GILL MORPHOLOGY

Gill morphology in Chondrichthyes

The first and the most primitive type of gill, the Septal gill, is typical of Elasmobranchs. In this group, the interbranchial septa are exceptionally well developed and extend beyond.

STRUCTURE OF GILL IN CHONDRICHTHYES

1. Gills open independently to the outside and are separated from each other not only by skeletal gill arches of cartilage but also by branchial septa.
2. On either side of branchial septa is located a set of filaments or **Hemibranch.**
3. A septum and its 2 hemibranchs together make up a gill or **holobranch**.
4. Along the inner margin of gill arches are present finger like projections referred to as **gill rakers** which not only keep food from entering the slits but also aid in directing it along the straight and narrow esophageal path in which it should go.
5. The interbranchial septa is very significant in Chondrichthyan fish. The reduction of interbranchial septum is significantly seen in Osteichthyan fish, so the gill all lie compacted together in a common chamber covered by the operculum. The interbranchial septa in addition to separating the gill pouches serves to protect the gills themselves.
6. The most anterior pair of pharyngeal gill slits develops into **Spiracles** in Chondrichthyes. Spiracles are found in Chondrichthyes and in a few other fish. In others the spiracle is lost or is merely represented by a blind pocket.

PSEUDOBRANCH

1. The walls of the spiracles are provided with false gills or Pseudobranchs in some cases.

2. Pseudobranch (meaning false gill) is so called because its blood supply is not derived directly like that of true gills from an afferent branchial artery bearing deoxygenated blood but from efferent branchial artery of the following gill arch that has already given up its load of carbon dioxide and taken up oxygen and hence carries oxygenated blood.
3. The blood in the Pseudobranch is actually exposed to oxygenation a second time so that the brain and eyes to which this blood is directed receive an unusually high percentage of oxygen. This is undoubtedly of some advantage to the animal.

STRUCTURE OF GILLS OF OSTEICHTHYES

1. Gills are located in gill chambers and protected by **operculum.**
2. 'V' shaped gills are composed of primary lamella which are again subdivided into secondary lamella which are the actual sites of gas exchange.
3. In fishes having operculum, a pliant **Branchiostegal membrane** supported by bony **Branchiostegal rays** usually extends from the inner surface of operculum to the body wall.
   Function- It serves as a one-way valve which permits water to leave branchial chamber through opercular opening but does not allow it to re-enter.
4. Another set of valves known as oral valves are located just within the mouth opening.
   Function- These permit water to enter the mouth but not to leave it.
5. The interbranchial septum is found to be reduced in Ganoids. The reduction of interbranchial septum becomes complete in Teleost fishes so the gills all lie closely together in a common chamber which is covered by the operculum.
6. In Osteichthyes, the spiracle is either lost or is merely represented by a blind pocket.

7. On the inner side of gill slits, along the inner margin of gill arches, a series of stiff, comb-like projections are present known as the **Gill rakers.**
8. In cross-section, each gill is ‘V’-shape and composed of Primary Lamella that are subdivided into Secondary Lamella which are the actual site of gaseous exchange.