

Oyster Biology

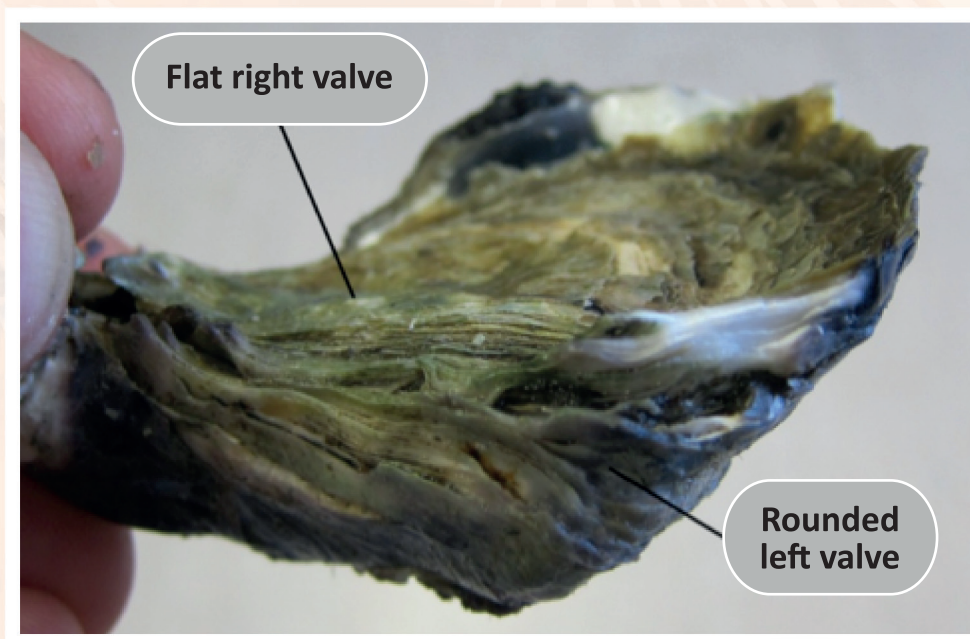
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Phylum: Mollusca **Class:** Bivalve **Genus:** Ostrea

PHYSIOLOGY / PHYSICAL CHARACTERISTICS / DISTRIBUTION

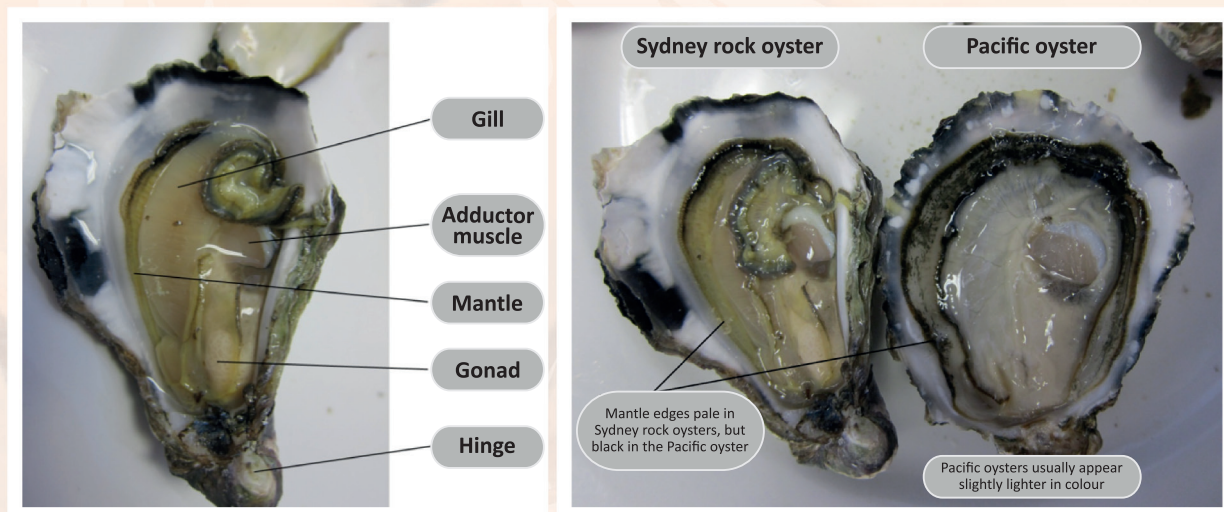
An oyster is a bivalve (meaning two shells) and belongs to a group of animals with shells called Molluscs. The two valves are thick and irregular in shape and appear a purplish / grey on the outside and white inside. The shorter of the valves is called the right valve (top shell below), and the longer, more rounded valve is called the left valve.

The left valve attaches to a rock or solid object and modifies its growth, allowing space for the animal inhabiting it, whereas the right valve is flattened and fits itself into the shape of the left. Small teeth exist in the internal rim of the upper shell usually near the hinge that holds the two valves together. The hinge comprises an elastic substance called a ligament that allows for the opening of the oyster. Closure of the oyster shell is undertaken by an adductor muscle. A closed oyster therefore indicates the adductor muscle is at work to overcome the action of the ligament. Like other bivalves (such as scallops and mussels), oysters tend to open their shells when sick because the adductor muscle is not strong enough to overcome the ligament. The oyster's mantle edges and adductor muscle are pale in colour.



It can be difficult to identify a Sydney rock oyster by looking at the shells alone, as oyster shape and structure can change with environmental factors and growing conditions in different locations. Sydney rock oysters (*Saccostrea glomerata*) usually range between 6-8 centimeters, and between 50-60 grams although under cultivation, this size may increase. They usually reach market size in around 3 years and individuals have been known to live for up to ten years.

Sydney rock oysters are not to be confused with the introduced Pacific oyster (*Crassostrea gigas*) that now inhabits almost all estuarine waterways south of the Macleay River (extending down into Victoria, Tasmania & South Australia). The range of the Pacific oyster therefore overlaps significantly with the range of the Sydney rock oyster which is found on the East Coast between Hervey Bay (QLD) and Wingan Inlet (VIC). In comparison to Sydney rock oysters, Pacific oysters are larger, have a thin, rough appearance with no hinge teeth on the upper shell, the mantle edges are black and the adductor muscle is purple / brown in colour.



Declared a noxious species in all NSW waters except Port Stephens, a number of estuaries are now starting to trial the growing of sterile Pacific oysters that are brought from special hatcheries. These sterile Pacific oysters will not produce offspring and therefore should not compete with the native Sydney rock oysters if any escape. Estuaries part of the trial include: Wapengo Lake; Shoalhaven River; Georges River; Hawkesbury River, Port Stephens and the Manning River. Pacific oysters grow much quicker than Sydney rock oysters and will reach maturity in 12-18 months.

HABITAT

Oysters live in marine or brackish (salty) waters and can tolerate a wide range of salinities. The Sydney rock oyster is endemic to Australia and found in bays, inlets and sheltered mangroves and estuaries along the East Coast. Compared with open waters, these environments provide protection from storms and the rich availability of organic matter on which they feed. Adult oysters live permanently attached to rocks or other hard surfaces and are usually found in the intertidal zone to 3 metres below the low water mark. The oyster is sessile (immobile) and will not move unless disturbed by humans or shifted by waves.

FEEDING, RESPIRATION and ANATOMY

Oysters are filter feeders and obtain their food by straining microscopic plankton, bacteria and organic matter from the surrounding water as it passes through their gills. The gills around the edge of the animal are important for both respiration and feeding and have tiny hair-like parts called cilia that create small water currents. These currents essentially act like a pump to bring a stream of food-rich water into the shell and then removes waste as the water is expelled by the oyster. Gills sieve out the minute food particles and take these to the animal's mouth. Being permanently attached to a solid object in the environment, an oyster depends solely on water currents for its food.

The mantle is lined with many small, thin-walled blood vessels that extract oxygen (O_2) from the water and expel carbon dioxide (CO_2). A small, three chambered heart, lying under the adductor muscle, pumps colorless blood to all parts of the oyster's body. At the same time, a pair of kidneys located on the underside of the adductor muscle, purifies the blood of any waste products.



BREEDING

Most oyster species, including the Sydney rock oyster, change sex during their lifetime. The first spawning is usually as a male and later, spawn as a female once they have grown larger and developed more energy reserves. Spawning can occur at any time of year although the usual season is summer into autumn, between December and June. The environmental conditions that trigger oyster spawning are an increase in water temperature along with tides and currents that are optimal for wide distribution of eggs and sperm. Mass, intensive spawning occurs, clouding the water with millions of eggs and sperm. This is referred to as 'broadcast spawning'. During spawning, females can release up to 20 million eggs, whilst males release hundreds of millions of sperm. The eggs are fertilized in the water, and within hours, develop into microscopic larvae that drift in the plankton, guided by the tides and currents.

For up to four weeks, the larvae drift in the coastal and estuarine waters during which they develop transparent shells and a retractable foot. Survival rates during this phase of the life cycle is less than 0.1%, however, the millions of eggs and sperm released in one season ensures successful settlement of some larvae. The larvae (still only about 0.3 mm in length) settle on a clean, hard substrate (surface) using the foot to crawl around to find a suitable site for permanent settlement. Once attached, the foot is reabsorbed into the body of the larvae. Juvenile, attached larvae are called 'spat'. As they grow and mature, the shell hardens and darkens and the animal takes on the appearance of a small adult oyster. Maturity is reached in roughly 3 years with growth rates varying depending on local conditions. There is no way of telling male oysters from female by examining their shell. About 75% of prime eating oysters are female.

