8. Fossils and Palaeontology

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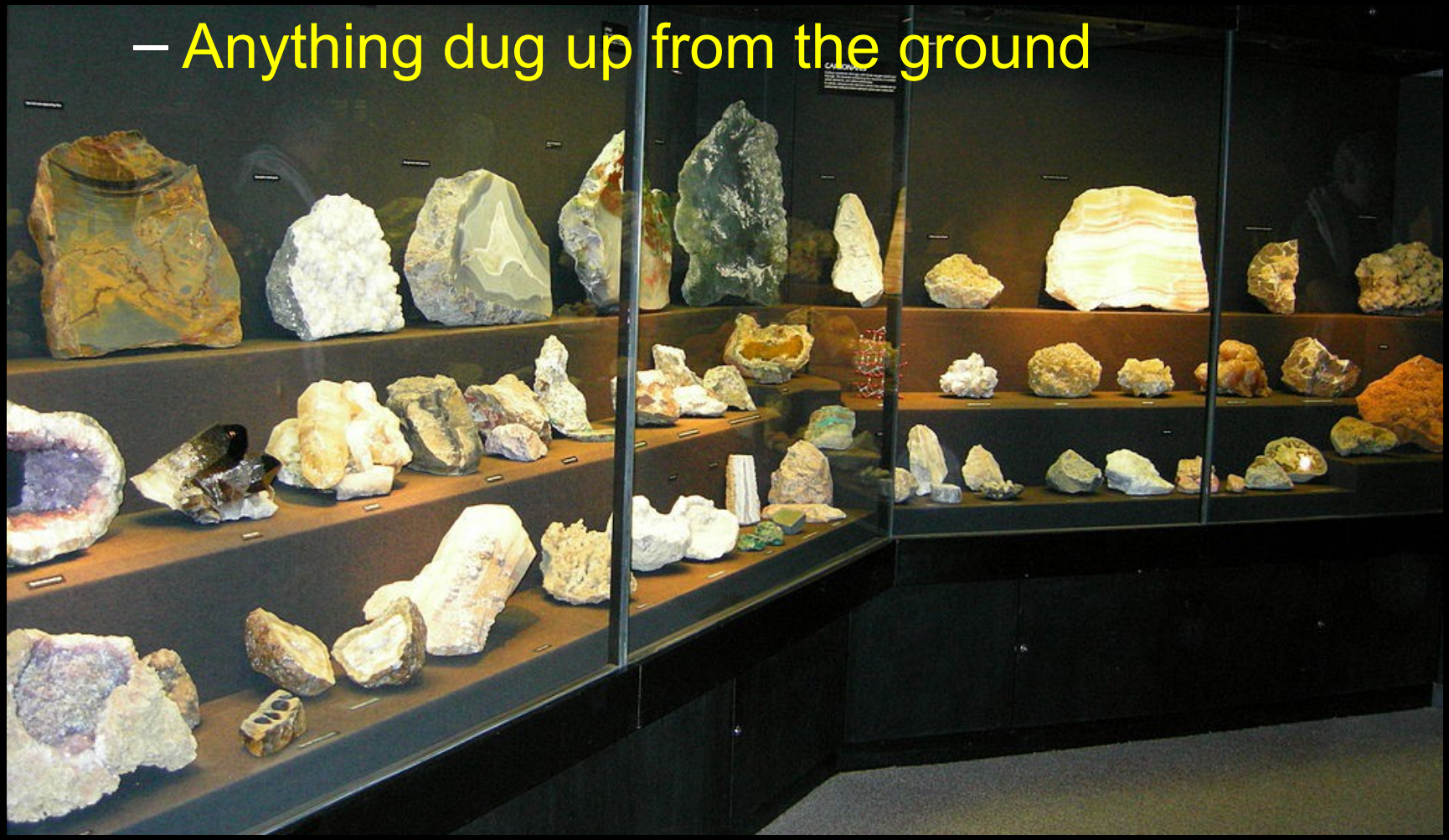
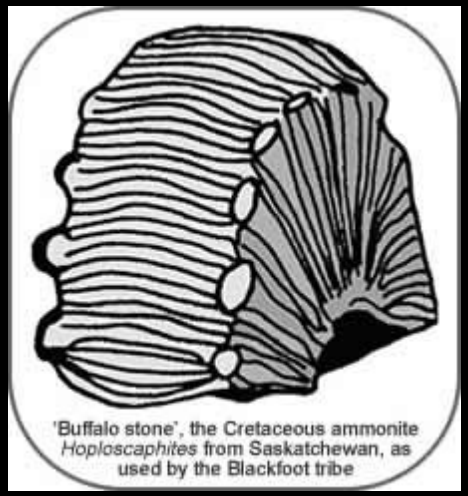
What are fossils?

- '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

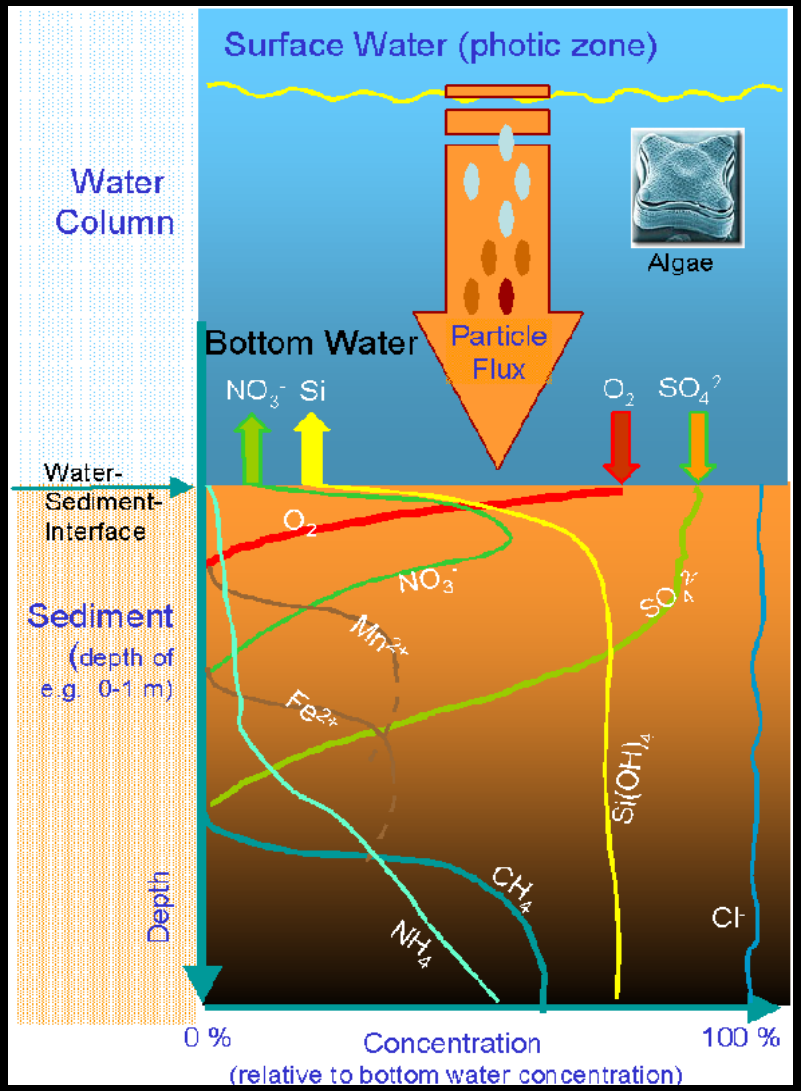
Of grave importance

Biostratinomy

- from death to burial

Diagenesis

- after burial



Taphonomic processes

Transport

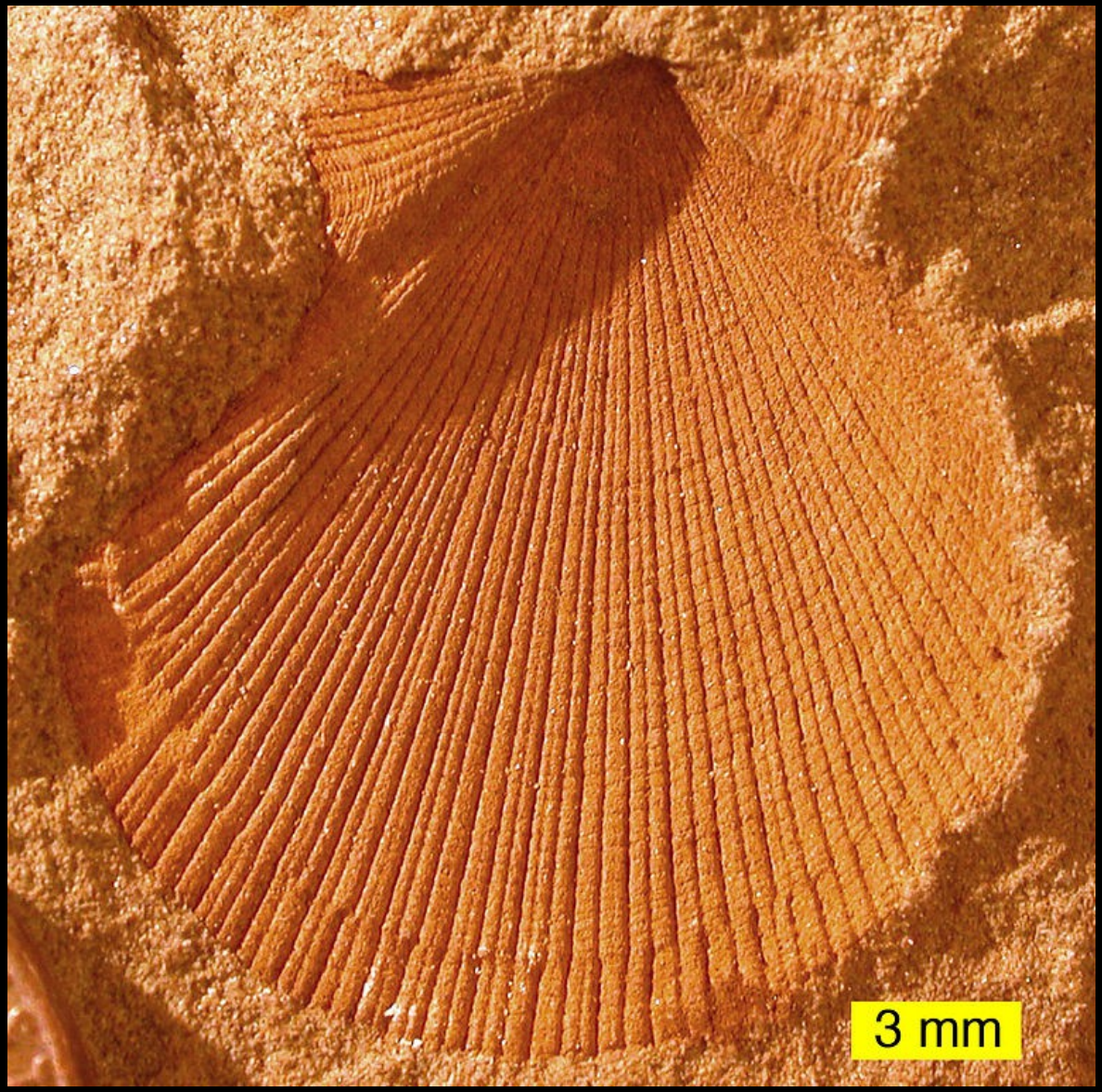
Decay

Dissolution

Fragmentation

Fossilization – Moulds & Casts

External mould



Fossilization – Moulds & Casts

Dino print cast

Recrystallization

Same chemistry

Different structure

Replacement

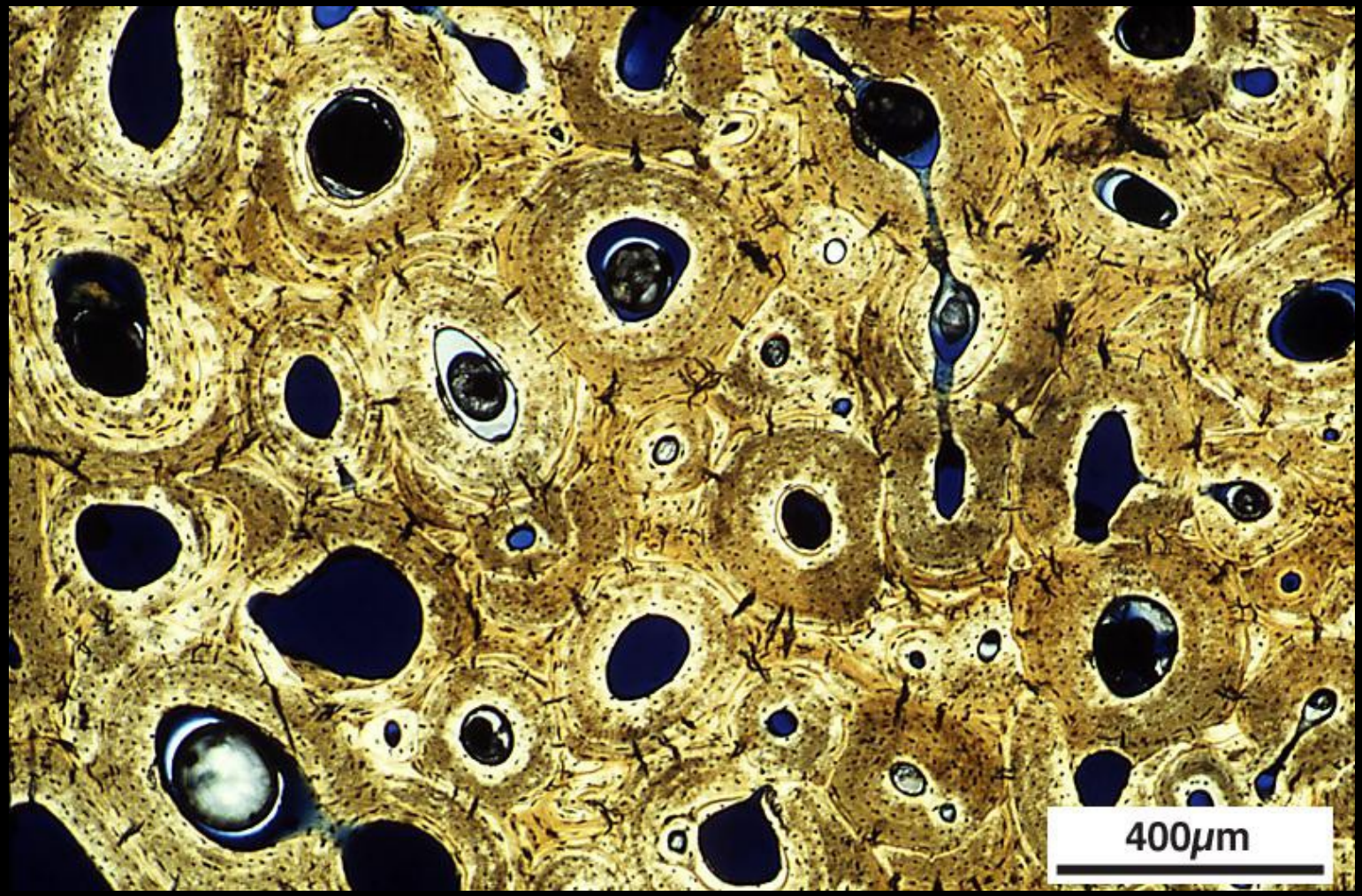
New minerals

Carbonization

Loss of volatiles in low-oxygen environment

Permineralization

Impregnation of pores



Lagerstätten

Sites of exceptional fossil preservation

Can include soft tissue fossilization

Commonest fossil types

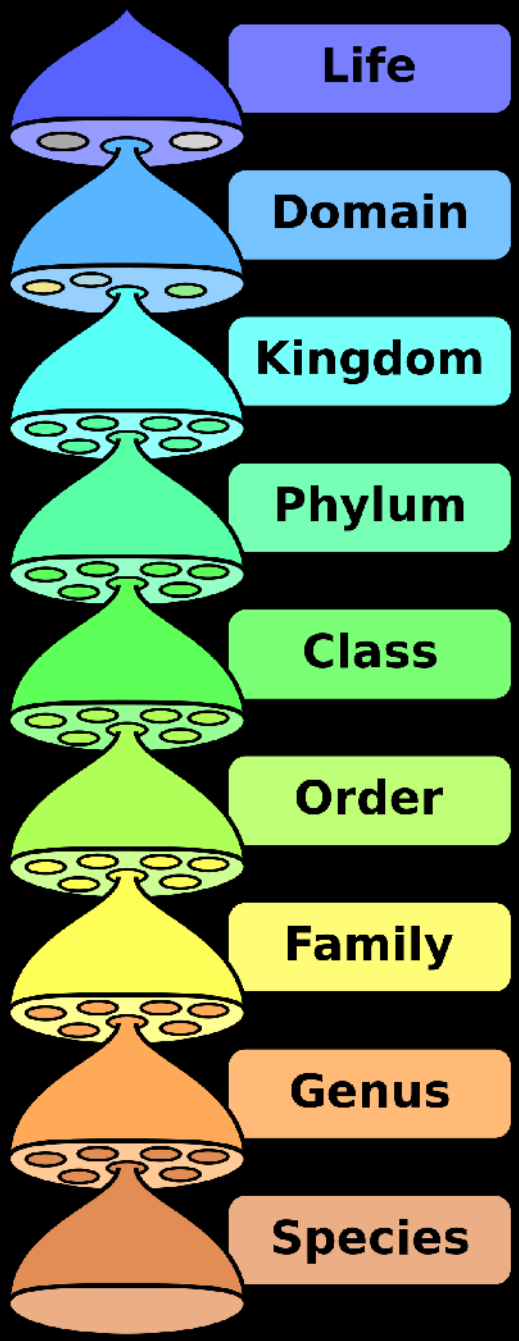
Shelled invertebrates

Mainly marine

Why bother?

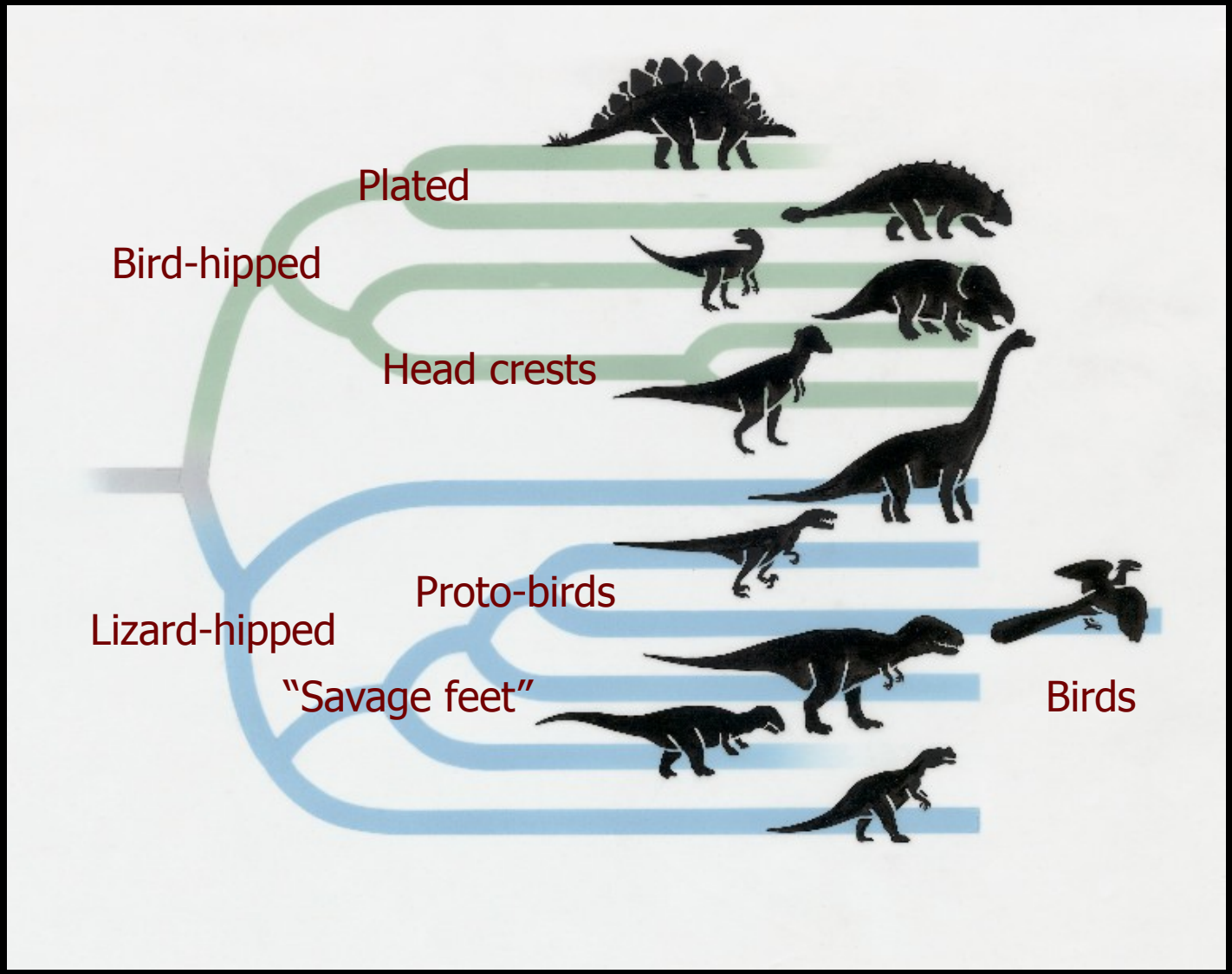
- 1. Earth history
- 2. Correlation of strata
- 3. Palaeo-ecology
- 4. Palaeo-geography
- 5. Just because!

Taxonomy

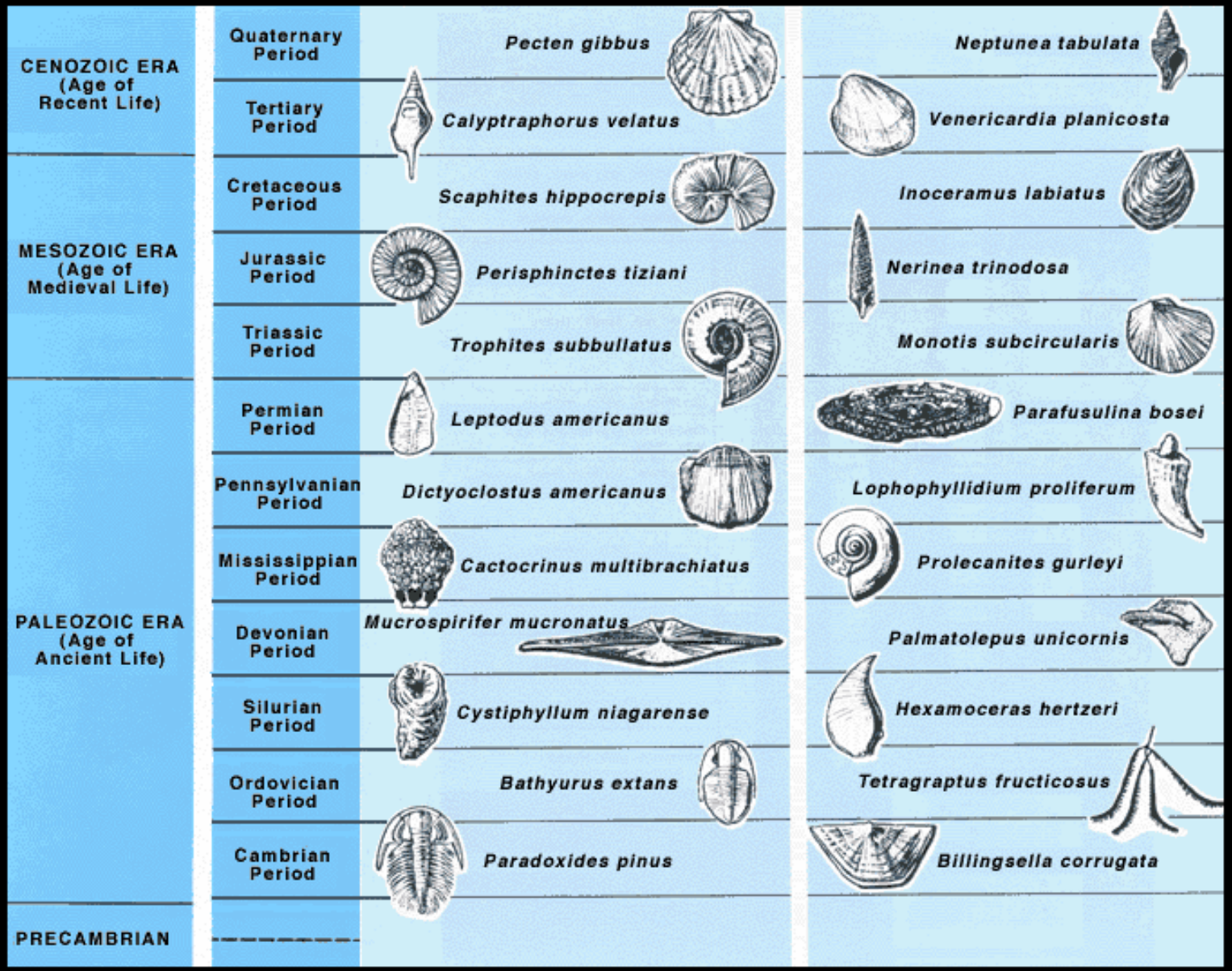


- Carl von Linne (1707-1778)
- Classification by shared morphology
- Binomial system

Phylogeny


Plated
Bird-hipped
Head crests
Proto-birds
Lizard-hipped
"Savage feet"
Birds

Biostratigraphy

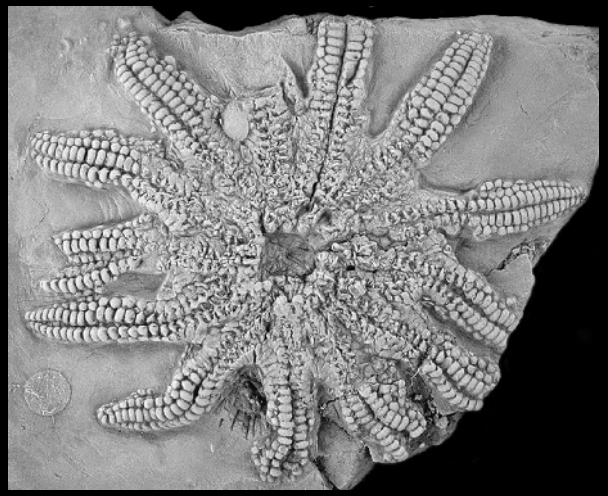


Palaeoecology

- Compare fossil assemblages…

Sea lily

Trilobite



Starfish

Coral

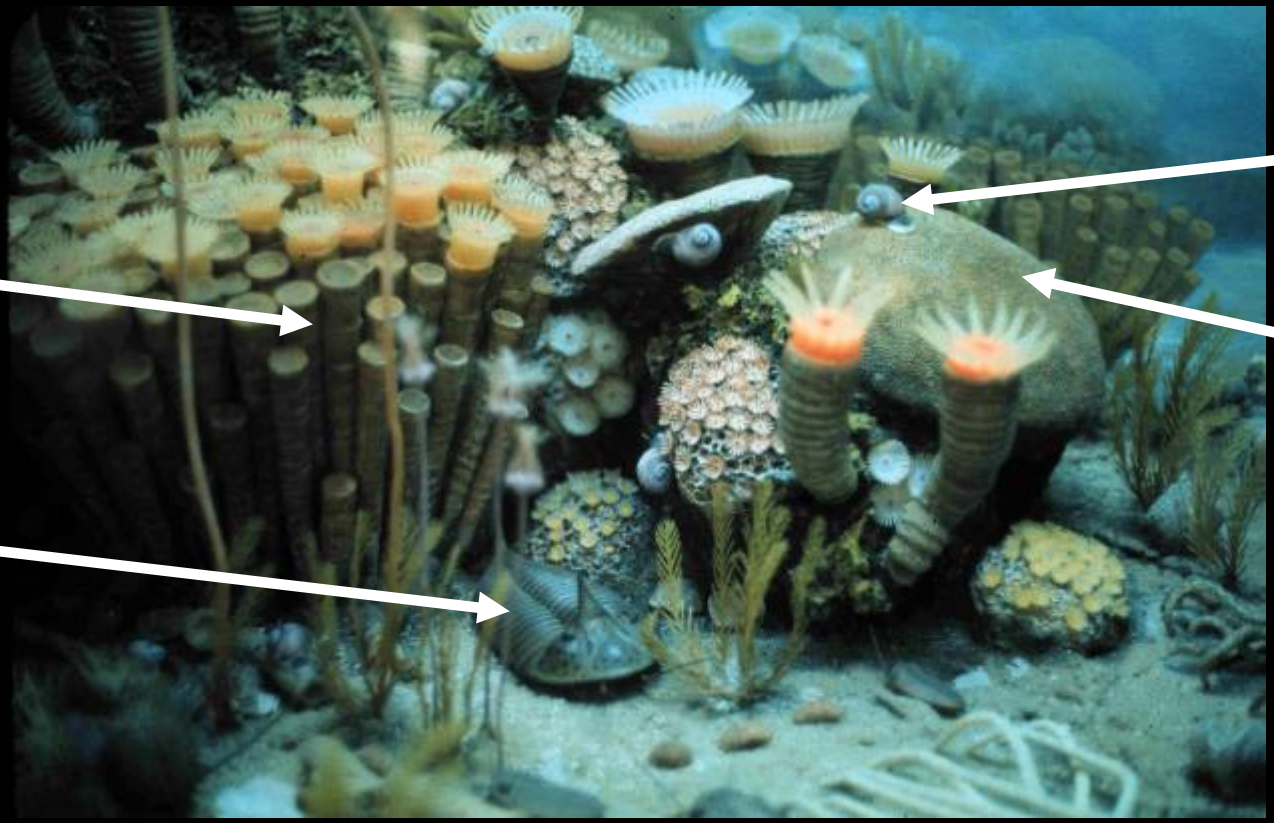
Palaeoecology

- …with modern ecosystems

Tropical reef

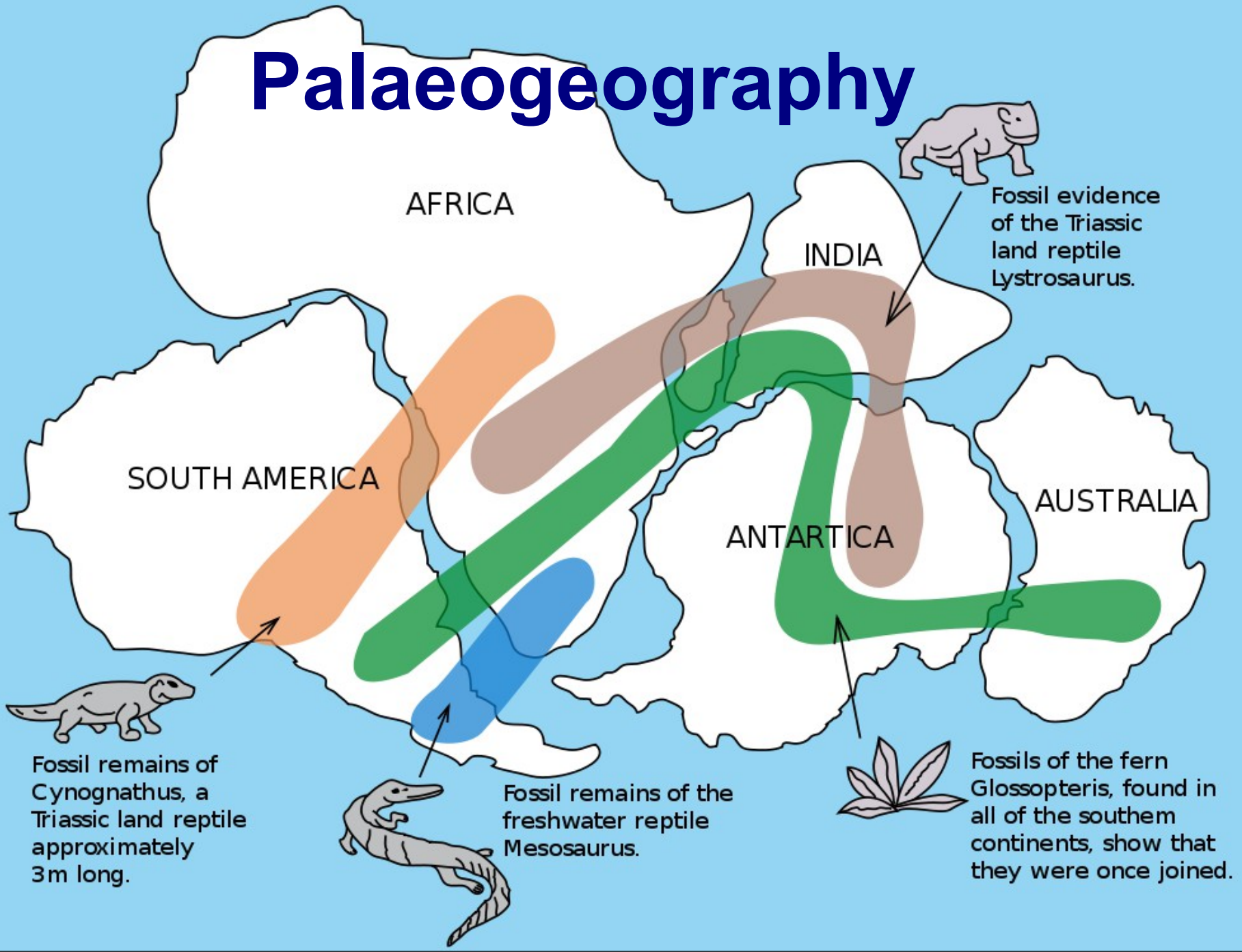
Palaeoecology

- The present is the key to the past

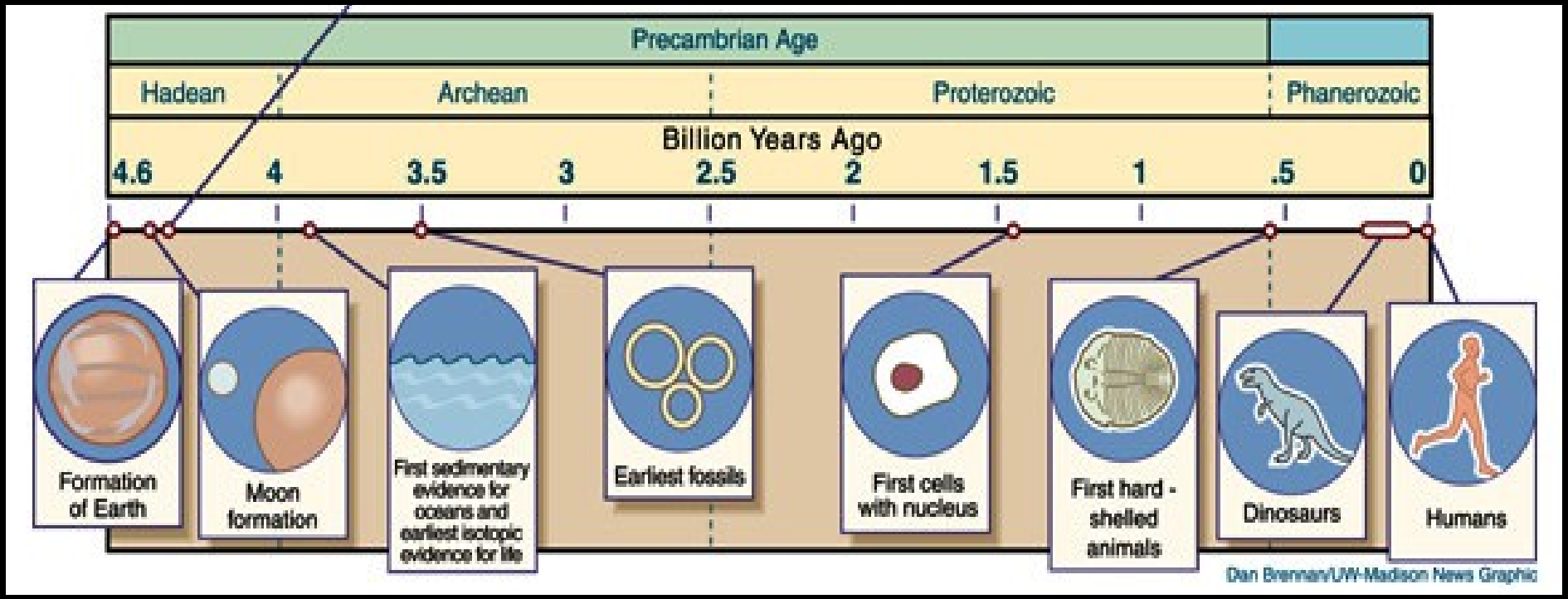


Silurian reef ecosystem?

Palaeogeography

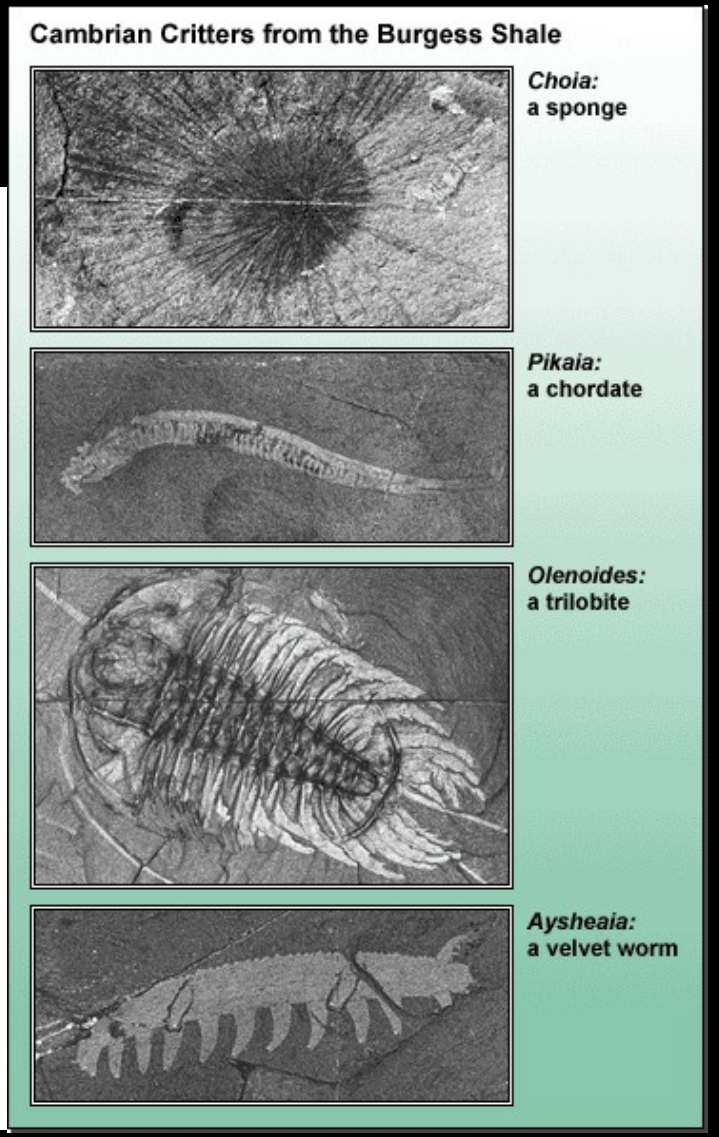


Early fossil record

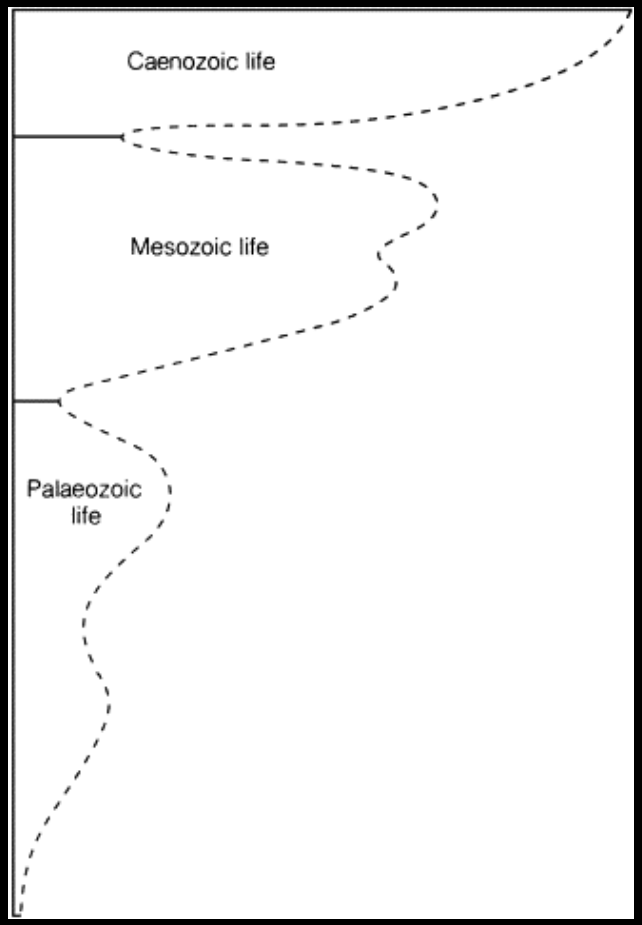


Beginnings of animal life

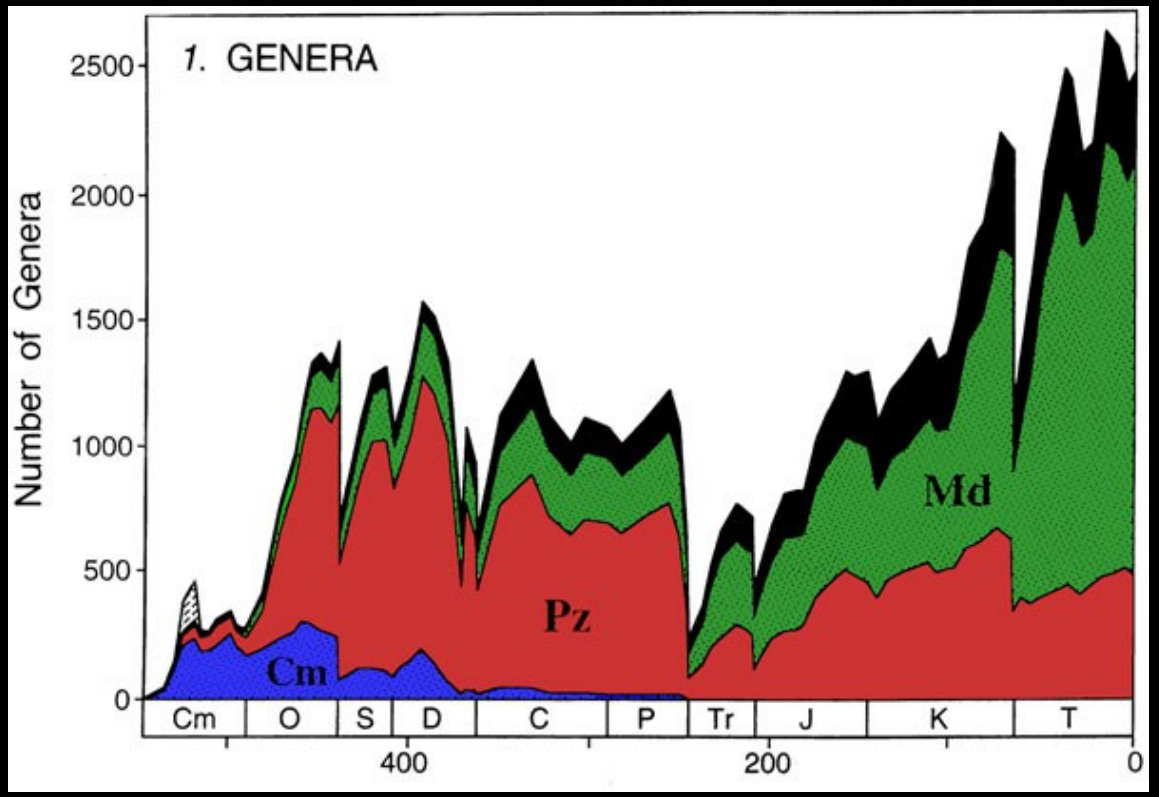
Cambrian Explosion



Diversification and extinction



Phillips (1860)



Raup & Sepkoski (1982)

Next week

Mines & Yours:
Economic Geology