# ACCESSORY RESPIRATORY ORGANS

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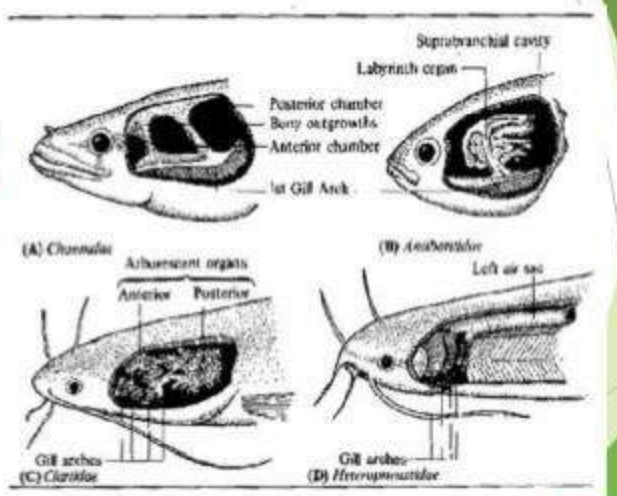
**Accessory respiratory organs are the special respiratory structures developed in addition to the gills (the primary respiratory organs) as adaptations for air breathing in many fishes. The purpose of these organs is to supply extra oxygen for respiration in fishes which are to live in water with depleted oxygen or to live out of water for short periods.**

# CAUSES OF DEVELOPMENT OF ACCESSORY RESPIRATORY ORGANS

- Sometimes the fishes of the tropical fresh water and streams of the hills, develop accessory respiratory organs to meet extra demand for oxygen, because depletion of oxygen occurs during summer as the water level falls to a considerable degree.
- Prolonged drought forces some fishes to develop some device to live out of water for a short period of time.
- In some fishes, the metabolic rate is so high that dissolved oxygen present in water becomes insufficient.
- The usage of accessory respiratory organs prevent death during aestivation.

# DIFFERENT ACCESSORY RESPIRATORY ORGANS

- A--- AIR SAC
- B---LABYRINTHINE ORGAN
- C---ARBORESCENT ORGAN
- D---BRANCHIAL AIR TUBE



# Different Types of Accessory Respiratory Organs

- Accessory respiratory organs evolved as modifications of various organs in various fishes:
- Skin
- Buccopharyngeal Epithelium
- Pharyngeal Diverticulum
- Opercular Chamber
- Diverticula from Branchial Chamber

# Cutaneous Respiration By Skin

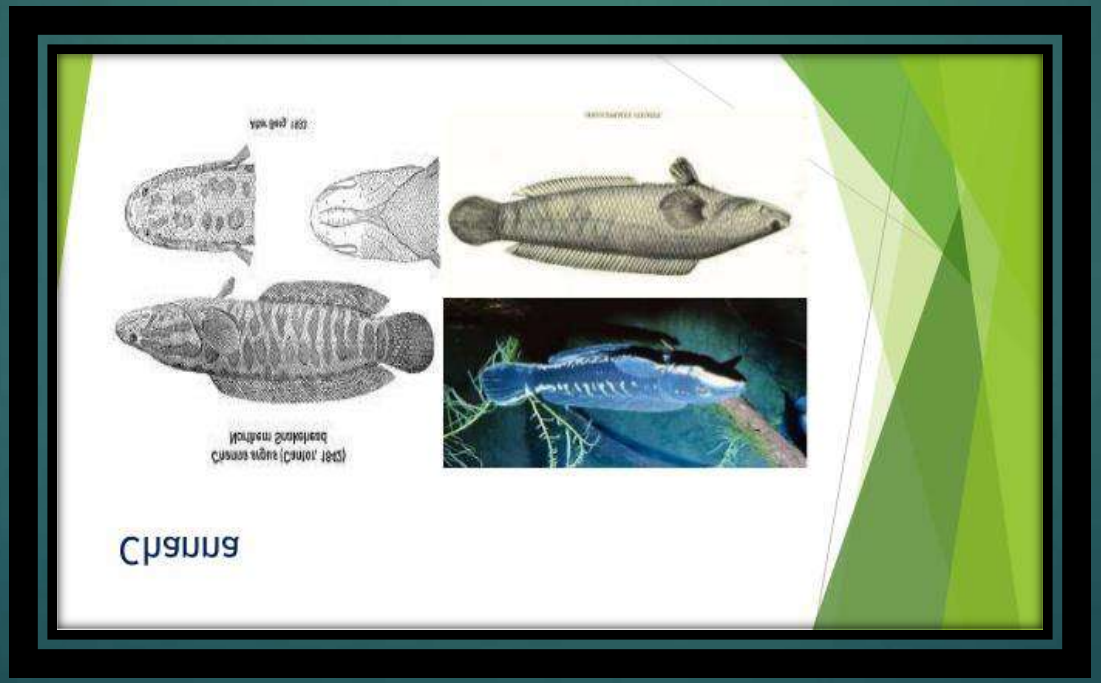
- Simplest Form Of Aerial Respiration.
- In this case the skin is thin , moist , glandular and richly vascular.
- The embryos and larvae of many fishes breathe by skin , until gills become functional.
- Acipenser and some catfishes , the highly vascular opercular fold serve as an accessory respiratory structure.
- Eg:Anguilla ,Periophthalmus ,Boleophthalmus.

# Bucco-Pharyngeal Respiration

- Buccal and pharyngeal epithelia are richly vascular they may serve as a respiratory surface for gas exchange.
- Fish may keep its branchial chamber water filled ,while going out of water, gill respiration to continue.
- Eg :Periophthalmus,Monopterus,Electrophorus

# PHARYNGEAL DIVERTICULUM

- Here pharynx develops sac-like vascularized diverticula to temporarily store air for gaseous exchange.
- Example: *Channa sp, Amphipnous cuchia*



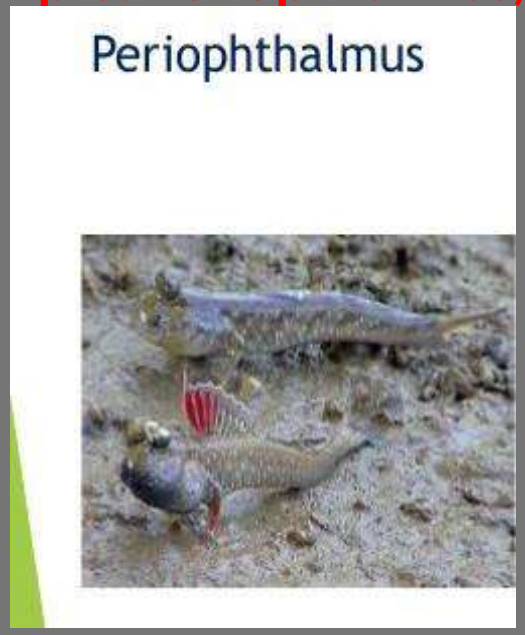
# Pharyngeal Air Sacs

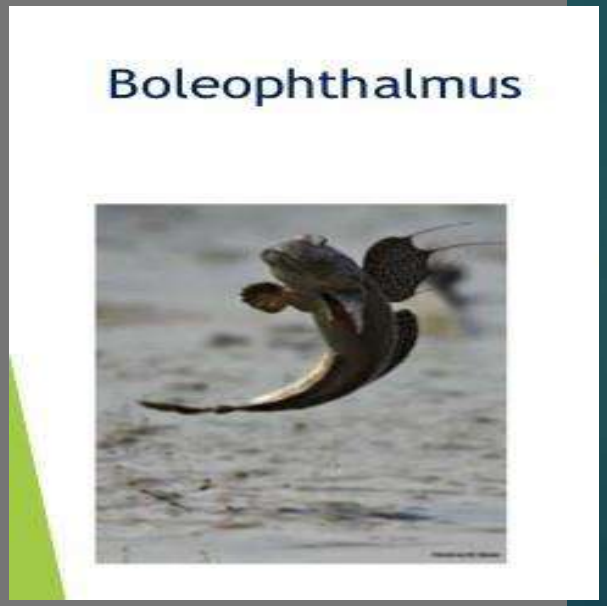
- The accessory respiratory organs are a pair of lungs like pharyngeal pouches . extension of the pharynx .
- They are lined by a thick vascular membrane. this membrane provides the respiratory surface for gas exchange.
- In amphipnous a pair of blind sac like pharyngeal diverticulam ,sac are lined by the richly vascular pharyngeal epithelium.


Eg:Channa , Amphipnous

# OPERCULAR CHAMBER

- The operculum chamber possess highly vascularized epithelial membrane in some species.
- Example: Periopthalmus, Boleophthalmus



# Respiration Through Air Reservoirs

- In a number of fishes accessory respiratory organs are air sacs or air reservoirs.
- It specialized air storage and gas exchange.
- They may extensions or outpushing of the branchial chamber, buccal cavity ,pharynx, stomach or intestine

The commonest type of air reservoirs

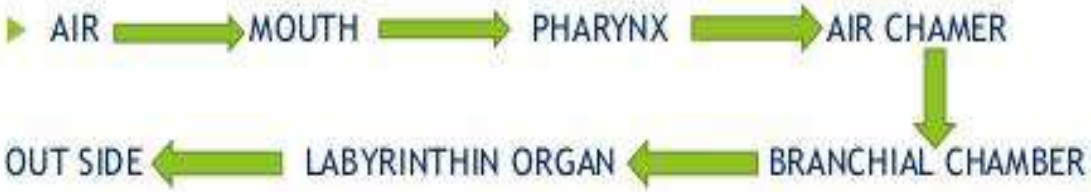
- labyrinthine organs
- branchial air tubes
- intestinal air reservoirs

arborecent or dendriform organs

pharyngeal air sacs

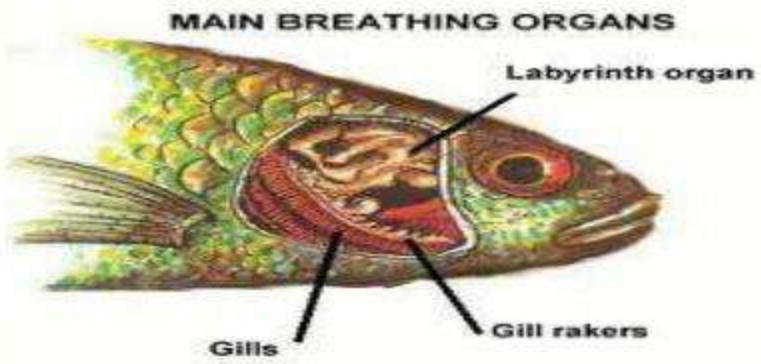
# Labyrinthine organs

- Accessory respiratory organs are labyrinthine like structure.
- It develop from branchial epithelium.
- Mainly it located one on each side above the gills.



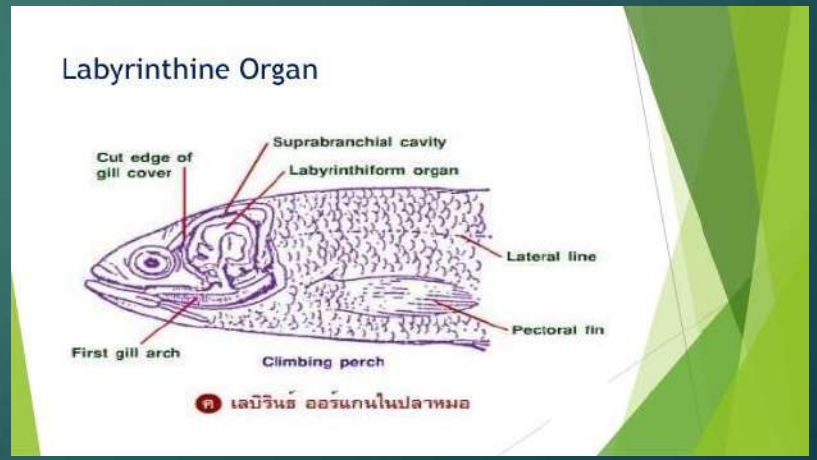

Eg: Anabas , Osphronemus, Macropodus , Betta

# Labyrinthine Organ



# LABYRINTHINE ORGAN IN *Anabas*

- There are two sac like spacious outgrowths (chambers) that develop from the dorsal side of the branchial chambers.
- The epithelium lining of these chambers is highly vascular and becomes folded to increase the respiratory area.
- Each chamber contains a characteristic rosette like labyrinthine organ.
- Labyrinthine organ consist of concentrically arranged shell like bony plates, each with wavy margin.



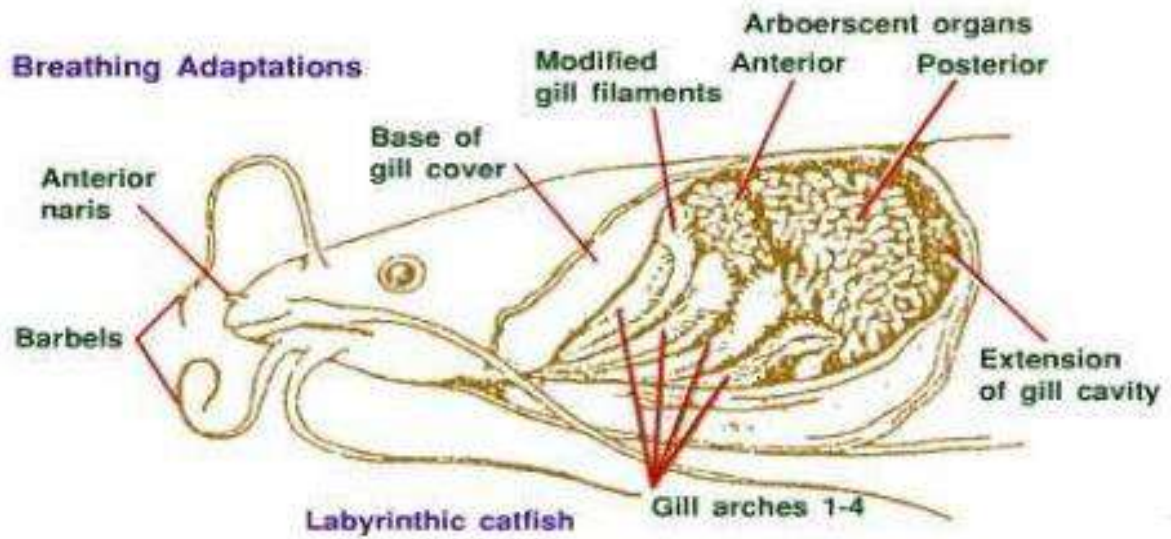
# Labyrinthine organ in fishes


# Arborescent Organs or Dendriform Organs

- It is an two air chambers which are extensions of the branchial cavities.
- The air chamber contains two richly vascular branching structures, called as dendriform organs or arborescent organs.
- The surface of arborescent organs covered by vascular fold of branchial epithelium .The organs provide a respiratory surface for gas exchange.


Eg: Some cat fish Clarias, Heterobranchus

# Arborescent organ

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# The accessory respiratory organs of *Clarias batrachus*

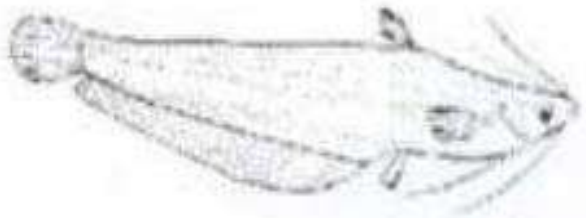
- The accessory respiratory organs of *Clarias batrachus* are comprised of- the suprabranchial chamber, the fans or gill plates, the dendritic organ or the respiratory tree(also called rosettes or arborescent organs) and the respiratory membrane.
- A pair of suprabranchial chambers provided with inhalant and exhalent apertures and lined by highly vascularized respiratory membrane, are present.
- The entrance of the suprabranchial chamber is guarded by fan like structure.
- Each rosette is a tree like branchial chamber supported by cartilaginous internal skeleton. Arborescent organs of Clarias allows it to breath air directly. The rosette is composed of numerous terminal knobs. Each terminal knob has a core of cartilage covered by vascular membrane and shows eight folds in it.

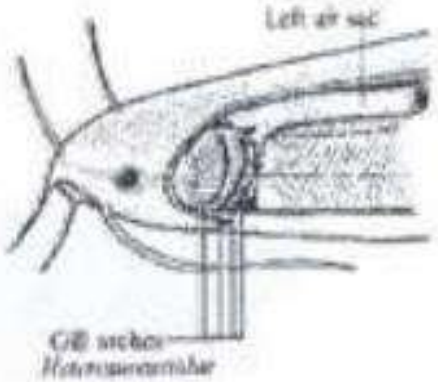
# Branchial Air Tubes

- It is an long lung like air tubes
- The tube situated one on each side of the vertebral column.
- They are extension of the branchial chamber and extentend middle of tail .It provides a respiratory surface for gas exchange.


Eg : Heteropneustes

# BRANCHIAL AIR TUBE

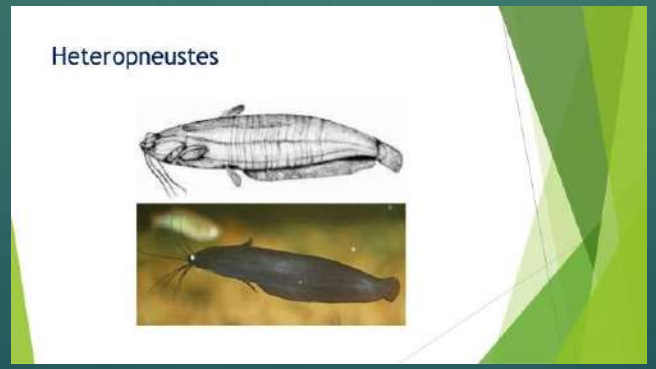





Catfish.ir

# ACCESSORY RESPIRATORY ORGAN OF *Heteropneustes fossilis*

- A pair of tubular pneumatic sac like structures, one on each side of the body acts as the accessory respiratory organs.
- These tubular sacs extend backwards from the gill area upto the middle of the caudal region.
- The walls are thin and highly vascularized.
- The opening of the sac are guarded by valve like structures



# Intestinal Air Reservoirs

- unusual method of air breathing ,specialized vascular pouch present on intestine Eg: Cobitidae,Doras
- rectum is used as an air reservoirs

Eg: Cat Fish Callichthys