

**\* STATE COMPETITION ONLY**

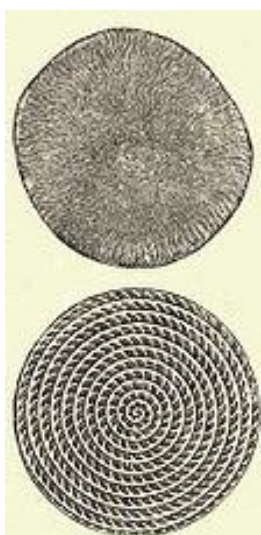
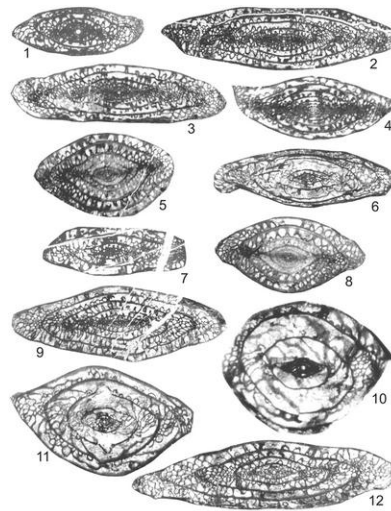
Kingdom – Protozoa or Protista  
Phylum – Foraminifera (Forams) \*  
Order Fusulinida (Fusulinids)  
Order Rotaliida

Note: Forams have been included in both the Protozoa kingdom or the Protista kingdom and you will find variation in the books.

**Genus *Nummulites***

Forams are small (usually less than 1 mm) shelled aquatic species. There are over 10,000 known species. Most are benthic and marine, but pelagic and fresh-water species do exist. The larger forams are excellent index fossils for both age and environment for much of geologic time as their form and structure continuously evolved. They are used in oil industry research in understanding geologic environment of drilled strata.

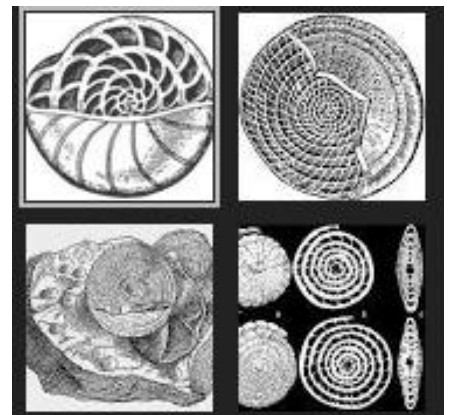
Fusulinida is an extinct order of Foraminifera that lived from the Silurian until the Permian Periods of the Paleozoic Era. They tests (shells) were composed of tightly packed microgranular calcite.



**Top view**

**Horizontally bisected**

Genus *Nummulites* - A genus of relatively large (0.5-2 inches) modern recent forams found in Eocene to Miocene rocks. The pyramids in Egypt are constructed of fossiliferous limestone full of *Nummulites*



**1 inch**

Kingdom – ANIMALIA  
Phylum – Porifera (Sponges)

Genus *Astraeospongia*  
Genus *Hydnoceras* \* (state only)

Sponges are the simplest of animals, lacking tissues or organs. However, sponge cells are integrated and organized for filter feeding, waste disposal, reproduction, and secreting a calcite base that fixes the anchors the animal to substrate. The skeletal structure is often comprised of silica and forms protective **spicules**. Sponges get their name from the fact that their unicellular food is not taken into a single mouth. It is filtered out of water that passes through many pores, connected by canals, in their bodies. The food is digested by cells that line the pores and canals. The undigested food and water are expelled through the **osculum**, a large opening at the top of the animal.

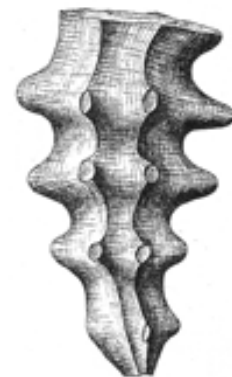
### Genus *Astraeospongia*

- *calcareous sponge*
- Important Silurian and Devonian index fossil

### Genus *Hydnoceras* \*

- *also known as glass sponges*
- Characterized by aligned nodes
- Late Devonian to Carboniferous

spicules



*Hydnoceras*

## Phylum – Bryozoa

### Genus *Archimedes*

### Genus *Rhombopora*



Bryozoans first appeared in the Early Ordovician Period. The structure you see in a Bryozoa fossil is the support structure composed of calcium carbonate. Individual mm size organisms live in each living chamber (called **zoecium**). They are sessile, benthic filter feeders. They live in shallow waters and prefer clear water as murky water clog the zoecium.

### Genus *Archimedes*

- Late Paleozoic Era only (Mississippian through Permian)
- Named for characteristic screw shape of the supportive fossilized test



Several *Archimedes* fossils, note crinoid head (calyz) in lower left

### Genus *Rhombopora*

- Late Paleozoic Era only (Mississippian through Permian)
- Branching bryozoa



Note the individual zoecium

Phylum – Hemichordata \*

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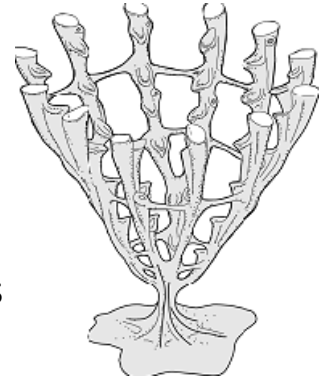
(Graptolites)

Order Dendroidea (benthic graptolites)

Order Graptoloidea (planktonic graptolites)

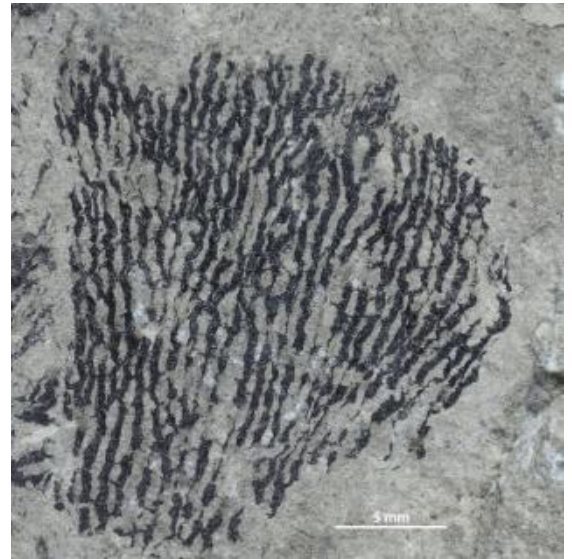
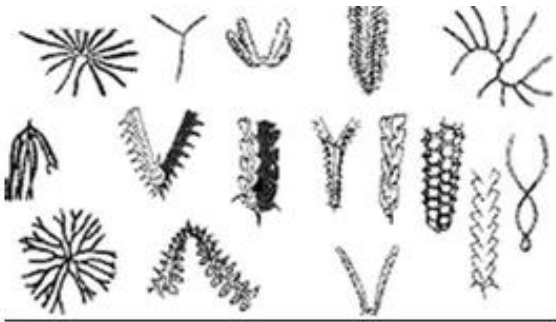
Graptolite – translates are writing on rock (Greek)

Variation through Paleozoic makes them good index fossils



### Order Dendroidea

- Middle Cambrian to Mississippian
- Most were branching and attached to sea bed
- Often preserved by carbonization, almost appear to be pencil drawings on rocks



### Order Graptoloidea

- Lower Ordovician until Lower Devonian
- Planktonic, means of locomotion are conjectural
- Filtered food from seawater with lopophores

