

# Introduction to Biology. Lecture 14

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## 1 Where we are?

- Ediacarian period and multicellularity
- First animals

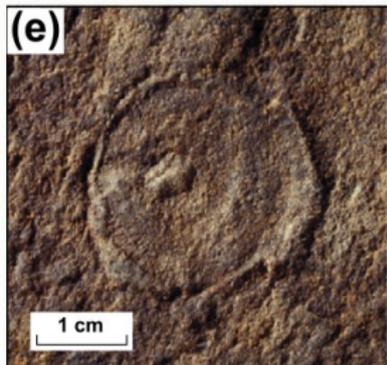
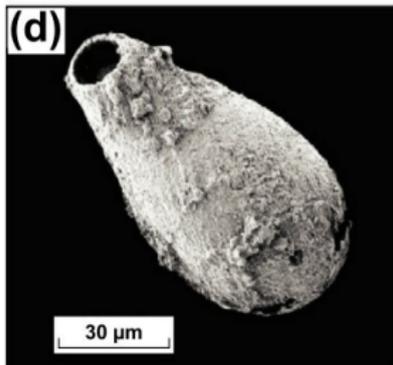
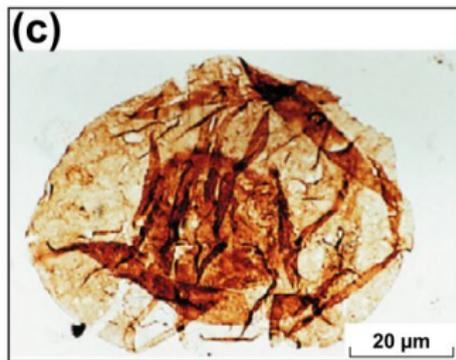
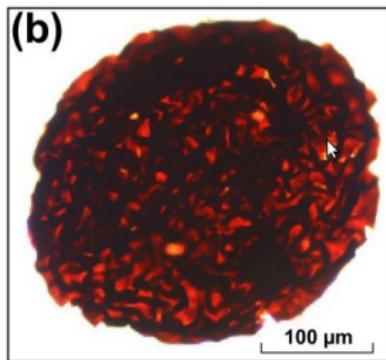
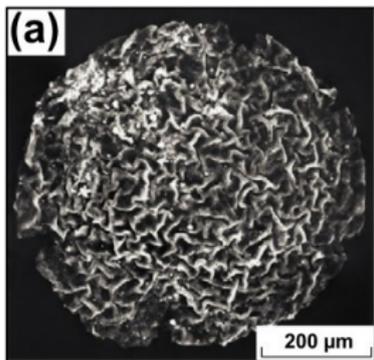


# Marionan glaciation: Snowball Earth

- 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 CO<sub>2</sub>)—small
- As a result, from time to time Earth was completely covered with ice sheet 1 km tall!



# Cryogenian fossils

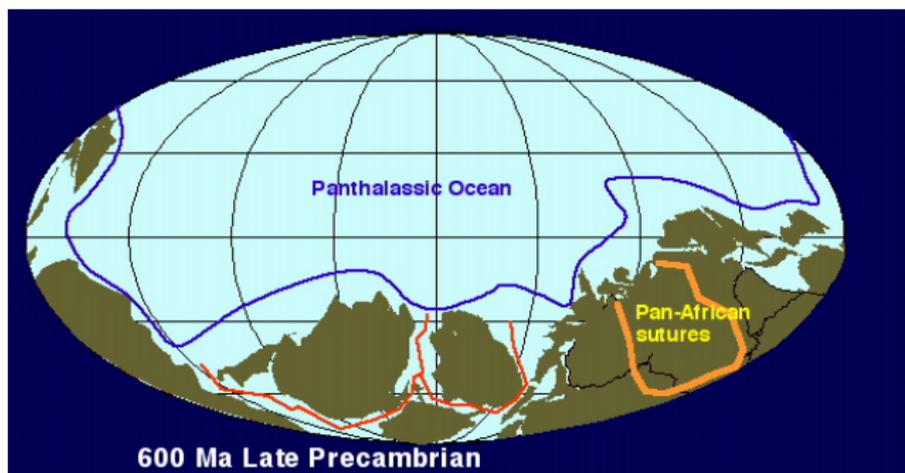


# Where we are?

## Ediacarian period and multicellularity

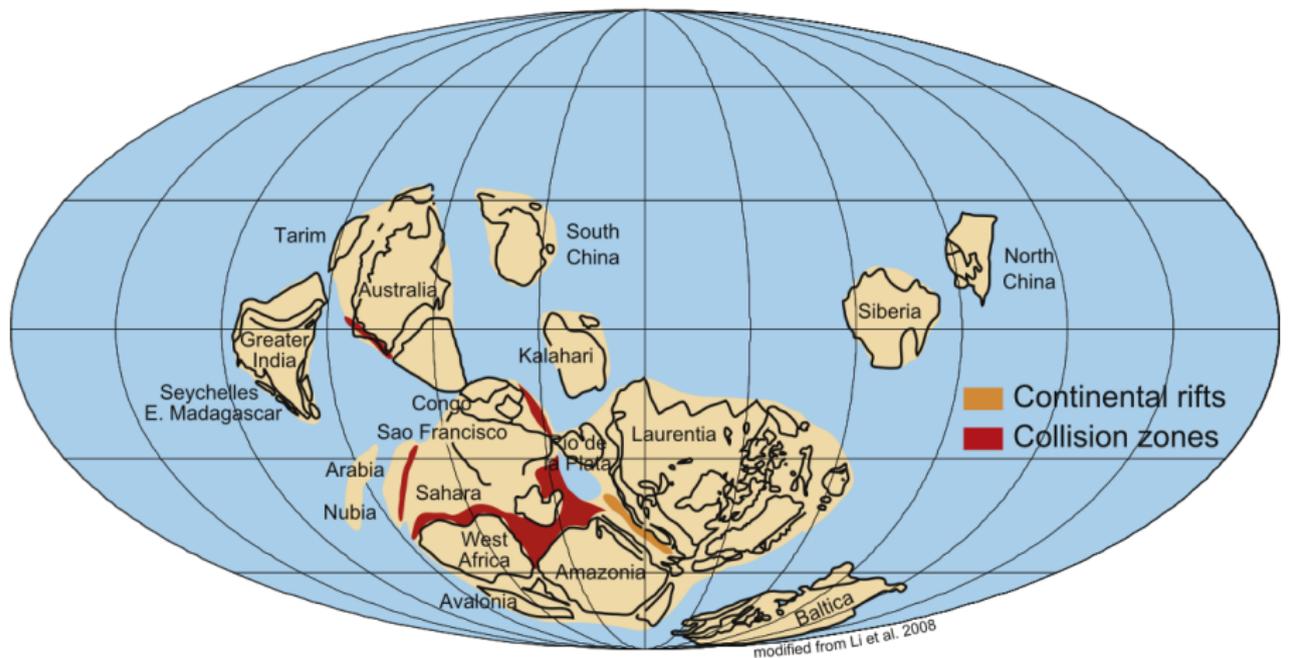


# Rodinia breaks



# Ediacarian continents

### 600 Ma Ediacaran



# First multicellular life

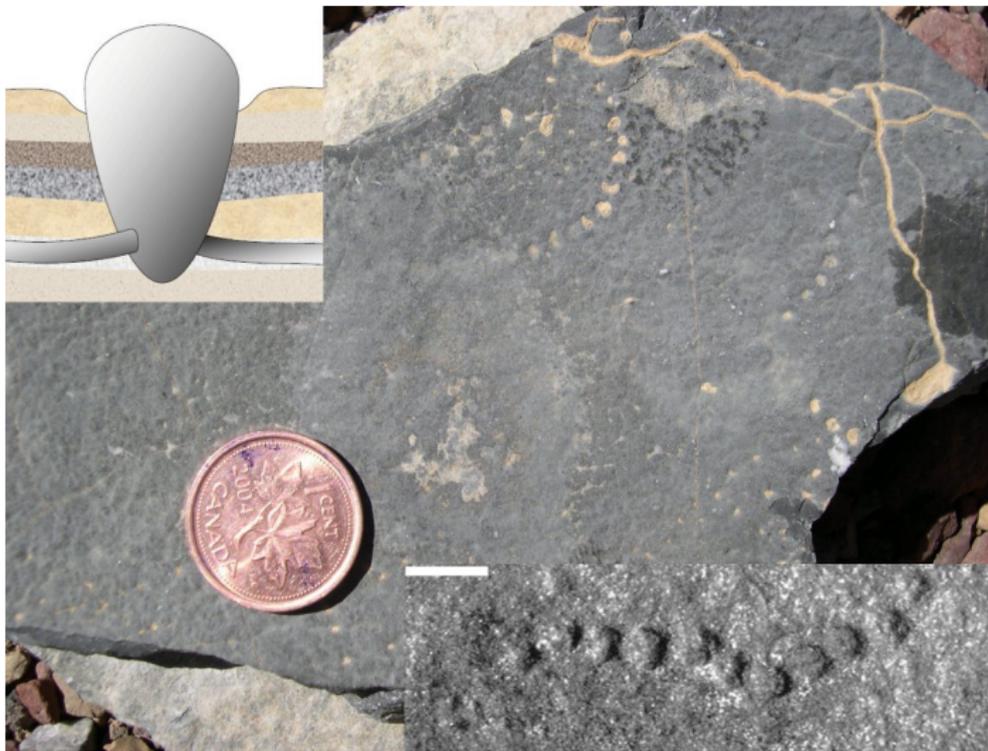
- Apart from enigmatic *Grypania* and *Horodyskia*, multicellular eukaryotes were not known before Ediacarian
- From the beginning of Ediacarian, multicellular Lantian algae were known, and then—fabulous “Ediacara garden”, the fauna of animals without skeleton



# *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

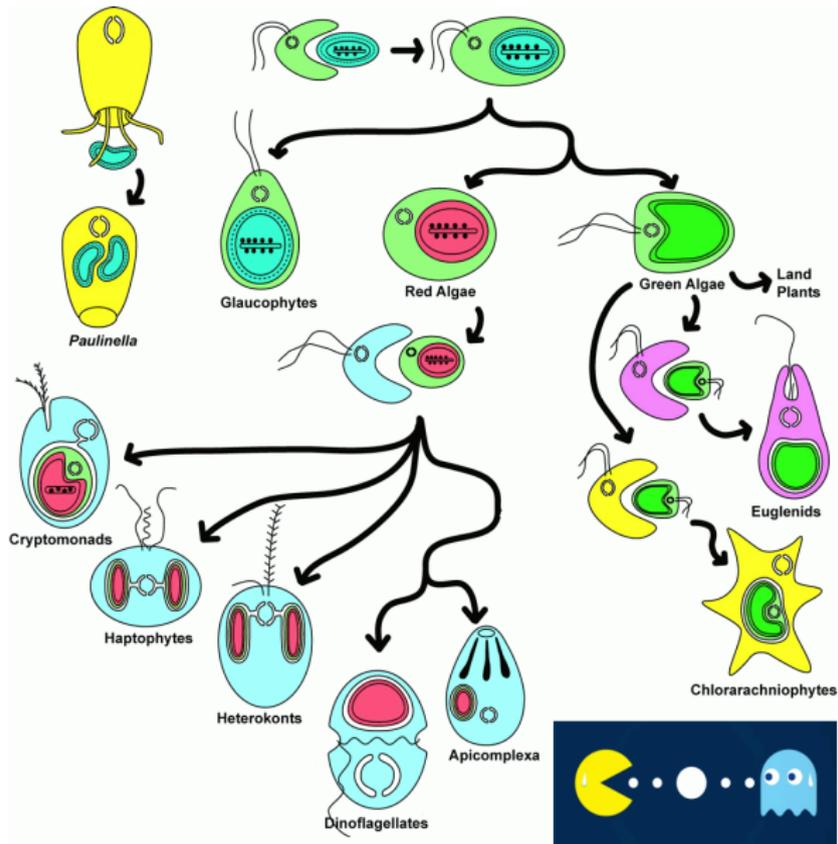


# What are algae?

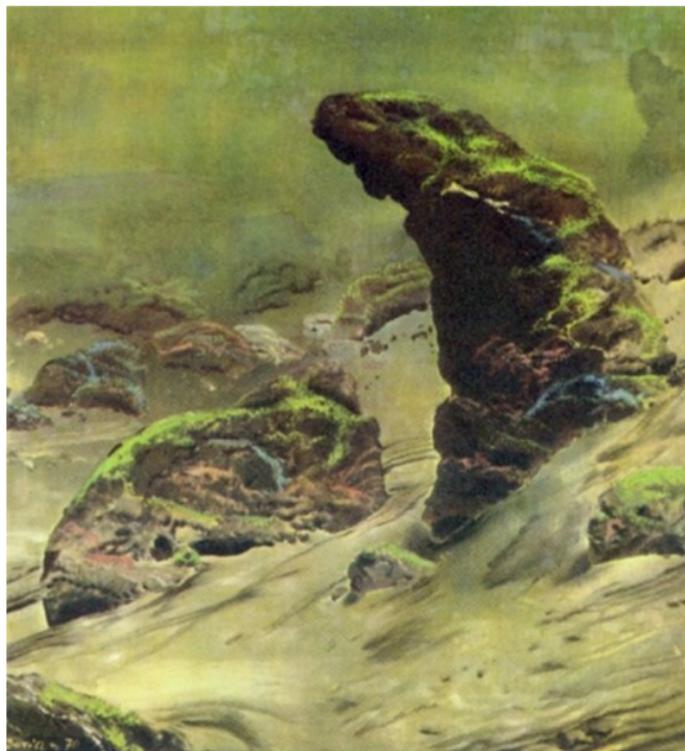
- Eukaryotes which are capable for photosynthesis with chloroplasts
- All chloroplasts were symbiotic (cyanobacteria in the past), and some even secondary symbiotic (other alga in the past)



# “Pacman game” of algae origin



# Life without animals



# Where we are?

## First animals

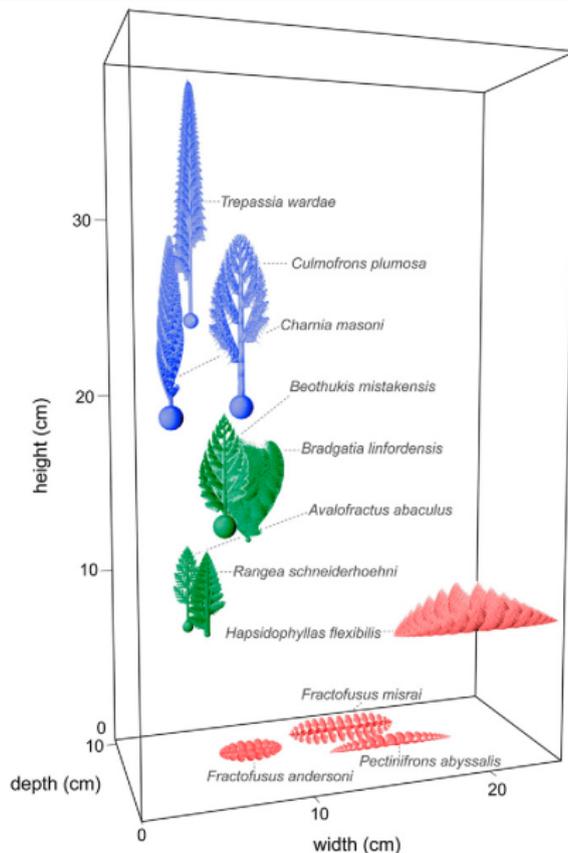




# Finding *Ediacara biota*



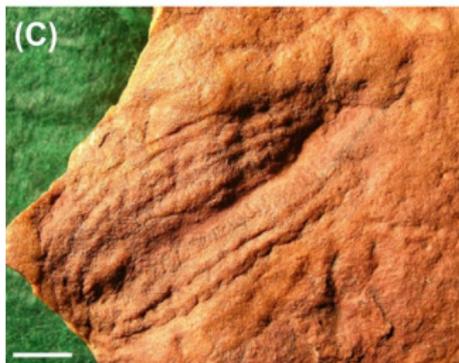
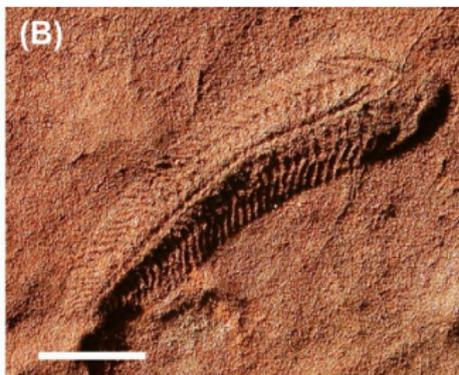
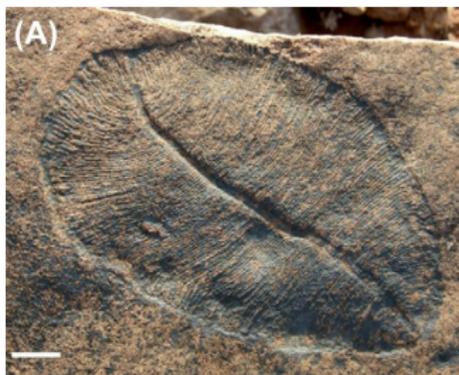
# Mistaken Point (Canada) fauna: rangeomorphs

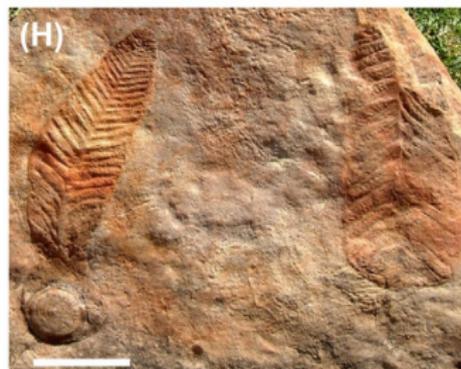
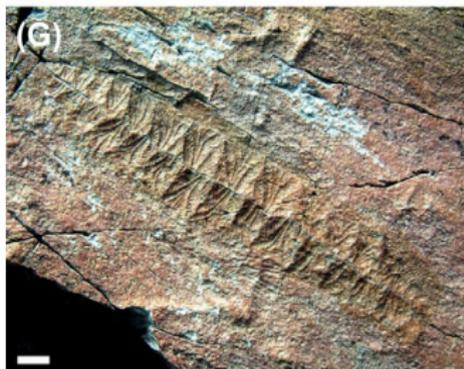


# Extant sea pen (Pennatulacea soft corals)



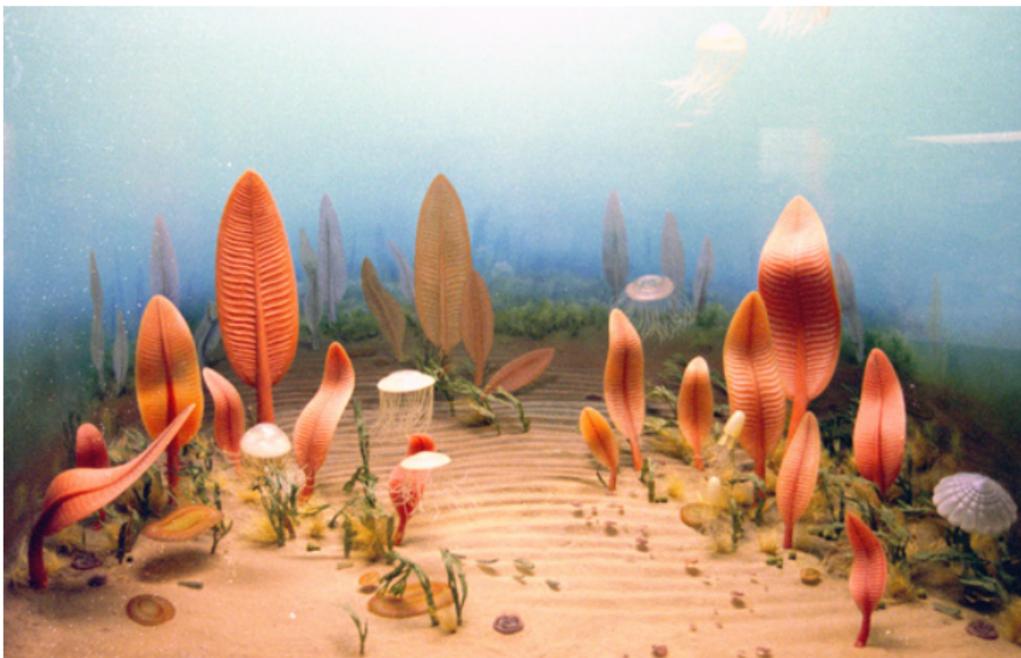
# Ediacara Garden: *Dickinsonia*, *Spriggina* etc.



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



# 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](http://en.wikipedia.org/wiki/Ediacara_biota)

