

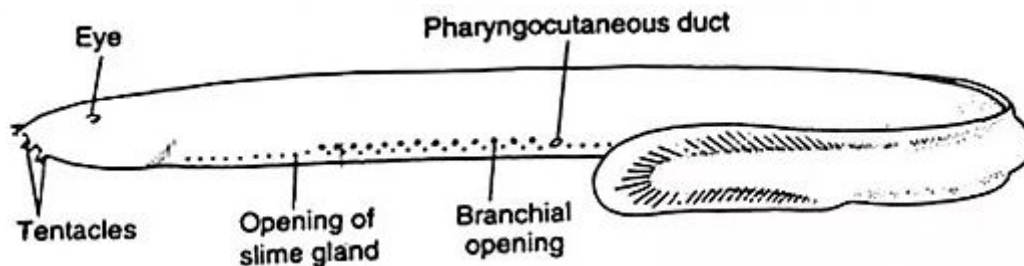
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B.Sc 1st yr Paper 2nd, Group A

General characteristics & classification of cyclostomes

General characteristics

- ✓ The Cyclostomes (Gr., cyklos = circular + stoma = mouth) are the living agnathans, they are primitive in many respects, but specialised in others.
- ✓ May be marine or fresh water in habitat.
- ✓ Body is elongated and Eel like. Body is divisible into trunk and tail. Trunk and tail muscles are segmented into myotemes separated by myocomata.
- ✓ Notochord is persistent throughout the life.
- ✓ Vertebrae are represented by imperfect neural arches (arcualia) present surrounding the notochord.
- ✓ In the adult state they are parasitic or scavengers on fishes.
- ✓ They have round bodies with laterally compressed or diphyccercal tail.
- ✓ They resemble eels superficially.
- ✓ The suctorial mouth is ventral and round (hence, Cyclostomata).
- ✓ Mouth is surrounded by tentacles.
- ✓ Digestive system lacks stomach.
- ✓ Oesophagus directly opens into intestine.
- ✓ Excretion takes place by 2 mesonephric kidneys.
- ✓ Heart is 2 chambered with 1 auricle and 1 ventricle.
- ✓ Conus arteriosus is found anteriorly.
- ✓ Hepatic portal system is well-developed.
- ✓ Blood contains R.B.C leucocytes and poikilotherms.
- ✓ Nervous system includes a brain and a dorsal nerve cord. 8-10 cranial nerves are present.
- ✓ A median nasal chamber is found with a single nostril.
- ✓ Auditory organ is with 1-2 semicircular rings.
- ✓ Reproduction is sexual.
- ✓ Fertilization is external.
- ✓ Development is direct or by prolonged larval stage.

- ✓ Buccal cavity has a muscular tongue bearing epidermal teeth by which they rasp the flesh of fishes.
- ✓ They are the only living vertebrates without jaws.
- ✓ They have 6-15 pairs of internal gills in different species.
- ✓ Gill-chambers are round pouches (hence, Marsipobranchii).
- ✓ The skin is soft and devoid of scales, paired appendages are absent, though median fins are present and supported by cartilaginous fin rays.
- ✓ Exoskeleton is lacking.
- ✓ Endoskeleton is cartilaginous with no bones and the vertebral column is primitive.
- ✓ There is a single median nostril, and only one or two semicircular canals are present in each auditory organ.
- ✓ Heart is enclosed in cartilage derived from the hinder visceral arch.
- ✓ They have no spleen.
- ✓ Cyclostomes include lampreys and hagfishes.
- ✓ Its two orders are not closely related, because they have evolved from different orders of ostracoderms.
- ✓ Mouth without jaws, so grouped under Agatha.



Fig; Structure of cyclostomes

classification of cyclostomes

About 50 species of cyclostomes are recognised.

Kingdom: Animalia

Phylum: Chordata.

Subphylum: Vertebrata.

Superclass: **Cyclostomata** Duméril, 1806.

Classes. Myxini (hagfishes);

Hyperoartia (lampreys and kin).

They belong to two major divisions (Petromyzontiformes and Myxiniformes).

They are termed variously as subclasses, orders or families. Because they possess a round jawless mouth, they are combined in the class Cyclostomata.

The similarity of these two groups is probably the result of convergent evolution. However, they show important and basic morphological differences which can be attributed to their long phylogenetic separation and different habits and habitats.

Order 1: Petromyzontiformes (Gr., petros = stone; myzon = suck):

Members of this order are called lampreys or lamper eels or lamperns or sand pride, etc.

1. Mouth ventral, suctorial with rasping tongue beset with many horny teeth.
2. Nostril dorsal. Nasohypophyseal sac terminates posteriorly in a blind sac, i.e., it does not communicate with the pharynx.
3. 7 pairs of gill-pouches and gill-slits which open into a separate respiratory pharynx below the oesophagus.
4. Dorsal fin well developed.
5. Branchial basket complete.
6. Dorsal and ventral roots of spinal nerves remain separate.
7. Ear with 2 semicircular canals.
8. Eggs numerous, small. Development indirect with a long larval stage and metamorphosis.
9. Both marine and freshwater forms.

Examples:

Lampreys. Over 30 species. *Petromyzon*, *Lampetra*, *Ichthyomyzon*.

Order 2: Myxiniiformes (Gr., myxa = slime; oidea = type of):

Representatives of order are called hagfishes. They are exclusively marine.

1. Mouth terminal and surrounded by 8 small tentacles. Teeth few. No buccal funnel.
2. Nostril terminal. Nasohypophyseal sac opens posteriorly in the pharynx.
3. Gill-pouches and gill-slits 6 to 14 pairs.
4. Dorsal fin feeble or absent.
5. Branchial basket poorly developed.
6. Dorsal and ventral roots of spinal nerves united.
7. Ear with only 1 semicircular canal.
8. Eggs few, large. Development dark.
9. Hagfishes are all marine species.

Examples:

Hagfishes. About 15 species *Myxine*, *Eptatretus* (= *Bdellostoma*), *Paramyxine*.

Representative Types of Cyclostomata:

1. *Myxine*:

Members belonging to the order Myxiniiformes are commonly known as hagfishes. They are exclusively marine. *Myxine* (Fig. 12.1) is found buried in the sea bottom. *Myxine* has a wide distribution along sea coasts of both Atlantic and Pacific Oceans, occurring in the waters of Northern Europe, North Atlantic, America, Chili, Africa and Japan, etc. Body is eel-like, measuring about 2 feet (50-60 cm) in length and differentiated into head, trunk and tail.

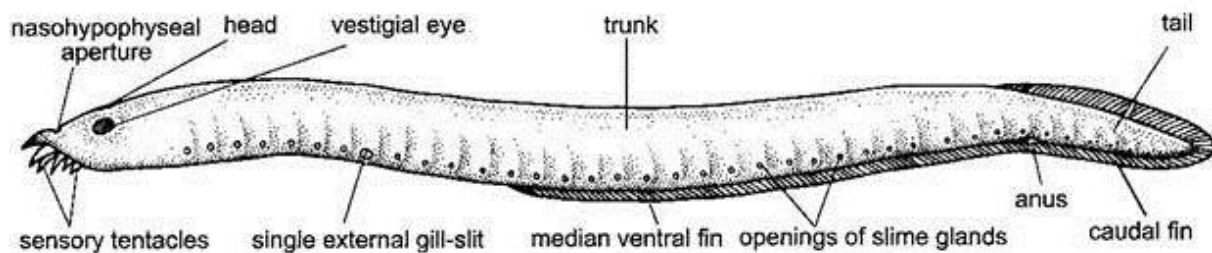


Fig. Myxine.

The surface of the body is soft and smooth without scales. The mouth is terminal and surrounded by soft lips. Buccal funnel and jaws are absent. Branchial basket is also reduced. Lateral to the mouth are four pairs of short tentacles supported by skeletal rods. Nostril is single, lies very close to the mouth and opens terminally. Single pineal eye is visible on the top of the head. Paired eyes are vestigial or degenerated due to bottom dwelling habit.

Six pairs of gills which do not open separately to the outside but open by a single pair of external gill openings. Single median ventral fin runs from about the middle of the ventral surface extending around the tail region. Large mucus glands are present opening by mucous pores along both the sides of the body and secrete mucus.

Hermaphroditic with single ovotestis, anterior part being ovary and posterior testis. These animals are parasitic or quasi-parasitic because they are sometimes found within the bodies of their prey, which are fishes of various types. Nocturnal feeders. During the day time they live buried in the sea bottom mud at depths of over 2,000 feet. Hagfishes do not migrate to freshwater to spawn. Development is direct.

2. *Eptatretus* (= *Bdellostoma*):

Bdellostoma (Fig. 12.2) is also commonly known as hagfish. It is found buried in the bottom mud of sea. It occurs off the Pacific coasts of both North and South America, South Africa and New Zealand. The long eel-like body has a soft smooth integument without scales. It is about one metre in length. The mouth is terminal surrounded by soft lips. Buccal funnel and jaws are absent. Four pairs of short tentacles supported by skeletal rods are present on the lateral sides of the mouth.

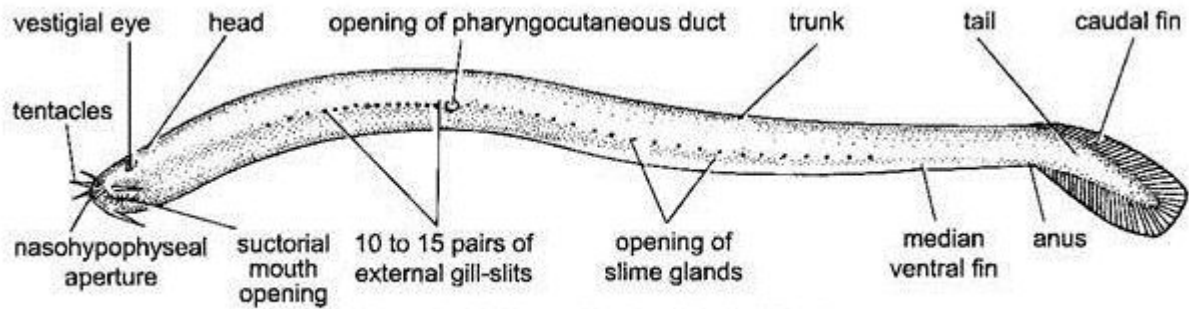


Fig. *Eptatretus* (= *Bdellostoma*).

The single nostril lies very close to the mouth and opens terminally. Single pineal eye is present on the top of the head. Paired eyes are vestigial or degenerated due to the bottom dwelling habit. The gill-openings are 6-14 in number which all open independently to the exterior by round pores. The opening of pharyngocutaneous duct lies behind the last gill-slit of left side.

It opens into the pharynx. The median fin is confined to the caudal region. Large slime or mucous glands are present opening by mucous pores on both sides of the body. Hermaphroditic. Single ovotestis, the anterior part being ovary and the posterior testis. It is parasitic or quasi-parasitic. Nocturnal feeders. During the day time they live buried in the sea bottom mud.