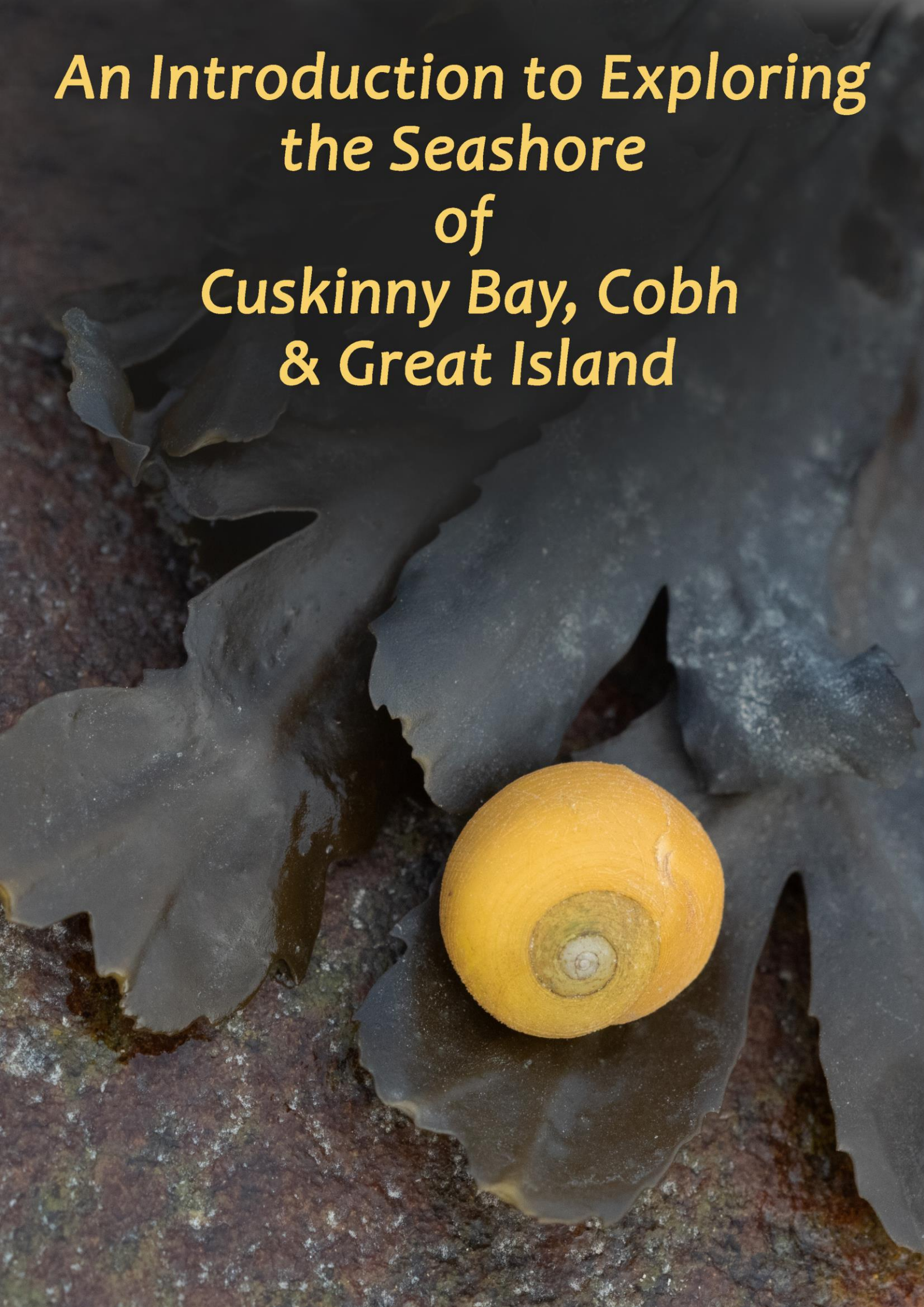
An Introduction to Exploring the Seashore of Cuskinny Bay, Cobh & Great Island



This is an introduction and identification guide to exploring the seashore and some of its more easily identifiable marine life, to be found between the high and low tidelines of Cuskinny Bay, Cobh and the Great Island. I had to use some scientific terms in the text that may not be familiar. There is a glossary on page 62 to give their meaning.

Thanks to Frances Gallagher, Dave Wall, and Tom Sharpe for their invaluable help, advice, and expert knowledge of all things marine and geology and Ann Wilson for proof reading. To Cobh Tidy Towns for sponsoring the printing of the guide. Any errors are all mine. Material compiled by Jim Wilson / www.irishwildlife.net

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Explore Your Shore!

RECORDING Our Coastal Biodiversity

Explore Your Shore! is a citizen science project run by the National Biodiversity Data Centre

Ireland has 3,171 km of coastline and yet we have relatively few records of intertidal and coastal marine species.

Explore Your Shore! is a citizen science project funded by the Environmental Protection Agency focused on exploring the potential of intertidal and coastal species as bio-indicators of water quality and climate change.

We are looking for volunteers like YOU to take some time to Explore Your Shore! and help us increase our knowledge of the distribution of our intertidal species.

www.ExploreYourShore.ie

National Biodiversity Data Centre
Documenting Ireland's Wildlife

Scan the QR Code to start recording what you find!

Clean Coasts
An Taisce

What do we do?

Clean Coasts create a tangible improvement of Ireland's coastal environment by supporting over 2000 community groups to host beach clean-ups, empower volunteers, facilitating marine litter surveys and complete a range of environmental focused activities in their region.

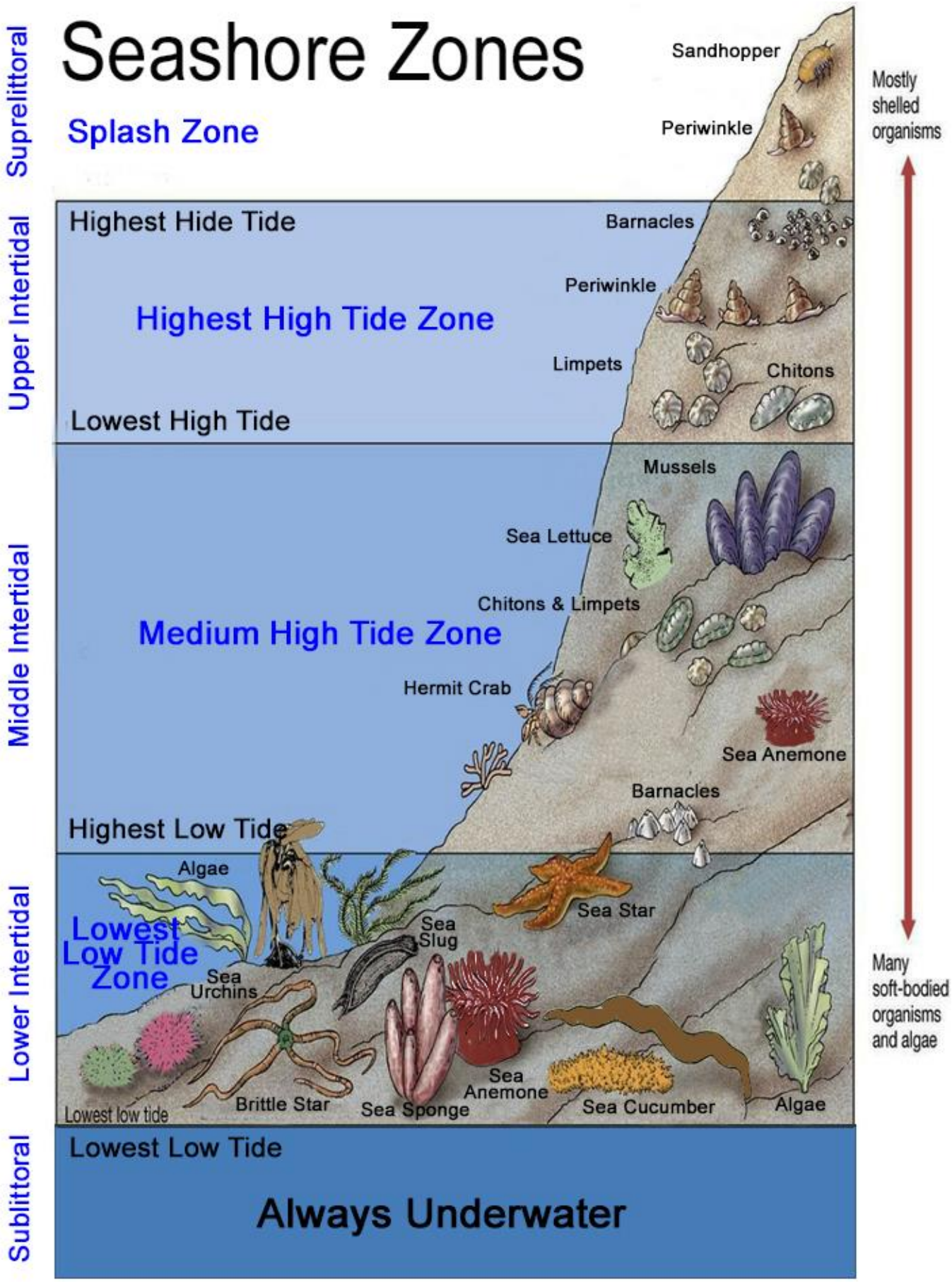
Through its growth and expansion, Clean Coasts also includes:

- Green Coast Award
- Love Your Coast Photography competition
- Clean Coasts Roadshow
- Clean Coasts Grants Scheme
- Corporate Volunteering
- Ocean Hero Award

Several campaigns are also operated by Clean Coasts, such as Think Before You Flush and the #2MinuteBeachClean.


THE SEASHORE CODE
Show respect for living things on the seashore
Leave all living animals and plants where you found them
If you overturn any rocks, carefully put them back
Make sure that a shell is empty before you take it home
Respect the sea and check the tide times
Stay away from the cliffs
Leave only footprints – take all your litter with you
Primary Science Teaching Trust

Seashore Zones



The Seashore

The seashore is the transition between sea and land. It is repeatedly exposed and submerged by the ocean and many of the living things on the seashore are adapted to survive both out of and in the sea. When you are planning your visit to the beach, it can be helpful to think of the seashore as made up of different zones.

The supralittoral (splash zone) is also known as the spray zone or the supratidal zone, sometimes also referred to as the white zone, is the area above the spring high tide line, on coastlines and estuaries, that is regularly splashed, but not submerged by ocean water. Seawater penetrates these elevated areas only during storms with high tides.

The strandline (tideline) is the line or mark left on a beach by the highest point of the tide. It is often seen as a distinct area or band where items have been carried up the beach and deposited by the tide at high water. This debris is then left behind when the tide goes out again. Exploring the strandline provides evidence of what can be found in the sea nearby and of pollution and gives rich opportunities to consider the impact of human behaviour on the seashore.

The upper intertidal (upper shore) is the area at the limit of high tide. It is only submerged for a few hours each day and is dominated by small periwinkles, barnacles, limpets, and encrusting lichens. Some species of algae such as channelled wrack can be found here, but all must be adapted to survive drying out and extreme changes in temperature.

The middle intertidal (middle shore) is the main tidal belt covered and uncovered at every tide cycle, dominated by brown seaweed called wracks, as well as barnacles, limpets, mussels,
crabs, anemones, and some types of green and red algae. Inhabitants must be equally able to survive exposed to air or underwater.

The lower intertidal (lower shore) is the lower limit of the tide, only exposed for a short period of time during spring tides (the lowest tides that occur every fortnight) and is dominated by a variety of organisms including kelps and red seaweed. There is generally a greater diversity of animals and seaweed here due to more stable conditions.

The sub-littoral is the marine environment beyond the lowest low-tide mark and is always covered in water.

Care of the natural environment

Many living things on the seashore are adapted to live in a very specific part of it (for example under a rock or buried) and so they should always be gently returned to where they were found after looking at them. Animals that live in shells and attach themselves to rocks should not be pulled off the rock as they may not survive. Further care should be taken when moving animals to observe them: they should always be placed in individual pots or trays to reduce the risk of fighting or eating each other!

The shoreline is incredibly important, and we must work together to protect the marine life we find. This is also important when carrying out your exploration and can be done by following the advice in the following pages.

Safety on the Shore

If leading a group on the seashore it is advisable to carry out a full risk assessment beforehand. Children should be made aware of the Seashore Code (see page 4).

- Check the weather forecast and the tides before you go exploring the seashore.
- Be aware of the dangers of an incoming tide and becoming trapped or cut off by the tide. Aim to start your exploration 1 – 2 hours before low water and be off the shore before the tide changes. Tide Tables for Cobh can be found here: https://www.sailing.ie/Tides/Cork-Harbour
- Never go to the seashore alone. For safety always have someone with you. Remember to wash your hands after every trip to the beach.
- Tell somebody where you are going and what time you expect to be back.
- Dress appropriately for the weather and wear appropriate footwear for the ground you will be walking. It can be slippy in places.
- Stay clear of the base of cliffs as there is a danger of falling rocks/soil or being buried by cliff material.
- Bring a fully charged mobile phone with you in case you need to call for help. If you do need to call for help, dial 999 or 112 and ask for the Irish Coastguard.
- Some stinging animals may be washed up onto the beach, including Portuguese Man O' War and other jellyfish. These can sting when 'dead' or stranded and should not be touched. They can survive short strandings too, so they are best left alone.
- Wearing protective gloves is recommended for handling debris and materials washed up on the strandline
- Soft muddy areas – beware, you might get stuck!

Seashore Exploration Checklist

- **Clear bucket, jar, or plastic 'take away' tray** to get a closer look at anything you find.
- **Pond-dipping net** to sweep the shallow water at the shore to see what creatures are swimming in the water.
- **Magnifying glass** to look at the details of small creatures or plants you find. You could use a phone camera and zoom in on the image.
- **Camera (phone)** to take photos of what you find and especially anything you cannot identify. Submit these photos to the Explore Your Shore website (see page 3) and it will identify them for you!
- **ID guide** if possible, either a pocket guide or a website
- **Notebook** for recording what you find.

Teaching notes and ideas.

Very young groups

Beachcombing

Shells – discussion function – home, protection, stop drying out etc. Discuss specifically Limpets and mussels. *Seaweed* – talk about what it is, plants under the sea, need the sun to grow, air bladders to make them float and be closer to the sun when the tide is in.

Activity - Create images of sea creatures, fictional or real, using stones, shells and seaweed – need to be sure they are not picking up dirt.

Middle groups.

Shells – talk about function – home, protection, stop drying out etc. *Seaweed* – talk about what it is. Is it a plant or animal under the sea, need the sun to grow, air bladders to make them float and be closer to the sun when the tide is in. *Crab shell* – talk about skeletons – we have ours on the inside and creatures like crabs have them on the outside. Problem with having your protection/armour on the outside is when you are growing you must change your outer shell because it gets too small as you grow (think of growing out of your shoes). So, the crabs shed the old one and grow a new one to fit their new size. Hermit crabs – use someone else's shell, usually a sea snail. Mud – discuss its formation and its importance for many marine creatures and birds.

Pollution – talk about what would happen if someone kept dumping all sorts of rubbish into your bedroom. how would you like it? (kids do not see other rooms in a house as valuable to them). Also explain how most sea creatures get their oxygen from the water they swim in just like we get our oxygen from the air we move through. Polluting the sea is like someone filling your house with smoke and poisonous gases which you must breathe because and you cannot get out and so you get sick. This is one reason why we should not pollute the sea.

Activity – Do a 2-minute beach clean-up (requires gloves etc.)

Older Groups

Explain and discuss the tides – moon, sun etc. – look for the different tide lines, spring neap etc. (see page 15). Mud – discuss what it is and its formation and its importance for many marine creatures and birds. Cork Harbour is of international importance for migratory birds that come there each winter because it has lots of food and the climate is not too harsh. Birds come from countries such as Canada, Greenland, Iceland, UK, Holland, Estonia, and Russia. Geology – talk about the stones on the beach, their age and origin. Some are formed from mud and sediment. (see information pages 10 to 15).

Talk about Cork Harbour and the fact that it is a flooded river valley which was dry after the last ice age, and it was only when all the ice melted and sea level rose up that the harbour as we know it today was formed (see page 15).

Activity – Do a 2-minute beach clean-up (requires gloves etc.)

IMPORTANT: Make the Explore Your Shore experience your own. Where appropriate use props such as shells, rocks, etc. Try and get across just a small number of concepts/ ideas during the session, as less is more. For your groups include a creative activity such as creating sculpture or an image with items found on the shore. Try to incorporate a 2-minute beach clean-up during your time ashore.

Resources:	For everyone:	https://exploreyourshore.ie/
	For Teachers:	https://pstt.org.uk/resources/seashore-science/

Geology of Cuskinny & Great Island

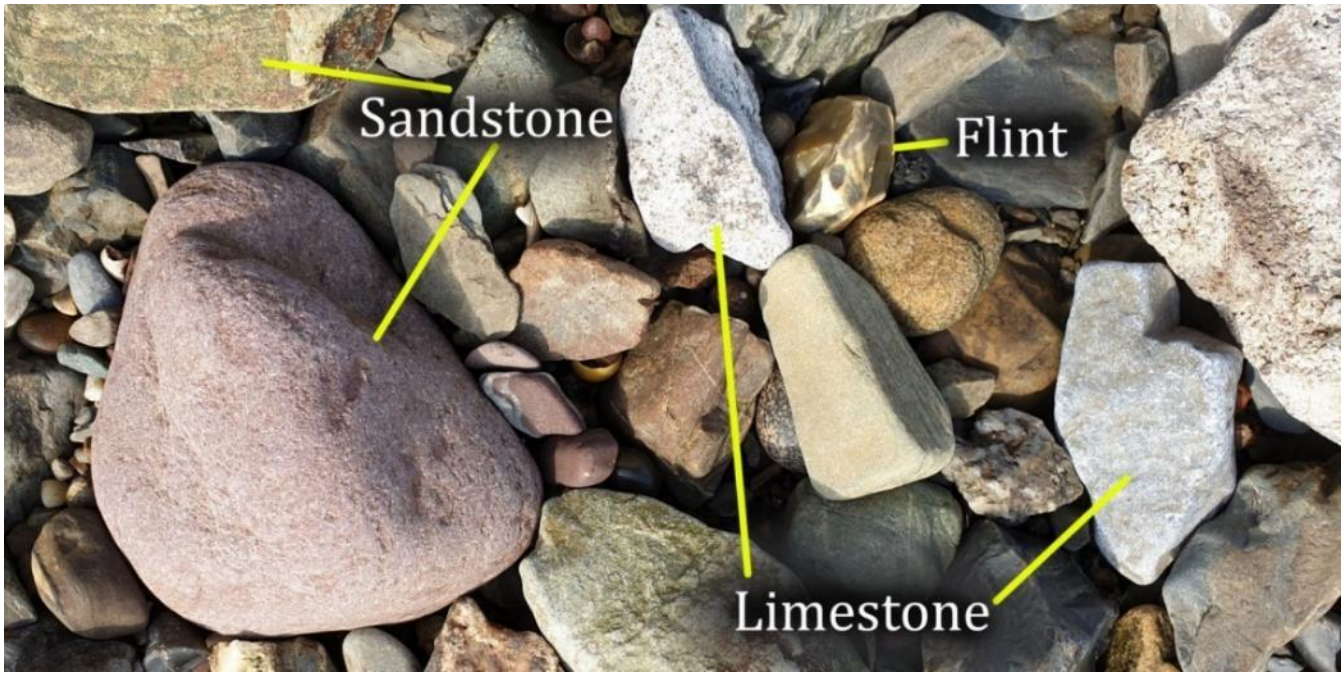


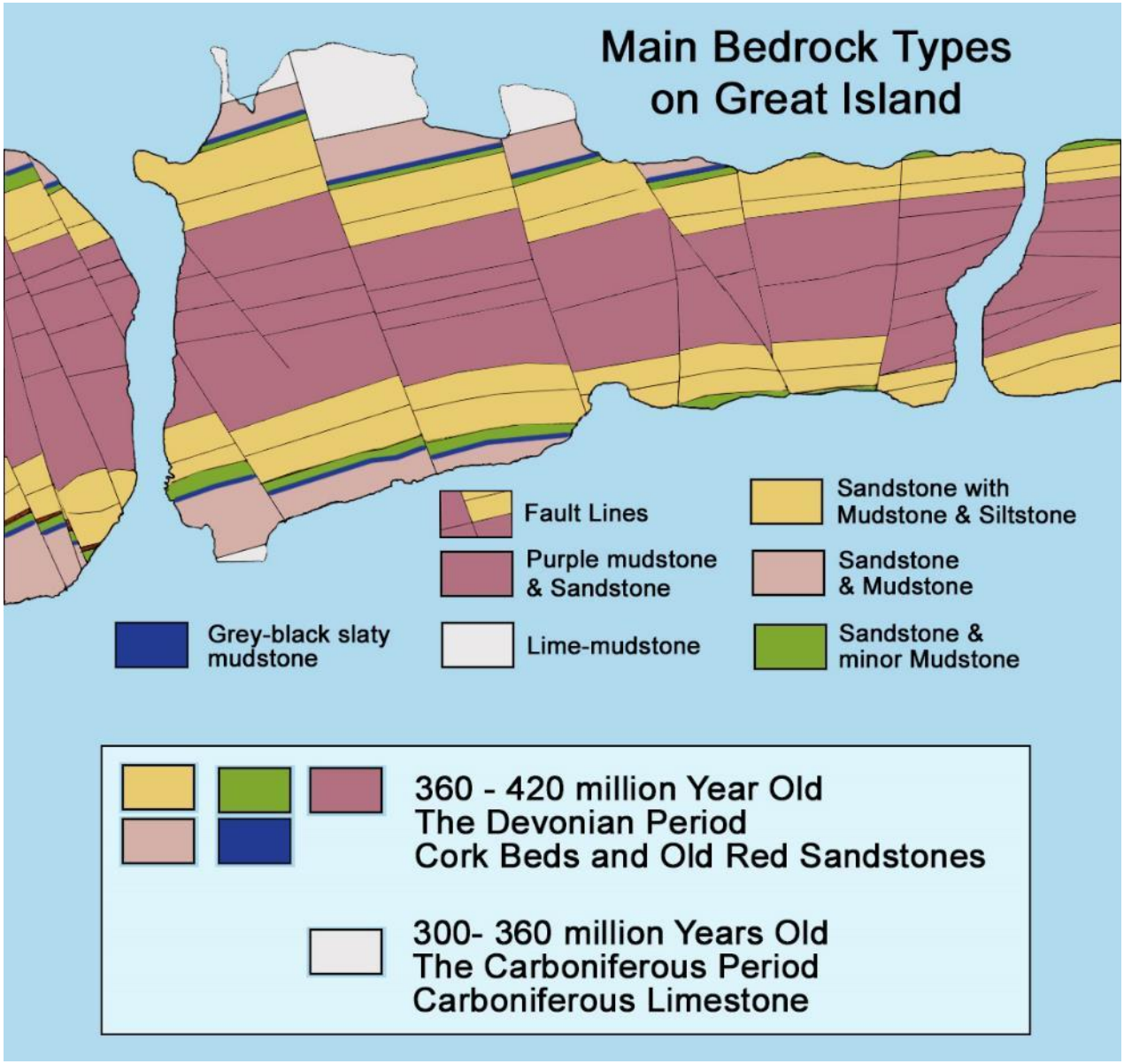
Photo by Jim Wilson

When you walk the seashore of Cuskinny Bay and Great Island you will notice it is mainly made up of pink, grey, yellow, green, light brown, purple and red stones and rocks. These are from the three main rock types in Cork Harbour: red sandstone and mudstone, which make up the ridges in the Harbour area such as Great Island and Crosshaven/Whitegate, and grey limestone, which is found in the valleys such as under parts of the River Lee. The River Lee has eroded a valley west to east along the softer limestone and then south through the west-to-east-running sandstone ridges by following cracks or faults in these layers of rock.

These are all sedimentary rocks, formed under water by sand, silt or mud laid down by rivers or in lakes or under the sea. As the grains of sand, silt and mud build up over millions of years, they become cemented together to form rock. (See illustration page 12)

The sandstone, mudstone and limestone formed when Ireland was crossing the equator many million years ago, moving slowly northwards on what is called a tectonic plate. Over the last few million years of geological time Cork Harbour has spent more time without sea water in it than with sea water in it. Every ice age caused sea levels to fall by as much as 45 metres.

Main Bedrock Types on Great Island



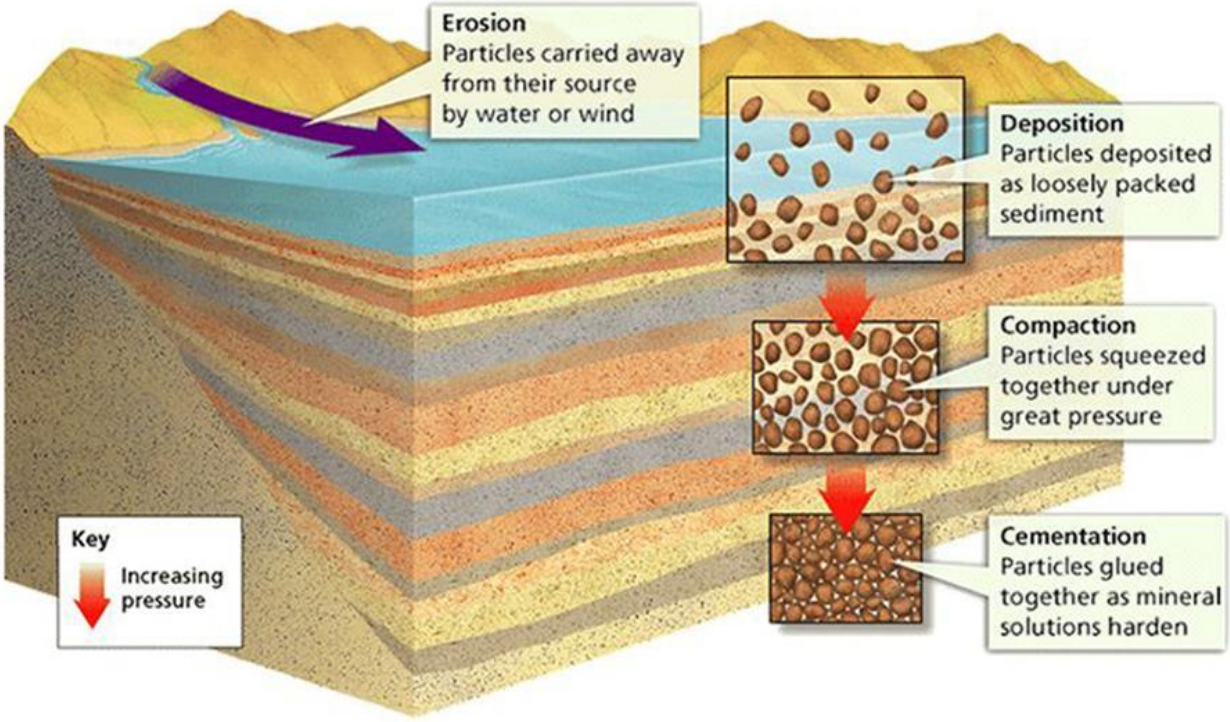
(Source: Geology of the Ballincollig-Crookstown Area, County Cork. Ivor McCarthy 2012)

What is Bed Rock?

Bedrock is **the hard layer of rock beneath loose rocks and soil**. In some places, the bedrock is exposed, while in others it lies deep underground. A geologist who's interested in studying the bedrock in different areas might have to dig through the various layers of soil to reach that bedrock.

From Sediment to Rock

Most sedimentary rocks are formed through a series of processes: *erosion, deposition, compaction, and cementation.*



Source: https://studylib.net/doc/6843239/from-sediment-to-rock-reading

Sediment is formed by the erosion of the land as rocks are worn down by rain, snow and ice. As the rocks, boulders and pebbles are carried by rivers towards the sea, they break up into sand, silt, and mud.

Layers of sediment build up downriver over millions of years. Under enormous pressure these layers of sand become cemented together to form the sandstone and mudstone rock of the Cork Harbour area.

What is Sandstone?

Selection of sandstones and mudstones from Great Island seashore

What is the Old Red Sandstone?

- The Old Red Sandstone is made up of sands, silts and muds deposited by rivers and floods on an ancient continent about 360-420 million years ago when Ireland was near the equator.
- It gets its red colour from oxidation of iron in the sand.
- It usually feels like sandpaper to the touch.
- In Cork Harbour, it does not usually contain a lot of fossils.
- It forms many of the hills of County Cork

Not all the ‘Old Red Sandstone’ is red or sandstone – the sequence also includes conglomerates, mudstones, siltstones and thin limestones and colours can range from grey and green through to red and purple. The Old Red Sandstone rocks also include mudstone. Mudstone is very like sandstone but is made up of finer clay and mud.

What is Limestone?

Fossil Coral in Limestone

Limestone is a sedimentary* rock formed under the sea.

- Made up mainly of the broken shells of ancient sea creatures.
- Layers of these build up on the sea floor over millions of years.
- Under enormous pressure they become cemented together to form limestone rock.
- It often contains fossils of the shells of the sea creatures that lived in the sea or on the sea floor at the time they died millions of years ago.
- It is usually grey in colour and feels smooth to touch.
- Limestone in Cork Harbour is about 300 -360 million years old.

**Sediment = matter that settles to the bottom of a liquid*

Cork Harbour 16,000 Years Ago

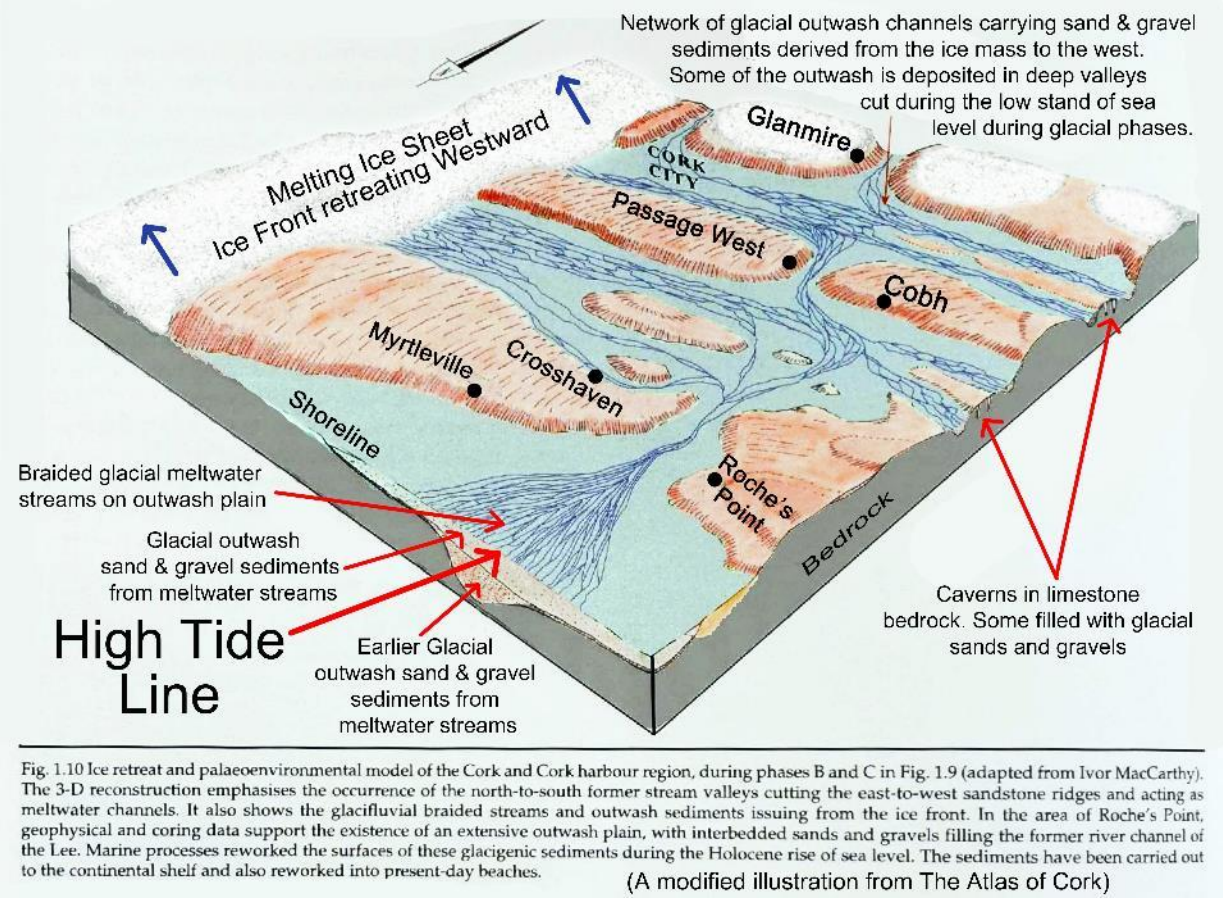


Fig. 1.10 Ice retreat and palaeoenvironmental model of the Cork and Cork harbour region, during phases B and C in Fig. 1.9 (adapted from Ivor MacCarthy). The 3-D reconstruction emphasises the occurrence of the north-to-south former stream valleys cutting the east-to-west sandstone ridges and acting as meltwater channels. It also shows the glacifluvial braided streams and outwash sediments issuing from the ice front. In the area of Roche's Point, geophysical and coring data support the existence of an extensive outwash plain, with interbedded sands and gravels filling the former river channel of the Lee. Marine processes reworked the surfaces of these glacigenic sediments during the Holocene rise of sea level. The sediments have been carried out to the continental shelf and also reworked into present-day beaches.

(A modified illustration from The Atlas of Cork)

Source: Adapted from an illustration by Ivor McCarthy

This reconstruction shows what Cork Harbour looked like about 16,000 years ago, with north-to-south former stream valleys cutting through the east-to-west sandstone ridges and acting as meltwater channels. It also shows the crisscrossing braided streams and sediments washing out of the melting ice front. These sands and gravels filled in an earlier channel of the River Lee.

As sea level rose at the end of the last ice age, the sea (waves, currents etc.) reworked the surface of these sediments and carried them out onto the continental shelf and washed them along the coast into present-day beaches.

The Tide Cycle

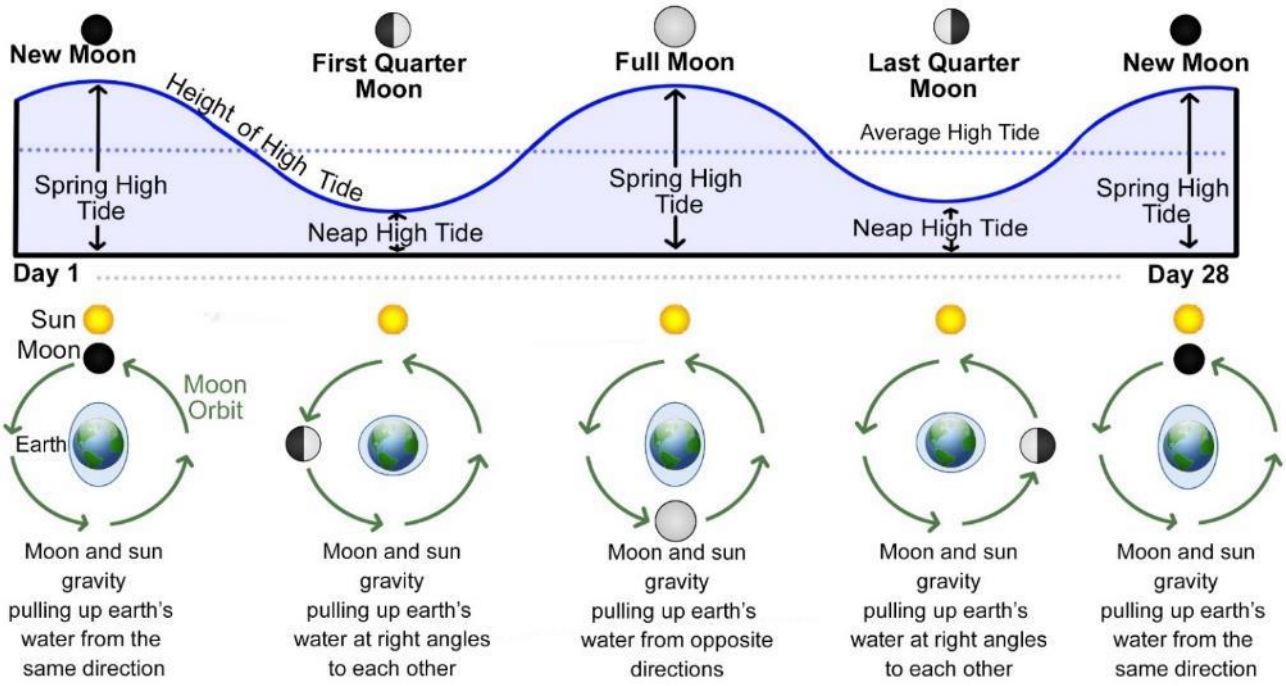


Illustration by Jim Wilson

There are many complex factors that affect the tides, such as wind direction and strength, and rainfall. Basically, two thirds of our planet is covered in water and as Earth spins once every 24 hours the moon passes each point on the globe once in that time. The gravitational pull of the moon causes the water, especially the oceans, to rise as it passes it, resulting in two high and two low tides roughly every 24 hours. The bulge on the opposite side of the earth to the pull of the moon is caused by a phenomenon in the physics of a liquid called inertia. Also, the Sun itself has a gravitational pull on the Earth. The moon orbits the Earth roughly every 28 days and so two to three times each month the Moon, Sun and the Earth line up and the combination of the gravitational pull of both the Moon and the Sun pulls the water up off the Earth even more than just the moon on its own. When this happens, the tides are called spring tides. There is a similar effect when the Moon and the Sun line up on opposite sides of the Earth. The lowest height of our high tides occurs when the Moon is pulling from an angle of roughly 90 degrees to that of the Sun. At this time the sun's gravitational pull reduces the effect of the Moon's gravitational pull. These tides are called neap tides. As you will see from the graph above the height of the tide follows a cyclical pattern and is always changing so is never the same any two days in a row. As a rule of thumb, the high tide time advances by about 54 minutes each day.

You can find tide table for Cobh here: https://www.sailing.ie/Tides/Cork-Harbour

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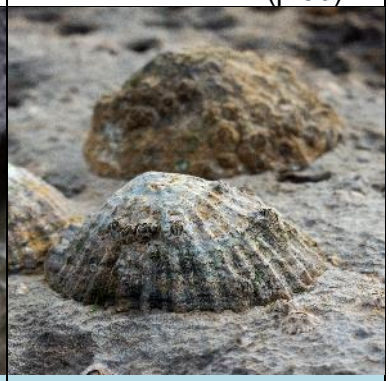

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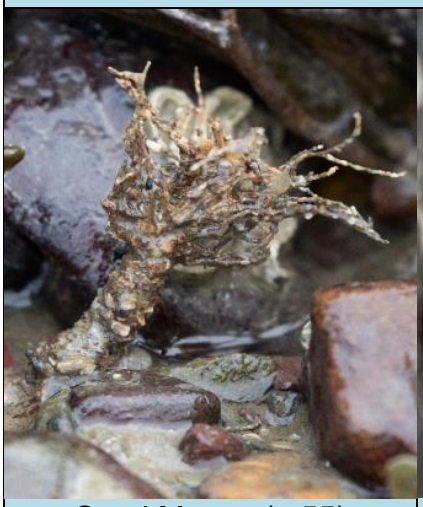

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Sea Squirts, Jellyfish, Anemones, Starfish, Urchins etc.

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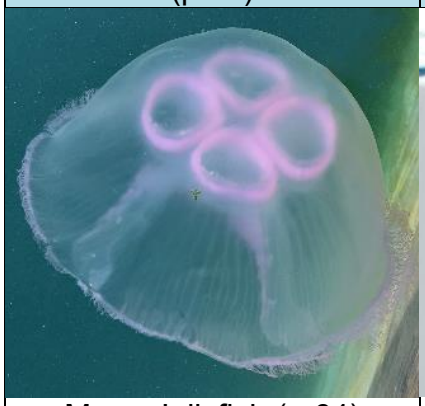

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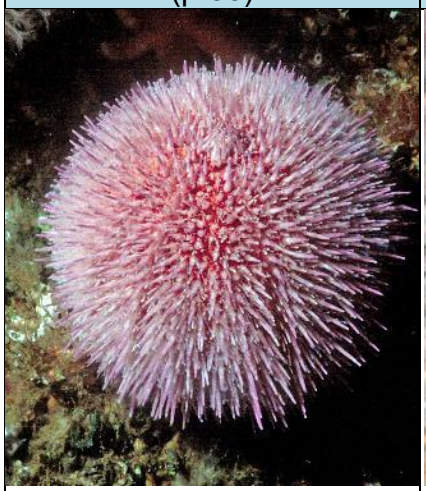

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Egg Cases

Egg cases from some marine species can be found on the shoreline. Eggs are more commonly found attached to seaweeds and rocks after spawning and settling. The photographs below show some of the egg types that you may find. All the items below may come in different colours depending on whether they are dead, alive, recently washed up or have been there for a long time. For the catshark and ray egg cases only the two more common ones are shown. For definite identification of any you find check out the website https://www.sharktrust.org/

Common whelk cases are a fairly common sight. They are a mass of small spongy balls that could indeed be mistaken for sponges. In the past, sailors did actually use them as wash balls! The first whelks to hatch are cannibalistic and will eat their still developing siblings to give themselves a burst of energy to help them survive in the open ocean.

Common Whelk Egg Cases

Dog whelks lay their eggs in small yellowish capsules which can be spotted under rocks on the lower and mid intertidal zones. Each capsule contains up to a thousand eggs - though most of these will become food for the few that hatch and develop.

Dog Whelk Eggs

Small spotted Catshark (*Scyliorhinus canicular).* Found fairly often on the shore. Small egg case, capsule length 5 - 7cm, Curly tendrils at each corner, can be many colours (don't use colour to ID)

Small Spotted Catshark (Dogfish) Egg Case

Small-eyed Ray egg cases are one of the most frequently sighted black mermaids' purses on Irish beaches. The top horns on this egg case are extremely long and filamentous, while the bottom pair are short and hooked at the tips.

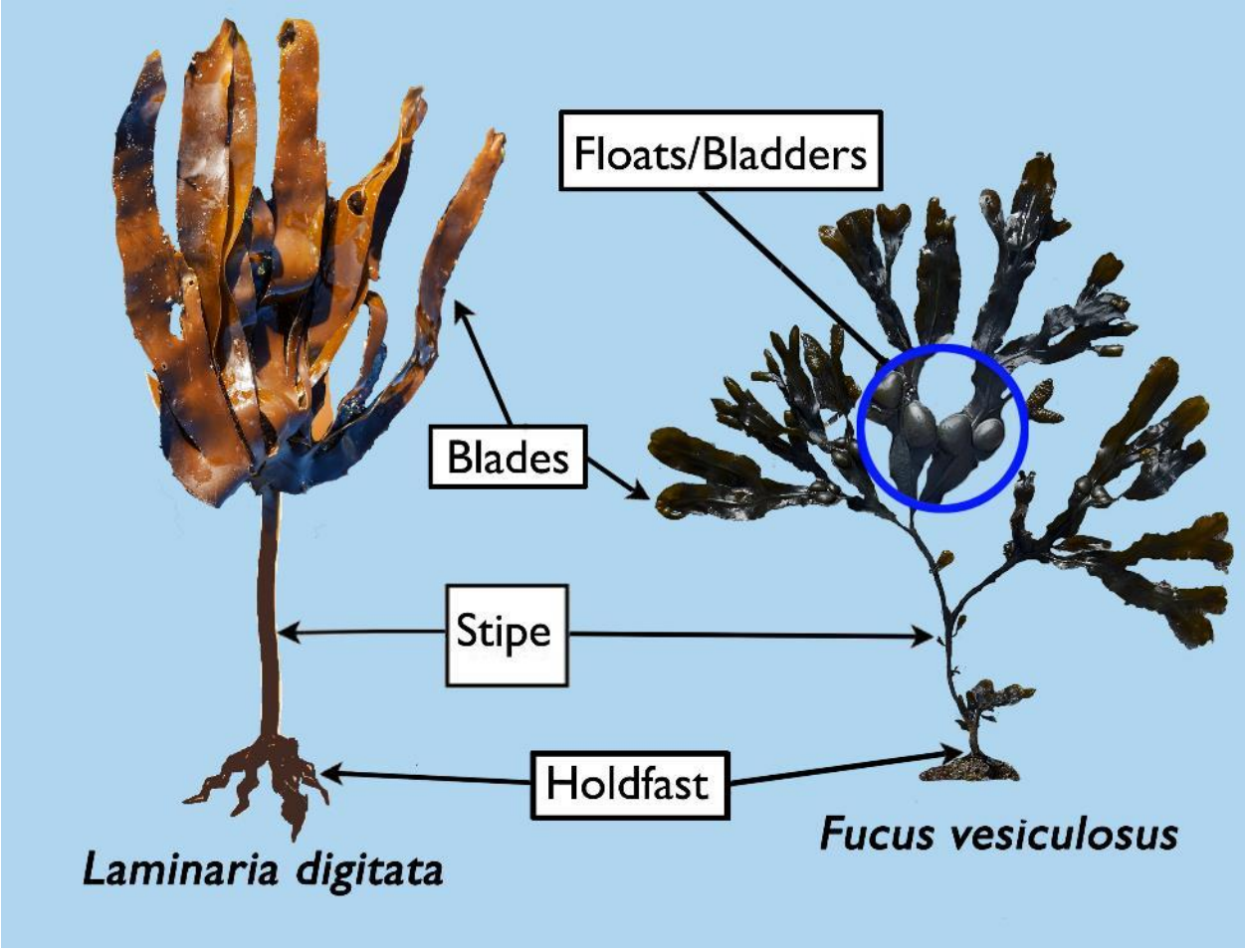
Small-eyed Ray Egg Case

Seaweeds and Marine Plants

What is Seaweed?

"Seaweed" is the common name for countless species of marine algae that grow in the ocean. We usually think of seaweeds as plants that live in the sea but scientists say they are a lot more complicated than that, with characteristics of both plants and animals. They anchor to surfaces by means of a holdfast (this is not its roots, as seaweeds don't have roots like plants). The main body of a seaweed may be divided into fronds or blades, which provide a large surface for the absorption of sunlight. The stem of a seaweed is called a stipe, and is absent in small seaweeds. Air-filled bladders called floats help to keep the stipe and fronds buoyant and close to sunlight.

Some seaweeds are microscopic, such as the phytoplankton that live suspended in the water column and provide the base for most marine food chains. Some are enormous, like the giant kelp that grow in abundant "forests" in the Pacific and tower like underwater trees from their holdfasts at the bottom of the sea. Most seaweeds are small or medium-sized, and come in colours of red, green, brown, and black.



Main parts of a generalised Seaweed

(Source: https://www.quora.com/Can-seaweed-be-found-in-all-oceans)

Common Eel-grass/Zostra *Zostera marina*

Description – Dark green or grass green in colour. Grass-like marine flowering plant with numerous flowers down one side of a sharp spike like that of terrestrial grass; thin, flat, long, narrow, ribbon-shaped leaves usually 20-50cm long but up to 2m with rounded tips. Most visible on the seashore in spring/summer after storms where blades of the eel-grass can be found on the tideline.

Habitat – Dense swards usually on sheltered beaches or estuaries on gravel, sand, and mud; sometimes sublittoral down to 4m.

Sea Lettuce *Ulva lactuca*

Description - Translucent bright to dark green. The frond can be 15-50cm across; broad, crumpled frond that is variably shaped; fronds often flimsy and floppy; generally wider at the top than at the base; stipe if present is solid; attaches to rock etc. via a small holdfast.

Habitat – All levels of the intertidal zone and in shallow brackish water; may float free or be washed up on shore.

Irish Moss/Carragheen *Chondrus crispus*

Description – Red/purple in colour, may turn green in strong light. The frond can be up to 22cm long; fronds flat, wide, and fan-like with rounded tips and repeatedly dividing into two branches; branches form wedge shaped segments, somewhat variable in appearance with narrow and broader forms existing; stem not channelled; reproductive bodies are small swellings on upper parts. When dead, they can turn pink or even white.

Habitat – On stones and rocks on middle to lower and mid intertidal zones and in pools, also in shallow water; found in estuaries.

Additional information – May be confused with False Irish Moss (*Mastocarpus stellatus*). Unlike the Irish Moss its frond is not flat but has a channel running along it.

Wrack Siphon Weed *Polysiphonia lanosa*

Description - A small reddish-brown filamentous alga most commonly associated with Egg Wrack on which they look like 'pom poms'. The filaments are made up of a ring of 12 -24 elongated cells or siphons surrounding a central siphon. The plant is found wherever the host is common. Wrack Siphon Weed has occasionally been recorded on Serrated and Bladder Wrack and, more rarely, on rocky seabed.

Habitat - Lives on the surface of Egg Wrack and more rarely on other fucus seaweeds. Common on the mid-littoral of rocky shores, but not extending far into estuaries. On bedrock, boulders, cobbles and in pools on middle to lower and mid intertidal zones and down to shallow water; forms a turf in pools and scattered clumps in shallow water; occasionally found on mollusc shells.

Bladder Wrack *Fucus vesiculosus*

Description - Dark olive brown; olive-brown-yellow reproductive bodies. 15-100cm long; tough and leathery fronds with a prominent midrib; almost spherical air bladders, usually paired or in threes, but may be absent in very young plants; reproductive bodies form swollen forked tip branches.

Habitat – Mid-shore; often with Egg/Knotted Wrack, below Spiral Wrack and above Serrated Wrack.

Egg/Knotted Wrack *Ascophyllum nodosum*

Description - Brown in colour. Fronds 0.5-2m long; tough, long, strap like fronds; lack of midrib; large egg-shaped air bladders and regular intervals along the middle of the frond. Often bears tufts of the small reddish algae Wrack Siphon Weed *(Vertebrata lanosa)*.

Habitat – Attached to rocks and boulders on upper and middle shores; occupies similar shore height as Bladder Wrack.

Serrated/Saw Wrack *Fucus serratus*

Description - Olive-brown to greenish colour. Forward pointing saw-like edges to the flat, strap like fronds with a thick midrib; typically, about 60cm long and 2cm wide and splitting in two repeatedly, no air bladders.

Habitat – Attached to hard surfaces on the lower and mid intertidal zones in more sheltered areas of the coastline; often forms a dense, distinct zone.

Horned Wrack *Fucus ceranoides*

Description - Brown in colour. Fronds 30-60cm long; generally smaller than other species of *Fucus*; delicate, prominent midrib; narrow, pointed reproductive bodies grouped on ends of branches in fan-like clusters; no air bladders but sides of fronds are often inflated.

Habitat – On rocks and stones on all levels of the shore; restricted to growing in estuaries in brackish water.

Spiral Wrack *Fucus spiralis*

Description - Brown in colour. Fronds up to 40cm long; tough, leathery; prominent midrib; branches usually twisted near tips; rounded reproductive bodies on tips of branches, usually in pairs, and surrounded by a characteristic flat ridge around the edge of the receptacles; no air bladders.

Habitat – Upper shore usually found above Bladder Wrack and Egg/Knotted Wrack.

Channelled Wrack *Pelvetia canaliculata*

Description - A common brown seaweed found high on the shore. It is very tolerant of drying out, surviving up to 8 days out of the water. It lives for about 4 years and grows up to 15cm long. The fronds of the algae are curled longitudinally forming a channel on the underside (the side nearest the rock), which holds moisture and apparently helps the wrack to survive very high up on the on the shore.

Habitat – Channelled Wrack grows attached to hard surfaces on the upper shore. It is found in a band above Fucus spiralis and can tolerate ultra sheltered to moderately exposed conditions.

Additional information – Channelled Wrack has what is called an obligate endophytic fungus *Mycosphaerella acophylli* (Ascomycetes). An obligate endophytic fungus is one which infects living tissues of this and other seaweeds and lives in it without causing any visible disease symptoms.

Laver *Porphyra umbillicalis*

Description - Greenish when young becoming purplish-red with age. Fronds small, up to 20cm across; tough, irregularly shaped broad frond; gelatinous, membranous growth, like sheets of plastic, arranged in 'leaves'; usually attached at one central point by a small disk-like holdfast; plastic bag-like texture.

Habitat – On stones and rocks, especially when covered by sand, highly adaptable to conditions on different parts of the shore but most frequent on upper shore.

Additional information – Made from Laver, Laverbread became a breakfast staple for coal pit mine workers in Wales in the eighteenth century and was more broadly enjoyed throughout Wales and also the rest of the UK and Ireland. In addition to being a major producer of laverbread, Swansea was famous for being near the abundant cockle beds of Burry Port inlet. Cockles and laverbread were often eaten together and are still regarded as icons of Welsh cuisine.

Sea Belt/Sugar Kelp *Saccharina latissima*

Description - Yellow-brown to dark brown. Fronds 20cm - 4m long; relatively thin stipe; long parallel sided, raffled blade, somewhat like a crumpled ribbon; short, smooth, flexible stipe about one quarter of the blade length; large, root-like branching holdfast that is two-tiered in appearance; smooth and slippery. Sugar Kelp takes 2-4 years to reach full size (up to 5 metres) and provides important food and shelter for marine life during this time.

Habitat – Attached to stones, rocks, and shells from extreme lower and mid intertidal zones down to about 20m.

Additional information - Sugar Kelp is one of the most concentrated natural sources of iodine on the planet. All kelps contain alginates which are used as for thickeners, stabilizers, and gelling agents for food: E400 – alginic acid, E401 – sodium alginate, E402 – Potassium alginate, E403 – Ammonium alginate, E404 – Calcium alginate, E405 – propylene glycol alginate (PGA).

Oar Weed *Laminaria digitata*

Description - A large conspicuous kelp growing up to 2m in length commonly found at low water during spring tides on rocky shores. The frond is broad and digitate (like fingers), glossy and dark brown in colour, lacking a midrib. The length of the frond varies with season, age of plant and location. Oar Weed may be confused with young Tangle (*Laminaria hyperborea*) plants. However, the stipe of Tangle feels rough to the touch, is circular in cross section, is stiff and snaps easily when bent (although you won't see that in younger weed).

Habitat - Found attached to rock in the lower intertidal and sublittoral fringe, down to a maximum depth of 20m in clear waters. Oar Weed flourishes in moderately exposed areas or at sites with strong water currents. Occurs in rockpools up to mid-tide level and higher on wave-exposed coasts.

Additional information - Common names in Ireland include Leath and Learach. The number of frond digits vary with amount of exposure. In shelter these are few and short, but with increasing exposure, they are more numerous (up to 10 or 12) and extend almost to the base of the frond. Reported to store sodium glutamate and thus tasty when dried. Oar Weed rarely live longer than five years.

Bootlace Weed *Chorda filum*

Description - This is a brown seaweed with long cord-like fronds, only 5mm in diameter. The fronds are hollow, round in section, slippery, unbranched and grow up to 8 m long. The species attaches to rocks using a small disc shaped holdfast. It is an annual species, disappearing in winter.

Habitat - Found in rock pools on the low shore and in the sublittoral down to 5m. It is most commonly found in sheltered bays attached to stones and shells, often with the holdfast buried in sand.

Additional information - Other common names include Deadman's Bootlace, Mermaid's Tresses and Cat Gut.

Red Encrusting Seaweeds and Corralines *(Hard to identify species without a microscope)*

Description - An encrusting seaweed that is rose-red, dark-red or red-brown in colour with no surface markings. It forms an extensive crust with an irregular outline on the surface of rocks, stones, and pebbles. In some areas, crusts can be as large as 15cm across. Thin, unmarked encrusting layer 0.2-0.5mm thick. Colour varies from rose red to dark red. Dull when dry. Irregular outline. The accurate identification of different species of dark encrusting seaweeds requires microscopic examination. Corralines are similar but are characterized by a thallus that is hard because of calcareous deposits contained within the cell walls.

Habitat - Found on rocks, stones, and pebbles at all tidal levels of the shore. Particularly abundant in moist, shaded areas and the upper shore due to its tolerance of temperature, light, and salinity. It is also the only red crust found on rock in the upper shore.

Sea Snails, Barnacles and Sea Slugs

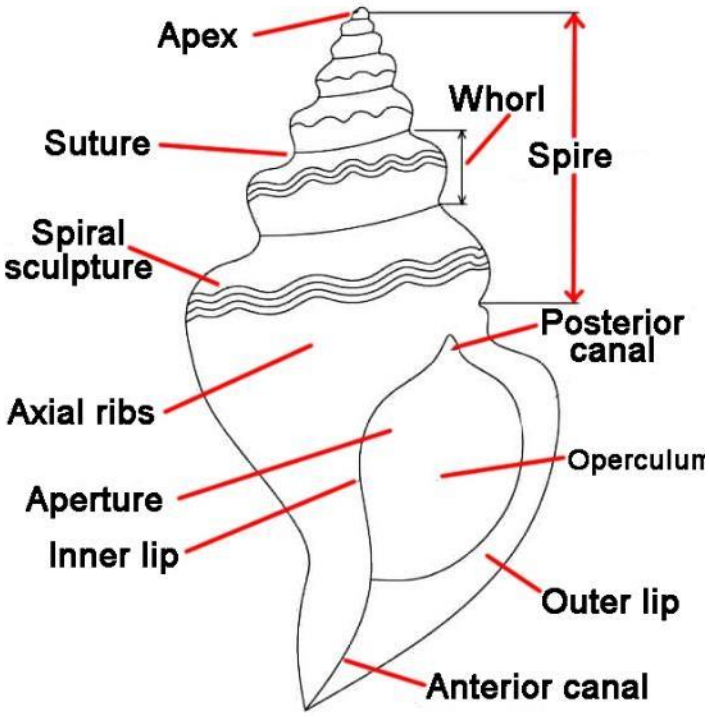
What is a Sea Snail?

Sea snail is a common name for slow-moving marine gastropod molluscs, usually with visible external shells, such as Periwinkle or Dog Whelk. They share the taxonomic class Gastropoda with slugs, which are distinguished from snails primarily by the absence of a visible shell. Molluscs that have a single shell are called Gastropods. The word gastropod comes from Greek meaning ‘Stomach foot’, a reference to the fact that the animal's "foot" is positioned below its guts.

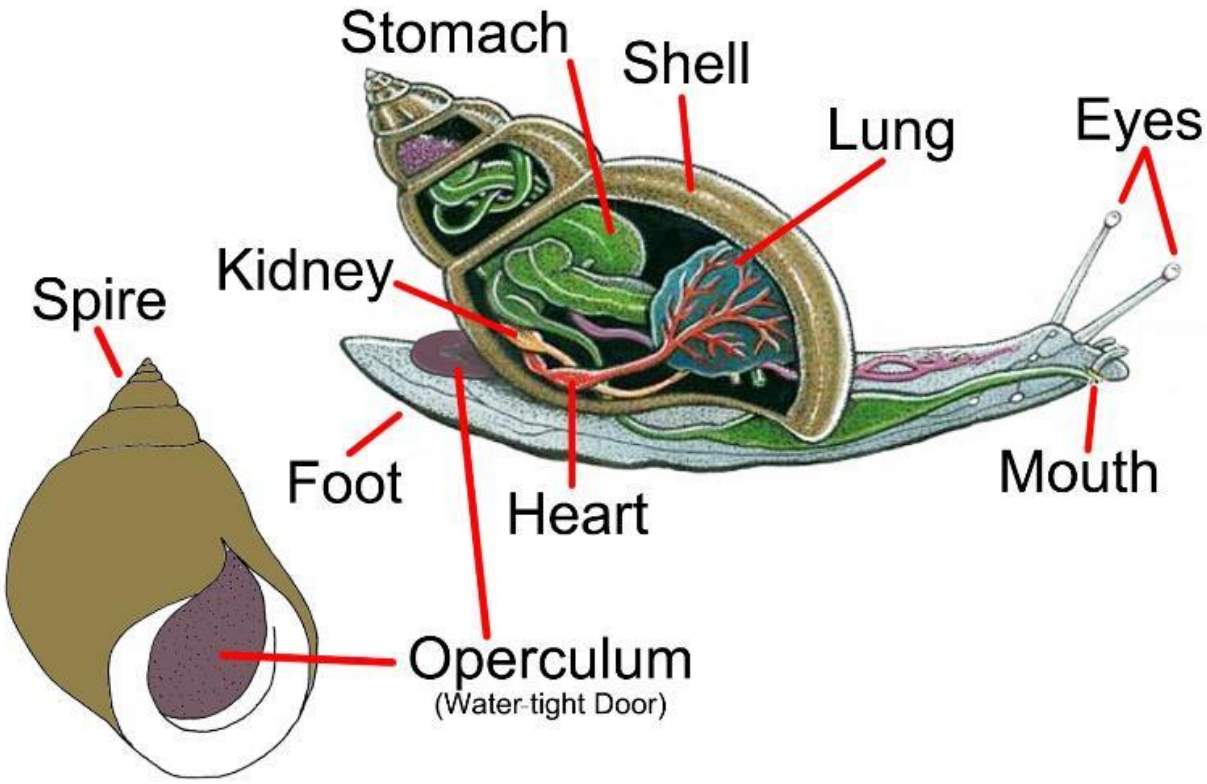
Determining whether some gastropods should be called sea snails is not always easy. Some species that live in brackish water (such as certain neritids) can be listed as either freshwater snails or marine snails, and some species that live at or just above the high tide level (for example, species in the genus Truncatella) are sometimes considered to be sea snails and sometimes listed as land snails.

Sea snails are a very large and diverse group of animals. Most snails that live in saltwater breathe using a gill or gills; a few species, though, have a lung, are intertidal, and are active only at low tide when they can move around in the air.

(Source https://en.wikipedia.org/wiki/Sea_snail)



Parts of a Sea Snail Shell
(Source: https://aquariumbreeder.com/snails-external-anatomy/)



General Anatomy of a Sea Snail
(Source: https://slideplayer.com/slide/4988295/)

Netted Dogwhelk *Hinia reticulata*

Description - A small creamy-brown whelk (up to 3cm in height) it has a pointed, straight sided spire. The criss-crossing of longitudinal and spiral sculpture/ridges gives the whelk its characteristic netted (reticulate) pattern. It has an oval aperture with an outer lip that is thickened and toothed in mature animals. It feeds on dead and decaying animal matter.

Habitat - Common on the lower rocky shore, from the low water of spring tides extending to sublittoral depths of up to 15m. As a burrower, it can be found on both rocky and sandy shores in a mixture of rock, mud, and sand, or within pockets of soft material on rocky shores under runnels of water at low tide.

Common Dog Whelk *Nucella lapillus*

Description - The shell is broadly conical, bearing spiral ridges and consisting of a short, pointed spire, dominated by the last whorl. The shell is usually up to 3cm in height by 2cm broad but may reach up to 6cm in height. The shell colour is variable, usually white, but may be grey, brown, or yellow, occasionally with contrasting (usually brown) spiral banding. The outer lip of the aperture is thin in young specimens, becoming thickened and toothed internally with age. The shell shape, shell thickness and relative size of the aperture vary with wave exposure. The head bears two tentacles, each bearing an eye about one third of the length of the tentacle from its base. The egg capsules of the Dog Whelk are vase shaped, about 8mm high, usually yellow, and found attached to hard surfaces in crevices and under overhangs (see page 24).

Habitat - Found on wave exposed to sheltered rocky shores from the middle intertidal zone downwards. Rarely present in the sublittoral but may be abundant in areas exposed to extremely strong tidal stress. They are gregarious and common amongst barnacles and mussels on which they feed.

Common Whelk *Buccinum undatum*

Description - A large whelk up to 10cm high and 6cm wide. The shell has 7-8 whorls with spiral ridges. The shell is yellowish brown with irregular light and dark spiral areas. The aperture is broadly oval tapering to a point with a short wide siphonal canal leading from the base of the aperture.

Habitat - Occasionally intertidal but mainly sublittoral down to 120m. Found on muddy sand, gravel and rock. Sometimes present in brackish waters.

Additional information - Masses of lentil shaped eggs are often found attached to sublittoral rocks, stones, or shells. Empty egg masses, known as 'sea wash balls', are often found on the strandline and are sometimes mistaken for polystyrene or sponges.

Edible Periwinkle *Littorina littorea*

Description - This the largest Irish periwinkle, with the shell reaching a maximum height of 52mm. The shell is sharply conical with a pointed apex and surface sculpturing. The spiral ridges which are marked in young animals tend to become obscured in older individuals, giving the shell a smooth appearance. The shell colour ranges from grey, to black, brown or red but is generally black or dark grey-brown, often lighter towards the apex, and is usually patterned with spiral darker lines.

Habitat - The Edible Periwinkle is widely distributed on rocky coasts, in all except the most exposed areas, from the upper shore into the sublittoral. In sheltered conditions they can also be found in sandy or muddy habitats such as estuaries and mudflats. The species is fairly tolerant of brackish water.

Additional information – These sea snails are eaten a lot, mainly in parts of continental Europe. If you are thinking of eating them, you have the be very careful and to be on the safe side the advice would be not to eat periwinkles inside Cork Harbour.

Rough Periwinkle *Littorina saxatilis*

Description – The Rough Periwinkle has a plump shell, up to 18mm in height and 14mm wide with a low spire of 4-5 whorls. The sculpture of the whorls is often V-shaped in section, with deep sutures. The aperture is large and rounded, with the outer lip turns outward slightly where it meets the columella. The colour of the shell is variable - yellowish white, greenish, reddish, brown - but usually has some pattern and a dark throat.

Habitat – The Rough Periwinkle occurs from the upper intertidal zone down to the littoral fringe of the intertidal and is typically found in crevices of bedrock, empty barnacle shells and under stones.

Flat Periwinkle *Littorina obtusata/fabalis*

Description – One of two very similar small periwinkles (up to 1.5cm in height), it has a flattened spire and large tear-drop shaped aperture. The last whorl makes up about 90% of the height of the shell and the outer lip joins the body a little below the apex. The shell appears smooth but upon closer inspection is found to have a fine net-like pattern. It is highly variable in colour (from olive green to yellow to banded and chequered patterns) depending on its habitat, with lighter shells being found in more sheltered shores.

Habitat - The flat periwinkle is almost always associated with brown seaweeds, particularly Egg Wrack, Serrated Wrack and Bladder Wrack from mid to lower tidal levels on rocky shores. It is tolerant of low salinities and a wide range of exposure.

Grey Topshell *Gibbula cineraria*

Description - A small topshell (up to 1.5cm high and 1.7cm across), it is bluntly conical with an oval-shaped umbilicus. The umbilicus/aperture hole appears as a small but deep hole on the underside of the shell. The shell has five or six whorls. It is grey to light yellowish in colour, with broad stripes of reddish-brown to purple. The apex is sometimes eroded and silvery.

Habitat - It is found on the lower levels of rocky shores on weed and under stones to a depth of 130 m. It is sometimes found in rock pools higher on the shore.

Flat/Purple Topshell *Gibbula umbilicaris*

Description - A small topshell (up to 1.6cm high and 2.2cm across. A small top shell, it is slightly broader, more rounded and flatter than the Grey Topshell, it also has a large round deep hole on the underside of the shell. It is dull greenish-grey in colour and has broad diagonal stripes of reddish-purple.

Habitat Found from the upper shore into the sublittoral on sheltered rocky shores and is tolerant of emersion and brackish waters.

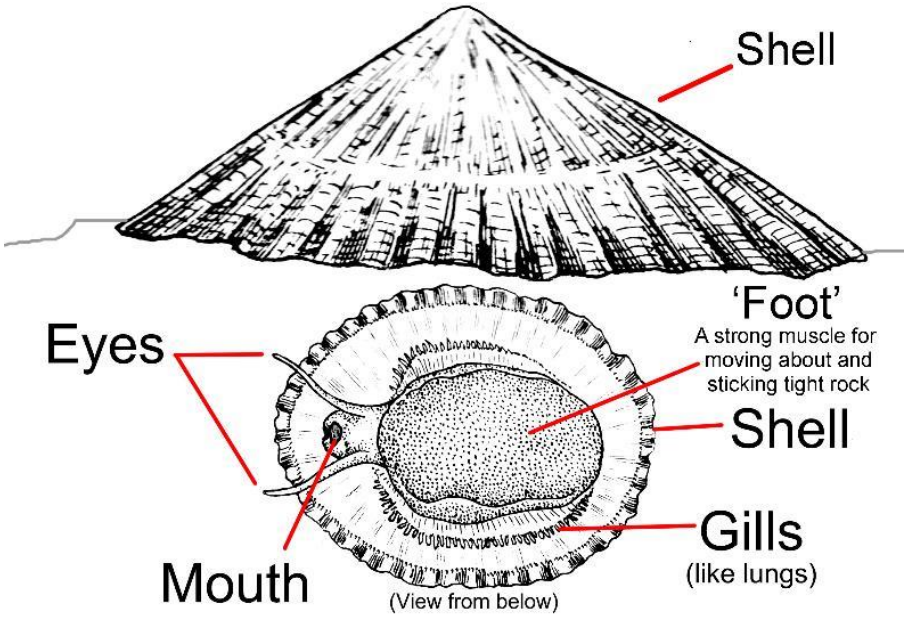
Grey Chiton *Polyplacophora species*

Chitons are a kind of mollusc identifiable by their characteristic coat-of-mail shells.

Description - A small oval shell found attached to rocks on the shore. There are around a dozen species of chiton on Irish shores, most are greyish or brown with mottled markings that make them rather hard to spot. They all have 8 interlocking plates surrounded by a muscular girdle. There are other species of chiton around Ireland which can be identified by different markings and the arrangement of bristles. When recording sightings as part of a recording scheme include clear, close-up photos to help verifiers confirm your sighting.

Habitat - Chitons live in the intertidal zone, their mottled grey shells offering excellent camouflage against their rocky homes. Found from the middle shore to sublittoral. When the tide is out it lives under stones, especially ones lightly embedded in sand or gravel in rock pools. Then underwater it moves up into well-lit areas where it feeds on algae. When out of water it moves down into shade and moisture to avoid drying out. Because of its eight interlocking shell plates it can shape itself onto uneven rock surface. When alarmed, it can increase its grip on the rock, and if knocked off, can roll into a ball.

Additional information - They are a type of gliding mollusc, a bit like a Limpet, and will move slowly across rocks in search of food. Like Limpets they are grazers and will feed on films of algae using their tough rasping tongue. Called a Radula, this rasping tongue is the world's strongest biological structure - it has to be to constantly scrape sponges off tough rocks without wearing away. Chitons are sometimes called Coat-of-Mail Shells as they have 8 interlocking shell plates across their backs. These are embedded in the tough muscular girdle that surrounds the chiton's body.



External Anatomy of a Limpet
(Source: https://en.m.wikipedia.org/wiki/File:Limpet_(PSF).png)

Common Limpet *Patella vulgata*

Description - The conical shell of the Common Limpet is up to 6cm long with radiating ridges and the apex central or slightly anterior. Individuals from the high shore generally have a taller shell and smaller shell length when compared to juveniles and low shore animals. The outer surface of the shell is greyish white or grey, sometimes with a yellow tint, and has coarse radiating ridges and well-marked growth lines. The inner surface is smooth and greenish-grey in colour. The sole of the foot is yellowish, dull orange or brown with a grey or greenish tinge. The mantle skirt is fringed with translucent pallial tentacles arranged in three series of different lengths, internal to which lies a complete circlet of pallial gills.

Habitat - The Common Limpet is found wherever there is substratum firm enough for its attachment on rocks, stones and in rock pools, from the high shore to the sublittoral fringe. It is abundant on all rocky shores of all degrees of wave exposure although the highest densities of Common Limpet coincide with wave exposed conditions. The species is usually not abundant on shores with a dense growth of seaweed. It extends into estuaries.

Additional information - The Common Limpet belongs to the mollusc family and is a gastropod. Animals that belong to the mollusc family have a fleshy body and a strong foot with a hard shell on the outside. The limpet has a single cone shaped shell. This shell protects them from drying out when the tide is out and being attacked by predators such as crabs and birds.

They have one huge foot that acts as a watertight sucker under its shell. This helps the Limpet stick to the rocks. Limpets move very slowly around the surface of the rock scraping microscopic plants that live on the rocks off with their tongue (like a file). They leave a trail of mucus (just like snails) behind them, which provides their direction of travel. After feeding, they return to their home base where they have carved out a little groove on the rocks.

Sea Slugs

What is a Sea Slug?

The sea slug is closely related to sea snails. It is grouped in the order Opisthobranchia which? includes not only the spectacular and often very colourful nudibranchs, which have all lost their shells, but also primitive groups such as the Cephalaspidea or Bubble Shells which have snail-like members with heavy external shells (Pupa sulcata) as well as members with brightly coloured bodies and no shell.

Sea Lemon *Geitodoris planata*

Description - A large sea slug up to 12cm long. The top side of the slug is covered in small wart like bumps (tubercles). It has a ring of eight or nine upright feathery gills close to the posterior end, which are quickly retracted when a disturbance is sensed and retracted when out of water. The colouration of the sea slug is blotchy and variable and can be yellow, green, brown, or pink. There is another variety (var. *flammea*) that is bright red all over.

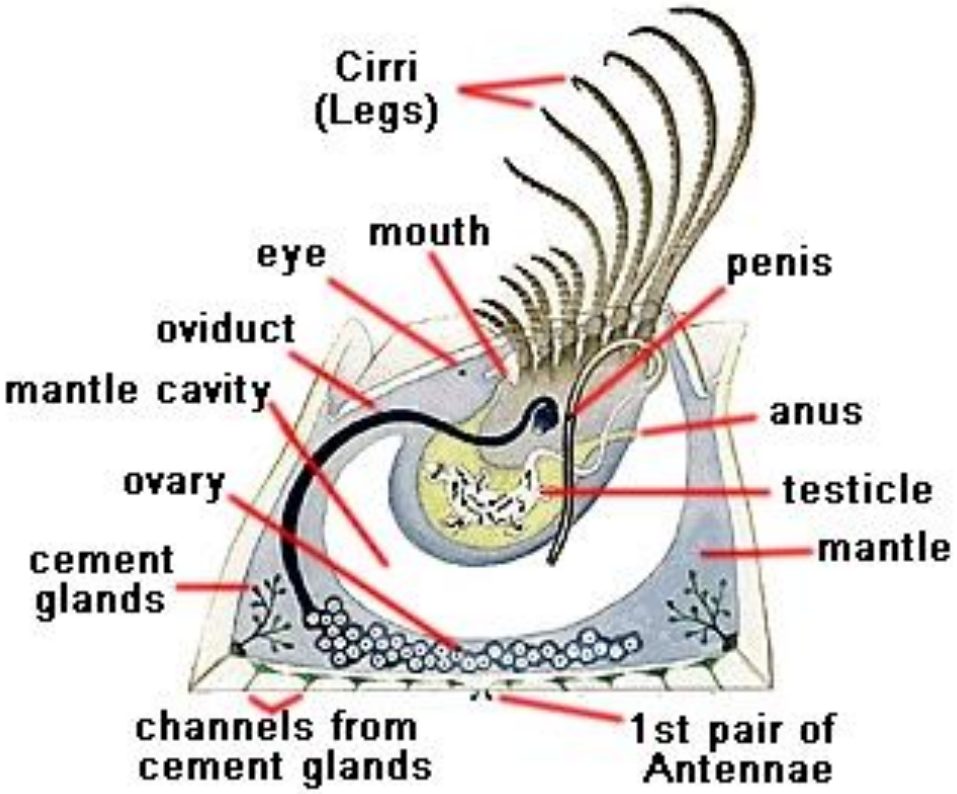
Habitat - Found on the lower and middle intertidal zones underneath large boulders and offshore into the sublittoral zone to about 300m.

Additional information - The sea lemon feeds mainly on sponges, especially the breadcrumb sponge (*Halichondria panicea*).

What is a Barnacle?

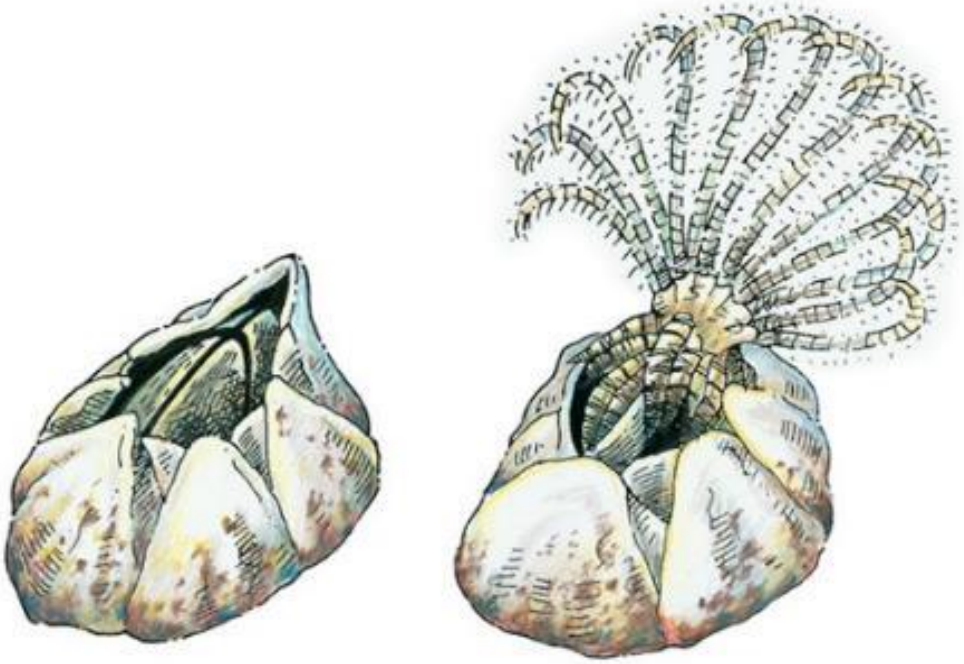
The Barnacle is a Crustacean. It has been described as ‘a shrimp-like animal standing on its head in a limestone house and kicking food into its mouth with its feet’ (Louis Agassiz). Of the more than 1,400 species of barnacles found in the world’s waterways, the most common ones are called acorn barnacles. How do barnacles stick to the undersides of vessels, to other sea life, to each other, and to pretty much anything they come in contact with. They secrete a fast-curing cement that is among the most powerful natural glues known — the glue is so strong that researchers are trying to figure out how it can be used commercially. Barnacles feed through feather-like appendages called cirri. As the cirri rapidly extend and retract through the opening at the top of the barnacle, they comb the water for microscopic organisms. They quickly withdraw into their protective shells if they sense a potential threat. Barnacles secrete hard calcium plates that completely encase them. A white cone made up of six calcium plates forms a circle around the crustacean. Four more plates form a "door" that the barnacle can open or close, depending on the tide. When the tide goes out, the barnacle closes up shop to conserve moisture. As the tide comes in, a muscle opens the door so the feathery cirri can sift for food.

(Source: https://oceanservice.noaa.gov/facts/barnacles.html)



General Anatomy of a Barnacle

(Source: https://courses.washington.edu/mareco07/students/nina/barnacleshome.html)



A Barnacle extending its feeding tentacles (Cirri)

(Source: https://www.calvertmarinemuseum.com/353/The-Mud-Flat)

Northern Rock Barnacle *Semibalanus balanoides*

Description – The Northern Rock Barnacle is the most widespread intertidal barnacle in Ireland. It may grow up to 15mm in diameter and has 6 grey-white shell plates. It may be distinguished from other barnacles by the presence of a diamond shaped opercular aperture and a membranous shell base.

Habitat - It can be found on shores of all exposure and typically occurs in a zone below the similar-looking Montagu's Stellate Barnacle (*Chthamalus montagui*), although the two can overlap. It may extend into the lower reaches of estuaries.

Additional information - Barnacles are suspension feeders, feeding on prey/food items suspended in the water above them. When covered by water they eat phytoplankton and zooplankton, microscopic plants and animals in the water as they float by that stick to their feeding feather like feeding tentacles which are actually its legs (Cirri). It may live for up to eight years, depending on its position on the shore.

Shellfish (Bivalves)

What is a Shellfish/Bivalve?

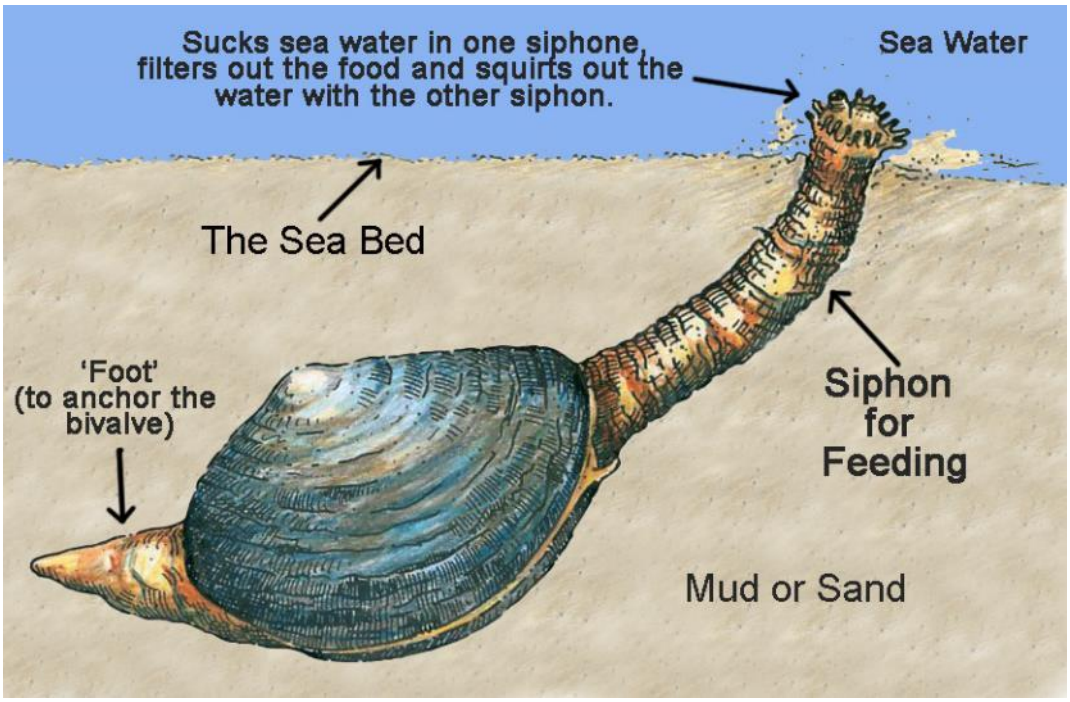
Bivalve molluscs (e.g., clams, oysters, mussels, scallops) have an external covering that is a two-part hinged shell and contains a soft-bodied invertebrate. The two shells are also called valves, hence the name bivalve (two-shelled).

Like fish, bivalve molluscs breathe through their gills. As filter feeders, bivalves also gather food through their gills. Some bivalves have a pointed, retractable "foot" that protrudes from the shell and digs into the surrounding sediment, effectively enabling the creature to move or burrow.

Bivalves even make their own shells. An internal organ called the mantle secretes calcium carbonate so that as the inner invertebrate grows, the outer shell provides a roomier home.

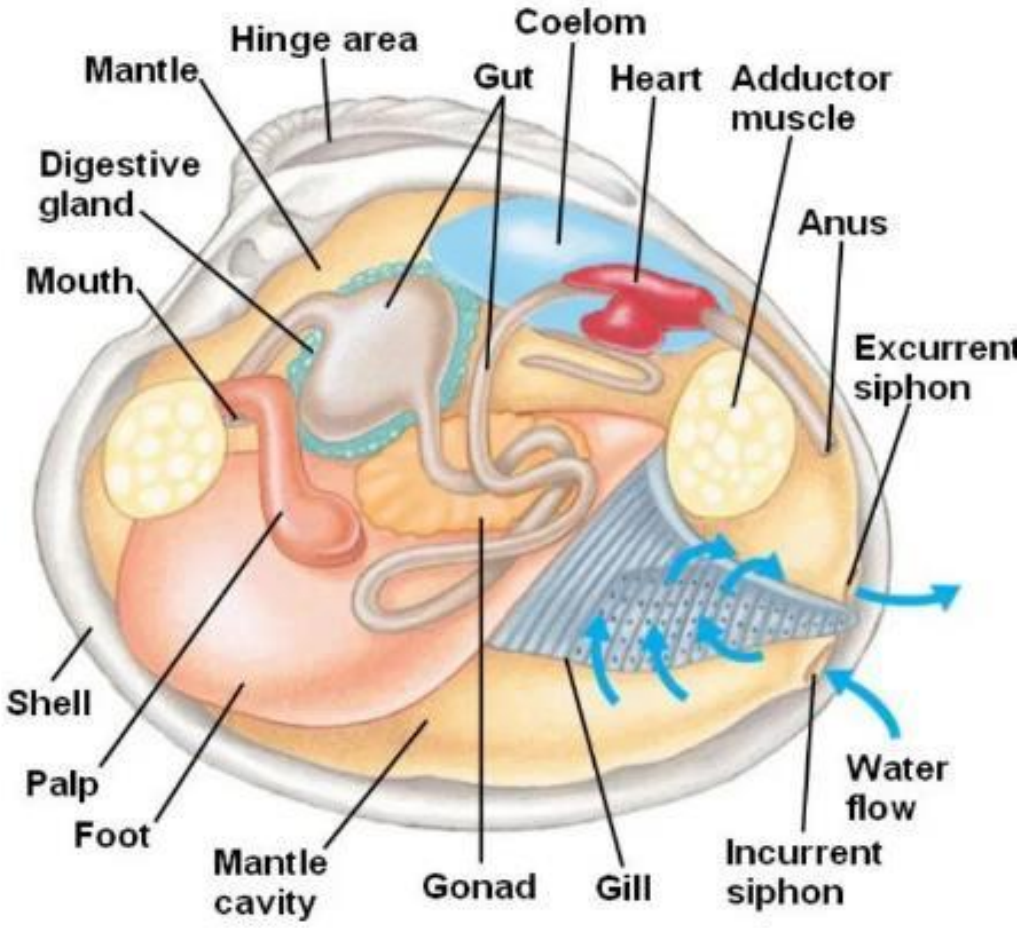
Many bivalve species play important roles in aquatic and marine ecosystems by filtering the water and serving as habitat and prey for a variety of sea life. This diverse group of species, estimated at about 9,200, inhabits virtually the entire world ocean, from the balmy tropics to the sub-zero Arctic, and from the deep ocean to sandy and rocky shorelines. A few have even taken up residence around hydrothermal vents reaching over 400°C, found deep in the Pacific Ocean, below 13,000 feet.

(Source: https://oceanservice.noaa.gov/facts/bivalve.html)



A Shellfish (Bivalve) in its burrow

(Source (modified): Calvert Marine Museum https://www.calvertmarinemuseum.com/353/The-Mud-Flat)



Shellfish (Bivalve) Anatomy

(Source: Bivalvia https://gl2019bivalvia.wordpress.com/anatomy/)

Common/Blue Mussel *Mytilus edulis*

Description - The shell is roughly triangular in outline; however, shell shape varies considerably with environmental conditions. The shell is smooth with a sculpturing of concentric lines but no radiating ribs. The ligament, holding the two shells together, is not very obvious. The shell colour varies, usually purple or blue but sometimes brown. Length varies, specimens usually ranging from 5 -10cm although some populations never reach more than 2- 3cm in length, and the largest specimens may reach 15 - 20cm.

Habitat - Occurs from the high intertidal to the shallow sublittoral attached by fibrous hair-like threads to suitable surfaces such as rocks and even ropes. Found on the rocky shores of open coasts attached to the rock surface and in crevices, and on rocks and piers in sheltered harbours and estuaries, often occurring as dense masses where there is a lot of movement of water.

Additional information – It has a strong fleshy muscle inside the shell that keeps the shell closed.

Bearded Mussel *Modiolus barbatus*

Description - The Bearded Mussel can grow up to 6cm long, although individuals are usually smaller. The shell is an stretched oval shape. The outer surface of the shell is yellowish-white, light yellow or reddish-brown in colour. Long, flat bristles, secreted by the mussel, each with a distinctly serrated edge (its 'beard') found over the broader half of the shell. The inner surface of the shell is shiny and pale blue in colour.

Habitat - This species is found among rocks and stones on the lower and mid intertidal zones, extending into the sublittoral to depths of around 100m.

Additional information - Also known as the bearded horse mussel. Like other mussels it is a filter feeder. Rarely found in large bunches.

Common/Edible Cockle *Cerastoderma edule*

Description - The shell is solid, thick, and broadly oval in outline; up to 5cm long but usually less. Shell with 22 - 28 radiating ribs, crossed by conspicuous concentric ridges and may bear short, flat spines. Outer surface off-white, yellowish or brownish. Growth lines are prominent. Inner surface dull white, with a brownish or light purple stain near the hinge.

Habitat - Inhabits the surface of sediments, burrowing to a depth of no more than 5cm. Found on clean sand, muddy sand, mud, or muddy gravel from the middle to lower intertidal, sometimes the sublittoral zone.

Additional information - Active suspension feeders, living in the top few centimetres of sediment. They are easily dislodged by storms and cockle beds can be washed away during winter gales.

Prickly Cockle *Acanthocardia echinata*

Description - The Prickly Cockle or European Prickly Cockle, is a species of saltwater clam, marine bivalve molluscs in the family Cardiidae.

The yellowish-brown shell is up to 75mm in diameter and is adorned by 18 to 22 spiny ridges. The shell edge is wavy and its inner surface is white, and prominently grooved.

The Prickly Cockle is found in the Irish waters and those of northwestern Europe. It lives within a few centimetres of the sea bottom, at depths of 3m or more. Dead shells can be found on the shore.

Habitat - Burrows in muddy sand and gravel from the lower intertidal and sublittoral zones to 100m where it filters phytoplankton.

European (native) Oyster *Ostrea edulis*

Description - The native oyster has an oval or pear-shaped shell with a rough, scaly surface. The two halves (valves) of the shell are different shapes. The left valve is spoon-shaped and fixed to the sea bed, the right being flat and sitting inside the left. The shell is off-white, yellowish, or cream in colour with light brown or bluish concentric bands on the right valve. The European (native) Oyster grows up to 11cm long, rarely larger. The inner surfaces are pearly, white or bluish-grey, often with darker blue areas.

Habitat - It is associated with highly productive estuarine and shallow coastal water habitats on firm bottoms of mud, rocks, muddy sand, muddy gravel with shells and hard silt. In exploited areas, suitable habitat is/has been created in the form of 'cultch' - broken shells and other hard surfaces.

Additional information - Also commonly known as the Flat Oyster.

Pacific Oyster *Crassostrea gigas*

Description - The shell can grow up 18cm long. An off-white to yellow or bluish grey in colour, the shell often has deep purple patches. The left valve is deeply cupped with 6 or 7 bold ribs making the shell edge rough. The right valve is flat or slightly curved and has ribs corresponding to channels of left valve. Exterior off-white to brown with streaks of purple; periostracum dirty brown; interior white-purple.

Habitat - Found on the lower and mid intertidal zones and shallow sublittoral to a depth of around 80m.

Additional information - Pacific oyster farming began in Ireland in 1973 and has since expanded (Minchin, 2007). 'Feral' populations of oysters have begun to spread from farm locations but the exact extent of the spread and whether it is localised to areas with aquaculture is unknown (Kochmann et al., 2013).

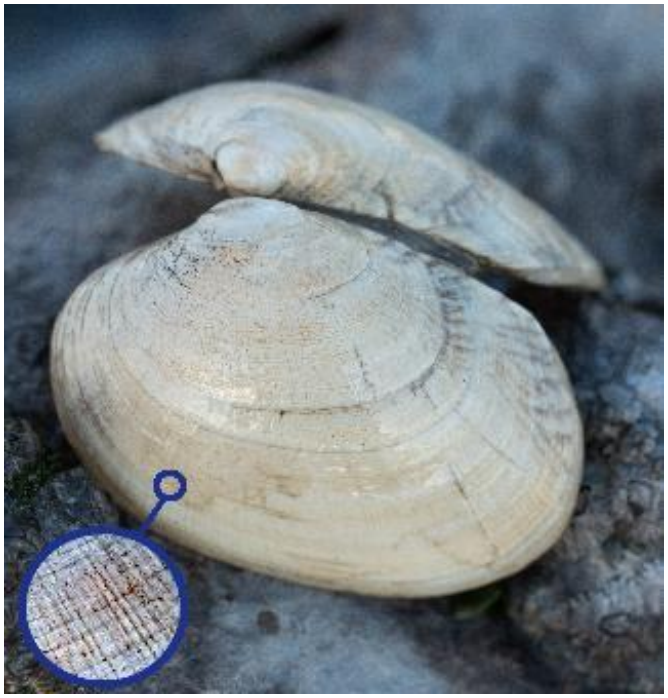
Peppery Furrow Shell *Scrobicularia plana*

Description - This bivalve has a thin, rounded and flattened shell and grows up to 6.5cm in length. Internal features for identification are the hinge of the valves, the right valve has two teeth and the left valve one tooth. Externally, the shell is sculptured with fine concentric lines, the outer surface white, pale grey or yellow and the inner surface is white.

Habitat - The peppery furrow shell is found in estuarine and intertidal conditions and can tolerate low salinities in thick mud or muddy sand. It burrows up to 20cm deep in sediments and can be identified when buried by the characteristic star-shaped markings made at the surface by its inhalant siphon. .

Additional information - Feeds by extending a siphon above the sediment when the tide is in. The siphon is often clipped by fish, crabs and birds, however lost tissue regrows within four or five days.

Chequered Carpet Shell *Ruditapes decussatus*



Description - The shell of the chequered carpet shell is broadly oval or square in shape and is cream, yellowish, or light brown in colour, often with darker markings. The sculpture of the shell consists of concentric grooves and bold radiating ridges. There are quite distinct criss-cross markings present. It can grow up to 7.5cm in length. Each valve has three teeth, one on the left shell and two on the right. The inside of the shell is polished white with an orange tint, occasionally with purple over a wide area near the hinge.

Habitat - This species tends to bury itself in sand, muddy gravel, or clay and is found on the lower and mid intertidal zones and shallow sublittoral zone.

Great Scallop *Pecten maximus*


Description - Both shells (valves) are fan shaped with an 'ear' on either side of the hinge of each shell. The right valve is strongly spoon-shaped and tends to be off-white, yellowish, or light brown in colour, often with bands or spots of darker colour. The left shell is flat and is light pink to reddish brown in colour. The Great Scallop grows up to 15cm long and both valves each have 15 -17 radiating ribs.

Habitat - Usually found in a shallow depression in the seabed. Prefers areas of clean firm sand, fine or sandy gravel and may occasionally be found on muddy sand.

Additional information - Also known as the King Scallop, Giant Scallop, Escallop and Coquille St. Jacques.

Variegated Scallop *Mimachlamys varia*

Description - This bivalve mollusc is very variable in colour and ranges through white, pink, red, orange, yellow, purple with all shades in between, often in irregular patterns. Both shells are spoon-shaped, oval in outline, except for the protruding ‘ears’ at the hinge, and usually up to 6cm long. There are 25 - 35 prominent ribs on the shells, each with spines. These are especially well developed near the edge of the shell. Growth stages are sometimes clear. The ‘ears’ are 2-3 times longer on one side.

Habitat - The Variegated Scallop lives very low on the shore and in the sublittoral zone to about 100m, either free-living or attached by a byssus. It is usually found on rocky ground, often in seaweed holdfasts.

Additional information - The Variegated Scallop matures as a male, changing sex several times during its life (Hayward et al.,1996).

Common Razor Shell *Ensis ensis*

Description - Razor shells have an elongated and fragile shell with half open at both ends. The shell is smooth on the outside and whitish in colour with vertical and horizontal reddish-brown or purplish-brown markings separated by a diagonal line. The outermost layer of the shell is olive-green. The inner surface is white with a purple tinge and the foot is pale red-brown. The presence of razor shells in the sand is indicated by keyhole-shaped openings made by the short, united siphons which extend just above the sediment surface when the animal is suspension feeding.

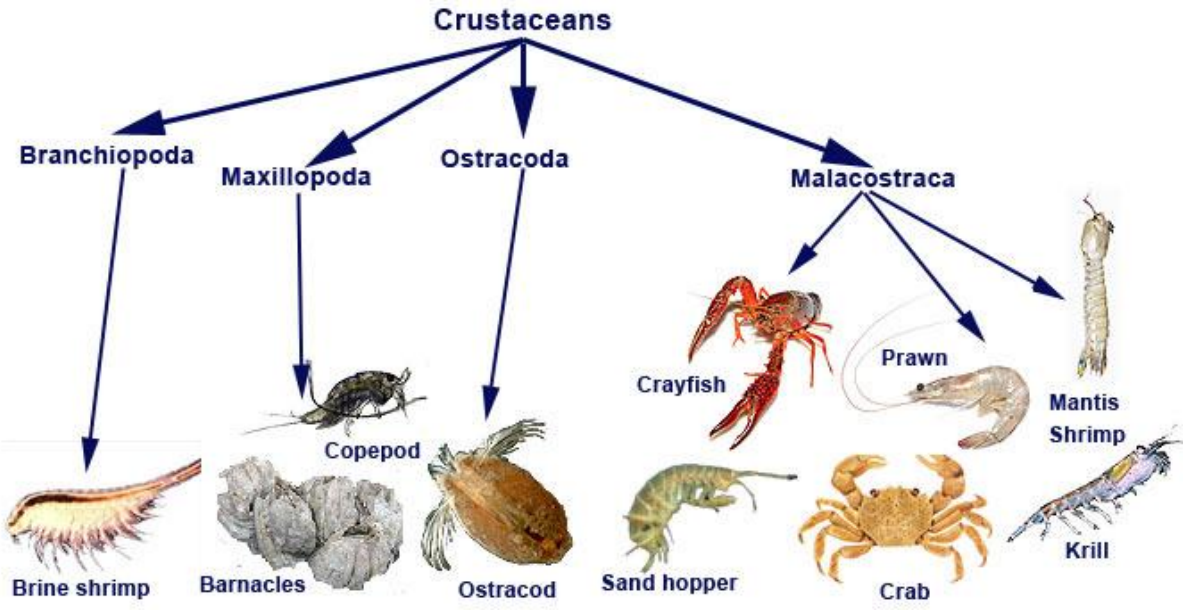
There are three species of razor shell in Ireland: Common Razor Shell, Pot Razor (*Ensis siliqua*) and *Ensis arcuatus*. Common Razor Shell is slender, with a slightly curved elongate shell up to 13cm long. In the Pot Razor both sides of the shells are straight edged, and adults are up to 20cm long. *Ensis arcuatus* grows up to 15cm long, and one side of each shells is straight edged and the other side is curved. It may be particularly difficult to distinguish between species in young individuals.

Habitat - Razor shells live in deep, vertical, permanent burrows in fine, sometimes muddy, sand from the low intertidal zone to the shallow sublittoral. *Ensis arcuatus* lives in coarser sediment than either Common Razor Shell, Pot Razor.

Additional information - Also known as Sword Razor. Many intertidal populations have been reduced by overfishing and the species is in decline in many areas. Razor fish are very sensitive to minor environmental changes (for instance increased/decreased temperature and higher to lower salinity - salt is used as a method of dislodging them from their burrows).

Crustaceans and Allies (Crabs, Prawns, Shrimps, Lobsters etc.)

What is a Crustacean?

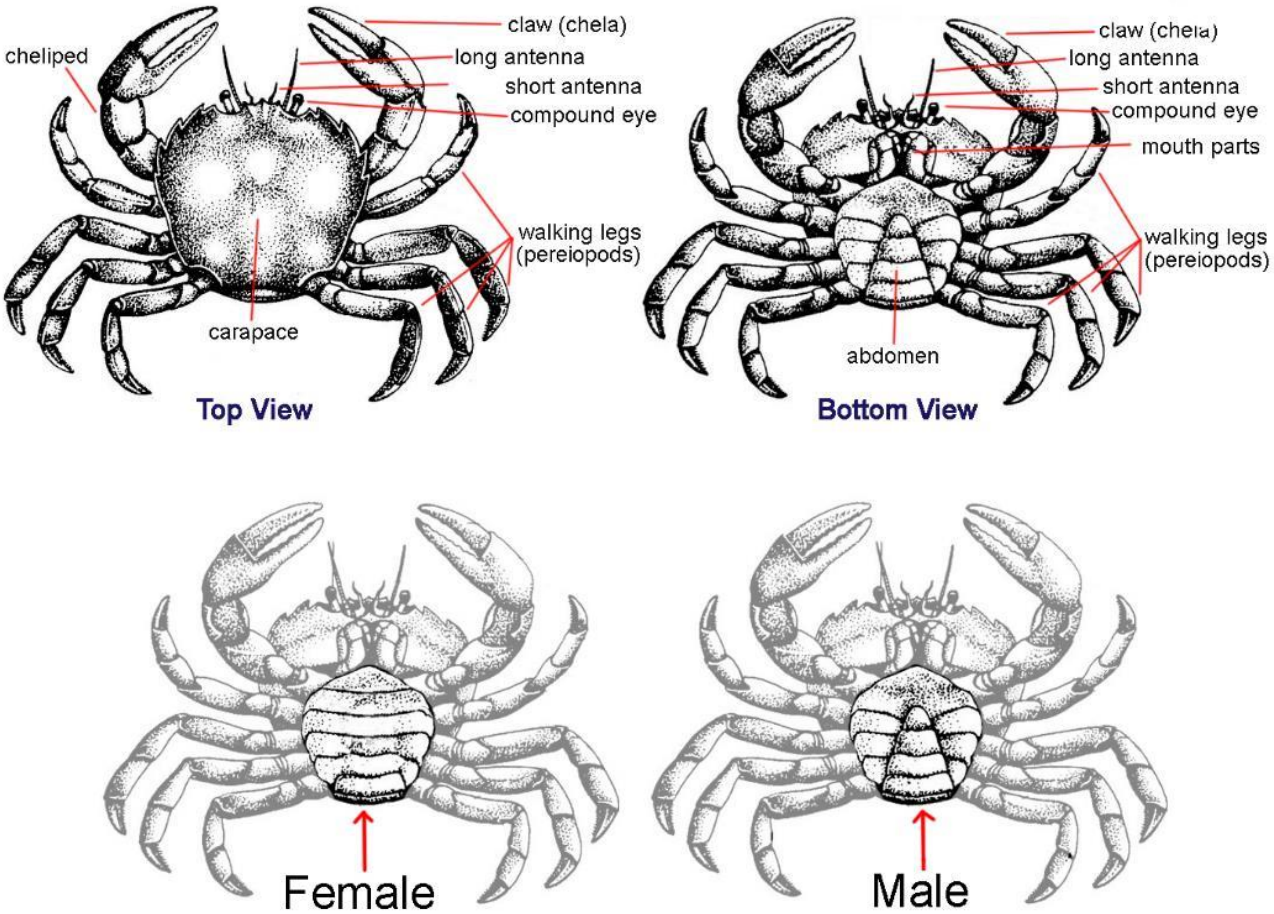


(Source: http://www.mesa.edu.au/crustaceans/)

Crustaceans make up a very large group of the Arthropods which include the crabs, lobsters, crayfish, shrimp, krill, barnacles brine shrimp, copepods, ostracods and mantis shrimp. Crustaceans are found in a wide range of habitats - most are free-living freshwater or marine animals, but some are terrestrial (e.g. woodlice), some are parasitic (e.g. fish lice) and some do not move (e.g. barnacles).

There are over 50,000 known species of crustaceans divided into a number of major groups - the Branchiopods, the Maxillopods, the Ostracods and the Malacostraca. The Malacostraca are further divided into five groups - decapods (e.g. crabs, lobsters and shrimp), stomatopods (mantis shrimp), euphausiids (krill), amphipods (e.g. sandhoppers) and isopods (land-based) crustaceans.

Crustaceans are invertebrates with a hard exoskeleton (carapace), a segmented body that is bilaterally symmetrical, more than four pairs of jointed appendages ("legs") and an open circulatory system (the "blood" does not flow in a closed loop). They also have eyes usually on stalks, a primitive ventral nerve cord and "brain" (ganglia near the antennae), a digestive system which is a straight tube for grinding food and a pair of digestive glands. Gills are used for breathing, and they have a pair of green glands to excrete wastes (found near the base of the antennae).
(Source: http://www.mesa.edu.au/crustaceans/)



External Anatomy of a Crab

(Source (modified): https://www.pinterest.ie/pin/373798837794597923/)

Edible/Sand Crab *Cancer pagurus*

Description - The Edible Crab, also known as the Sand Crab, is a common crab found under rocks along our coasts. They get their name from their reddish-brown colour and a large oval-shaped carapace that is crinkled around the edges to resemble a pie crust. These crabs can also be identified by their black-tipped claws. Females tend to be larger than males with an average carapace length of 98mm and males of 60mm but they have grown to a carapace (see diagram above) width of 250mm!

Habitat - Found on bedrock including under boulders, mixed coarse grounds, and offshore in muddy sand. Lower and mid intertidal zones, shallow sublittoral and offshore to about 100m. Also known as the brown crab.

Additional information - The edible crab will eat just about anything it can get its pincers on – mussels, whelks and even other crabs like porcelain crabs and squat lobsters. They are known to stalk and ambush their prey and dig down deep to get other tasty treats like the razor clam. Edible crabs are a favourite food of the octopus.

Common Shore Crab *Carcinus maenas*

Description - The shore crab has a shell (carapace) that is much broader than long (up to 8 cm across). The front of the carapace is serrated with five teeth on either side and three rounded lobes between the eyes. The first pair of legs (pereopods) have well developed pincers (chelae). Its colour is highly variable from dark green to orange and red. Variation in colour may be due to the stage of the life cycle or the habitat. Juveniles in particular display a wide range of mottled patterns. Crabs are known as the scavengers and predators on the seashore.

Habitat - The Common Shore Crab is found on all types of shore, from high intertidal zone to depths of 60m in the sublittoral, but it is predominantly a shore and shallow water species. The Common Shore Crab is often found under rocks and seaweed on both rocky and sandy shores on the middle to the sub tidal year on the seashore. They can also be found in shallow waters in the ocean. It tolerates a wide range of salinities and is especially abundant in estuaries and salt marshes.

Additional information - It can survive out of the water for a short period and can therefore moves around the seashore eating small animals and even other crabs.

Velvet Swimming Crab *Necora puber*

Description - A fast moving, medium sized, swimming crab with distinctive bright red eyes. Its body is covered in short hairs, giving it a velvet appearance. Velvet swimming crabs have blue lines on their legs and blueish tips to their strong claws. Like all swimming crabs, their rear-most legs are flattened like paddles, helping them swim effectively. They are fast moving underwater and will catch swimming prey like fish and prawns, as well as munching on easier catches like worms, bivalves and sea snails. They grow to about 8cm wide.

Habitat - Found on stony and rock intertidal zones and in shallow water, most abundant on moderately sheltered shores.

Additional information - The Velvet Swimming Crab is also known as "Devil crab". We don't know whether it got this name from its red eyes or from its feisty behaviour - but we do know that you should not put your fingers anywhere near its claws!

Hermit Crab *Pagurus bernhardus*

Description - A large hermit crab with a carapace length that reaches 35mm. It is reddish in colour and will occupy any suitable shell. As it grows it must find a bigger shell to live in so you can find it in shells from the very small to the large. It uses shells of a number of sea snail species for protection, including Common Periwinkle, Flat Periwinkle, Netted Dog Whelk, Flat Topshell and Dog Whelk. Both pincers are covered with thick, pointed bumps, the massive right pincer has two rows of large bumps and no bristles.

Habitat - Found on rocky and sandy ground from mean tide level to 140m.

Additional information - The common hermit crab is also flexible when picking from the menu, and eats almost anything it can catch, including its own relatives.

Long-clawed Porcelain Crab *Pisidia longicornis*

Description - A very small crab less than 10mm across the carapace. It is reddish-orange in colour, frequently with patches of pearly white on the carapace or sometimes all of the carapace is white. Long claws and with only three pairs of walking legs apparent and a tiny fifth pair of appendages often concealed.

Habitat - Present under boulders in the intertidal zone and common in the sublittoral zone.

Montagu's Crab *Xantho hydrophilus*

Montagu's Crab or the Furrowed Crab is a species of crab from the family Xanthidae.

Description - The carapace of Montagu's Crab reaches a width of 70mm, and a length of up to 22mm. The dorsal surface of the carapace has a smooth appearance to the unaided eye but on closer examination it can be seen to be finely granular. The back/sides edge of the carapace bears five blunt lobes. The claws are large and robust and equal in size and lack spines or tubercles, the walking legs are relatively short and rather stout. It is yellowish-brown, except for the tips of the claws, which are black.

Habitat - It lives under stones on sandy and stony beaches, below the intertidal zone, up to a depth of 40m (130 ft), although it can be found in rock pools at low tide.

Additional information - It has a broad diet and feeds chiefly on various algae, but also scavenges and is mostly active at night. When disturbed it spreads out its large claws to make itself seem bigger.

Common Sandhopper (A collective word for several similar looking amphipods)

Description - The Common Sandhopper refers to several amphipods (lots of species and not easy to identify). They are active supralittoral sandhoppers. They are crustaceans, growing up to 20mm in length. Antennae are distinct and one is much longer and robust than the other. Eyes are round and black, the body being grey-brown in colour. The animal's typical "hopping" movement gives it its common name and is produced by a flexing of the abdomen. To do this, it must stand on its legs (amphipods usually rest on their sides) and suddenly extend its abdomen from under its body. It can thus leap several inches into the air, although without any control over its direction.

Habitat - Sandhoppers spend the day buried at depths of above the strandline but emerge at night on the falling tide to feed. They are scavengers typically feeding on partly decayed seaweed and other vegetation.

Additional Material - They are capable of navigating where the water is not clear using multiple indicators, including the angle of the sun, moon, or even by detecting the blue wavelengths of light from the sea and the red-brown colours of land. Their diet is composed chiefly of the rotting seaweed which accumulates on the strandline. The Common Sandhopper is an important food source for shore birds.

Common Prawn *Palaemon serratus*

Description - The Common Prawn (known locally as 'shrimp') is a typical prawn with a cylindrical body composed of a carapace at the front and six abdominal segments. It has a large, upturned saw-like snout in front of the eyes. It has long whip-like antennae. The first two pairs of walking legs have claws and have yellow and red banding.

Habitat - Present usually in groups, in crevices and under stones from intertidal pools to the shallow sublittoral. Also found in estuaries and seagrass beds

Additional information - Prawns have pincers on three of their five pairs of legs, shrimp have pincers only on two of their five pairs of legs. In addition, their gills and body shape are different as well. Prawns are generally bigger than shrimps.

Sea Slater *Ligia oceanica*

Description - The Sea Slater is the largest of the isopods, a group that includes the Woodlouse. It can be up to 3cm in length and has large eyes similar to the compound eye of insects. It is oval shaped, and the body is twice as long as broad. The antennae are approximately two thirds the length of the body. It possesses seven pairs of walking legs of similar appearance. The colouration of Sea Slater varies in shade from grey to olive.

Habitat - Abundant on rocky coasts within the terrestrial and littoral fringe, especially common in crevices, rock pools and under stones.

Additional information - The Sea Slater is omnivorous, its diet consisting of shore debris such as decaying seaweed and encrusting diatoms.

Leach's Squat Lobster
Galathea squamifera

Description - The Leach's Squat Lobster is the most commonly found squat lobster on north European shores. It can reach lengths of up to 65mm, having a carapace length of up to 35mm. There is a pointed, triangular snout with 4 spines on either side. The first pair of legs are 1.5 times longer than the body. The claws are well developed and are covered in scales without spines on the outer margin. This Squat Lobster is chestnut brown in colour with a greenish hint and red tipped spines. The carapace is shiny between grooves and has scattered short hairs.

Habitat - The Leach's Squat Lobster lives under stones and rocks on the lower and mid intertidal zones and in crevices and fissures in the sublittoral zone to depths of about 180m.

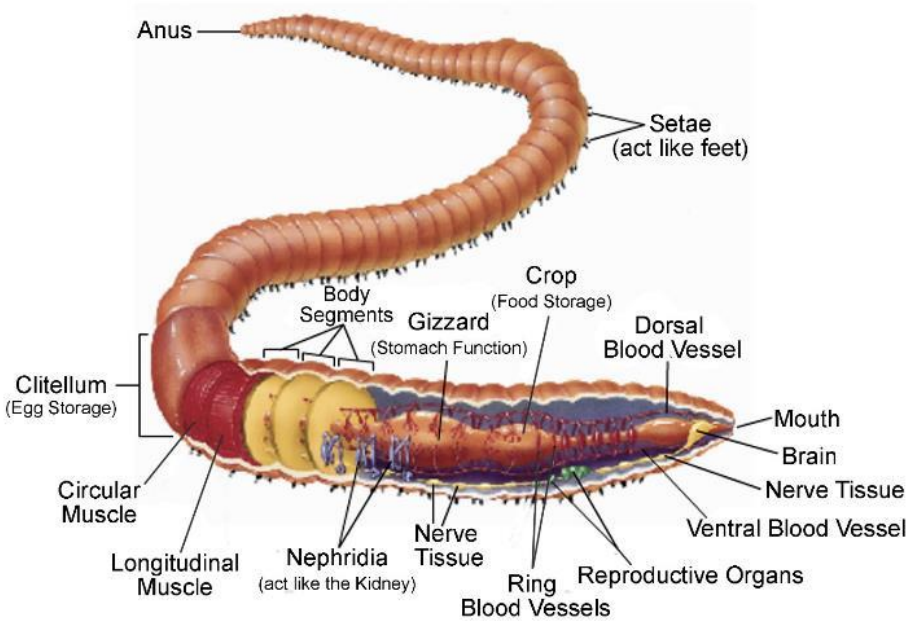
Additional information - This species is a filter feeder and a scavenger. Juveniles often have a reddish colour. Females carry eggs during late winter and early spring.

Marine Worms

What are Marine Worms?

There are many different worms that live on the seashore. They can be found in mud and sand, under rocks, and sometimes even living on other animals!
Most of the worms on our shores belong to a group called Polychaetes or Polychaeta, which means bristle worms. Poly = Many, Chaete = Bristles or hair. Polychaeta have been spotted in the deepest parts of the ocean, as well as on the seashore, and in all habitats in-between.

The worms that stay in the same place for their whole lives are called sedentary, such as coiled tube worms or keeled tube worm. Many are filter feeders, using tiny tentacles to gather floating bits of food from the water around them. The worms that can move around freely are called errant and are usually scavengers or predators. These worms include the ragworm and lugworm. They usually have eyes and jaws, for spotting and grabbing food. (Source: Marine.ie)



General Anatomy of a Worm

(Source: http://mrsdmarine.weebly.com/annelids.html)

Sand Mason *Lanice conchilega*

Description - The Sand Mason is a worm up to 30cm in length and yellow, pink, and brownish in colour. Its body is divided into between 150 and 300 segments. It has 3 pairs of bushy gills that are blood red in colour. It makes a tube out of sand grains and shell fragments, which has a characteristic frayed end that sticks up above the sand. The Sand Mason uses its crown of white tentacles, which only come out when underwater, to trap particles of food.

Habitat - The Sand Mason is found in intertidal and sublittoral sediments, especially sand.

Spiral Worm *Spirorbis spirorbis*

Description - The body of the Spiral Worm is often no more than a few mm in length and orange-red in colour. It is permanently encased in a characteristic smooth, white, evenly coiled hard tube, 3 - 4mm in diameter. The tube coils to the left.

Habitat - The Spiral Worm particularly favours the fronds of Serrated Wrack and Bladder Wrack seaweeds in the shallow intertidal and sublittoral zones but also occurs on other seaweeds such as kelp and, more rarely, stones. Large numbers of individuals may be found on a single piece of wrack seaweed.

Ragworm *Hediste diversicolor*

Description - The Ragworm is one of the commonest intertidal worms in estuaries. Its body appears flattened with a prominent blood vessel along its back. Adults may reach 6 -12cm in length. The colour of the Ragworm varies. Mature worms become a brighter green approaching and during spawning, otherwise specimens appear to be a reddish orange or brown.

Habitat - Inhabits muddy areas in a more-or-less permanent U or J-shaped burrow that may be up to 20cm in depth. Also occurs under stones on mud where the burrow is adjacent to the stone. The Ragworm is widespread in brackish water environments throughout north-west Europe.

Additional information - They spin a mucus net at the entrance to their burrow in which they catch plankton and other small particles. They can also leave the burrow in search of bigger food, scavenging on whatever is available or hunting out small invertebrates which they catch with strong pincer-like jaws.

Lugworm *Arenicola marina*

Description - The Lugworm has a firm, cylindrical body divided into a thoracic and an abdominal region. Adults reach between 12 and 20cm in length and vary in colour from pink to dark pink, red, green, dark brown or black. Digs a U or J-shaped burrow (20 - 40 m deep) with characteristic depressions at the head end (the 'blow hole') and a mound (cast) of digested sediment at the tail end that looks like a pile of rope. Feeds on food that falls onto the seabed and micro-organisms by literally eating sand or mud. The cast is large and often the colour of clean sand. Preyed on by flatfish and wading birds, which may 'nip' off the tail as it deposits casts.

Habitat - Found from high water neap tidal level to the middle or lower and mid intertidal zones in sand and muddy sand. Often reaches high abundances in sheltered estuarine sediments.

Additional information - Once it burrows into the sand a lugworm seldom leaves it. It can stay there for weeks on end, sometimes changing its position slightly in the sand. But it may leave the burrow completely and re-enter the sand, making a fresh burrow for breeding.

Scaleworm *Harmothoe impar*

Description - The body is 10 - 35mm long, broad, flattened and more or less straight-sided. It has 15 pairs of oval scales that overlap and cover the back except for the last two segments. The scales on the back are smooth and decorated with very variable patterns. The scales are pale reddish brown in colour with a dark circle on each scale. This species can glow in the dark (bioluminescence).

Habitat - This species is found in the mid to lower intertidal zone, under stones or in crevices.

Additional information - Often found living harmlessly on other worms, sea cucumbers and the brittlestar *Amphiura brachiata*. The pigmentation of the worm often perfectly mimics the colour of the animal it is living on.

Keelworm *Spirobranchus triqueter*

Description - This shell-like tube of the Keelworm is 3.5mm wide and up to 25mm long. It is white, smooth, and irregularly curved with a single, noticeable ridge (like the keel on a boat) along the top of the tube that ends in a projection over the rear opening. The colour of the body is bright but variable, and when seen under water the crown of tentacles (radioles), used to catch passing prey or food, is banded with various colours.

Habitat - The Keelworm encrusts stones, rocks and shells, and the carapace of some species of decapods such as crabs and lobsters. They are mainly found in the lower intertidal and sublittoral zones to depths of 70m.

Additional information – A bit like the Spiral Worm but its shell is not curled.

Sponges, Bryozoans and Sea Mats

What is a Sea Sponge?

Sea sponges are not plants. They are relatively basic multi-celled animals without a brain or a central nervous system. They also do not have tissues or organs like other animals do, rather, they have specialized cells to perform necessary functions. Some of these cells are in charge of digestion, some of reproduction and others for bringing in and filtering water so that the sponge can feed.

Sponges are classified as invertebrates, which means they do not have backbones, and they make up an entire phylum of animals (Phylum porifera). They come in many different colours, sizes and shapes and, since very few animals eat them, they can live for a very long time. Some types have been found to live over 200 years.

Their skeleton is formed from spicules made of silica (a glass-like material), calcium or calcium carbonate materials, and spongin, a protein that supports the spicules. Their body texture looks very much like the texture of your kitchen sponge. It is full of pores whose job is to filter lots and lots of water from which it extracts food.

(Source https://spongean.com/amazing-facts-about-sea-sponges/)

Breadcrumb Sponge (*Halichondria (Halichondria) panicea*)

Description - The appearance of the of Breadcrumb Sponge can be highly variable. Most commonly found on the open coast, it can form a low crust with volcano-like exhalent openings (osculae). In wave sheltered areas, the species may grow into a massive form up to 20cm thick, and in tidal rapids or sounds may be several metres across. Vethaak et al. (1982) recorded a specimen that measured about 60cm across and 25cm high in the Netherlands, although most specimens are rarely this big. Colonies are sometimes composed of connecting (anastomose) lobes or digits. On the shore and in shallow depths, it may be green due to the symbiotic presence of green algae in the tissue. In the shade and deeper water or in winter it is cream-yellow in colour. Breadcrumb Sponge smells strongly of seaweed.

Habitat - It is found in damp habitats on the shore including rock pools, and under boulders and overhangs. Underwater, it is particularly abundant in wave exposed or tide-swept situations often dominating kelp stipes. In low or variable salinity, it is likely to colonize red seaweeds.

What is a Byrozoan?

A Bryozoan is a small invertebrate that grow from just one to a colony of thousands, which might encrust an entire kelp blade. The individual bryozoan — called a zooid — lives within a box-shaped compartment made of calcium carbonate and chitin, a material found in crab shells. Zooids are tiny, perhaps no taller than 2mm.

The tiny larval bryozoan is a clam-like swimmer in a bivalve shell. Opening its shell like an umbrella, it parachutes down onto a clean kelp blade. Alert for chemical cues, the bryozoan tests the surface, then cements itself to the blade with a sticky glue. The youngster settles in place and changes to its adult form, a captive within its own shelled rectangular fort. Once established on the kelp, the lone settler begins to multiply. Budding off clones in neat rows, a colony fans out to frost the blade with a crust of the tiny animals. Bryozoan colonies are important food sources for some sea slugs and fish.

They possess a unique feeding structure called a lophophore. The lophophore is a U-shaped or circular ring of hairy looking tentacles used for filter feeding. Extending a crown of tentacles above its shell, the bryozoan flicks its tentacles through the water to catch bits of food.

They use tiny mobile pincers called avicularia to pluck off any settlers that land on them.

If a piece of a bryozoan colony breaks off, the piece can continue to grow and form a new colony.

(Source https://www.montereybayaquarium.org/animals/animals-a-to-z/bryozoan)

What is a Sea Mat?

A Sea Mat is a very common and conspicuous bryozoan forming encrusting, lacy, mat-like colonies on seaweeds. Young colonies are circular, but growth tends to be fastest towards the base of the frond, which is where new growth of the kelp is occurring. This pattern of growth keeps the colony spreading away from the most encrusted areas, and from the areas of the algal frond most likely to be torn off by waves.

Hairy (or Thorny) Sea Mat *Electra pilosa*

Description – The Hairy (or Thorny) Sea Mat may form star shaped or broad sheet colonies on the fronds of large algae (e.g. Kelps and Wracks), small irregular patches on stones and shells, narrow tufts (free floating), or cylindrical incrustations around the fronds of small red algae (e.g. Carragheen or False Irish Moss).

Habitat - colonizes a variety of surfaces in marine habitats from low water into the shallow sublittoral, particularly seaweeds such as Serrated Wrack and kelps.

Additional information - The Hairy Sea Mat is a bryozoan which lives in a tiny box-shaped limy skeleton. This skeleton is the white net-like structure you can sometimes see on the fronds of kelp and occasionally other brown seaweeds and some red seaweeds.

Sea Squirts, Jellyfish, Anemones, Starfish, Urchins etc.

What is a Sea Squirt?

Sea squirts get their nickname from their tendency to "squirt" out water when they are removed from their watery home. And while they may look like rubbery blobs, they are actually very advanced animals, close to humans on an evolutionary scale.

That's because they have a spine. Sea squirts belong to the phylum Chordata, which includes all animals with a spinal cord, a supporting notochord (backbone), and gill slits at one point in their lives--everything from fish to humans. Tunicates have all these features as larvae, when they resemble tadpoles. Usually within 24 hours of planktonic life, the tunicate larvae will settle down on a hard surface and attach itself with adhesive organs. The tunicate then undergoes a transformation, rearranging its organs (absorbing its notochord, nerve cord and tail) and becoming a full-grown sea squirt. Sea squirts possess both sex organs but are unable physiologically to self-fertilize.

Tunicates actually "wear" tunics. They secrete the leathery sac, called a tunic, that protects the animal. There are two openings in the sac, called "siphons." Cilia (look like hairs) on the pharynx move about to create a current and draw water in through the incurrent siphon. The water is then filtered through the mucus-coated throat, which traps food particles. Oxygen is drawn from the water as it passes through the gills and moves out through the excurrent siphon. (*Source: Woods Hole Oceanographic Institute*)

Common Sea Squirt *Diplosoma listerianum*

Description - Common Sea Squirt is a colonial sea squirt forming thin (0.2cm), flat, soft jelly-like sheets. They are translucent with scattered brown or grey pigmented cells.

Habitat - This species can be found growing on algae fronds, seagrasses (Zostera leaves) and hard surfaces such as rocks. It is often observed on marina pontoons. Mainly sublittoral and may also reach depths of 80m.

Leathery Sea Squirt *Styela clava*

Description - A solitary sea squirt with a long club-shaped body, tapering to a slender and tough stalk. The overall height of the sea squirt can reach 12cm and the stalk can be a 1/3 of the total length. The surface of the sea squirt can be leathery with folds and swellings. Identifying features: Body long, narrow and club-shaped. Slender tough stalk can be 1/3 of total length. Total length up to 12cm. Surface leathery with folds and swellings.

Habitat - The Leathery Sea Squirt is found in shallow water on hard surfaces and also occurs abundantly in sheltered warm water docks and harbour installations.

Additional information - The Leathery Sea Squirt is a non-native marine species originally from the northwestern Pacific. It is considered a fouling pest on ships hulls and oyster beds, and the transport of oysters and any movement of ships probably aided its rapid dispersal (Eno et al., 1997). It is also now found in France, the Netherlands and Denmark.

Colonial Sea Squirt *Botrylloides violaceus*

Description - This species is a colonial sea squirt forming lobed sheets usually 2 - 3mm in thickness. Thick sheets or lobes sticking to the surface that may grow back-to-back. Individual colonies are always one colour. The colonies can be different colours, e.g. dark brown, brick red, orange, purple or yellow.

Habitat - Found on artificial surfaces in shallow water, especially in harbours and marinas. Also found attached to seaweed.

Additional information - A non-native species from Japan recorded in Ireland/Britain for the first time in 2004.

What is a Sea Anemone?

The ornately coloured sea anemone (uh-NEM-uh-nee) is named after the equally flashy terrestrial anemone flower. A close relative of coral and jellyfish, anemones are stinging polyps that spend most of their time attached to rocks on the sea bottom or on coral reefs waiting for fish to pass close enough to get ensnared in their venom-filled tentacles. Their bodies are composed of an adhesive pedal disc, or foot, a cylindrical body, and an array of tentacles surrounding a central mouth. The tentacles are triggered by the slightest touch, firing a harpoon-like filament into their victim, and injecting a paralyzing poison. The helpless prey is then guided into the mouth by the tentacles.

(Source: https://www.nationalgeographic.com/animals/invertebrates/facts/sea-anemones)

Beadlet Anemone *Actinia equina*

Description - This anemone has a broad (up to 5cm in diameter) base, which is moderately or firmly adhesive, with a smooth column. It has up to 192 tentacles arranged into 6 circles. The tentacles readily retract if the animal is disturbed. The Beadlet Anemone is uniform in colour, with no pattern on the disk, and can be red, brown, green or orange in colour. Bright blue wart like spots, called acrorhagi, are often found round the inside of the top margin of the column.

Habitat - The Beadlet Anemone is found attached to hard surfaces, both in exposed and sheltered situations, from the upper to lower and mid intertidal zones and rarely in sublittoral areas to depths of around 20m. It is highly adapted to the intertidal zone as it tolerates high temperatures and drying out.

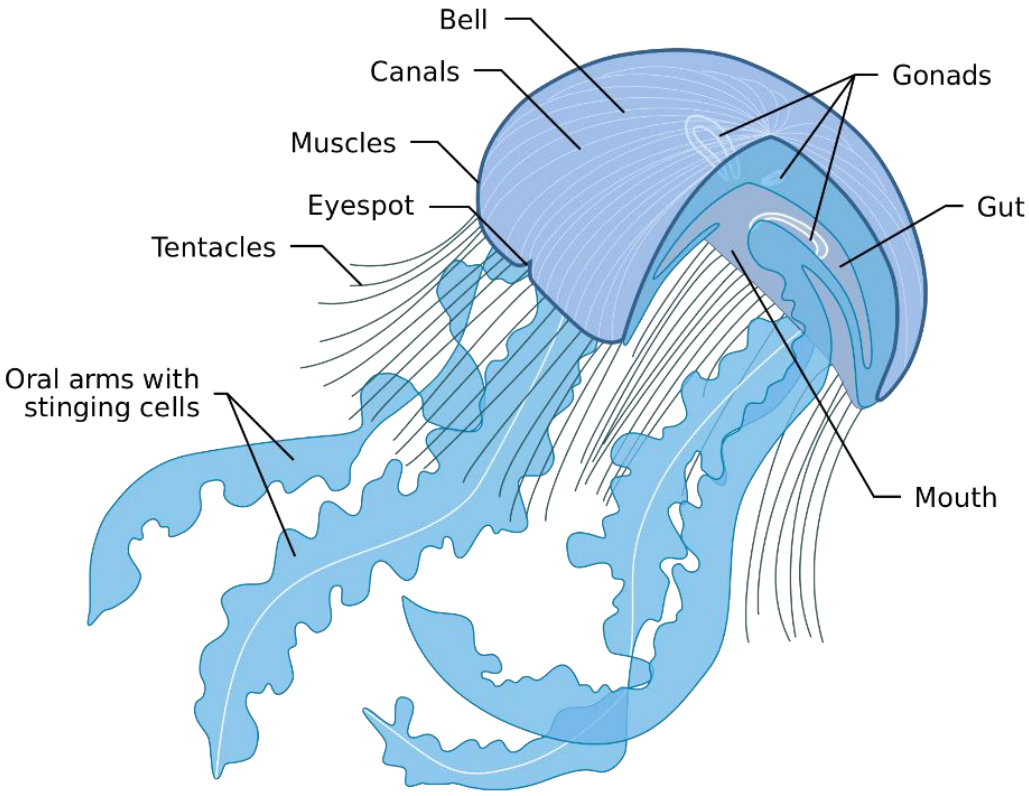
Additional information - The Beadlet Anemone displays aggressive behaviour towards neighbouring individuals. This aggressive behaviour is stimulated when the tentacles of adjacent anemones come into contact. The aggressor stings the victim with special stinging cells (nematocysts) in the acrorhagi (nematocyst-studded fighting structures), which leads to the victim either crawling away or dropping off the substratum.

What is a Jellyfish?

A Jellyfish is an animal of the phylum Cnidaria. Most of them live in the oceans, in salt water, where they eat small sea animals like plankton and little fish, and float in the sea. Only a few jellyfish live in fresh water.

It has a soft body and long, stinging, venomous tentacles that it uses to catch its prey, usually small plankton animals or small crustaceans or tiny fish. Some jellyfish hunt others by stinging cells called nematocysts. A jellyfish is 97% water.

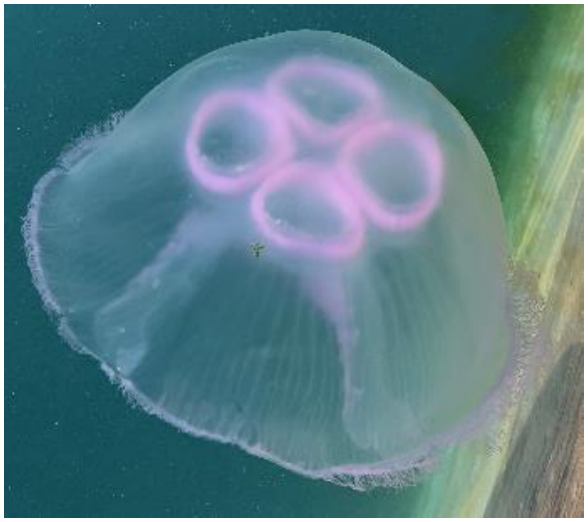
Most jellyfish have a bell-shaped body and long tentacles at the underside of the body. Tentacles are long "arms" with special stinging cells called cnidoblasts containing the structure of the nematocyst. The nematocysts are pockets in the tentacle that have a small stinger that is sealed with a cap. There is a microscopic hair, or “trigger” on the outside of the pockets and when the tentacle brushes against something it activates the hair which opens the cap and allows salt water to pour in. The inrushing saltwater increases the pressure in the nematocyst pushing out the venomous tentacle or thread, thus stinging the jellyfish’s prey. They move by contracting their bodies, but they do not have much control over where they go: most of the time, they drift with the water current. The largest type of jellyfish is the Lion's mane jellyfish, which has tentacles that can be as long as 60 meters, but most jellyfish are much smaller. *(Source: https://simple.wikipedia.org/wiki/Jellyfish)*



Anatomy of a Jellyfish

(Source: https://planetlovelife.com/are-jellyfish-transparent-or-translucent/)

Moon Jellyfish *Aurelia aurita*



Description - The Moon Jellyfish is Ireland's most common jellyfish. It has a smooth, flattened saucer-shaped bell (the umbrella) with eight simple marginal lobes. The umbrella is colourless, with four circles which are typically mauve, violet, reddish, pink or yellowish in colour. It usually grows to approximately 25cm in diameter but can reach 40cm. The umbrella is quite thick, thinning towards the edge, with numerous short, hollow tentacles forming a fringe around the edge. These short tentacles are ringed by numerous stinging cells (nematocysts).

Habitat - It is sporadic in its appearance, forming massive local populations in some areas but totally absent in other areas for some years. It is a pelagic species but may be found washed up on the shore. It is known to occur up estuaries and into harbours.

Additional information - Moon Jellyfish feed, but not exclusively, on plankton and can at times occur in massive swarms, which may be so dense as to give the sea a uniform red colour and slow the passage of small boats (Russell, 1970).

Compass Jellyfish *Chrysaora hysoscella*

Description - Typically, the Compass Jellyfish is yellowish white in colour with a highly distinctive brown pattern. The upper surface of the bell has 16 V-shaped brown markings radiating from a dark apical circle or spot at the centre like the radii of a compass. It has a thickened bell (manubrium) that can grow up to 30cm in diameter. The edges of the bell are developed into 32 lobes and bear 24 marginal tentacles. These are arranged in eight groups of three which alternate with eight sensory organs and are capable of great elongation. They are also covered with clusters of stinging cells (nematocysts).

Habitat - The Compass Jellyfish is normally a deep-water species. Young Compass Jellyfish appear in Irish waters in May. And can be seen close to shore or when stranded.

Additional information - The stinging cells and venom of the Compass Jellyfish are strong and can produce painful, long-lasting red marks on human skin.

Crystal Jellyfish *Aequorea 'species'*

Crystal Jellyfish are not true jellyfish but look very like them. They are in the phylum Cnidaria and can grow in size comparable to true jellyfish. It gets its name because it is almost entirely transparent. If you look closely, you can see up to 100 faint lines radiating out from the centre to the bell edge. They are famous for being the source of green fluorescent protein (GFP) that absorbs blue light and re-emits it as green. This discovery of GFP by Osamu Shimomura, Martin Chalfie and Roger Tsien won them the Nobel Prize in 2008 as it transformed medical research and how we visualise molecular processes.

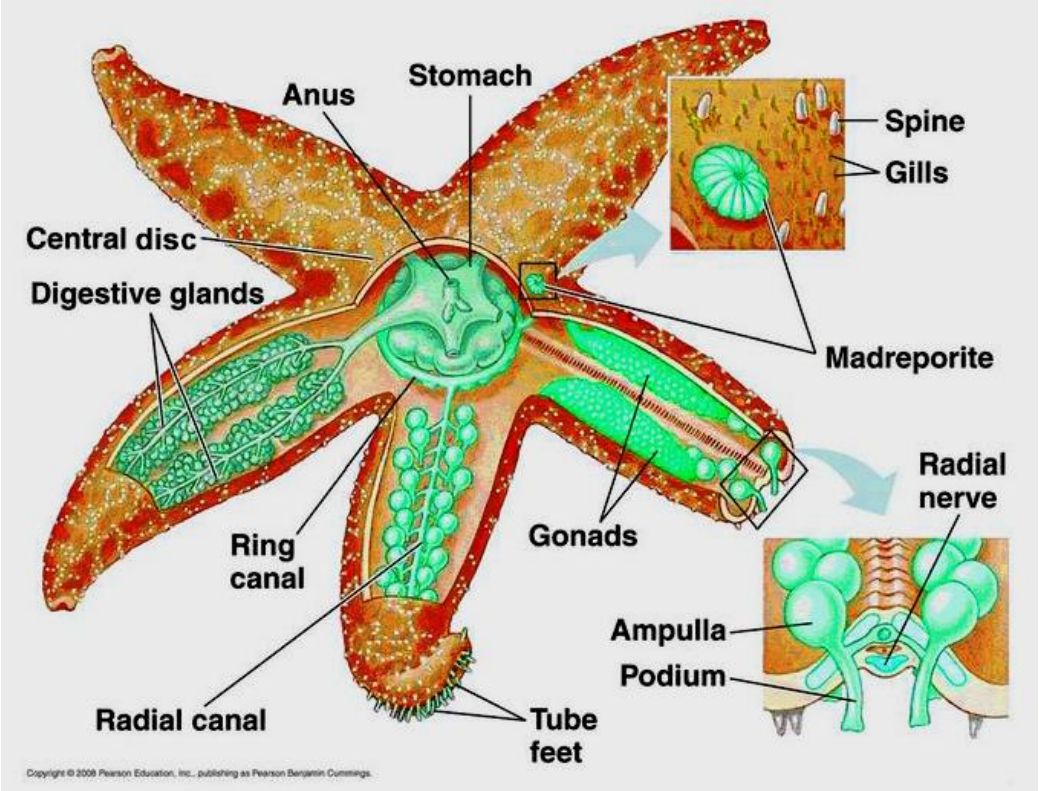
What is a Sea Star (Starfish)?

Sea stars are invertebrates related to sea urchins, sea cucumbers and sea biscuits, which are all echinoderms. Echinoderm means spiny skin—a reference to their hard skin, which helps to protect them from predators.

Sea stars have rows of tiny tube feet extending from the grooved surface on their underside. These tube feet allow them to crawl along the ocean floor using suction created by an internal water-driven hydraulic system. These animals also have an amazing ability to regenerate arms when they are severed, or even a new body in some species. All of their vital organs are located in the arms, so a portion of an arm could potentially grow a whole new sea star.

There are close to 2,000 species of sea stars in the world's oceans. Most species have five arms, but some have many more—even as many as 40!

(Source: https://aqua.org/explore/animals/sea-stars)



Anatomy of a Sea Star (Starfish)

(Source:https://quizlet.com/400583215/lab-final-starfish-external-anatomy-diagram/)

Common Sea Star (Starfish) A*sterias rubens*

Description - The Common Sea Star/Starfish is the most common and familiar starfish in the north-east Atlantic region. It may grow up to 52cm in diameter, but commonly 10 - 30m. The size of Common Starfish varies markedly with food availability and hence size is not necessarily a good indicator of age. It is variable in colour, though usually orange, pale brown or violet. It has five tapering arms, broad at the base and narrow at the tips, that are often slightly turned up at the tip when active.

Habitat – Common Sea Star/Starfish occurs in varying abundance upon a variety of surfaces that include coarse and shelly gravel and rock.

Additional information – The Common Sea Star/Starfish can regenerate its own arms if it loses one to a predator or trying to escape. Arms can take months, even years to fully regenerate, so it has to be a pretty serious situation to lose one. Incredibly, if the severed arm is not harmed, it can heal itself and even regenerate - resulting in a genetically identical starfish. Seawater is pumped throughout their body as a replacement for blood, with the water delivering key nutrients to the Common Sea Star/Starfish and allowing its organs to function properly. The use of water saves space as there is no need for a complex blood system. They have eyes at the end of each arm.

Brittle Star *(a collective name for a number of species)*

Description – There are several similar species of Brittle Star. The five arms are long (about five times the diameter of the central disk) and spiny. The upper disk surface has a 5-rayed pattern of spines. This species is very varied in colour, commonly brown or grey but ranging through purple, red, orange, yellow, and white. Colouration may be plain or banded (particularly on the arms). The arms are fragile and often broken.

Habitat - Found from the lower and mid intertidal zones to the sublittoral zone and beyond on hard surfaces including bedrock, boulders and on coarse sediment. Most abundant on tide swept rock and on mixed coarse sediments. In the intertidal these species are found in crevices and under boulders.

What are Sea Urchins?

Sea urchins belong to a group of marine invertebrates called Echinodermata, which means spiky-skinned. Animals in this group are known as echinoderms and also include sea cucumbers, sea lilies, brittle stars and Common Sea Stars/Starfish.

Sea urchins can be found in all of Earth's oceans. Some species live between the high and low tide lines near the seashore. Others live in the deep ocean, mostly up to 5,000 metres below the surface. The deepest a sea urchin has ever been recorded at is 7,340 metres.

Sea urchins first appeared around 450 million years ago. Of the groups present in our oceans today, the first to evolve were the Cidaroidea, appearing about 268 million years ago. These primitive sea urchins often have stubby, rounded-off spines.

The second group of sea urchins, Euechinoidea, evolved a little later and include the spiky creatures you may be more familiar with. This subclass is considered the 'modern' sea urchin.

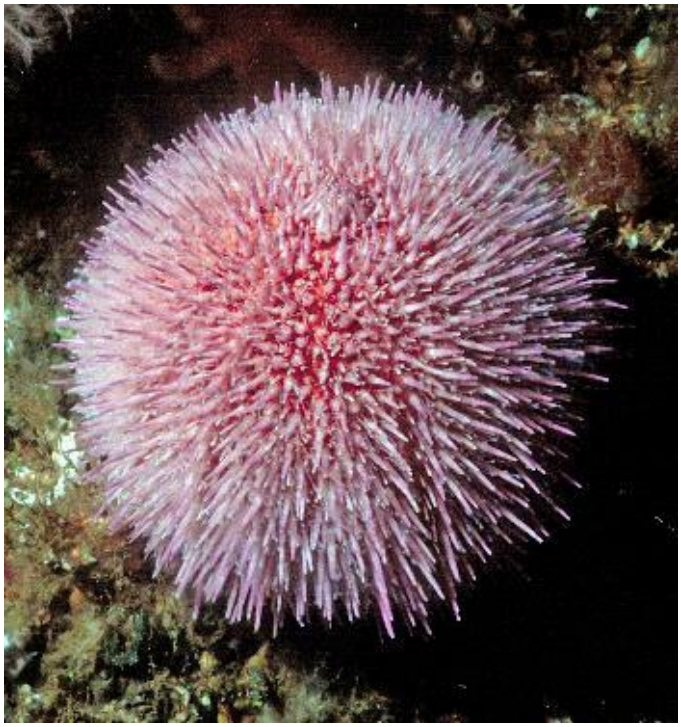
(Source: https://www.nhm.ac.uk/discover/sea-urchins-strange-and-spiny-wonders-of-the-ocean.html)

Green Sea Urchin *Psammechinus miliaris*

Description - An almost round, slightly flattened urchin that grows up to 57mm in diameter (although more typically to 35mm diameter). It is greenish in colour with distinctive violet tips to the spines. The spines are robust, short, and closely packed.

Habitat - Found on the intertidal zone on rocky shores under stones, boulders, and seaweeds especially Sugar Kelp. Also found in the sublittoral zone in seagrass beds or on mixed coarse bottoms such as muddy sand and gravel.

Edible Sea Urchin *Echinus esculentus*



Description - A large ball-shaped sea urchin, up to 15 -16cm in diameter at seven to eight years of age, although the largest diameter recorded was 17.6cm.

Habitat - Found on rocky surfaces from the sublittoral fringe to about 40m, although it may be found at depths of 100m or more.

Additional information - The first part of the Edible Sea Urchin's scientific name *Echinus esculentus* (Genus) is derived from the Greek 'echinos' meaning 'a hedgehog'. An omnivorous grazer feeding on seaweeds, Bryozoa, barnacles and other encrusting invertebrates. Size range varies depending on age and locality, e.g. ca 4cm at one year, 4 - 7cm at two years, 7 - 9cm at three years and 9 - 11 cm at four years.

Fish

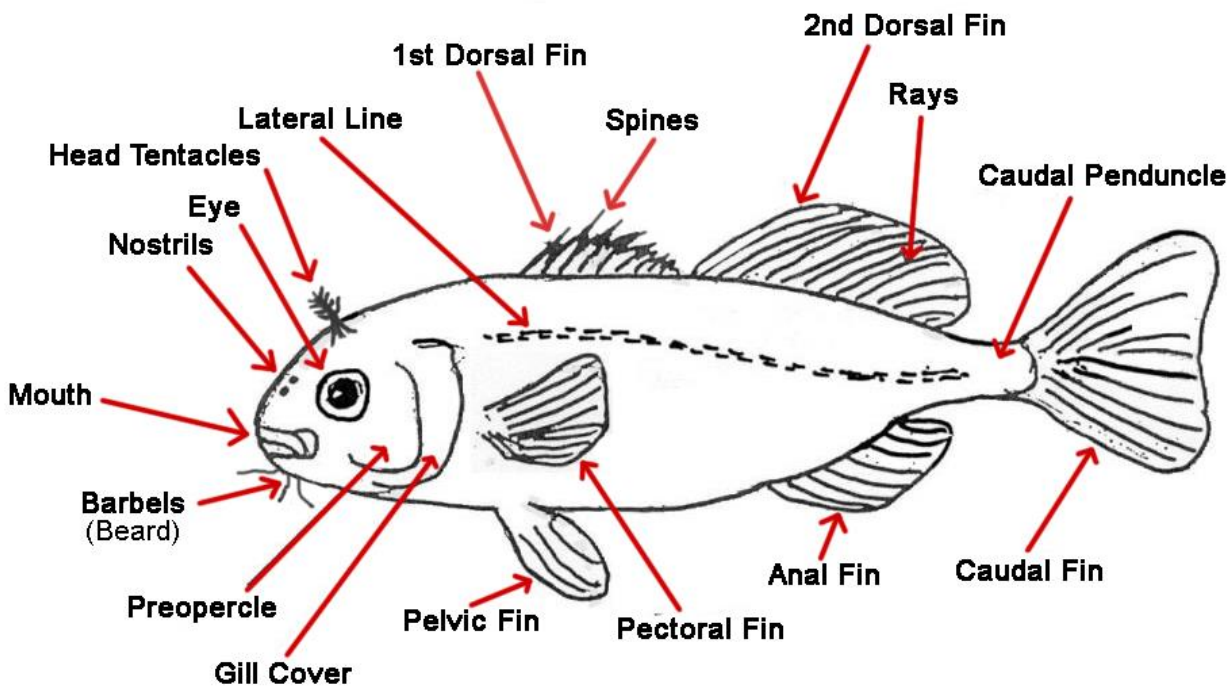
What is a Sea Fish?

This is a difficult question to answer because fishes have a huge variety of body forms.

The popular concept of a fish as an animal that has fins and scales, and lives in water, is not strictly correct. Many species of fish, such as the clingfishes, lack scales, and others such as some species of eels have no fins. Some fish, such as the lungfishes, can spend considerable time out of water.

All fish have a backbone or a notochord, and all breathe using gills. Some animals that are not fish, such as the axolotls, also breathe using gills. These animals however have fully formed limbs that are lacking in fish.

Nelson (1994) states that fish are 'aquatic vertebrates that have gills throughout life and limbs, if any, in the shape of fins'.



External Anatomy of a Fish

Source (modified): https://studylib.net/doc/5401234/the-marine-ingredients-organisation)

Butterfish *Pholis gunnellus*

Description - The Butterfish has a long, slightly flattened body up to 25cm long. This fish has thick fleshy lips and small, conical teeth. A black stripe is present through the eye. The dorsal fin is long, consisting of 75 - 82 spines, begins just behind the head and reaches to the base of the caudal fin. A series of around 12 distinctive black spots, outlined in white are present along its side. The butterfish is yellowish to reddish brown with irregular darker vertical bars or a mottled pattern on the body.

Habitat - Primarily found on the shore from mid to lower intertidal zones amongst seaweed, under rocks and in crevices. It is also common the sublittoral zone to 40m. Offshore it occurs amongst rocky areas but also on sand and muddy seabed.

Additional information - The Butterfish is related to Yarell's Blenny (*Chirolophis ascani*) and together these belong to a group called the Arctic blennies (Dipper, 2001). The butterfish is unusual in that both parents may take turns to guard the eggs. The name 'butterfish' comes from the slimy skin of this fish, making it very slippery and hard to catch.

Worm Pipefish *Nerophis lumbriciformis*

Description – The Worm Pipefish has a slender, smooth worm like body up to 15cm long. Its snout is short and upturned. It has a small dorsal fin but no pectoral, anal or tail fins. It is dark green or brown above while the underside is paler, white to yellowish in colour, sometimes with paler spots or bars.

Habitat - Found under boulders or amongst seaweed on the lower and mid intertidal zones and shallow water.

Additional information – The Worm Pipefish usually eats small crustaceans like copepods. They are related to the Seahorse and like it, the males protect the eggs until they hatch. The female transfers about 150 eggs into a shallow groove on the male's belly. Egg-carrying males can be found from May to August.

Shanny *Lipophrys pholis*

Description - The Shanny, a species of blenny, has a smooth, elongated body, and measures up to 16cm in length. Its colouration varies with surrounding habitat from dark brown or blotched to blackish, with a dark spot behind the first dorsal fin. The blennies in general have an elongated body with a large, blunt head, fairly large eyes, and small tentacles on the head. The Shanny has similar characteristics to other blennies, although it has no head tentacles, and its eyes are set high up on its head. Older animals develop a fleshy ridge on their forehead.

Habitat - Most commonly found on the shore in rockpools, or hiding under damp stones and seaweed, from where it emerges at high tide to forage over the shore. An adaptable species, it is also often found around man-made structures such as pier pilings.

Additional information - The adult stays in the same area for their entire life after settling there as a juvenile. Spawning takes place from April to August and collections of eggs can be found stuck to the undersides of boulders. The males will guard the eggs after fertilisation has taken place and will remain there until the eggs hatch. The juveniles will then take two years before they become sexually mature.

Five-bearded Rockling *Ciliata mustela*

Description - The five-bearded rockling is a long, slender fish that may reach up to 25cm in length. Its body is covered with smooth, scaleless skin. The five-bearded rockling has notably long dorsal and anal fins. It is easily recognisable by the five barbels around its mouth, two above each nostril and one on the lower jaw. The mouth itself is small and the corners of the mouth barely extend past the eyes. It is dark brown in colour.

Habitat - The five-bearded rockling is a demersal species that inhabits shallow water down to 20m, usually over sand and under intertidal rocks.

Additional information - Five-bearded Rockling can be distinguished from Shore Rockling (*Gaidropsarus mediterraneus*) by the five barbels around its mouth, while the Shore rockling only has three.

The Value of the Marine World of Cork Harbour

The aim of showing people the biodiversity and geology of Cork Harbour is to help them value it not only as an amenity but as a wonderful and valuable place not just for us but for all the creatures we share it with.

If we can do that poeple are less likely to treat it badly by polluting it or damaging important habitats for marine life and the birds and animals that live there.

It is worth protecting the biodiversity of Cork Harbour for its own sake, but also for its recreational and financial value to the people living around the harbour.

A 2-minute strand clean-up is an opportunity to have people do something practical to help improve the environment and will hopefully make them more aware of the need to minimise or stop the pollution of this amazing harbour.

Glossary

Acrorhagi	Specialized tentacles containing stinging cells.
Adductor muscle	The adductor muscle is used to hold the two shells together allowing the mussel to close its shell.
Algae	Single or multicellular predominantly aquatic plant organisms.
Amphipod Crustacean	A small crustacean that is similar in appearance to a shrimp but has no shell.
Antennule	A small antenna, especially either of the first pair of antennae in a crustacean.
Aperture (snail)	The opening of a snail shell from which the snail's soft body emerges, sometimes called the "mouth."
Apex (snail)	the top end of a shell's columella, opposite the umbilicus and furthest from the aperture.
Apical circle	A groove near the top of the shell.
Beak (shells)	The oldest part of the shell, located near the hinge.

Bioluminescence	The biochemical emission of light by living organisms such as plankton and deep-sea fish.
Bivalve mollusc	A shellfish with two shells linked by a hinge such as cockles and mussels.
Brackish	Part fresh and part salt water.
Bryozoa	Usually sedentary mat-like colony forming simple marine invertebrates. Colony appearances are diverse, typically encrusting or branching, many of them calcified.
Byssus (shells)	A tuft of tough silky filaments by which mussels and some other bivalves adhere to rocks and other objects.
Carapace (crabs etc.)	The hard upper shell of a crustacean such a crab or lobster.
Cardinal teeth	Projections about the middle of the shell hinge
Chaetae	Bristles of polychaeta (Bristle worms).
Chelae (crabs etc.)	A pair of hinged pincer-like claws on the front limbs of a crab or lobster, typically Curved and sharply pointed and used for feeding, defence, and courtship.
Chelipeds	One of the pair of legs that bears the large claws in ten legged crustaceans such as crabs.
Chondrophore (shells)	A cavity that supports the internal hinge cartilage between the two shells of a bivalve mollusc.
Chondrophore (animal)	Small jellyfish-looking animal best known for their species known as By-the-wind-sailor (Velella velella)
Circalittoral	The subzone of the rocky sublittoral zone below that dominated by seaweeds/algae and dominated by animals.
Commensal	Living in a relationship in which one organism obtains food or other benefits from another without damaging or benefiting it.
Coralline	Derived or formed from coral.
Crenulated (shells)	Having an irregularly wavy or serrate outline.
Detritus	Organic matter produced by the decomposition of organisms.
Diatoms	Single-celled algae which have a cell wall of silica. Many kinds are planktonic.
Digitate	Having radiating divisions or leaflets resembling the fingers of a hand.
Discoid	A thing that is shaped like a disc.
Dorsal	Relating to or situated near or on the back especially of an animal or of one of its parts.
Dorso-ventrally	Referring to the axis between the dorsal and the ventral of an animal.
Ears (shells)	Small extension of dorsal region of bivalve shell, usually with a notch between it and main part of shell.
Epiphyte	Plant that grows on the outer surface of another organism.
Flexion	The action of bending or the condition of being bent, especially the bending of a limb or joint.
Foot (snail)	The muscular organ whose contractions propel a sea snail, the foot is located on the under surface of the animal's soft body.
Frond	The leaf or leaflike part of a seaweed. It gives a surface to absorb sunlight.
Gastropod	Any of a large class of molluscs, such as sea snails and slugs, usually with a single shell or none and a distinct head bearing sensory organs.
Gonads	A reproductive gland (such as an ovary or testis) that produces gametes.
Gregarious	Living in groups or loosely organized communities.
Hermaphrodite	An animal or plant having both male and female reproductive organs, structures, or tissue.
Holdfast	The part of some seaweeds used to hold or secure it in place, usually on something hard like rock and can look like roots.
Intertidal	The area where the ocean meets the land between high and low tides.

Invertebrate	Any animal that lacks a vertebral column, or backbone, in contrast to the cartilaginous or bony vertebrates.
Isopod	An order of crustacean, which includes Woodlice, Sea Slaters and their relatives.
Kelp	Any of various large marine brown algae that are large seaweeds (order Laminariales) growing in cool waters.
Larva	The first life-stage of an organism, which usually looks very different from the adult and may have a different habitat.
Ligament (shells)	The ligament joins the two shell parts along the hinge margin, it is elastic, mostly brown or black in colour and serves to open the shell when the adductor muscles relax.
Mollusc	An invertebrate of a large phylum which includes snails, slugs, mussels, and octopuses. They have a soft unsegmented body and live in aquatic or damp habitats, and most kinds have an external calcareous shell.
Morphology	The study of the shapes and arrangement of parts of organisms, in order to determine their function, their development, and how they may have been shaped by evolution.
Neap Tide	Either of the two tides that occur midway between spring tides and attain the least height.
Omnivore	An animal that eats a variety of food of both plant and animal origin.
Opercular Aperture (barnacle)	A protein-based or calcium-based lid that covers the shell opening (shell aperture).
Oral arms (Jellyfish)	Long appendages move captured prey to the animal's mouth.
Pallial line (shells)	A mark (a line) on the interior of each valve of the shell of a bivalve mollusk. This line shows where all of the mantle muscles were attached in life.
Pallial sinus (shells)	An indentation or inward bending in the pallial line that corresponds to the position of the siphons in those types of clams which have siphons.
Pelagic	Inhabiting the surface waters of the sea.
Periostracum	The outside layer of a shell (periostracum) is a thin horn-like layer composed of an organic material.
Phytoplankton	Freely floating, often minute organisms that drift with water currents.
Plankton	The small and microscopic organisms drifting or floating in the sea or fresh water, consisting chiefly of diatoms, protozoans, small crustaceans, and the eggs and larval stages of larger animals.
Planktotrophic	Feeding on small, suspended material in the water column.
Posteriorly (shells)	The back side of the shell.
Radial canals (Jellyfish)	They help distribute the digested food to other parts of the jellyfish's body.
Radiating ribs (shells)	Ridge-like structures on the outside of a shell that might contribute to the burrowing process.
Reticulate	In the form of mesh or net.
Rostrum	A beaklike projection, especially a stiff snout or anterior prolongation of the head in a crustacean.
Sculpture (shells)	Three-dimensional ornamentation on the outer surface of the shell, as distinct from either the basic shape of the shell itself or the pattern of colouration, if any.
Sea slug	A shell-less marine mollusc which is typically brightly coloured, with external gills and a number of appendages on the upper surface.
Sessile	Sedentary – permanently attached to the substratum.
Siphon (shells)	Tube-like structures in which water (or, more rarely, air) flows. The water flow is used for one or more purposes such as locomotion, feeding, respiration, and reproduction.

Siphonal canal	A semi-tubular extension of the aperture of the shell through which the siphon is extended when the animal is active.
Spire (snail)	The part of a snail shell above the final full whorl.
Stipe	Joins the fronds/ body to the holdfast, like a stalk.
Sublittoral	The region in an ocean between the lowest point exposed by a low tide and the margin of the continental shelf.
Sublittoral fringe	The upper part of the sublittoral zone that is uncovered by the tide.
Substrata	An underlying layer or substance, in particular a layer of rock or soil beneath the surface of the ground.
Substratum	Material available for colonisation by plants and animals.
Subtidal	Of or relating to, inhabiting or existing in the region below the level of low tide, that is always underwater.
Supralittoral	The seashore zone permanently above water but made damp by spray from waves.
Test	Layer that encloses the body.
Turreted	Having or resembling a turret or turrets.
Umbones (shells)	One of the lateral prominences just above the hinge of a bivalve shell.
Umbrella (Jellyfish)	The main feature of a true jellyfish, the umbrella-shaped bell.
Valve (shells)	Bivalve molluscs (e.g. clams and oysters) have a shell which is composed of two separate but articulating parts. Each one of these two parts is known as a "valve".
Whorl (snail)	A single, complete 360° revolution or turn in the spiral or whorled growth of a mollusc shell.
Zooids	Individual animals connected together in a common mass constituting a colony.
Zooplankton	Small floating or weakly swimming organisms that drift with water currents.

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Marine Dimensions (https://marinedimensions.ie/)

AlgaeBase (https://www.algaebase.org/)

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Small-eyed Ray https://fishingwales.net/species/small-eye-ray/


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