



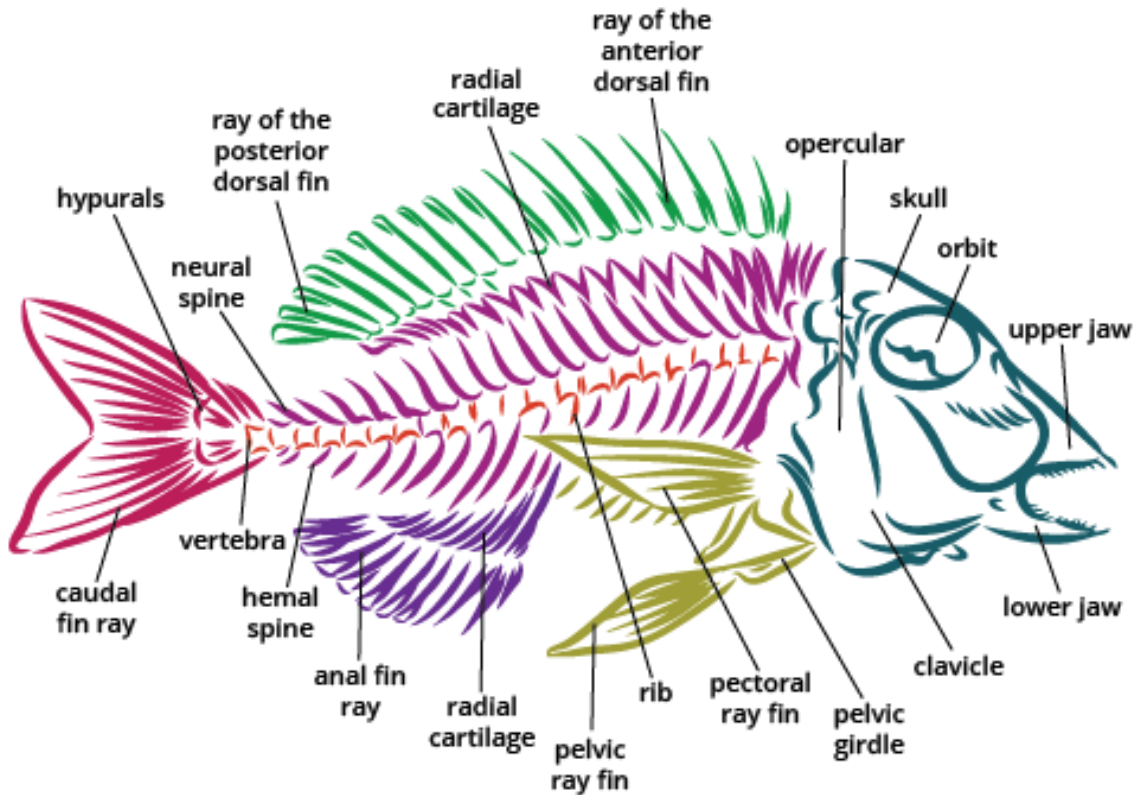
# Osteology fish

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Asst. Prof.

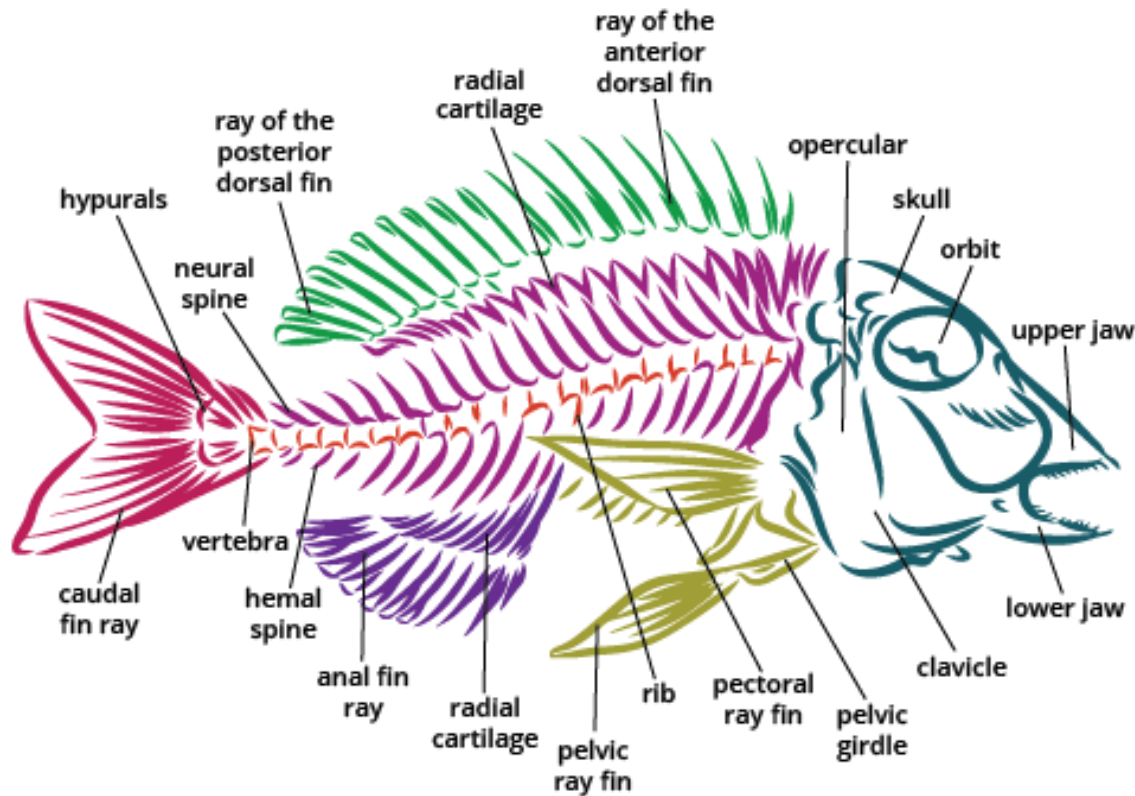
TCSC, Mumbai

# Definition



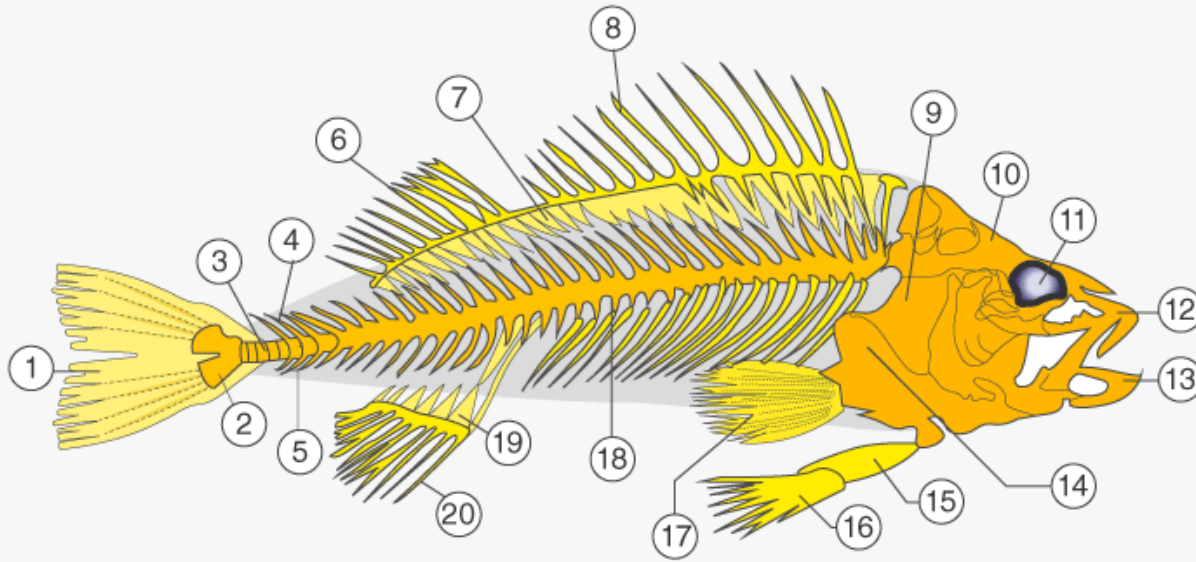
- The study of the structure and function of the skeleton and bony structures is known as osteology.

# Parts of the Skeleton



- A fish is a vertebrate, and vertebrate skeletons may be generally classified into two axial and appendicular skeletons.
- The skull, vertebrae, and ribs make up the axial skeleton.
- The pectoral and pelvic girdles, as well as the bones of the appendages, make up the appendicular skeleton.

# Osteology



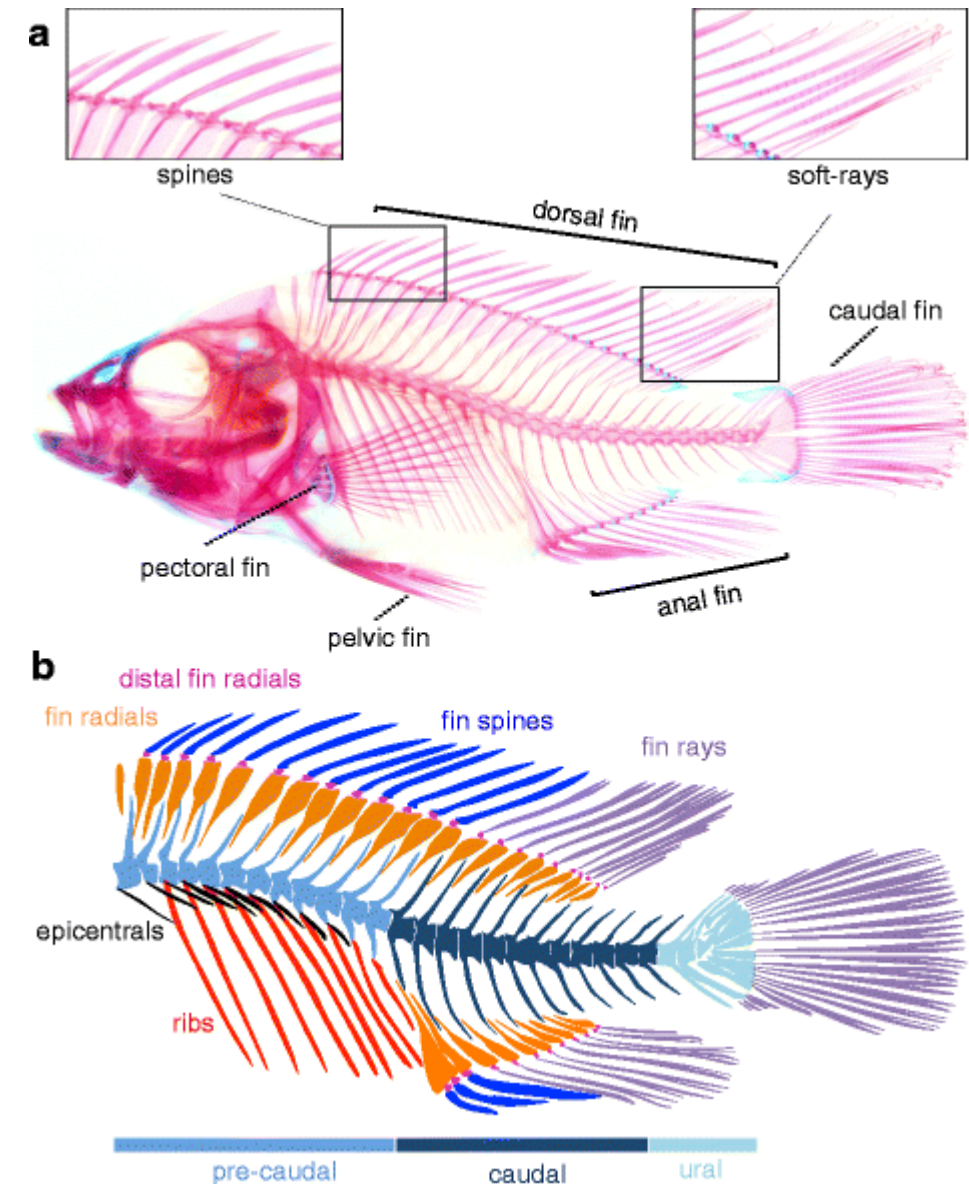
- |                  |                                   |                  |                     |
|------------------|-----------------------------------|------------------|---------------------|
| 1 Caudal fin ray | 6 Ray of the posterior dorsal fin | 11 Orbit         | 16 Pelvic fin ray   |
| 2 Hypural        | 7 Radial cartilage                | 12 Upper jaw     | 17 Pectoral fin ray |
| 3 Vertebra       | 8 Ray of the anterior dorsal fin  | 13 Lower jaw     | 18 Rib              |
| 4 Neural spine   | 9 Opercular                       | 14 Clavicle      | 19 Radial cartilage |
| 5 Hemal spine    | 10 Skull                          | 15 Pelvic girdle | 20 Anal fin ray     |

➤ The skeletal system forms the framework of the body and is mainly composed of bones and tissues. The main functions of the skeletal system are as follows:

- Protection.
- Helps in movement.
- Provides shape and support.
- They are the site for the storage of minerals like calcium.

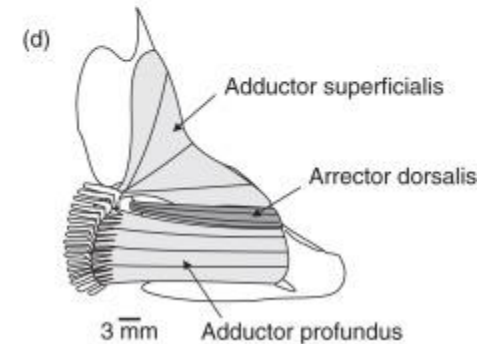
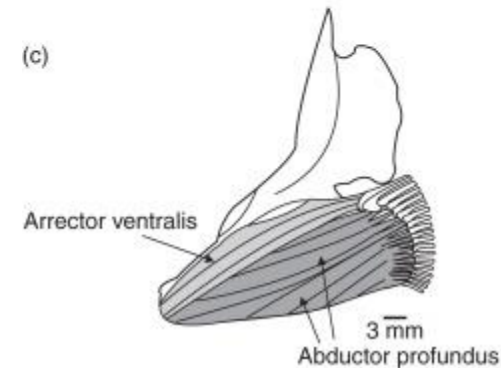
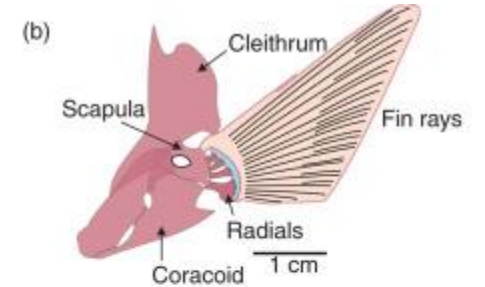
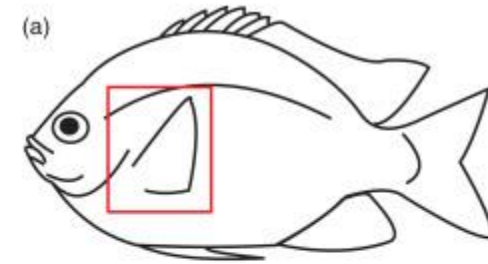
# Fish Skeletal

- Fish have vertebrae. The vertebrae, which make up the spine, have bone or cartilage that surrounds the dorsal nerve cord.
- A fish skeleton is formed of bones and cartilage.
- Some fish which are formed of only bones are called bony fishes, while those formed of cartilage are called cartilaginous fishes.



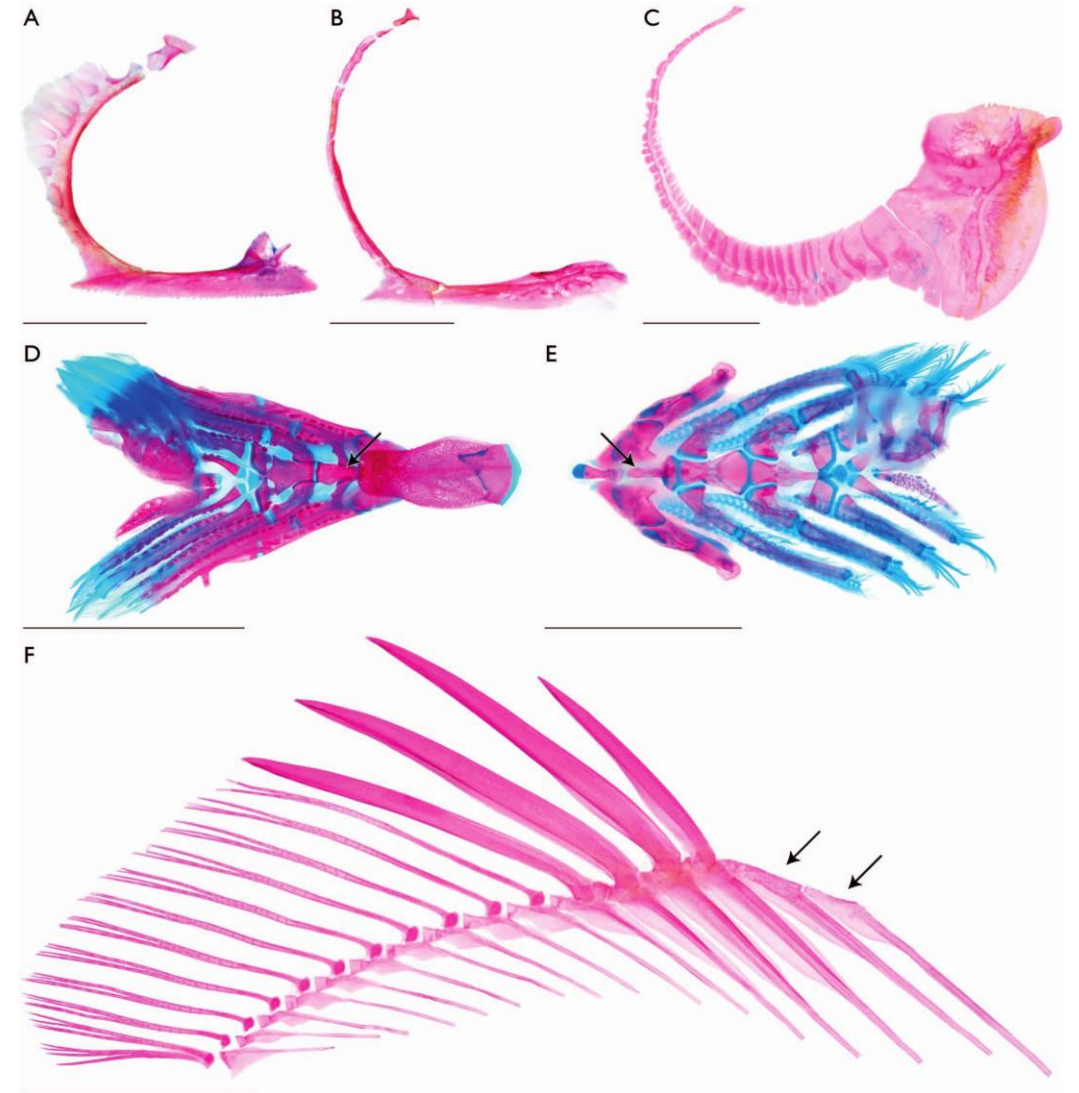
# Fish Skeletal

- The predatory fishes in the class Chondrichthyes include sharks, rays, skates, and ratfishes.
- They have jaws and paired fins.
- Many of them have their skin covered by a special form of scale, and their skeleton is composed of cartilage rather than bone.
- These are cartilaginous fish.



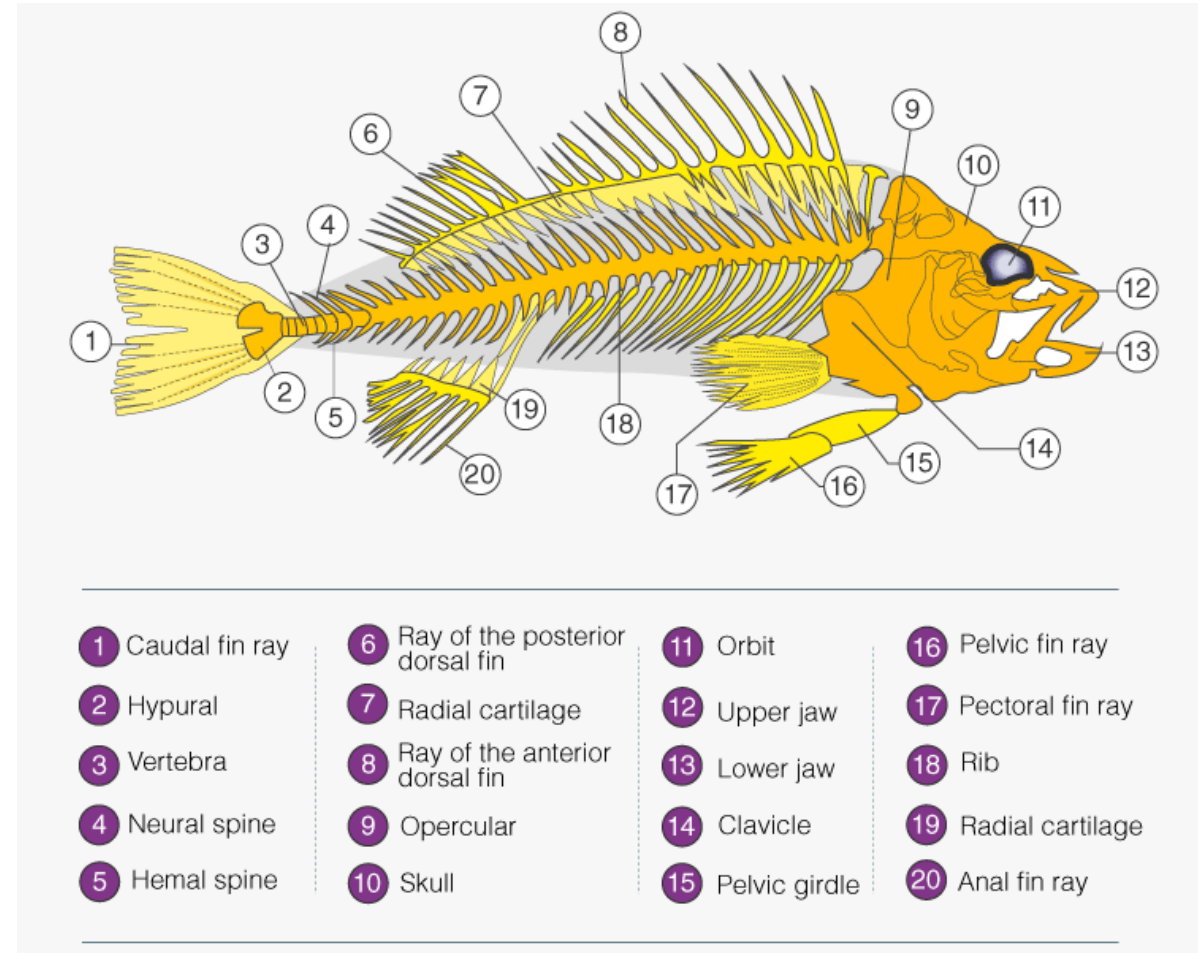
# Fish Bones

- Bones may recover on their own and become stronger than the original bone since they are made of tissues that include blood vessels and nerves.
- The skeleton system of a fish has many small bones.
- Approximately 150 bones are present in the skeletal system.
- The bones are dense, less flexible connective tissue.



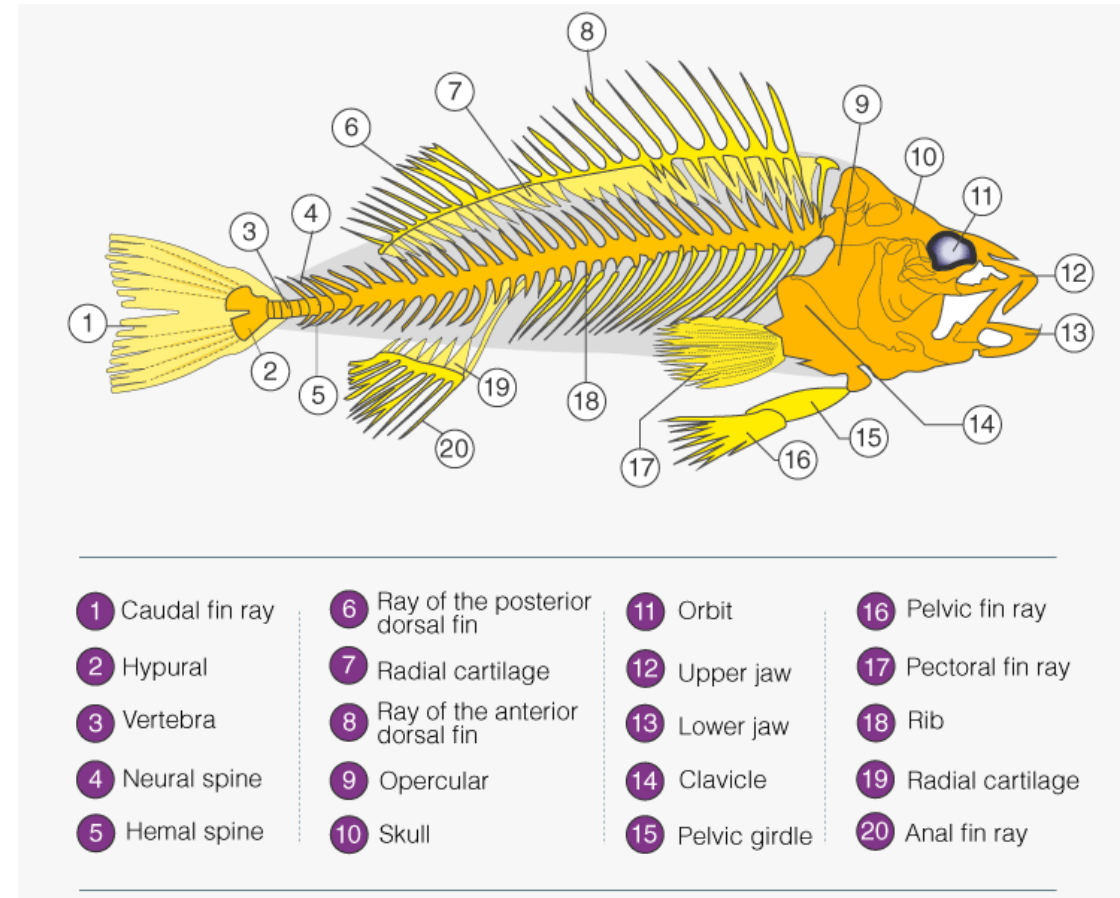
# Fish Bones

- **Vomer:** On the roof of the mouth is the vomer midline bone, which typically supports teeth.
- **Maxillary:** Paired bones are located behind or above these bones (toothed primitively).
- **Articular:** A moveable joint is formed dorsally by a pair of paired, angular-shaped bones that are articulated and take up a portion of the lower jaw's posterior end.
- **Retro Articular:** Paired bones are located at each articular's lower posterior corner.



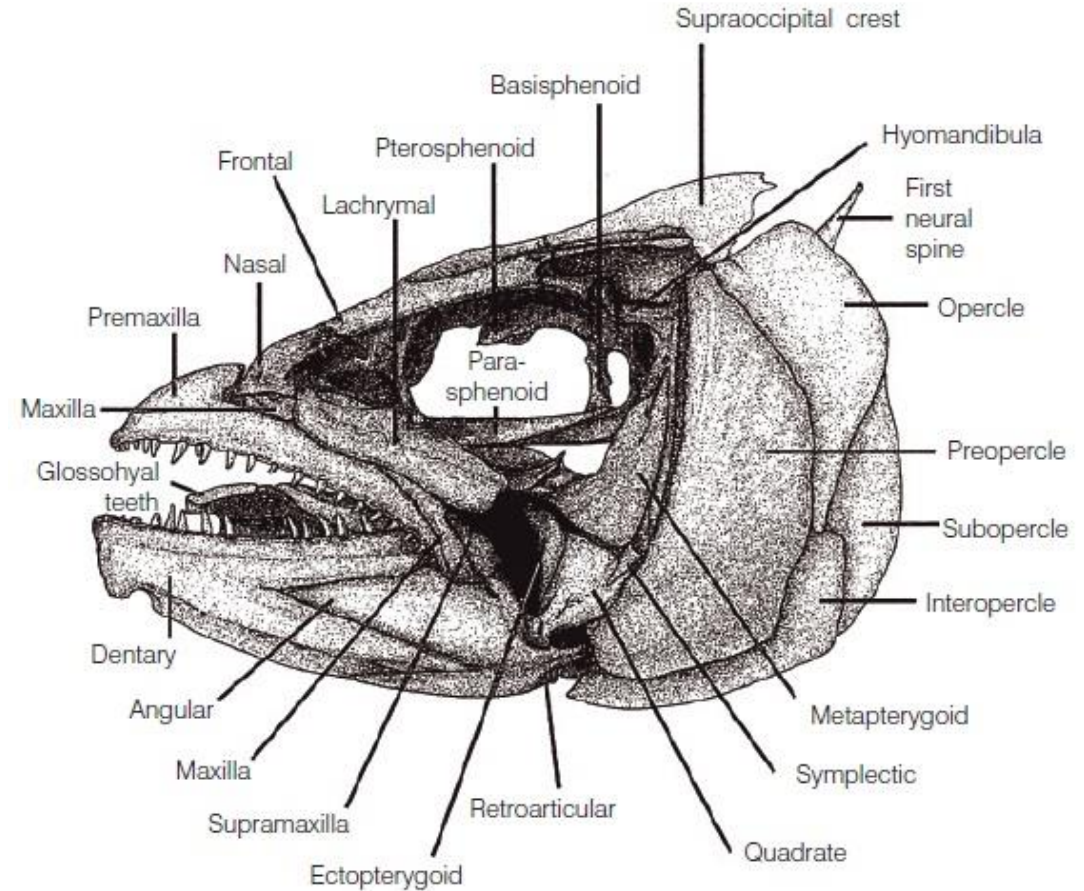
# Fish Bones

- **Dentary:** Large paired dental bones that are united medially and create the lower jaw's front (toothed).
- **Opercula:** Flat, paired, and connected to hyomandibula bones form the majority of the gill cover.
- **Centrum:** The centrum, the central, cylindrical component of each vertebra, obstructs the embryonic notochord during ossification.
- **Scapula:** They are a pair of flat bones that articulate with the cleithra posteriorly and the coracoids anteriorly. The cleithra and scapula articulate with the coracoid paired bones. Small bones, called radials, connect the fin rays; they articulate anteriorly with the scapula and coracoid bones.



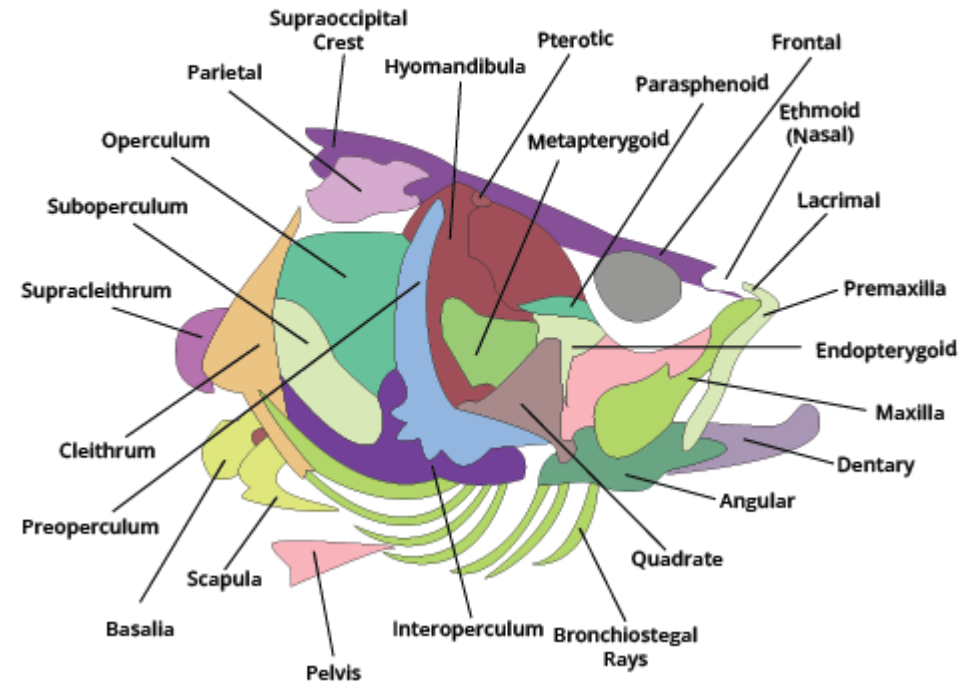
# Fish Skull

- The skull is also known as the cranium.
- The fish's skull is really a double construction made up of two bone "boxes" that are encased in one another.
- Dermal bone forms the outer shell of the skull. Endochondral bone makes up the inside of the skull.
- On the surface of the gills, there is an operculum. First, on top of the gills, is the preoperculum.
- The premaxilla is very close to the mouth.



# Fish Skull

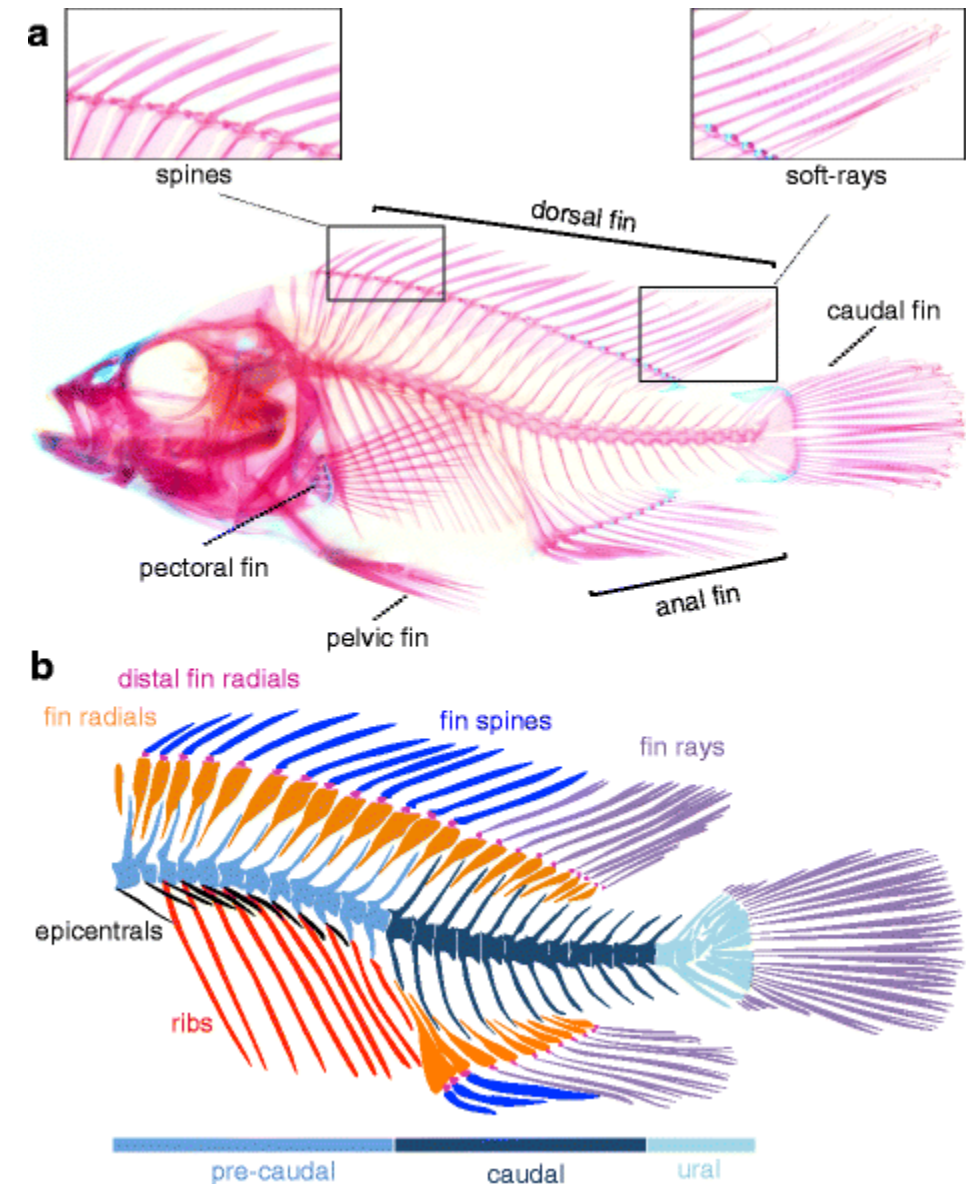
- Second, in the mouth, after the palatine are the maxillae.
- The jaw's bottom is called the dentary, and between the palatine and the dentary lies the angular.
- Between the palatine and hyomandibular is the quadrate, while the hyomandibular and cranium are joined.
- The mouth roof refers to the palatine.



# Vertebral Column:

## ➤ Vertebral Column:

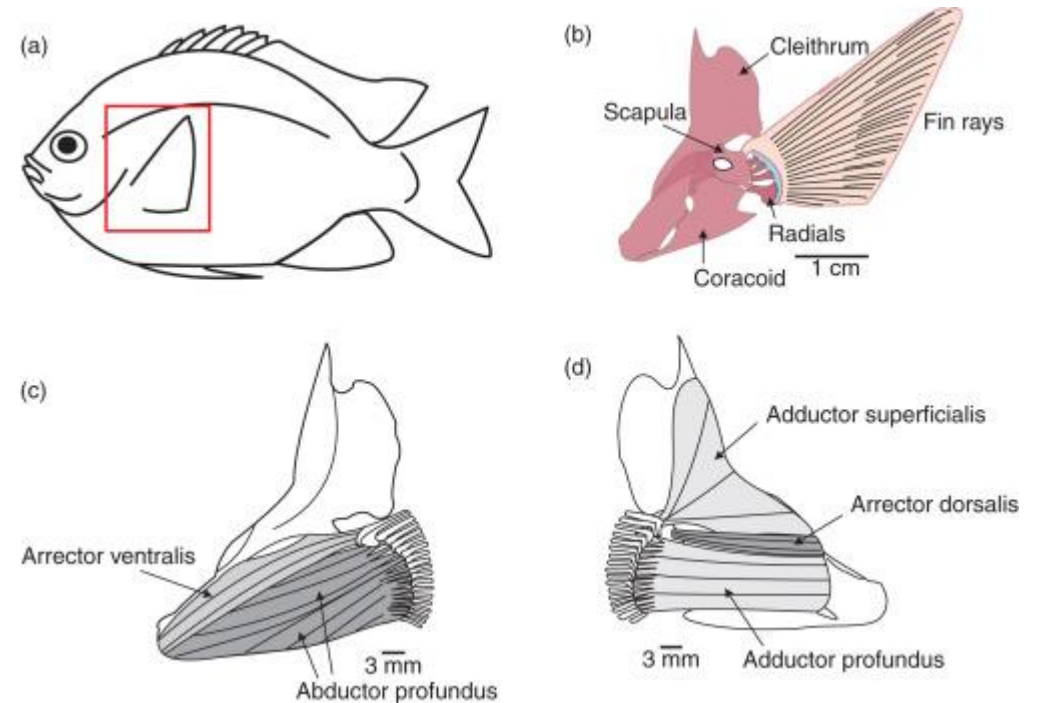
- The vertebral column is made up of a number of endochondral bones known as vertebrae.
- The centrum of one is the enormous spool-shaped core region.
- The trunk and the tail are the two sections of the fish's vertebral column.
- Fish ribs are attached to the spinal column in the trunk region.



# Pectoral and Pelvic Girdle

## ➤ Pectoral and Pelvic Girdle

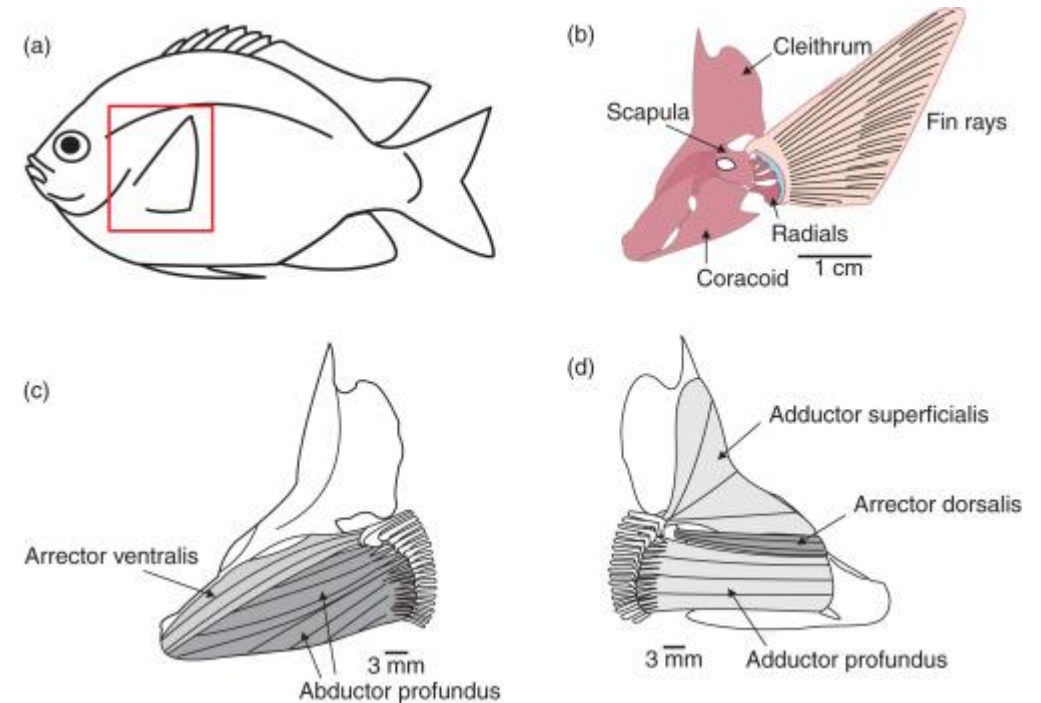
- The pectoral fin is connected to the fish skeleton by the pectoral girdle.
- The pelvic girdle joins the fish skeleton to the pelvic fin.
- The pelvic girdle is free-floating and not connected to the spinal column or the pectoral girdle.



# Pectoral and Pelvic Girdle

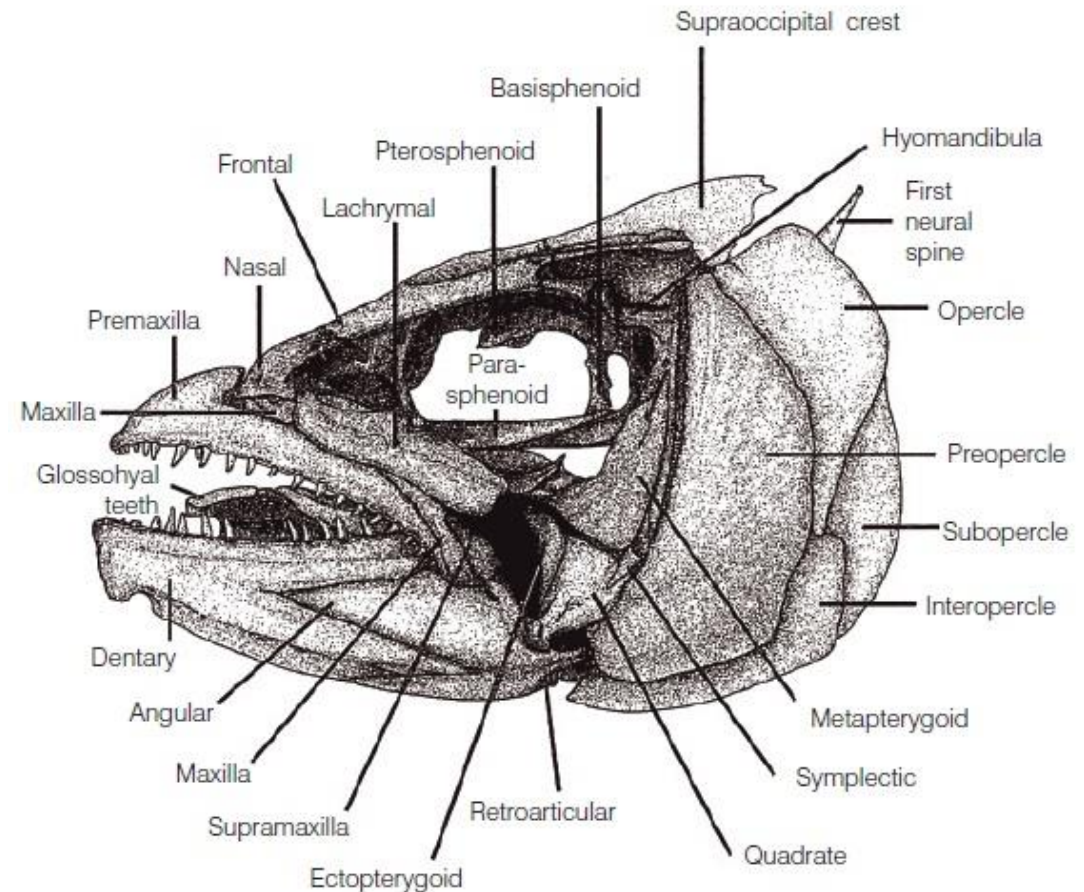
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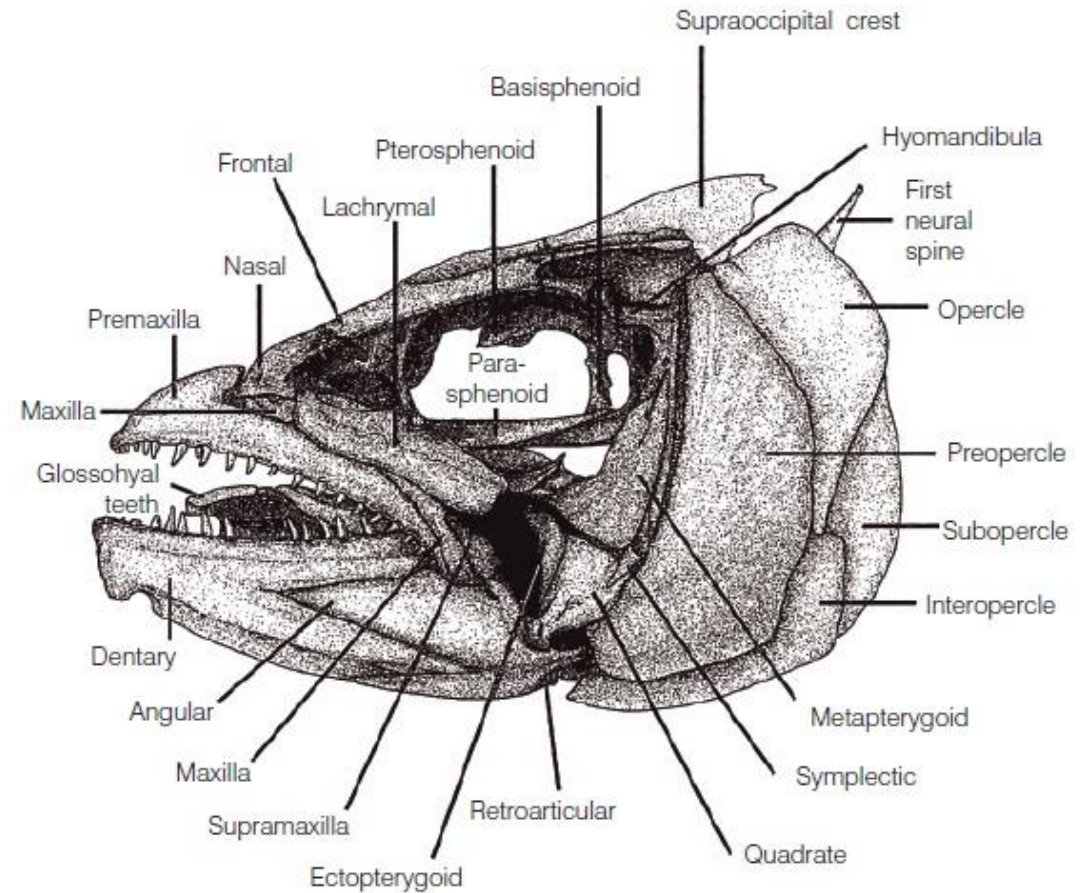
# Function of Skeleton

- It provides a framework and support that surrounds and supports the body's soft organs.
- The heart, lungs, and brain are among the fragile organs that the skeleton protects.
- It aids in bodily movement, and muscles use bones as levers.
- The bone is a component of the skeleton and aids in the storage of minerals like calcium and phosphate.
- Bone marrow in the bones aids in the production of blood cells.



# Function of Skull

- Fishes have a cranium (skull), which protects the brain.
- The skull covers the brain and protects it from any injury and shock.

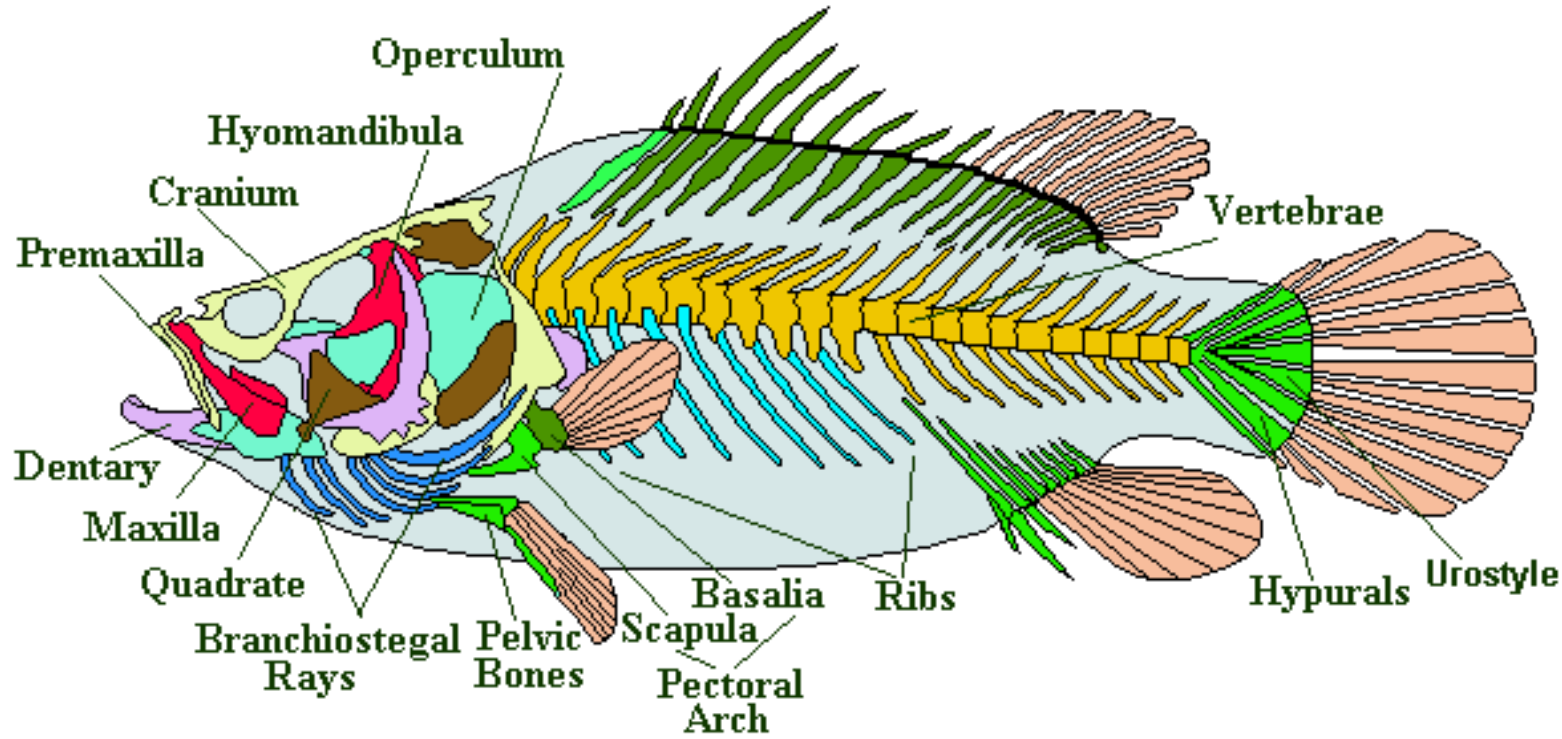


# Application Taxonomy



- Osteology plays very important role in taxonomy.
- Total no. of vertebral count and structure part of bone are taken for study purpose.

## A Generalised Bony Fish Skeleton



*Thank*

*You*