Invertebrate Palaeontology

By

Dr. Purnima Srivastava

(For Students of M.Sc Sem II Elective Geology)

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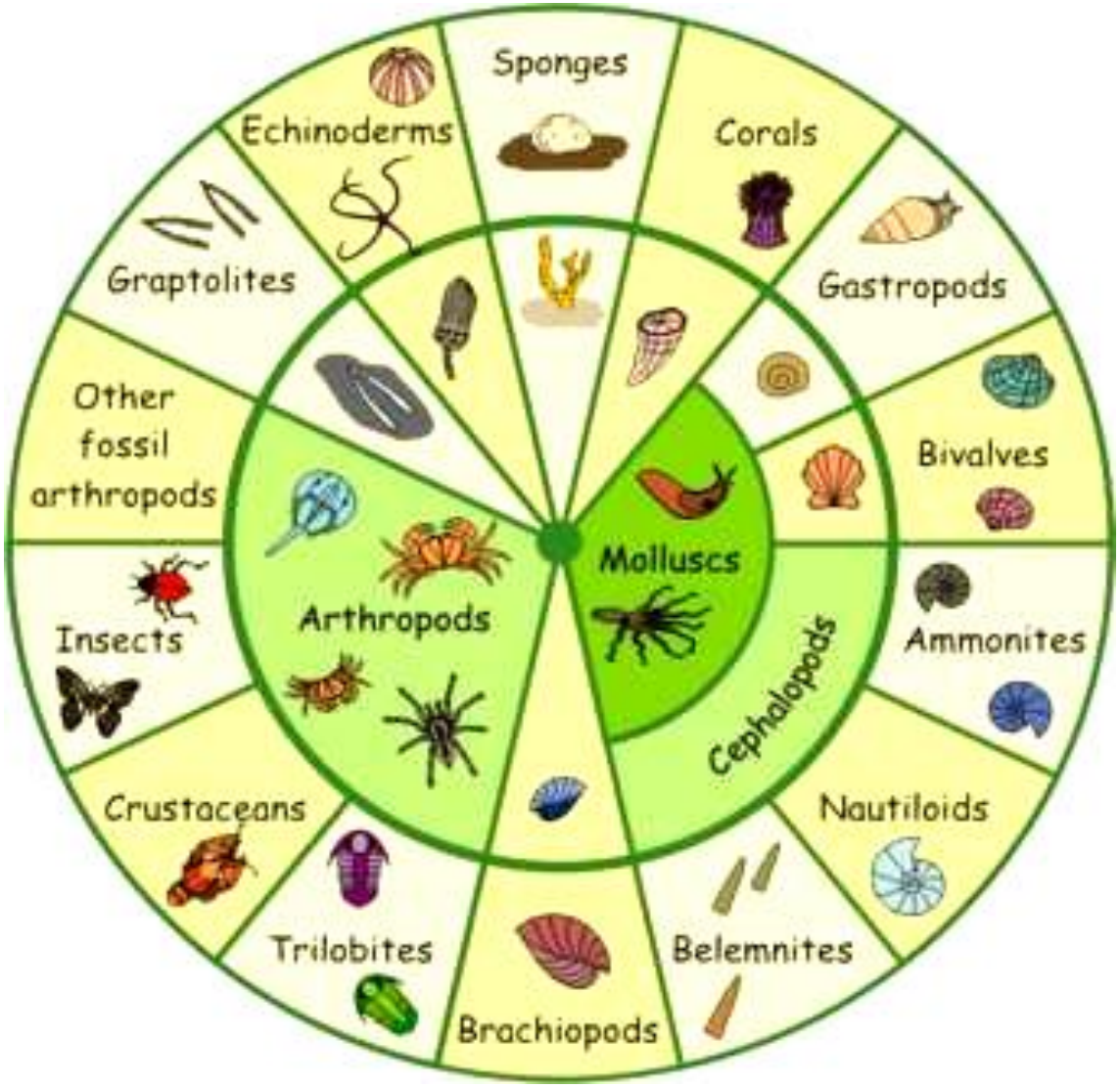
Paleontology is the study of ancient animal life and how it developed. It is divided into two subdisciplines, invertebrate paleontology and vertebrate paleontology. Paleontologists use two lines of evidence to learn about ancient animals. One is to examine animals that live today, and the other is to study fossils. The study of modern animals and comparing different organisms to see how they are related evolutionarily (cladistics). The fossils that paleontologists study may be the actual remains of the organisms, or simply traces the animals have left (tracks or burrows left in fine sediments). Paleontology lies at the boundary of the life sciences and the earth sciences. It is thus useful for dating sediments, reconstructing ancient environments, and testing models of plate tectonics, as well as understanding how modern animals are related to one another.

Invertebrate Palaeontology:

An invertebrate is essentially a multicellular animal that lacks a spinal column encased in vertebrae and a distinct skull. There are about 30 phyla, or groups, of invertebrates, and roughly 20 of these have been preserved as fossils. Still other phyla probably existed, but are not represented in the fossil record because the animals' soft bodies were not preserved. Only one invertebrate phylum is known to have become extinct—the Archaeocyathida. These organisms, which were superficially similar to sponges, did not survive past the Middle Cambrian period (530 million years ago).

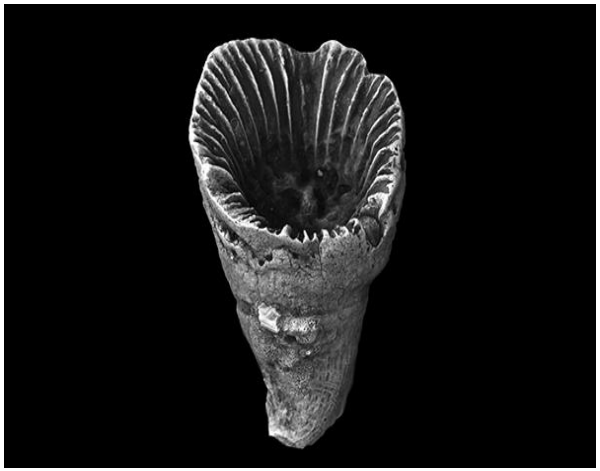


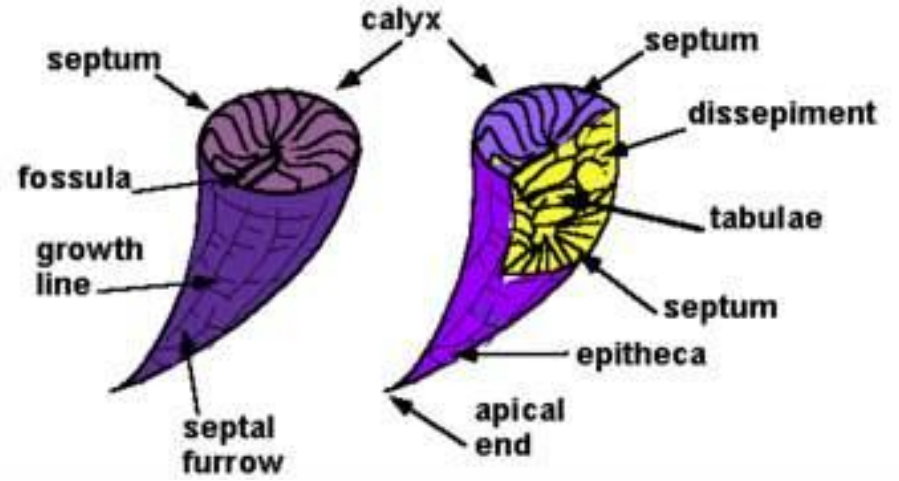
Different phyla of Invertebrate Palaeontology

Phylum- Porifera (Sponges)

These are multicellular organisms which are poorly organised into tissues. Water is drawn into the body through many small pores on the surface of sponge and ejected through exits (oscula). They are benthic, shallow marine organisms but few live in deep marine waters also. Fresh water forms also exists. They have medicinal value

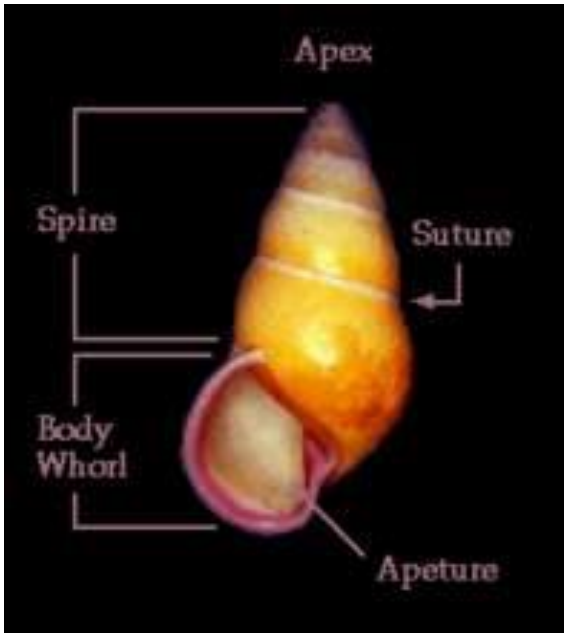
Phylum- Coelenterata
Class- Anthozoa (Corals)





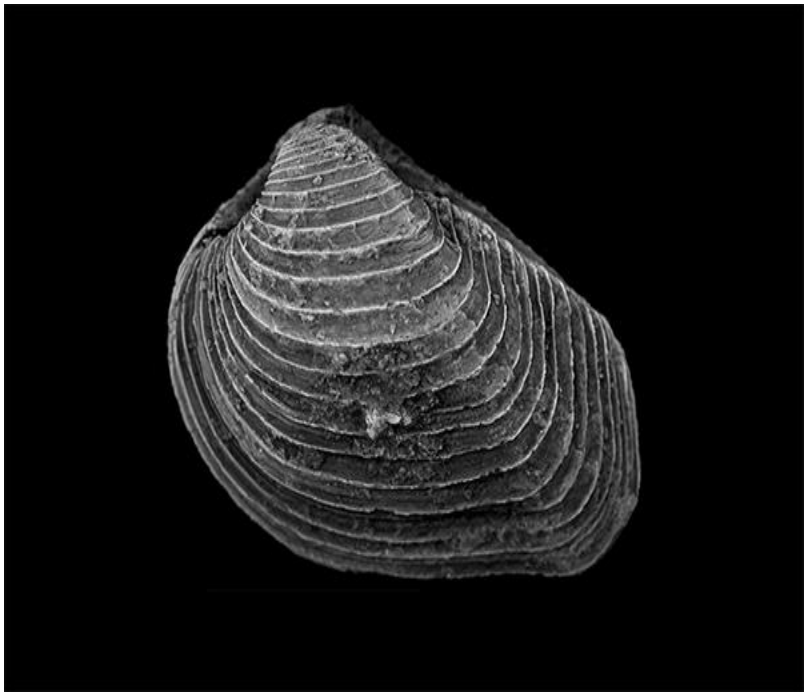
These are generally benthic organisms, with central cavity radially partitioned by fleshy mesenteries. The mouth is surrounded by retractable tentacles. The are exclusively marine organisms Examples are: Calceola, Zaphrentis etc. They form Reefs and some varieties are semi precious, they also have ornamental and medicinal value.

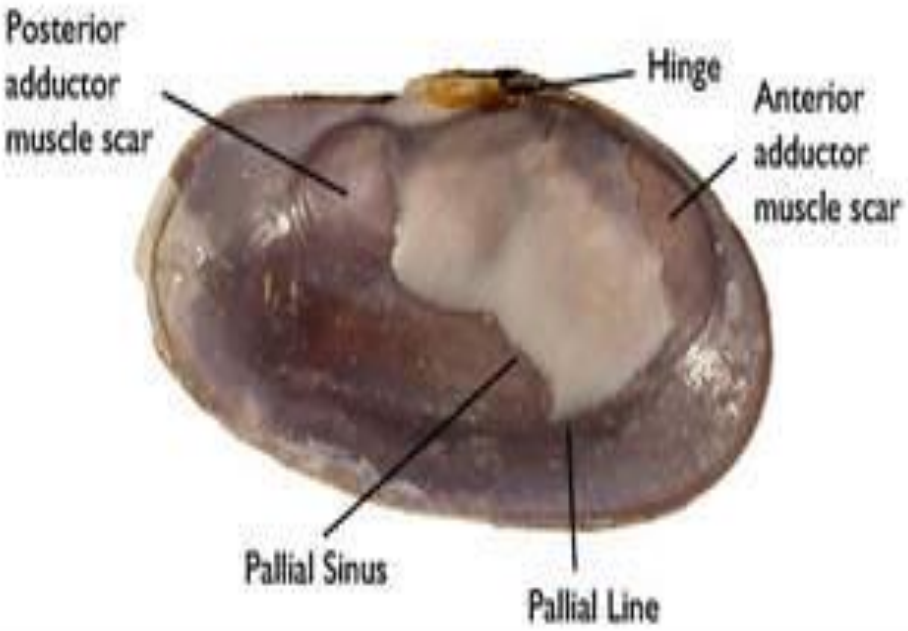
Phylum- **Mollusca**
Class-Gastropoda



These are molluscs with a single valve and no internal septa. Most gastropods crawl on their feet, but in some the foot is adapted for swimming. They may be marine, fresh water, terrestrial organisms.Examples are: Strombus, Physa, Murex etc.

Phylum- Mollusca
Class- Bivalvia



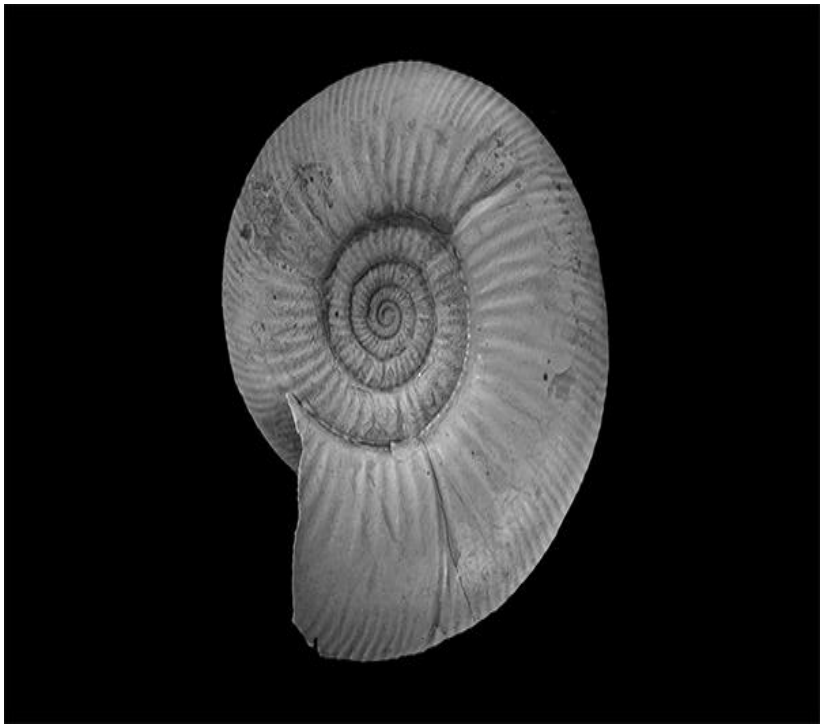


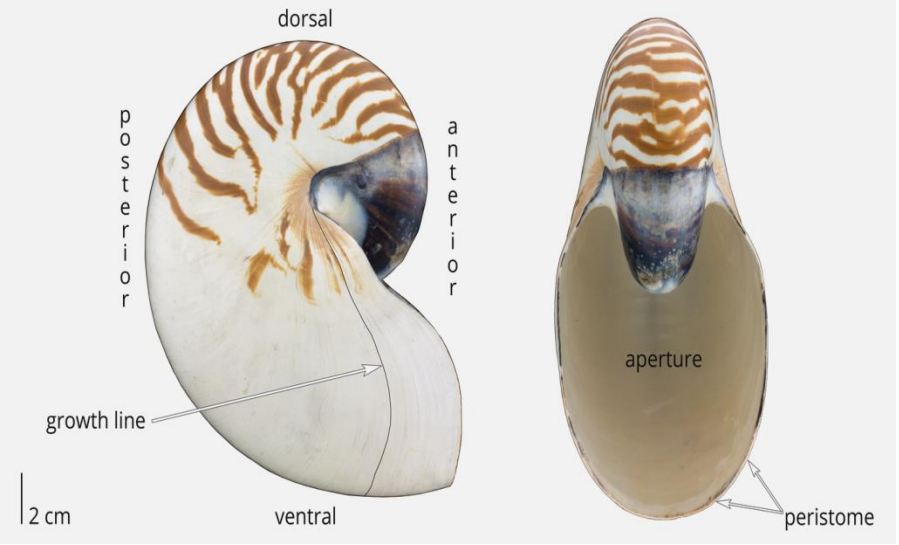
- A **bivalve shell** is part of the body, the exoskeleton or shell, of a bivalve mollusk. In life, the shell of this class of mollusks is composed of two hinged parts or *valves*. Bivalves are very common in essentially all aquatic locales, including saltwater, brackish water, and freshwater.

Phylum- Mollusca
Class- Bivalvia

- **The shells of bivalves commonly wash up on beaches (often as separate valves) and along the edges of lakes, rivers, and streams. Bivalves by definition possess two shells or *valves*, a "right valve" and a "left valve", that are joined by a ligament. The two valves usually articulate with one another using structures known as "teeth" which are situated along the hinge line. In many bivalve shells, the two valves are symmetrical along the hinge line—when truly symmetrical, such an animal is said to be *equivalved*; if the valves vary from each other in size or shape, *inequivalved*. If symmetrical front-to-back, the valves are said to be *equilateral*, and are otherwise considered *inequilateral*.**

Phylum- **Mollusca**
Class- Cephalopoda



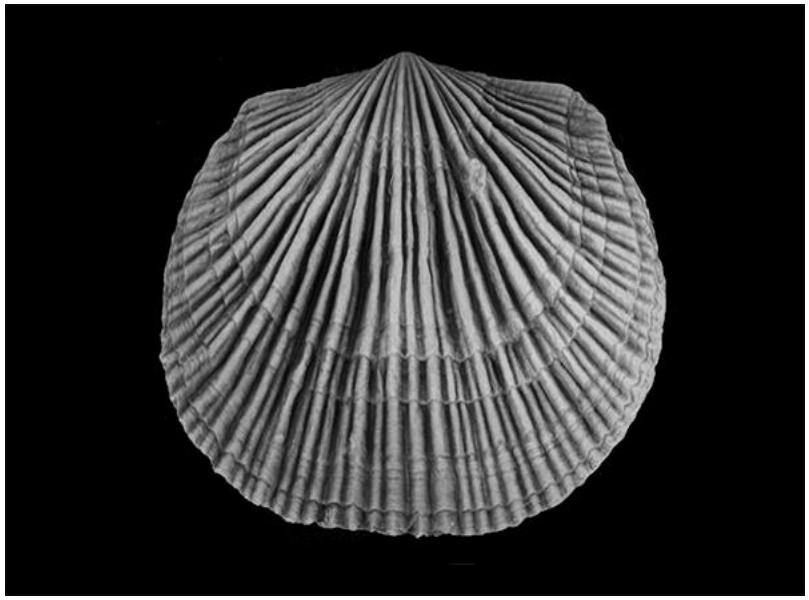


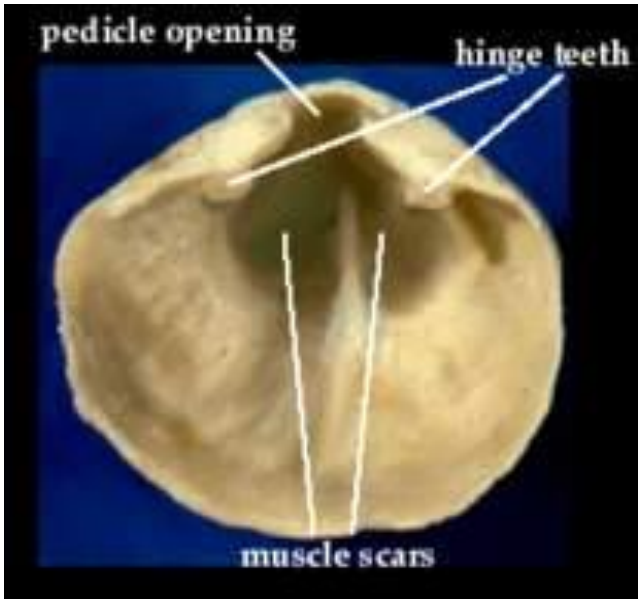
Phylum- **Mollusca**
Class- Cephalopoda

- **A cephalopod is a member of the molluscan class Cephalopoda, which means "head-feet"[such as a squid, octopus, or nautilus. These exclusively marine animals are characterized by bilateral body symmetry, a prominent head, and a set of arms or tentacles (muscular hydrostats) modified from the primitive molluscan foot. Fishermen sometimes call cephalopods "inkfish," referring to their common ability to squirt ink. The study of cephalopods is a branch of malacology known as teuthology.**

- **Cephalopods became dominant during the Ordovician period, represented by primitive nautiloids, octopuses, squid, and cuttlefish.Two important extinct taxa are the Ammonoidea (ammonites) and Belemnoidea (belemnites).**

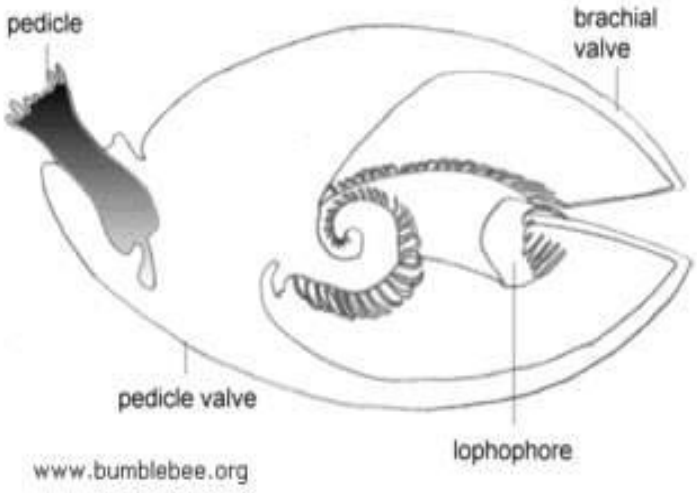
Phylum - Brachiopoda





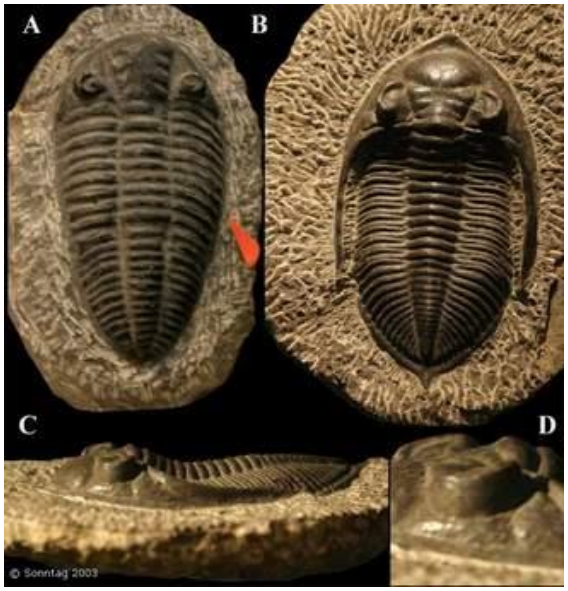
- **Brachiopods are marine animals that, upon first glance, look like clams. They are actually quite different from clams in their anatomy, and they are not closely related to the molluscs. They are lophophorates, and so are related to the Bryozoa and Phoronida. Although they seem rare in today's seas, they are actually fairly common. However, they often make their homes in very cold water, either in polar regions or at great depths in the ocean, and thus are not often encountered. There are about 300 living species of brachiopods.**

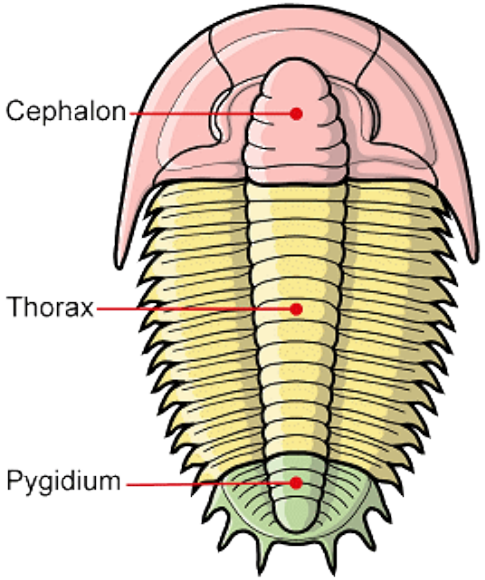
Phylum - Brachiopoda

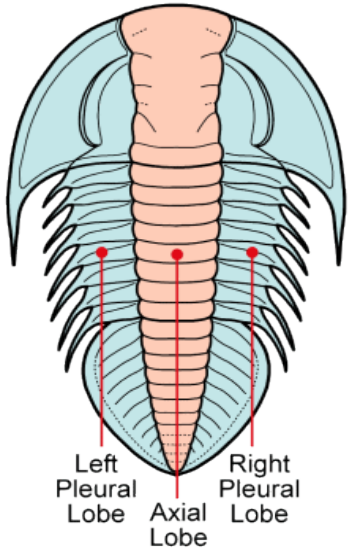


- **They diversified into a number of different morphologies and even participated in the build-up of ancient reefs. At the end of the Paleozoic, some 250 million years ago, they were decimated in the worst mass extinction of all time, the Permo-Triassic event. Their numbers have never been as great since that time.**

Phylum- Trilobita





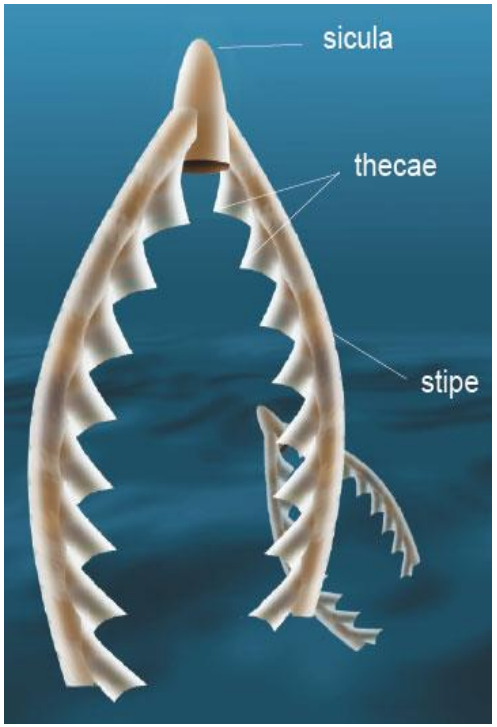


Phylum- Trilobita

- **Trilobites are remarkable, hard-shelled, segmented creatures that existed over 520 million years ago in the Earth's ancient seas. They went extinct before dinosaurs even came into existence, and are one of the key signature creatures of the Paleozoic Era, the first era to exhibit a proliferation of the complex life-forms that established the foundation of life as it is today.**

- **Whatever their size, all trilobite fossils have a similar body plan, being made up of three main body parts: a cephalon (head), a segmented thorax, and a pygidium (tail piece) as shown at left. However, the name "trilobite," which means "three lobed," is not in reference to those three body parts mentioned above, but to the fact that all trilobites bear a long central axial lobe, flanked on each side by right and left pleural lobes (pleura = side, rib). These three lobes that run from the cephalon to the pygidium are what give trilobites their name, and are common to all trilobites despite their great diversity of size and form.**

Phylum- Graptolithina



Phylum- Graptolithina

- **Fossil graptolites are thin, often shiny, markings on rock surfaces that look like pencil marks, and their name comes from the Greek for 'writing in the rocks'. Graptolites are the remains of intricate colonies, some of which accommodated up to 5000 individual animals; these individuals lived in a skeleton of collagen, similar to the material from which our finger nails are made. We focus on the two main groups of graptolites: the cone-like, largely bottom-living dendroids, and the planktonic graptoloids. They lived between the Cambrian and Carboniferous periods, about 520 to 350 million years ago. Graptolites are excellent geological time-keepers, for they can be used to date the rocks in which they are found.**

Phylum -Echinodermata

Phylum -Echinodermata

- **Echinodermata [Gr.,=spiny skin], phylum of exclusively marine bottom-dwelling invertebrates having external skeletons of calcareous plates just beneath the skin. The plates may be solidly fused together, as in sea urchins, loosely articulated to facilitate movement, as in sea stars (starfish), or reduced to minute spicules in the skin, as in sea cucumbers.**
- **The skin usually has warty projections or spines, or both. Echinoderms display pentamerous radial symmetry, that is, the body can be divided into five more or less similar portions around a central axis. Unlike other radially symmetrical animals, they develop from a bilaterally symmetrical larva and retain some degree of bilateral symmetry as adults.**
- **There is no head; the surface containing the mouth (the underside, in sea stars and most others) is called the oral surface, and the opposite side, which usually bears the anus, the aboral surface. There are five living classes of echinoderms.**

- **These are significant and common phylums of Invertebrate Palaeontology .All these phylum bear biostratigraphic, palaeogeographic and evolutionary palaeobiological significance.**