THE f WORD

An Introduction to Fossils

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The F Word

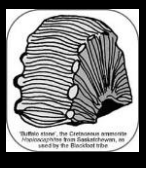
What are fossils?
What is a palaeontologist?
Why are fossils important?



What are fossils?

- Ammonites
  - Snakestones (England)
  - Horns of Ammon (Greece)
  - Buffalo stones (N. America)
  - Chakras of Vishnu (India)
  - Crampstones (Scotland)






What fossils really are

- Petrified remains of ancient organisms
- Most life is dead
- Most things don't get fossilized
  - Best to live in the sea
  - Best to have a hard shell

Why bother?

- 1. Earth history
- 2. Correlation of strata
- 3. Palaeo-ecology
- 4. Palaeo-geography
- 5. Just because!

Fossilization

Taphonomy – of grave importance

Taphonomic processes

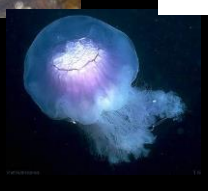
Transport

Decay

Dissolution

Fragmentation

What gets fossilized?



The taphonomic filter

But also Lagerstätten

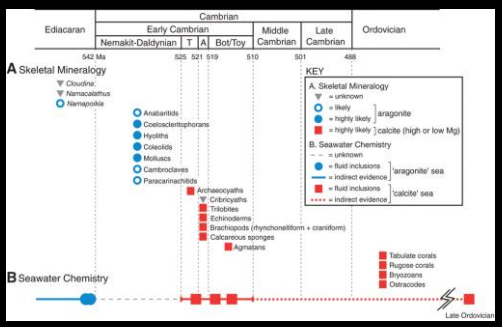
Common bio-minerals

Calcium carbonate
(calcite/aragonite)

Silicon dioxide (silica)

Calcium phosphate
(apatite)

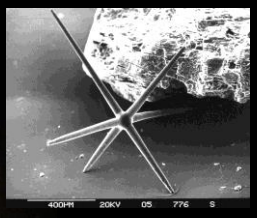
Calcium carbonate



Apatite

(Calcium phosphate)
Bones and teeth

Silica
(Silicon dioxide)

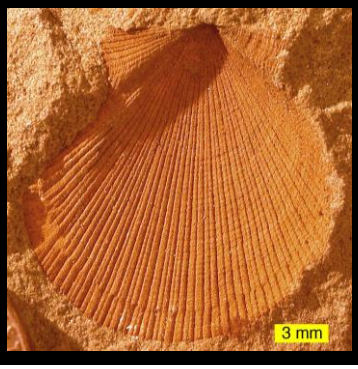


Siliceous sponges

Diatoms

Fossilization – Moulds & Casts

External mould



Recrystallization

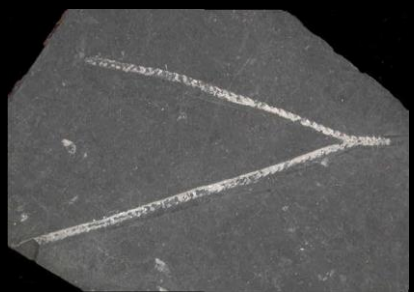
Same chemistry
Different structure

Replacement

New minerals

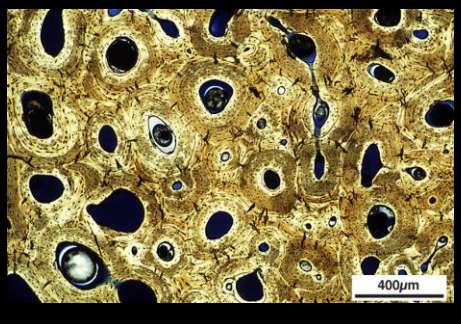
Carbonization

Loss of volatiles in low-oxygen environment



Permineralization

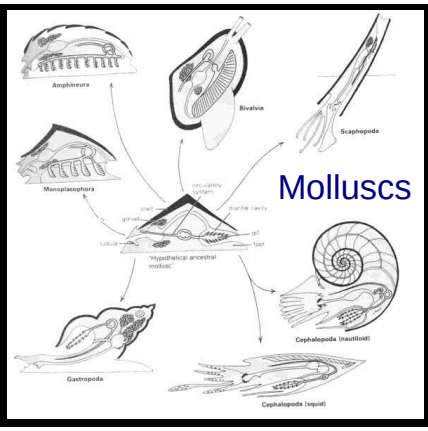
Impregnation of pores



Common Fossil Groups

Taxonomy

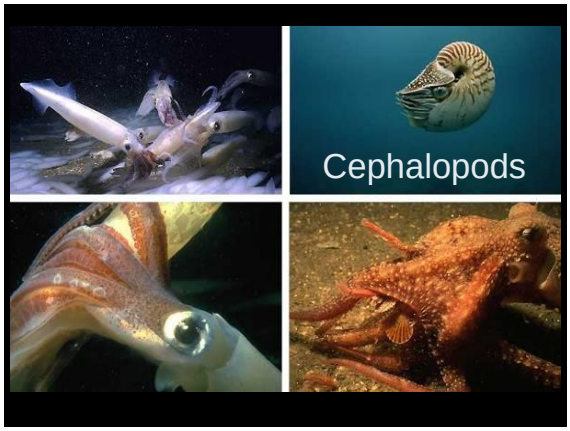
- Carl von Linne (1707-1778)
- Classification by shared morphology
- Binomial system



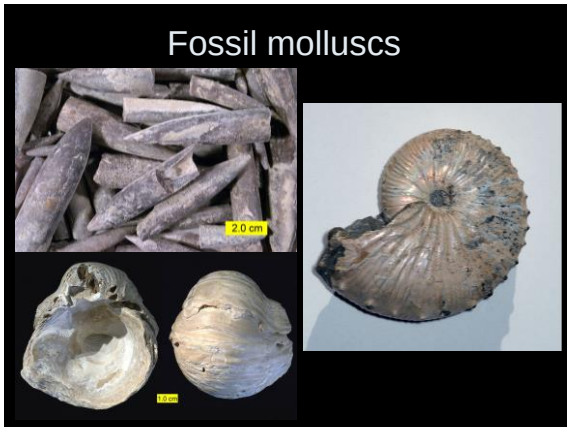
Molluscs

Bivalves

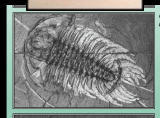
Gastropods


Cephalopods


Other classes


Fossil molluscs
2.0 cm

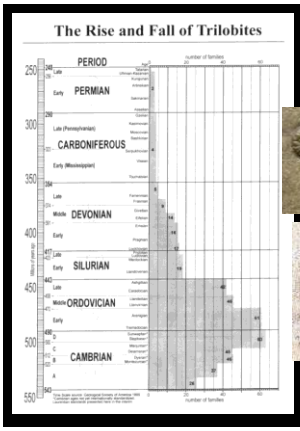
Fossil arthropods



Olenoides: a trilobite

Aysheaia: a velvet worm

Class Trilobita



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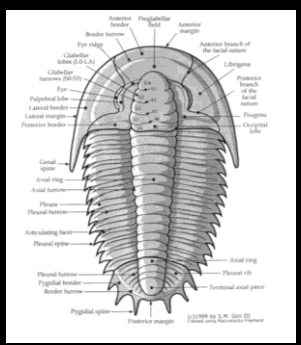
Key features



- Axial /pleural lobes
- Cephalon, thorax, pygidium
- Cephalon most useful
- Eyes, glabella, fixed/free cheeks

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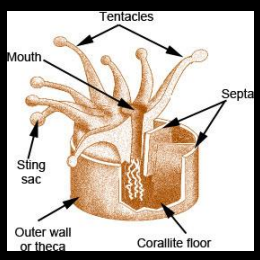
Phylum Cnidaria

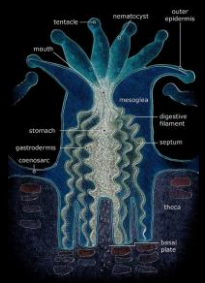
Anthozoa, Cubozoa, Hydrozoa, Scyphozoa

Stony corals

Class Anthozoa:
Subclass Zoantharia

Coral anatomy





Fossil corals – Order Tabulata

Colonial; without septa

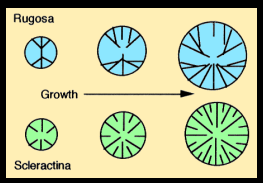
Fossil corals – Order Rugosa

Solitary / colonial; septa in four regions

Rugose = wrinkled

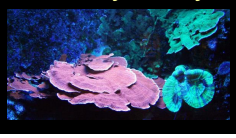
'Modern' corals - Scleractinia

Solitary or colonial
Septa well-developed
- sets of six

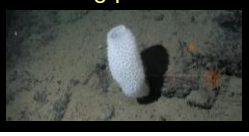


Cnidaria vs Porifera

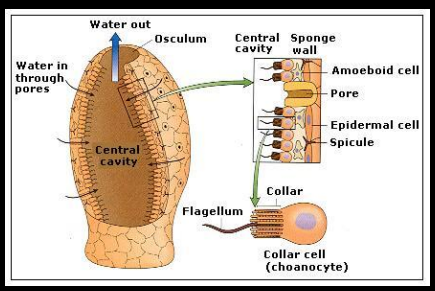
The stingers
* simplest animals
* two tissue types
  - endoderm
  - ectoderm
* radial symmetry



The holey
* few cell types
  - choanocytes
* no true tissues
* no nervous system
* filtering pores



Sponge anatomy



What you got?

Simple, large hole; pore canals = Porifera

Colonial, with floors but no septa = Tabulata

Solitary/colonial; four-fold septa = Rugosa

Colonial/solitary with six-fold septa = Scleractinia