

# 2. Introduction to subphylum – Vertebrata

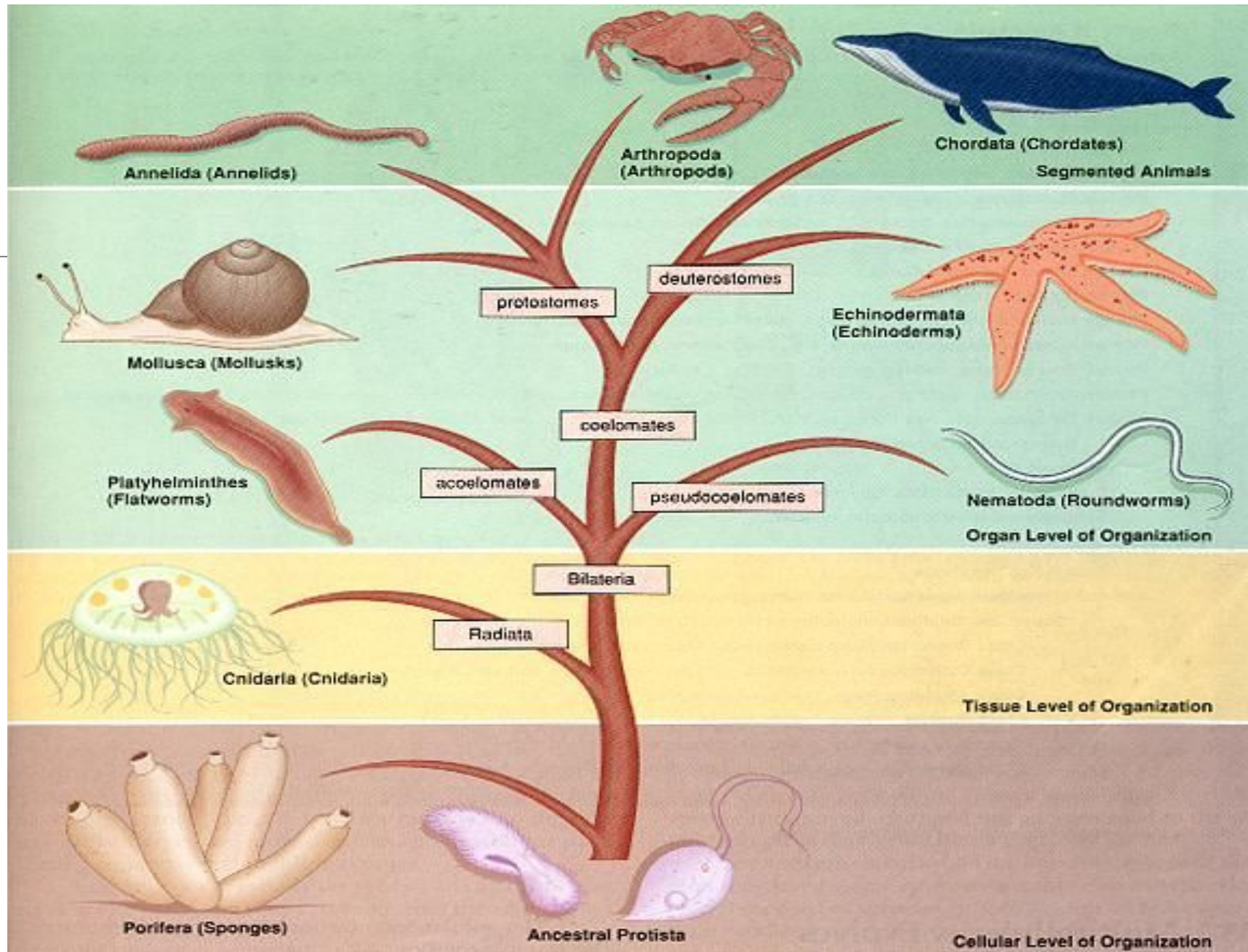
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**3.1 SALIENT FEATURES OF VERTEBRATA.**

**3.2 INTRODUCTION AND GENERAL CHARACTERS OF SECTIONS WITH TWO EXAMPLES - NAMES ONLY.**

**AGNATHA – *PETROMYZON* & *MYXINE***

**GNATHOSTOMATA – *FROG* & *LABEO*.**



	Eon	Era	Period	Epoch		
Younger ↑ ↓ Older	Phanerozoic	Cenozoic	Quaternary	Holocene	← Today	
				Pleistocene	← 11.8 Ka	
			Neogene	Pliocene		
				Miocene		
				Oligocene		
			Paleogene	Eocene		
				Paleocene		
					← 66 Ma	
			Mesozoic	Cretaceous	~	
		Jurassic		~		
		Triassic		~	← 252 Ma	
		Paleozoic	Permian	~		
			Carboniferous	Pennsylvanian	~	
				Mississippian	~	
			Devonian	~		
			Silurian	~		
			Ordovician	~		
			Cambrian	~	← 541 Ma	
Proterozoic	~	~	~	← 2.5 Ga		
Archean	~	~	~	← 4.0 Ga		
Hadean	~	~	~	← 4.54 Ga		

**Vertebrates**

reptiles



mammals

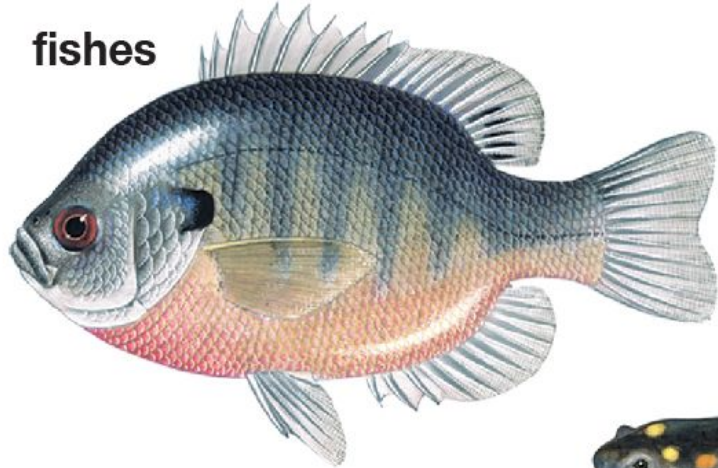


whale

birds



fishes



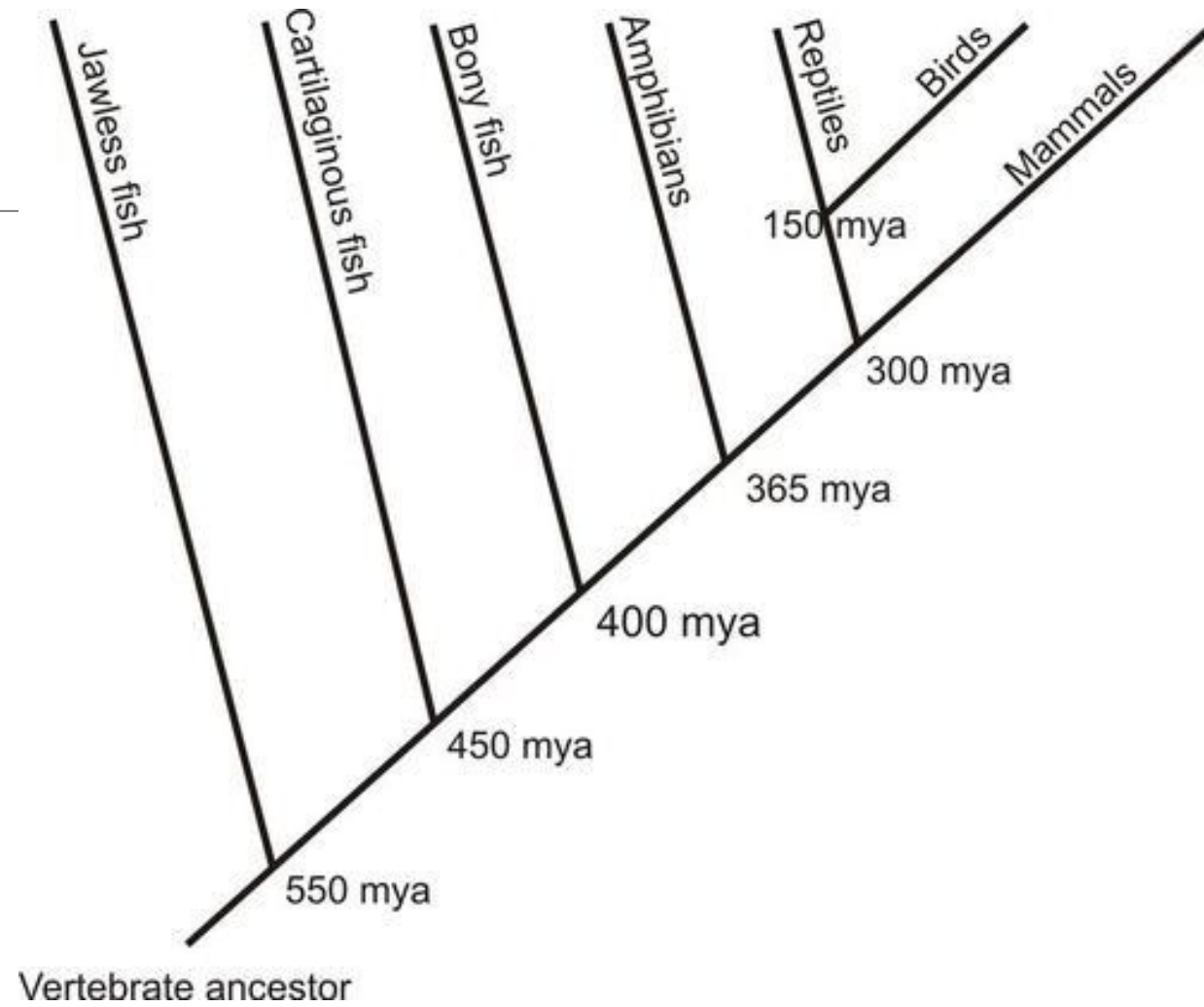
amphibians



human



groundhog

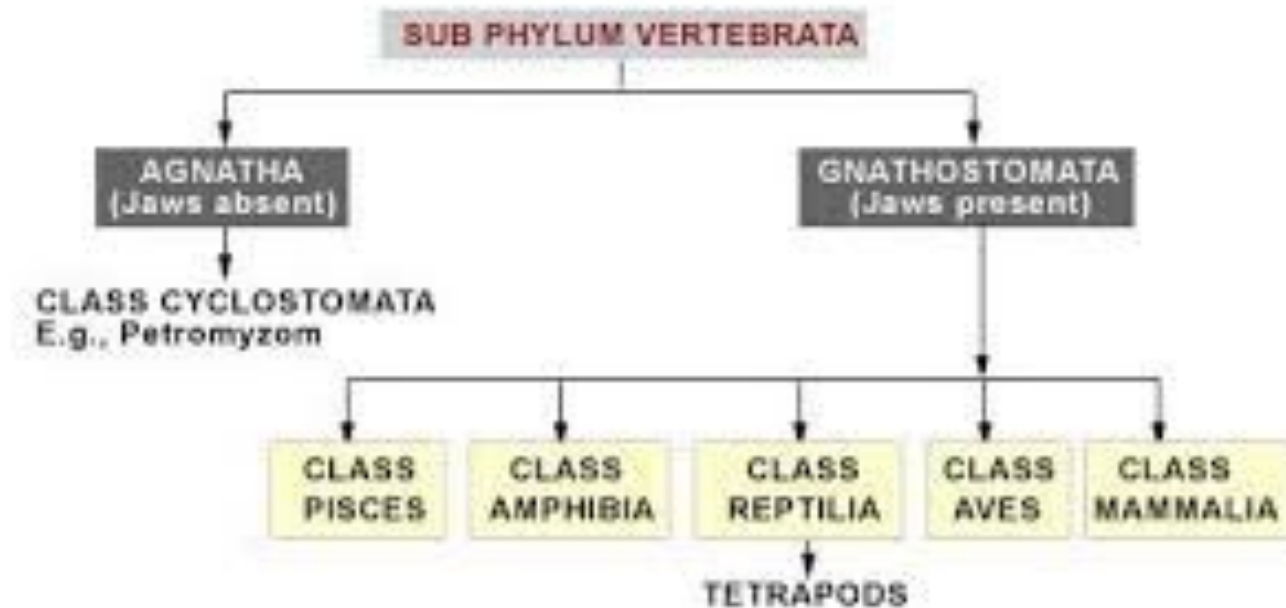


# Vertebrata

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The vertebrates constitute the main subdivision of the Phylum Chordata and occupy the **highest rank**.

All the vertebrates or **craniate** are placed under the Subphylum Vertebrata or Craniata.



## 2. Characters of Subphylum Vertebrata (Craniata):

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- a. All vertebrates have **endoskeleton** framework.
- b. All the members possess **cranium**
- c. Presence of **vertebral column**,
- d. The notochord does not extend beyond the brain.
- e. All vertebrates possess a well-developed head, i.e., **cephalization**

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- g. The anterior part of the nerve tube becomes specialised to form a complex structure, called **brain**.
  - h. The basic organisation of brain is similar in different vertebrates, especially the **cerebral hemispheres**.
  - i. 10 to 12 pairs of **cranial nerves**.
  - j. Dorsal and ventral roots are usually united
  - k. Major part of the nervous system develops from '**neural crest cells**', the embryonic cells that are found only in vertebrates.



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k. The heart is **chambered**.

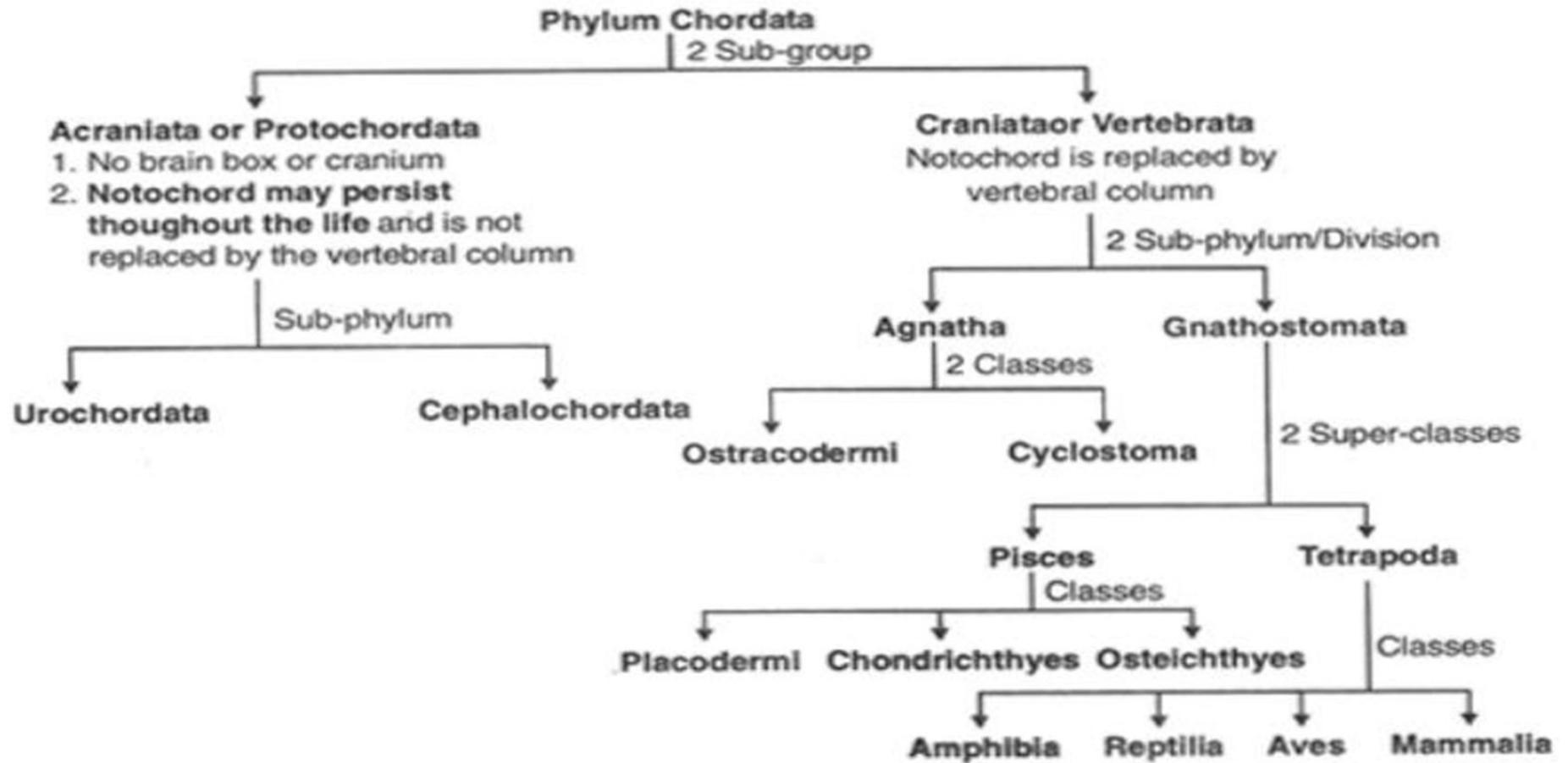
l. Distinct **blood vessels and red blood corpuscles** are present.

m. **Hepatic portal system** is present in all vertebrates.

n. The excretory organs are kidneys, which are of mesodermal origin that regulate the osmotic pressure and also excrete the nitrogenous wastes.

# Classification

## PHYLUM CHORDATA



# Agnatha. Jaw is Absent

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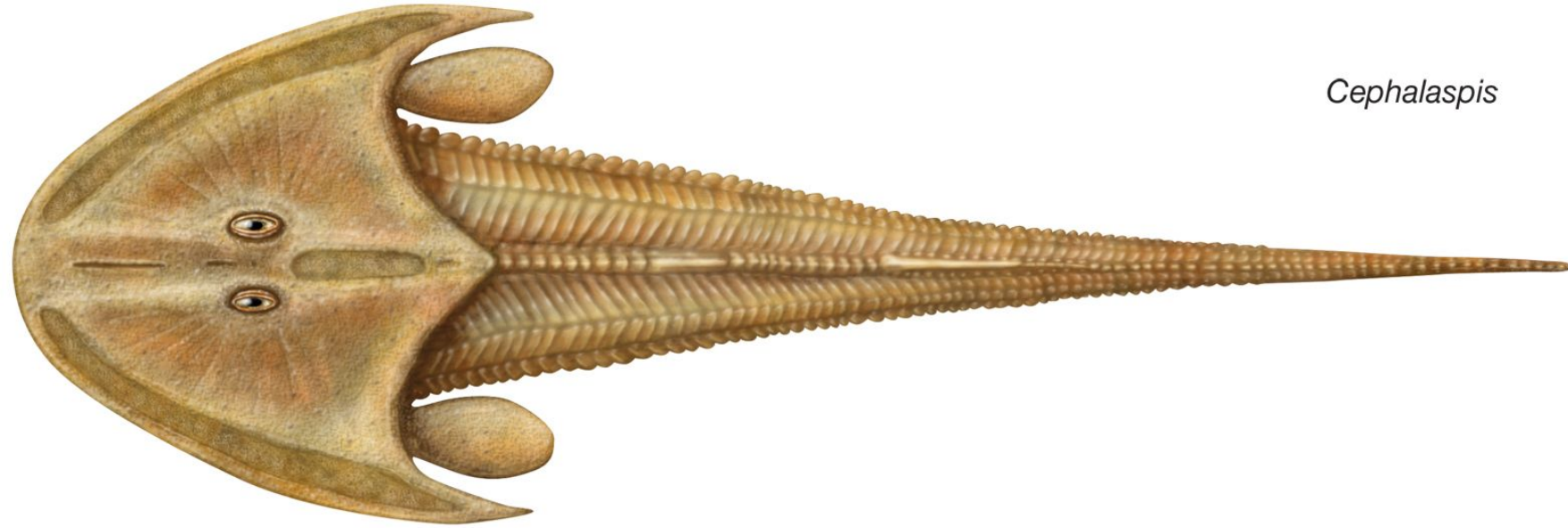
1. The mouth does not possess jaws,
2. Notochord persists throughout life.
3. Vertebral column is represented only by small imperfect neural archs over the notochord.
4. They do not have paired appendages.
5. They have single nostril. Internal ear has one or two semi-circular canals.
6. They are cold blooded.
7. Agnatha has two classes: **Ostracodermi** and **Cyclostomata**.

# Class 1. Ostracodermi (**Extinct**):

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They are earliest known vertebrates which appeared in Ordovician period. They had well developed dermal scales which led to their names “**Ostracoderms**” — **bony skin**. They are also called “armoured fishes”. All are extinct.

Examples: *Cephalaspis*, *Pteraspis*, etc.



*Cephalaspis*



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# Class 2. Cyclostomata (The Circular mouthed fishes: **cyklos-circularal;** **stome-mouth**)

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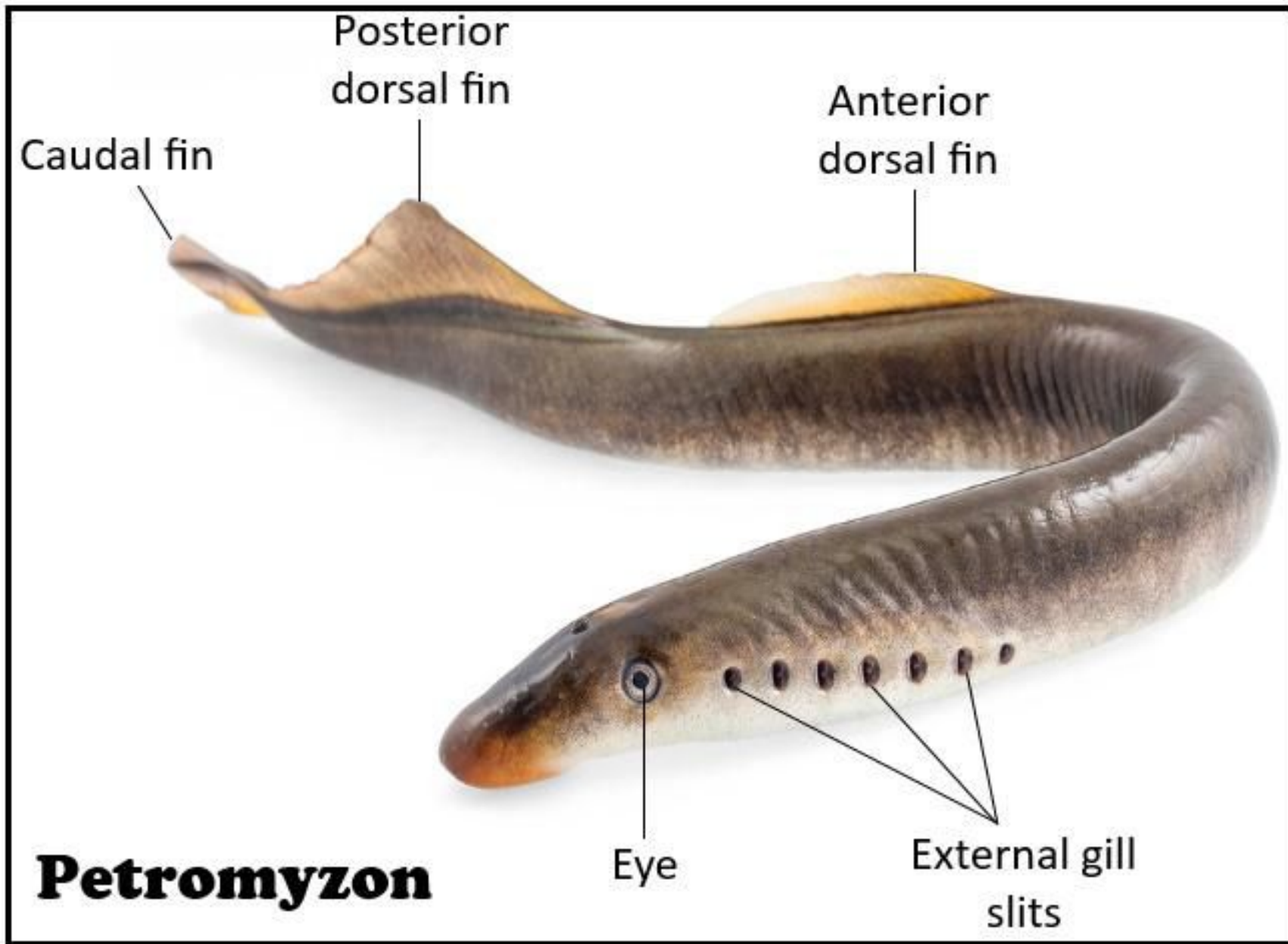
1. They occur in the seas and large rivers.
2. The mouth is circular and jawless.
3. They have 1-16 pairs of gill slits.
4. Head and brain are poorly developed.
5. Unpaired fins are present.
6. Endoskeleton is cartilaginous.
7. Kidneys are mesonephric.
8. Stomach is absent.

1. Respiratory organs are **gills**.
2. Heart is **two chambered** (one auricle and one ventricle).

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3. There are **10 or 8 pairs of cranial nerves**.
4. **Lateral line sense** organs are present.
5. Fertilization **is external**.
6. *Petromyzon* (Lamprey), *Myxine* (Hagfish).









tentacles

gill slits (twelve pairs)

mucous glands

a Hagfish



b Lamprey gill openings (seven pairs)

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# Gnathostomata. Jaw is present

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1. **Mouth has jaws** hence it is named gnathostomata.
2. Embryonic notochord is usually replaced in adult by a **vertebral column**.
3. Paired fins or limbs are **present**.
4. **Paired nostrils** are present.
5. **Calcified, bony skull and vertebra** are characteristic features of Gnathostomata
6. Gnathostomata is divided into two super classes: **Pisces and Tetrapoda**.

# LABEO AND FROG

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Labeo fish from class **Pisces**.

Frog is vertebrate from class **Amphibia**



