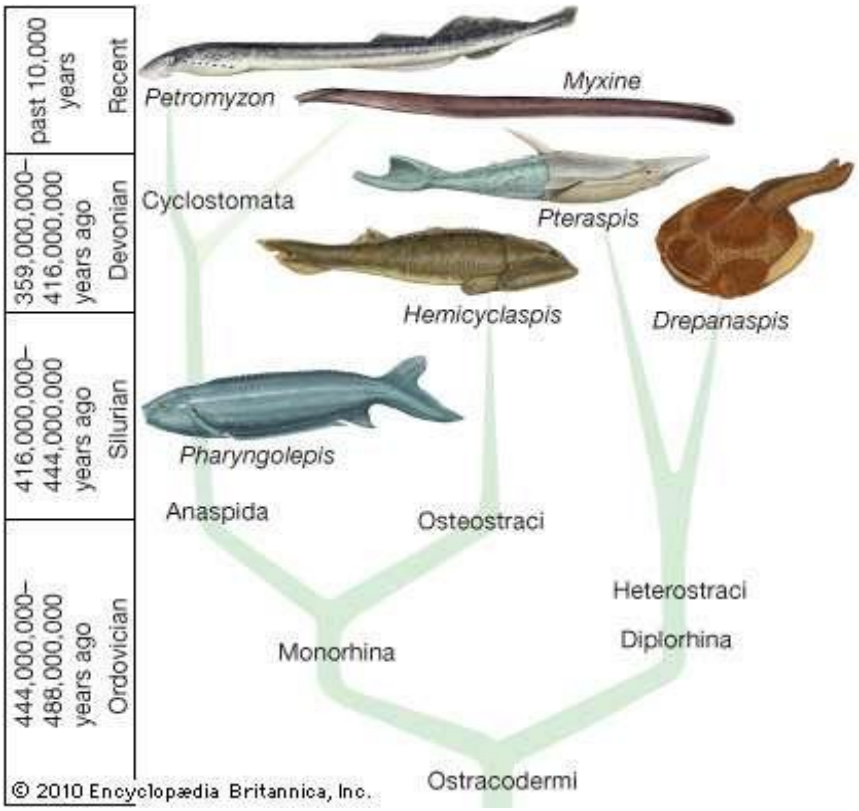
M.Sc. II Sem. (Zoology)

Ostracoderms- General Organization and affinities

- Ostracoderms encountered first as fragmented fossils.
- Occurs in the rocks of late Cambrian and middle Ordovician periods.
- Quite abundant during the upper Silurian and Devonian periods.
- Fossils were preserved in the bottom sediments of freshwater streams



Characteristics:

(1) Ostracoderms were the first vertebrates.

(2) They were popularly called armoured fishes.

(3)They were jawless vertebrates.

(4) They lived in freshwater.

(5) They were bottom dwellers.

(6) Their body was fish-like and did not exceed 30 cm in size.

(7) Paired fins were absent.

(8) Median and caudal fins were present.

(9) The caudal fin was of heterocercal type.

(10) The head and thorax were covered by heavy armour of bones. It protected ostracoderms from the giant scorpion like arthropods, eurypterids.

(11) Bony skull was well developed.

(12) Mouth was mostly present on the ventral side.

(13) They were having large number of gill slits.

(14) The nervous system had 10 pairs of cranial nerves.

(15) The head had a pair of lateral eyes, and a median pineal eye.

(16) They were filter feeders, feeding like a vacuum cleaner.

(17) The endoskeleton was either bony or cartilaginous.

Class ostracodermi (extinct Agnathans) is divided into following four orders:

- 1. Euphanerida. Example – Jamoytius.
- 2. Pteraspidomorphi. Example – Pteraspis, Thelodus, Lanarkia and Coelolepsis.
- 3. Cephalaspidomorphi. Example – Cephalaspis, Hemicyclaspis, Ateleaspis.
- 4. Anaspida. Example – Birkenia, Pterolepis and Rhyncholepis.

<u>General organization</u>

- Small to medium sized.
- Body form was fishlike, flattened dorso-ventrally.
- Huge head and gill region.

- Tapering but muscular trunk .
- Jaws and pectoral fins are absent, median fin present
- Very bony and heavily armoured
- The head was encased in a solid shield made up of broad bony dermal plates
- Separate pharyngeal gill pouches along the side of the head, which were permanently open with no protective operculum.
- Body is surrounded by a series of smaller plates- Dermal scales
- Large lateral eyes and median pineal eye on the top of the head is present
- Single median nostril was located anterior to pineal eye

Ostracoderms internal anatomy

- No axial endoskeleton or vertebrae
- Mouth was anteroventral, small and without jaws or teeth
- Sensory fields on head was part of lateral line system
- Internal ear with two semicircular canals were present

Affinities of ostracoderm

- **According to Lankester, pteraspids were related to cephalaspids**
  - both are jawless
  - Have a large cephalic shields
  - Occurs in same beds.
  - As per Prof. Eric Stensio (1927) pteraspids gave rise to myxinoids and the cephalaspids to lampreys.
  - White, suggested that, the earliest vertebrates had straight or diphycercal tails. From these evolved pteraspids with hypocercal tails, as well as cephalaspids with heterocercal tails.
  - The modern cyclosotomes have been probably evolved from the cephalaspids

The ostracoderms have close affinities with modern cyclostomes:-

- Absence of biting jaws
- Single nasal opening
- Pineal eye
- Structure of brain and cranial nerves
- Similar auditory capsules
- Unpaired olfactory organs
- Pouch like branchial sacs
- Stensio (1927) believes that cyclostomes have descended from ostracoderms by the evolution of sucking type mouth, loss of bony exoskeleton and paired limbs and development of cartilage