Hands On Learning
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SHELLS Z15/A

Human beings have hard bones inside their body to support and protect the soft, fleshy bits. Some animals though, have a hard outer case to do the same job. Insects and molluscs both do this, as well as many other groups of animals.

Most shells that you find on the beach were made by molluscs. There are said to be about 112,000 species within this group, including species of squid and octopus. True, octupuses and squid have soft, shell-less bodies, but they did have shells once, although over time they have evolved so that they no longer have them!

Shells are usually made of a substance called nacre. Mollusc blood is rich in dissolved calcium and this, in the form of calcium carbonate, is one of the basic chemicals of the shell. Nacre is continually deposited onto the inner surface of the animal's shell and forms the iridescent layer known as Mother of Pearl. Shells may grow over time as the animal inside adds nacre to the leading edge near the opening. This causes the shell to become longer and wider to better accommodate the growing animal inside.

All the shells in this box are from the warm Indian and Pacific Oceans. They are more colourful and strangely shaped than most of the shells that are found in the North Atlantic and around the coasts of Britain. When they had a living creature inside they would have been even more exotic. They are frequently encrusted with other shells and weed, and their flesh, which protrudes from the opening, is often brightly coloured and elaborately folded.

Tiger Cowry (*Cypraea tigris*)



Cowry shells are found chiefly in tropical regions. The shell itself is almost always smooth and more or less egg-shaped, with a long, narrow, slit-like opening. Most varieties have a porcelain-like shine and many have colourful patterns.

The Tiger Cowry is probably the best known of all the cowries and the most variable in size, shape and colour. It is found throughout the Indian and Pacific Oceans. It can be seen under rocks or resting on soft corals during the day and foraging for food at night.

Reading Borough Council

Heritage Lottery Fund

Pink Abalone (*Haliotis corrugata*)



Members of the Haliotidae family such as this cling to rocks with a muscular foot like a limpet. Their shells have a series of holes through which water and waste matter is passed. The number of open holes depends on the species. Abalones reach maturity at a small size. Their fertility is high and increases with size (from 10,000 to 11 million eggs at a time). The inner surface of the shell is iridescent and for this reason they are collected and used to make jewellery.

Abalones are also widely eaten. In the Channel Islands Ormers (*Haliotis tuberculata*) are considered a delicacy and have been seriously overfished. Gathering Ormers is now strictly regulated in order to preserve stocks. Any breach of these laws is a criminal offence and can lead to a heavy fine. The demand for Ormers is such that they led to the world's first underwater arrest, when Mr Kempthorne-Leigh of Guernsey was arrested by a police officer in full diving gear when illegally diving for Ormers! In some places Abalones are farmed for their shells and their meat.



Above: An abalone farm.

In the case of the Pink Abalone there are usually 3-4 open holes. Species in the Haliotidae family have a worldwide distribution, along the coastal waters of every continent, except South America and the East Coast of the United States of America, though the Pink Abalone is only found on the coast of California.

Magnificent Volute (Cymbiolena magnifica)



The *Volutidae* or volutes are found mainly in tropical seas, though some species also inhabit the waters of the polar circles. They can grow up to 25 cm (10 inches) in length. They are distinguished by their distinctively marked spiral shells (to which the family name refers, *voluta* meaning 'scroll' in Latin). Volutes are carnivorous, preying on small animals, including other molluscs and echinoderms.

The Magnificent Volute is found off the coast of eastern Australia down to a depth of 230 metres. They are buried in the sand by day and come to the surface to hunt for food at night.

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Striated Cone (*Conus striatus*)



The *Conus* group is one of the most popular with shell collectors as they are generally beautifully coloured and patterned. All members of the group are carnivorous, generally eating marine worms, small fish, and even other molluscs. They kill their prey by injecting poison with a harpoon shaped barb or tooth. Some species are able to catch fast-moving prey such as fish. Most of them are not harmful to humans, but a few species can cause death. The picture to the right shows a Geographic Cone (*Conus geographus)*. This *Conus* species is highly venomous and is known colloquially as the Cigarette Snail, in the belief that the victim will only have enough time to smoke a cigarette before perishing!



The Striated Cone is found in both the Indian Ocean and the Pacific. Like the Geographic Cone it is a piscivore that is, it hunts and eats fish. Its venom is dangerous to human beings.

Hebrew Cone (*Conus ebraeus*)



Another Conus species from the Indo-Pacific region. A small, chunky shell with three distinctive bands of chevron markings. It lives in shallow waters down to about 3 metres and feeds on worms.

Polished Nerite (*Nerita polita*)



A small, but strikingly banded shell from the Indo-Pacific region. The Polished Nerite lives on beaches beneath the surface of the sand at the high tide line and feeds on algae.

Mediterranean Pelican's Foot (*Aporrhais serresianus*)



Unfortunately this specimen has lost the extensions which make it look like a pelican's foot. (Its Latin name is derived from that of Pierre Marcel Toussaint de Serres, 1780-1862, a French geologist). Unlike the other shells in the box, this species lives in cool seas. It can be found all the way from Iceland down to the Mediterranean. All species of Aporrhaidae are actively carnivorous.

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Thrush Cowry (*Cypraea (Erosaria) turdus*)



A cowry species that lives in the Red Sea region. Most cowries have a smooth shell and a porcelain-like shine, although this example has also been worn smooth by the action of the sea.

Laciniate Conch (*Strombus (Tricornis) sinuatus*)



At least 65 species of conch are known to exist. Most are in the Indo-Pacific Oceans, while a few are found in the western Pacific and the Caribbean region. They are all herbivores (plant eaters), living mostly in shallow , sandy areas. Conches are active browsers in the shallow waters around coral reefs. They have a characteristic leaping motion when they move. They lay eggs in long, gelatinous strands.



The Laciniate Conch is found in the south-west Pacific, particularly around the Philippines. It is a member of the Strombidae family. Strombids have long eye stalks, a long and narrow aperture, and a siphonal canal with an indentation near the anterior end called a stromboid notch, through which the conch can extrude one of its eyes (see the photograph, right, which shows the protruding eyes of another conch, *Strombus alatus*). They grow a flared lip upon reaching sexual maturity.

Ram's Murex (Chicoreus ramosus)



This is one of many species which belong to the large Muricidae family. At least 1,000 species are known. The shell spire is usually ornamented with protective knobs, ribs, or spines. Most species are carnivorous, feeding on other molluscs and on barnacles.

The Ram's Murex is also known as the Giant Murex. It is found in the Pacific, the Indian Ocean and the Red Sea.

Miscellaneous Shells



These are for **you** to identify ...