



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

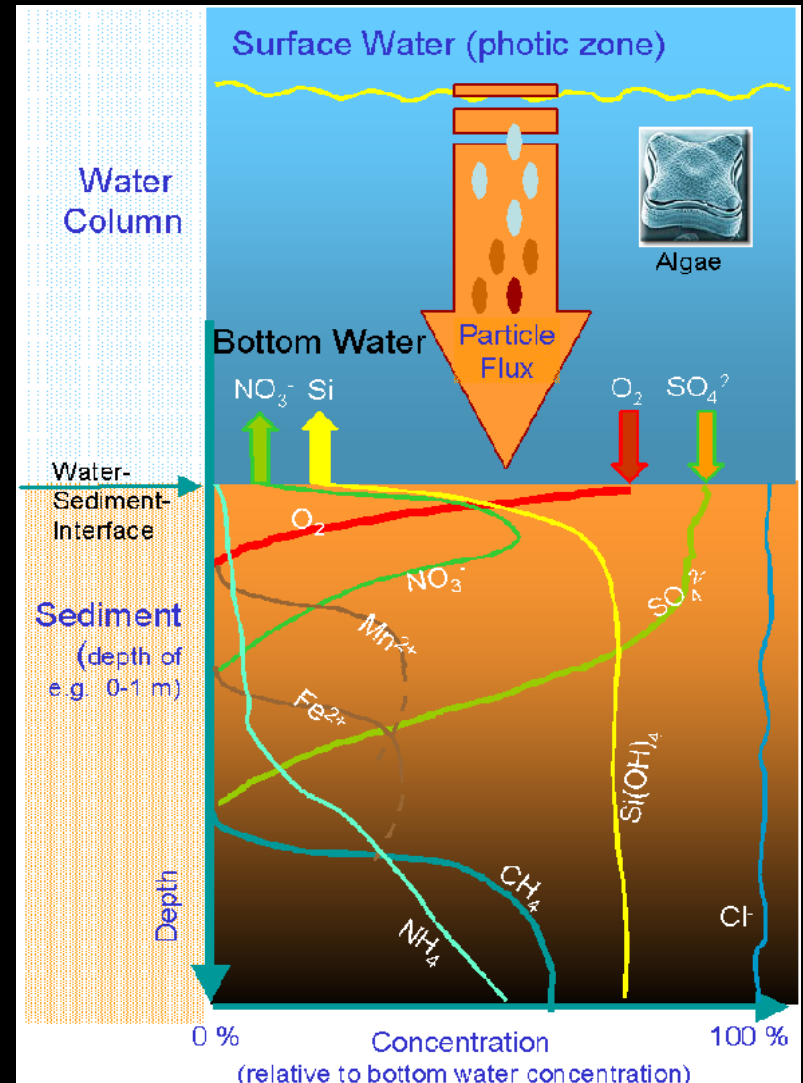
Biostratinomy

- from death to burial



Diagenesis

- after burial



Taphonomic processes

Transport



Decay



Dissolution

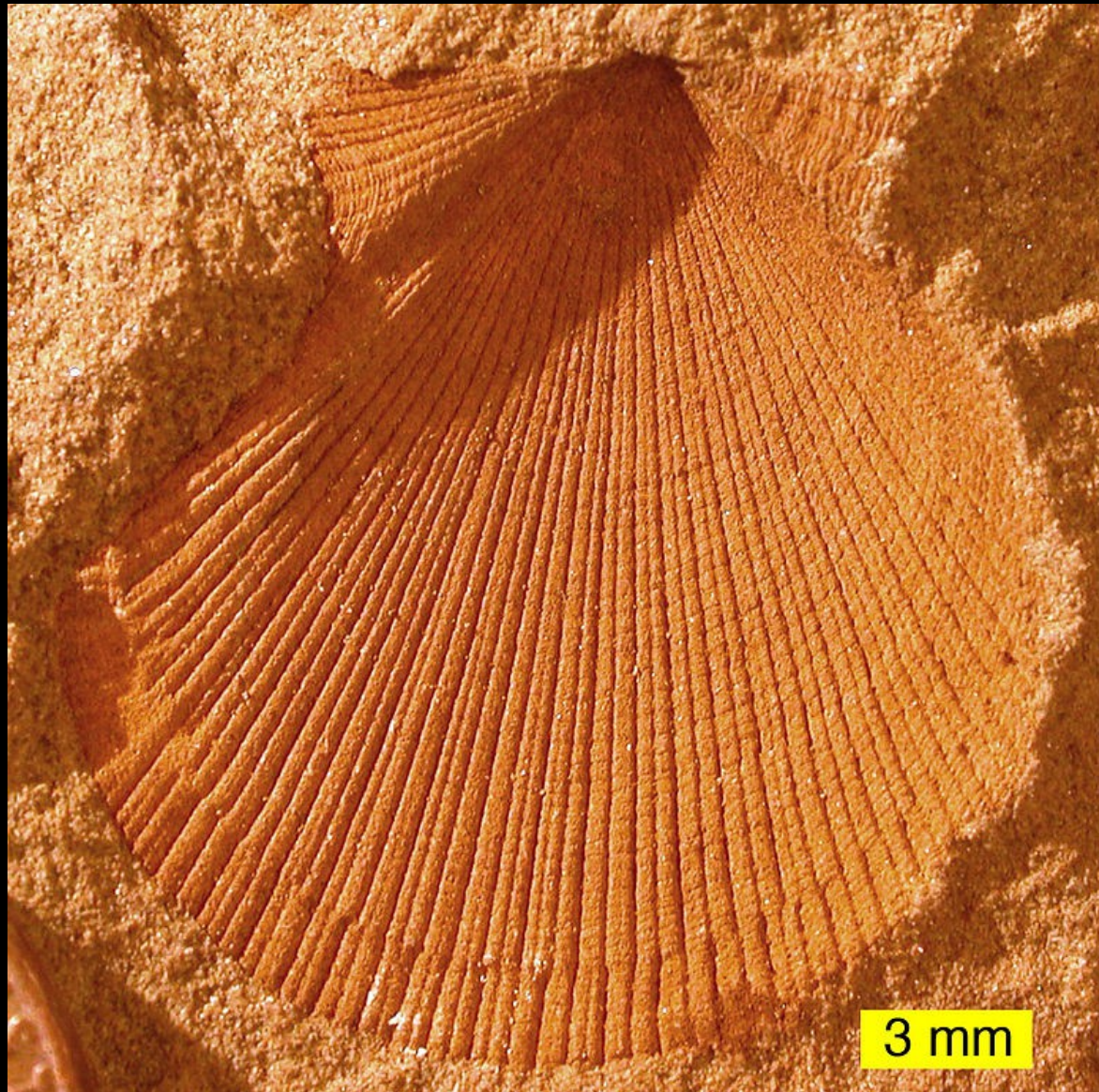


Fragmentation



Fossilization – Moulds & Casts

External
mould



Fossilization – Moulds & Casts

Dino print cast



Recrystallization

Same chemistry

Different structure



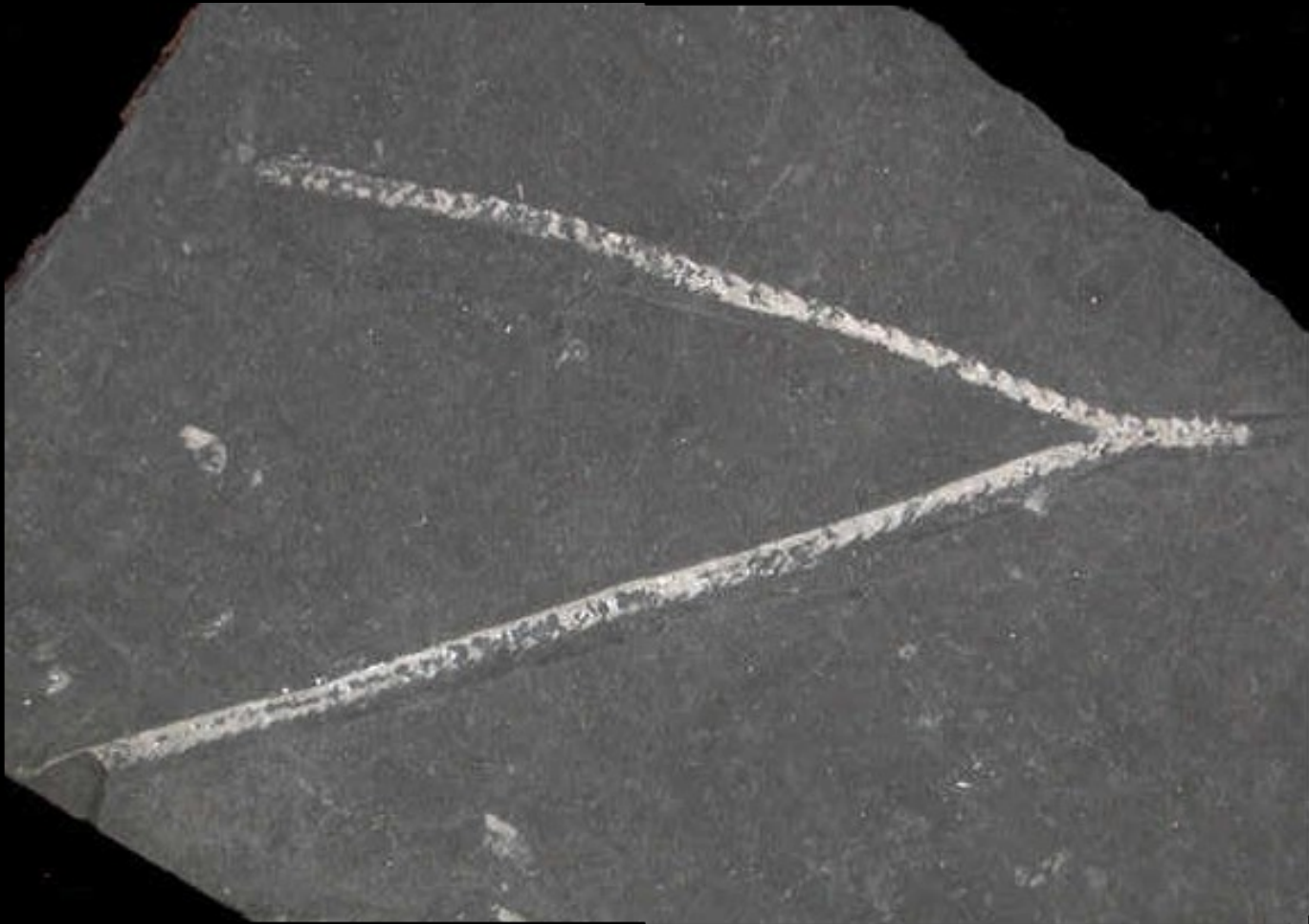
Replacement

New minerals



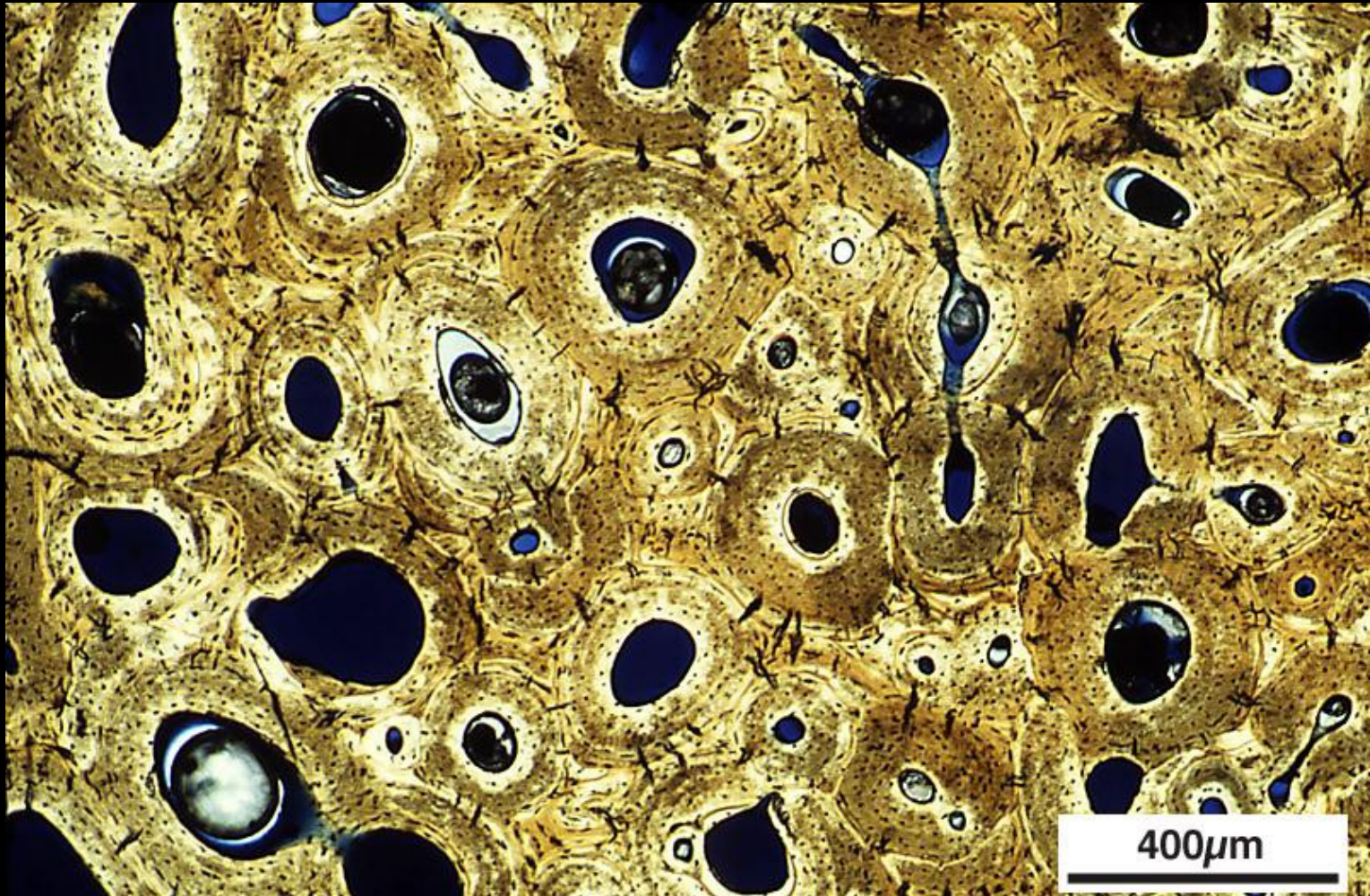
Carbonization

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

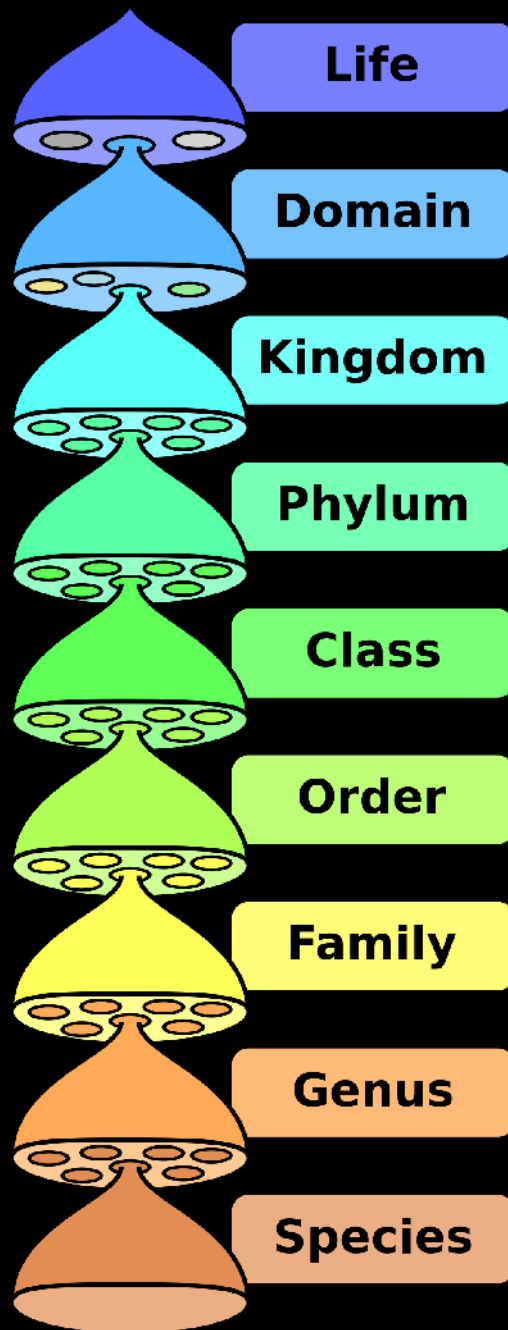


Why bother?

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



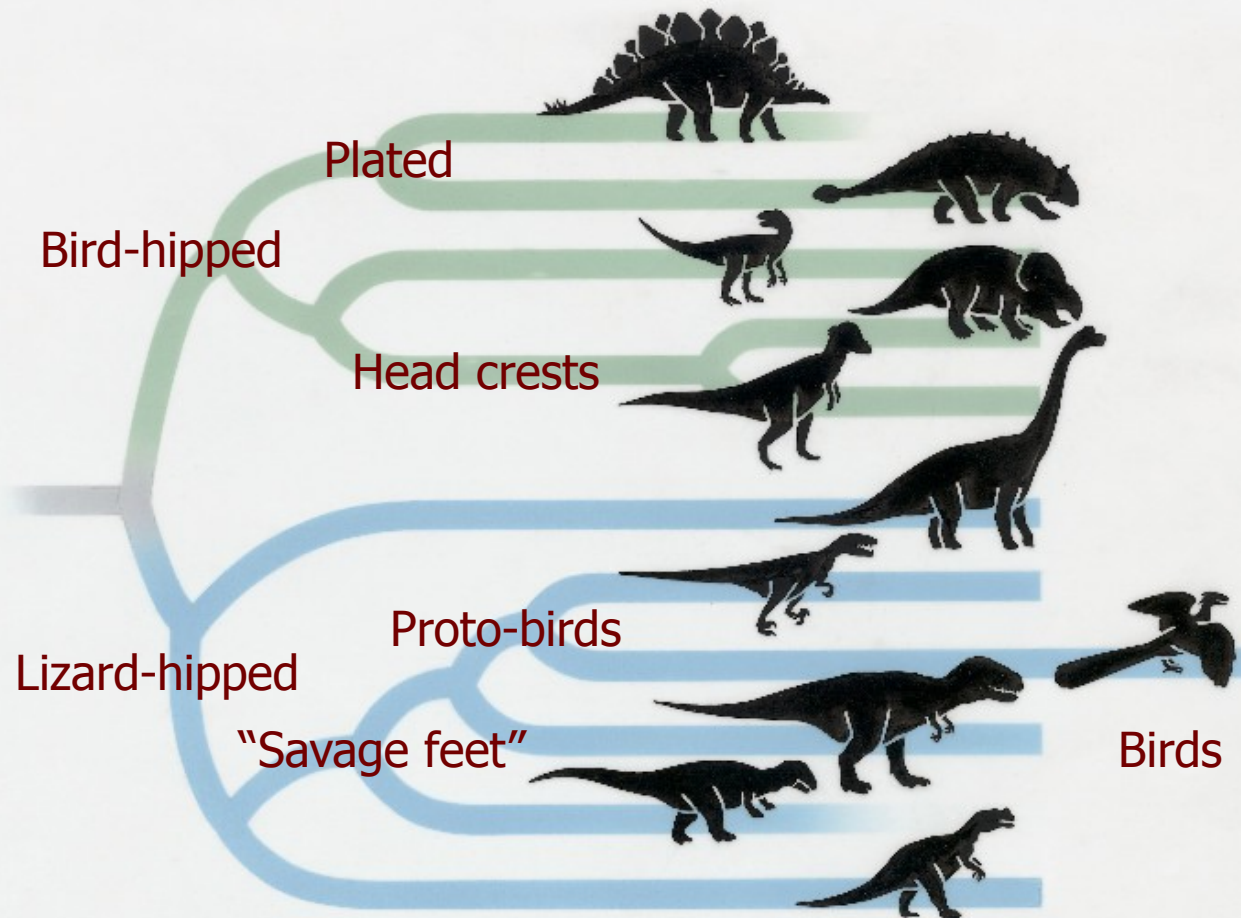
Taxonomy
























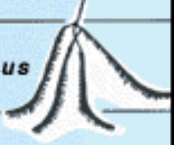


- Carl von Linne (1707-1778)
- Classification by shared morphology
- Binomial system



Phylogeny



Biostratigraphy

CENOZOIC ERA (Age of Recent Life)	Quaternary Period	<i>Pecten gibbus</i>		<i>Neptunea tabulata</i>	
	Tertiary Period	 <i>Calyptraphorus velatus</i>		 <i>Venericardia planicosta</i>	
MESOZOIC ERA (Age of Medieval Life)	Cretaceous Period	<i>Scaphites hippocrepis</i>		<i>Inoceramus labiatus</i>	
	Jurassic Period	 <i>Perisphinctes tiziani</i>		<i>Nerinea trinodosa</i>	
	Triassic Period	<i>Trophites subbullatus</i>		<i>Monotis subcircularis</i>	
	Permian Period	 <i>Leptodus americanus</i>		<i>Parafusulina bosei</i>	
PALEOZOIC ERA (Age of Ancient Life)	Pennsylvanian Period	<i>Dictyoclostus americanus</i>		<i>Lophophyllidium proliferum</i>	
	Mississippian Period	 <i>Cactocrinus multibrachiatus</i>		<i>Prolecanites gurleyi</i>	
	Devonian Period	<i>Mucrospirifer mucronatus</i>		<i>Palmatolepus unicornis</i>	
	Silurian Period	 <i>Cystiphyllum niagarensis</i>		<i>Hexamoceras hertzeri</i>	
	Ordovician Period	<i>Bathyrurus extans</i>		<i>Tetragraptus fructicosus</i>	
	Cambrian Period	 <i>Paradoxides pinus</i>		<i>Billingsella corrugata</i>	
PRECAMBRIAN					

Palaeoecology

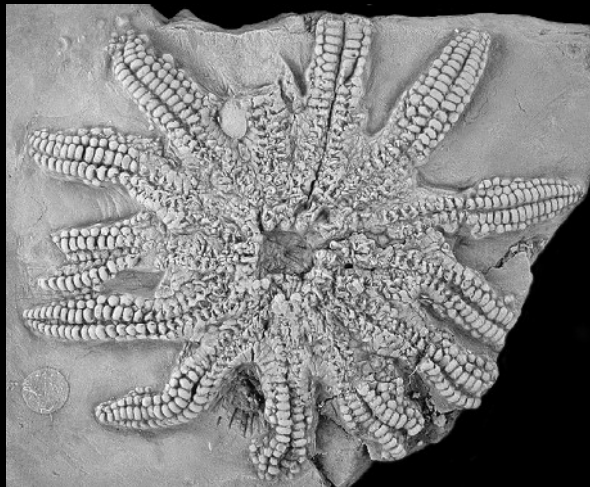
■ Compare fossil assemblages...



Sea lily



Trilobite



Starfish



Coral

Palaeoecology

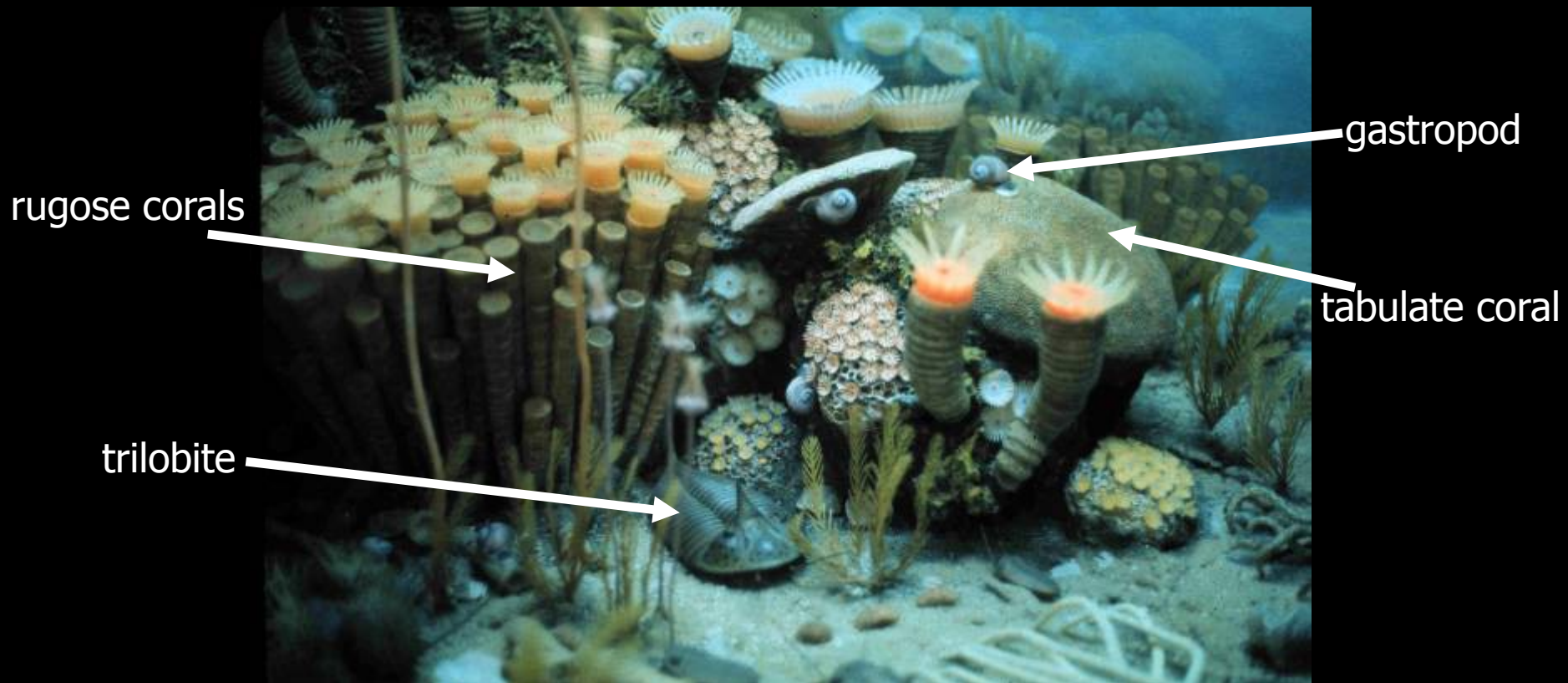
- ...with modern ecosystems



Tropical reef

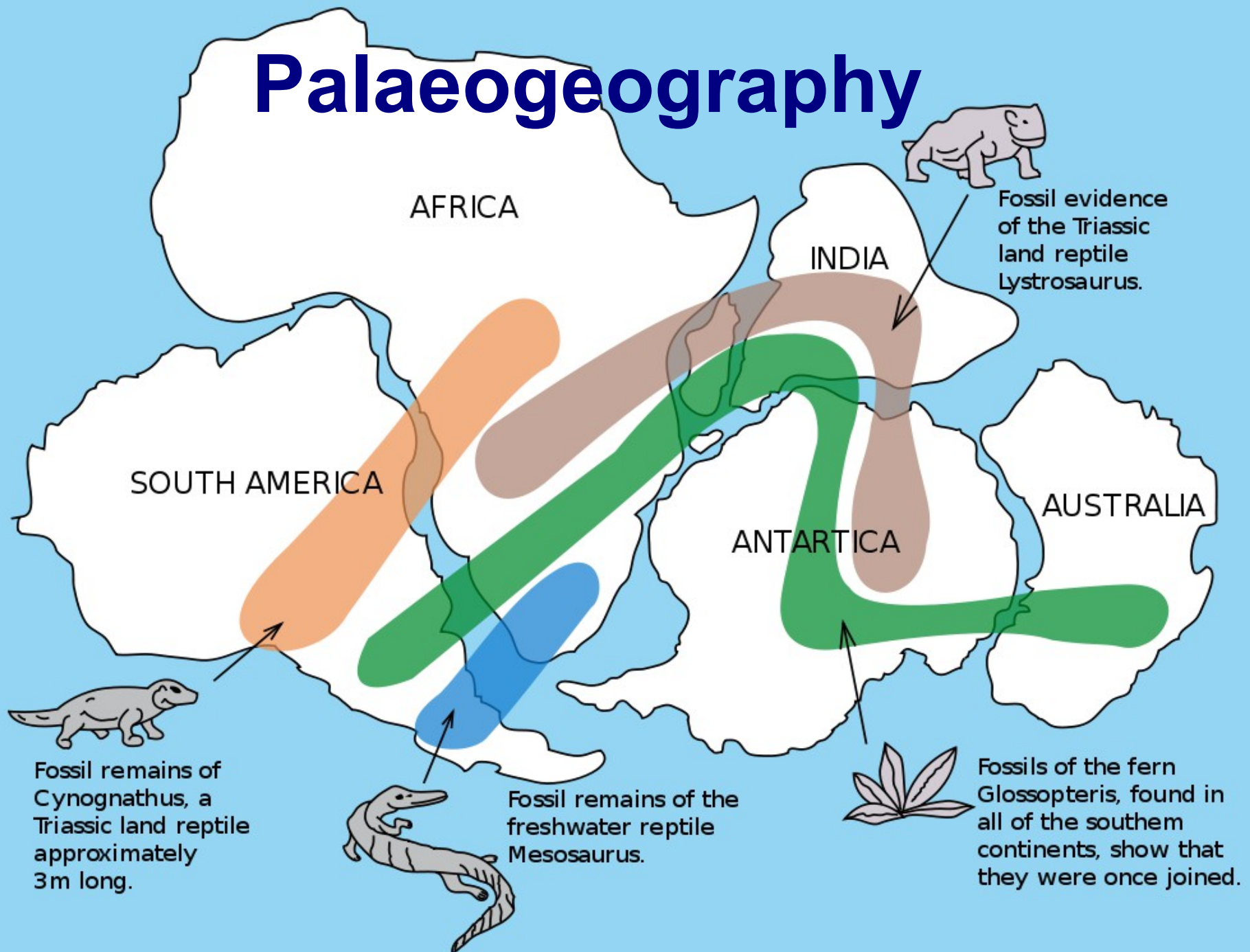
Palaeoecology

- The present is the key to the past

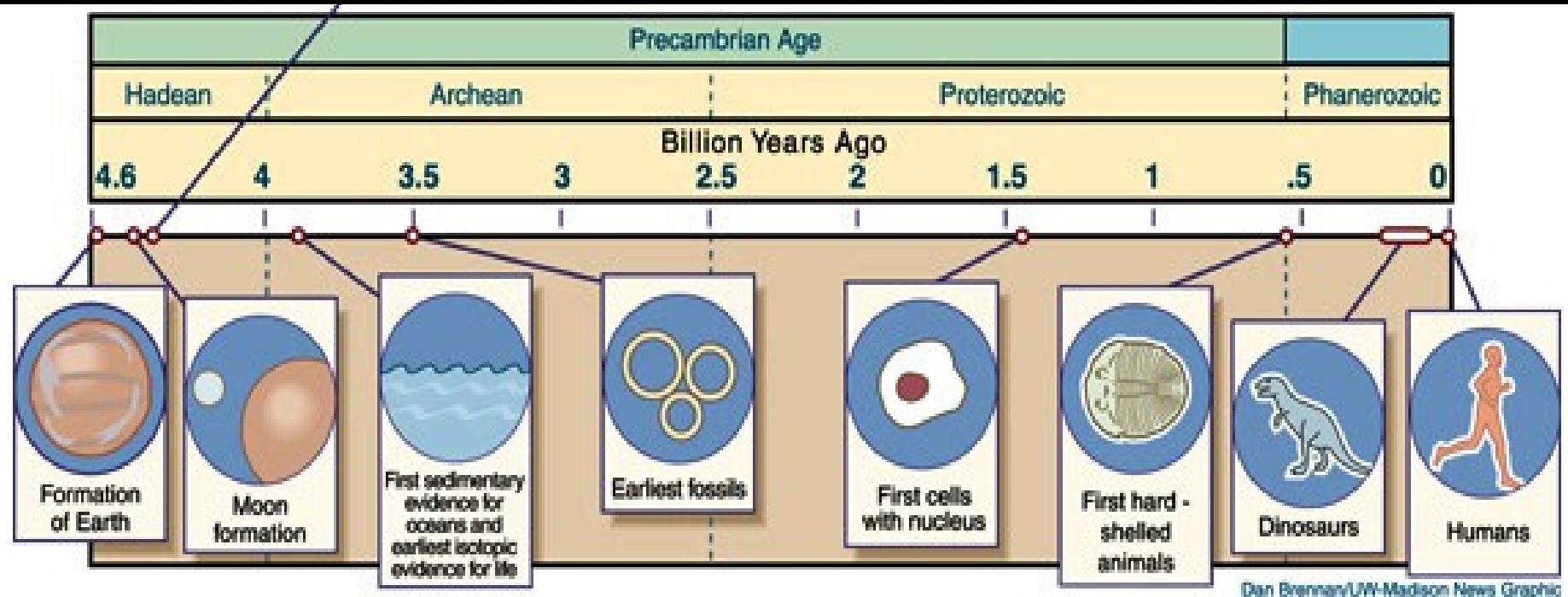


Silurian reef ecosystem?

Palaeogeography



Early fossil record



Dan Brennan/UW-Madison News Graphic

Beginnings of animal life

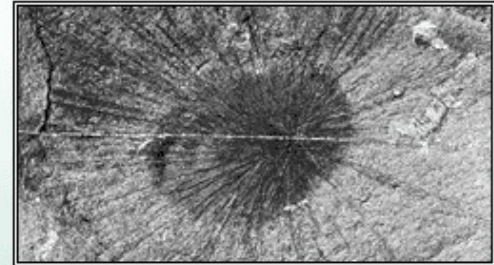


Cambrian Explosion



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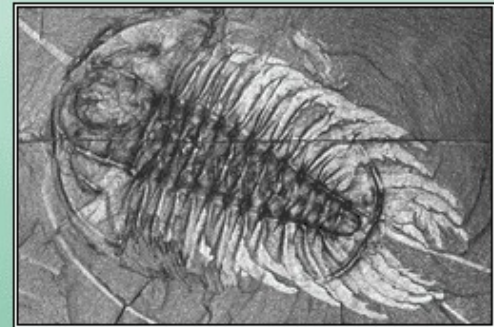
Cambrian Critters from the Burgess Shale



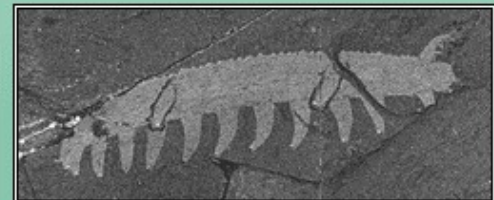
Choia:
a sponge



Pikaia:
a chordate



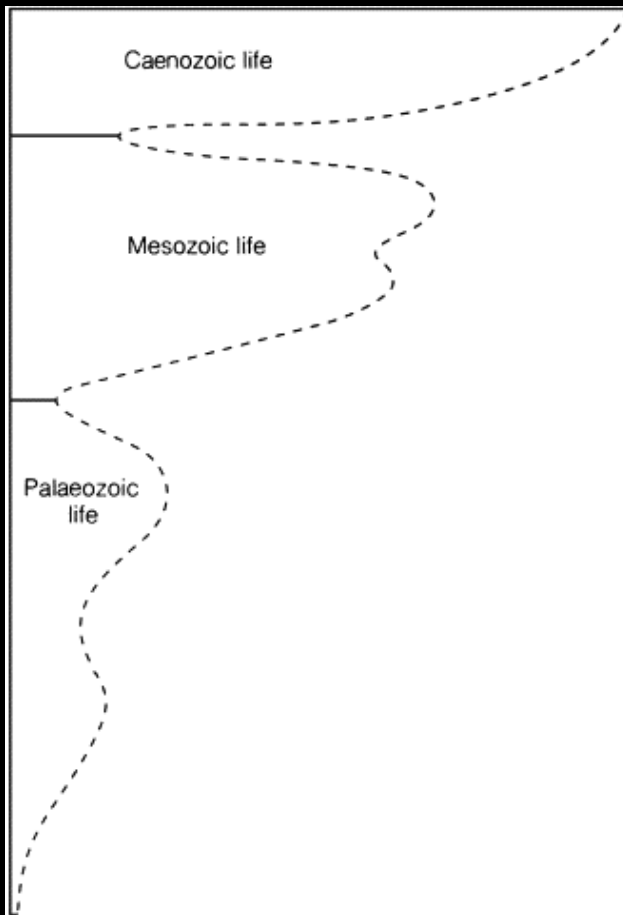
Olenoides:
a trilobite



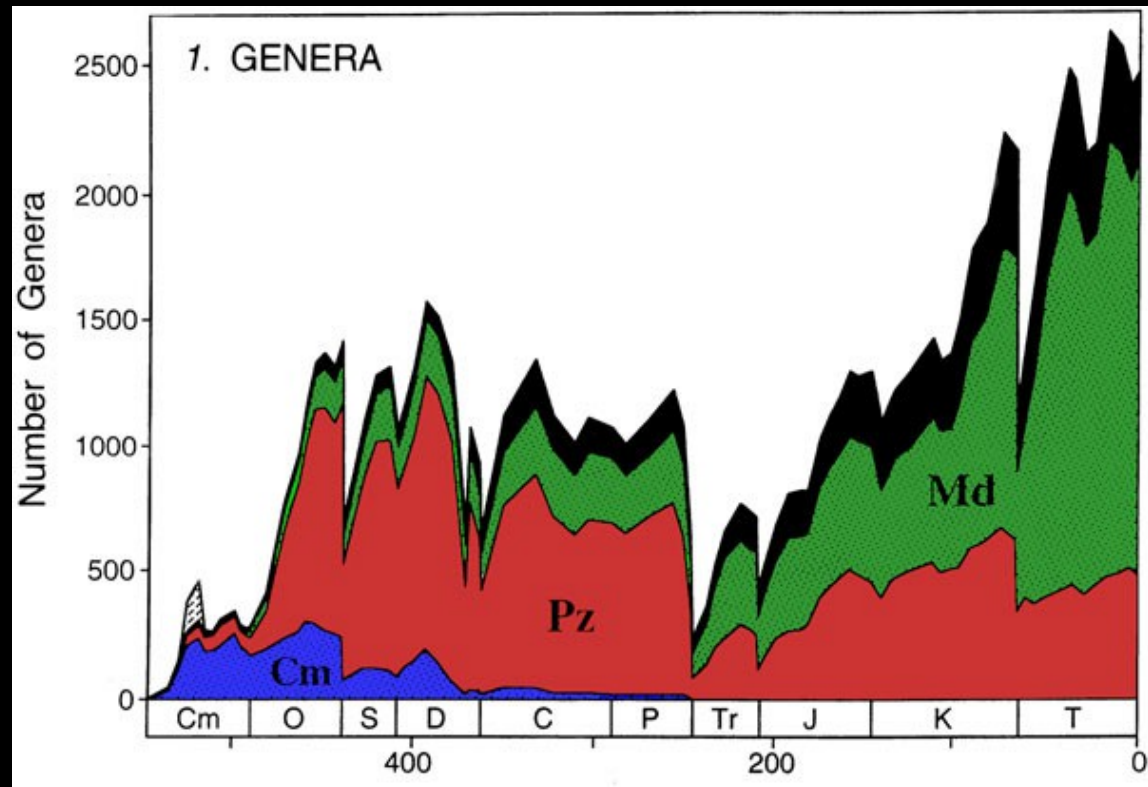
Aysheaia:
a velvet worm

Diversification and extinction

Phillips (1860)



Raup & Sepkoski (1982)



Next week



Mines & Yours:
Economic Geology

