Hands On Learning
with Reading Museum Service

COD SKELETON Z140



There are three species of cod fish - the Atlantic, Pacific and Greenland cod. The species that inhabits the sea around Britain is the Atlantic cod (*Gadus morhua*). A drawing of one can be seen below. Their back tends to be a greenish to dark brown while their belly is a silvery white. The upper jaw extends over the lower jaw and they have a well developed chin barbel. This organ is thought to be used to detect prey that may be buried in the sand.

Cod can grow to be large adults. They develop quickly and can reach a length of 20cm after one year, 50cm after two years and 80cm by the time they are four years old. The skeleton in this case is about 85cm long. Surveys in the late twentieth century recovered fish between 130 and 140cm long, but most that are caught are less than half this size. The weight of an average cod caught in the late twentieth century in the Gulf of Maine was 3kg. However, an 81kg cod was caught in 1838 and 95kg specimen was caught off the coast of Massachusetts in 1895. Such huge weights are not to be found today.

The Atlantic cod population is divided into a number of distinct groups over its range. These include the Arcto-Norwegian, North Sea, Faroe, Iceland, East Greenland, West Greenland, Newfoundland and Labrador stocks. There would seem to be little movement between the stocks, although migrations to their individual breeding grounds may involve distances of 200 miles or more.



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Cod live in relatively shallow waters (30 metres or less) but migrate towards warmer, even shallower waters to spawn during the winter and early spring. Sexual maturity is reached between the ages of two and four. At that age the female cod can produce a very large amount of eggs. Huge numbers are released during spawning because only a few will survive and develop into adults. As the fish grow larger their ability to produce eggs grows: a 100cm female may lay about 3 million eggs and a 125cm female up to 9 million eggs in one season. It has been calculated that if each female cod produces just two juveniles that live to be sexually mature adults then the population would be stable. Unfortunately cod stocks have catastrophically declined in the course of the twentieth century.



Courtship involves adults displaying their fins and males grunting! The two fish then swim in circles - the male upside-down underneath the female - during which eggs and sperm are released and float to the surface of the water. The fertilised eggs hatch between 8 and 23 days later, with the young fish being just 4mm long. Huge numbers of eggs and young fish are predated in this period. In the next five weeks the young cod will increase their body weight by 40 times and reach 2cm in length (right). At this point they descend to the sea bottom and their diet changes to small crustaceans. If they are very lucky and can avoid predators - including adult cod, haddock, hake, flounder and even crabs - then they will have few enemies other than humans.

Adult cod are active hunters, feeding on sand-eels, whiting, haddock, small cod, squid, crustaceans and molluscs. By weight, around three quarters of the food of all sizes of cod consists of a variety of fish and crustaceans. The rest is made up of smaller quantities of molluscs and worms.





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Cod are a valuable source of food for human beings. In medieval Europe the Lofoten islands, off the coast of northern Norway, were the centre of a cod fishing and processing industry which provided fish for most of southern Europe. The cod were dried by sun and wind on wooden racks (right). The resulting 'stockfish' had a storage life of several years and could be easily transported to distant markets.

In the sixteenth century the vast shoals of cod that lived off the north-eastern coast of America were discovered. The first European explorers described the waters as being so full of cod you just had to lower a basket into the water to bring it up full of fish. Small inshore boats took sustainable amounts of cod for centuries up to the 1950s. This changed for the worse during the 1950s and 60s. Technological advances in trawler design and the use of sonar to locate shoals meant that factory trawlers with huge nets could haul up massive quantities of fish, quickly processing and deep-freezing the catch, working around the clock in all but the worst weather conditions. In an hour, they could haul up as much as 200 tonnes of fish, twice as much as a typical sixteenth century ship would have caught in an entire season.

In 1992 it emerged that cod stocks were less than 1% of the levels of the 1960s. In 1992 commercial cod fishing off the coast of Canada was banned. It was hoped that the cod numbers would rise again once fishing was halted, but this has not happened. This is probably partly due to the fact that the remaining fish were smaller and the eggs and young of first-time spawners are less likely to successfully develop into adult fish. What eggs are produced are rapidly devoured by other predators. Some scientists think that the cod population off north America may never recover.

In the early twenty-first century the cod population off north-west Europe was healthier, but showing signs of a similar imminent catastrophe. Scientific research suggested to environmental groups that a total ban on cod fishing should be introduced to allow stocks to recover, but this was resisted by fishing communities. The amount of fish which is allowed to be caught has been reduced, but fishing continues. In addition, although small cod are not allowed to be landed, huge numbers are still netted and killed in the process of catching other species. In 2005 28,000 tonnes of North Sea cod were legally landed, while 63,000 tonnes were inadvertently killed and discarded.