

Investigate how the height to width ratio of limpets varies with distance from se...



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The term Limpet is a common name used for many different types of saltwater or freshwater snails that have a simple shell which is conical in shape, and coiled in appearance(1). The majority of this species are commonly found attached strongly to rocks or other hard surfaces such as pebbles and sand on exposed rocky shores. They attach themselves to rocks using pedal mucus and a muscular foot. They move using wave-like muscular contractions of the foot when it is suitable for them to feed, usually at high tide.

A adaptation of the Limpet to its particular surroundings, enable them to stick to the rock surface when necessary so that they remain safely attached, essential due to the exposure to strong prevailing winds and destructive wave action. The ability to remain secured to the rock also seals the shell edge against the rock surface, which prevents water loss when the tide is out. This action stimulates chemicals to be released, which increases the rate of vertical growth of their shell(4). Other adaptations which have increased the survival rate of Limpets include their structually strong shell which provides protection from destructive waves and predators.

The shell is of similar colour to the surroundings and with a cover of green algae, the Limpet is provided with camoflauge. Most Limpets feed by grazing on algae or brown seaweed, which grows on the rock or other surface in the same location. They scrape up films of algae with a radula; a ribbon-like tongue with longitudinal rows of teeth (10). Food and movement paths are identified by two tentacles which are located above the rudala. When Limpets feed on soft rock, feeding trails are often visible due to the action of the radula. There are two common species of Limpet found on rocky shores

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in England, the Common Limpet (*Patella Vulgata*) being the most abundant, and the Black-Footed Limpet (*Patella Dipressa*)(2).

The Common Limpet is the largest limpet, with shells reaching a diameter of up to 6cm and generally taller shells than the *Patella Dipressa*; they are also more steeply conical in shape. The muscular foot colour is can vary from a greyish green to pale yellow. This species of are shorter in height but have wider diameters than the common limpet. The Black-Footed Limpet is generally flatter than the common limpet, as it is found in more exposed locations, therefore favouring a more streamline shape. The foot as stated in the name, is dark grey or black in colour. Some species of limpets return to the same spot on the rock known as a " home scar" just before the tide retreats by following a mucus trail that was left from their movement.

The mucus contains high levels of Nitrogen which stimulate the growth of more algae. The shape of their shell often grows to precisely match the contours of the rock surrounding the scar, consequently allowing the Limpet to form a better seal to the rock(3) . Because of this, Limpets display signs of territoriality and will smash into other organisms with their shell to compete for their patch. Limpets found on exposed shores, which have fewer rock pools than sheltered shores and a minimal amount of water, are at greater risk of desiccation due to increased sunlight, water evaporation and the higher wind speed. Therefore shell height is often higher. Limpets reproduce once a year, usually during winter.

Limpets are hermaphrodites, maturing as males at 9 months and undergoing sex change after 2 years (8). Rough tides disperse the eggs and sperm, the

larvae are suspended in the sea before securing themselves to a hard surface. The environment in which these organisms are found, benefits greatly from their presence. The area is kept clear of algae; however this does have a decreasing affect of the number of other species which are able to live successfully such as Barnacles (9).

A typical rocky shore can be divided into a spray zone (also known as the supratidal zone, which is located above the spring high-tide line and is covered by water only during storms. The intertidal zone is between the high and low tidal extremes and can be separated into 3 subzones: high tide zone, middle tide zone, and low tide zone. The high tide zone is only flooded at high tide and is consequently very saline, Limpets can successfully live here due to their specialised adaptatations. Rock pools will also form here at the low tide. The low tide zone is submerged completely except at low tide, as a result both organisms and vegetation can survive. Many species of Seaweed and Algae thrive in these conditions, which are the main source of food for Limpets therefore their distribution is much greater in this zone.

(13) 14)The chosen location for my data collection is Sawdern Point located in Rhoscrowther in Pembrokeshire, South west Wales. This sheltered rocky shore is suitable to investigate the height to width ratio, due to a high distribution of *Patella Vulgata*. In February 1996 the Sea Empress, carrying crude oil to Milford Haven ran aground leaking 72, 00 tonnes of oil and 480 tonnes of fuel into the sea. Despite a rapid clean-up operation, oil was washed on the shore of 200km of welsh coastline. This dramatically affected the environmental quality of beaches and rocky shores in Wales and has had a lasting impact on both wildlife and vegetation.

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Large numbers of limpets were killed on heavily-oiled rocky shores near to the grounding site, with a 90% mortality rate recorded along some parts of the coastline. Although impacts have minimised in the last 11 years the distribution and size of Limpets may be different due to permanent damage to their surroundings, which consequently may affect the reliability of my results(5).