

Circulatory Systems In Animals

Transport systems are crucial to survival. Unicellular organisms rely on simple diffusion for transport of nutrients and removal of waste. Multicellular organisms have developed more complex circulatory systems.

Open and closed circulation systems

There are two types of circulatory systems found in animals: open and closed circulatory systems.

Open circulatory systems

In an open circulatory system, blood vessels transport all fluids into a cavity. When the animal moves, the blood inside the cavity moves freely around the body in all directions. The blood bathes the organs directly, thus supplying oxygen and removing waste from the organs. Blood flows at a very slow speed due to the absence of smooth muscles, which, as you learnt previously, are responsible for contraction of blood vessels. Most invertebrates (crabs, insects, snails etc.) have an open circulatory system. Figure 1 shows a schematic of an open circulatory system delivering blood directly to tissues.

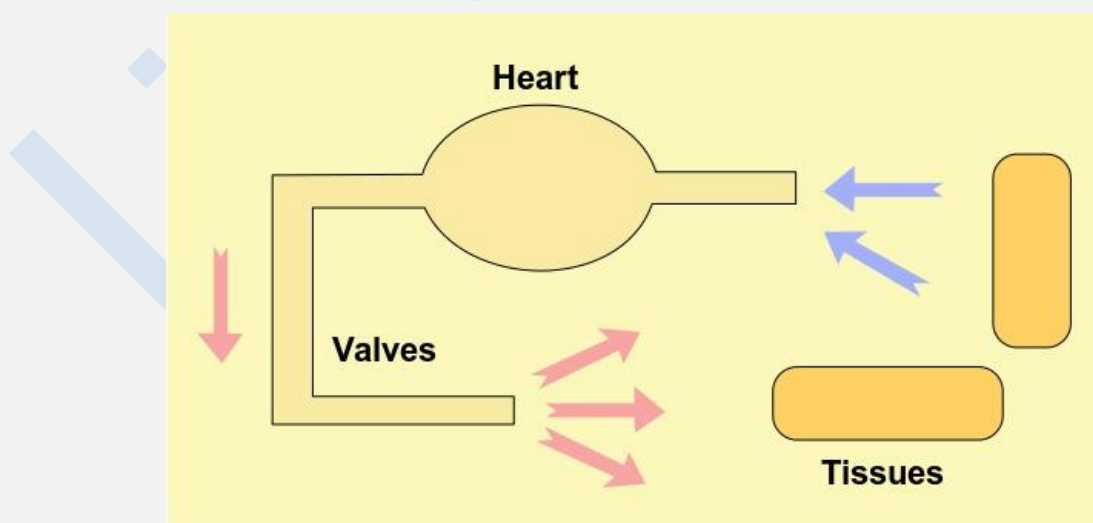


Figure 1: Open circulatory system.

Closed circulatory systems

Closed circulatory systems are different to open circulatory systems because blood never leaves the blood vessels. Instead, it is transferred from one blood vessel to another continuously without entering a cavity. Blood is transported in a single direction, delivering oxygen and nutrients to cells and removing waste products. Closed circulatory systems can be further divided into single circulatory systems and double circulatory systems.

Single and double circulation systems

The circulatory system is a broad term that encompasses the cardiovascular and lymphatic systems. The cardiovascular system consists of the heart (cardio) and the vessels required for transport of blood (vascular). The vascular system consists of arteries, veins and capillaries. Vertebrates (animals with backbones like fish, birds, reptiles, etc.), including most mammals, have closed cardiovascular systems. The two main circulation pathways in invertebrates are the single and double circulation pathways.

Single circulatory pathways

Single circulatory pathways as shown in the diagram below consist of a double chambered heart with an atrium and ventricle. Fish possess single circulation pathways. The heart pumps deoxygenated blood to the gills where it gets oxygenated. Oxygenated blood is then supplied to the entire fish body, with deoxygenated blood returned to the heart.

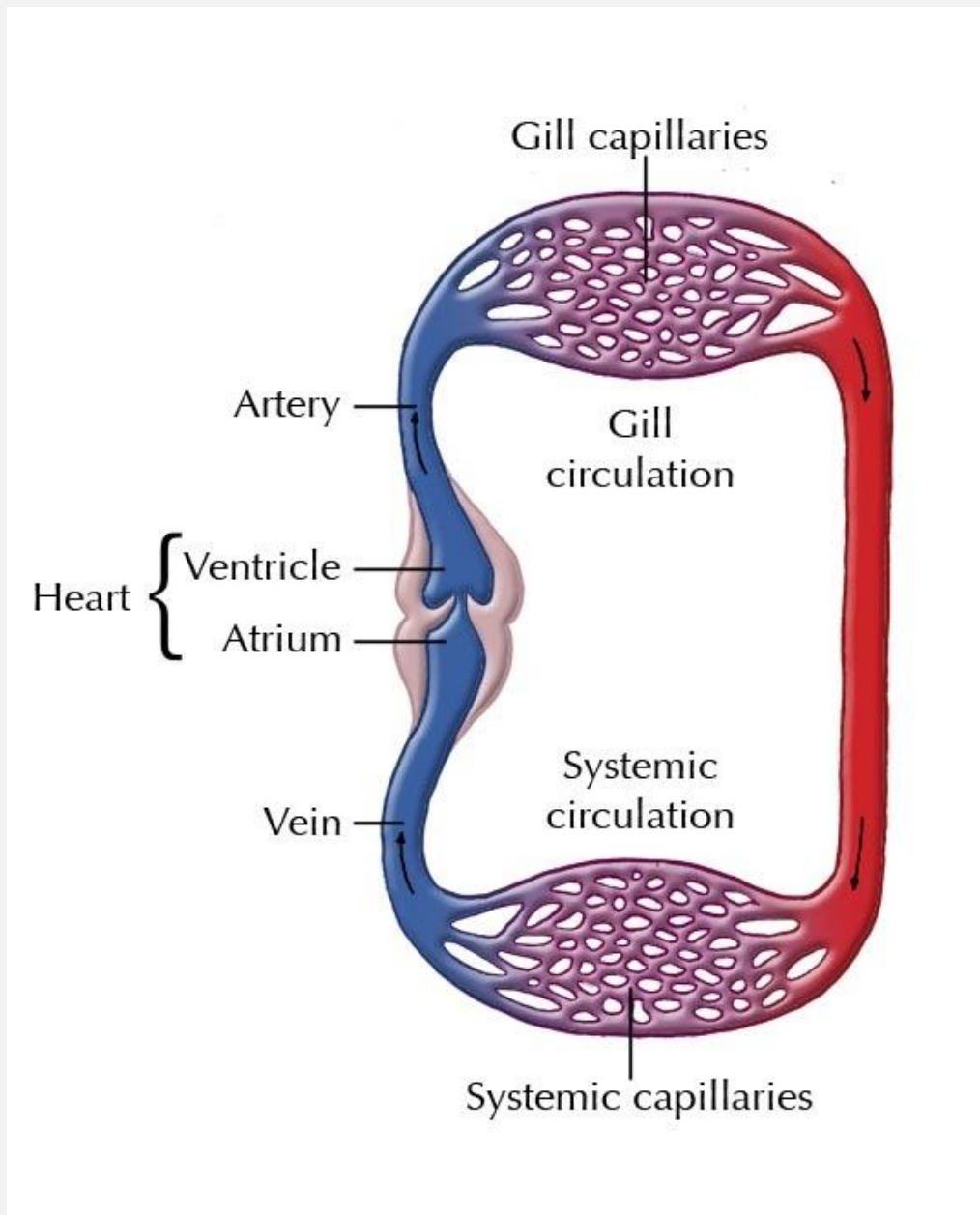


Figure 2: Single circulation system as found in a typical fish species. The red represents oxygen-rich or oxygenated blood, the blue represents oxygen-deficient or deoxygenated blood.

Double circulatory systems

Double circulation pathways are found in birds and mammals. Animals with this type of circulatory system have a four-chambered heart. The right atrium receives deoxygenated from the body and the right ventricle sends it to the lungs to be oxygenated. The left atrium receives oxygenated blood from the lungs and the left ventricle sends it to the rest of the body. Most mammals, including humans, have this type of

circulatory system. These circulatory systems are called 'double' circulatory systems because they are made up of two circuits, referred to as the pulmonary and systemic circulatory systems. Humans, birds, and mammals have a four-chambered heart. Fish have a two-chambered heart, one atrium and one ventricle. Amphibians have a three-chambered heart with two atria and one ventricle. The advantage of a four chambered heart is that there is no mixture of the oxygenated and deoxygenated blood

ترجمه
فا