

Perch Circulatory System

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Organs involved in the circulatory system

Two chambered heart: the simplest type of a true heart. Is a two chambered organ composed of one ventricle and one atrium.

Jugular vein: lies in the middle of the lower part of the jaw. This drains the the deoxygenated blood from the head to the gills.

Dorsal aorta: carries blood from heart to organs

Gills: organs that extract oxygen from the water

Ventral aorta: circulates blood from heart to the gills and throughout the body

Sinus Venosus: connected to the Atrium deoxygenated blood flows through there from sinus to Atrium

Atrium: thin walled muscular chamber connected to ventricle

Bulbus Arteriosus: a pear shaped chamber that maintains continuous blood flow into gill arches

Ventricle: pumps the blood to the gills to be oxygenated

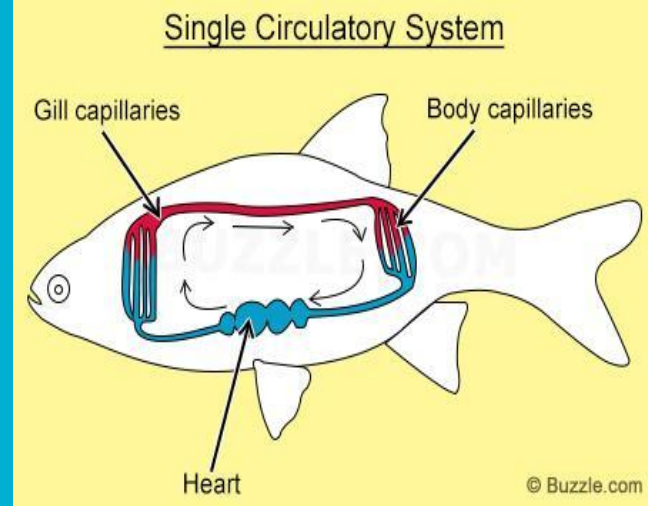
Lamellae: a thin layer and a plate like tissue with a large surface area. It is located in the gills and it drops the blood pressure of the blood.



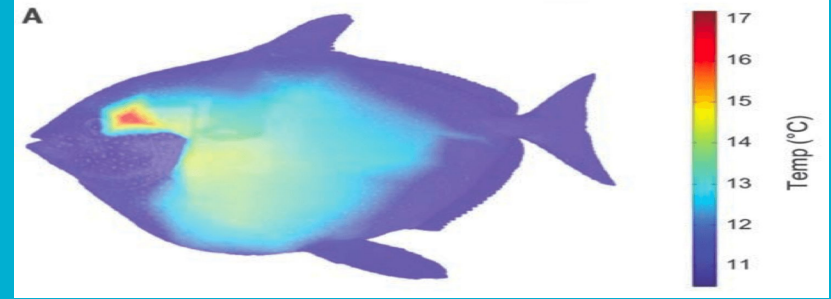
Fish Circulatory System

Fish have a closed circulatory system. This means that the blood flows through veins, arteries, and capillaries and they have a heart that push the blood around. The fish have a circulatory system similar to humans except much much simpler. Mammals have a double circulatory system while fish only have one atrium and one ventricle.

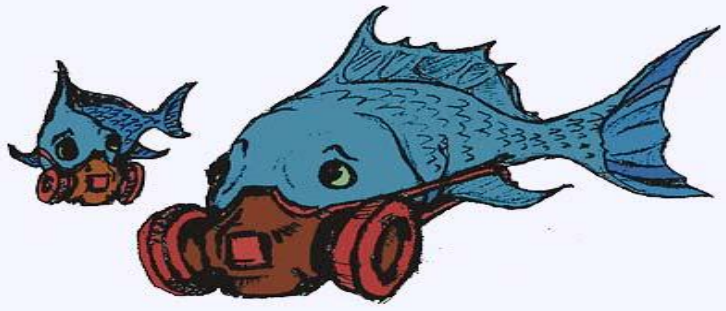
The deoxygenated blood from the fish's body then travels to the atrium and the ventricle then is moved to the gills where it is oxygenated then moved to the body. When the blood is pumped to the gills that's where the gas exchange takes place. Since the perch is a freshwater fish in the gills it saves ions and excretes water while in salt water the gills save the water and excrete ions. In order for the gas exchange to take place the gills have to be very thin walled and because of that, the gills cannot tolerate high blood pressure. The blood cells go through the lamellae, the blood pressure drops but it's still high enough to allow the blood to be able to flow through the body efficiently.



Regulating the body temperature



Generally fish are not able to control their body temperature, as they are cold-blooded. Cold-blooded means that their body temperature depends on their environment, so the temperature in their surroundings and their internal body temperature are the same or close to the same number. For most fish the body temperature directly correlates with the temperature, but in some fish this is not the case. Some fish like tuna and sharks (they were classified as a fish because of their pectoral fins, cartilaginous skeleton, and their gills slits and now modern fish are classified as the sister group to the stingray) are some of the exceptions. These animals that are the exception possess biological components that allow them to be able to keep their body temperature at a higher temperature than the environment.



Gas transportation

To start, fish gain water through the mouth and the water is transported to the gill filament and the lamellae inside the gill filaments. The reason why this is important to gas transportation is because the blood and water flow in opposite direction known as countercurrent flow. Because of countercurrent flow, this allows fish to extract oxygen at 3 times the rate of a human. As the blood flows in one direction, the water that is flowing next to it is water that has given up less of its oxygen (because of the direction it's flowing). So, because of the highly oxygenated blood, this allows blood to absorb more and more oxygen as it moves along. The blood of this fish is what transports the oxygen. A scientist named R.W. Root made a theory, derived from the Bohr theory, that there a phenomenon that occurs in fish's blood or hemoglobin when an increased protein or carbon dioxide concentration that lowers the fish blood's ability to carry and have a capacity for oxygen.

Waste transportation



The organs in the fish that help transport waste are the kidneys, digestive tract, cloaca, skin, and gills. Solid waste is excreted through their cloaca which is similar to an anus and is located at the base of the tail (not the fin). The cloaca in fish is not only used to excrete waste, but it also used to expel either eggs or sperm, depending on the gender of the fish. The way that fish excrete urine depends on the type of fish as to whether it is a freshwater or saltwater fish. For saltwater fish, they dispose of their urine through their gills because of the fact that they take in a lot of salt and need to get rid of it this way. For freshwater fish like the perch, they dispose of urine through the urinary pore which is located close to the cloaca. To expand, freshwater fish and saltwater fish have different kidney functions because of their environment. For freshwater fish, the kidney's job is to prevent excess solvents from being lost as fish have a higher ratio of salt to water in their blood. Due to that, water naturally diffuses into the fish through osmosis causing lots of water to build up there. So, the kidneys in freshwater fish increase the amount of water in urine. The kidney also reabsorbs salt that would otherwise pass out of the kidney in order to maintain balance in the fish. The opposite goes for the kidney in the saltwater fish. In this kind of fish, water is constantly being sucked out of the fish into its surroundings because their bodies are less concentrated than its surrounding saltwater. The saltwater fish counteracts this process by constantly "drinking" water and using their kidneys to extract all of the unnecessary salt.

Structural Adaptations and beneficial circulatory system



One of the perch's structural adaptations is their gills. Gills allow the fish to "breathe" oxygen in water or to further explain, gills absorb oxygen through the water as it passes next to them. Also, fish have a thin and streamlined body which allows them to pass through the water quicker because of the lessened water resistance. A fish's fins also benefits them a lot. Their fins allow them to not only propel them through the water, but also allow them to steer themselves in their desired direction. To continue, fish have a system of muscles for quick movements. Muscle contradictions travel through the body which pushes the tail fin through the water propelling the fish forward. Fish's brains are small compared to most invertebrates, but they have highly developed sense organs that allow to use the five senses. The two chambered fish heart is beneficial for the fish because of its own simplicity. This closed system is more efficient and allows for the fish to distribute more oxygen to the tissues and organs that need it.

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