

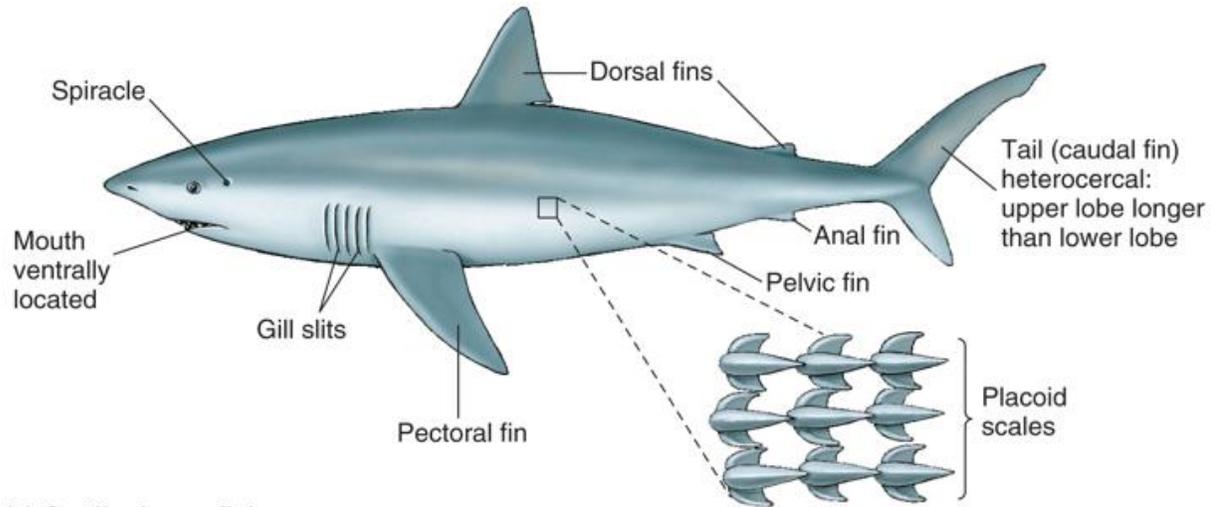


Osteichthyes



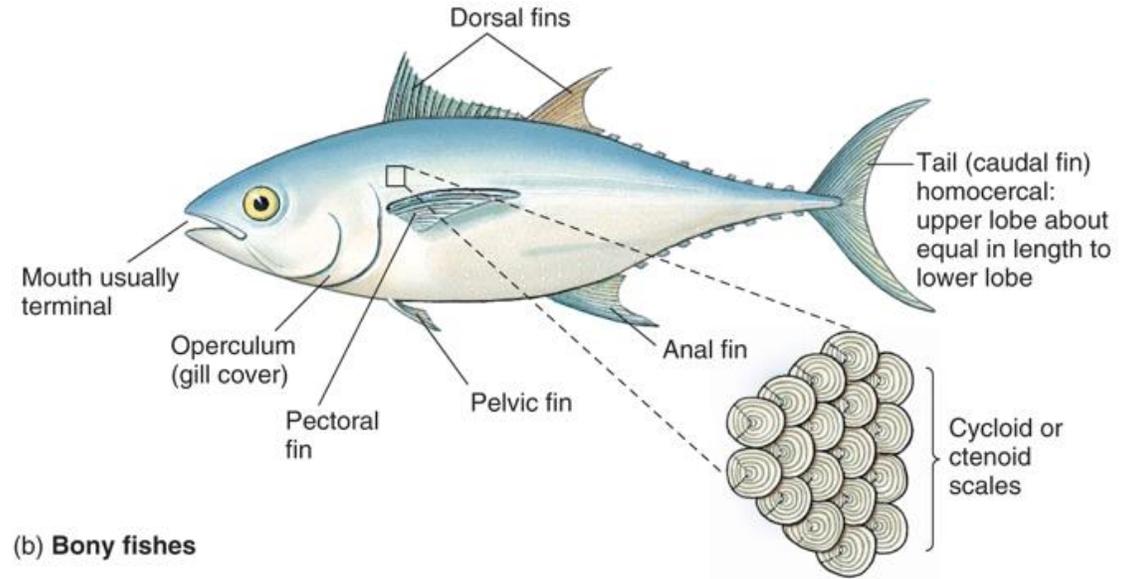
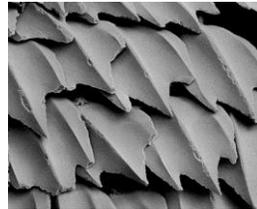
Lab

Differences Between Cartilaginous Fish and Bony Fish



(a) Cartilaginous fishes

- ▶ Mouth ventrally located
- ▶ 5 to 7 gill slits
- ▶ Placoid scales
- ▶ Heterocercal caudal fin
- ▶ **Spiracle**: respiratory opening
- ▶ Large lipid-rich liver



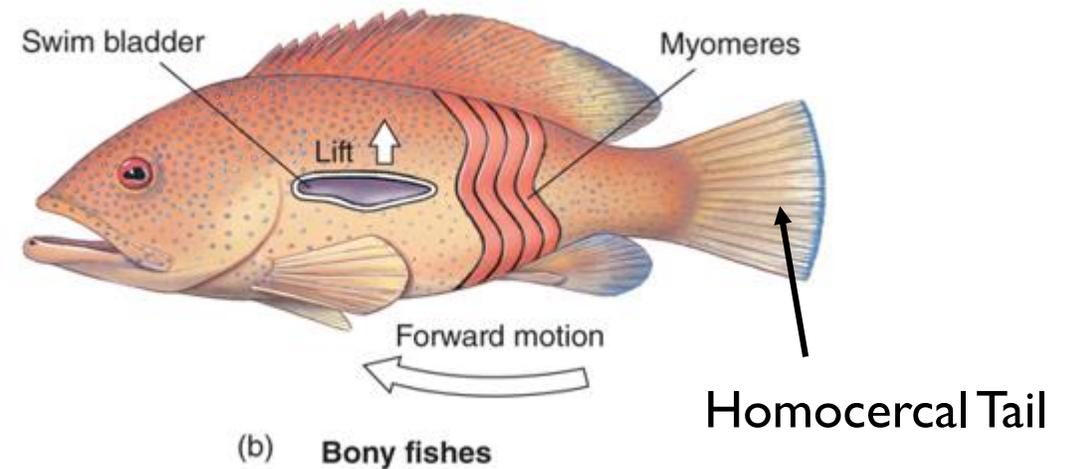
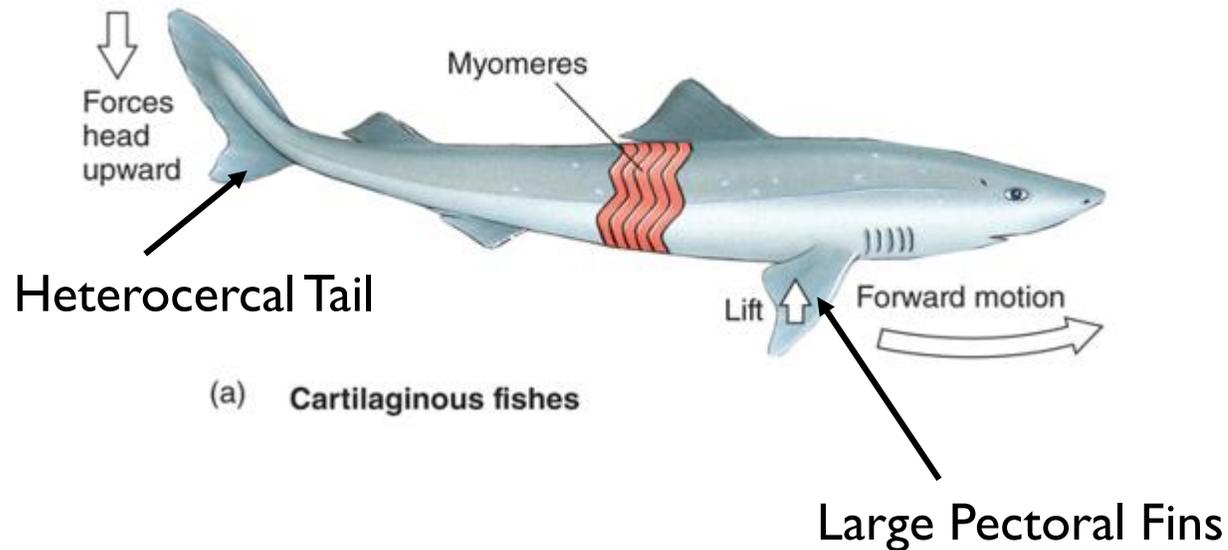
(b) Bony fishes

- ▶ Mouth at front of body (terminal)
- ▶ Single gill cover (operculum)
- ▶ Ctenoid or cycloid scales
- ▶ Homocercal caudal fin
- ▶ Swim bladder

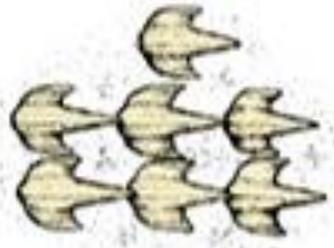


Differences Between Cartilaginous Fish and Bony Fish

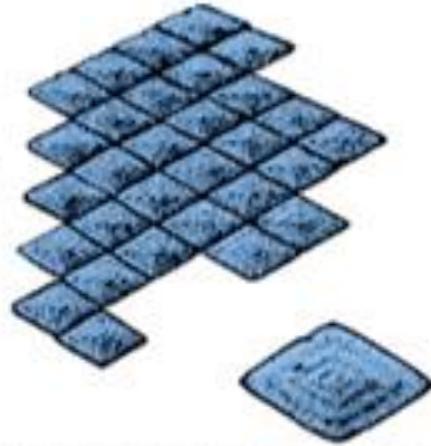
- ▶ Cartilaginous fish have large, fleshy pectoral fins that provide lift, and a heterocercal tail that draws the head upward when swimming
- ▶ Bony fish have a swim bladder to maintain buoyancy, which allows them to use their thin, rayed fins for maneuverability
 - ▶ Greater diversity of swimming styles in bony fishes



Types of Fish Scales



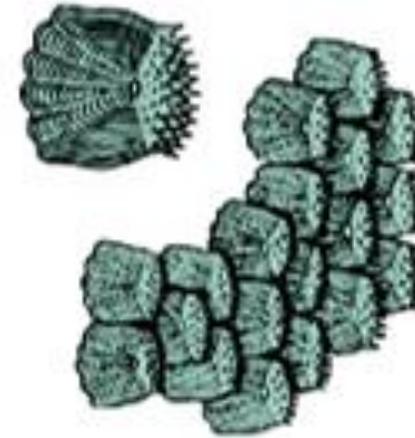
**Placoid scales
(cartilaginous
fishes)**



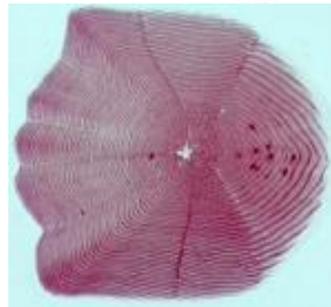
**Ganoid scales
(nonteleost
bony fishes)**



**Cycloid
scales
(teleost
fishes)**

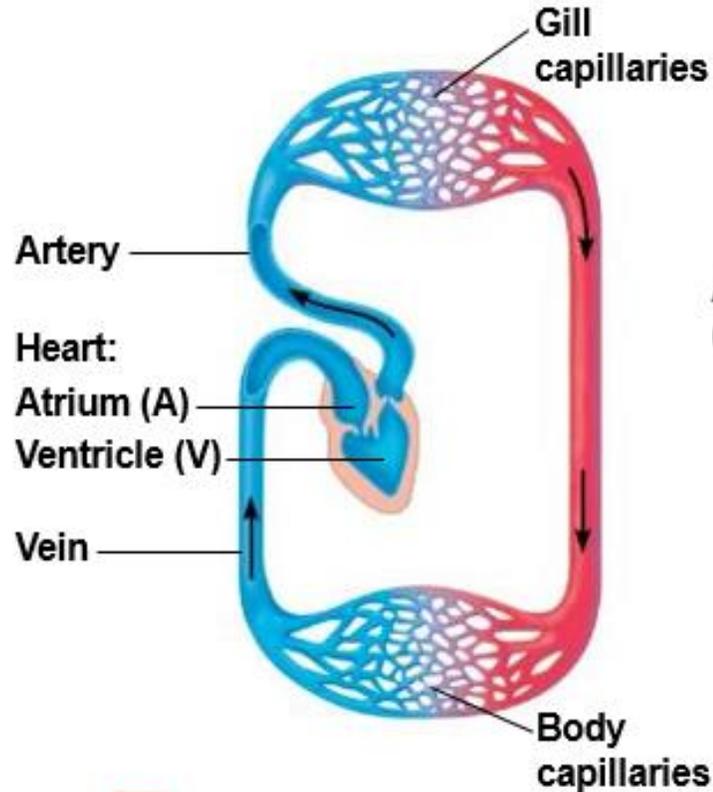


**Ctenoid
scales
(teleost
fishes)**



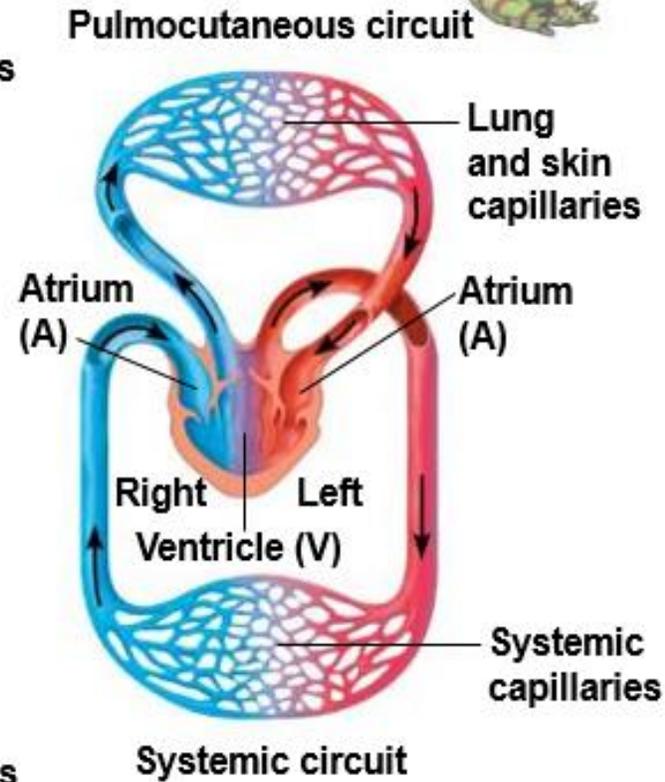
Vertebrate Circulatory Systems

(a) Single circulation:
fish

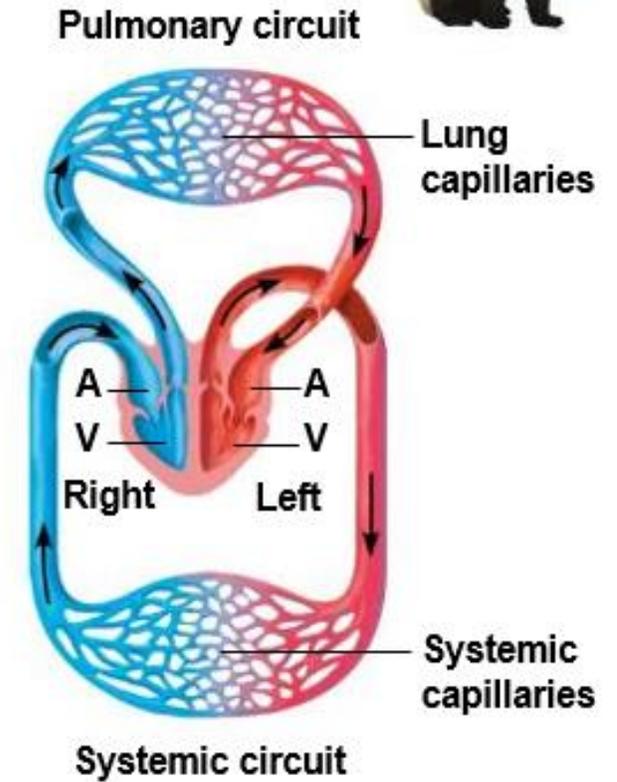


Key  Oxygen-rich blood
 Oxygen-poor blood

(b) Double circulation:
amphibian

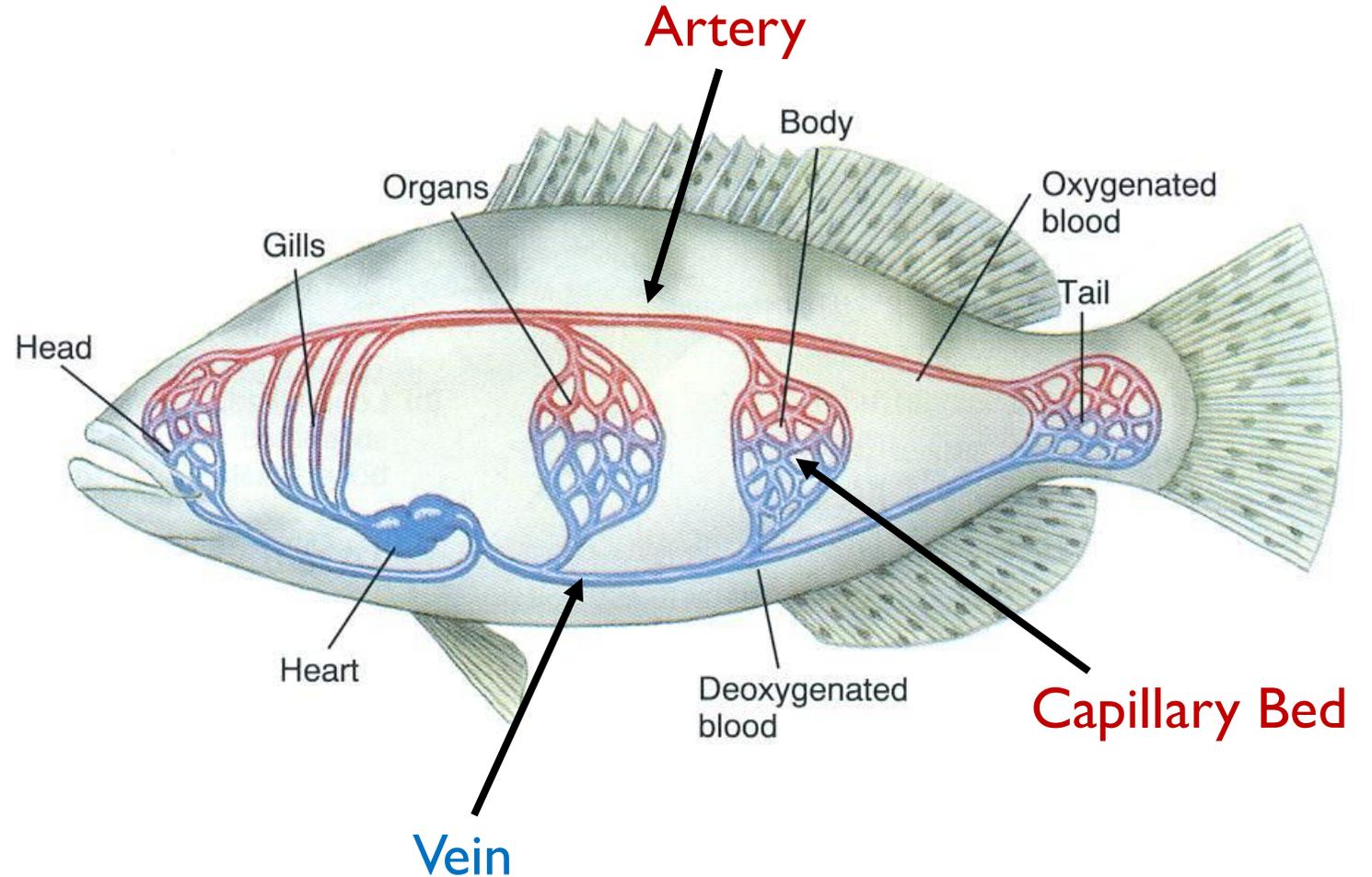


(c) Double circulation:
mammal



Circulation in Fishes

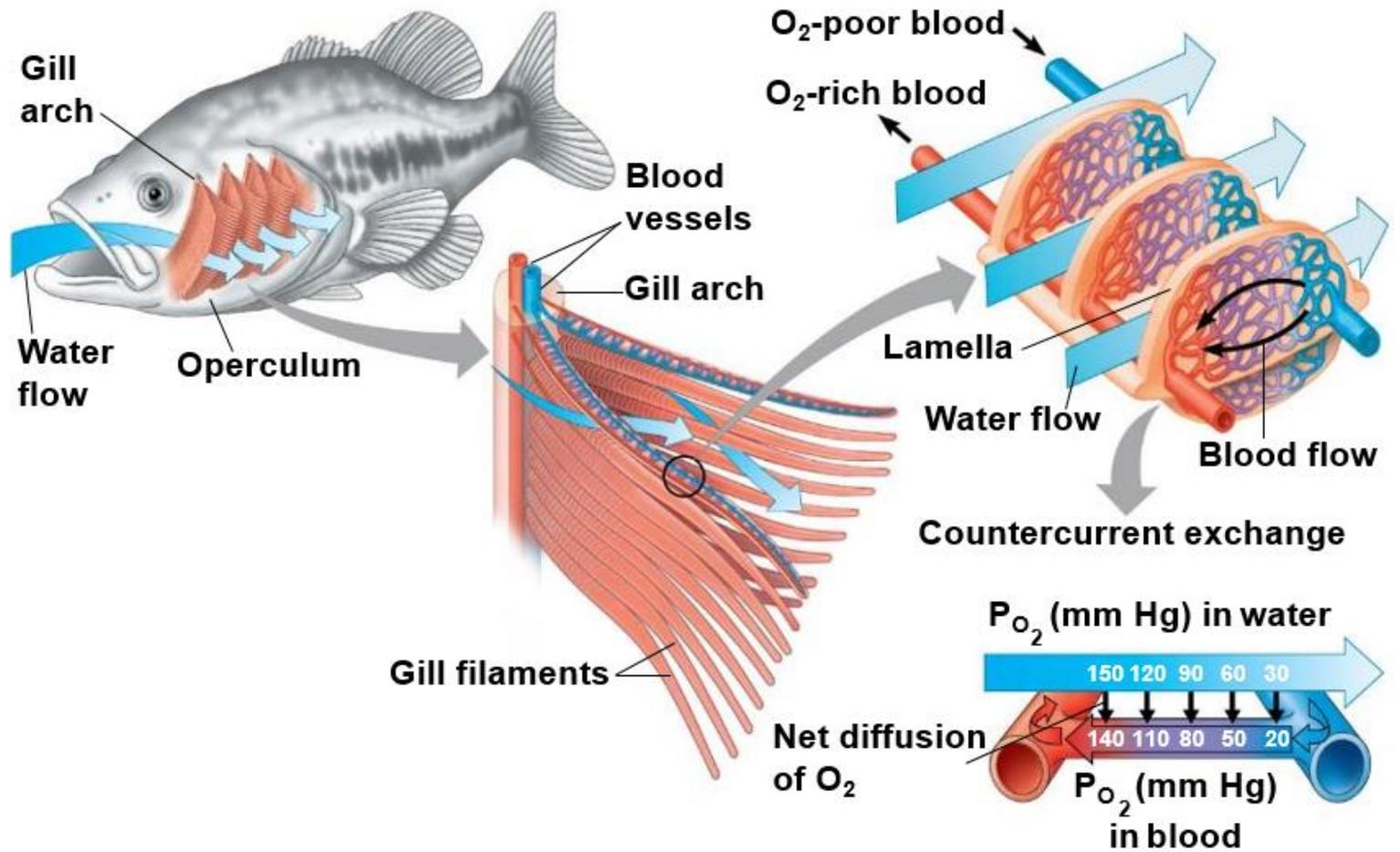
- ▶ One way blood flow
- ▶ Heart
 - ▶ Pumps blood to gills
- ▶ Arteries
 - ▶ Carry blood away from heart to tissues
- ▶ Capillaries
 - ▶ Site of gas and nutrient exchange
- ▶ Veins
 - ▶ Carry blood to heart



Respiration in Fishes

Countercurrent gas exchange:
oxygen-poor blood runs
opposite direction to water
high in oxygen content

- ▶ Diffusion gradient for oxygen maintained along entire gill surface
- ▶ Maximum efficiency in gas exchange



Osteichthyes (AH-stee-IK-thee-eez)

Bony fishes

- ▶ Ossified (bony) endoskeleton
- ▶ Pair of lungs or swim bladder
- ▶ Bony fin rays
- ▶ Ganoid, ctenoid, or cycloid scales (no placoid)

Divided into Two Classes

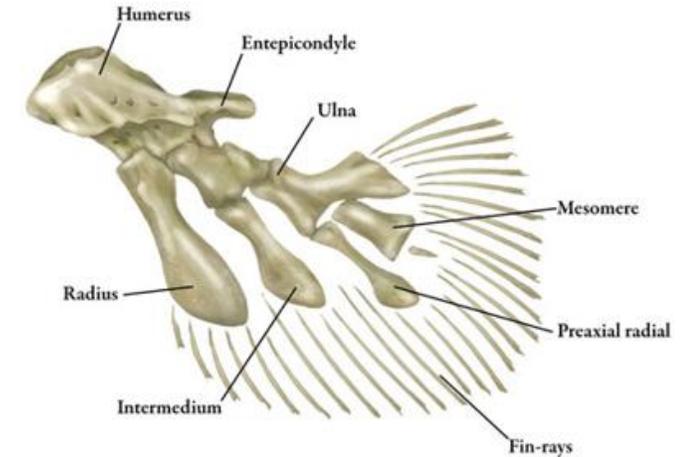
Class Sarcopterygii (sar-KOP-tuh-RIJ-ee-eye)

- ▶ Lobe-finned fishes
 - ▶ Pectoral and pelvic fins made of rod-shaped bones surrounded by muscle

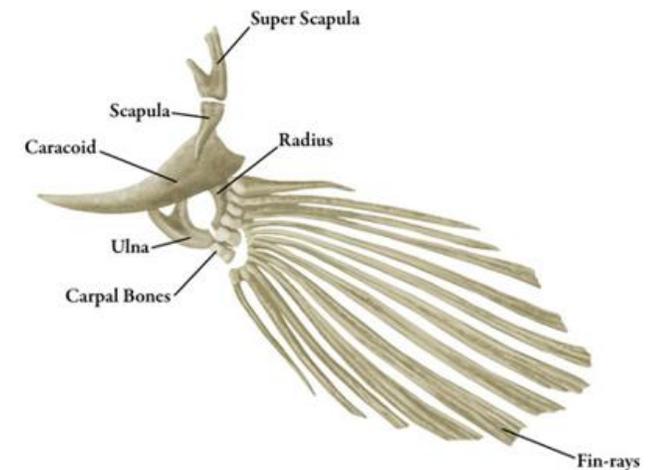
Class Actinopterygii (ACK-tih-NOP-tuh-RIJ-ee-eye)

- ▶ Ray-finned fishes
 - ▶ Elongated, flexible fin rays

Lobed fin



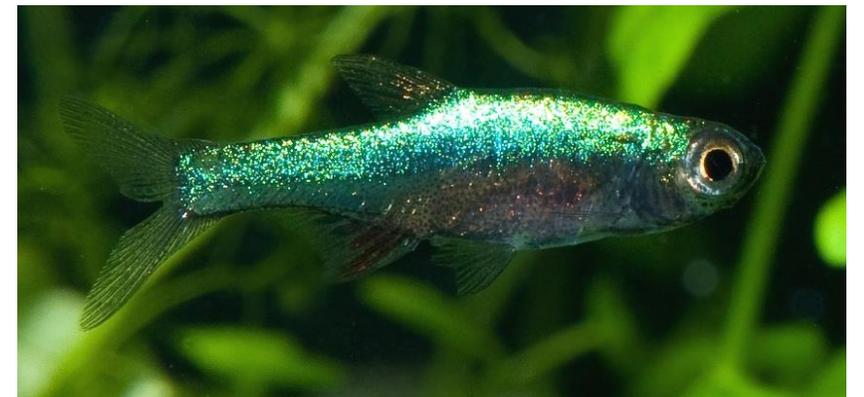
Rayed fin



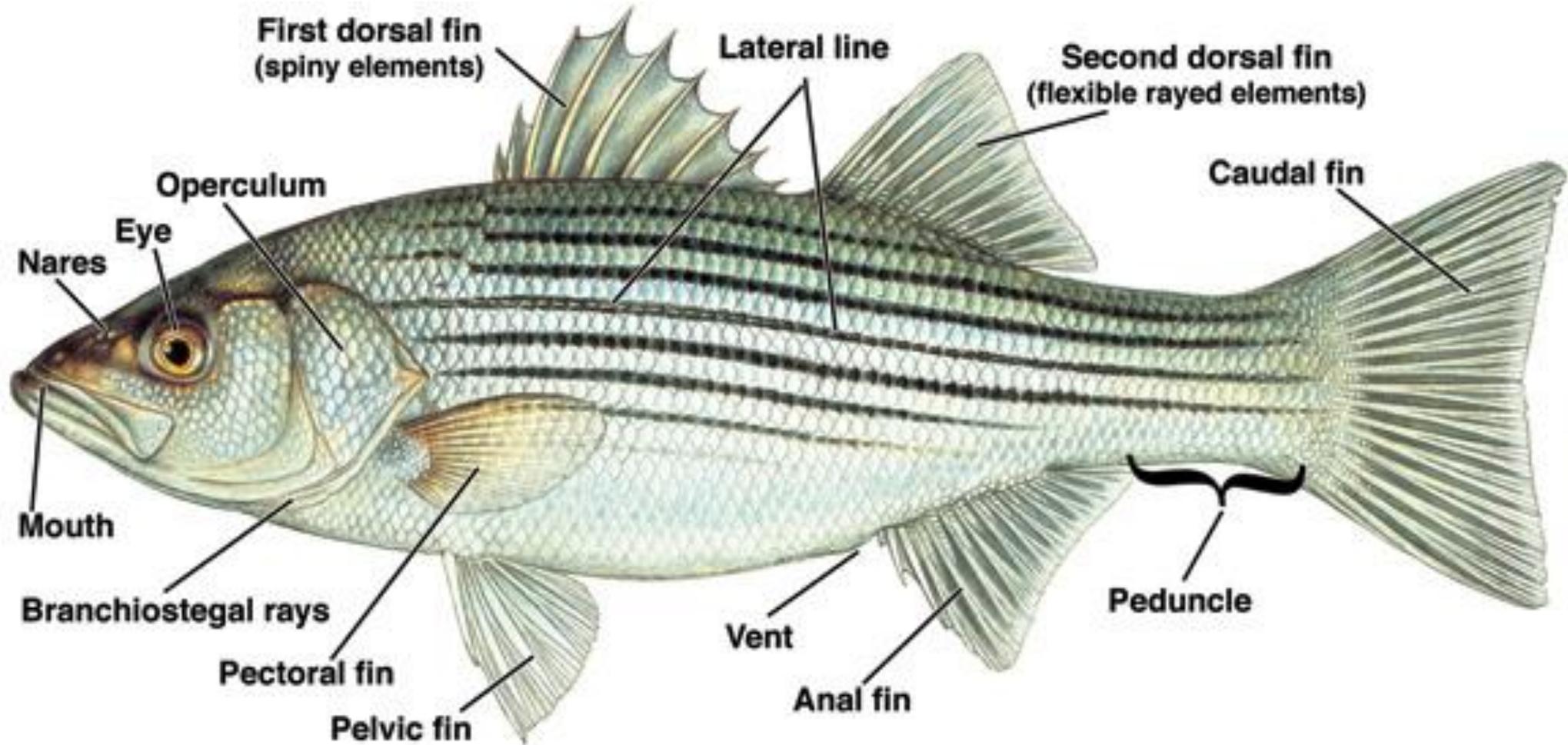
Lobe Finned Fish



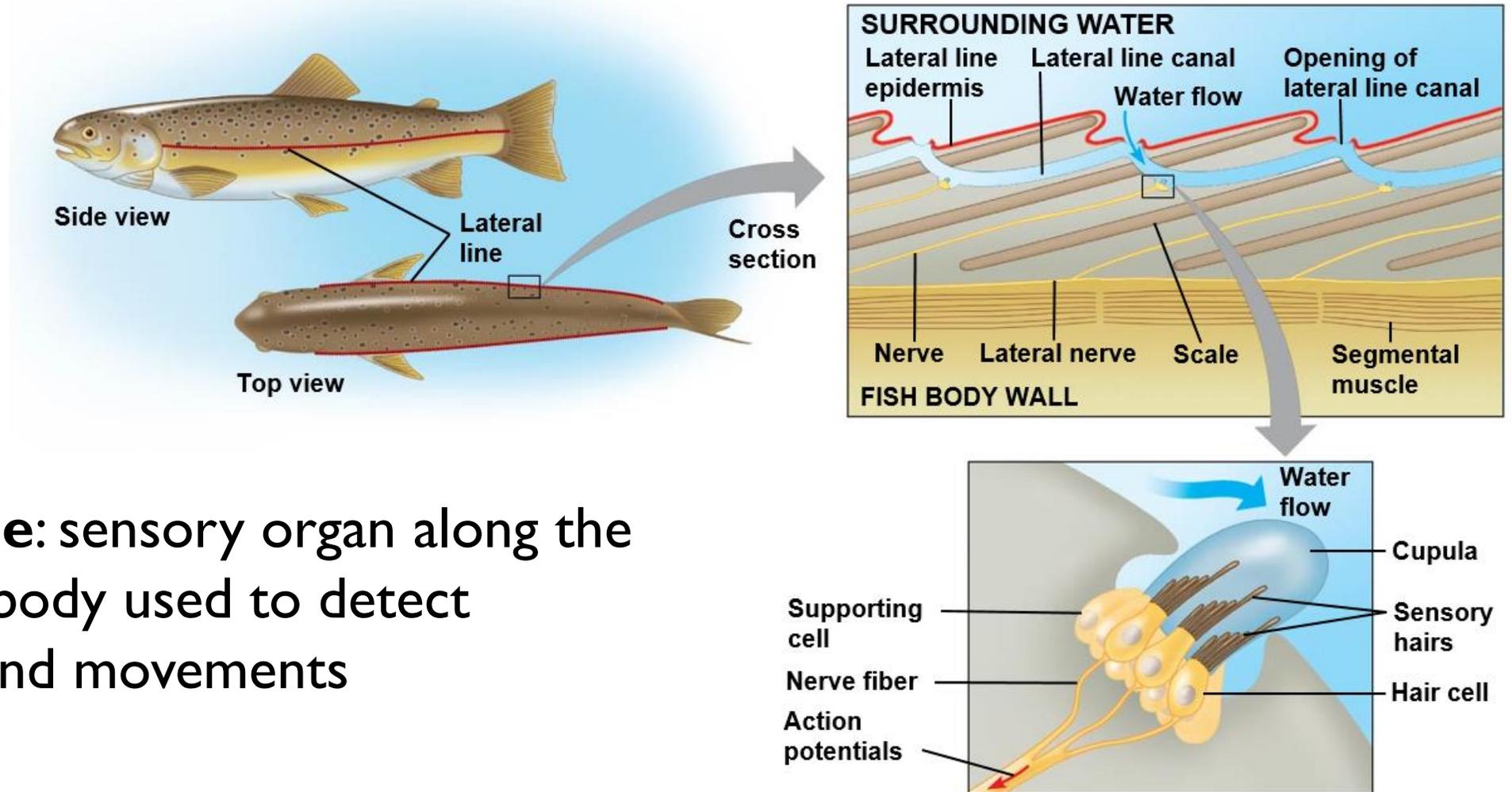
Ray Finned Fish



External Anatomy of a Bony Fish

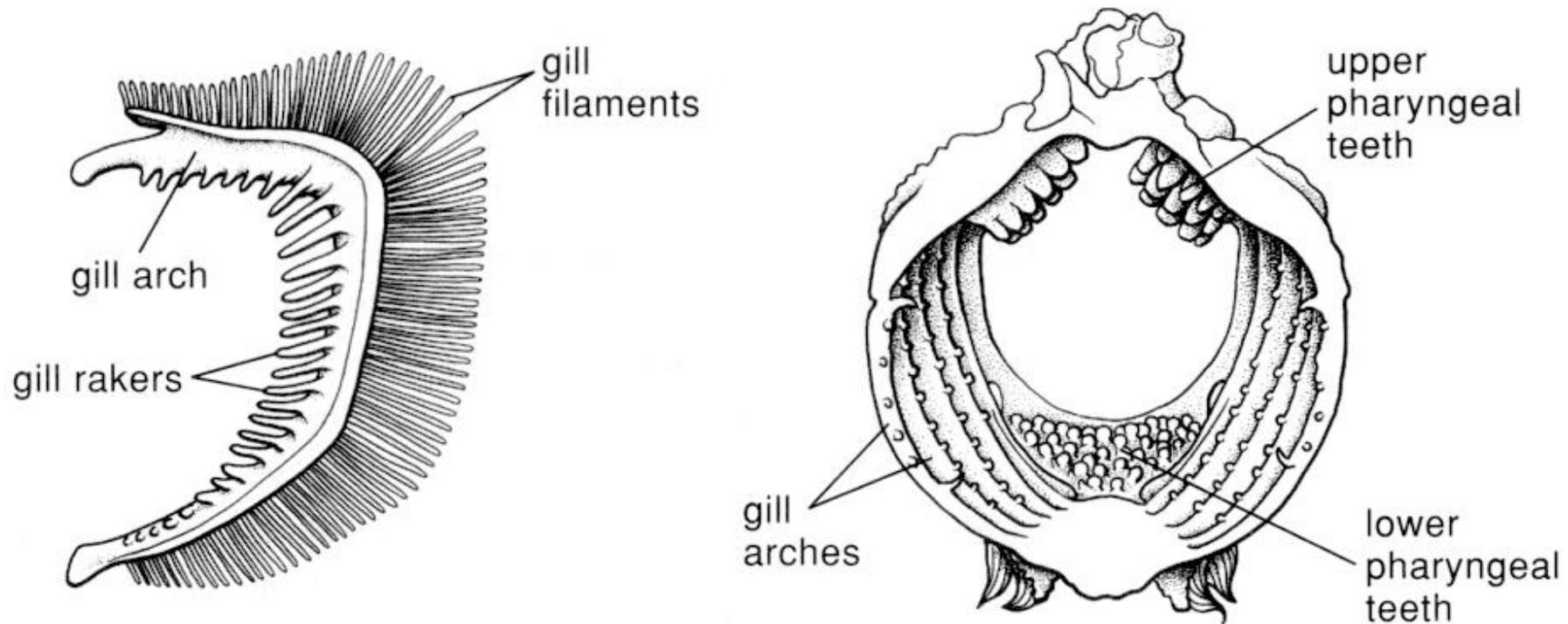


Lateral Line



- ▶ **Lateral line:** sensory organ along the side of the body used to detect vibrations and movements

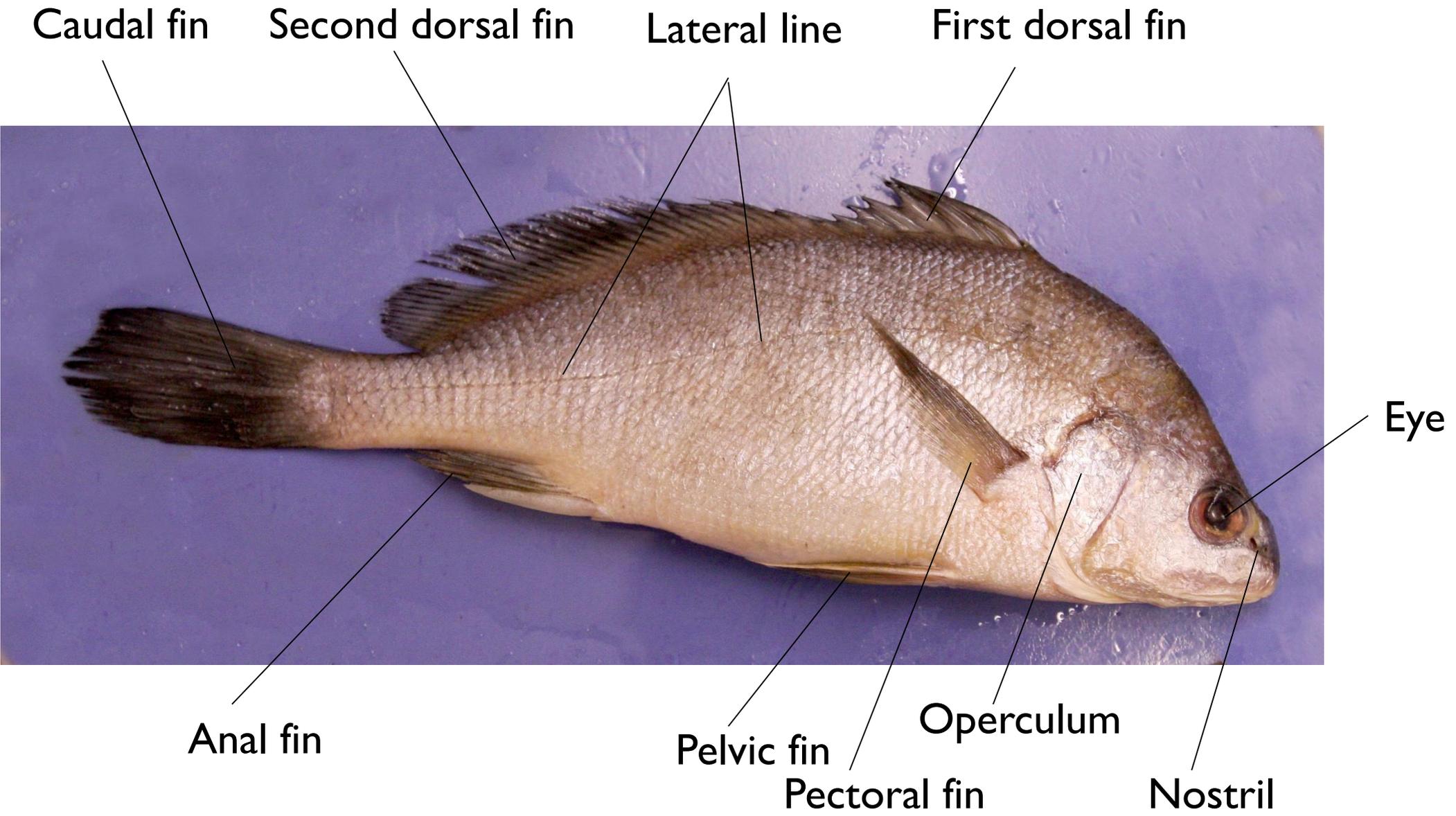
Pharyngeal Teeth and Gill Rakers



- ▶ Gill rakers are extensions of the gill arches and are found in planktivorous fishes where they are used trap plankton

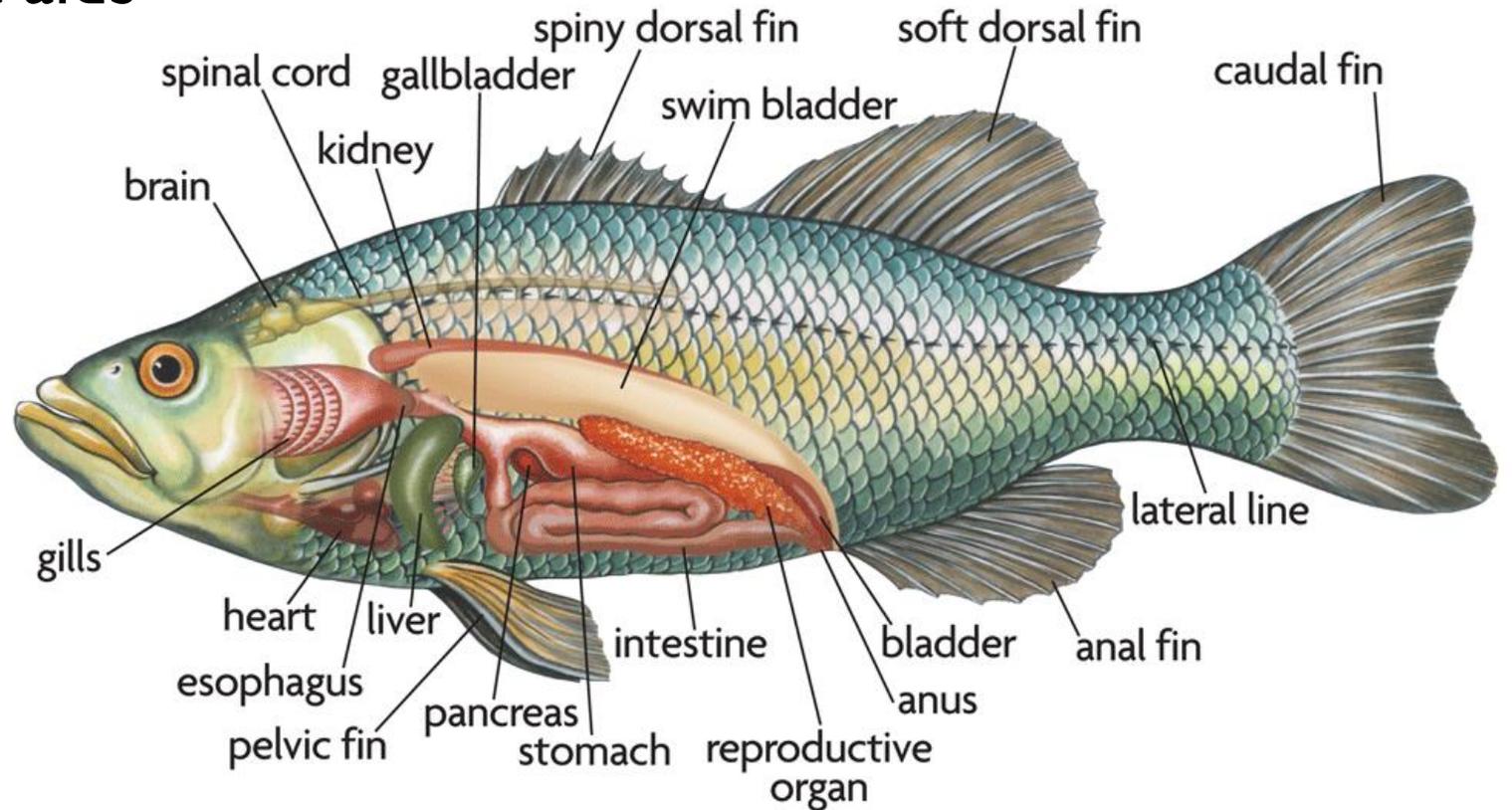
- ▶ Many fish have pharyngeal teeth that are used to breakdown food in the throat



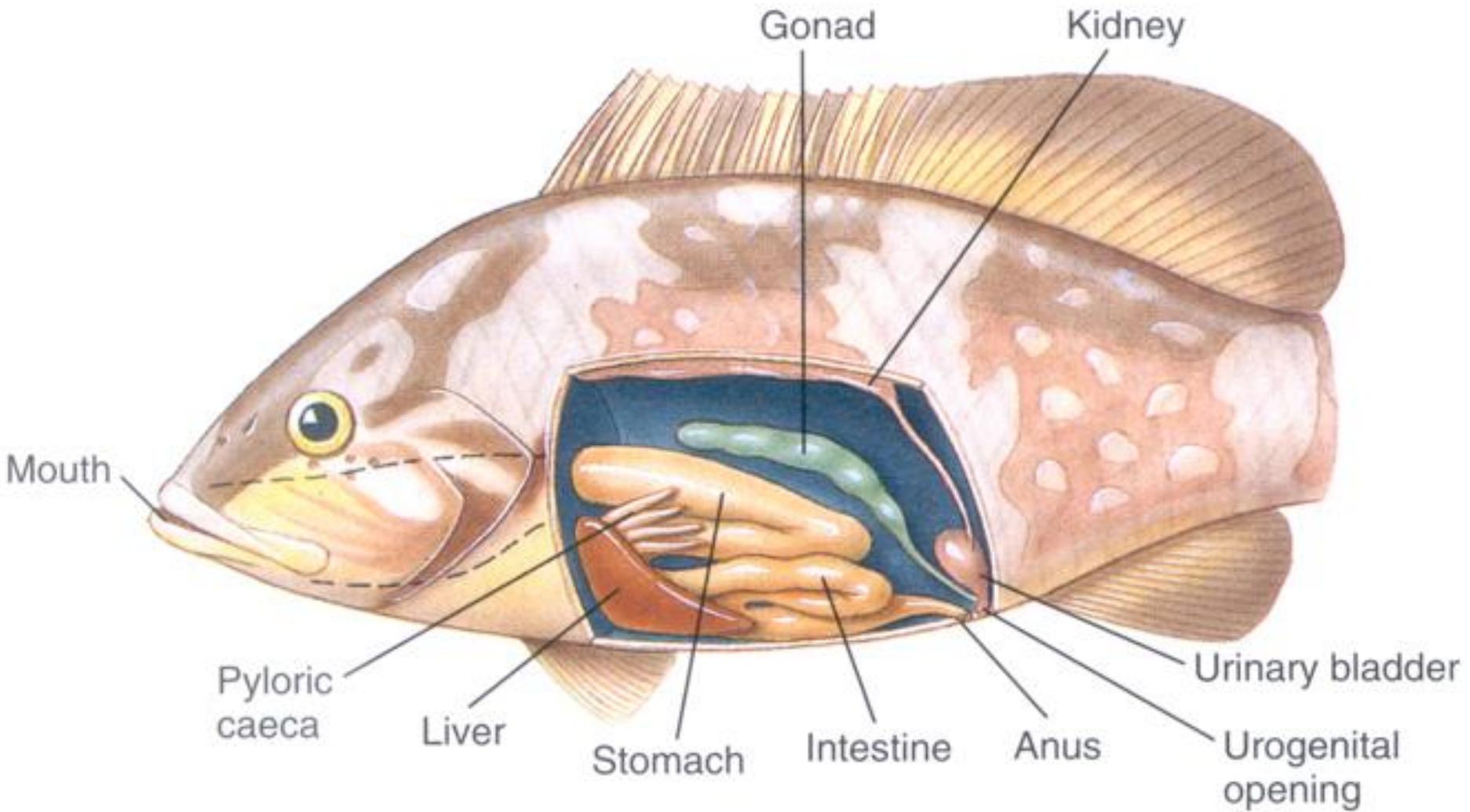


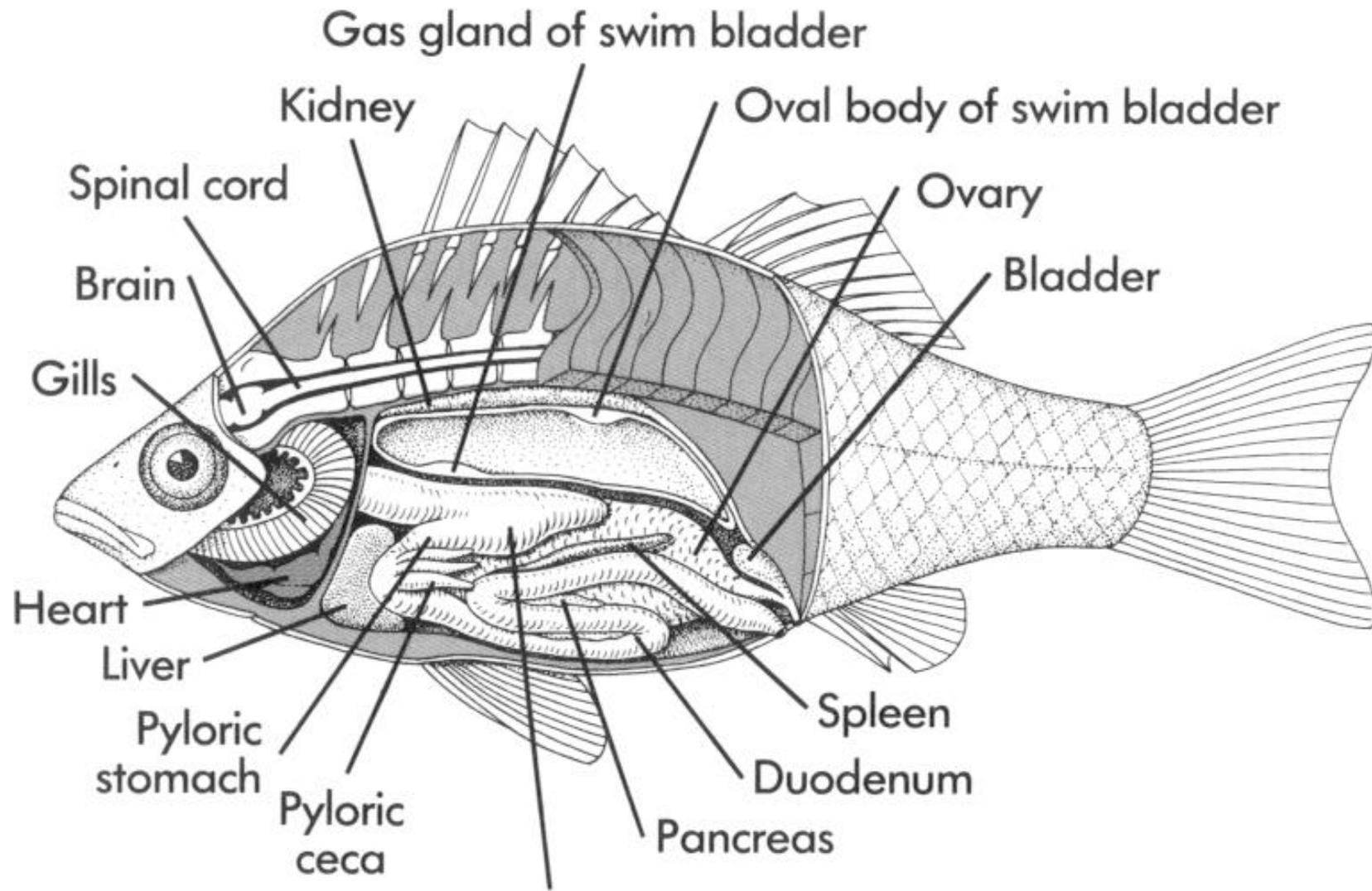
Internal Anatomy of a Bony Fish

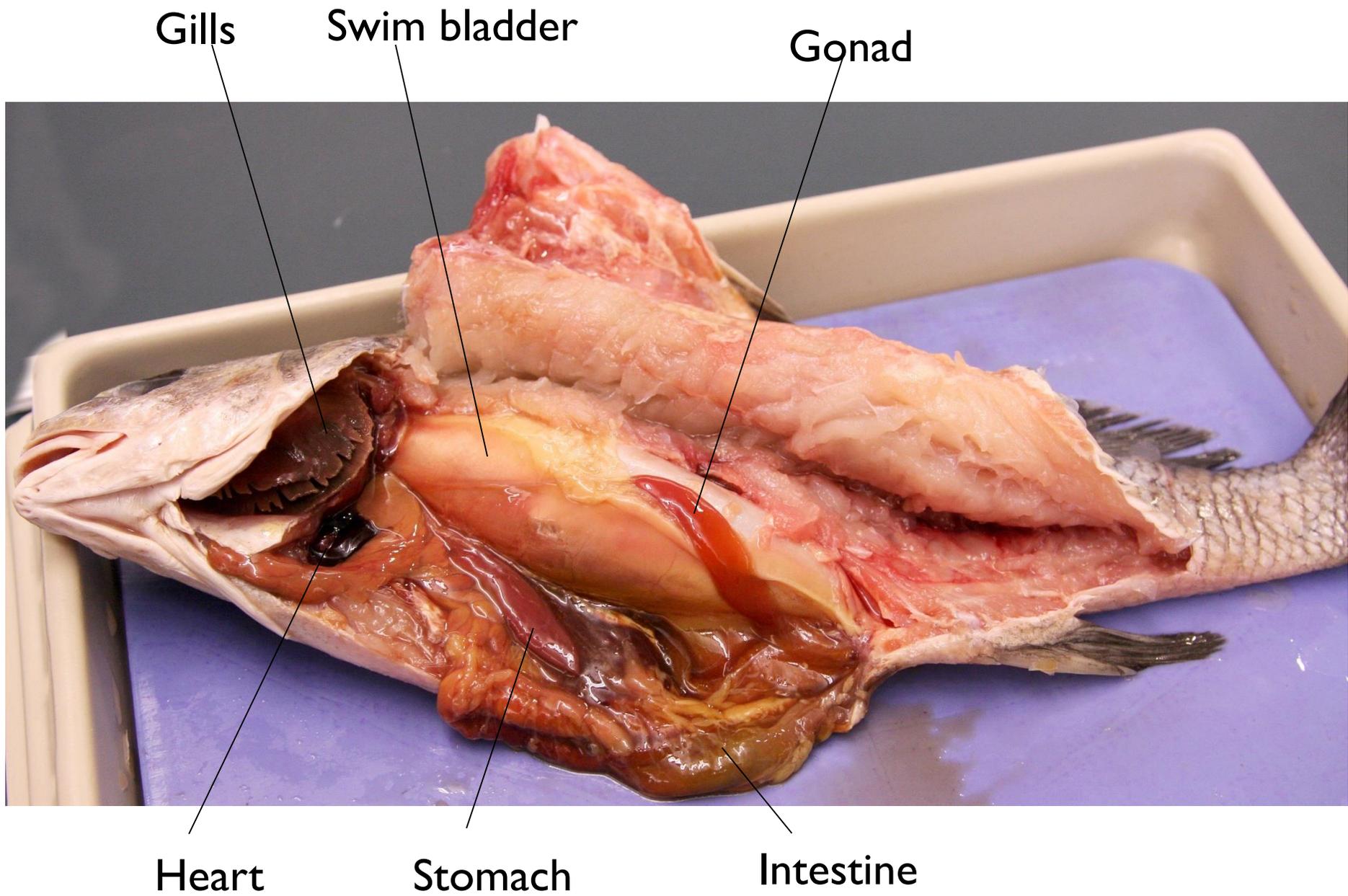
- ▶ **Swim bladder (gas bladder):**
internal air filled organ that aids
in buoyancy

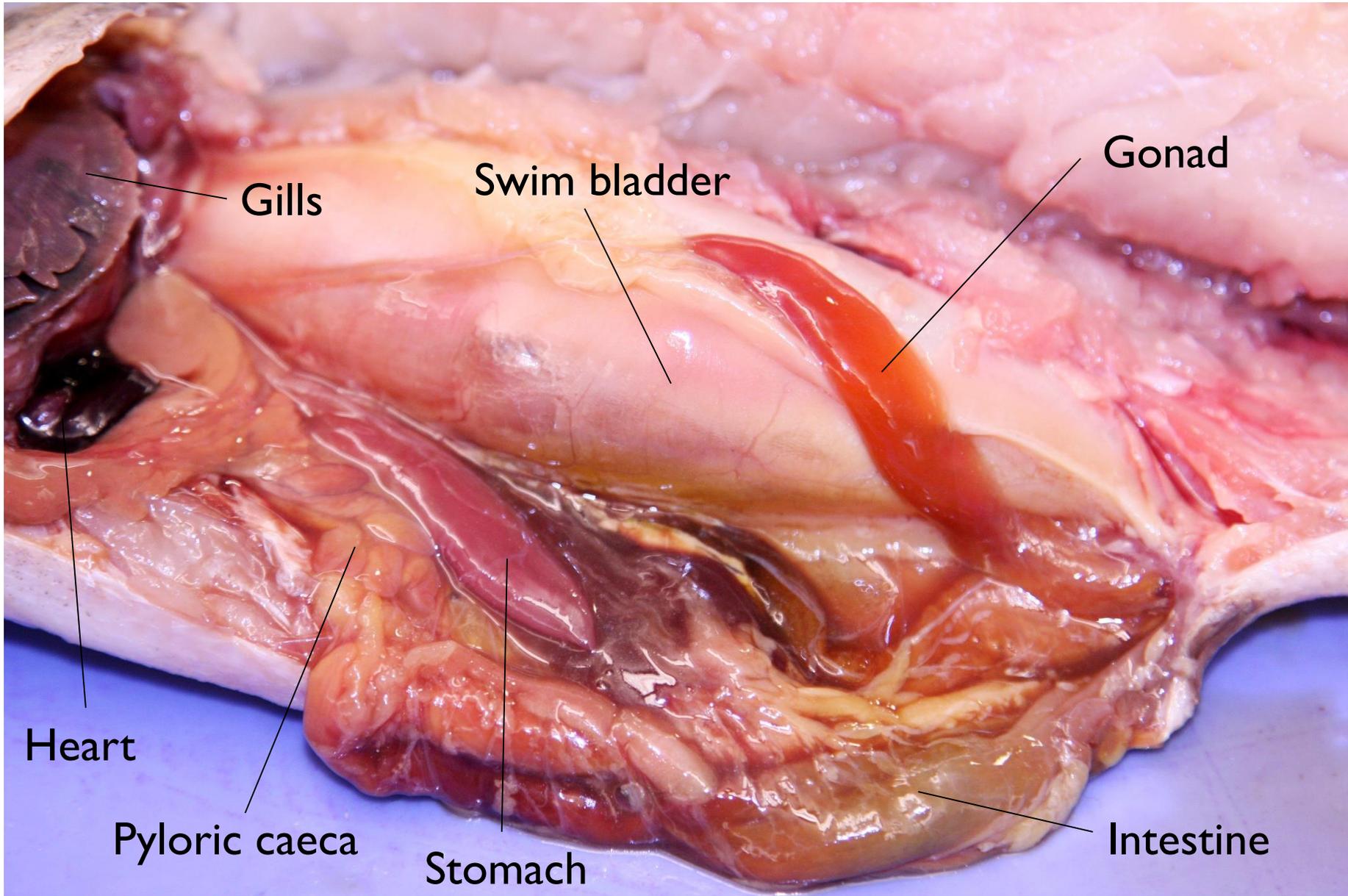


Internal Anatomy of a Bony Fish









Gills

Swim bladder

Gonad

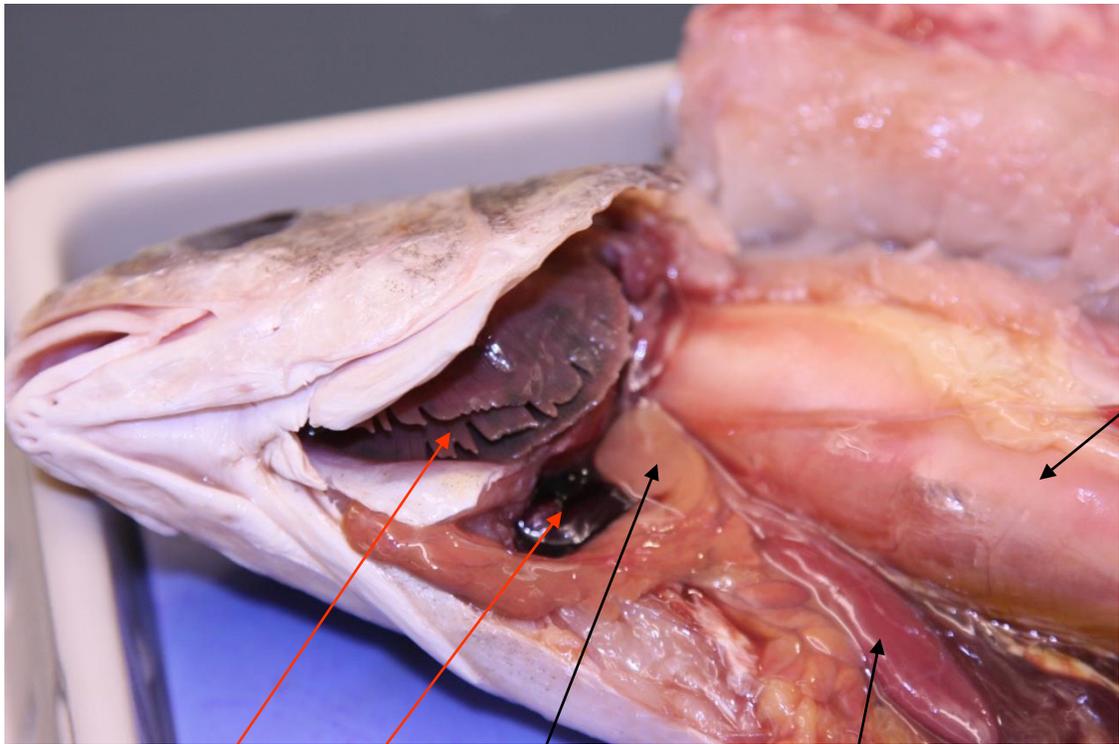
Heart

Pyloric caeca

Stomach

Intestine





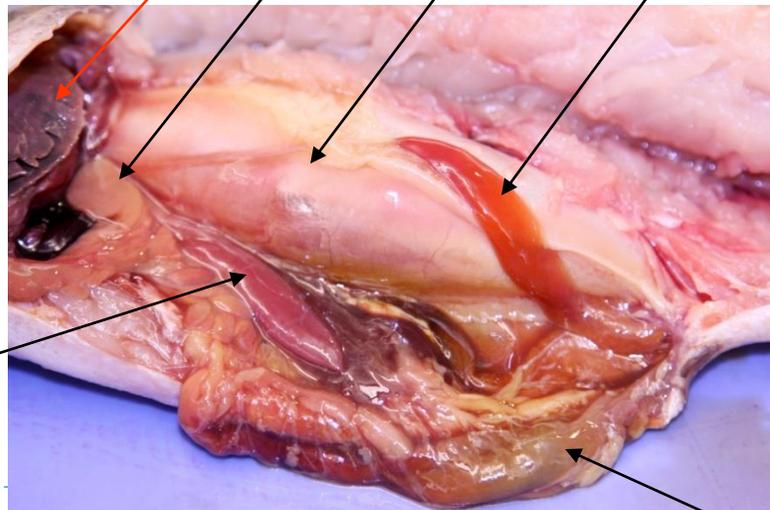
Gills

Heart

Liver

Stomach

Swim bladder



Gills

Liver

Swim bladder

Gonad

Stomach

Intestine



Internal Anatomy of Different Sexes

