Types of Fish

TEACHER'S NOTES

What this topic is about

Fish live in water and breathe with gills. All fish have a backbone. All fish are cold-blooded, which means their internal body temperature changes as the surrounding temperature changes. Otherwise, diversity is the key word. This topic gives pupils a feel for the basics of identification and classification while serving as an introduction on how diverse fish are.

What will pupils learn?

- The basic characteristics of all fish
- How to classify fish
- About the many different species

Essential information

Fish are vertebrates. The 25,000 known species of fish are divided into three main groups.

Agnatha

The agnatha ("no jaw") class are the most "primitive" of the fishes; they lack a jaw and a bony skeleton. As they lack true bones, these fish are very flexible, the hagfish can actually tie itself in a knot to rid itself of a noxious slime it produces to deter predators. They have a smooth, scaleless skin and are soft to the touch. In place of the jaws is an oral sucker in the centre of which is the mouth cavity. Many of the agnathas are highly predatory, attaching to other fish by their suckerlike mouths, and rasping through the skin into the viscera of their hosts. The juvenile lamprey feeds by sucking up mud containing micro-organisms and organic debris - as did the primitive agnatha. Agnathas are found in both fresh and salt water and some are anadromous (living in both fresh and salt water at different times in its life cycle). The hagfish has no eyes, while the lamprey has well-developed eyes.

Chondrichthyes

Chondrichthyes ("cartilage-fish") include the sharks, skates, rays, and ratfish. These fish have a cartilaginous skeleton, but their ancestors were bony animals. These were the first fish to exhibit paired fins. Chondrichthyes lack swim bladders, have spiral valve intestines, and posses 5-7 gill arches (most have 5). They have cartilaginous upper and loosely attached lower jaws with a significant array of teeth. Their skin is covered with teeth-like denticles which gives it the texture and abrasive quality of sandpaper.

Osteichthyes

The bony fish comprise the largest section of the vertebrates, with over 20,000 species worldwide. They are called bony fish because their skeletons are calcified, making them much harder than the cartilage bones of the chondrichthyes. Bony fishes have great manoeuvrability and speed, highly specialized mouths equipped with protruding jaws, and a swim bladder to control buoyancy. The bony fish have evolved to be of almost every imaginable shape and size, and exploit most marine and freshwater habitats on earth. Many of them have complex, recently evolved physiologies, organs, and behaviors for dealing with their environment in a sophisticated manner.

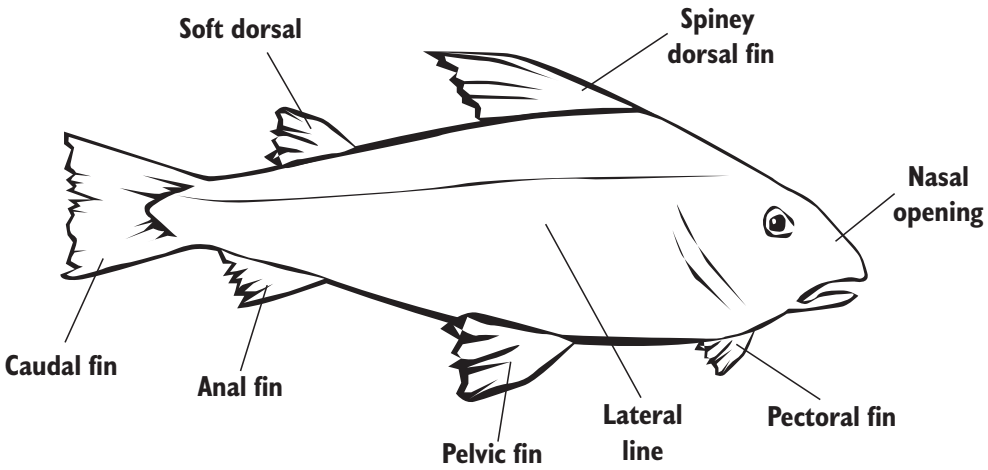
The story of fishes dates back to over 480 million years. Fish evolved in fresh water; the chondrichthyes moved to the sea early in evolution, while the bony fishes went through most of their evolution in fresh water and spread to the seas at a much later period. Fish are found in both fresh and salt water worldwide.

Fish come in all shapes and sizes, some are free swimming, while others rest on the bottom of the sea, some are herbivores and others are carnivores, and some lay eggs while others give live birth and parental care to their young.

Types of Fish (continued 1)

TEACHER'S NOTES

Pupils should try to acquaint themselves with the external anatomy of fish. The names of various fins and parts of the body are constantly occurring in the description of the species.



Fins
The fins are made up of stiff rays covered by skin. Some may be jointed and some separate near the edge of the fin. In certain fish some of the rays supporting the find are bony, stiff and enjoined. They are referred to as spines.

Skin
The skin of fish is divided into two layers, the epidermis (outer) layer and the dermis. The epidermis is made up of Epithelial cells, arranged one above the other. These cells are constantly shed and replaced with new ones.

Scales
There are two main types of scales, both are round, but in one the edges are serrated and the other are completely smooth. In some fish, the scales are replaced by bony plates. In some other species there are no scales at all.

Pigment cells
The many pretty colours and patterns seen in fish are produced by cells in the dermis. The cells are named for the pigment they contain. Fish can change colour from one moment to the next. This is caused by the movement of melanin grains within each cell. When dispersed, they absorb more light and the area of the fish darkens. When tightened the fish goes pale.

Gills
Respiration is carried out by means of gills located under the gill covers. The walls of the pharynx is perforated by five slit-like openings. The tissue between the slits is called the gill arch, so on each side of the fish there are five gill slits and Four gill arches. On the gill arches are mounted the actual gills, a delicate system of blood vessels covered by a very thin epithelium through which the gaseous exchange takes place.

Lateral line
The lateral line consists of a series of scales, each modified by a pore, which connects with a system of canals containing sensory cells and nerve fibers. It runs in a semi line from the gills to the tail fin. It can easily seen in fish as a band of darker looking scales running along the side. The lateral line has shown to be a very important sensory organ in fish. It can detect minute electrical currents in the aquarium water. It can also function as a kind of echo location process that helps the fish identify its surroundings.

Types of Fish (continued 2)

TEACHER'S NOTES

Things your pupils can do:

- ***Before their visit***

Organize a graphic activity to accompany the opening paragraph on the pupil fact sheet that describes the common characteristics of all fish. Ask your pupils to draw a simple diagram and label parts of the fish - choose from dorsal fin, scales, barbel, gills, pectoral fin, pelvic fin, anal fin, lateral line, caudal fin, fin rays. Alternatively, give them an outline sketch of a fish and ask them to label different parts.

- ***During their visit***

Remind your pupils that fish are divided into three main groups. Their task will be to look closely at the different species at the Sea Life centre and decide which of the three groups different fish belong to.

- ***After their visit***

Use books, magazines, CD-ROMs and the Internet to help pupils find out all they can about their favourite fish from the Sea Life Centre. Each pupil can then make an illustrated presentation. Try and make sure they do not all choose the same fish!