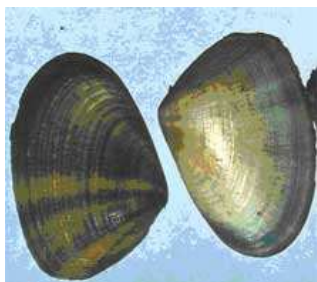


Old Pipi Shells (*Donax deltoids*)



Pipis are the largest of the Wedge Shells - agile bivalves that live on the lower slopes of sandy beaches and the most common mollusc on many ocean beaches. When uncovered by waves they quickly rebury themselves. Rapid digging is possible because of their smooth, solid triangular shells and a muscular 'foot'.

The pipi lives only a few centimetres below the surface, its presence often indicated by two small holes in the sand, and because it lives where at times it may be caught and knocked about by the waves the shell is very strong. At certain seasons and places, hundreds of small specimens of varying size, perhaps up to 2cm in width, are exposed as every wave recedes. It is then interesting to see how quickly they move and disappear beneath the sand again.



Oyster Shells

Oysters are a part of international cuisine and have been recognised as a delicacy since the times of the ancient Greeks and Romans. Increased pressure on natural populations has led to the farming and cultivation of oysters in Australia since the 1870's.

The valuable edible rock-oyster shell has two valves that are rather irregular in shape, purplish-blue on the outside and white inside. One, the left, is attached to rock or other solid object, and becomes modified in its growth by reason of this contact. It forms a cavity for the viscera. The right valve is flattened and fits in more or less exactly with the irregularities of the left one. Young oysters settle down at an early age of about two to three weeks, when they are almost microscopic and they never move away again. Indeed, they cannot change their position, and must stay where they settle unless their support is shifted by human hands or the waves. It may surprise many to hear that oysters have marine enemies - starfish, birds and crabs can actually open oyster shells and insidious worm parasites and members of the mollusc group itself can bore through the shell.



Razor Shells (or Razor Clams)

Large pointed bivalve that lives rooted in the sand or mud narrow end down and wide sharp edged end projecting above the surface of the sediment. The sharp projected edge gives them their name – beware of

stepping on them in the seagrass at low tide!



Chinaman's Fingernails

A bivalve with a very distinctive shape that allows it to burrow itself in soft sand faster than a human could dig. It can bury itself to a depth of 30cm or more if conditions allow and may do so as a result of heavy surf as it is often found on surf beaches. When the two shells (or valves) are closed gaps still exist at the top and bottom ends. The gap at the top end allows siphons to protrude and enable the animal to obtain water when close to the surface. The large foot protrudes from the bottom end like a long yellow cylindrical tongue and can be extended quickly and very forcibly far outside the shell. When in action the foot is pushed down through the sand to its fullest possible extent. Then the creature causes the tip of the foot to expand and act as a holdfast, whilst at the same time the whole foot is contracted in length. The consequence is that the animal is literally pulled down after its foot. It is by the very quick repetition of this movement that the burrowing is achieved. The shapes of the shells as well as the development of the foot are both adaptations to this end. When the tide is out and a fingernail shell lying near the top of its burrow is disturbed the first indication of its descent is usually a quick squirt of water.



Cockle Shell

Also known as heart cockles due to their heart shaped outlines when intact (both valves) and held sideways.



Circular Clam

Common North Australian 'circular' mollusc that grows to 50mm diameter and burrows in intertidal sand flats.



Mantis Shrimp Hole

Mantis Shrimp are crustaceans with prawn like bodies but are usually larger than prawns with some species exceeding 30cm in length. Some of the

tropical species are brightly coloured with vivid splashes of colour. They usually occur in the intertidal region and in shallow, coastal marine waters, burrowing into the sand or sheltering in crevices and holes in rocks or coral.

Evidence of Mantis Shrimp activity can be found beachcombing by studying their prey. Mantis Shrimp are predatory and they hunt small fish, other crustaceans such as prawns or molluscs such as bivalves. To capture this prey they use their large pair of second legs which either have a grasping function using a set of sharp spines on the inside face to pierce the prey's shell or a hammering function used to batter the prey. Larger species with a 'hammer' have sometimes been known to break the glass walls of fish tanks! This hammer action is reported to be the fastest recorded action of any animal!

Some of the shells washed up on beaches are the remains of the Mantis Shrimp Prey and feature larger holes created by the Shrimp's 'spines' or 'hammer'.



Snail Hole

The hole left by carnivorous molluscs such as the moon snail in their prey (pipis, clams etc) is very small (1mm diameter) and perfectly circular. The hole is made by the predators drill-like 'radula' and aided by acidic shell softening secretions. The proboscis of the predator is then inserted into the hole and the body of the prey eaten.



Moon Snail

A carnivorous snail with a large fleshy body. They leave a meandering trail as they hunt bivalves on intertidal sand flats. To capture their prey they drill a tiny hole through its shell (see above). Females lay egg masses of stiffened jelly in which tiny eggs are embedded, forming sandy egg collars common on sand flats.



Murex Shell

There are over 1000 different species of Murex shells throughout the world. They are most notable for their 'spikes' (when intact) and 'spines'. The spikes serve to protect (who would eat a spiny shell?) and help camouflage the shell (trapping mud or providing anchor points for growths such as sea weed etc) while the spines strengthen the shell. Murex shells are carnivorous, feeding on a range of invertebrate prey such as other molluscs, barnacles and worms. They attack prey such as molluscs by drilling holes in their shells with a rotating 'radula' and shell softening secretions. Different species of Murex Shells have different behaviours with some species laying their eggs on each other's backs while some live amongst rocks and others amongst coral, mud or buried in muddy sand.



Sundial

These attractive shells have quite a flat base and a shallow raised cone above. They tend to live in shallow waters throughout the world.



Wrinkle Pod Mangrove Fruit

The Wrinkle Pod Mangrove (*Cynometra iripa*) is a small, straggly untidy shrub growing very high in the intertidal zone on the landward edge of the mangrove forest. While many people think the fruit looks like a brain or an old bald parrot and is referred to as 'kidney-shaped' in mangrove guides 'Cyno-metra' actually means *dogs uterus* in Greek in reference to the peculiar shape of the fruit while the latin word 'iripa' is the derivation of riparian and means *within the stream bank*. The wrinkled fruit is only produced in the summers of years of abundant rain and relies on a pithy wall for buoyancy to disperse its single seed. The Wrinkle Pod Mangrove is also found in India where a lotion prepared from the leaves and oil extracted from the seeds has been used as a treatment for leprosy and scabies.



Cannonball Mangrove Seed

The Cannonball Mangrove (*Xylocarpus granatum*) is a large mangrove (to 25m) growing upstream in tropical estuaries with distinctive large buttress roots and ‘cannonball’ like fruits from June to September. These large spherical fruit contain between 8 and 20 almost tetrahedral (four faces, four apices and six edges) seeds and can grow to 25cm width giving the tree both it’s common name (cannonball) and it’s scientific name – *Xylocarpus* means *woody fruit* and *granatum* means *having many seeds*.

It is the individual seeds which are found washed up on tropical beaches as the fruit splits naturally after falling. Small air spaces in the corky seed coat give the seed buoyancy and allow it to float up onto beaches. In many specimens there is a rough, stubby outgrowth which is the first root. Some Cannonball Mangrove seeds germinate while still floating which is very unusual for species dispersed by ocean currents.

Because the seeds fit neatly together like a three dimensional puzzle the fruit is also referred to as monkey puzzle nuts. The timber is also similar to the famous timber tree Red Cedar to which it is related but is only available in small sizes.



Mangrove Seedling

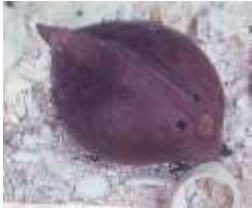
The long slender mangrove seedlings commonly found on the beach may be from the Yellow Mangrove (*Ceriops tagal*) if they are about 20cm long and only 1cm thick, the Red Mangrove (*Rhizophora stylosa*) or the Tall Stilted Mangrove (*Rhizophora apiculata*) if they are up to 40cm long and 2cm wide, *Rhizophora mucronata* if they are up to 60cm long or the Orange Mangrove (*Bruguiera gymnorrhiza*) if they are up to 25cm long and 2 cm wide.

Interestingly, all these species have seeds that germinate while still attached to the parent tree and the seedlings remain attached while they grow – this process is called vivipary. The small fruiting body of *rhizophora* is also sometimes present and resembles a small pear.



Orange Mangrove Flowercase (*Bruguiera gymnorrhiza*)

The spent flowers of the Orange Mangrove are among the most eye catching items when beachcombing. They are brightly coloured when fresh and shaped like bells with a fringe of rigid claws. The flower is still attached to the long slender propagule when it falls from the parent tree in late summer generally but usually separates before it washes ashore elsewhere. Apart from the flower the Orange Mangrove can be recognised by its large distinctive knee roots.



Looking-Glass Mangrove Fruit

The Looking Glass Mangrove is a tall mangrove growing in tropical rivers in areas of high rainfall. Large leaves with silvery white undersides along with the distinctive ‘keel’ on the fruit help to identify the mangrove. The 10cm long fruit is produced in groups of five from each flower and is buoyant thanks to a space between the shell and the single seed which is reported to be edible but not delicious. The keel acts as a sail when the fruit is floating to aid dispersal while the many holes often present are a result of insects which have entered or emerged from the shell before or after eating (and destroying) the seed.



Nicker Nut Seed

The Nicker Nut or Wait-a-while (not the same as the better known rainforest wait-a-while) is a robust scrambler with a pair of hooked prickles at the base of each pair of leaflets, more on the leaf axis and still more scattered over the plant. The plant produces 6cm long densely prickled seed pods which crack open on the plant to reveal one or two marble (or porcelain) like seeds. The 1.5 to 2cm wide seeds are slightly flattened with a stony blue-grey coat and a round brown spot where the seed was attached to the pod. Surrounding the spot are fine concentric seeds extending over the whole seed.

The seeds are capable of remaining afloat for extremely long periods of time and travelling extremely long distances with specimens from the West Indies reaching Scandinavian shores. Experiments have shown the seeds capable of floating in sea water for two and a half years while seeds planted after one year’s immersion germinated.

The leaves have been used in some countries as a treatment for worms.



Alexandrian Laurel or Ball Fruit (*Calophyllum inophyllum*)

Calophyllums are a distinctive tree thanks to their large size, habit of branching from the base to spread out over sandy beaches (making them fantastic for tree climbing), spherical golf ball sized green fruits and large, elliptical, tough glossy leaves (in Greek *kalos* is beautiful while *phylon* is leaf). They are common from Cardwell north along the high tide mark of sandy beaches where their bases may be lapped by saltwater at high tide or during storms. When the fruit drops the green fleshy layer wrinkles and turns brown. If the seed then floats in the sea for long enough it loses this fleshy layer altogether leaving a few fibrous strands which in turn too are lost leaving a hard light brown shell which is almost perfectly spherical but for a small beak at the stalk end. The buoyancy is due to the oily nature of the seed and spongy tissue between the shell and seed.

The fruits have been found to float for up to four months but the seed may not be viable after such a period. They are not edible, but the green oil which can be extracted from them has been used for lighting, soap making and a wide variety of medicinal purposes including the treatment of skin disorders and rheumatism. Aboriginal people also reportedly ground the seed and used it to relieve pain.



Pandanus Fruit

Queensland species of Pandanus are also known as Screw Pines (from the spiral arrangement of leaves) or Breadfruit (due to the fruit's resemblance to the true breadfruit which Captain Bligh was carrying on his way to the West Indies when his crew mutinied). The slender leaves can be up to 2m long and have needle sharp prickles along their length. The fruit grows on the female trees to about head size and consists of numerous segments or syncarps which separate from each other and drop when ripe. Each syncarp holds numerous oily seeds in individual cavities inside a woody structure surrounded by a pithy-fibrous layer which gives buoyancy. If the syncarp spends enough time getting washed up and down and along a beach the fibrous layer will be abraded away leaving an irregular disc penetrated by several holes which were the individual seed cavities.



Coastal Sheoak Cone (*Casuarina equisetifolia*)

Large numbers of Casuarinas grow along North Queensland beaches with Holloways Beach no exception – they are the dominant foreshore species from the centre down to the mouth of Richters Creek. As a result of this there are thousands of the rounded spiky cones accumulated at the top of the beach. Unlike other plants in the activity however, this cone or pod does not assist seed dispersal as the tiny winged seeds have already left the cone by the time it drops off the tree.

The name Casuarina was given due to the resemblance of the fine soft foliage to the plumage of the Cassowary (*Casuarius*). This needle-like foliage is usually assumed to be the leaves but is actually the branchlets. Along the branchlets are seven toothed whorls of scales which are the actual leaves and towards the swollen end of the branchlet male and female flowers appear in spring. Following fertilization of the flowers the surrounding leaf scales increase in size and become fused to form the nobbly wooded cone. As the cone dries it cracks and leaves numerous slits from each of which a small winged nut escapes.

The roots also have a specialised ball like structure containing bacterium which convert atmospheric nitrogen to a form usable by the plant. This is very important as it allows the casuarina to live in the infertile sand at the top of the beach. This means it can be used to help prevent erosion along inhabited beaches by stabilizing the foreshore and enriching the soil (by the dropping and breaking down of the branchlets) which allows other species which can not survive in bare sand to grow.

It is reported that Aboriginal people soaked the cones of casuarinas in their drinking water to give it a lemon flavour. At times when water was scarce, they chewed the needle-like stems. This made their saliva flow more and decreased the need for water. Some casuarinas develop hollows in their trunks which trap water. To get this the Aborigines would find a hollow tube to use as a straw or soak the water up with a ball of crushed grass. Sheoak wood is hard and suitable for making implements like spears, spear throwers, clubs, shields, digging sticks and clapping sticks. Returning boomerangs were carved from the roots, using the natural bends to advantage.



Beach Almond Fruit (*Terminalia Cattapa*).

The Beach (or Sea) Almond is a common tree along the foreshore in front of HBEEC. It is recognisable because of its large (up to 35cm), sometimes colourful leaves (winter) that fall from the branches annually. The tree produces fruits up to 10cm long which have a thin flesh covering a fibrous stone and a distinct flange around the outside. The stone contains a kernel which has a flavour like that of the common almond but is far harder to extract from its shell. Cockatoos crack through the tough outer covering with their sharp strong beaks and enjoy eating this fruit and flying foxes love eating the fleshy covering (be careful parking under these trees at night!) but humans usually use a large knife to access the small kernel. These fruits can remain afloat for at least two years.

Juice of the young leaves has been used in parts of India to make an ointment for skin disease while the bark has been used to treat dysentery. Also present on the beach is the similar but smaller fruit of the closely related *Terminalia arenicola*.

Further Reading and Reference List

The information above was obtained from the following sources along with anecdotal and general information.

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