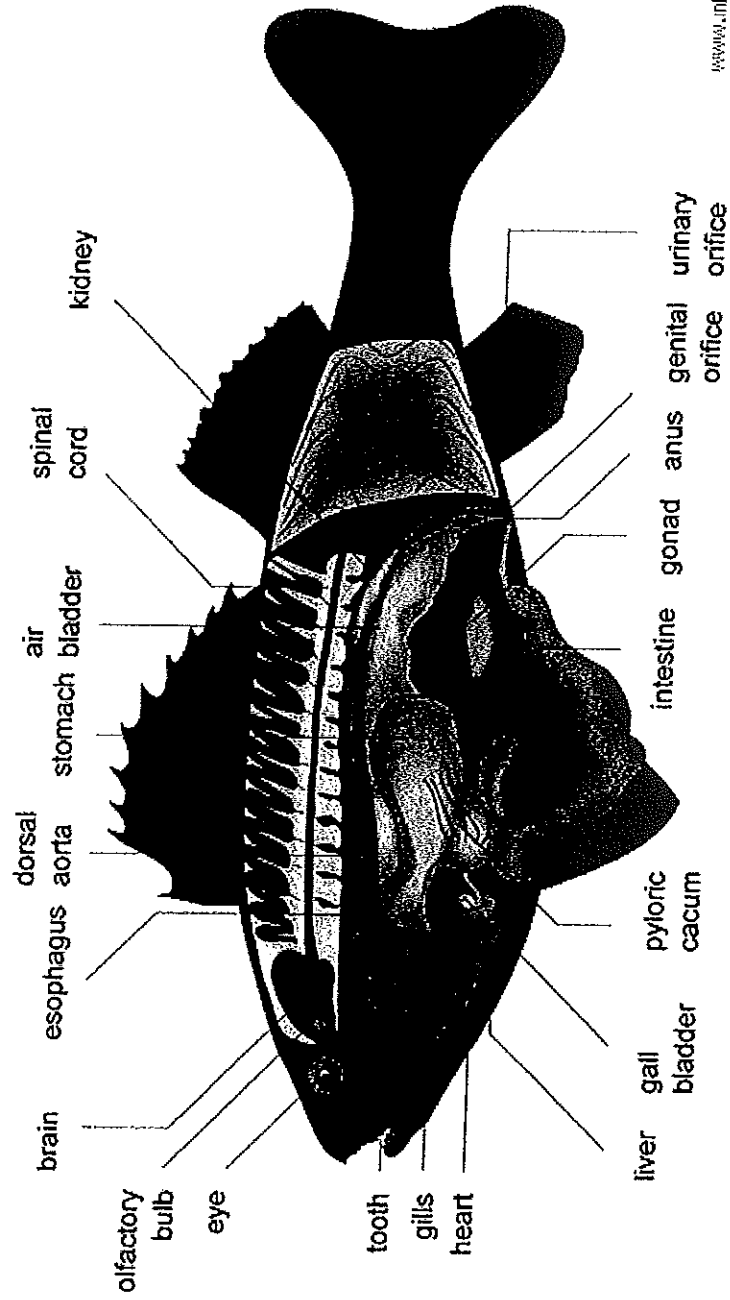


INTERNAL ANATOMY OF A BONY FISH



(Parts of a fish and their functions)

Internal anatomy of a bony fish: finned aquatic vertebrates animal with skin covered with scales. It lives in water and is usually oviparous.

Brain: seat of the mental faculties of a fish.

Esophagus: part of the digestive tract connecting the mouth to the stomach.

Dorsal aorta: vessel in the back that carries blood from the heart to the organs.

Stomach: part of the digestive tract between the esophagus and the intestine.

Air bladder: pocket in which urine collects.

Spinal cord: part of the nervous system that connects the brain to all other parts of a fish.

Kidney: blood-purifying organ.

Urinary orifice: opening for eliminating urine.

Genital Orifice: opening related to the genital organs.

Anus: end of the digestive tract.

Gonad: hormone-secreting sexual gland of a fish.

Intestine: last part of the digestive tract.

Pyloric cecum: cul-de-sac related to the intestine.

Gall bladder: small sac containing the bile.

Liver: bile-producing digestive gland.

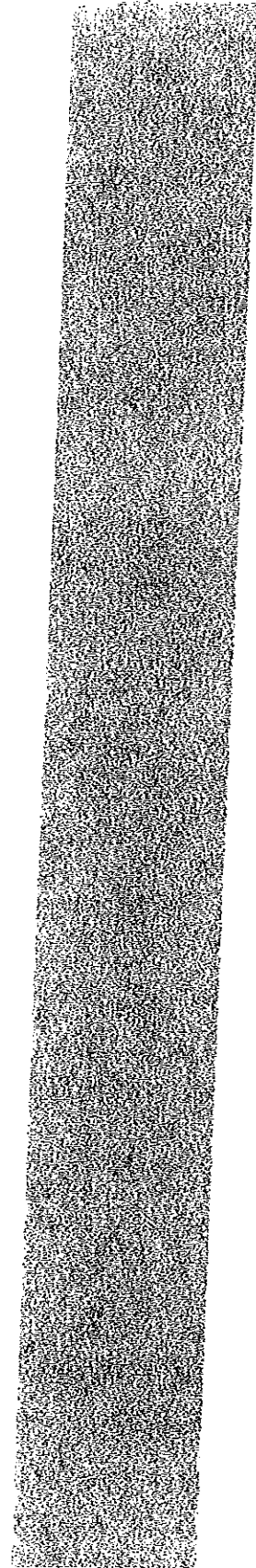
Heart: blood-pumping organ.

Gills: respiratory organ of a fish.

Tooth: hard organ of a fish used to shred food.

Eye: sight organ of a fish.

Olfactory bulb: bulging part of the smell organ of a fish.



Fins

The fins are made up of bony 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 fin are bony, stiff and unjointed. They are referred to as spines. Almost half the fin rays in the Dorsal fin of Cichlids are bony spines. So the front (Anterior) portion of such a fin is called the Spiny Dorsal and the rear (Posterior) portion is called the Soft Dorsal. In Gobies and some other species the Spiny Dorsal and the Soft Dorsal are completely separated and form two distinct Dorsal Fins. The number of rays in the fins is also used in classification.

Fin Functions

Each fin on a fish is designed to perform a specific function. I will list them here.

- o Dorsal fin. Lends stability in swimming.
- o Ventral fin. Serves to provide stability in swimming.
- o Caudal fin. In most fish, the Caudal or tail fin is the main propelling fin.
- o Anal fin. Also lends stability in swimming.
- o Pectoral fins. Locomotion and side to side movement.
- o Adipose fin. Stability.

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. Inter-spaced between the Epithelial cells are slime cells which produce Mucoid secretions that form the very important protective covering we know as the slime coat. The Dermis lies under the Epidermis and many important functions happen there.

Scales

The deeper place Dermis of the skin is made up of connective Fibroblasts, Collagen and blood vessels. The scales of a fish lie in pockets in the Dermis and come out of the connective tissue. Scales do not stick out of a fish but are covered by the Epithelial layer. The scales overlap and so form a protective flexible armor capable of withstanding blows and bumping.

There are four types of fish scales

- o Placoid scales, also called dermal denticles, are similar to teeth in that they are made of dentin covered by enamel. They are typical of sharks and rays.
- o Ganoid scales are flat, basal-looking scales that cover a fish's body with little overlapping. They are typical of gar and bichirs.
- o Cycloid scales are small oval-shaped scales with growth rings. Carps and similar fish have this type of scale.
- o Ctenoid scales are similar to the cycloid scales, with growth rings. They are distinguished by spines that cover one edge. Cichlids have this type of scale.

In the hobby most fish will have two main types of scales, Cycloid and Ctenoid. In the Wanted Catfish the scales are replaced by bony plates. In some other species, there are no scales at all.

Pigment (color) cells

The many pretty colors and patterns seen in fish are produced by cells in the Dermis. The cells are named for the pigment they contain.

- o *Melanophores*: Brownish-Black pigment called Melanin.
- o *Erythrophores*: Red pigment.
- o *Xanthophores*: Yellow pigment.
- o *Iridophores*: Contain crystals which refract and reflect light, given many fish their metallic look.

Fish can change color 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 be 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.

Other senses in fish

Fish have the five senses man has as well as the Lateral line. In fish the importance of each sense is different than us. I will briefly describe them here.

- o *Sight* Vision underwater poses many special problems. The most significant is the small amount of light available in all but the uppermost layers of water. Vision under water is limited to a few yards at best and fish do not use this as one of their primary senses.
- o *Smell* In most fish the sense of smell is highly developed and is probably used more in the location of food than sight.
- o *Hearing* It has been shown that fish can hear, but its full function is still not understood.
- o *Taste* Taste buds in fish are located in the mouth and also in the skin covering the head, body fins, barbels and lips. It is entirely probable that fish can taste food well before it enters their mouth.
- o *Touch* Fish also have elevated tactile sense and is shown none better than in certain catfish who use their barbels as extensions of their body.

(Parts of the human body and their functions)

Kidney- Your kidneys are bean-shaped organs, each about the size of your fist. They are located near the middle of your back, just below the rib cage. The kidneys are sophisticated reprocessing machines. Every day, your kidneys process about 200 quarts of blood to sift out about 2 quarts of waste products and extra water. The waste and extra water become urine, which flows to your bladder through tubes called ureters. Your bladder stores urine until you go to the bathroom.

Liver- The liver is one of the largest organs in your body. It has many important jobs. It's like a factory that makes vital substances (such as albumin and factors that help with blood clotting). It cleanses the body of toxins (like alcohol) and bacteria. It produces bile that helps digest food. The healthy liver also gathers and stores important substances for your body to use later, such as sugar and vitamins.

Gall bladder- The gallbladder is the organ that receives the bile from the liver and stores it until it is needed in the digestive system to break down fats and cholesterol.

Heart- The basic job of the heart is pump that blood through your body so that the blood can deliver the oxygen and nutrients right to the cells. The heart keeps your blood pumping at all times as it picks up oxygen from your lungs and nutrients from your digestive system and sends them to all cells of your body. Your heart is the power behind the delivery system.

Intestines- The small intestines have a little bit of digestive function at the beginning but their main function is to absorb all of the nutrients out of the food. The large intestines (or the colon) absorb water and electrolytes out of the food. The large intestines are the pathway to the rectum.

Esophagus- The esophagus, sometimes known as the gullet, is an organ in vertebrates which consists of a muscular tube through which food passes from the pharynx to the stomach.

Spinal Cord- The spinal cord connects the brain to the body.

Eye- Eyes are the parts of our body that perceive light. They allow us to see the world and to understand how objects relate to each other. We can distinguish far objects from close ones and determine their color and shape.