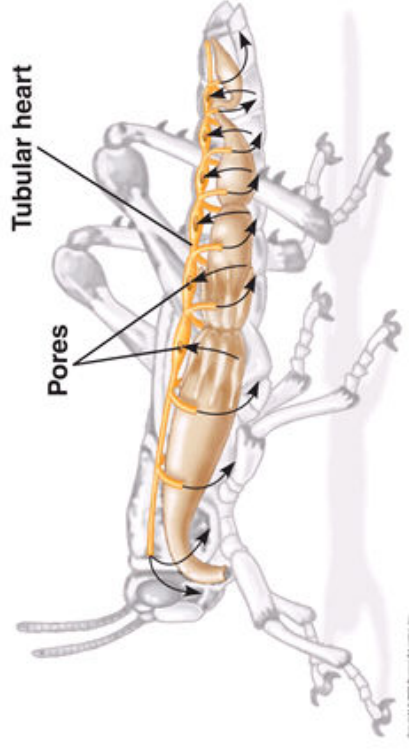


Circulatory Systems in Animals

What Does It Do? Why Needed?

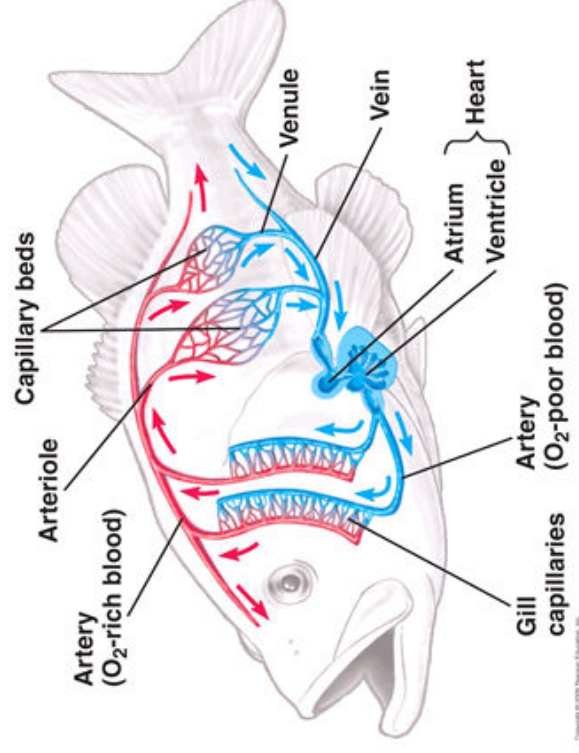
- All organisms must exchange matter with their environment, as well as distribute materials within their bodies
- The circulatory system transports oxygen and CO_2 , distributes nutrients to body cells, moves the waste products of metabolism from cells to sites of disposal

Circulatory Systems can be "Opened" or "Closed"



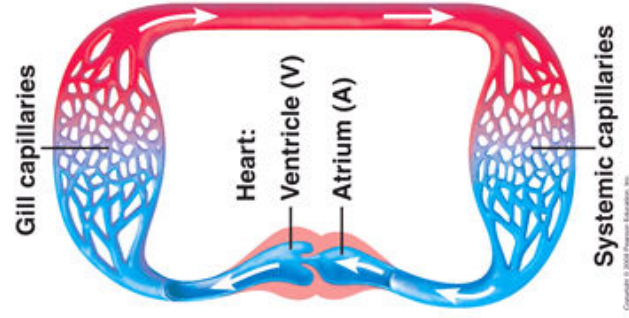
Opened systems lack a separation between blood and interstitial fluid...present in molluscs and arthropods

In closed systems, blood is confined to vessels and is physically separated from interstitial fluid...found in vertebrates, earthworms, squids, octopuses

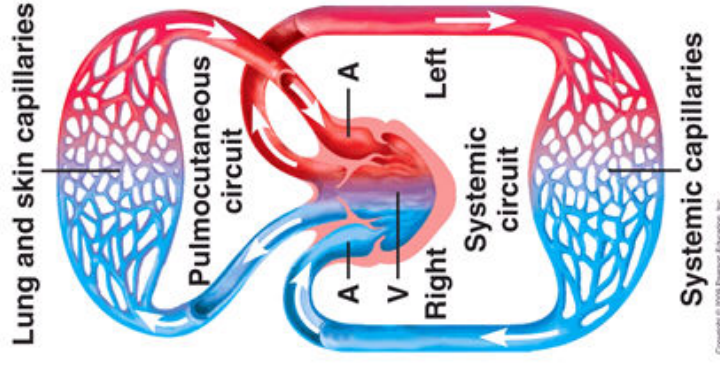


Vertebrate cardiovascular systems have evolved to overcome the challenges of life on land

The biggest change was from single circulation to double circulation



Single circulation with two-chambered heart...seen in fish

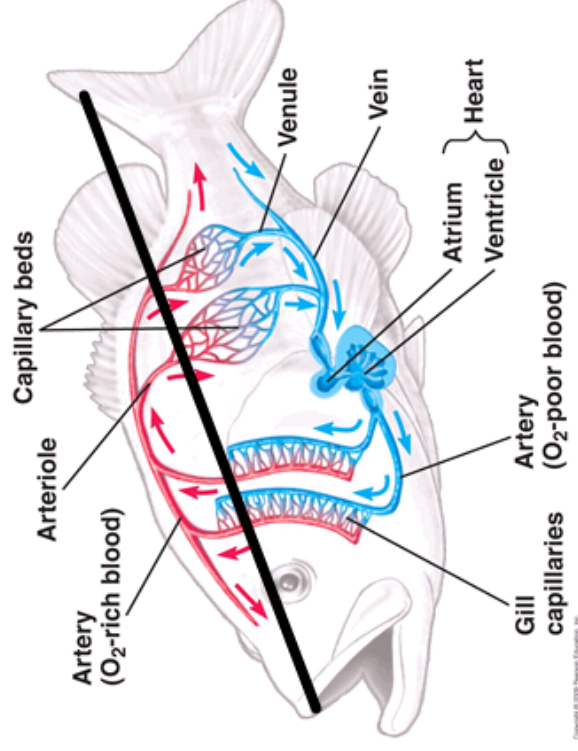


Double circulation with three chambered heart...seen in amphibians

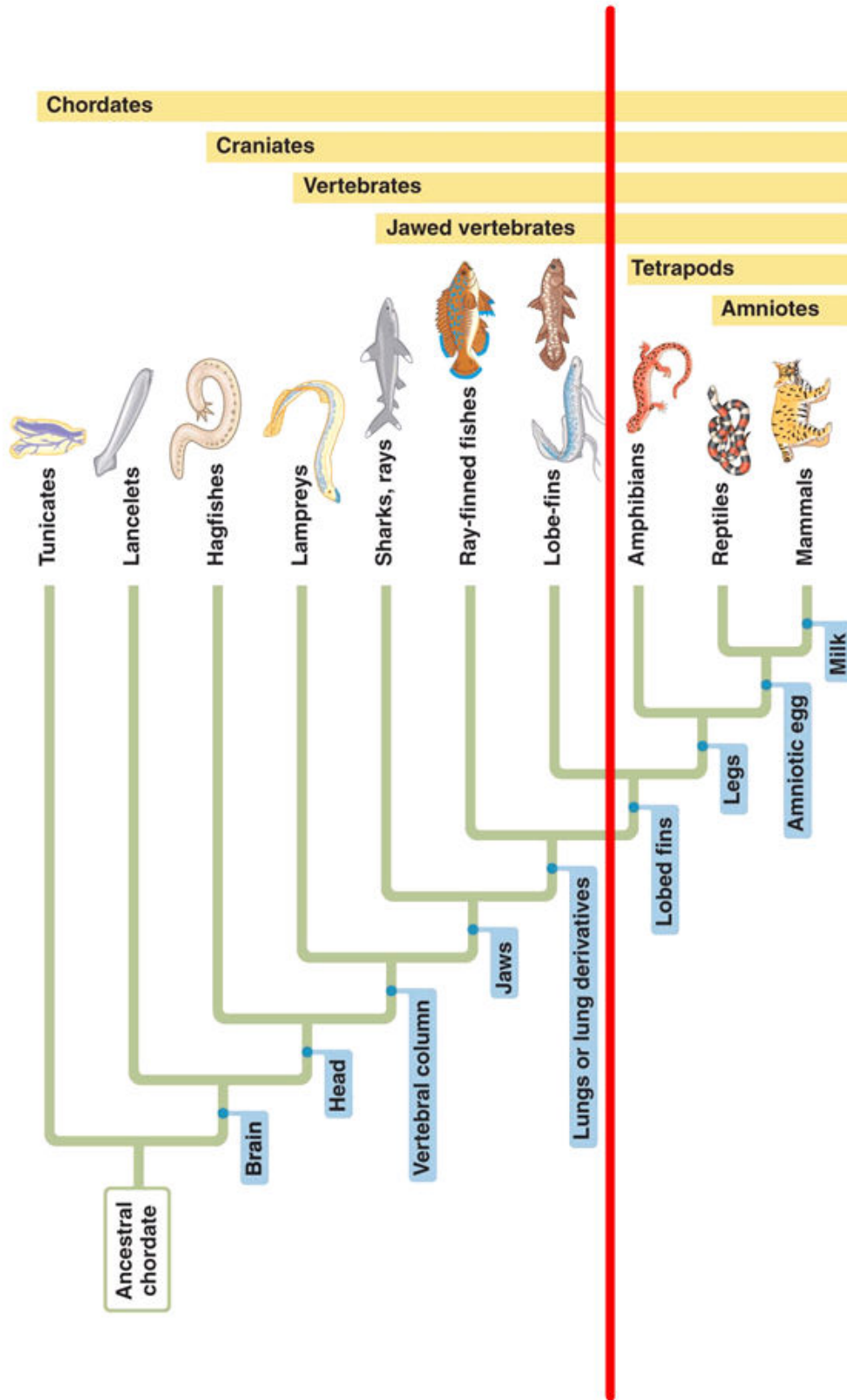
Fish can "get away" with single circulation as their body movements can compensate for the pressure drop caused by blood passing through gills....why?

Gravity has much less of an effect on the flow of blood in a fish as the height/length ratio of a fish is less than that of terrestrial organisms

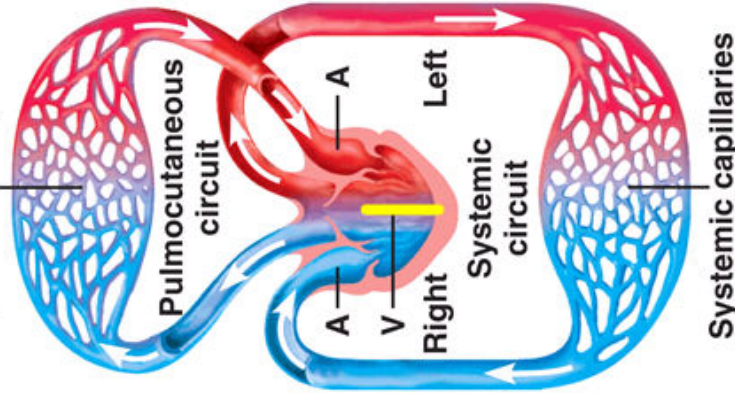
Also...most of the muscle of a fish is located near the main artery along the dorsal side



Vertebrate Phylogeny:



Lung and skin capillaries



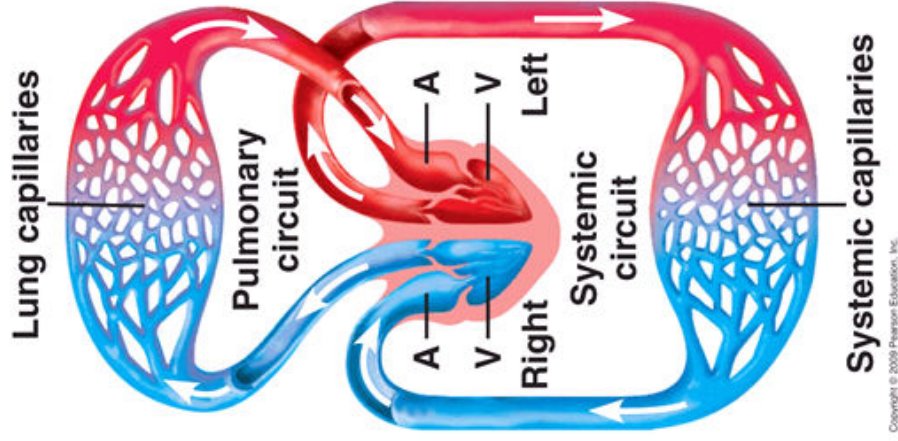
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In reptiles...heart is still three-chambered, but less mixing of oxygen-poor and oxygen-rich blood occurs due to a semi-divided ventricle...

this shows an evolutionary connection between two-chambered (in fish...living in aquatic systems) to four chambered hearts of mammals



High levels of metabolic activity...such as in birds and mammals need a better system



A double circulation with a four-chambered heart

This allows for the drop in blood pressure in the capillary beds of the lungs to be increased prior to blood entering the systemic circuit

This also allows blood to be pumped against the influences of gravity

6. Imagine that you are a tour guide on an RBC Bus (that's a red blood cell) in a human body. Describe the "attractions" that you would see on your journey through the circulatory system...

Let's start our tour in the right atrium, we have just returned from _____ and our level of oxygen is _____. Next we move along to the _____.