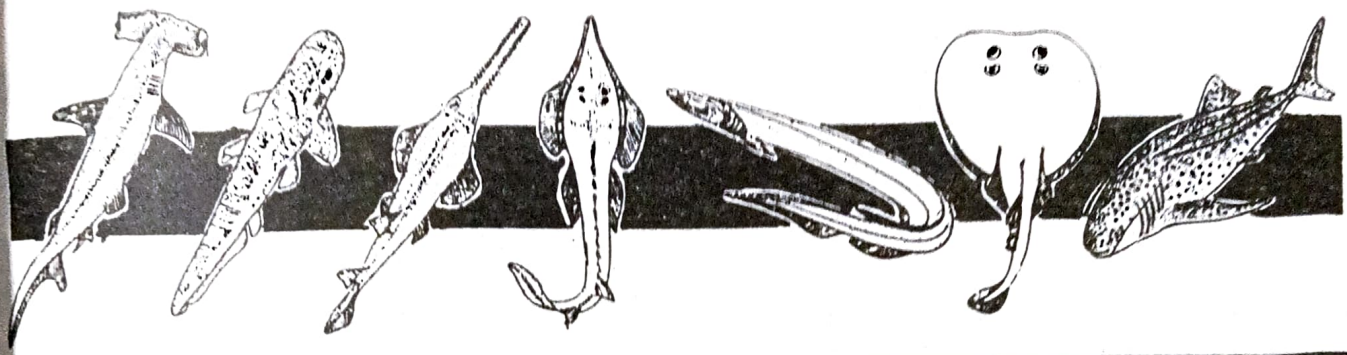
# 15



# Class 4. Chondrichthyes : The Cartilaginous Fishes

## General Characters

1. Mostly marine and predaceous.
2. Body fusiform or spindle shaped.
3. Fins both median and paired, all supported by fin rays. Pelvic fins bear claspers in male. Tail heterocercal.
4. Skin tough containing minute placoid scales and mucous glands.
5. Endoskeleton entirely cartilaginous, without true bones (Gr., *chondros,* cartilage + *ichthys*, fish). Notochord persistent. Vertebrae complete and separate. Pectoral and pelvic girdles present.
6. Mouth ventral. Jaws present. Teeth are modified placoid scales. Stomach J-shaped. Intestine with spiral valve.
7. Respiration by 5 to 7 pairs of gills. Gill-slits separate and uncovered. Operculum absent. No air bladder and lungs.
8. Heart 2-chambered (1 auricle and 1 ventricle). Sinus venosus and conus arteriosus present. Both renal and hepatic portal systems present. Temperature variable (poikilothermous).
9. Kidneys opisthonephric. Excretion ureotelic. Cloaca present.
10. Brain with large olfactory lobes and cerebellum. Cranial nerves 10 pairs.
11. Olfactory sacs do not open into pharynx. Membranous labyrinth with 3 semicircular canals. Lateral line system present.
12. Sexes separate. Gonads paired. Gonoducts open into cloaca. Fertilization internal.

Oviparous or ovoviviparous. Eggs large, yolky. Cleavage meroblastic. Development direct, without metamorphosis.

## Classification

The class *Chondrichthyes* (Gr., *chondros*, cartilage + *ichthys*, fish), also called *Elasmobranchii* (Gr., *elasmos*, plate + *branchia*, gills), including the sharks, rays, skates and chimaeras, comprises about 600 living species (according to Schultz) of cartilaginous fishes. The classification followed here is based after that of Romer (1959).

**Subclass 1. Selachii**
(Gr., *selachos*, a shark)

1. Multiple gill slits on either side protected by individual skin flaps.
2. A spiracle behind each eye.
3. Cloaca present.

**Order 1. Squaliformes or Pleurotremata**
(Gr., *pleuro*, side + *trema*, opening)

1. Body typically spindle-shaped.
2. Gill slits lateral, 5 to 7 pairs. Spiracles small.
3. Pectoral fins moderate, constricted at base.
4. Tail heterocercal.

Examples : True sharks. About 250 living species. Dogfishes (*Scoliodon, Chiloscyllium, Mustelus, Carcharinus*), spiny dogfish (*Squalus*), seven gilled shark (*Heptanchus*), zebra shark (*Stegostoma*), hammer-headed (*Sphyrna*), whale shark (*Rhineodon*).

**Order 2. Rajiformes or Hypotremata**
(Gr., *hypo*, below + *trema*, opening)

1. Body depressed, flattened dorso-ventrally.
2. Gill slits ventral, 5 pairs.
3. Pectoral fins enlarged, fused to sides of head and body.
4. Spiracles large, highly functional.

Examples : Skates and rays. About 300 species. Skate (*Raja*), stingray (*Trygon*), electric ray (*Torpedo*), eagle ray (*Myliobatis*), guitar fish (*Rhinobatus*), sawfish (*Pristis*).

**Subclass 2. Holocephali**
(Gr., *holos*, entire + *kephale*, head)

1. Single gill opening on either side covered by a fleshy operculum.
2. No spiracles, cloaca and scales.
3. Jaws with tooth plates.
4. Single nasal opening.
5. Lateral line system with open groove.

Examples : Rat fishes or chimaeras. About 25 species. *Hydrolagus* (= *Chimaera*).

## Other Chondrichthyes

**1. Dogfishes.** Dogfishes are widely used for study in laboratories because of their small size which rarely exceeds 1 metre. The types commonly described in books are the common European spotted dogfish, *Scyliorhinus* (=*Scyllium*) *caniculus*, spiny dogfish, *Squalus acanthias, Brachaelurus*, etc. They all resemble the Indian dogfish, *Scoliodon*, in their general anatomy and possess a spiracle and 5 gill slits on either side. They are widely distributed in temperate and tropical seas. *Scyliorhinus caniculus* occurs in the coastal waters of Europe. *Squalus* and *Acanthias* are abundant in both North Atlantic and North Pacific Oceans. They are so named for a prominent spine associated with each dorsal fin. *Mustelus* is the smooth dogfish in the sense that it lacks dorsal spines. Dogfishes are bottom dwellers and live on mixed diets including crustaceans and molluscs.

**2. Sharks.** Sharks are pleurotrematic elasmobranchs comprising about 300 living species. Most of them are marine, occurring in the warm waters of the tropics. As a group they are distinguished by their muscular strength, agility of movements and acuteness of their sight and smell. On the average sharks are very large animals, the largest of all fishes. A mature whale shark, *Rhincodon* (=*Rhineodon*) *typicus*, may reach 15-17 metres in length. With the exception of whales, they are the largest living vertebrates. Sharks are all predaceous carnirvores, capacious scavengers and active swimmers. They feed voraciously with