

S. S. College, Jehanabad

Department: Zoology

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Subject: Zoology

Topic: Accessory Respiratory Organs in Fishes

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Accessory respiratory organs

Note.

Some accessory respiratory organs commonly found in fishes are skin, buccopharyngeal epithelium, gut epithelium, pelvic fins, pharyngeal diverticula, branchial diverticula and air bladder (swim bladder).

Different forms of accessory respiratory organs

These take different forms and structure that suit the habit and habitat of the fish. Some accessory respiratory organs commonly found in fishes are skin, buccopharyngeal epithelium, gut epithelium, pelvic fins, pharyngeal diverticula, branchial diverticula and air bladder (swim bladder).

4) Skin — The skin of eels and many other fishes is richly supplied with blood vessels and serves as accessory respiratory organ. It performs the respiratory function both in water and on land. Anguilla and amphibious eels often move on land through wet vegetation. This feature is especially useful when the eels undertake extensive migratory journeys. In pariophthalms (sand swimmer) too skin function as an accessory respiratory organ.

2) Buccopharyngeal epithelium :

The buccal cavity and pharynx of Periophterous and Gymnarchus are lined with highly vascular epithelium. Fresh air is gulped into these cavities and exchange of respiratory gases occurs through the epithelium.

3) Gut epithelium :

In a few fishes, certain regions of the alimentary canal are highly vascular and become modified for aerial respiration. In *Misgurnus fossilis* for example, the region behind stomach serves as an accessory respiratory organ. The intestine of *Lepidogireon* and the rectum of *Callichthys* also function as accessory respiratory organs. In these cases, fresh air enters the gut either through mouth or anus. The expiratory air goes out through anus.

4) Pelvic fins : — In the American lung fish *Lepidogireon*, during breeding season, the pelvic fins of the male fish enlarge in size, become highly vascular and form filamentous outgrowths. These fins, besides serving as accessory respiratory organs supply oxygen to the eggs guarded by them.

45) Pharyngeal Diverticula

The Pharynx of the fishes *Periophthalmus*, *Anphiprurus*, *Channa* (*Lophioperichthys*), etc. forms sac-like outgrowth called diverticulum which is lined by vascular epithelium. Sometimes the sac extends above the gill pouch. Air is drawn into the diverticulum, and oxygen and carbon dioxide are exchanged. *Anphiprurus* possesses a small and smooth diverticulum, which opens through midventral gill slits. The diverticulum of *Channa* is folded. In all these cases, the diverticula function as accessory respiratory organs during aestivation or when the oxygen content of the water is too low.

b) Branchial Diverticula

In many fishes the outgrowths or diverticula formed from gill (branchial) chambers contain complex accessory respiratory organs for aerial respiration. These include tubular diverticula, labyrinthine organs and dendritic or arborescent organs.

a) Tubular diverticula

In heterokneustes (*Cacchobrama*) a pair of long tubular air sacs arises from the gill chamber one on either side and extends up to the tail. Exchange of respiratory gases take place through the highly vascular wall of the diverticulum.

b) Labyrinthine organs :

Anabas (Junction climbing Perch) often comes to water surface and gulp down fresh air for aerial respiration. It has two spacious subbranchial cavities as dorsal outgrowth of the gill chambers. Each of these cavities contains an accessory respiratory organ called labyrinthine organ. It is formed by much folded concentric bony plates, which develop from the first epibranchial bone. This organ is covered by vascular mucous membrane. Fresh air reaches the subbranchial chamber through the mouth and after gas exchange the expiratory air is expelled through the opercular opening. In Trichogaster, fasciatus, a similar but simpler a similar but simpler labyrinthine organ is present.

c) Dendritic (Arborescent) organs :

In clarias (Indian cat fish), the wall of the gill chamber on either side evaginates to form a pair of subbranchial cavities. These cavities contain highly branched and tree-like accessory air breathing organs called dendritic or arborescent organ. Exchange of respiratory gases occurs through the highly vascularized mucous membrane covering these organs.

7) Air bladder (Swim bladder)

Air bladder or swim bladder is found in all bony fishes. In teleosts, it functions as a hydrostatic organ. However, in lower bony fishes such as Dipnoans, Ganoids etc. gills are poorly developed and the air bladder functions as an accessory respiratory organ. It is vascular and contains many alveolus-like structures. In Anni and Lepidosteus, single air bladder is present, which opens dorsally into pharynx. In Lepidosteus and Protopterus, the air bladder is bilobed, ventral and opens ventrally into pharynx.

8) oral Papilla

In electric eel (Electrophorus), the mucous membrane of the mouth is raised into oral papillae. They are well vascularized and they help in aerial respiration.

9) Lungs : — Lungs are present in Dipnoi, e.g. Protopterus, Lepidosteus, etc. They have a pair of lungs. They open into the oesophagus by a common opening called glottis. The lungs contain alveoli and are well vascularized. In Dipnoi, lungs are used for aerial respiration during aestivation.

Note