

Ministry of Higher Education  
and Scientific Research  
University of Ishik  
College of education  
Department of Biology

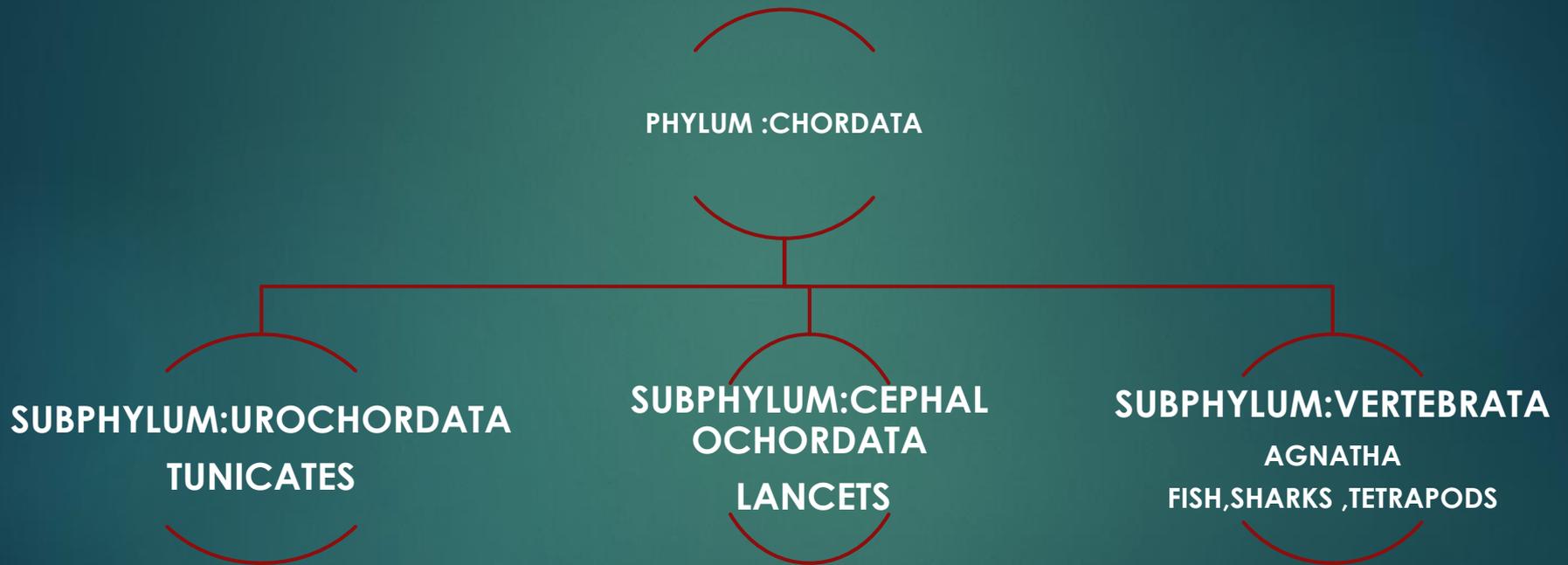


**Practical Comparative  
Anatomy  
2018- 2019 (4<sup>th</sup> Grade)  
2<sup>nd</sup> lab.**

**By:Yadasht Haydar Karim**

# QUIZ

- ▶ 1-The structure that are similar in different species because the species have common descent , while may or may not have the same function is known as .....
- ▶ 2- **chordates** are **classified** into three major subphyla which are  
.....
- ▶ 3-**Comparative anatomy** : is the study of similarities and differences in the **anatomy** of different **biology** and **phylogeny** . species. It is closely related to .....



# UROCHORDATES (TUNICATES)

- ▶ Sessile
- ▶ Body structure :covered by a tunic composed of polysaccharides
- ▶ Reproduction
  - asexual :in colonis
  - sexual:hermophrodites



# Urochordata

- ▶ Tunicates: at young age have dorsal nerve cord
  - ▶ As larvae, they swim, looking for a place to settle
  - ▶ Once they find a place to anchor, they undergo metamorphosis, losing many chordate characteristics (nervous system, muscles, etc.)

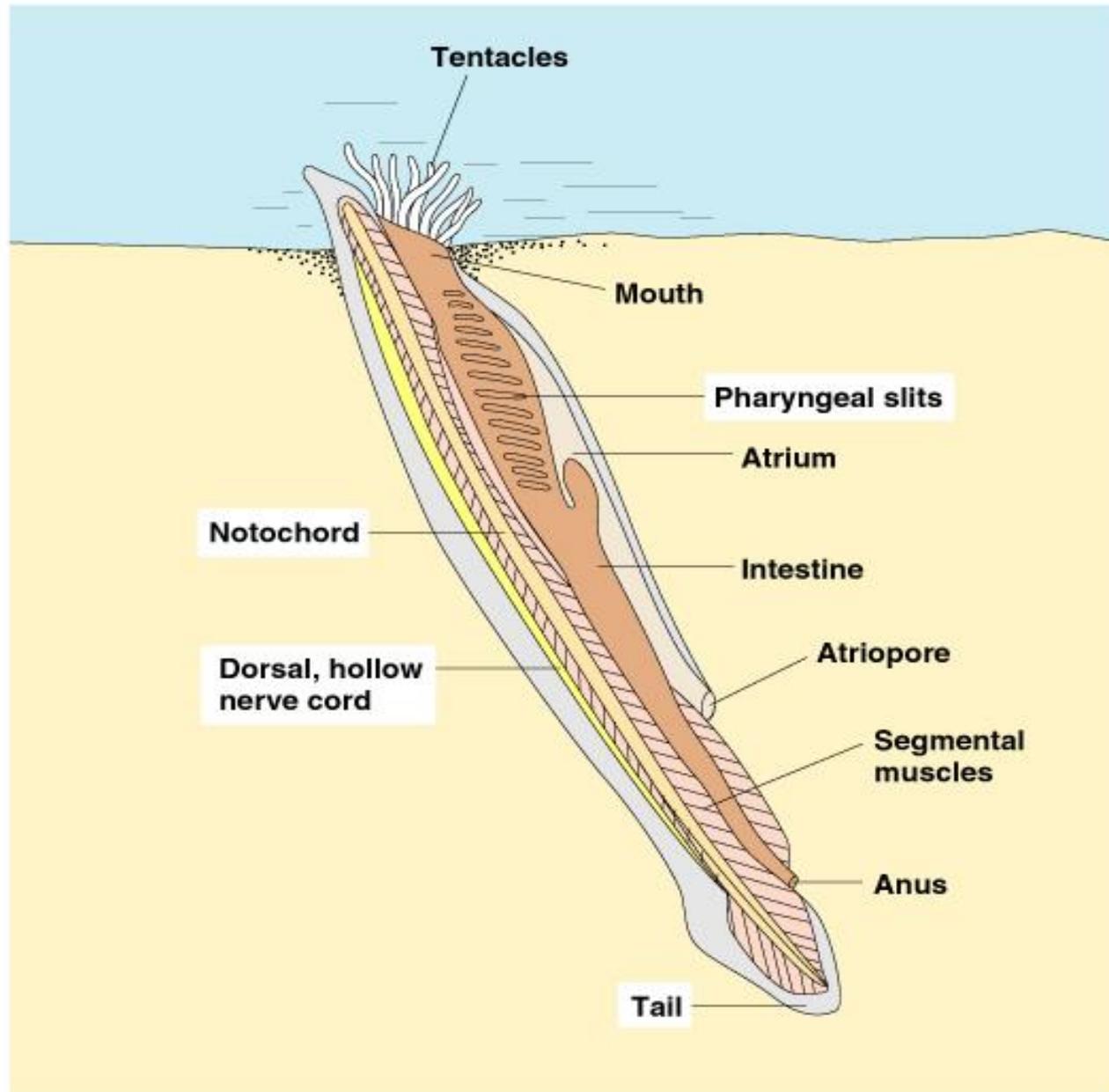


Tunicate Diagram. Digital image. [Http://kentsimmons.uwinnipeg.ca/16cm05/1116/34-03-Tunicate-L.jpg](http://kentsimmons.uwinnipeg.ca/16cm05/1116/34-03-Tunicate-L.jpg). Pearson Education Inc. Web. 13 Mar. 10. Paul Riviere

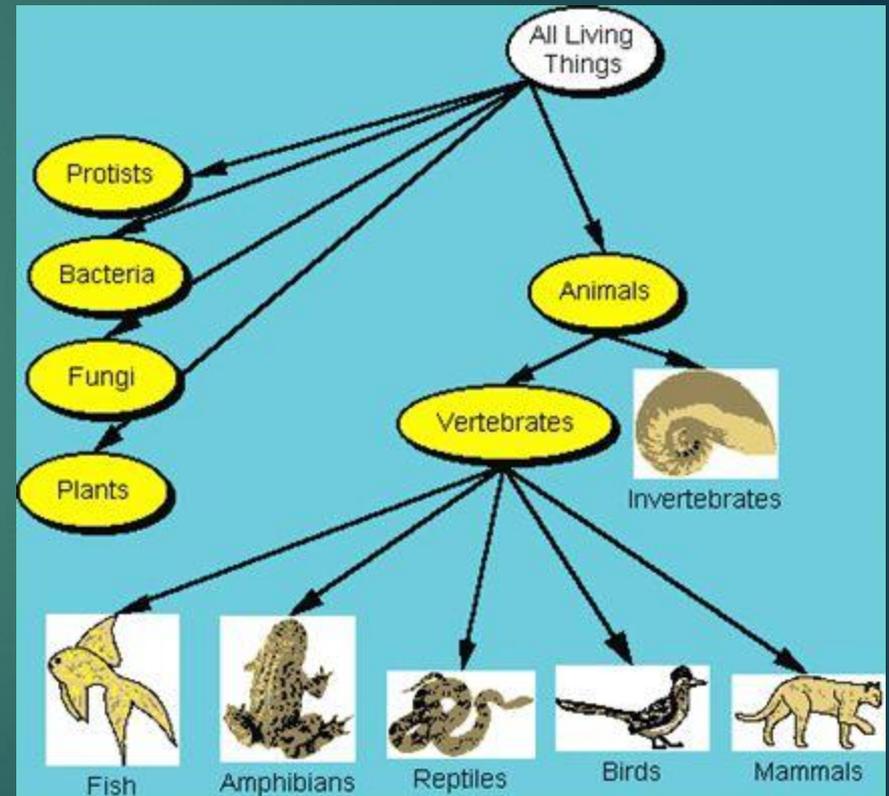
# Subphylum: Cephalochordates.

- ▶ Lancelet or amphioxus
- ▶ Notochord present throughout life extends into head region
- ▶ Shallow marine waters
- ▶ Chordates characteristics developed and a apparent in adult
- ▶ Tail has blocks of muscles called myotomes
- ▶ Adults resemble tunicate larvum





# Subphylum :Vertebrata



# Superclas : Agnatha (jawless vertebrates)

## General Characteristics

- Jaws are absent.
- Paired fins are generally absent.
- Early species had heavy bony scales and plates in their skin, but these are not present in living species.
- In most cases the skeleton is cartilaginous.
- The embryonic notochord persists in the adult.
- Seven or more paired gill pouches are present.

Class: Cyclostomata

(Similar to fish .cyclic mouth , without mandibles, some of them act as ectoparasites. Like Lamprey and others free like hag Fish).

1- Order: Petromyzonita

2- Order: Myxinodia

Genus: Petromyzon (lamprey )

Genus: Myxine (hagfish )

<https://nhpbs.org/wild/agnatha.asp>

# Jawless Fish (Agnatha )

## ▶ **Lampreys**

- ▶ Filter feeders as larvae. Parasites as adults
- ▶ Head is a round sucking disk with a mouth in the middle

## ▶ **Hagfish**

- ▶ worm like bodies with 4-6 short tentacles around the mouth
- ▶ only a light detecting-region.no eyes
- ▶ they use a toothed tongue to scrape holes into dead or dying fish for food
- ▶ They secrete tons of slime

# Hagfish



# Lamprey



Lamprey	Hagfish
Round mouths, tube like bodies covered with slimy skin (no scales), cartilage skeleton (tough flexible tissue that is not hard like bone), cuts other fishes and feeds off of their fluids	Round mouths, tube like bodies covered with slimy skin (no scales), cartilage skeleton (tough flexible tissue that is not hard like bone), lives in salt water (lampreys are in fresh water),

# General characteristics

## Superclass :Gnathostomata

1. Vertically biting device called jaws.
- 2- Paired pelvic and pectoral fin.
- 3- Interventral basiventrals nfn the backbone.
- 4- Gill arches which lie internally to the gills and branchial blood vessels.
- 5- A horizontal semicircular canal in the inner ear.

# Fish

Chondrichthyes

Osteichthyes

Elasmobranchii

Holocephali

Sarcopterygii

Actinopterygii

Class

Subclass

# Osteichthyes VS Chondrichthyes

## **Chondrychthyes**

## **Osteichthyes**

<b>Skeleton</b>	Cartilage only	Cartilage and bones
<b>Swimming</b>	Forward only	Forward and backward
<b>Buoyancy</b>	Large , oily liver	Gas-filled swim bladder
<b>Respiration</b>	Gills	Lung or swim bladder
<b>Reproduction</b>	Internal and external fertilization	Eggs usually fertilized externally
<b>Scales</b>	Rough , sand-paper like placoid scales	Smooth , overlapping scales

## Sub class :Elasmobranchii e.g. :Rays ,skates and shark )

Members of this sub class are characterized by :-

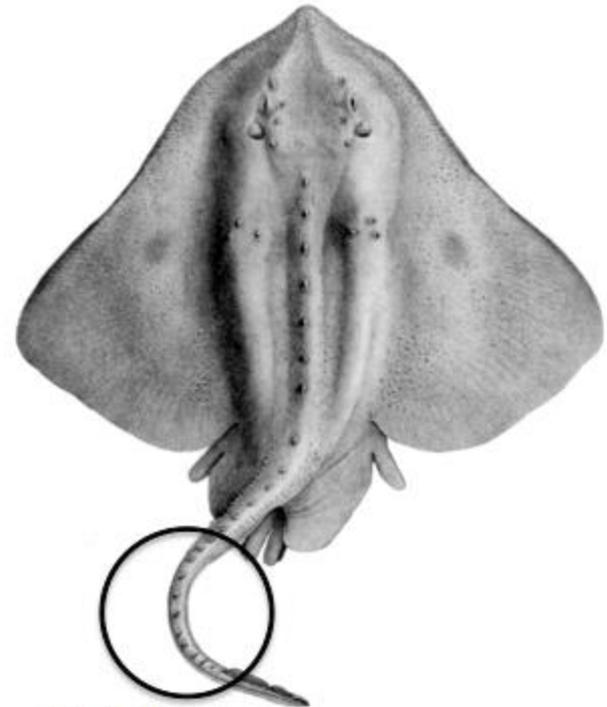
- ▶ Have no swim bladders
- ▶ Have five to seven pairs of gill clefts opening individually to the exterior
- ▶ Have rigid dorsal fins, and small placoid scales
- ▶ The teeth are in several series the upper jaw is not fused to the cranium and the lower jaw is articulated with the upper
- ▶ The inner margin of each pelvic fin in the male fish is grooved to constitute a clasper for the transmission of sperm
- ▶ These fishes are widely distributed in tropical and temperate waters
- ▶ Have a flexible skeleton made of cartilage .for this reason they are known as cartilaginous fishes
- ▶ In Rays and Skates are dorsally compressed .Pectoral fin is modified for swimming

Ray



Tail spike

Skate



No tail spike

# Differences between skates and rays

- Skates

- Small fins on tail
- Swim by creating a wave and starts at head then ripples down rest of body
- oviparous



- Rays

- Venomous barb or spines
- Swim by moving fins up and down (like a bird)
- Ovoviviparous



Group: vertebrata

Super class:

Gnathostomata

Class: Chondrichthyes

Order: Selachi

Genus: Squalus

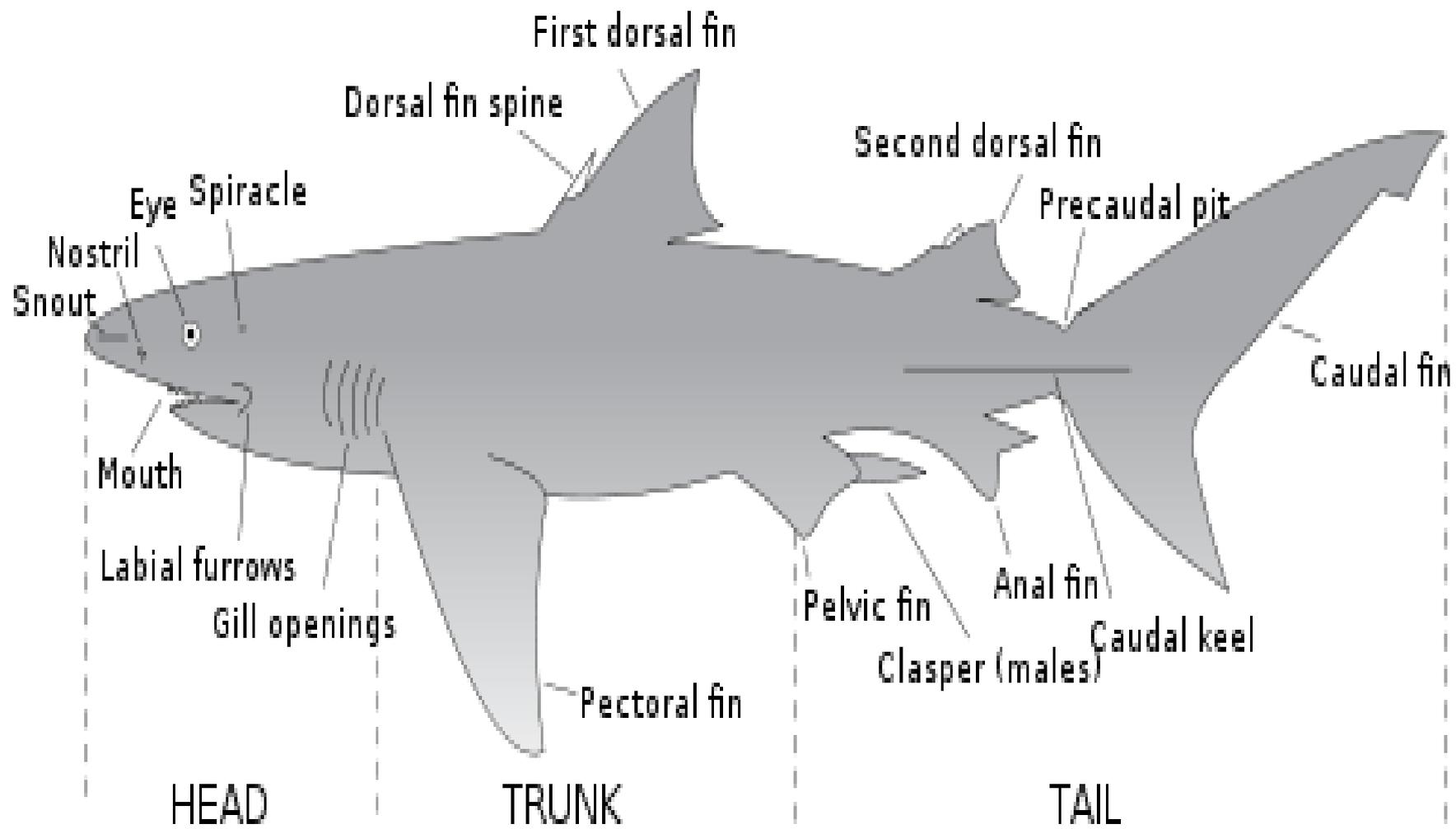
Examples :*Squalus*

*Acanthias*

(common name is Doge fish  
or Shark )

# Some characteristics

1. Aquatic animals.
2. Cartilage skeleton.
3. Body is compressed and tail is upraised
4. Ventral surface colorless.
5. Body is covered by shield type scales (placoid scale).
6. Has lateral line.
7. Body is divided into 3 regions ; head, trunk and tail.



# Head

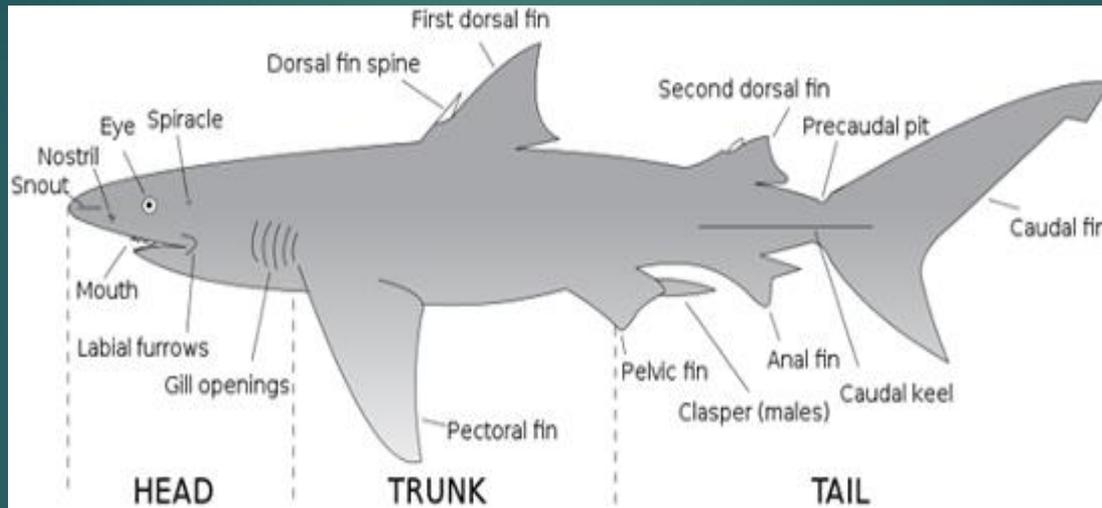
1. Rostrum.
2. Mouth is large with a crescent shape in ventral surface.
3. Mouth has two jaws strong and acute teeth.
4. Nostrils (two as longitudinal slits in each side).
5. Spiracle (pore behind eyes).
6. External gill slits (not covered by operculum )

# Trunk

1. Dark color.
2. Covered by placoid scales.
3. Fins.
4. Dorsal fins (anterior dorsal fin and posterior dorsal fin).
5. Pectoral fins(pair).
6. Pelvic fins(pair).
7. Anal fin(ventral fin).
8. Caudal fin(two lobes; dorsal lobe which is large and ventral lobe which is small, Therefore the tail is considered heterocephal tail).
9. Claspers (male reproductive organ, a cartilage structure in two sides of pelvic fins)

# Tail

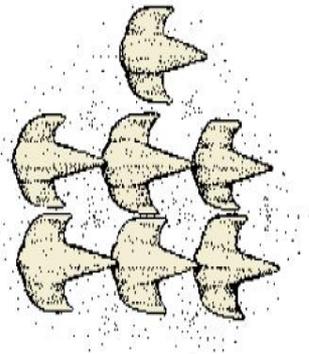
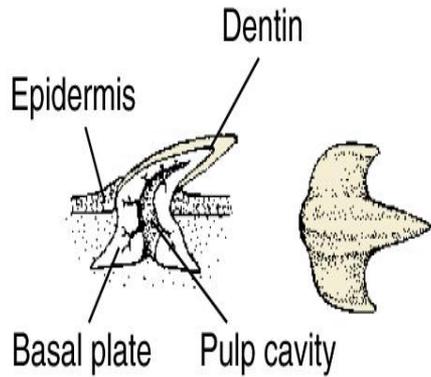
1. Direction is upraised .
2. Has caudal fin



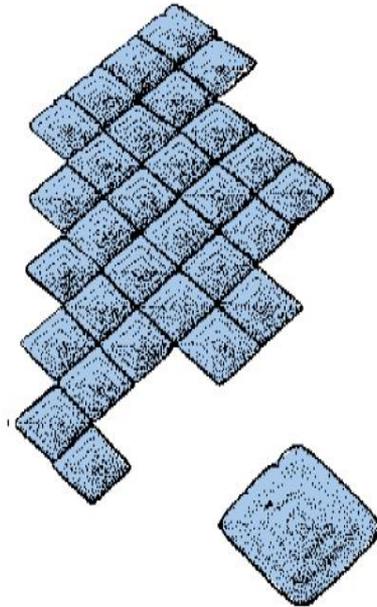
# Types of Scales

1. Placoid scales: dermal denticles.
2. Cosmoid scales: bone +spongy bone in above
3. Ganoid scales : bone
4. Elasmoid scales :thin , composed of a layer of dense, lamellar bone.
5. Cycloid scales & ctenoid scales: flexible , composed of bone-salt

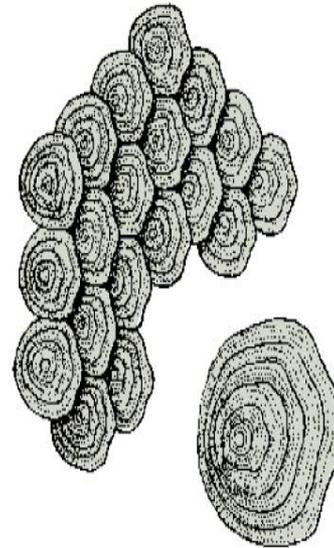
# Types of scales



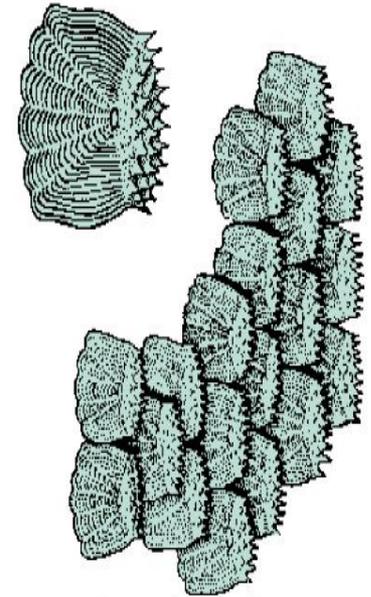
**Placoid scales**  
(cartilaginous fishes)



**Ganoid scales**  
(nonteleost bony fishes)

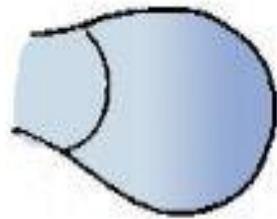


**Cycloid scales**  
(teleost fishes)

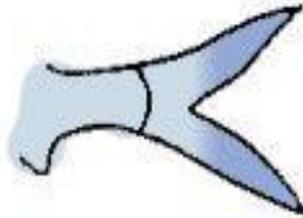


**Ctenoid scales**  
(teleost fishes)

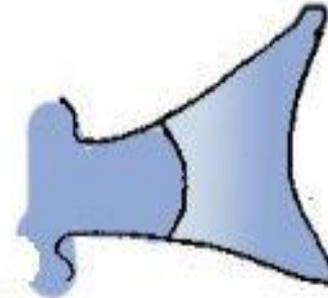
# Types of tail fin



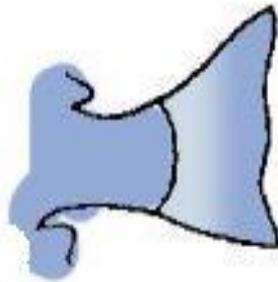
round



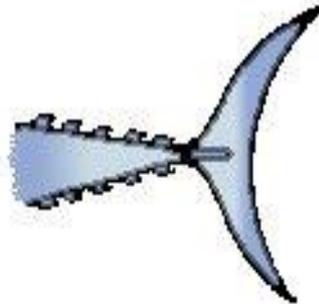
forked



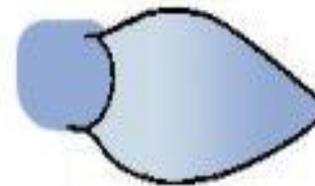
indented



square (truncate)

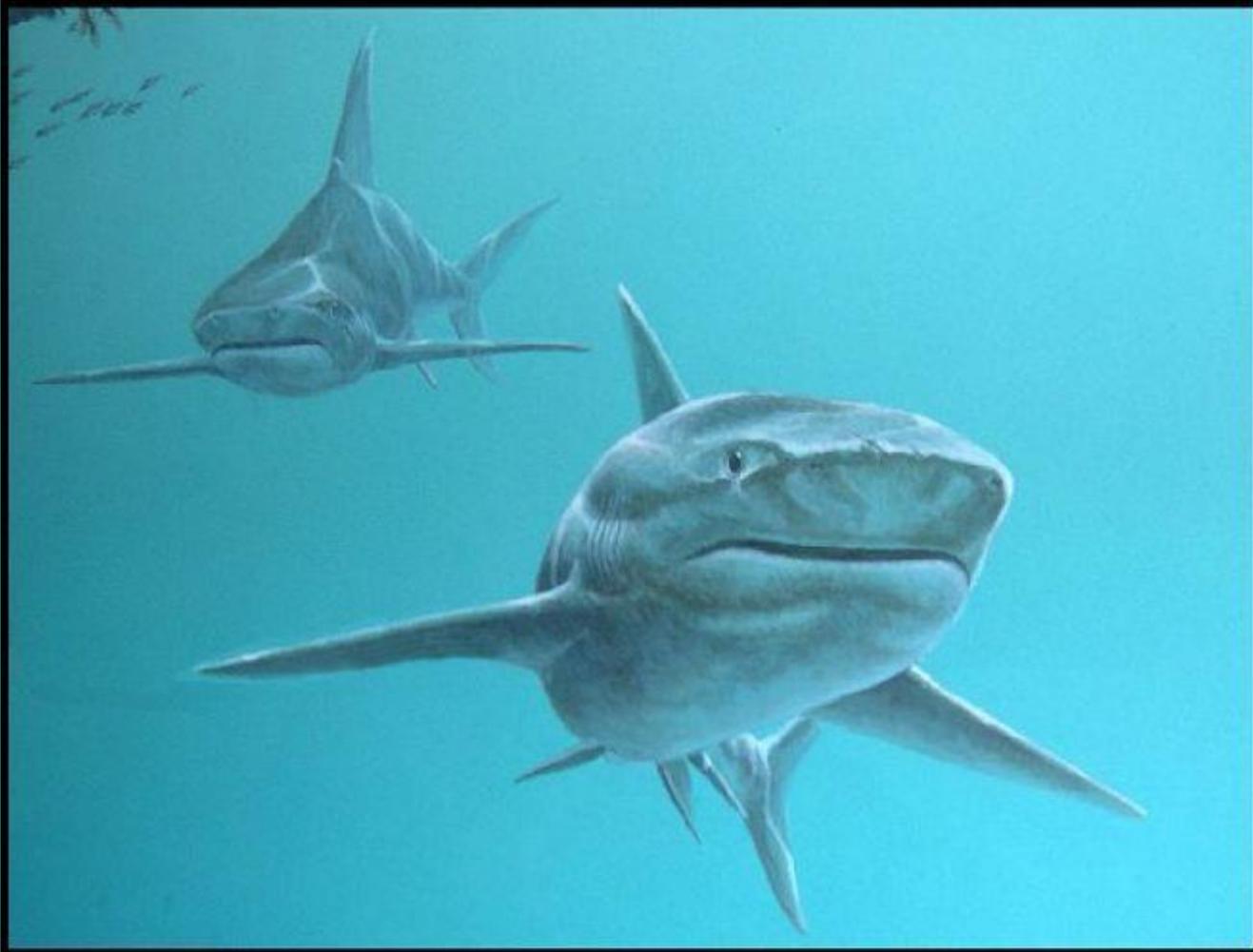


lunate



pointed

# Shark





# ELASMOBRANCHII



# Subclass : Holocephali

- ▶ *Holo*-whole ----- *Cephal*i-Head
- ▶ Ratfish
- ▶ Lack scales
- ▶ Gill covered with operculum
- ▶ Teeth large plates for crushing







Class :Osteichthyes



Subclass:Actinopterygii

Subclass:Sarcopterygii

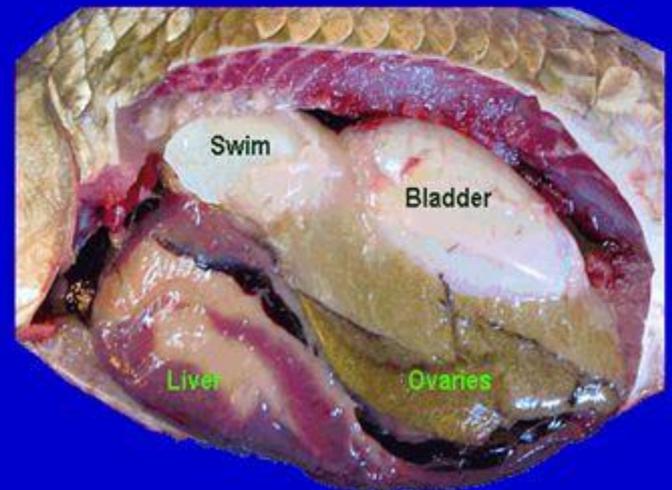


# Subclass Actinopterygii

- *Actin- ray, pteryx-fin*
- Ray-finned fishes because their fins lack muscular lobes
- Swim bladder-gas-filled sacs along the dorsal wall of the body cavity that regulates buoyancy

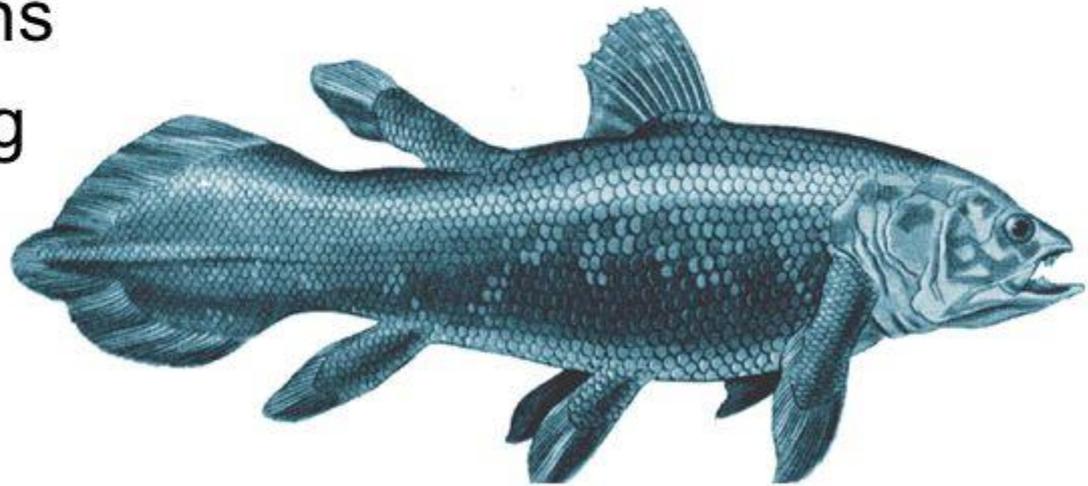


Swim\_bladder of a Rudd (*Scardinius erythrophthalmus*)



# Subclass Sarcopterygii

- Lobed fins joined to the body at a single bone.
- Two dorsal fins with separate bases and diphyccercal caudal fins
- There are only 8 living species in this subclass. These include lungfish and coelacanth.



Thank you for your attention 😊

▶ ANY QUESTIONS ????????