BONY FISH (Class Osteichthyes)

INTERNAL ANATOMY

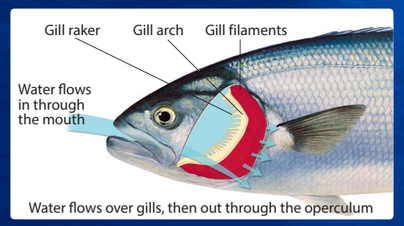
The largest group of fish are the bony fishes and includes eels, seahorses and pipefish. The total number of species of bony fish is thought to be more than 15,000.

As the name suggests, bony fish have a bony skeleton with a protective bony plate called the operculum covering the gill cavity and a single external gill slit.

Gills

Fish have a simple, single-loop circulatory system were blood flows from the heart to the gills, and then to the rest of the body in a continuous loop through a series of veins and arteries.

Gills consist of gill arches, which are a supporting structure, gill rakers that remove solid material, and gill filaments, across which gas exchange occurs. Gas exchange is the diffusion of oxygen from the water into the blood vessels of the filaments, with carbon dioxide diffusing out of these blood vessels into the water passing over them.



Brain

Spinal cord

Vertebral column (spine)

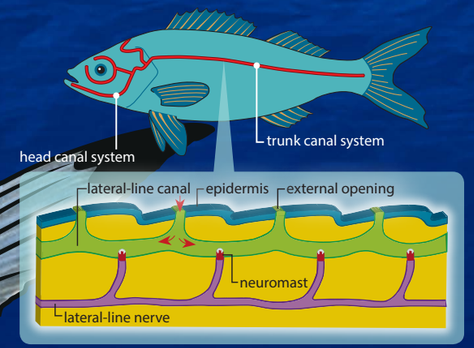
Kidney

The kidneys are one of the organs that assist with excretion and regulation of water balance.

Muscle

Lateral line

Hearing, vision and balance are controlled by the interaction of the inner ear, lateral line and swim bladder. The lateral line is a sensory organ that runs along the sides of the fish's body, under the skin. Neuromast cells are located in the inner ear and in the canals of the lateral line system. These cells translate vibrations in the water into nerve impulses. Nerves connect the lateral line to the ears and the brain. The swim bladder acts as a transducer to amplify sounds as the swim bladder vibrates.



Otolith

Whilst fish don't have ears in the human sense, they 'hear' sounds well in their own environment and can tell what direction it is coming from. Fish might not have 'ear holes' to let in sounds, but instead use their whole bodies to pick up vibrations that sounds make.

The otolith or 'ear bone' is the fish's inner ear, enabling them to listen to sound waves that travel through the water.

Tell me your age

Researchers can determine the age of bony fish by studying their otoliths. As a fish grows, tiny white and clear bands of calcified material are laid down in the otolith, similar to growth rings in a tree. The growth bands are counted under a microscope to determine the age of the fish.

Heart

The heart is a muscular organ which pumps blood throughout the body.

Similarly to sharks, blood is circulated by a 2-chambered heart and passes through the gills where it loses carbon dioxide and receives a fresh supply of oxygen prior to coursing the remainder of the body.

Liver

The liver produces enzymes (chemicals) to aid in digestion. It is also a storage area for fats, blood sugars and vitamins and breaks down toxins and old blood cells for excretion or recycling.

Intestine

The intestine is the main site of digestion and absorption. As a general rule, fish with short intestines are carnivorous (meat-eating) and those with long, coiled intestines are herbivorous (plant-eating), as fibrous plant materials are harder to break down.

Pyloric caecae

Finger-like pouches attached to the intestine (immediately following the stomach), which are believed to have a digestive and/or absorption function.

Stomach

The stomach is where digestion commences.

The main components of the digestive system include the liver, stomach, intestine and pyloric caecae.

Feeding

Like sharks and rays, fish have a one way digestive system. Food enters the mouth and travels via the oesophagus to the stomach. From the stomach it is passed into the intestine for further digestion. Digested wastes are eliminated from the intestine via the anus.

Vent

The vent, or anus, is the external opening to the digestive and reproductive systems.

Swim bladder

Most bony fishes (adult flounder and some bonito are an exception) have a swim bladder, a gas filled sac . The swim bladder controls the fish's buoyancy. The amount of gas contained within the bladder is adjusted to allow the fish to move up and down in the water column while conserving energy. In some species the swim bladder is also used in hearing and sound production.

Reproductive organs

The reproductive organs of fish are referred to as gonads. These organs are usually paired. Female gonads (ovaries) produce eggs and are usually pink, red or orange in colour and are covered in numerous blood vessels. Male gonads (testes) produce sperm and are usually white (cream) or grey in colour.

Reproduction

The majority of bony fish reproduce by external fertilisation of their eggs and have a pelagic larval stage. Most bony fish produce thousands (and in some fish, millions) of eggs each year.

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