

Introduction to Biology. Lecture 14

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1 Where we are?

- Ediacarian period and multicellularity
- First animals

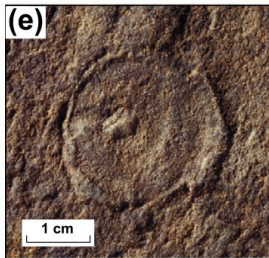
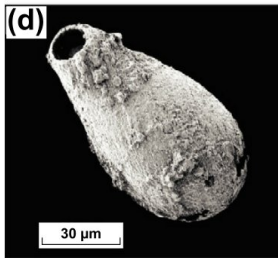
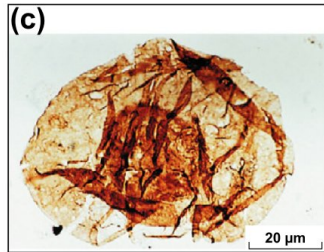
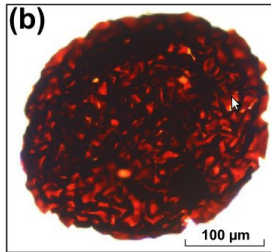
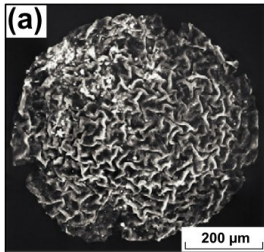


Marionan glaciation: Snowball Earth

- First global glaciation was started because ice started to concentrate over the pole and increase Earth albedo (this is the positive feedback)
- And because the configuration of continents blocked the equatorial warm current
- And because concentration of oxygen was high but greenhouse gases (like CO₂)—small
- As a result, from time to time Earth was completely covered with ice sheet 1 km tall!



Cryogenian fossils

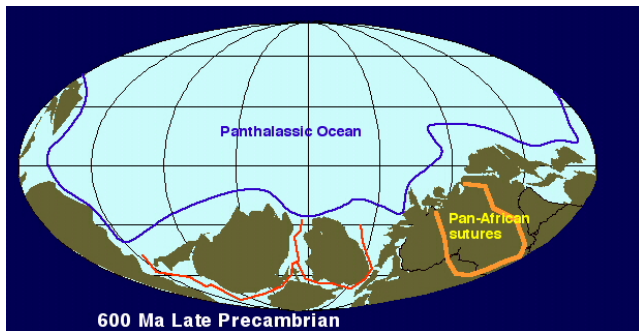


Where we are?

Ediacarian period and multicellularity

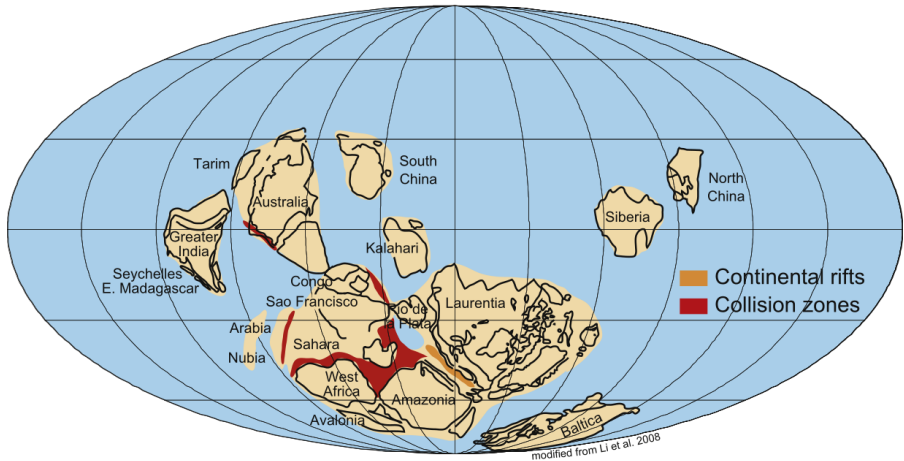


Rodinia breaks



Ediacarian continents

600 Ma Ediacaran



First multicellular life

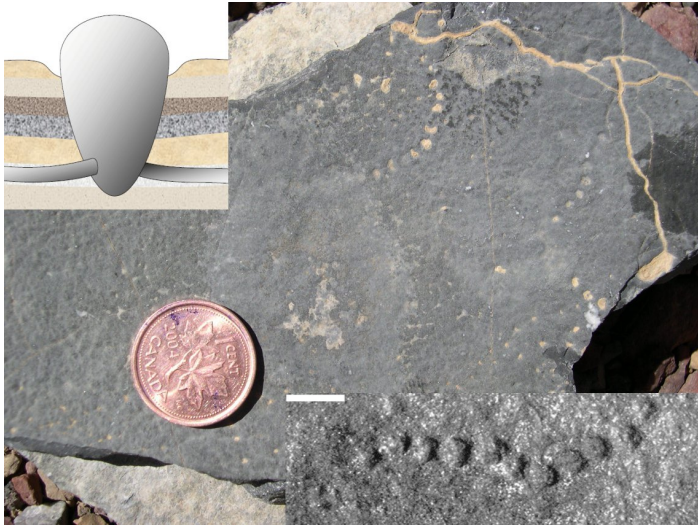
- Apart from enigmatic *Grypania* and *Horodyskia*, multicellular eukaryotes were not known before Ediacarian
- From the beginning of Ediacarian, multicellular Lantian algae were known, and then—fabulous “Ediacara garden”, the fauna of animals without skeleton



Grypania—the first alga?



Horodyskia and its interpretations



Multicellularity and origin of death

- Multicellular assemblages were probably originated from incompletely divided cells
- Initially, those assemblages were only benefit from their size
- Then, they started to use a division of labor: differentiated into somatic and generative cells
- Wheres generative cells are specialized for multiplication and will continue to “live” in next generations, somatic bodies ought to die
- Unicellular living organisms are still potentially immortal



Lantian (China) macroscopic algae

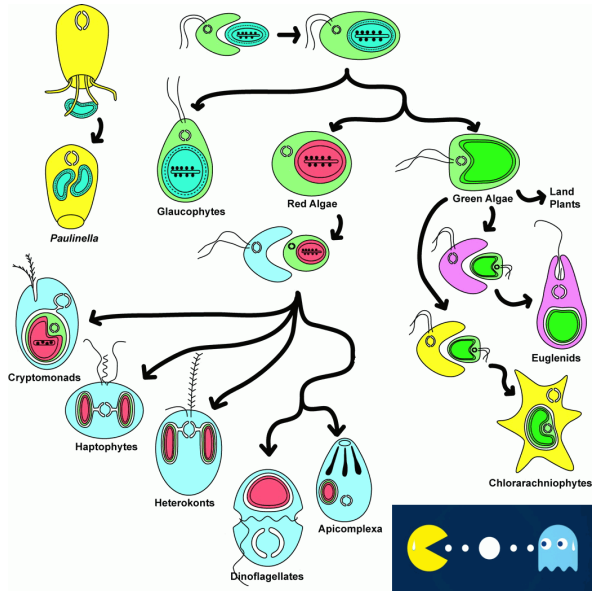


What are algae?

- Eukaryotes which are capable for photosynthesis with chloroplasts
- All chloroplasts were symbiotic (cyanobacteria in the past), and some even secondary symbiotic (other alga in the past)



“Pacman game” of algae origin



Life without animals

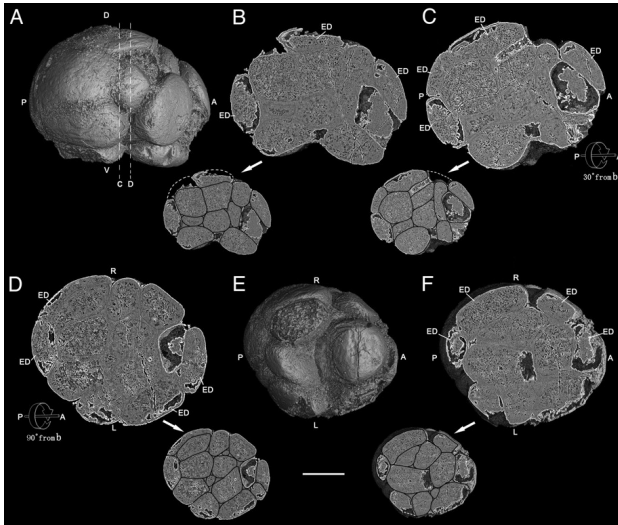


Where we are?

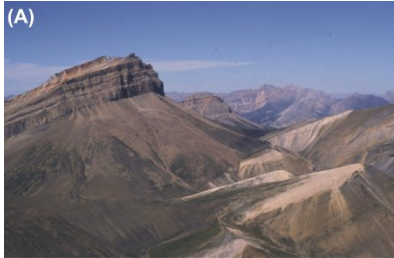
First animals



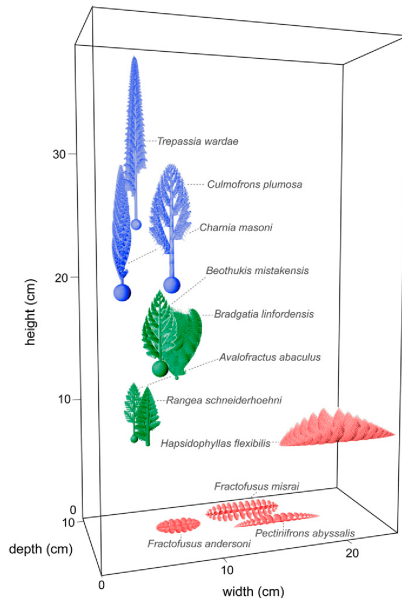
Doushantuo (China) “embryos”—first animals?



Finding Ediacara biota



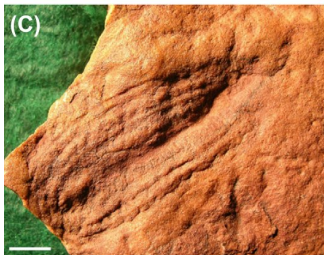
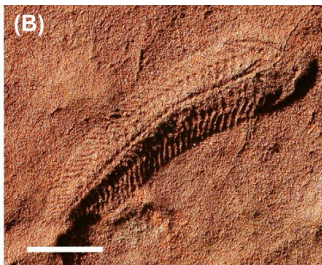
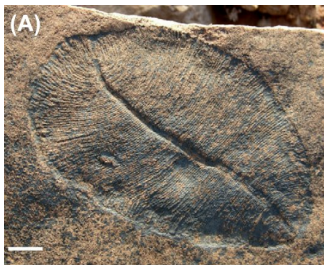
Mistaken Point (Canada) fauna: rangeomorphs



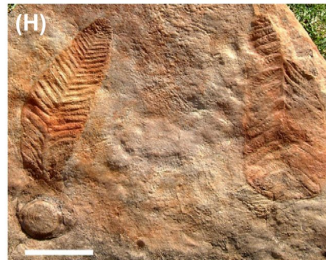
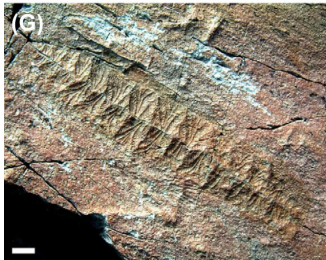
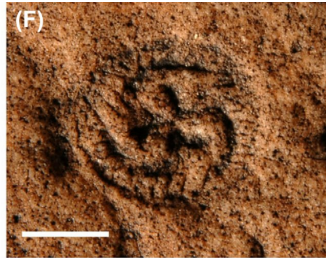
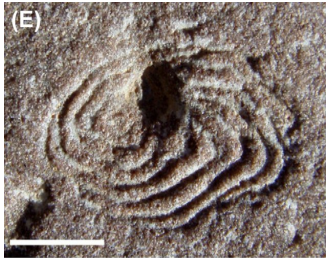
Extant sea pen (Pennatulacea soft corals)



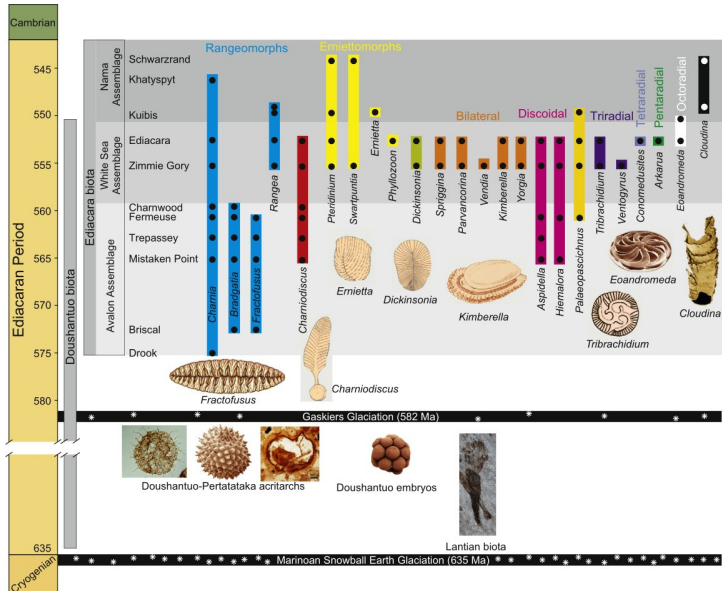
Ediacara Garden: *Dickinsonia*, *Spriggina* etc.



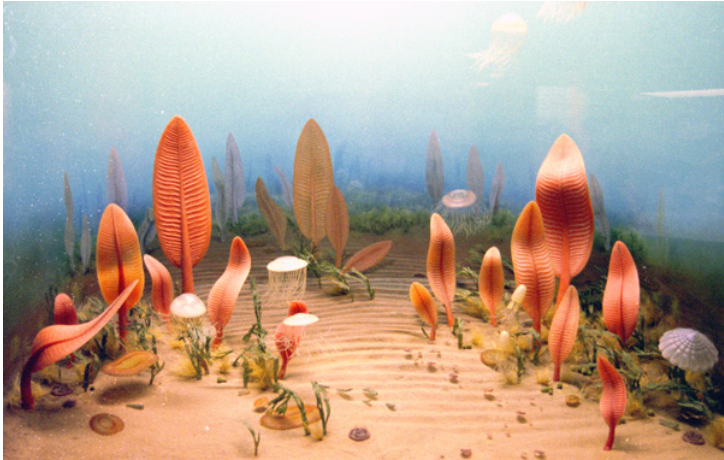
Ediacara Garden: *Eoandromeda*, *Charniodiscus* etc.



Life in Ediacarian



Ediacara “garden”—no predators *of macroscopic size*, nobody had skeleton



Origin of tissues—the most important event in late Precambrian

- Tissues are assemblages of similar cells doing the similar job
- Tissues are one level more over the eukaryotic cells
- Multicellular animals also have multiple tissues whereas multicellular algae and cyanobacteria are still on pre-tissues level of complexity
- Multi-tissued body is a great achievement, except for cancer...



Questions before Exam 2?



Summary

- In Cryogenian, Marinoan glaciation covered the whole Earth
- In Ediacarian, multicellular and then multi-tissued eukaryotes appeared



For Further Reading



Mitosis.

<http://en.wikipedia.org/wiki/Mitosis>



Ediacara biota.

http://en.wikipedia.org/wiki/Ediacara_biota

