THE f WORD

An Introduction to Fossils

Dr Liam Herringshaw
lgh865@hotmail.com

What are fossils?

- 'fossilus'
  - Anything dug up from the ground

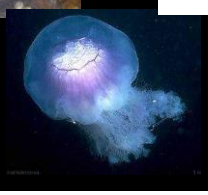
Fossils and folklore

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

What fossils really are

- Petrified remains of dead organisms
- Traces of ancient behaviour
- How 'good' is the fossil record?
  - What gets fossilized?

What gets fossilized?



Mostly hard parts

Taphonomy

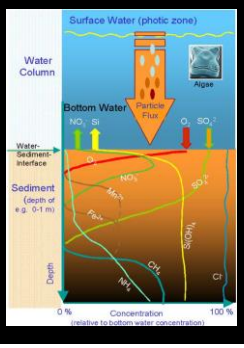
Of grave importance

Biostratinomy

- from death to burial

Diagenesis

- after burial

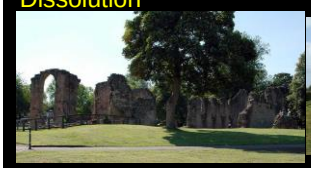


Taphonomic processes

Transport

Decay

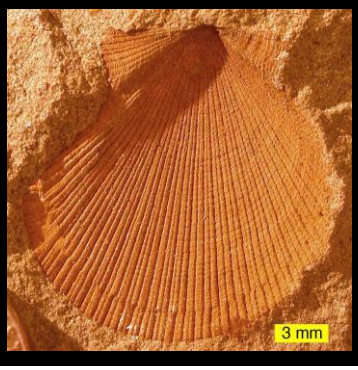
Dissolution



Fragmentation

Fossilization – Moulds & Casts

External mould



Fossilization – Moulds & Casts

Dino print cast

Recrystallization

Same chemistry

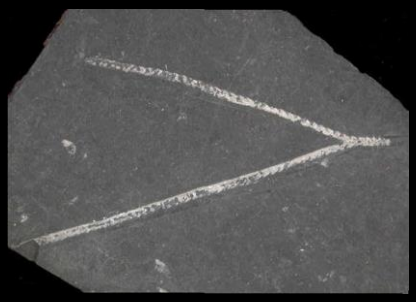
Different structure

Replacement

New minerals

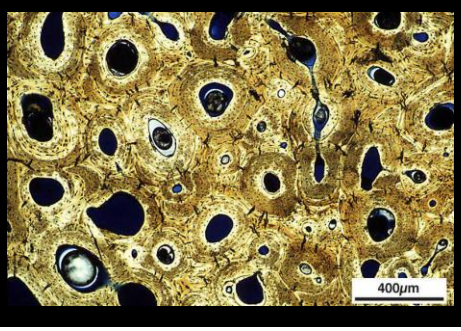
Carbonization

Loss of volatiles in low-oxygen environment



Permineralization

Impregnation of pores

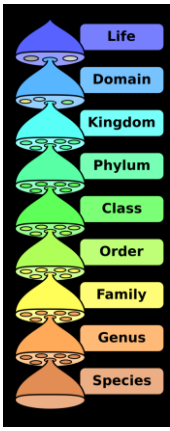


Lagerstätten

Sites of exceptional fossil preservation

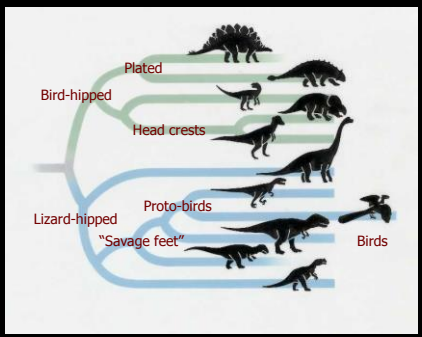
Can include soft tissue fossilization

Taxonomy



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

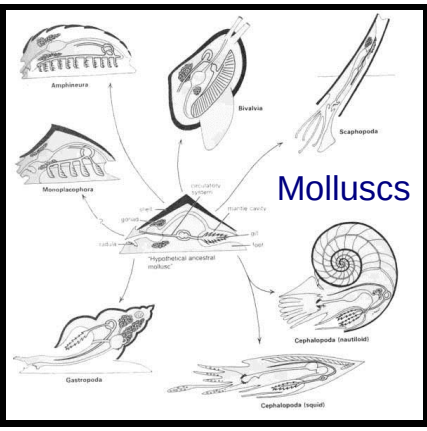
Phylogeny



Commonest fossil types

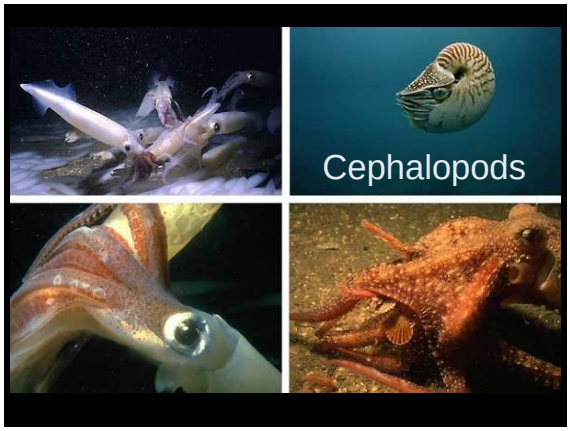
Shelled invertebrates
Mainly marine

Molluscs



Bivalves

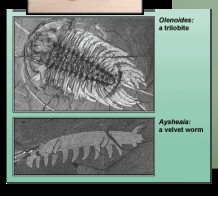

Gastropods


Cephalopods

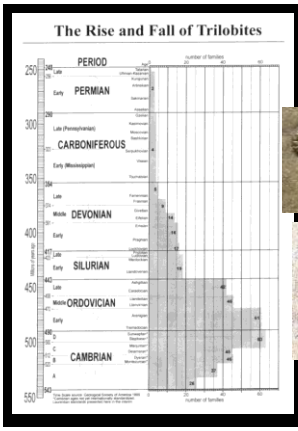

Other classes

Fossil molluscs

Fossil arthropods

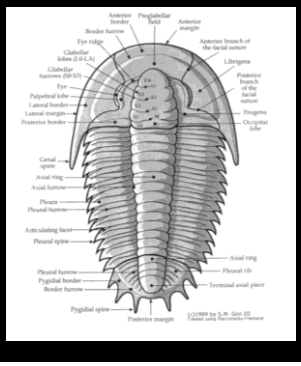


Class Trilobita



www.trilobites.info

Key features



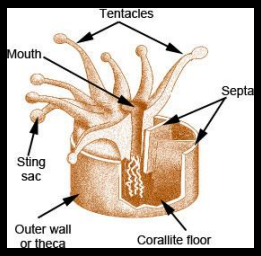
- Axial /pleural lobes
- Cephalon, thorax, pygidium
- Cephalon most useful
- Eyes, glabella, fixed/free cheeks

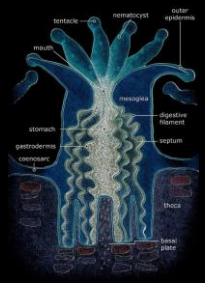
www.trilobites.info

Phylum Cnidaria

Stony corals

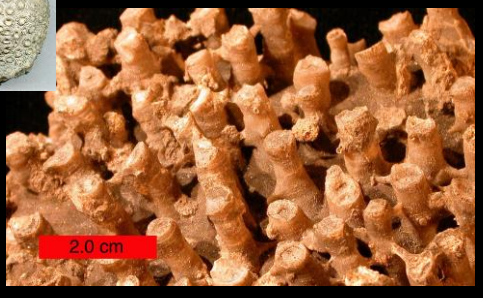
Coral anatomy





Fossil corals – Order Tabulata

Colonial; without septa



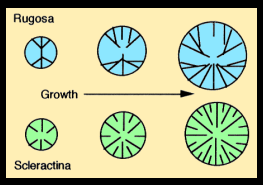
Fossil corals – Order Rugosa

Solitary / colonial; septa in four regions

Rugose = wrinkled

'Modern' corals - Scleractinia

Solitary or colonial
Septa well-developed
- sets of six



Trace fossils?

Sedimentary structures produced by life
- Burrows, borings, tracks, trails, roots...

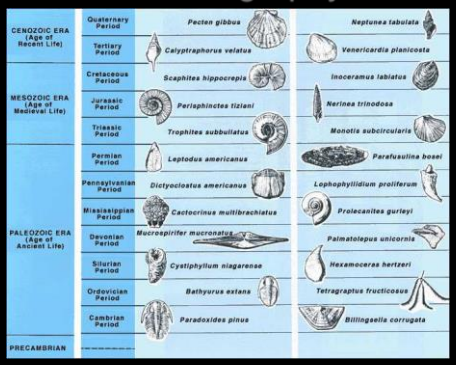
Uniformitarianism

The present is the key to the past

Fossils: why bother?

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

Biostratigraphy



Palaeoecology

- Compare fossil assemblages…

Sea lily

Trilobite

Starfish

Coral

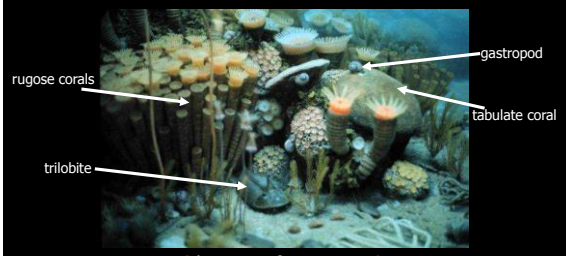
Palaeoecology

- …with modern ecosystems

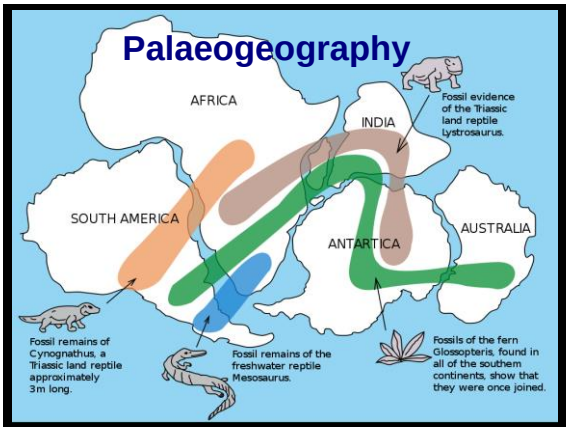
Tropical reef

Palaeoecology

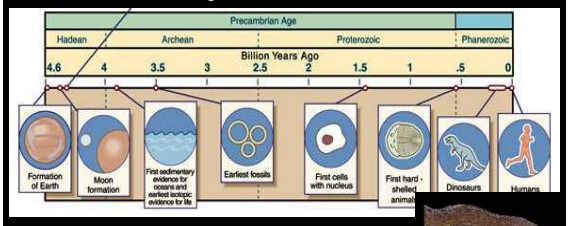
- The present is the key to the past



Silurian reef ecosystem?



Early fossil record

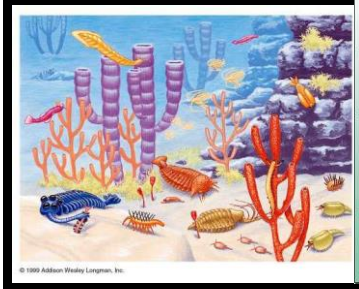


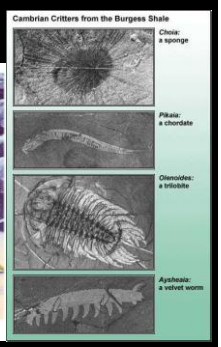
MISS in 3.48 Ga rocks of W. Australia

Stromatolites & cyanobacteria

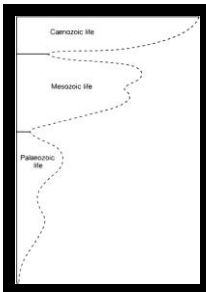
Beginnings of animal life

Cambrian Explosion

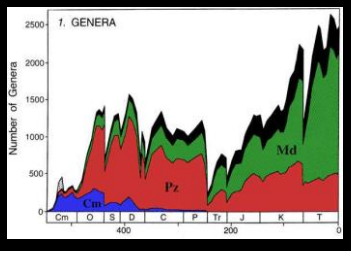




Diversification and extinction



Phillips (1860)

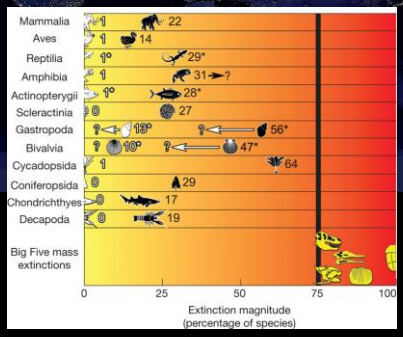


Raup & Sepkoski (1982)

Anthropocene

A whole new world?

Anthropocene



Future CLL classes

Heroes of Rock
Mondays, 7-9pm, from Jan 19th (8 weeks)

York: A Rocky History
Thursday 19th Feb, 7-8pm (free)

A Geological History of Britain
Saturday 14th March

(Geology of Yorkshire...)

www.fossilhub.org