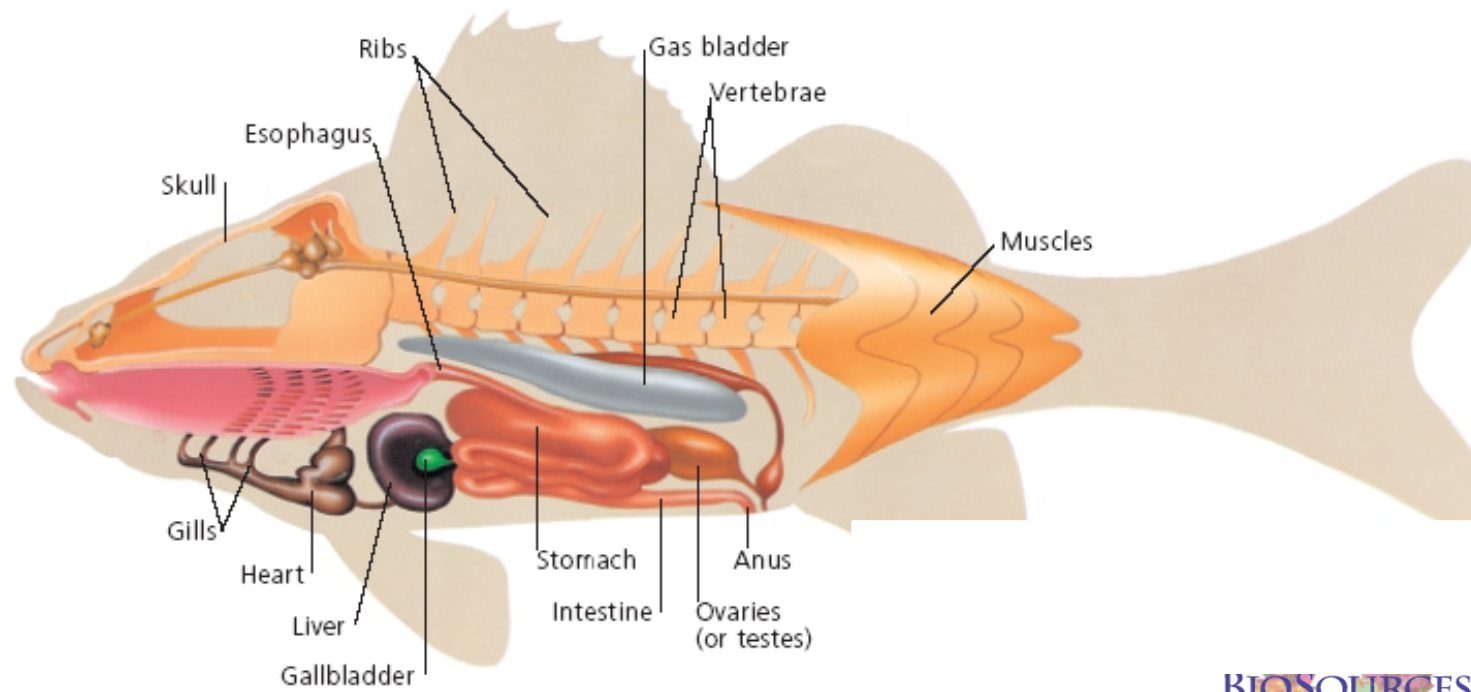


What characteristics make a fish recognizable?

Scales gills slimy water  
fins swim  
open mouth









“Fish” refers to anything in the three categories

Agnatha (jawless fishes)

Chondrichthyes (cartilaginous fishes)

Osteichthyes (Bone fishes)

## Major Groups of Fishes

Class	Number of modern species	Description	Examples
<b>Agnatha</b>	81	No jaws; no paired appendages	Lampreys, hagfishes 
<b>Acanthodii</b>	Extinct	Jaws; spiny, paired fins	Acanthodians 
<b>Placodermi</b>	Extinct	Jaws; paired fins; bony armor	Placoderms 
<b>Chondrichthyes</b>	850	Jaws; paired fins; skeleton of cartilage; no swim bladder; spiracle; internal fertilization	Sharks, skates, rays 
<b>Osteichthyes</b>	21,000	Jaws; paired fins supported by bony rays; bony skeleton; most have swim bladder	Ray-finned fishes 
	7	Jaws; paired lobed fins; bony skeleton; extinct forms are ancestors of amphibians	Lobe-finned fishes 

# Key Characteristics

## Gills

Single-loop blood circulation

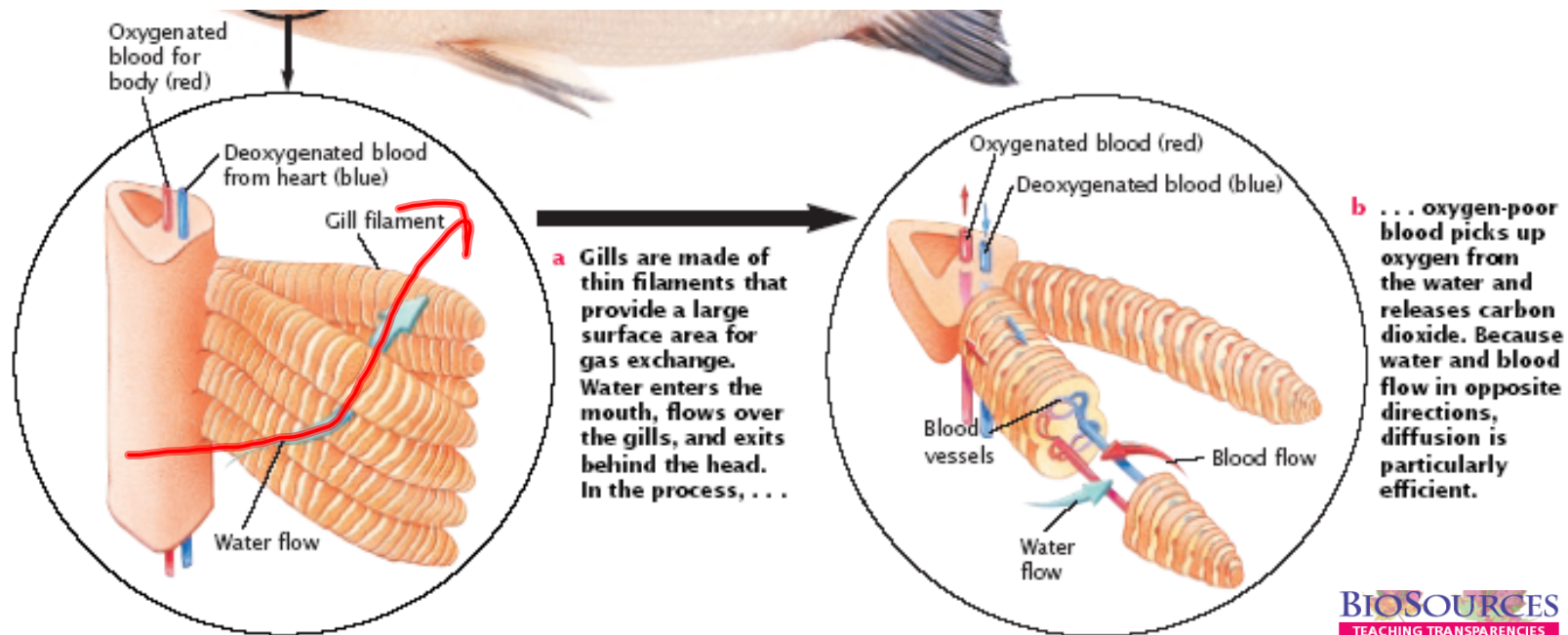
Vertebral Column

heat → gills → body



Gills are made up of gill filaments (finger-like projections by which gas enters and leaves the blood )

Gill slits are where the water exits the



# Fish Heart

1. Sinus Venosus- the collection Chamber that acts to reduce the resistance of blood flow into the heart

2. Atrium- Chamber is large and has thin, muscular walls

3. Ventricle- thick walled pump  
with enough muscle to contract  
strongly

4. Conus arteriosus- a 2nd pump  
that smoothes the pulsation and adds  
more force



The concentration of salt in the sea water is 3 times that of the tissues of the fish

The fish always then losing water through osmosis

They need to constantly drink water

Freshwater fish tend to take in water by osmosis and this dilutes the ions so they need to take them from their environment

Kidneys are made of thousands of nephrons (tubelike units that regulate the body's salt and water)

Spawning- male and female gametes are released near one another in the water.