

INVERTEBRATES

An invertebrate is defined as any animal that does not have a backbone or internal skeleton.

It must be remembered that all invertebrates are animals, this includes corals and anemones, although they resemble plants, or more particularly flowers, they are animals.

Invertebrates however consist of a huge and diverse range of living organisms ranging in size from microscopic planktonic animals to the giant squid. The number of species of inverts is phenomenal, it is so large it is unknown. There are many inverts not yet discovered, particularly in the ocean. Nonetheless of all the animals in the world, it is approximated that 97% are invertebrates. Therefore all the fish, reptiles, amphibians, birds and mammals only make up a meagre 3% of the worlds number of species.

Marine invertebrates can be kept in the home aquarium, it seems many hobbyists are discovering this and as a result this area of the hobby is growing at an extremely rapid rate. If you have children, do not underestimate the abundance of knowledge that can be gained by keeping an aquarium, particularly those attempting to replicate a natural ecosystem.

Living reef aquariums are now very popular, the techniques for keeping such aquariums and the fish contained are often discussed. However, the most vital inhabitants, the inverts are rarely discussed. There is now an extensive range of invertebrates available to the aquarist. Amongst others these include a range of corals, anemones, clams,

crabs, shrimps, sponges, and the list continues.

If you wish to succeed in keeping these animals you need to be armed with information on their care and requirements. Read on, and you will now be further equipped to establish one of nature's true wonders in your own home.

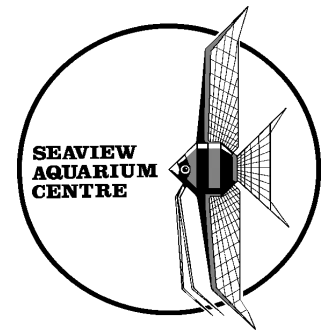
CORALS AND ANEMONES



Corals and anemones belong to the same phylum, namely coelenterates, jellyfish and sea fans also belong to this phylum.

Corals and anemones belong to the group Anthozoa, there are three other groups which make up the phylum coelenterata.

Coelenterates vary considerably in size, but all share a similar structure. They are all characterised by a radially symmetrical body plan. When dissected it can be seen that the body organs are arranged in an even circle around



a central axis. The body of coelenterates is a simple structure consisting of a stomach, with a single opening used both as a mouth and as the exit through which waste is ejected. This is usually surrounded by tentacles armed with tiny stinging cells called nematocysts, used for catching food.

Many corals and anemones are filter feeders and rely on the microscopic zooxanthellae, see below. A large number benefit by being fed directly with small pieces of fish or shrimp, dropped over the animal or lightly pushed among the tentacles once or twice a week. This is particularly applicable to the sea anemones and the Euphyllia corals.

Most corals have single celled symbiotic algae living in their tissue. This algae is called zooxanthellae and is also found in invertebrates apart from the corals. These algae are termed symbiotic because it appears both plant and animal benefit from the relationship. The coral uses the carbohydrates and oxygen produced by the algae whilst the zooxanthellae uses the animal's waste products and assist in the assimilation vital trace elements from the surrounding water. It has been reported corals obtain up to 90% of their food energy from the zooxanthellae, hard corals however, still need to capture planktonic organisms to survive. It is because of this algae in the corals that there is such a need for strong lighting.

The body structure of sea anemones is based on a simple polyp, with multiples of tentacles around the mouth. In some species the base is modified for burrowing, but more usually anemones are attached to hard objects by means of a suckerlike disc. Although they primarily remain attached to the one spot, some can cause havoc by moving about and stinging corals in the process. You must be careful to ensure that corals and/or anemones are not placed too close together as they will sting each other and cause great harm.

Some anemones have zooxanthellae but most catch living prey, including fish, using nematocysts on their tentacles. Others trap organic particles in the water in mucus streams propelled towards the mouth by the tentacles.

Several of the large anemones are host to clown fishes, that use the anemones tentacles as shelter. The fish are protected by the anemone whilst deterring predatory fish and removing parasites from the host. Furthermore, although only rarely documented, we have anemone fish in the shop that will feed the anemone. Often when food is drooped in for other larger fish the clown fish will fight to get the piece of food and



A pair of Percular Clownfish enjoying the security of an anemone

then proceed to push this into the anemones tentacles. Anemones can reproduce by budding off from the polyp, but they also reproduce sexually by releasing sperm and eggs.

We most often associate corals with building reefs. The corals that are responsible for this are the hard or stony corals. These corals have the hard calcareous external skeletons. They are most often in shades of beige and green, although some are blue or pink. The stony corals like the sea anemones have a six-tentacle body plan. The coral animal is basically a tiny sea anemone sitting in a chalky cup, but colonies of these animals can build structures as enormous as the Great Barrier Reef. In colonial stony corals, individual polyps may be as small as 5mm in diameter, but in some solitary forms, such as Heliofungia, the coral may be as much as 50cm in diameter. Coral reefs are built up over thousands of years; as old die, new colonies form on top.

A coral reef provides a habitat for sea anemones and other corals, as well as for a wide variety of other marine invertebrates, fish and plants. Reef building corals need warm, clear water, the temperature should rarely drop below 22° C. They are easily suffocated by sediment, it is therefore essential that they are provided with strong water movement. To build their skeletons stony corals require a high pH and a good supply of calcium in the water.

Reef corals grow in many different shapes, depending on their preferred position and water depth. Deeper corals and those in sheltered, still waters tend to form branches, while corals in exposed conditions are usually compact. New coral colonies can grow from small broken fragments of larger colonies if the conditions are right; this is one way in which coral reefs recover from the damage incurred by storms and cyclones.

Stony corals also reproduce sexually by releasing sperms and eggs. The corals on the Great Barrier Reef all spawn on the one single night each year. The reef becomes covered with a mass of swirling eggs and sperm. Scientists are still unsure why this occurs, it may be to confuse predators. The stony corals include; Goniopora, Leptoria, Tubastrea, Euphyllia, Plerogyra and Heliofungia.



Brain coral with eggs

There are also corals that do not build reefs but at the same time play an important role in the ecosystem of a reef. These corals include the soft corals, the sea feathers, and sea fans such as the gorgonians. These Anthozoans are made up of eight tentacles, unlike the stony corals they are less demanding in regard to lighting and water quality.

Also of interest to aquarists is a small group of anthozoans that are effectively halfway between anemones and corals. These are the zoanthids. They resemble small anemones but are colonial. There is no skeleton or basal disc, but the polyps have one or two rings of smooth slender tentacles. Zoanthids encrust rocks and even other animals, such as sponges and corals. The false corals, which include the mushroom polyps are also in halfway position. Their polyps resemble those of true corals, but have no hard external skeleton.