

GENERAL CHARACTER AND CLASSIFICATION OF PISCES

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General Characters of Pisces

The Superclass Pisces (L. Piscis = fish) are the truly jawed vertebrates. They have organs of respiration and locomotion related to a permanently aquatic life. The respiratory organs are the gills and the organs of locomotion are paired and impaired fins. All are poikilothermous.

General Characters:

1. Aquatic, either freshwater or marine, herbivorous or carnivorous, cold blooded, oviparous or ovoviviparous vertebrates.
2. Body usually streamlined, spindle-shaped, some are elongated snake-like and a few are dorsoventrally compressed, and differentiated into head, trunk and tail.
3. Locomotion by paired pectoral and pelvic fins along with median dorsal and caudal fins, supported by true dermal fin-rays. Muscular tail used in propulsion.
4. Exoskeleton of dermal scales, denticles or bony plates (in Placodermi) covering body surface. Placoid in Chondrichthyes and ganoid, cycloid or ctenoid in Osteichthyes.
5. Endoskeleton is cartilaginous or bony. The notochord is usually replaced by vertebrae, either bone or cartilage. Presence of well-developed skull and a system of visceral arches, of which the first pair forms the upper and lower jaws, the latter movably articulated with the skull.
6. Muscles arranged into segments called myotomes, with separate dorsal and ventral parts.
7. Alimentary canal with definite stomach and pancreas and terminates into cloaca or anus.
8. Organs of respiration are gills. Gill-slits 5 to 7 pairs, naked or covered by an operculum.
9. Heart is venous and two chambered, i.e., one auricle and one ventricle. Sinus venosus and renal and portal systems present. Erythrocytes nucleated. Poikilothermous.
10. Kidneys mesonephros. Excretions ureotelic.
11. Brain with usual five parts. Cranial nerves ten pairs.
12. Nostrils are paired but do not open into pharynx except Dipnoi. Nasal capsules are partly separate in Chondrichthyes and completely separate in Osteichthyes.

- 13.** Tympanic cavity and ear ossicles are absent.
- 14.** Internal ear with three semicircular canals.
- 15.** Lateral line system is well developed.
- 16.** Sexes separate. Gonads typically paired. Gonoducts open into cloaca or independently.
- 17.** Fertilisation internal or external. Females of Chondrichthyes are oviparous or ovoviviparous and of Osteichthyes are mostly oviparous and rarely ovoviviparous or viviparous. Eggs with large amount of yolk. Cleavage meroblastic.
- 18.** Extra-embryonic membranes are absent.
- 19.** Development usually direct without or with little metamorphosis.

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PISCES-CLASSIFICATION

The super class Gnathostomata includes craniates, in which one pair of the visceral arches is modified into this jaws. They have internal ear with three semi-circular canals and provided with paired 4, appendages (fins or limbs). Sexes are separate. The super class is divided into, two groups.

1) Pisces and 2) Tetrapoda.

Pisces Include three classes.

1) Placodermi,

2) Elasmobranchi (Chondrichthyes),

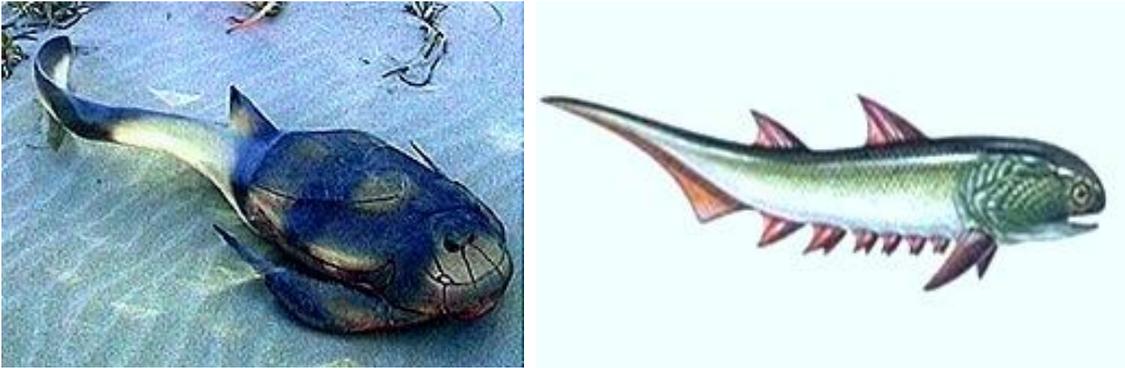
3) Osteichthyes.

Muller, Goodrich, Berg, Romer etc, classified the Pisces. There is no agreement among many authors with respect to the classification of fishes.

Class 1 Placodermi (Aphosthoids)

- 1) It includes extinct fishes.
- 2) They are all armored fishes. Their exoskeleton is in the form of bony plates or shields.
- 3) Their endoskeleton is bony:
- 4) The hyoid gill-slits are complete. It is not reduced.
- 5) The autodiastylic jaw suspension is seen in these fishes.
- 6) Heterocercal caudal fin is seen.
- 7) Hyoid arch will not support the jaws.
- 8) Primitive jaws are seen.
- 9) They survived up to Permian period of Paleozoic era.

Ex Climatius, Bothriolepis.



Class 2. Chondrichthys or Elasmobranchi

- 1) These fishes are exclusively marine.
- 2) The exoskeleton in the form of placoid scales.
- 3) Their endoskeleton is cartilagenous and are called Cartilage
- 4) Jaw suspension is amphistylic or hyostylic.
- 5) 5-7 pairs of gills are present.
- 6) External gill openings are separate. They are not covered by operculum.
- 7) Heterocercal caudalfin is seen.
- 8) Males show claspers for copulation.
- 9) Air-bladder is absent in these fishes.

The Class Elasmobranchi is divided into two sub-classes.

1. Sub-class Selachi :-

In these fishes the pectoral fin has cartilagenous rods. Fins are well developed. The caudal fin is hetetocercal. This subclass has four orders in which only two are living.

Order 1. Proto selachl

- 1) Jaws show many pointed teeth.
- 2) Nasal openings are paired.

3) Hyostylic or Axnphistylic jaw suspension.

It is represented by few living species.

Ex :Heteroloatas

Order 2. Euselachi

1) Skin contains placoid scales.

2) These fishes are exclusively marine.

3) 5 pairs of gill slits. They open separately. It is divided into two

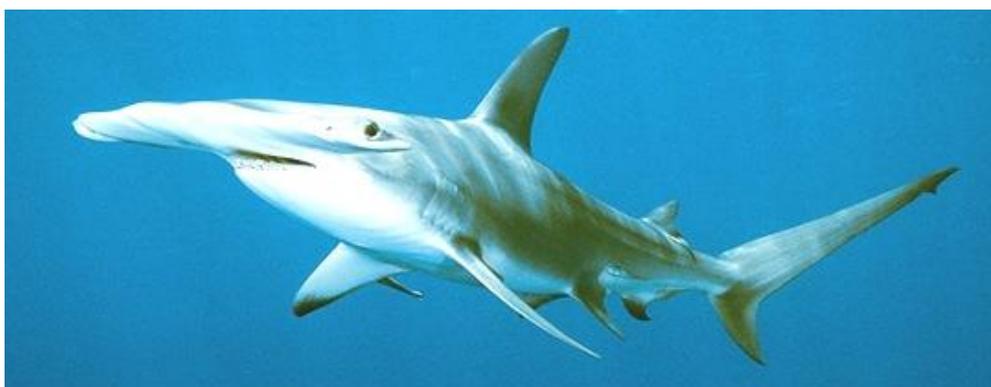
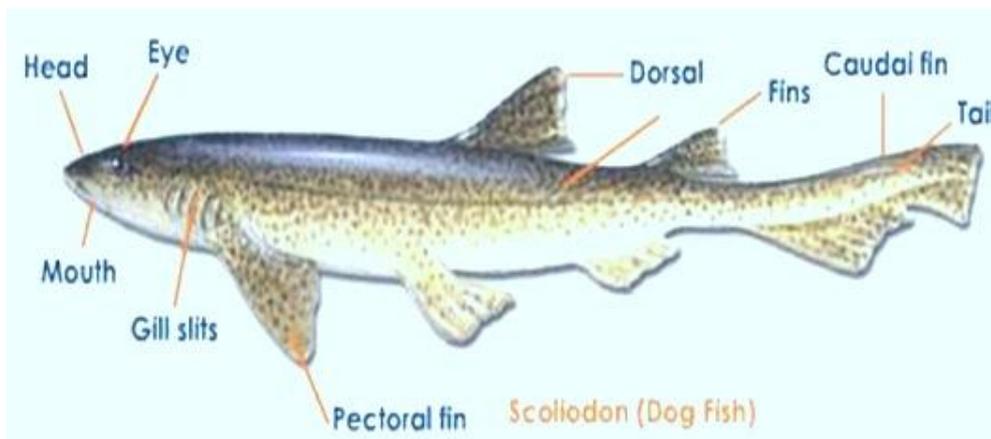
1. Sub-order . Pleurotremata:

1) Gill slits on the lateral sides of the body.

2) Pectoral fins are distinct.

3) It includes sharks and dog fishes.

Ex :- Scoliodon, Sphyrna (Hammer headed shark), Stegostoma (Tiger shark).

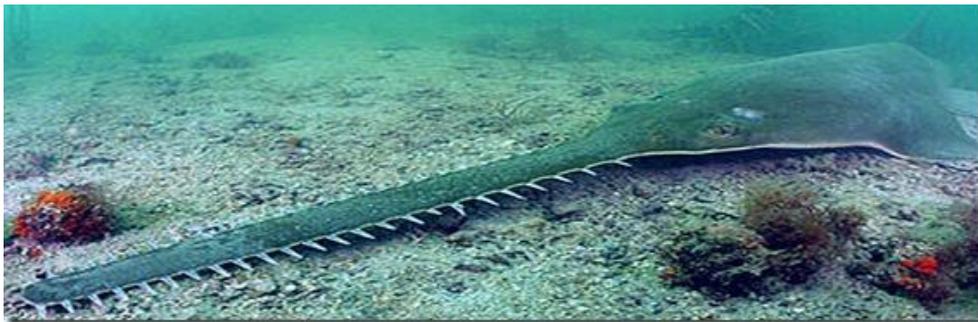




2. Sub-order Hypotermata:

- 1) It includes skates And Rays.
- 2) The body is flattened dorso-ventrally.
- 3) Pectoral fins are enormously expanded anteriorly and posteriorly and gill openings are ventral and five in number.
- 4) Dorsal fins, if present are seen on the tail.

Lx :- Pristis (Saw fish), Rhinobatus (Guitar fish), Torpedo (Electric ray), Raja (Skates), Trygon (sling rays), Myliobatis (Eagle rays)



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Sub-Class 2; Bradyodonti

It includes fossil and modern chimaeras.

1. Mouth is small and bounded by lips.
2. Holostylic jaw suspension is seen.
3. Gill opening are enclosed in boneless operculum.
4. Male possesses a frontal clasper on the head.

It is divided into 2 orders.

Order 1. Eubradodonti

‘It includes Helodus’.

order2. Holocephali

It includes chimaera. These are called devil fishes. Chimaera also called king of Herings. Chimara



Class 3. Osteichthyes a Telostomi

1. These fishes are marine, fresh water and brackish water niches.
2. Cycloid, ctenoid or ganoid scales will form the exoskeleton.
3. Endoskeleton bony.
4. Jaws suspension is autostylic
5. Operculum is present.
6. Claspers are absent
7. Usually air bladder is present

This class is divided into two sub-classes.

Sub-Class I. Crossopterygii,

Sub-Class II. Actinopterygii,

Sub-Class-I: Crossopterygii

In this sub-class bony fishes are included which show lobed and massive fins. The sub-class includes two orders,

Order - 1 Rhipidistia

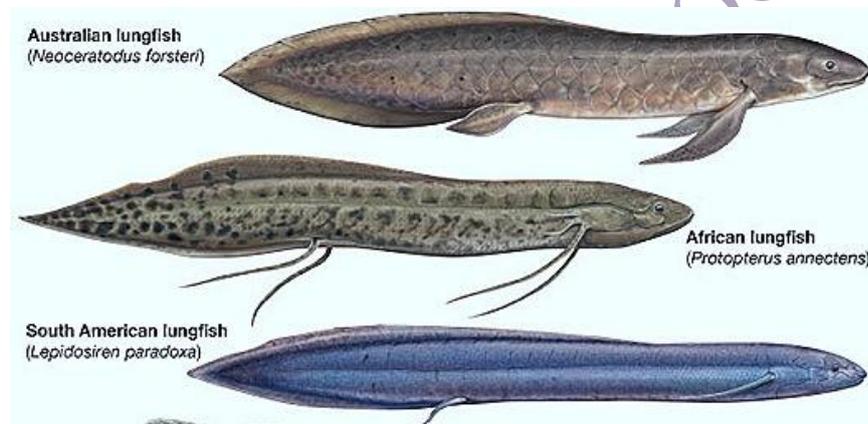
This order includes extinct fishes. But in 1938 one coelacanth fish was caught. This was identified as, Rhipidistian fish by Miss. Latimer. The fish is called Latimeria. It is the oldest living fossil.

Order -2. Dipnoi

This order includes living fishes. In the present day only 3 genera are living. They show discontinuous distribution.

Ex: 1. Neoceratodus (Australian lung fish),

- 2). Protopterus (African lung fish),
3. Lepidosiren (South American lung fish).



Sub-class II Actinopterygii

These fishes will live in fresh water or marine water. They not show internal nostrils. This subclass is divided into three super orders.

Super order I: Chondrostei

This super order includes 3 orders, only fishes of one order or surviving

Order polypterifonnes :- The fishes with ganoid scales Caudal fin is symmetrical. Dorsal fin has many peculiar fin-lets.

Ex:Polypterus.

Super order II: Holostel:

This include 2 orders.

Order 1. Amiiformes.

Caudal fin is heterocercal. Ex Antia (Bowin).

Order 2. Lepidoosteiformes:

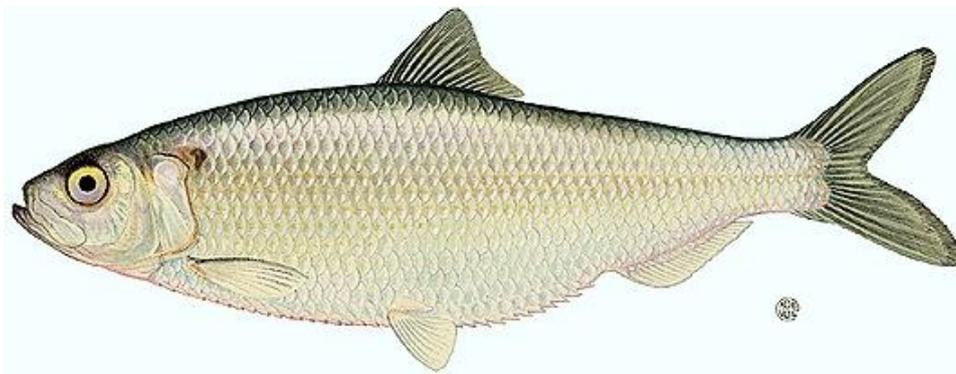
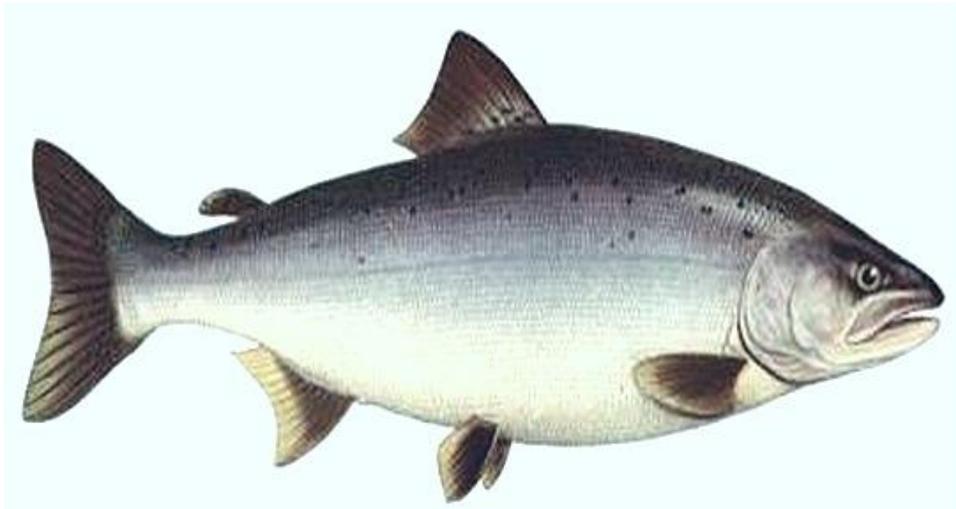
Nasal opening at the end of the much elongate snout. Caudal fin is abbreviate heterocercal.

Ex: Lepidosteus (Gar pike).

Super order III. Telosteti : This is a very important super order. It includes nearly 25,000 species. They are divided into many orders.

Order I. Clupeiformes : Caudal fin is homocercal.

Ex: 1. Hilsa (Herrings). 2. Salmon.



Order 2. Cypriniformes: Weberian ossicles connecting the ear with air bladder is present. Air-bladder is connected with duct to the alimentary canal

Ex : - Carps. (Labeo, Cinhina, Barbus).

Order 3. Anguilliformes. : Body eel like, air-bladder, If present connected with intestine by a duct.

Ex: Anguilla.

Order 4. Beloniformes :Physoclistic fishes in which fins are without spines.

Ex : Exocoetus, (flying fish)., Cypsilurus

Order-5. Syngnathiformes: Physoclistic fishes In which the first dorsal fin, If present, Is spinous.

Ex Hippocampus (Sea horse). Syngnathus (Pipe-fish)

Order 6: Syinbranehiformes: Eel like body, air-bladder is absent spines absent In fins.

Ex Asnphinuous.

Order 7. Psriformes: Physoclistic fishes fins usually with spines. Usually two dorsal fins.

Eg: Fierasfer, Anabas (Climbing perch).

Order 8. Pleuronectiformes. Both eyes are situated on one side skull is asymmetrical. Fins usually without spine. Adults without air bladder.

Ex :Cynogiossus

Order 9. Echeniformes The spinous dorsal fin is t into an adhesive disc placed on the head. Air bladder is absent.

Ex: Echenis (Sucker fish).

Order 10. Ophiocephaliformes: Physoclistic fishes in which are Without spine, scales are cycloid, air bladder is very long.

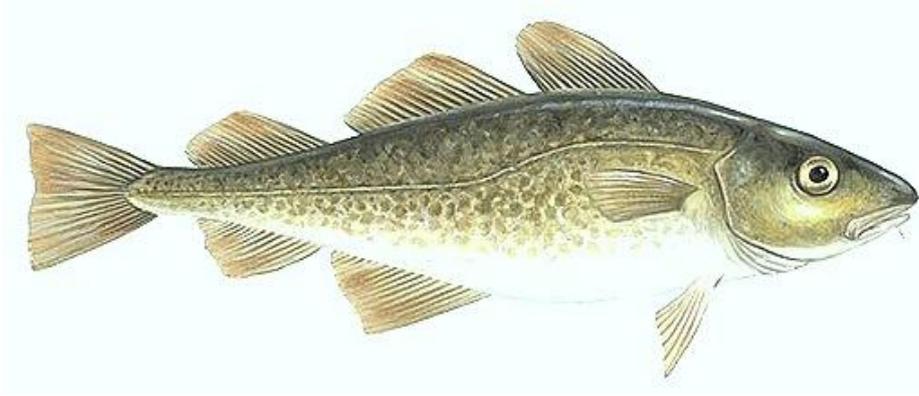
Ex Channa or opiocephalus.

Order 11. Tefradontiformes : Gill openings restricted air bladder is present or absent.

Ex: Tetradon, Diodon (Porcupine fish).

Order 12. Gadiformes Physoclistic fishes in which fins are without spines, scales cycloid. -

Ex Gadus (cod).



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