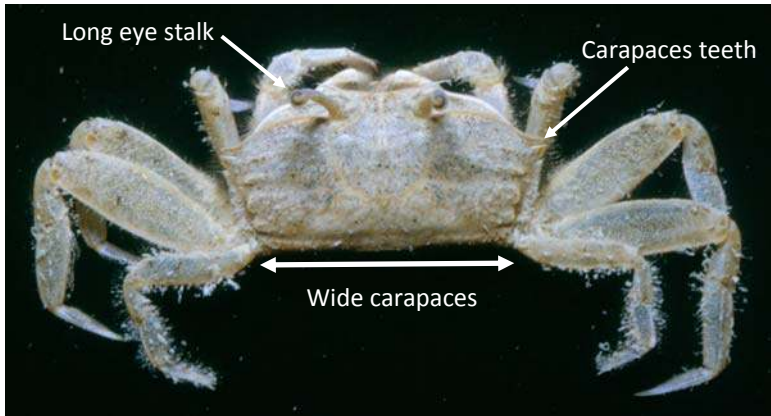
Photo: Marc Lavaleye.



Class: Malacostraca  
Order: Decapoda  
Infraorder: Brachyura  
Family: **Leucosiidae**

Description: Pebble crabs possess rather round and inflated carapaces. Some of them possess a defined rostrum.

Photo: Marc Lavaleye.



Class: Malacostraca  
Order: Decapoda  
Infraorder: Brachyura  
Family: Macrophthalmidae  
Species: ***Macrophthalmus* sp.**

Description: There are probably several species of sentinel crabs in RB and EMB. Sentinel crabs possess carapaces that are significantly wider than long. They possess two carapace lateral teeth. Eye stalks long.

Photo: Marc Lavaleye.



Class: Malacostraca  
Order: Decapoda  
Infraorder: Brachyura  
Family: Mictyridae  
Species: ***Mictyris longicarpus***

Description: Soldier crabs possess a carapace which is nearly spherical. The chelipeds point downwards.

Photo: Marc Lavaleye.



Class: Malacostraca  
Order: Decapoda  
Infraorder: Brachyura  
Family: **Pilumnidae**

Description: Hairy crabs possess a carapace and legs covered with hairs that retain sediment and other material.

Photo: Marc Lavaleye.



Class: Malacostraca  
Order: Decapoda  
Infraorder: Brachyura  
Family: **Portunidae**

Description: Swimming crabs possess flattened distal segments of the last pair of legs. The paddle shape legs allow the crabs to swim.

Photo: *Portunus armatus* Marc Lavaleye.



Class: Malacostraca  
Order: Decapoda  
Infraorder: Brachyura  
Family: **Callianassidae**

Description: Ghost shrimp have one of the chelipeds substantially enlarged. They possess a narrow and long body. They live in burrows in muddy sediments.

Photo: Grace Maglio.



Class: Malacostraca  
 Order: Decapoda  
 Infraorder: **Caridea**

Description: Shrimps possess a distinctive cephalothorax and a long narrow abdomen. They may possess a rostrum and eyes on stalks.

Photo: Marc Lavaleye.



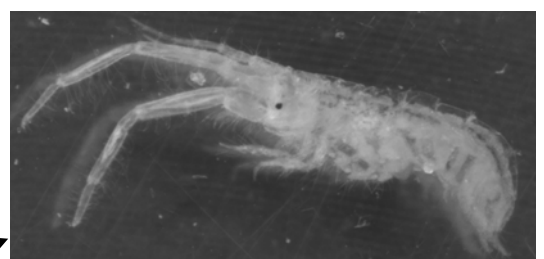
Class: Malacostraca  
 Order: **Amphipoda**

Description: Amphipods are small sized Crustacea that usually possess laterally compressed bodies. The compound eyes are not on stalks. They have different types of thoracic legs.

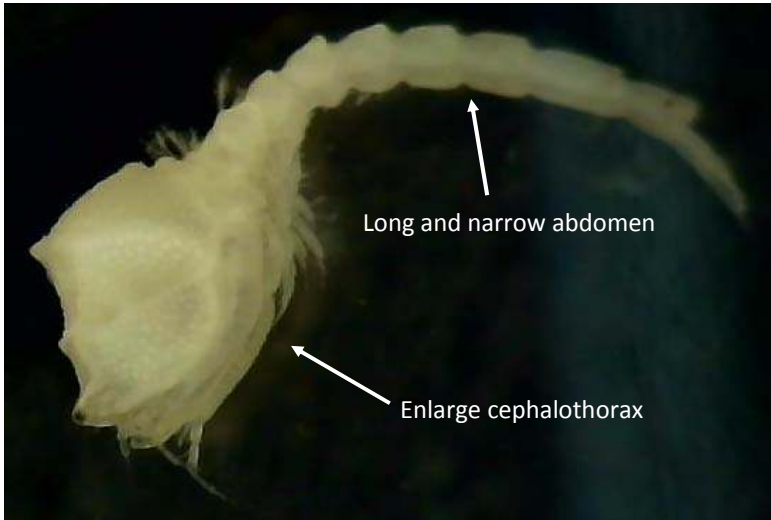
A common amphipod found at low tide pools in the higher areas of the intertidal flats of RB and EMB was the hermit mud shrimp from the family Corophiidae. These small crustacea were found in high densities. As with hermit crabs, they hide in empty gastropods shells, tusk shells and so on. They move with a peculiar jerky action.



Photos: Top Grace Maglio; middle Loran Kleine Schaars; Family **Corophiidae** (hermit mud shrimp) below left and right Marc Lavaleye.



hermit mud shrimp



Class: Malacostraca

Order: **Cumacea**

Description: Comma shrimps are small crustacea that have a distinctive comma shape. They possess an enlarged cephalothorax and a long and narrow abdomen that ends in a biforked tail.



Photos: Loran Kleine Schaars.



Anthuridea



*Eurydice sp.*

Class: Malacostraca

Order: **Isopoda**

Description: Isopods are small-sized Crustacea that are normally dorso-ventrally compressed. Their bodies are elongated, sometimes slightly arched. They possess composed eyes. Compared with amphipods, most isopods have thoracic legs of similar morphology and length.

Photos: Top picture **Anthuridea** Grace Maglio; below **Eurydice sp.** Marc Lavaleye.



Class: Malacostraca

Order: **Tanaidacea**

Description: Tanaids are small, long and slender crustaceans that live in burrows. Their pleon has a characteristic segmentation with 5 pleonites and normally ends in two long uropods.

Photos: Top Marc Lavaleye; below left Marc Lavaleye; below right Grace Maglio.



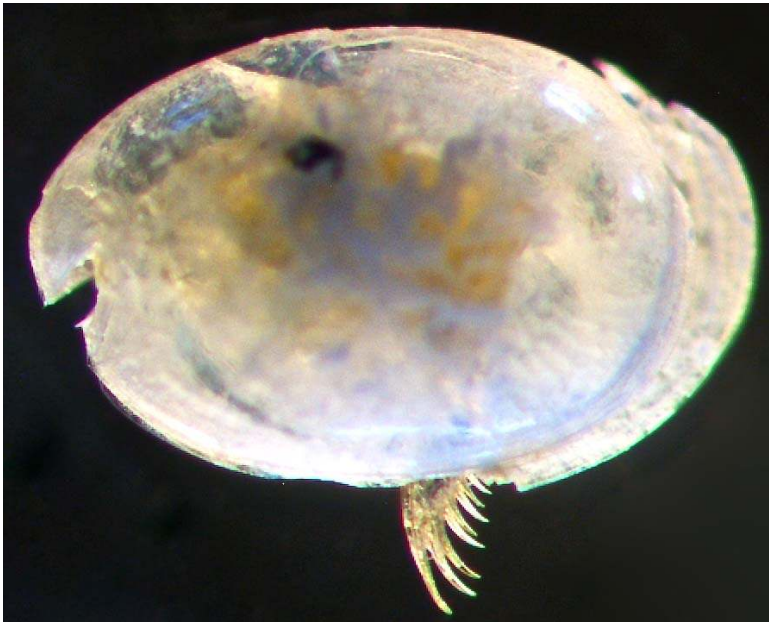
Class: Malacostraca

Order: **Stomatopoda**

Description: Mantis shrimps are intertidal predators. They possess a modified second pair of strong thoracic appendages which are used for hunting. Their eyes are on stalks. Caution should be taken when handling live specimens.



Photos: Marc Lavaleye.



Class: **Ostracoda**

Description: Seed shrimps are small-sized crustacea. Their body is enclosed in a bi-valve carapace, but they should not be confused with small/juvenile bivalve molluscs.



Photos: Top Marc Lavaleye; below Loran Kleine Schaars.

## PHYLUM BRACHIOPODA

Brachiopods are marine animals that look like bivalves but are not closely related to molluscs. They have two valves that cover the dorsal and ventral sections of the animal. The valves can be closed for protection. They possess a long stalk that is used to attach the animal to the substratum. As with phoronids, brachiopods have a lophophore, being a crown of tentacles that enables them to filter food particles from the water.



Photo: Marc Lavaleye.

Class: Lingulata

Species: *Lingula* sp.

Description: Although lamp shells look like bivalves, they are not related. Lingula species possess a tongue-shaped body. They burrow and attach with their peduncle that cannot be retracted.

## PHYLUM CHORDATA

Vertebrates like fishes, belong to the phylum chordata, but not all chordates are vertebrates. Chordates are animals that at some point of their life cycle have: pharyngeal slits (or branchial openings or gill slits; openings that connect the inside of the throat to the outside), a dorsal nerve cord (a bundle of nerve fibres that runs along the dorsal section), a notochord (a cartilaginous rod running underneath, and supporting, the nerve cord) and a post-anal tail.



Subphylum: **Tunicata**

Description: Sea squirts are marine invertebrates that possess a sac-like body. They are filter feeders and possess two openings. Some have a sand encrusted skin. They can be solitary or colonial (picture below).



Photos: Top Marc Lavaleye; below Loran Kleine Schaars.



Subphylum: Vertebrata

Class: **Osteichthyes**

Common name: Mudskipper

Description: Fish are no invertebrates but several were captured while sampling marine benthic invertebrates.

Photo: Marc Lavaleye.

## PHYLUM CNIDARIA

Cnidarians are radially symmetrical animals with the common character of the presence of cnidocytes (specialized cells that they use mainly for capturing prey or for defence). In many species of cnidarians, cnidocytes inject toxins into the target animal. Their mouths are surrounded by tentacles, where a lot of the cnidocytes are found.

There are two major body forms, mobile medusae (e.g. jelly fish) and sessile polyps (e.g. anemones). They have one single orifice in their body. Many species create colonies. Cnidarians are exclusively aquatic and the majority are marine species.

### Phylum Cnidaria

#### Class Anthozoa



Class: Anthozoa

Subclass: **Ceriantharia**

Description: Burrowing tube anemones look similar to anemones but they can withdraw within their tubes. They are filter feeders.

Photo: Marc Lavaleye.



Class: Anthozoa

Order: **Actiniaria**

Description: Sea anemones present at RB and EMB are generally small-sized and some of them have a burrowing habit. They possess a few tentacles that can be retracted if disturbed.



Photos: Marc Lavaleye.



Class: Anthozoa

Order: **Pennatulacea**

Description: Sea pens are a colony of polyps that take the form of a feather. The colony is anchored in the soft substratum with a long fleshy foot. This taxon can retract almost completely into the sediment when disturbed.

Photo: Marc Lavaleye.

## PHYLUM ECHINODERMATA

Echinoderms are strictly marine animals with radial symmetry, normally five-fold symmetry, with 5 or multiples of five sections (e.g. five arms in the case of sea stars or brittle stars). The larvae of echinoderms have bilateral symmetry but this symmetry is lost during metamorphosis ending with the adults having radial symmetry. Echinoderms have a mesodermal skeleton composed of calcareous plates or ossicles. Ossicles may be fused together (e.g. sea urchins), or may articulate with each other (e.g. the arms of sea stars).

Other characteristics of most echinoderms are the mutable collagenous tissue and the water vascular system. The mutable collagenous tissue can change its mechanical properties in a short period of time. This allows, for example, a sea star to change from a flexible mobile structure to a stiff and hard structure in seconds. The water vascular system is a network of fluid-filled canals in open contact with the seawater that function in gas exchange, feeding, sensory reception and locomotion.

### Phylum Echinodermata

Class Asteroidea

Class Ophiuroidea

Class Crinoidea

Class Echinoidea

Class Holothuroidea



Class: Asteroidea

Family: **Astropectinidae**

Description: Sea stars or starfish possess a characteristic shape. They normally possess five arms. The Astropectinidae can burrow in sand or mud and are opportunistic feeders. They move using numerous tube feet. Some organs can extend internally from the central disc to the arms.

Photo: Micha Rijkenberg.



Class: Ophiuridea

Families: **Amphiuridae** and **Ophiuridae**

Description: Brittle stars are echinoderms with generally 5 arms joined to a central disc. All organs are localised in the disc and never in the arms. They use the arms to move and burrow in the sediment. The most common brittle star in RB and EMB is *Amphiura tenuis*. The central disc of *Amphiura tenuis* is not completely covered by ossicles, and is therefore not well protected. Often these brittle stars are found damaged or broken in the samples.

*Amphiura tenuis*



Photos: Top *Amphiura tenuis* Marc Lavaleye; below *Dictenophiura stellata* Marc Lavaleye.

*Dictenophiura stellata*



Class: Crinoidea

Family: **Himerometridae**

Description: Feather stars are free living animals that can even swim. However they normally attach to the sediment using their cirri. These echinoderms present feathery arms used for filter-feeding.

Photo: Marc Lavaleye.



Class: Echinoidea

Family: **Arachnoididae**

Description: Sand dollars are a group of flat sea urchins that present a distinctive flower-like pattern on their back. They burrow to a shallow depth in the sediment and move with the help of their spines.

Photo: Marc Lavaleye.



*Thyone micra*

Class: **Holothuroidea**

Description: Sea cucumbers are echinoderms with a long, soft, cylindrical body and leathery skin. Some present sand-encrusted skin. They are detritivorous marine invertebrates.

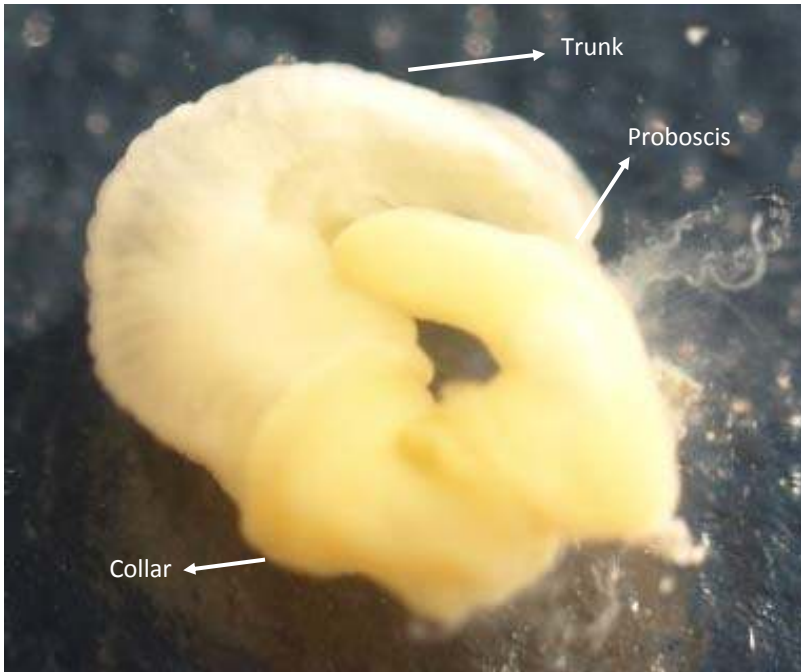


Sand-tailed sea cucumber  
*Paracaudina chilensis*

Photos: Marc Lavaleye.

## PHYLUM HEMICHORDATA

The phylum Hemichordata contains only a few marine species. Most of them live in burrows and are deposit feeders. They share some characteristics with chordates, like branchial openings, the stomochord in the collar region that is similar to a notochord, and a dorsal nerve cord. Some studies suggest that hemichordates are closer to echinoderms than to chordates.



Class: **Enteropneusta**

Description: Acorn worms belong to one of the two classes of hemichordates. They have a worm like morphology with a distinctive division of the body; an acorn-shaped proboscis, a collar and a trunk. The mouth is found at the collar.

Photo: Marc Lavaleye.

## PHYLUM MOLLUSCA

Molluscs are highly morphologically diverse. Members of this phylum include cephalopods, bivalves, chitons and gastropods among others. Most molluscs have bilateral symmetry. They are characterised by a soft body. They may possess external calcareous shells, an internal shell or lack any shell. Other distinctive characteristics are the mantle (a layer of epidermal tissue that surrounds the body), the radula (a scraping structure used for feeding; not found in bivalves). Most molluscs possess a recognised head and foot.

Molluscs are found world-wide in terrestrial and aquatic habitats, although the majority are marine. Mollusc are the largest marine phylum.

### Phylum Mollusca

Class Bivalvia

Class Gastropoda

Class Scaphopoda

## CLASS BIVALVIA

Bivalves are a class of Mollusca that are morphologically characterised by the presence of two calcium carbonate valves that enfold the soft body of the organism. The valves are joined together by a dorsal hinge, formed by a toothed interlock accompanied by a ligament that controls the valve opening, while one or two adductor muscles are used for closing the shell. They possess a muscular foot that is used for digging and in some cases displacement.

Most bivalves are filter feeders. They suck-in water for respiration and feeding through one of two siphons, filtering small, suspended food particles from the water, with the used water leaving the body through the second syphon.

Not all marine organisms possessing two valves are bivalves. For example ostracods, which are Crustacea, also possess two valves that surround their body.

Bivalves are widespread aquatic animals, most of them representing sedentary infaunal species. Many live in the intertidal zone, although some live attached to hard surfaces.



Family: Laternulidae

Species: *Laternula creccina*

Description: *Laternula creccina* is a filter feeding species in which the two siphons have been fused. There are no teeth on the hinge and the ligament is internal.

Photo: Tanya Compton.

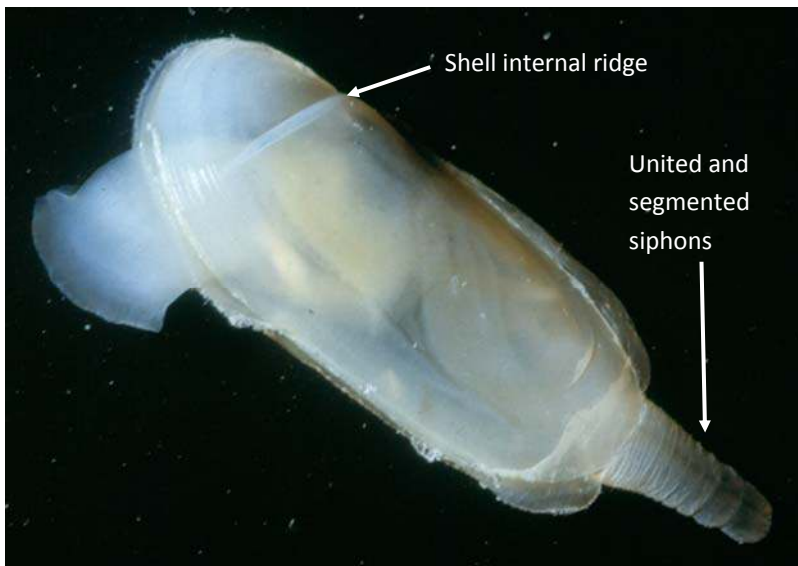


Family: Pharidae

Species: *Ensiculus cultellus*

Description: The “knife-finger oyster” is similar in shape to razor clams. However, this bivalve possesses two elongated flattened valves with blunt ends. It has an external ligament.

Photos: Top Micha Rijkenberg; below Grace Maglio.

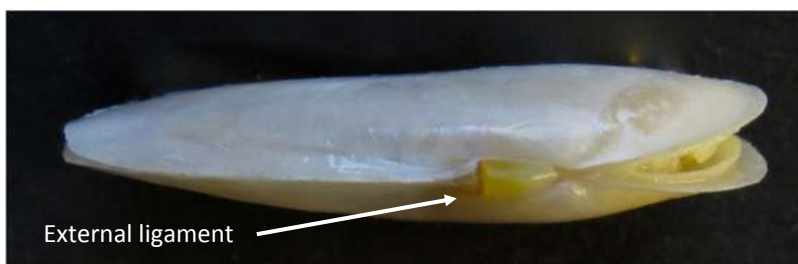


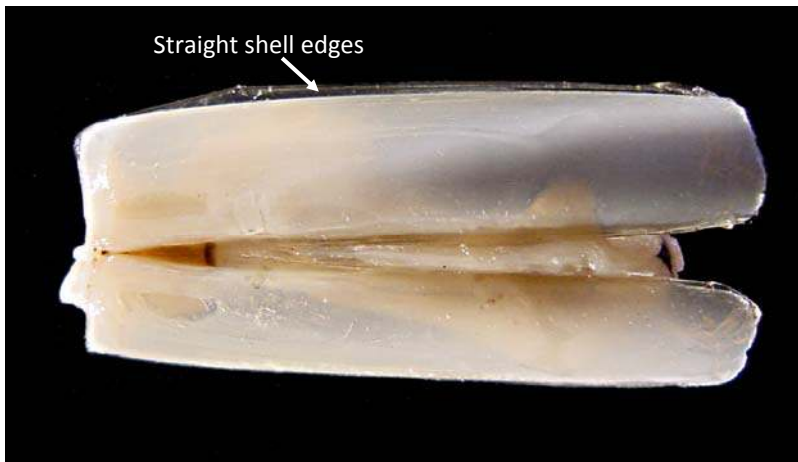
Family: Pharidae

Species: *Siliqua pulchella*

Description: The siphons are united and segmented and they break off easily when captured by a predator. *Siliqua pulchella* has a thin shell on which an internal ridge is visible. They are well adapted to living in fine sediment. It has an external ligament.

Photos: Top Marc Lavaleye, below Grace Maglio.



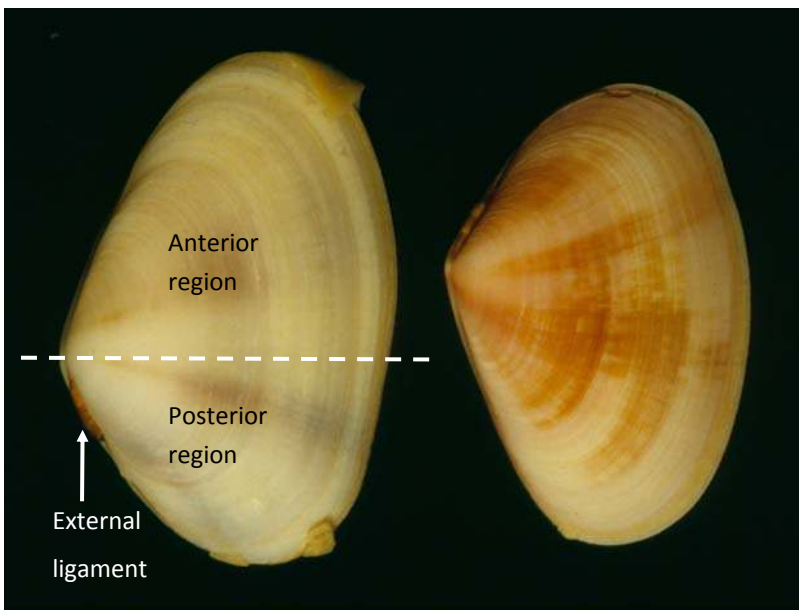


Family: Solenidae

Species: *Solen* sp.

Description: Razor clams have elongated bodies and shells that possess straight edges. *Solen* sp. commonly lives burrowed in soft intertidal sands. The ligament is external.

Photo: Tanya Compton.

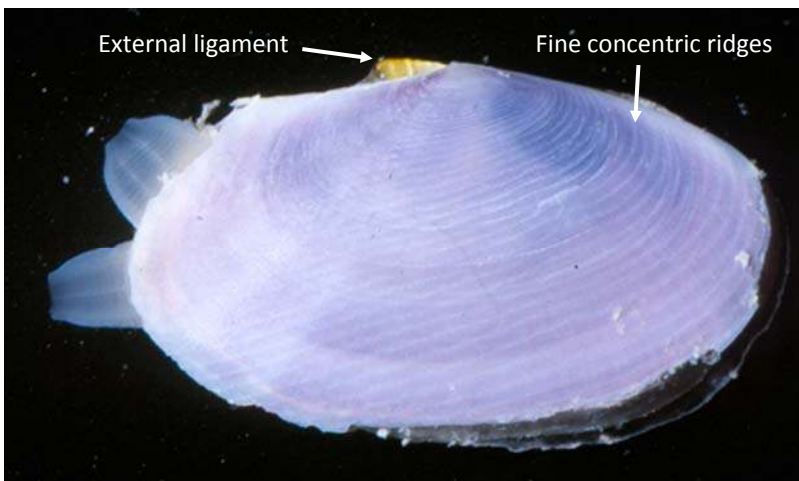


Family: Donacidae

Species: *Donax cuneatus*

Description: Small compressed bivalve with a narrow oval wedge shape. The posterior region is half the length of the anterior region. Normally found in wet sand of high-energy beaches such as EMB. The ligament is external.

Photo: Marc Lavaleye.



Family: Psammobiidae

Species: *Gari lessoni*

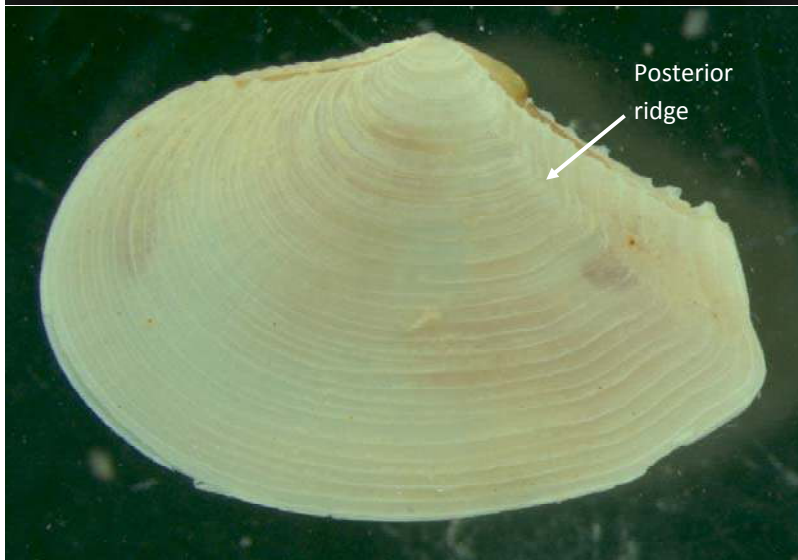
Description: Similar to Tellinidae, but *Gari* never possess lateral teeth. The shell is elongate-ovoid with fine concentric ridges. Normally found in sandy substrates. It has an external ligament.

Photo: Marc Lavaleye.

Family: Tellinidae

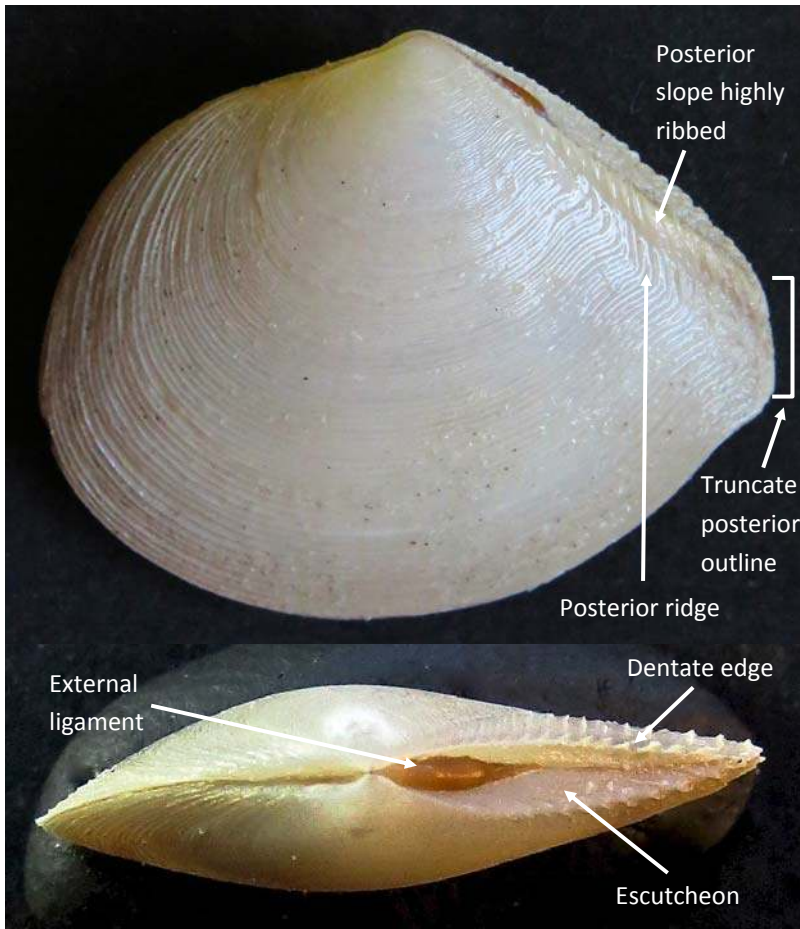
Species: *Serratina capsoides*

Description: This member of the diverse family Tellinidae possess a rather round and thick shell, smoothly ribbed in comparison to *S. piratica*. The anterior margin is rounded, ventrally curved. It shows a distinctive posterior ridge, lunule and escutcheon. The ligament is external.



Photos: Top and middle Grace Maglio; below juvenile by Marc Lavaleye.

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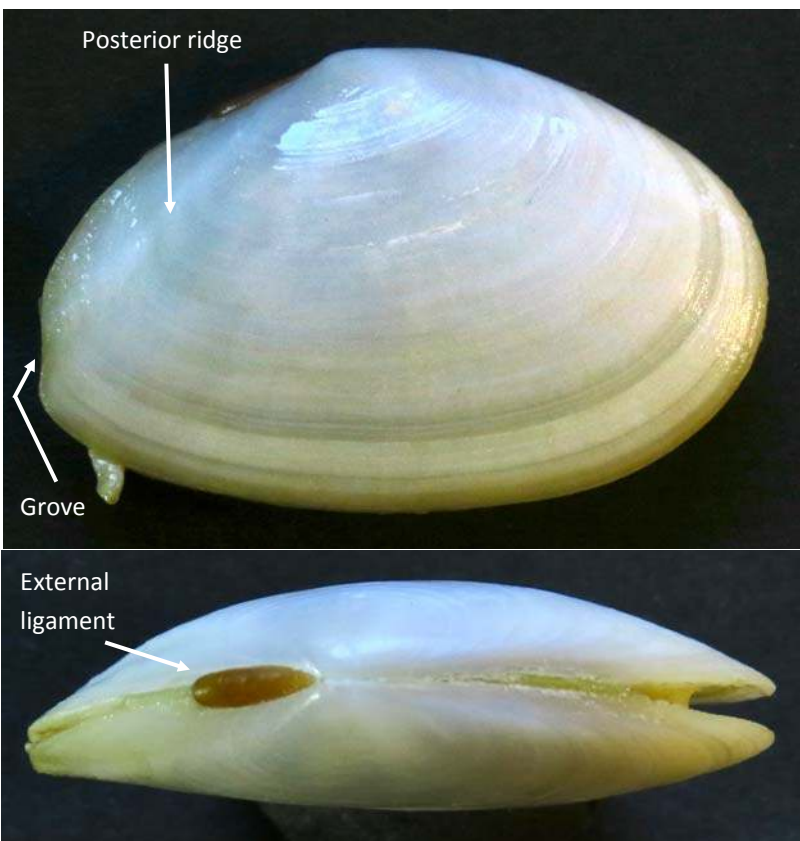


Family: Tellinidae

Species: *Serratina piratica*

Description: *Serratina piratica* anterior outline is largely rounded. The posterior dorsal margin is nearly straight, progressing to an almost truncate posterior outline. It is characterised by a distinctive posterior ridge and escutcheon, with no evident lunule. The posterior ridge is highly ribbed, nearly lamellated when compared with other tellinids, surrounding the escutcheon with dentate edges. It possesses an external ligament. The lunule is absent.

Photos: Grace Maglio.

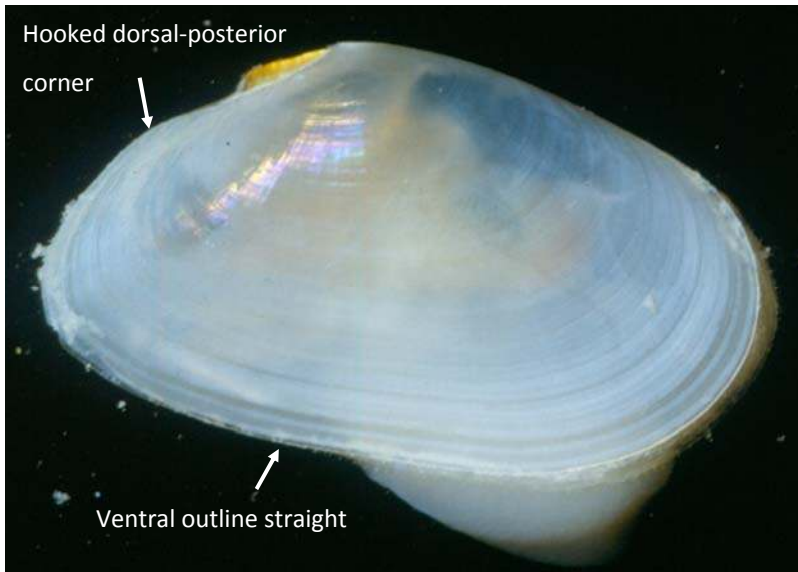


Family: Tellinidae

Species: *Tellina amboynensis*

Description: As with the two previous tellinids, adult members of *Tellina amboynensis* possess a smoother posterior ridge that is accompanied by a groove on the posterior margin. It is very similar to *T. "exotica"*, both possessing an oval-shaped outline, although *T. amboynensis* appear ventrally curved. The ligament is external, with a reduced escutcheon and absent lunule.

Photos: Grace Maglio.



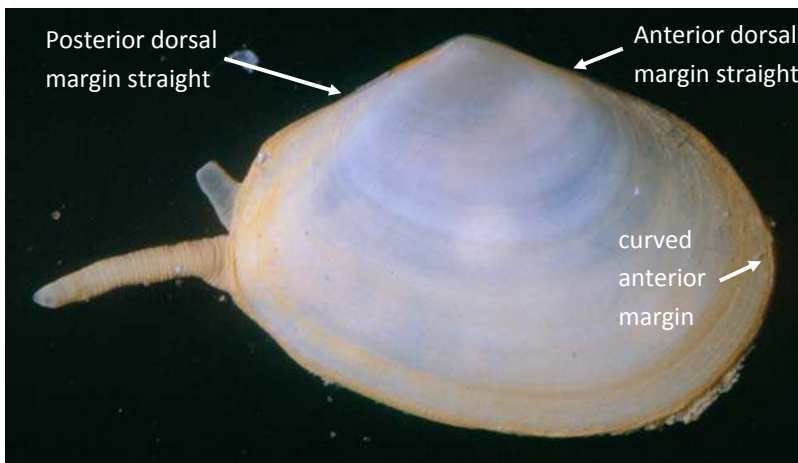
Family: Tellinidae

Species: *Tellina* "exotica"

Description: The fragile bivalve *T. "exotica"* is similar to *T. amboynensis* but the dorsal-posterior corner of the shell is hooked. The bivalve outline is ovate, posterior wedge-shaped and ventrally nearly straight. The ligament is external with reduced escutcheon and lunule.



Photos: Grace Maglio.



Family: Tellinidae

Species: *Tellina* "mud"

Description: Ovate-round tellinid, with a broadly curved anterior margin. The posterior dorsal margin is nearly straight.

Photo: Marc Lavaleye.



Family: Tellinidae

Species: *Tellina* "pointed"

Description: Similar to *T. exotica* but *T. "pointed"* has a rounded anterior margin, with the posterior outline of the shell distinctly pointed compare with the other tellinids. It has an external ligament.

Photo: Marc Lavaleye.

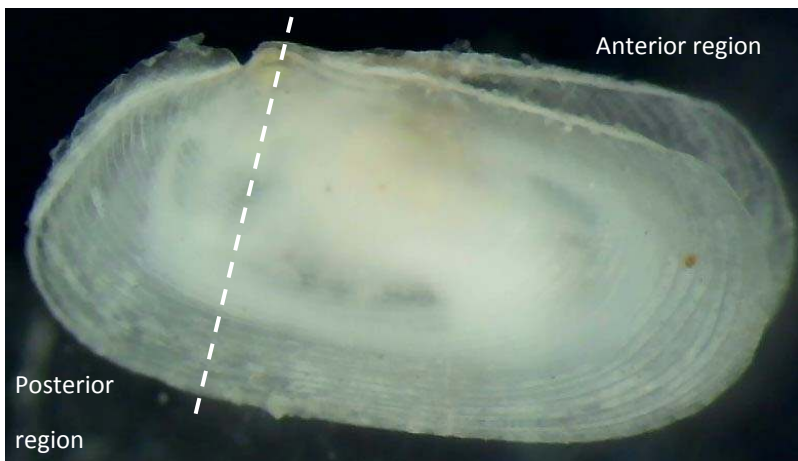


Family: Tellinidae

Species: *Tellina "rose"*

Description: *T. "rose"* is a small, fragile-shelled bivalve with a broadly curved anterior margin and a concave dorsal-posterior margin. The most distinctive characteristic of this tellinid is the pink coloured shell, with this colour retained after preservation. The ligament is external.

Photo: Marc Lavaleye.



Family: Galeommatidae

Species: *Galeomma sp.*

Description: *Galeomma sp.* is a small fragile oval-shaped shell that possesses a concentric ribbed pattern. The posterior region is one third of the anterior region. The anterior margin is broadly rounded and ventrally nearly straight. The ligament is internal.

Photo: Loran Kleine Schaars.



Family: Lasaeidae

Species: *Borniopsis macrophthalmensis*

Description: *Borniopsis macrophthalmensis* is a host-specific commensal small brown bivalve associated with the burrowing crab *Macrophthalmus sp.* It lives attached to the crab. They can be found loose in benthic samples.

Photo: Marc Lavaleye.



Family: Lucinidae

Species: *Cardiolucina sp.*

Description: *Cardiolucina sp.* has a small hard shell with an almost spherical shape. It has a characteristic ridge pattern, with a partially visible sunken ligament with reduced escutcheon.

Photos: top left Marc Lavaleye; top right and below Grace Maglio.



Family: Lucinidae

Species: *Cavatidens omissa*

Description: *Cavatidens omissa* is a small, circular, inflated bivalve, normally off white in colour. It has an internal ligament.

Photos: Top Marc Lavaleye; below Grace Maglio.



Family: Lucinidae

Species: *Divaricella irpex*

Description: *Divaricella irpex* has a small, round, inflated, hard shell characterised by the diverging ridges that decorate the shell. It has an internal ligament.



Photos: Grace Maglio.



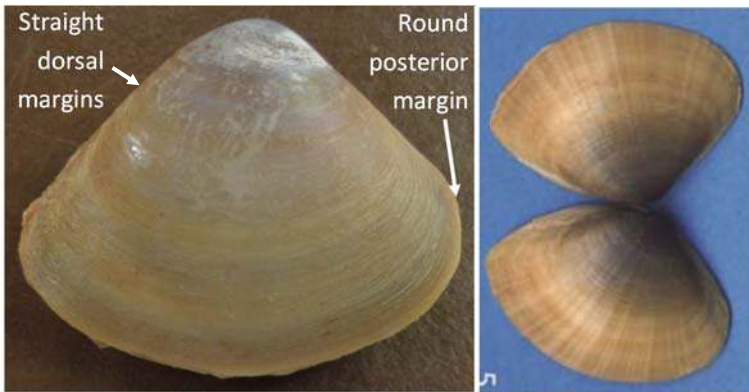
Family: Mactridae

Species: *Heterocardia gibbosula*

Description: *Heterocardia gibbosula* is a common, relatively large bivalve (adults), with rounded margins and appears inflated. The ligament is internal.



Photos: Top Marc Lavaleye; below Grace Maglio.

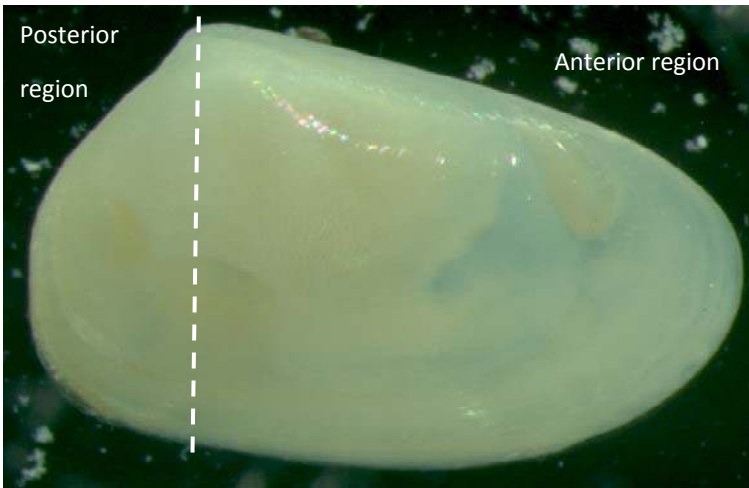


Family: Mactridae

Species: ***Mactra grandis***

Description: *Mactra grandis* is a large, brown, triangular-shaped Mactridae. Both posterior and anterior dorsal margins are almost straight with anterior margin broadly rounded and posterior margin more pointed. The ventral margin is also rounded. Patterns may be found on the shell. The ligament is small and external.

Photos: top left Marc Lavaleye; top right Jan Drent; below Marc Lavaleye.

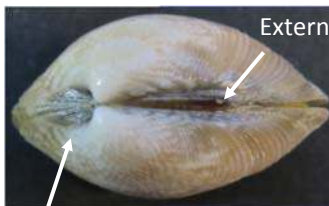


Family: Mesodesmatidae

Species: ***Paphies* sp.**

Description: *Paphies* sp. is a small bivalve with a shiny periostracum and internal ligament. It has a narrow oval and strong wedge shape. The posterior region is one third the length of the anterior region. Normally found in high densities.

Photo: Marc Lavaleye.



Heart-shaped lunule

External large ligament



Family: Veneridae

Species: ***Tapes* sp.**

Description: *Tapes* sp. is a group of bivalves with robust, thick shells. The lunule is heart shaped and the ligament is external and large, with the escutcheon not clearly defined. It possesses concentric ridges and grooves. Their coloration is highly variable with zigzag and ribbed patterns, lines and blotches.

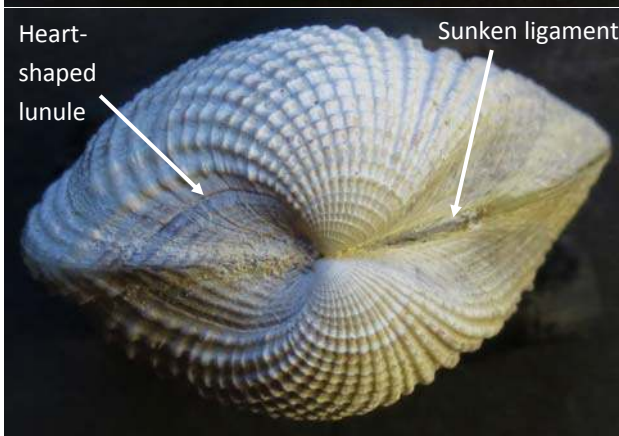
Photos: Top left Grace Maglio; large picture Tanya Compton.



Family: Veneridae

Species: *Anomalodiscus squamosus*

Description: Robust thick shell with a distinctive sculpture of concentric ridges and grooves and radial ribs. The shell is stronger towards the anterior end. Lunule is heart-shaped with a not very well-defined escutcheon. The ligament is sunken.



Photos: Grace Maglio.



Family: Veneridae

Species: *Placamen gilva*

Description: Both *Placamen* species are easily recognisable bivalves due to their shell sculpture. *Placamen gilva* possesses concentric prominent ridges nearly lamellate. The outline is almost triangular. The lunule is heart-shaped, while the escutcheon is elongated and extensive, almost reaching the posterior margin. The ligament is sunken.



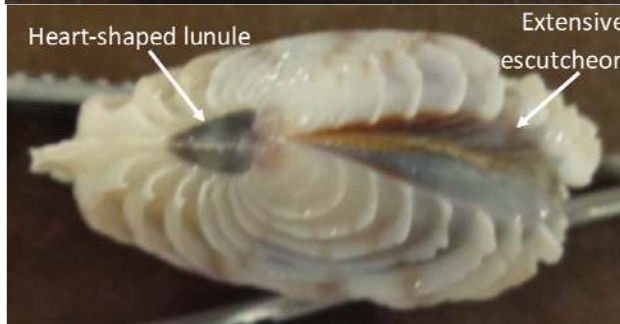
Photos: Marc Lavaleye.



Family: Veneridae

Species: *Placamen gravescens*

Description: *Placamen gravescens* sculpture possesses few concentric prominent frill-like lamellae. The lunule is heart-shaped while the escutcheon is elongated, almost reaching the posterior margin. The ligament is sunken.



Photos: Marc Lavaleye.



Family: Nuculidae

Species: *Nucula astricta*

Description: *Nucula astricta* has a rounded-triangular shape. The anterior-dorsal margin is very long, lightly curved, while the posterior dorsal margin is short and almost straight. The ventral margin is rounded. Escutcheon and lunule present poorly defined edges. The ligament is internal.



Photos: top Marc Lavaleye; below Grace Maglio.



Family: Solemyidae

Species: *Solemya terraereginae*

Description: *Solemya terraereginae* is a small bivalve with a non-calcareous fragile and nearly transparent shell. It possesses a distinctive subcylindrical shape. The ligament is internal. *Solemya terraereginae* normally lives burrowed in the sediment, but occasionally swims, forcing water from the shell and moving in small bursts.



Photos: Top Tanya Compton; below Grace Maglio.



Family: Arcidae

Species: *Tegillarca granosa*

Description: Commonly known as “blood cockle” due to the reddish colour of its meat, it is important for aboriginal communities as a food and cultural resource. Similar in form to cockles, they present a thick and strong shell. The strongly inflated shell shows solid radial ridges with prominent umbos and an almost straight dorsal margin. They have a large ligament that extends on a large section of the dorsal margin. Bands of fibres may be visible in a V-shape. The hinge has many similar teeth (taxodont hinge).



Photos: Grace Maglio.

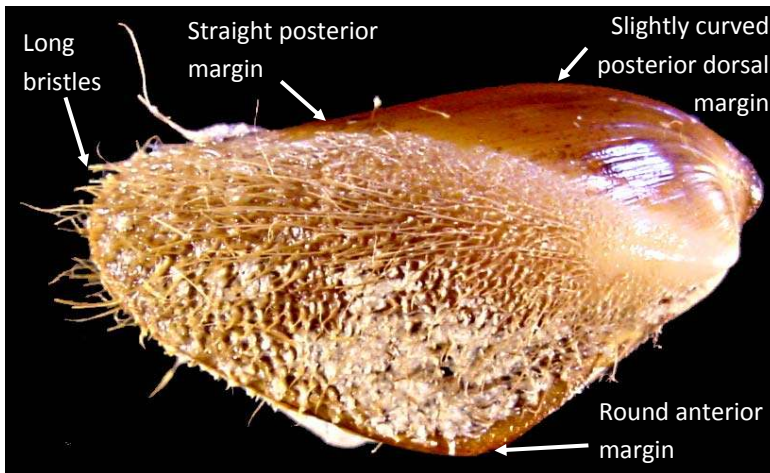


Photo: Tanya Compton.

Family: Mytilidae

Species: *Modiolus micropterus*

Description: Commonly known as mussels, these bivalves present a typical shape characterised by a straight ligament, margin joints with a distinctive angle and a slightly curved posterior dorsal margin. The posterior margin is straight while the anterior margin is rounded. The ventral region is straight. It has long bristles on the shell.

## CLASS GASTROPODA

Gastropods are the largest class of the Mollusca phylum and one of the most diverse group of animals. Their morphology is diverse. They include taxa with a soft body and a well developed external shell, taxa with an internal or reduced shell and animals lacking any shell. The first group, the sea snails, is the most common in Roebuck Bay and Eighty Mile Beach. Sea snails are morphologically characterised by the presence of, in most cases, a coiled calcium carbonate shell that protects part or all the soft body of the organism.

Sea snails present a variety of diverse feeding strategies, from herbivore species to scavengers and predators. In most cases the presence of a siphon indicates whether a species is a scavenger or a predator, since they use chemical cues in the water to locate their prey. Example of this characteristic is the Nassariidae family.

Gastropods are found worldwide, on land and all oceans. Many of them are marine species.



Family: Potamididae

Species: *Pirenella delicatula*

Description: This family is mostly found around mangroves. They have elongate shells that are sculptured with spiral rows of nodules and axial ridges. Potamidids show an anterior notch near the top of the aperture.

Photo: Grace Maglio.



Family: Epitoniidae

Species: *Epitonium sp.*

Description: *Epitonium sp.* possesses a fine glossy shell. The family is recognised also by the axial ribs on partly separated helical whorls. The aperture is nearly round.

Photo: Marc Lavaleye.



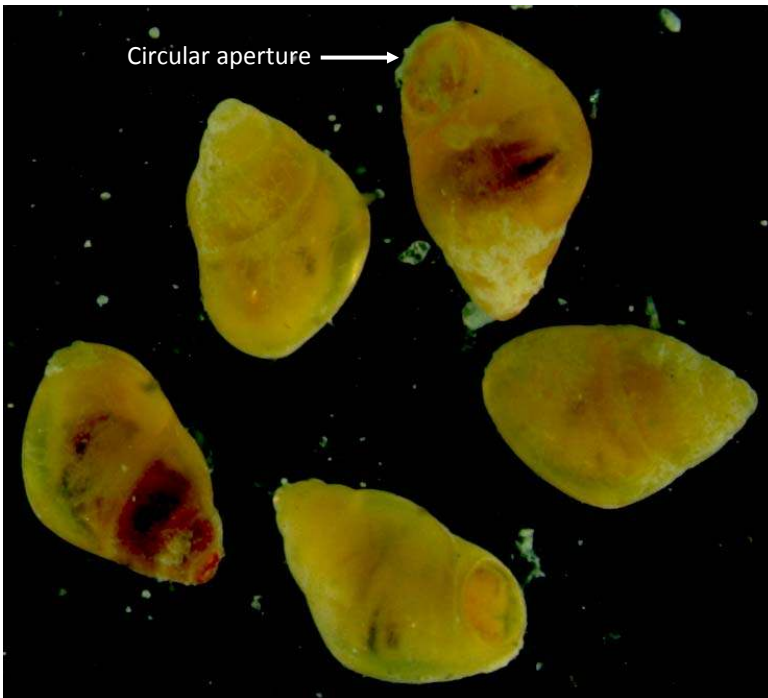
Family: Naticidae

Species: Top *Conuber conicum*; middle *Natica gualteriana*; bottom *Natica sp.*

Description: The Naticidae family, also known as moon shell, is recognised by their oval or globular shell and smooth surface. The last whorl is enlarged. They present a half moon shaped aperture and sometimes a callus-like structure obscures the umbilicus.



Photos: Top and middle Marc Lavaleye; below Grace Maglio.

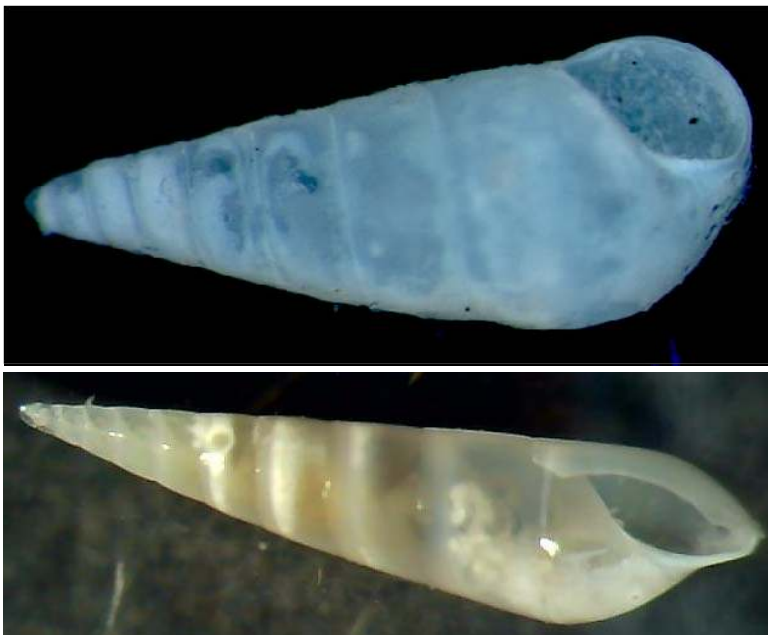


Family: Stenothyridae

Species: *Stenothyra* sp.

Description: Small-sized gastropods with a smooth shell. The aperture is circular.

Photo: Marc Lavaleye.



Family: Eulimidae

Species: *Eulima* sp.

Description: Eulimidae is a family of molluscs that are parasitic on echinoderms. They can be internal or external parasites, and this condition influence the shell morphology. Thus the shell morphology of this family is highly diverse. *Eulima* sp. possesses a colourless transparent, long, slender shell.

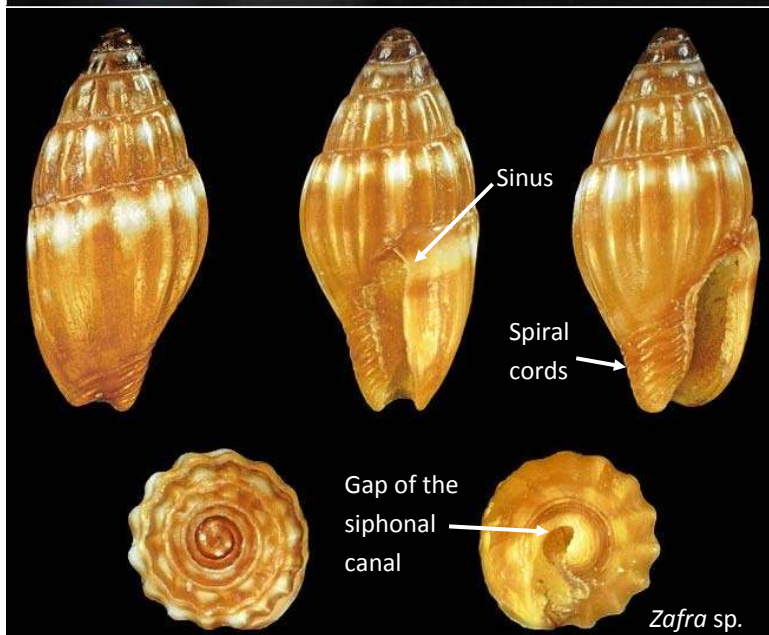
Photos: Top Marc Lavaleye; below Loran Kleine Schaars.



Family: Columbellidae

Species: First and second pictures *Mitrella essingtonensis*; third picture *Zafra* sp.

Description: Columbellidae or dove shell is a gastropod family with numerous genera. Therefore they show an extensive diversity in morphology. Columbellids can be either herbivorous or omnivorous. They have robust shells and most present a siphonal canal that appears as a gap at the anterior end of the aperture. All columbellids present spiral cords at the base and a sinus at the top of the outer lip.



Photos: Top Marc Lavaleye; middle Grace Maglio; below H. Zell, under the Creative Commons Attribution-Share Alike 3.0 Unported.



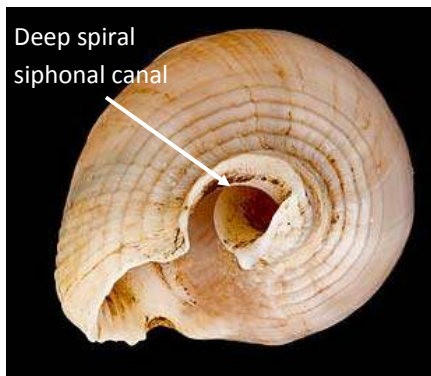
Family: Nassariidae

Species: From the top left, first and second pictures *Nassarius bicallosus*; third, fourth and bottom right pictures *Nassarius dorsatus*.

Description: The family Nassariidae is most commonly found in tropical intertidal areas. Nassariids are generally predators and scavengers. They have sturdy shells with a sharp apex. Nassariids show a deep spiral siphonal canal.



Photos: From the top left, first, second and fourth pictures Grace Maglio; third picture Marc Lavaleye; bottom right picture H. Zell, under the Creative Commons Attribution-Share Alike 3.0 Unported.





Family: Nassariidae

Species: *Nassarius* "small Ingrid"



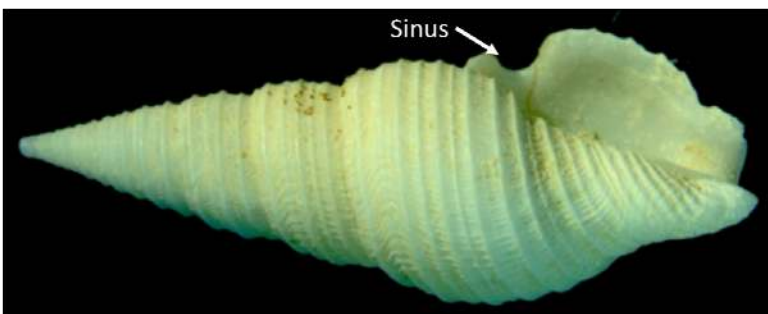
Photos: Grace Maglio.



Family: **Terebridae**

Description: The shells of this family resemble long, slender screws. They usually show a subsutural groove.

Photo: Marc Lavaleye.



Family: **Turridae**

Description: Turridae sensu lato was the largest marine gastropod family. However it has been recently split in more than 10 families. Shells of turrids often present as a spindle-shaped cone. They also have a distinctive sinus at the top of the outer lip.

Photo: Marc Lavaleye.



Family: **Marginellidae**

Description: The shells of the family Marginellidae are generally ovate (egg-shaped), smooth and white. They always have prominent columellar folds.

Photo: Marc Lavaleye.



Family: **Costellariidae**

Species: ***Vexillum radix***

Description: Costellariidae shells present distinctive axial ribbing and show strong plaits on the columella. They have a narrow aperture and a developed siphonal notch.



Photos: Grace Maglio.



Photo: Marc Lavaleye.

Family: **Acteonidae**

Description: The aperture of acteonids, also known as “barrel bubble snails”, is elongate and narrow. The aperture is wider at the anterior region and narrows towards the posterior region. They present spiral sculpturing.



Family: Amathinidae

Species: ***Leucotina* sp.**

Description: *Leucotina* species are ectoparasites that live on larger bivalves. They have no radula and the shell is white transparent and has spiral sculpture.

Photo: Gracie Maglio.



Family: Pyramidellidae

Species: Left top and bottom picture ***Syrnola* sp.**; left middle picture ***Turbonilla* sp.**; right bottom ***Chrysallida* sp.**



Description: Pyramidellidae are external parasites. The apex of some members of this family (first two pictures) is heterostrophic; the first whorls of the shell are sinistral and sit at an angle (normally 90°) to the rest of the dextral shell. Other species (last two pictures) have a blunt apex. Their aperture lacks siphonal canal.



Photos: Marc Lavaleye.





Family: Retusidae

Species: *Retusa* sp.

Description: Retusids have a cylindrical shape. The last whorl is very large and nearly envelops the other whorls. The operculum is usually absent and the animal can retract completely inside the shell.

Photo: Marc Lavaleye.



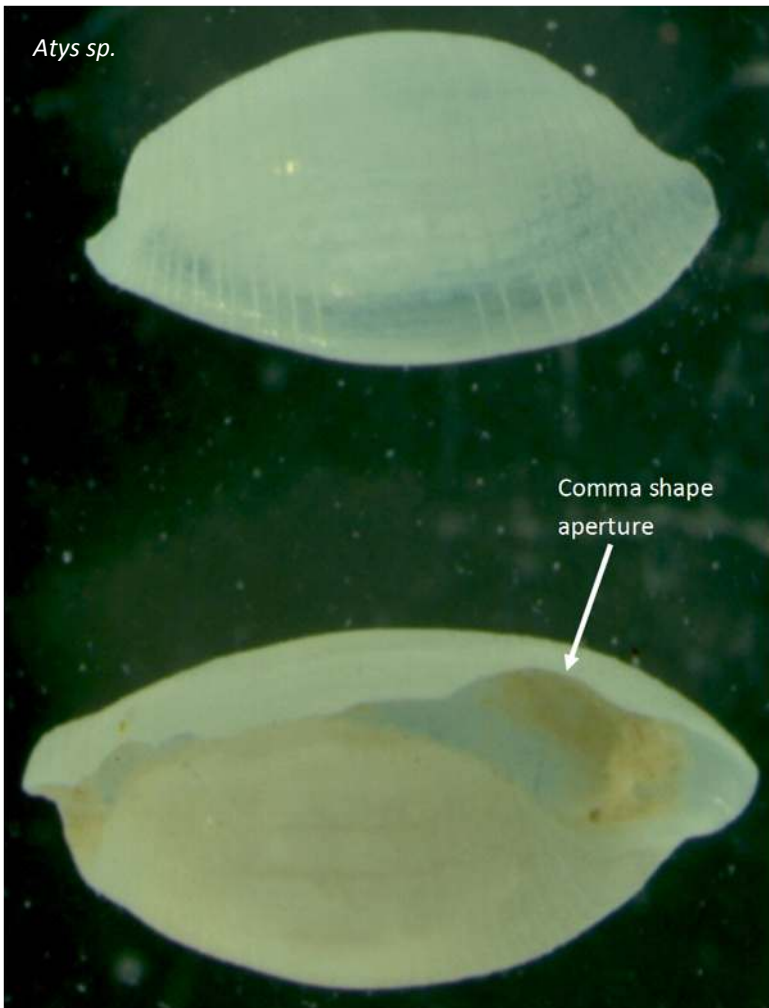
Round shield-shaped head

Family: Haminoeidae

Species: This page *Haminoea* "green"; next page top *Atys* sp., next page below *Liloea* sp.

Description: Gastropods of the family Haminoeidae are also known as bubble shells. The shells of this family are fragile, with a large comma-shaped aperture and lack an operculum. The animal cannot retract completely inside the shell and commonly possesses a round shield-shaped head.

Photo: Marc Lavaleye.

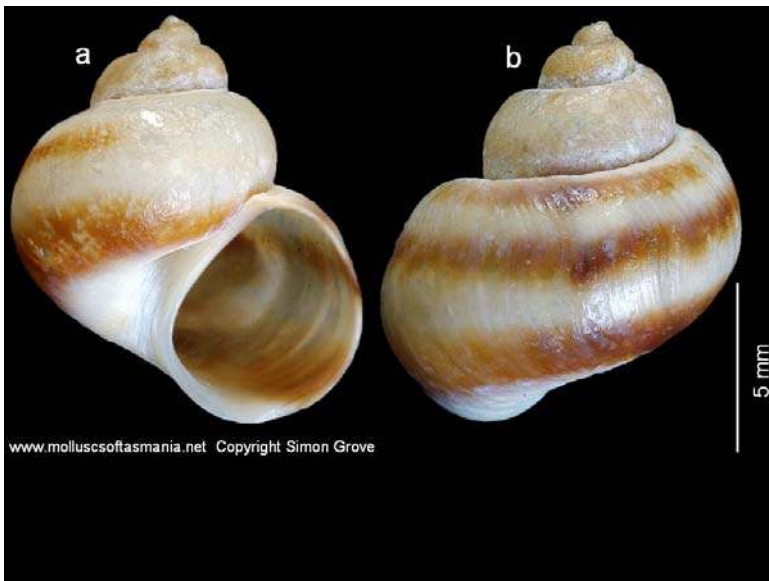


Family: Haminoeidae

Species: top *Atys* sp., below *Liloa* sp.



Photos: . Top *Haminoea* "green" Marc Lavaleye;  
below *Liloa* sp. Loran Kleine Schaars.



Family: Amphibolidae

Species: *Salinator burmana*

Description: The Amphibolidae family belongs to the air-breathing snails. They present an operculum and are found near mangrove areas of Roebuck Bay. The shells of Roebuck Bay are more depressed than in the picture, and resemble moon snails.

Photo: Simon Grove from Grove, S.J. (2017). A Guide to the Seashells and other Marine Molluscs of Tasmania web-site. from <http://www.molluscsoftasmania.net>



Family: Neritidae

Species: *Smaragdia souverbiana*

Description: The shells of nerites have an enlarged last whorl and are low spired. The aperture and operculum are D shape. There have a characteristic structure called the columellar deck, which is a flattened area bordering the columella. The area can be flat, with small nodules or lines/ridges. Most species are found in tropical regions.



Photos: Grace Maglio.



Family: Trochidae

Species: *Isanda coronata*

Description: This family is found world-wide. Most species can be recognised by their iridescent interior (internal nacreous shell layer). They present a corneous operculum.

Photo: Marc Lavaleye.

## CLASS SCAPHOPODA

Scaphopoda, commonly known as tusk shells, are molluscs with a distinctive morphology. Their external shell is conical and slightly curve, giving them the appearance of a small tusk. Both ends of the shell are open.

All scaphopods are representatives of the marine infaunal. Their head points downwards and only the narrow tip of the shell protrudes out of the sediment, to allow water exchange. They are deposit feeders.

Tusk shells are found world-wide.



Photo: Grace Maglio.

Order: Dentaliida

Family: Dentaliidae

Species: ***Dentalium cf. bartonae***

Description: *Dentalium cf. bartonae* is slightly less curved and more robust than *Laevidentalium* and possesses longitudinal striations.



Photo: Marc Lavaleye.

Order: Dentaliida

Family: Laevidentaliidae

Species: ***Laevidentalium lubricatum***

Description: *Laevidentalium lubricatum* is less robust and more curved than *Dentalium*.



Photo: Marc Lavaleye.

Order: Gadilida

Family: Gadilidae

Species: ***Polyschides gibbosus***

Description: *Polyschides gibbosus* is less curved than the other two species of scaphopoda. Their shells are transparent and slightly inflated in the central area.

## PHYLUM NEMERTEA

**Nemertea**, commonly known as ribbon worms, are invertebrates characterised by a lack of segmentation, with a slim body compared with their length. Most species are small. All have a proboscis, mouth and anus and a circulatory system. The majority of nemerteans are carnivores. They move slowly, using cilia or, in the case of large species, use muscular waves to swim.

Nemertea can be found in marine, fresh water and terrestrial cool damp areas.

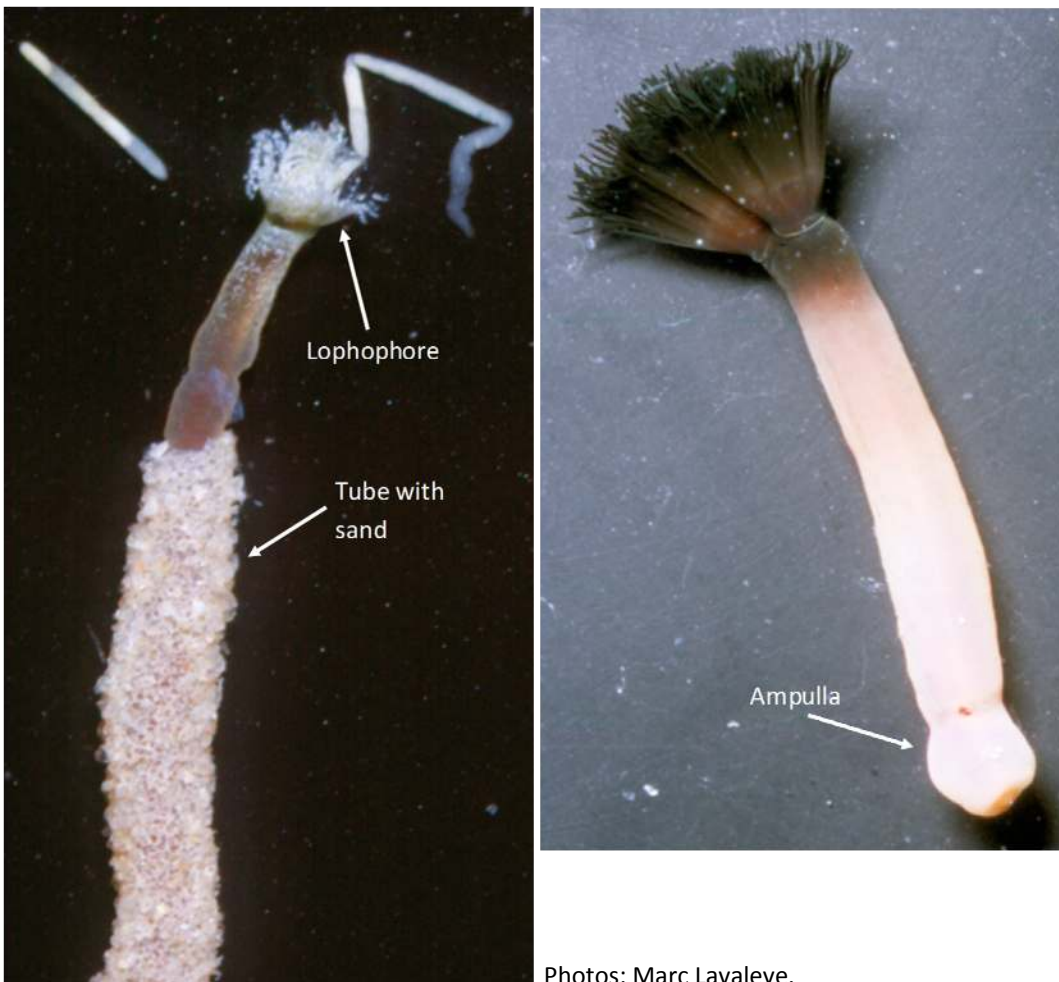


Photo: Chis Glasby, common Darwin Harbour mangrove nemertean.

## PHYLUM PHORONIDA

**Phoronids** are worm like animals that live in tubes of chitin commonly covered with sand grains. They differ from polychaetes in that they lack parapodia and chaetae and segmentation. When threatened, phoronids can retract their bodies very quickly into the tube thanks to the swelling at the end of the body (ampulla) that also anchors the animal in the tube. They present a lophophore, a tentacle crown used for filter feeding.

Phoronids live in all the oceans and seas except the Antarctic.



Photos: Marc Lavaleye.

## PHYLUM PLATYHELMINTHES

**Platyhelminthes**, commonly known as flatworms, are simple invertebrates with bilateral symmetry characterised by a lack of segmentation, circulatory and respiratory systems. The head and tail ends are distinctive. Flatworms present an extremely flat body that allows gas interchange by diffusion. They have a single aperture for food ingestion and waste egestion. While several groups of flatworms are parasitic, the free living species are mostly predators.

Flatworms are found in the oceans, in fresh water, and in moist terrestrial habitats.



Photos: Marc Lavaleye.

## PHYLUM PORIFERA

Sponges are animals that present bodies full of pores and characterised by a complex canal system that allows water circulation. They lack true tissues and organs and therefore nervous, circulatory or respiratory systems. Body symmetry is absent.

All sponges are sessile animals and the majority are marine.

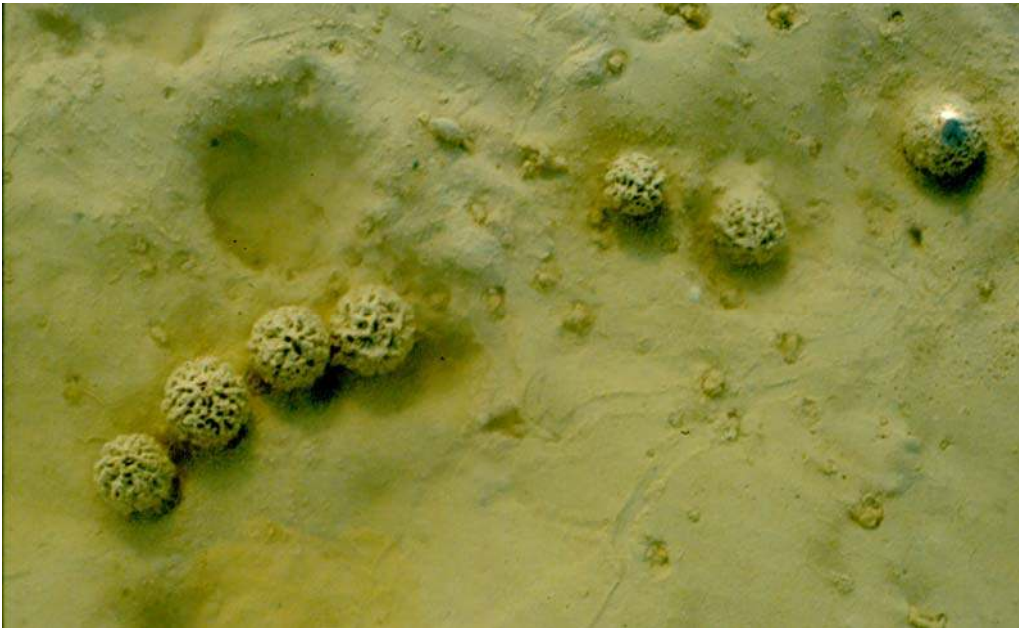


Photo: Marc Lavaleye.

## PHYLUM SIPUNCULA

Sipunculids or peanut worms are worm shaped animals with rough or warty body surface few. They lack segmentation, parapodia and chaeta. They present a narrow, retractable anterior section, called “introvert.” At the tip of the introvert is the mouth. When threatened they contract and reduce in size substantially. Most sipunculids are deposit feeders. All sipunculids are marine species.

The species common in Roebuck Bay and to a lesser extent in Eighty Mile Beach, *Sipunculus cf. nudus* possesses many longitudinal and transverse ribs.



Photo: Jan Drent.

## GLOSSARY OF TAXONOMIC AND ECOLOGICAL TERMS

**Ampulla:** the swelling at the posterior end of the body of phoronids that anchors the animal in the tube and helps it to retract into its tube.

**Antennae:** a pair of sometimes long sensory appendages situated on the head of molluscs, crustaceans, polychaetes and other animals.

**Anterior region or margin:** region situated towards the head.

**Apex:** the often sharp top of a gastropod shell.

**Axial:** an axis that runs from the anterior to the posterior region.

**Biforked:** forked in a way that presents two branches.

**Bilateral symmetry:** left and right sides of the animal are mirror images of each other.

**Branchial:** related to the gills.

**Buccal:** mouth.

**Cephalothorax:** head and thorax are fused together into one section.

**Chaeta:** a rigid bristle made of chitin. Common in annelids.

**Chelipeds:** claws or pincers of arthropods.

**Chitin:** a fibrous substance consisting of polysaccharides, forms the exoskeletons of arthropods, such as crustaceans (e.g., crabs, lobsters and shrimps) and insects, the radulae of molluscs, cephalopod beaks, and the scales of fish.

**Cirri:** a slender tendril or hair-like filament such as the appendage of a barnacle or the barbell of a fish that normally functions as a sensory appendage, food retriever or is involved in respiration.

**Dextral:** on or of the right-hand side.

**Dorsal nerve cord:** a bundle of nerve fibres that runs along the dorsal section.

**Dorsal section or margin:** region situated towards the top/back of an animal.

**Dorsal-posterior margin:** margin situated towards the back/upper side and rear end of the animal.

**Ectoparasite:** A parasite that lives externally on the host animal.

**Elytrae:** scales in polychaetes.

**Escutcheon:** an elongated and depressed section in some species of bivalve situated posteriorly to the umbo (the rounded protuberance in the dorsal region of a bivalve). The area surrounds the external ligament.

**Exoskeleton:** external skeleton.

**Foot:** in bivalves the foot is laterally compressed, shovel shaped for digging. In gastropods the foot is flat and broad and is used for locomotion.

**Host-specific commensal:** The species that benefits from the relationship with only one other specific taxon. In commensalism one species benefits from the relationship while the other is not harmed but it also does not obtain any benefit.

**Incised:** grooved or with a notched margin.

**Introvert:** narrow, retractable anterior section of peanut worms.

**Lophophore:** crown of tentacles in phoronids.

**Lunule:** depressed, heart-shaped area that may exist anteriorly to the umbo in bivalves.

**Mantel:** a layer of epidermal tissue that surrounds the body of molluscs.

**Mesodermal skeleton:** a skeleton that is developed from the middle tissue layer in echinoderms. It is composed of ossicles (calcareous plates).

**Notochord:** a cartilaginous rod running underneath, and supporting, the nerve cord.

**Operculum:** a structure that covers an aperture, a “lid”. Common in gastropods.

**Ossicles:** calcareous plates.

**Papillated:** an area or section of the body covered by papillae, or small, rounded protuberances.

**Parapodia:** the paired appendages in polychaetes where bristles are found. They have locomotion, sensory and/or respiratory functions.

**Periostracum:** the most external chitinous thin layer that covers the shell of molluscs and brachiopods.

**Pharyngeal slits** (or branchial openings or gill slits): openings that connect the inside of the throat to the outside.

**Pleon:** the abdominal section of a crustacean.

**Posterior region or margin:** region situated furthest from the head, towards the rear of an animal/object/part.

**Posterior-ventral margin:** margin situated to the rear part and towards the underside of the animal/object/part.

**Proboscis:** extendable sucking/predatory organ in polychaetes and other animals; anteriormost part of the gut.

**Prostomium:** the first anterior body segment in annelids.

**Proventricle:** the highly muscular anterior region of the digestive tract.

**Pygidium:** the posterior (rear/last) body part or shield of polychaetes, crustaceans and some other arthropods, such as insects. It contains the anus and, in arthropod females, the ovipositor.

**Radial symmetry:** The symmetry occurs around a central axis.

**Rostrum:** An anterior protuberance in front of the eyes in the head of some crustaceans.

**Sessile:** permanently attached to the substratum.

**Setae:** stiff bristles; also called chaetae.

**Sinistral:** on or off the left side.

**Sinus:** a cavity or broad dentation in a tissue or structure.

**Siphonal canal:** a tubular-formed canal in the anterior section of the aperture where the siphon is extended.

**Siphon:** a tube like structure through which water flows, common in molluscs. The water flow has multiple functions such as feeding, respiration and locomotion.

**Stomochord:** tube found in the anterior region of the hemichordates.

**Radula:** a scraping structure used for feeding in several taxa of mollusc but not found in bivalves.

**Umbo:** the rounded protuberance in the dorsal region of a bivalve.

**Uropods:** the last abdominal appendages in crustaceans associated with the locomotion function, e.g. fan tail.

**Ventral section or margin:** region situated towards the bottom/underside of an animal.