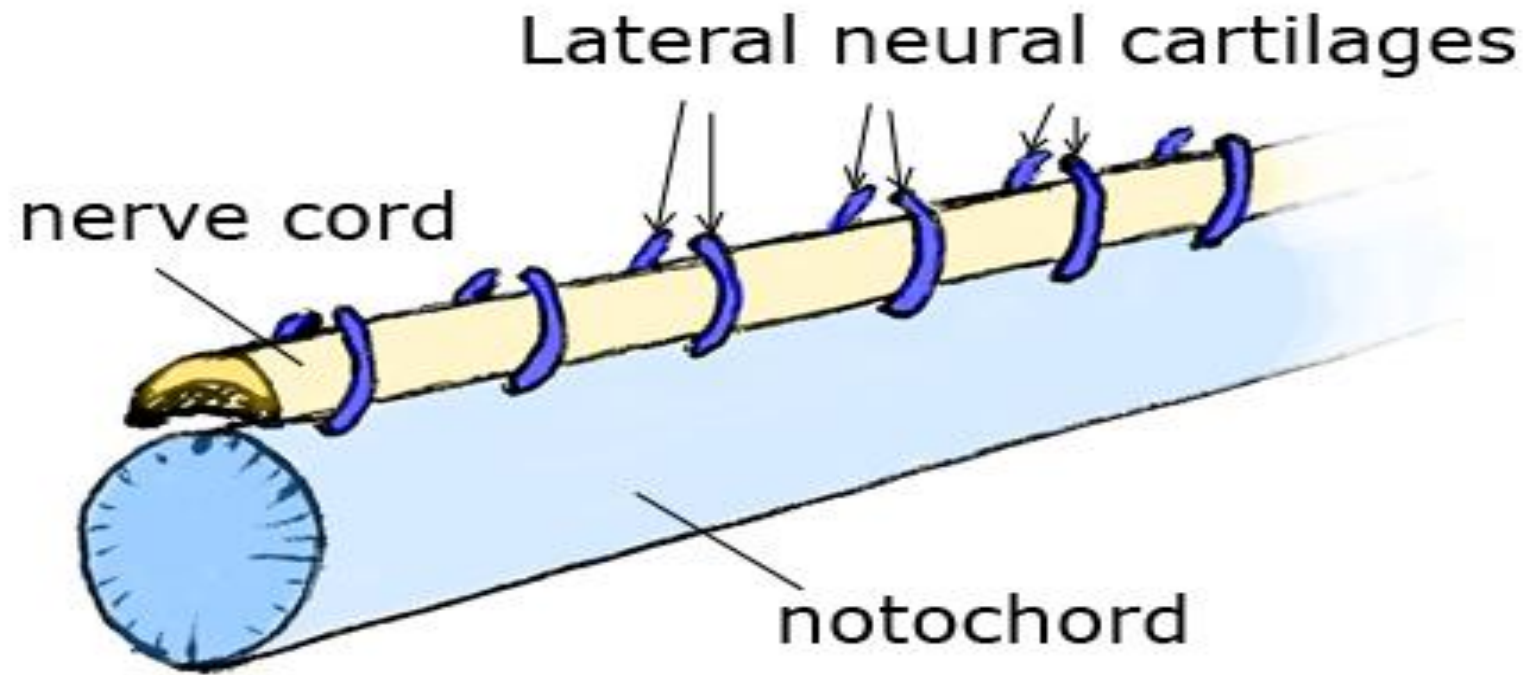


PHYLUM CHORDATA

(Chordates)

Definition

- The word Chordata is derived from the possession of the notochord
- **Notochord** - This can be divided into two words:
 - Noton - Back
 - Chorda - Cord
- The notochord is a structure possessed by all members of the phylum at one stage of its development.
- It may be in the larval or the embryonic stage or it may persist throughout life.



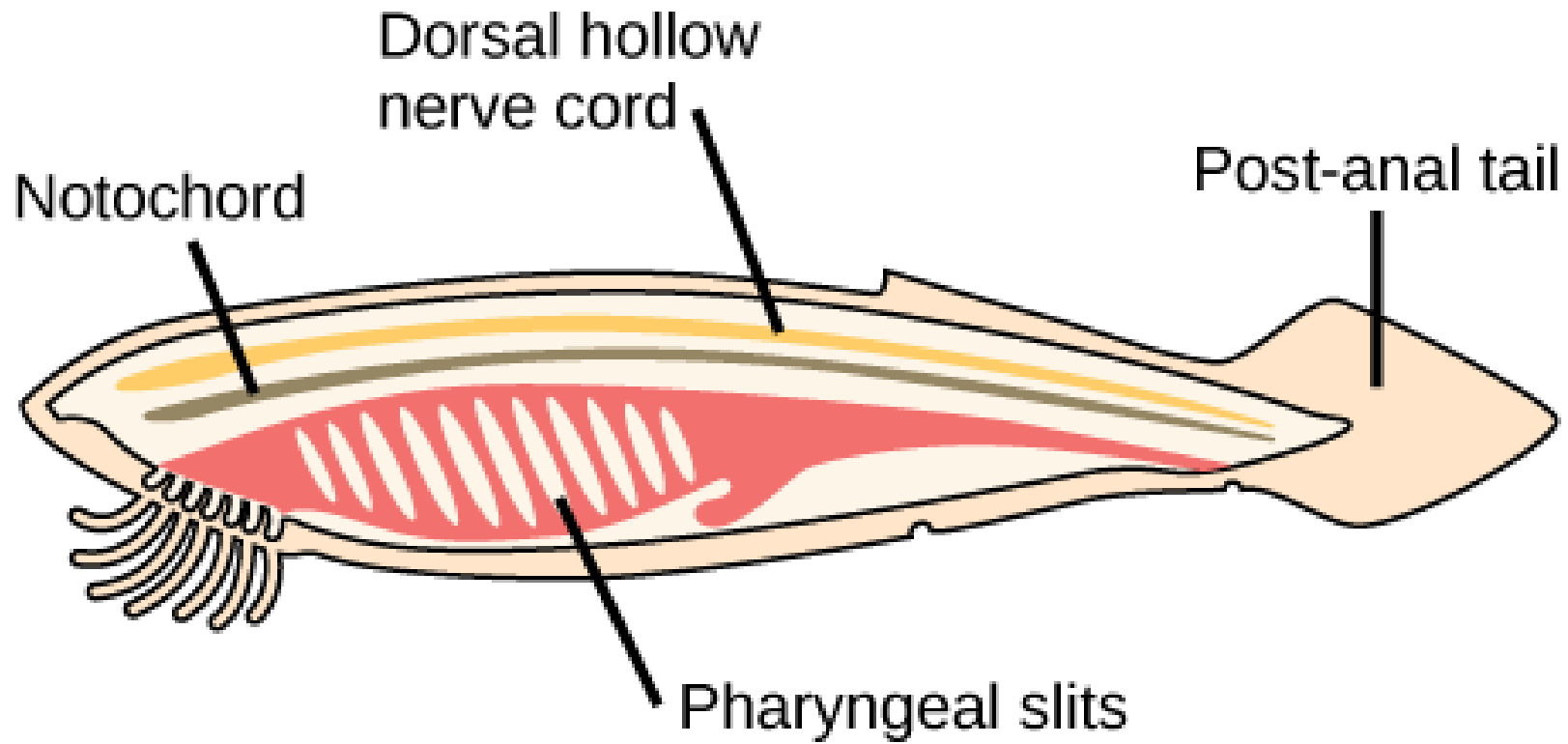


Diagram of a Generalised Chordate

The Main Chordate Characters

- These are the distinctive features that set chordates apart from all other phyla.
- These characters are always found at some embryonic stage although they may be altered, they may disappear in later stages of the life cycle.
- They are:
 - Possession of Notochord
 - Possession of hollow dorsal nerve chord
 - Possession of pharyngeal slit/pouches
 - Possession of post anal tail
 - Possession of endostyle

Protochordates

- Protos – First
 - Chorda – Cord
- } Animals indicated as chordate predecessor
- Also called the Acraniata (lack the cranium)
 - Also lack vertebral column and jaw
 - They are referred to as invertebrate chordates
 - They are the simplest chordates alive today
 - They are mostly of small size
 - They are all marine
 - Adult or larvae have notochord, dorsal nerve chord, pharyngeal gill slit and post anal tail

Protochordates

Classification

- They include the Hemichordates, Urochordates and Cephalochordates.
- The hemichordates have been removed and placed in a separate phylum of their own.

Urochordata

- Commonly called Tailed Chordates or Tunicates
- The name tunicate or tunicata is suggested by the usually tough, nonliving coat called test or tunic that surrounds the body of the animal. The tunic contains cellulose.
- They include the sea squirts and the Ascidians
- 2,200 Urochordates are known

Urochordata (Characters)

- They are widely distributed and show a great diversity of structure, habits and habitat.
- They are marine animals found in all seas, along the shores and up to a depth of more than 2 miles
- They are highly specialized chordates (Specialization for Sedentary living).
- They are sessile as adult and the larval forms are free swimming and resemble a microscopic tadpole which bears all the chordates hallmarks.
- The chordate affinities are clearly seen in free swimming larvae which have:
 - i). Pharyngeal gill clefts.
 - ii). A dorsal tubular central nervous system.
- A notochord which is confined only to the tail, that is where they get the name Urochordata (Tailed Chordates).
- They are all hermaphrodites

Classification of Urochordates

1. Ascidacea (Little bag)

- They are called sea squirts because some species discharge a jet of water from the excurrent siphon when irritated. Examples are *Ciona*, *Ascidia*

2. Larvacea (Resemble the larvae stage). Examples are *Oikopleura*, *Appendicularia*, *Fritillaria*

3. Thaliacea. Examples are *Salpa*, *Doliolum*.



Ascidia (sea squirt)



Salpa



Oikopleura

CEPHALOCHORDATES

- They inhabit sandy bottoms of coastal waters (marine)

Nomenclature

- They are commonly referred to as Lancelets.
- They are also called Amphioxus:

Amphioxus – Amphi (Both ends)

Oxus (Sharp)

- The name Amphioxus latter surrendered by priority to Branchiostoma:

Branchiostoma - Branchia (gills).
Stoma (mouth)

CEPHALOCHORDATES (Characters)

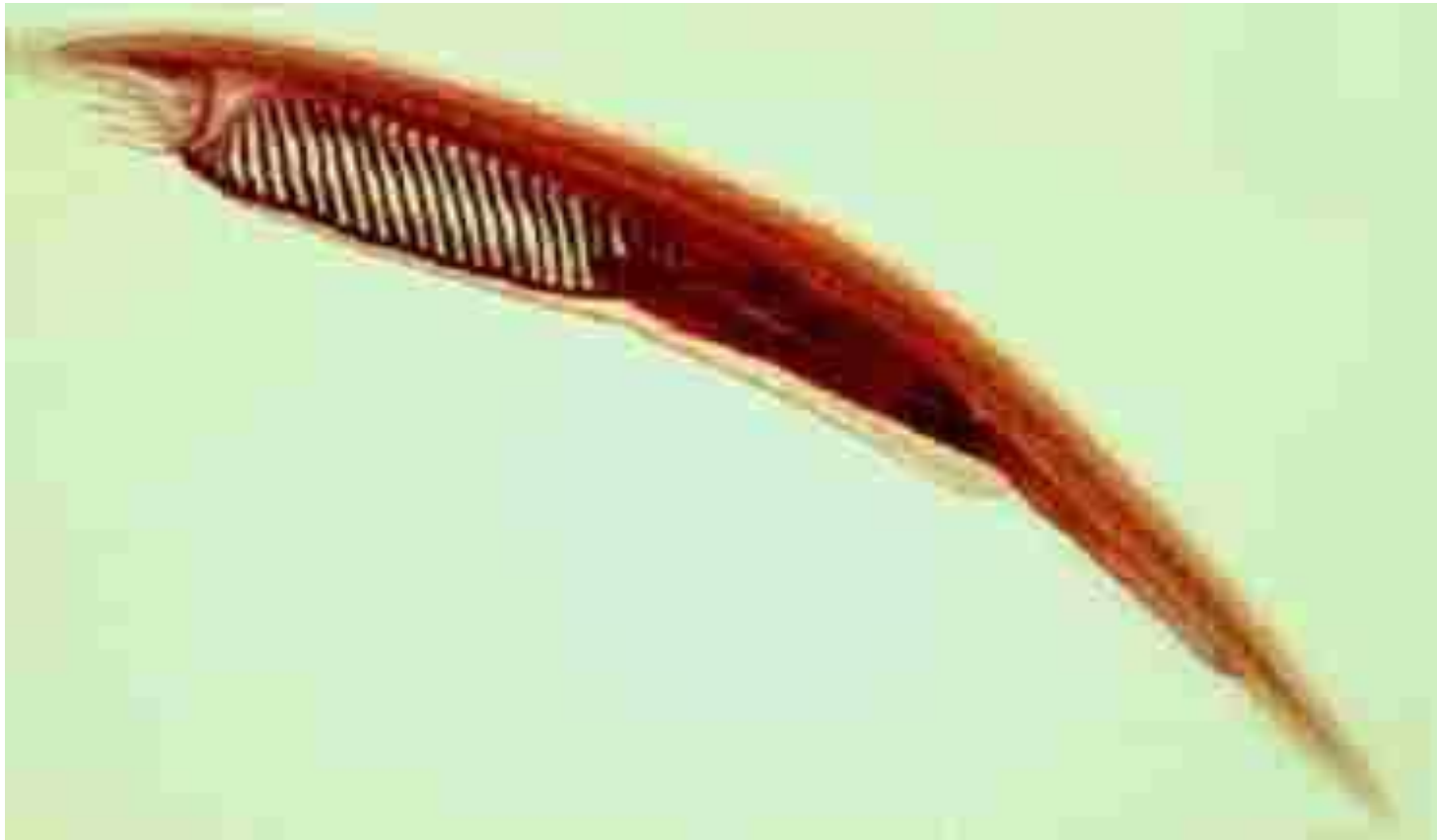
- They are translucent animals about 5 – 7cm in length
- They are fish like chordates showing the main chordate characters:
- Notochord extends the entire length of body and projects beyond the nervous system to the tip of snout (Hence the name cephalochordates).
- The cephalochordates have poor development of fins and therefore swim ineffectively
- They have no paired fins
- The head end present but shows little **Specialization.**

CEPHALOCHORDATES (Classification)

- Comprises a single genus *Branchiostoma* belonging to Order Branchiostomida

Examples are

- *Branchiostoma nigeriense* (found in Lagos lagoon and pink in color when fresh)
- *B. leonense*
- *B. senegalense*
- *B. gambiense*



Branchiostoma

THE VERTEBRATA

The vertebrata are made up of two super classes:

- a) Agnatha b) Gnathostomata.

- **Agnatha**
- Vertebrates without jaws
- Mainly fishes

- **Gnathostomata**
- Vertebrates with jaws
- Consist of fishes and other animals

THE VERTEBRATA

They include the following:

- Acanthodians
- Placoderms
- Chondrichthyes
- Osteichthyes
- Amphibian
- Reptilian
- Aves
- Mammalia

CONVENIENCE GROUPING

- The Vertebrates have been grouped for convenience, on the basis of limbs into :
- **Pisces** : These are fish like vertebrates. The limbs are fins.

They include:

- Agnatha
- Acanthodians
- Placoderms
- Chondrichthyes
- Osteichthyes
- **Tetrapod** :
- This includes:
- Amphibia
- Reptiles

Agnathans

- A / Gnathan – without jaws

Characters

- They are the earliest known vertebrates characterized by the absence of jaws.
- They are currently regarded as the most primitive living vertebrates because as far as vertebrate features are concerned they haven't changed from the old basic functions
- Many extinct and just few are alive.
- Living representatives of the group: Lamprey and Hag fishes
- Lamprey - *Lampetra fluviatilis* – freshwater *Petromyzon marinus* – marine
- Hag fishes - Atlantic hag fish – *Myxine glutinosa*

Classification of Agnathans

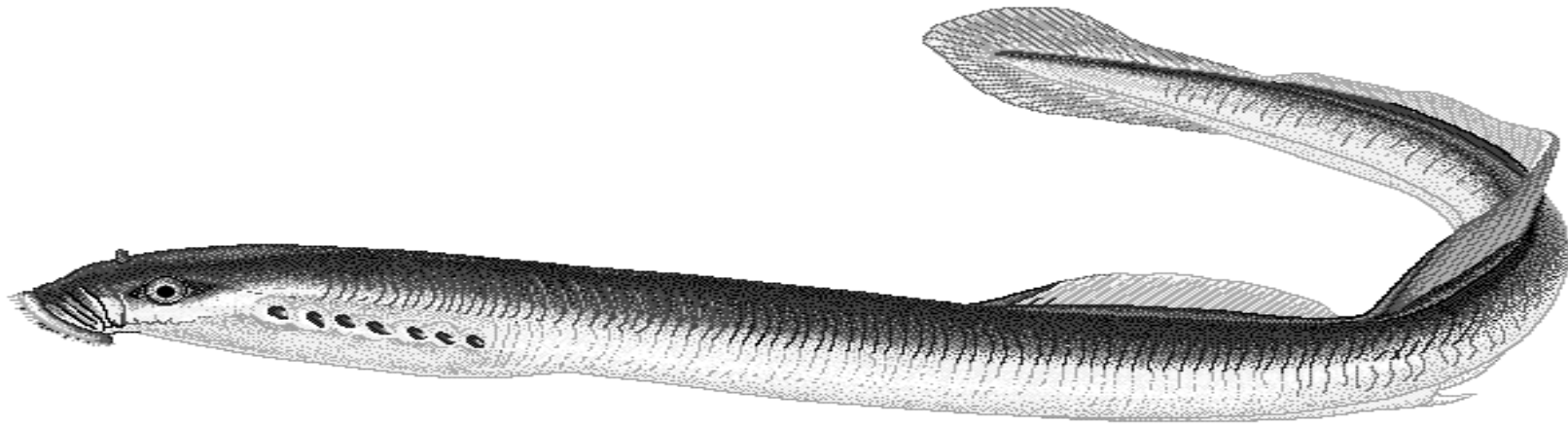
Divided into two:

Ostracodermi – Cephalaspis

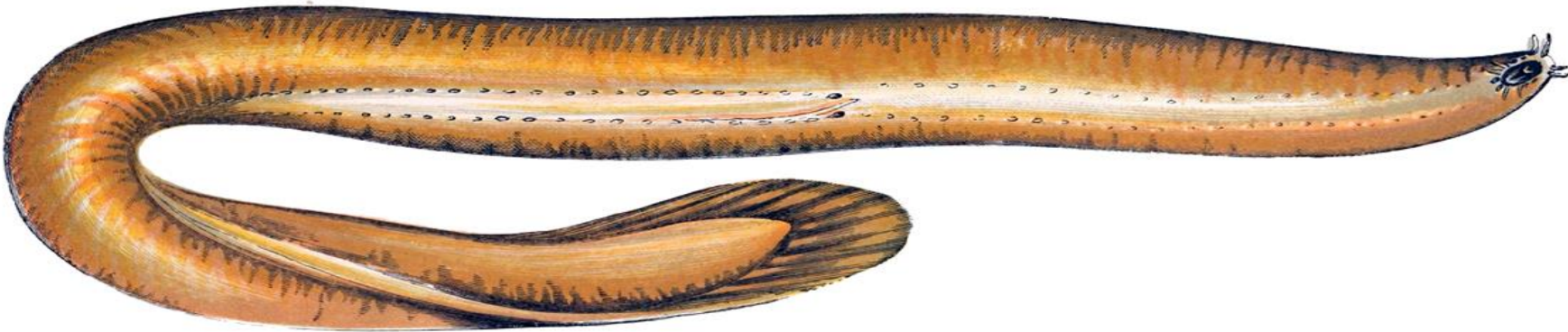
- They are extinct and are found as fossils.
- They have head with heavy armor and bony dermal plates on skin.

Cyclostoma

- Petromyzontia (Commonly called LAMPREY)
 - *Lampetra fluviatilis*, (Freshwater), *Petromyzon marinus* (Marine).
- Myxinoidea (Commonly called HAG FISHES).
 - *Myxine glutinosa*, *Bdellostoma*
- The cyclostomata have long rounded and eel like bodies.
- They are rounded mouth, from which the name Cyclostomata is derived,
- The mouth is also suctorial.



Lampetra fluviatilis



Hagfish

Gnathostomata

- Acanthodians
- Placoderm.

(The Placoderm and Acanthodian are the extinct forms).

- Chondrichthyes.
- Osteichthyes.
- Amphibia.
- Reptilia.
- Aves.
- Mammalia

(The Chondrichthyes ,Osteichthyes, Amphibia, Reptilia , Aves and Mammalia are the living forms)

Chondrichthyes

- All are marine except the river stingray – *Potamotrygon garouensis* which is found in fresh water
- They are cartilaginous fishes. The skeleton is made up entirely of cartilage
- The skin is covered with scales. The scales are referred to as placoid scales
- The gills are not covered by operculum
- Each gill opens separately on the body
- Usually 5 pairs on each side of body
- The pelvic fin is a sexually dimorphic structure
- Pelvic fins modified to form claspers in males
- The mouth is located ventrally
- Tail fin – usually heterocercal (Asymmetrical)

Classification of Chondrichthyes

- **Chondrichthyes**
- Elasmobranchi - Selachii (shark), Batoidea (rays & skate)
- Bradyodonti/Holocephali
 - Elasmobranchi
 - Selachii – sharks. Example
 - Dogfish – *Scyliorhinus canicula*
 - White shark – *Carcharodon carcharias*
 - Hammerhead shark – *Sphyrna couardii*
 - Saw fish – *Pristis pristis*
- Batoidea – Rays
 - *Torpedo torpedo* –(Electric ray).
 - *Dasyatis margarita* –(stingray).
 - Skate – *Raja eglanteria*
 - *Chimaera* sp – (rat failed fish / rabbit fish).



Scyliorhinus canicula



Torpedo torpedo

Osteichthyes

- Inhabit both fresh and marine waters.
- Skeleton is made up of bone
- Skin covered by cycloid, ctenoid or ganoid scales
- Mouth located terminally / sub terminally
- Gills are covered by Operculum or gill cover
- Presence of bladder in many species
- Tail usually homocercal
- Pelvic fins not modified to form claspers

Classification of Osteichthyes

Sarcopterygii – flesh finned fishes

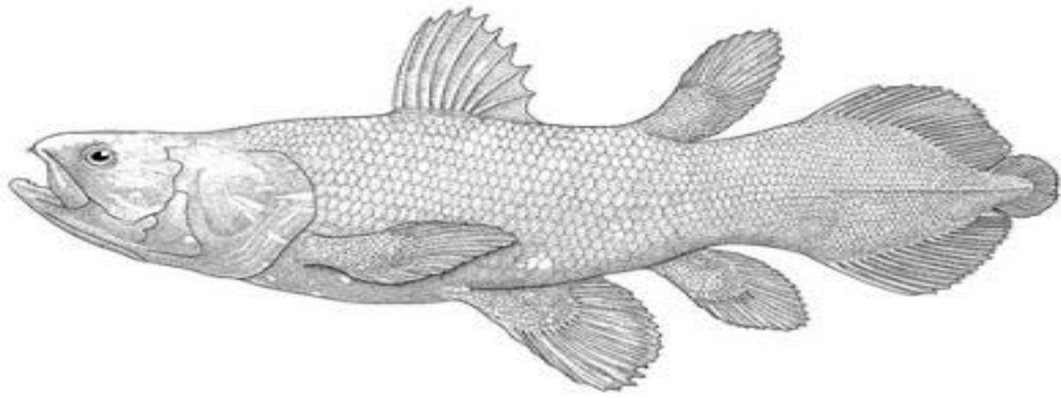
- Crossopterygii – lobe fins e.g. *Latimeria* sp
- Dipnoi – lung fishes e.g. *Protopterus*

Actinopterygii

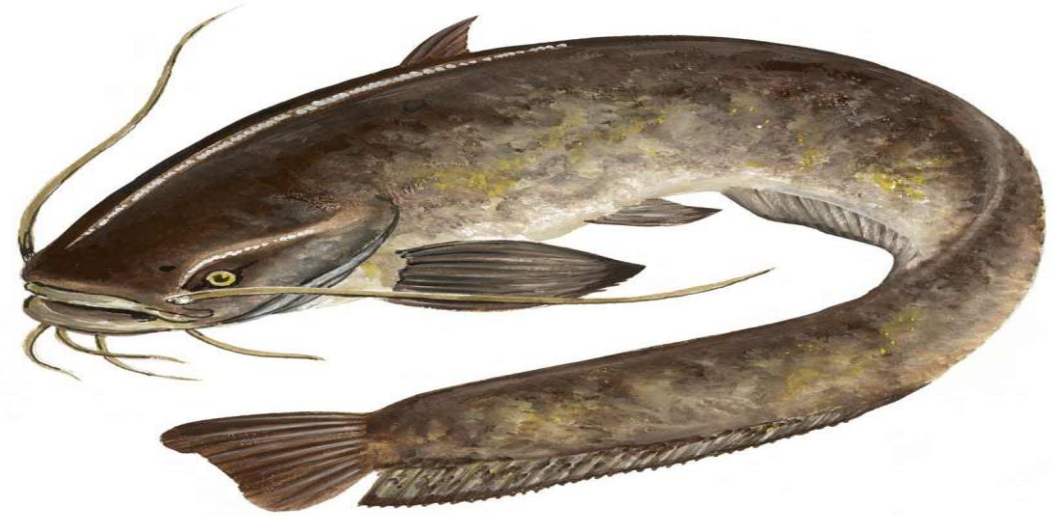
- Chondrostei
- Holostei
- Telostei

Examples

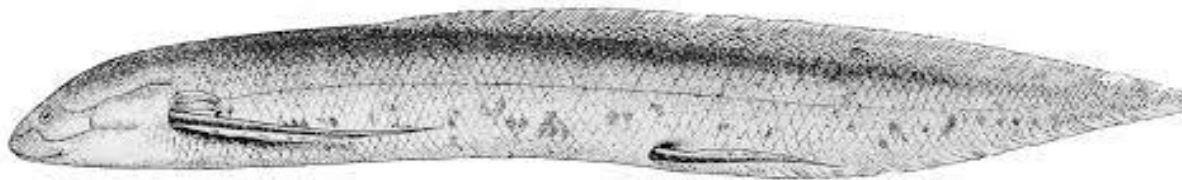
- *Oreochromis niloticus* - Tilapia
- *Clarias gariepinus* - Catfish.



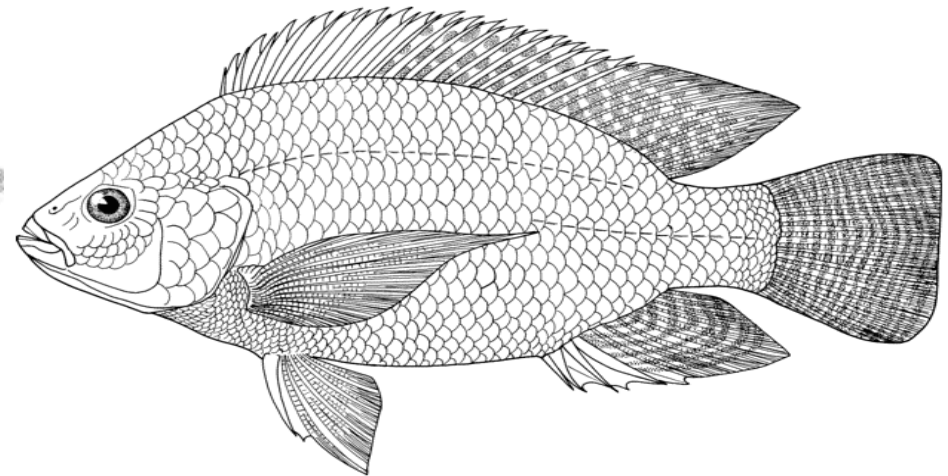
Latimeria sp



Clarias gariepinus



Protopterus



Oreochromis niloticus