

11.1: The need for a circulatory system

The Need For A Circulatory System

- A circulatory system ensures that oxygen and nutrients are delivered to every cell, also allows waste products that are removed from cells to be released into the external environment.
- Although circulatory systems vary among animals, all circulatory systems have three fundamental features:
 - a fluid that transports (circulates) materials through the body
 - a network of tubes in which the fluid circulates
 - pump that pushes the fluid through the tubes

Open Circulatory Systems

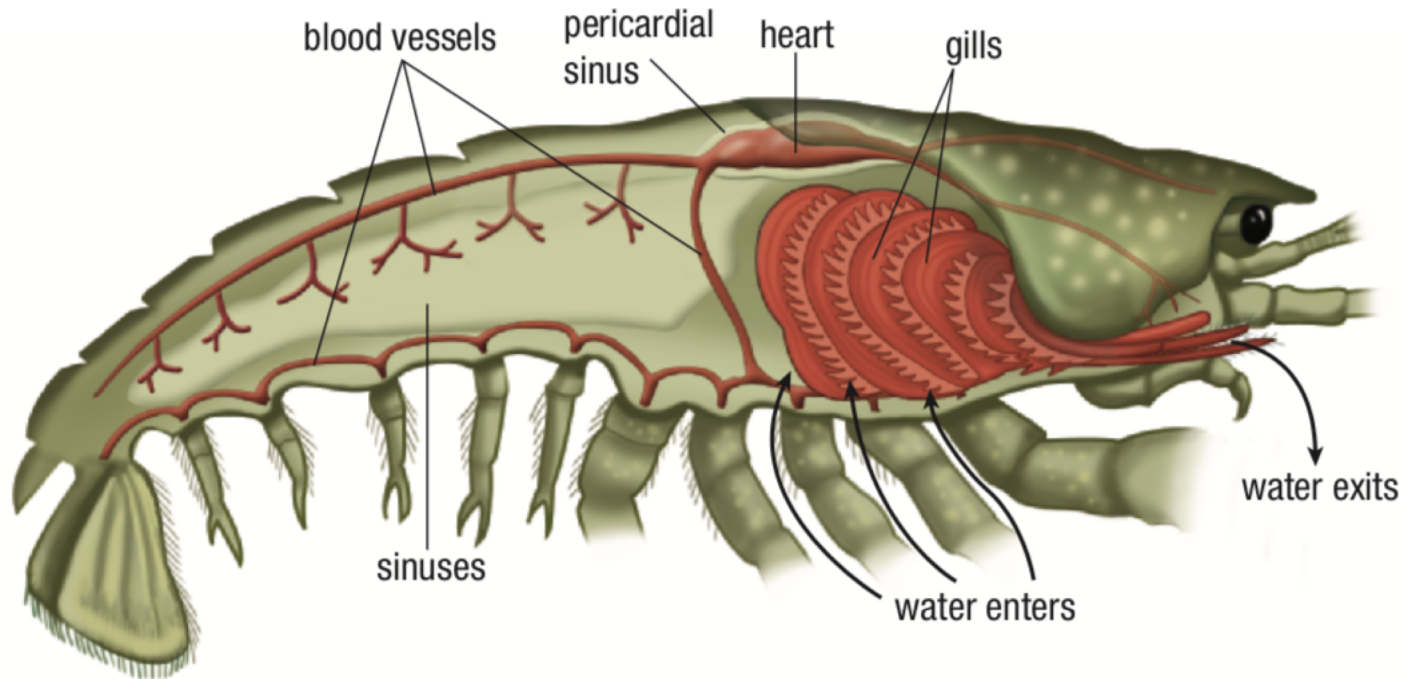
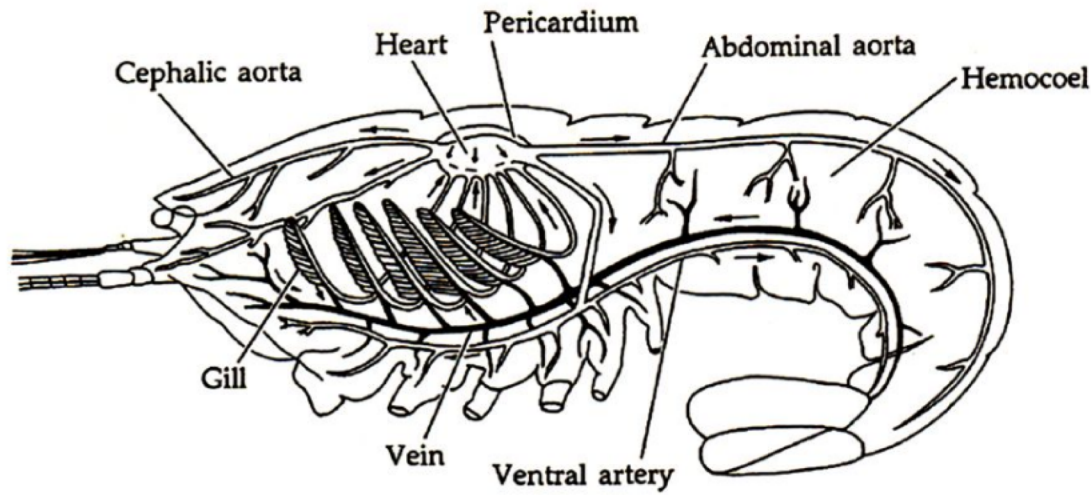


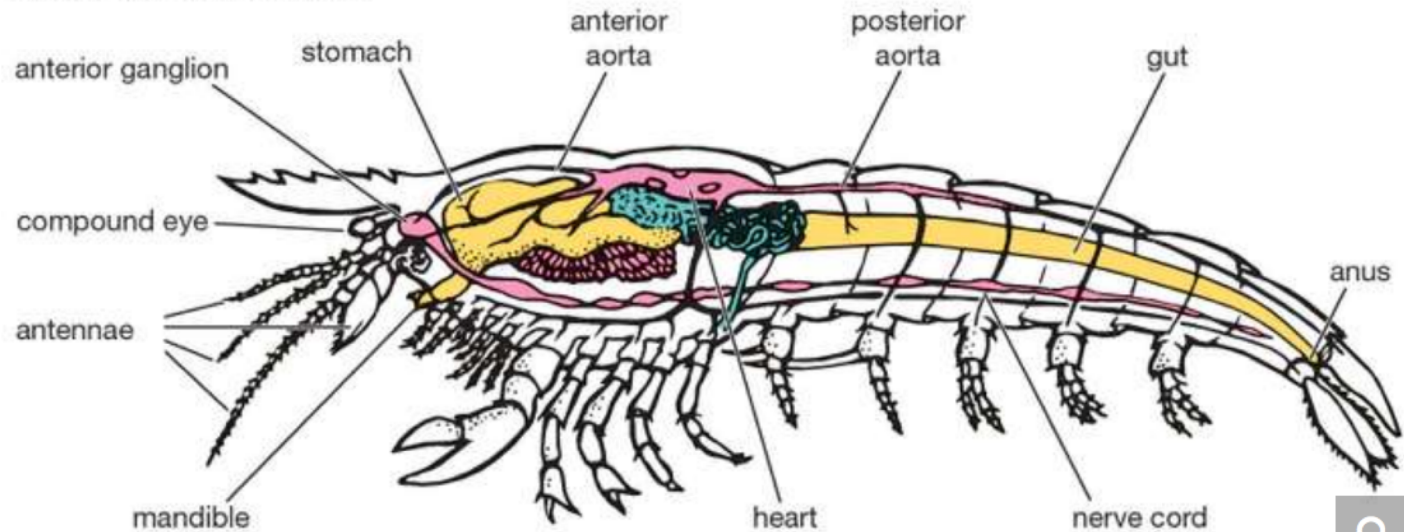
Figure 2 The lobster has an open circulatory system that distributes hemolymph through the sinuses.

In an open circulatory system the circulating fluid is pumped into an interconnected system of body cavities, or sinuses, where it bathes the cells directly. The circulating fluid, called hemolymph, is a mixture of blood and tissue fluid.



Heart → arteries → hemocoel → collecting vessels
 → pericardium → ostia → heart

Anatomy of a crustacean



Closed Circulatory System

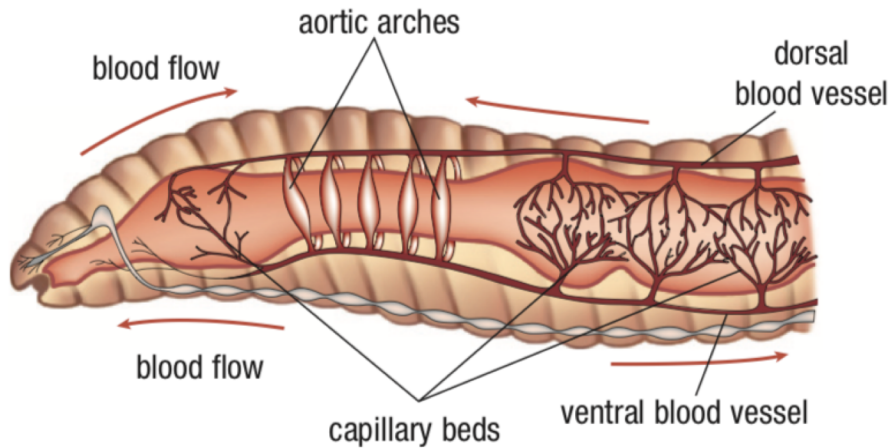


Figure 4 The blood of an earthworm is enclosed within a system of blood vessels.

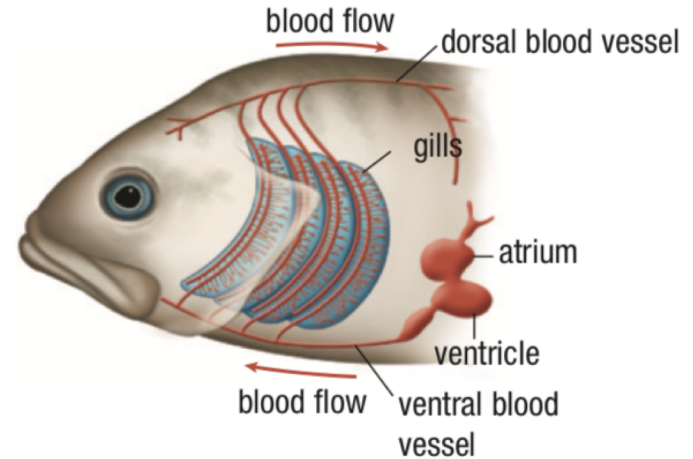
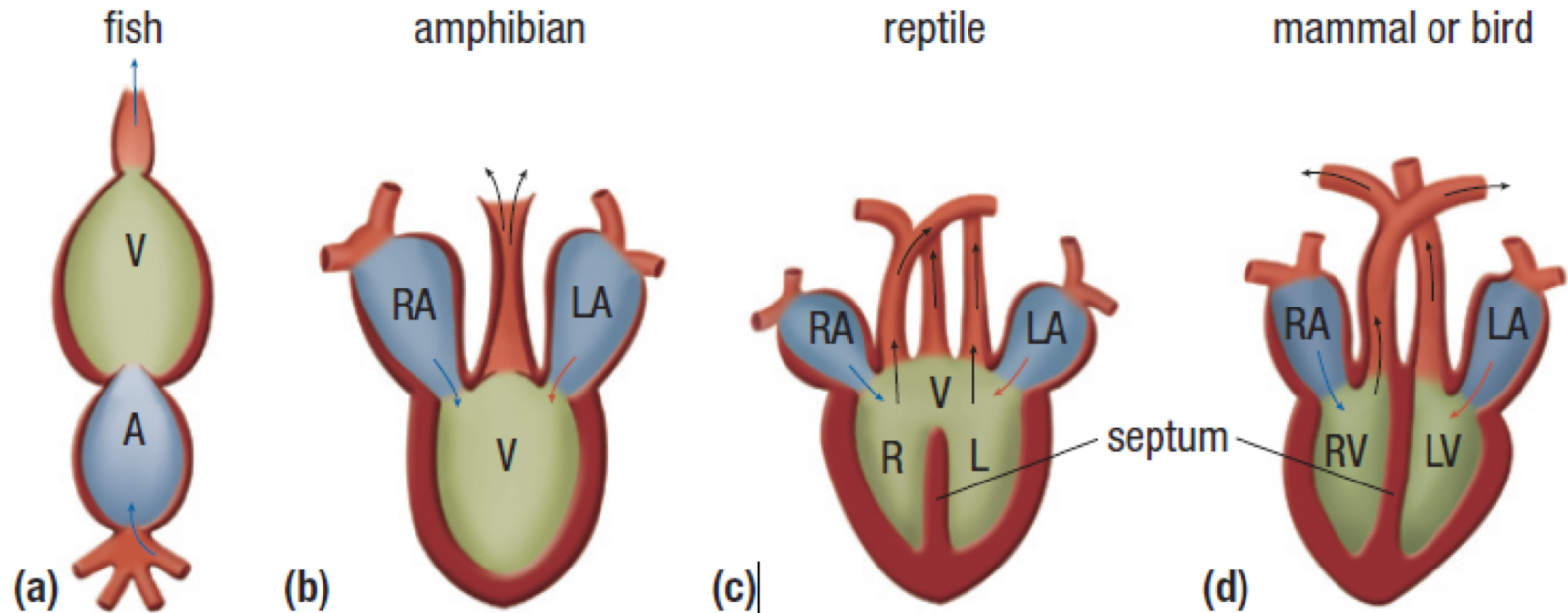


Figure 5 The circulatory system of fish is a single circuit. Blood is pumped through the gills, where it is oxygenated, and then pumped throughout the body.

- All vertebrates, as well as some invertebrates, have closed circulatory systems.
- The fluid (often blood) is contained within a network of tubes, or blood vessels.
- The tissue fluid surrounds the cells and provides a medium for diffusion of substances from the bloodstream to the cells.

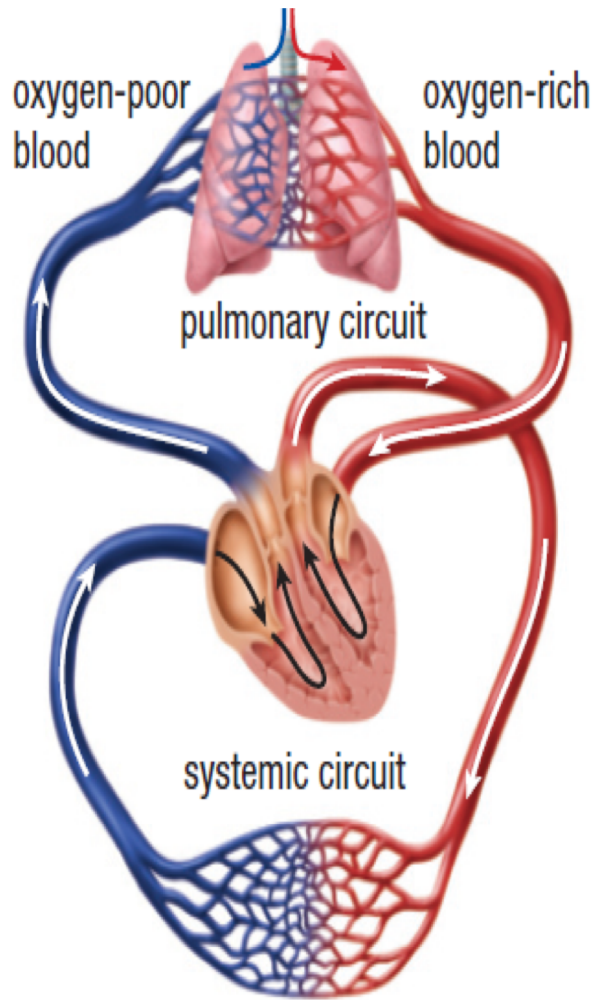
Evolution of the Heart

Simple to Complex



As animals evolved in size and complexity, the heart evolved from a simple two chambered structure to a four-chambered structure.

Two-Circuit Circulatory System



pulmonary circuit - the part of the circulatory system that delivers blood to the lungs

systemic circuit - the part of the circulatory system that delivers blood around the body

Figure 7 The mammalian circulatory