

# Introduction to Biology. Lecture 18

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# Outline

- 1 Where we are?
  - Precambrian life
- 2 Cells, tissues and kingdoms
  - Pyramid of Life
- 3 Cambrian period
  - Life in Cambrian
  - Cambrian explosion of skeletal fauna



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# Where we are?

## Precambrian life

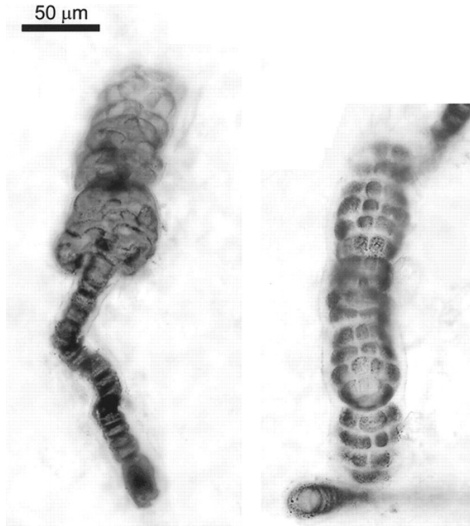


# Precambrian life

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



# One of first multicellular alga with reproductive cells



*Bangiomorpha*, putative red alga from Proterozoic



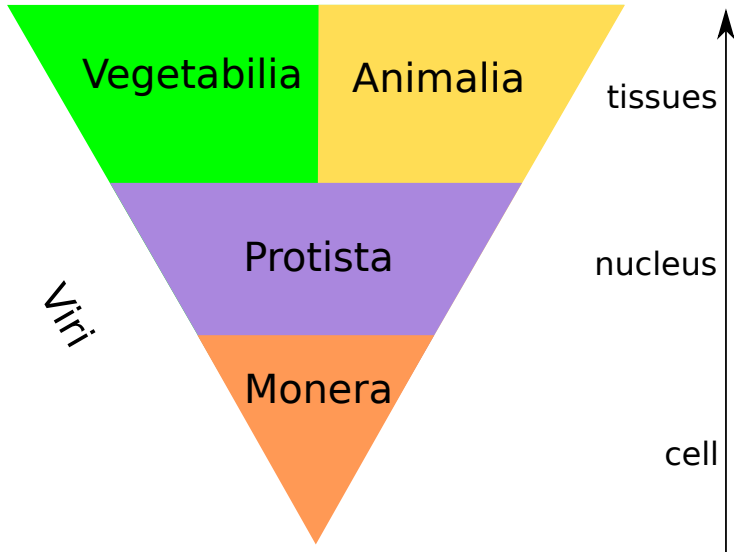
# Cells, tissues and kingdoms

## Pyramid of Life





# Cells, tissues, kingdoms and viruses



# Cambrian period

## Life in Cambrian



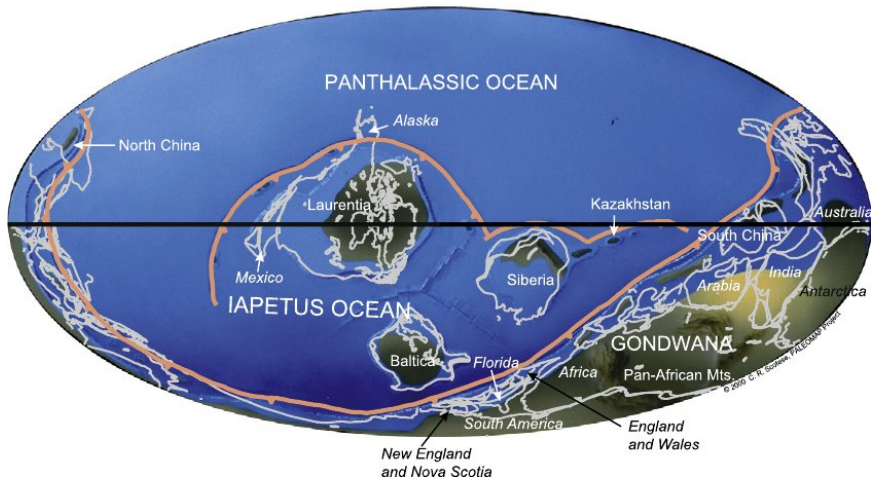
# Timescale of Phanerozoic eon, Paleozoic era

- Phanerozoic eon
  - Paleozoic era
    - Cambrian period: 541 Mya
    - Ordovician period: 485 Mya
    - Silurian period: 443 Mya
    - Devonian period: 419 Mya
    - Carboniferous period: 358 Mya
    - Permian period: 299–252 Mya



# Cambrian map

514 Ma Cambrian



# Cambrian climate

- Gradually changed from colder to warmer
- Polar ice caps were most probably present



# Main Cambrian biotas

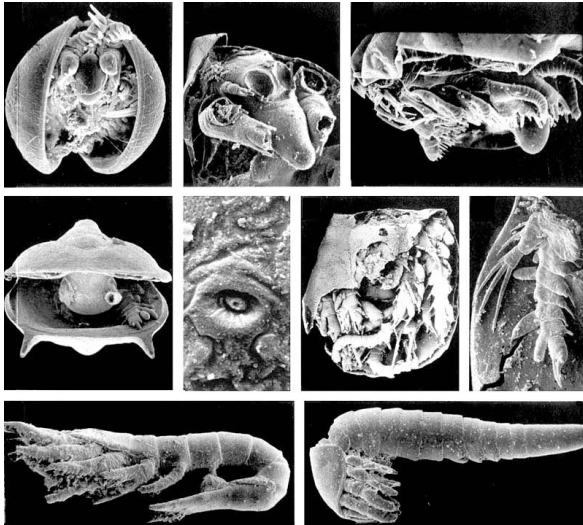
- Burgess shale (505 Mya)
- Orsten fauna (498 Mya)
- These fossils were kept in *Lagerstaettes*—exceptionally well preserves clay deposits
- This excellent preservation could be consequence of the rarity of Cambrian destroyers



# Burgess shale



# Orsten fauna





# Cambrian period

## Cambrian explosion of skeletal fauna



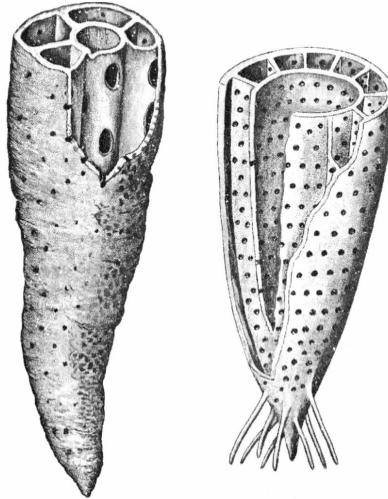
# Life in Cambrian



This is the picture of famous Czech artist Zdenek Burian



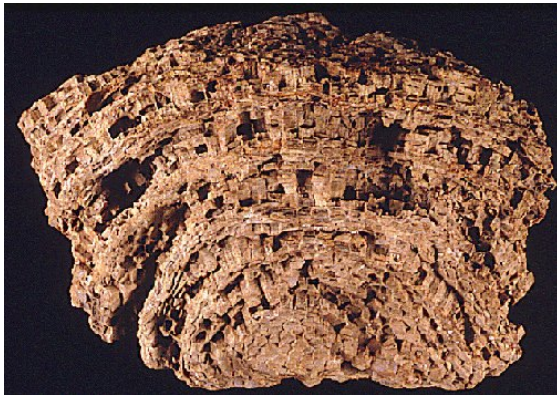
# Archaeocyaths (most probably sponges)



Most probably, Archaeocyaths were sponges

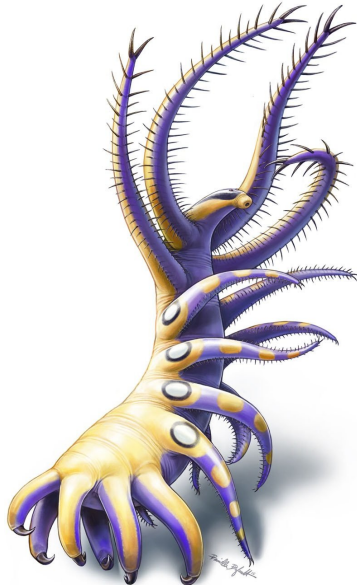


# Cnidaria

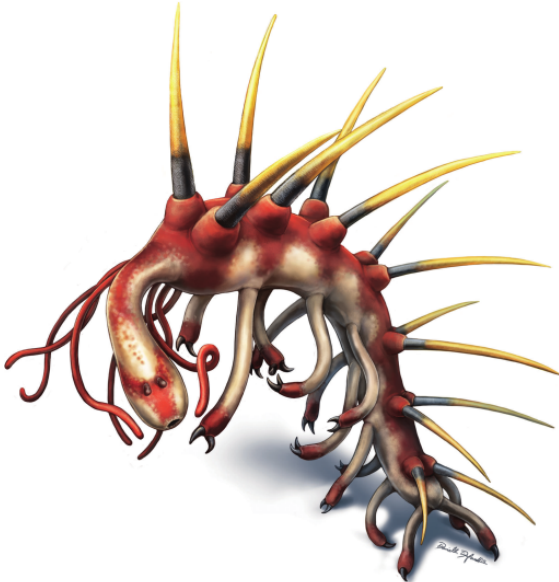


Tabulate coral

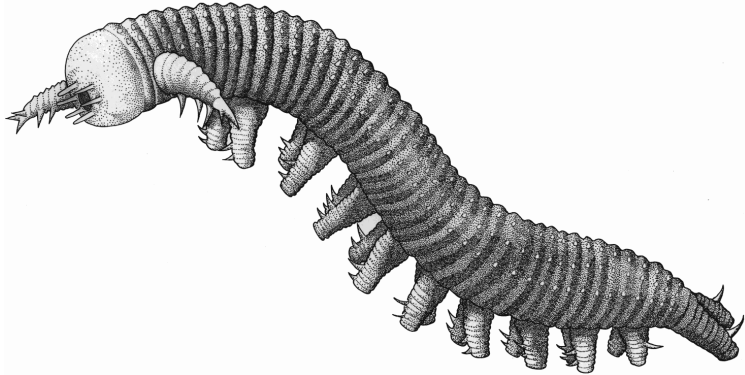
# Lobopod worms: *Ovatiovermis*



# Lobopod worms: *Hallucigenia*



# Lobopod worms: *Aysheaia*

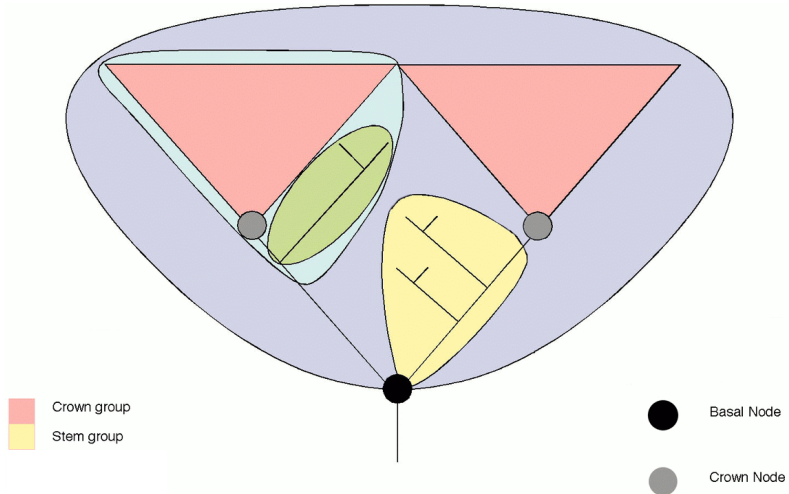


# Stem Arthropods





# Stem and crown groups



Stem group has no immediate sisters among living organisms.



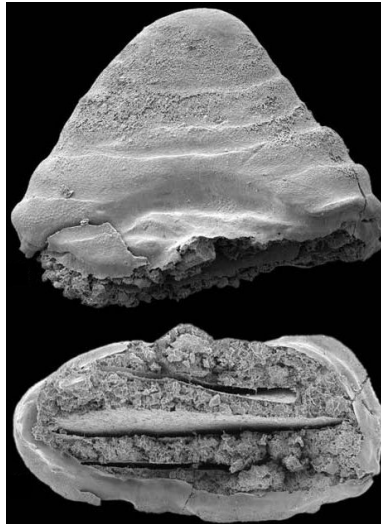
# Mollusks: naked



*Odontogriphus* – stem naked mollusk



## ... and shelled



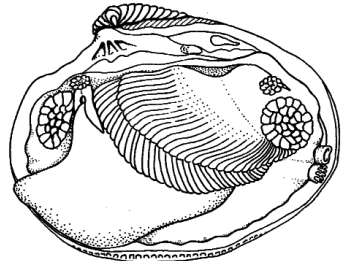
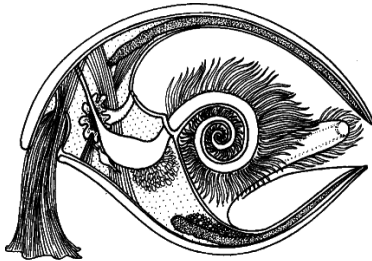
Helcionellid shell-bearing mollusk from Greenland



# Brachiopods



# Brachiopods are not mollusks!



Brachiopoda (left) are completely different internally from bivalve mollusks (right)

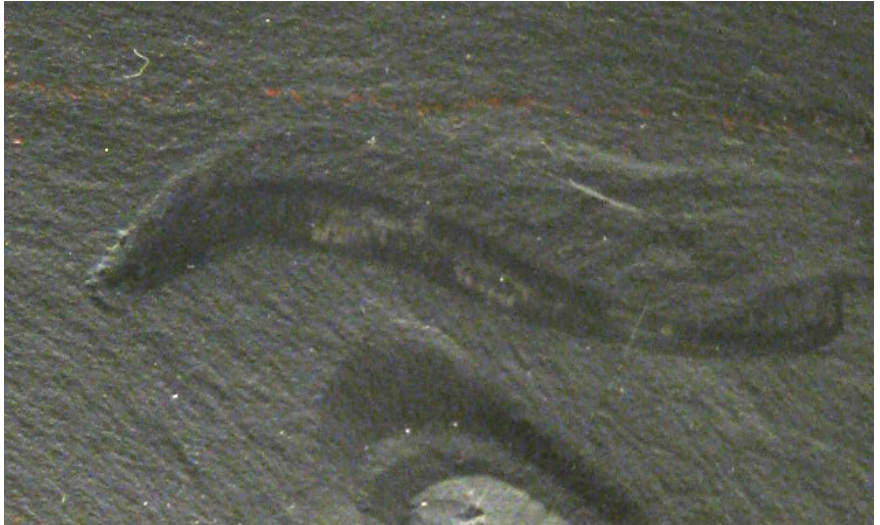
# Echinoderms



Sea lily *Gogia* from Nevada



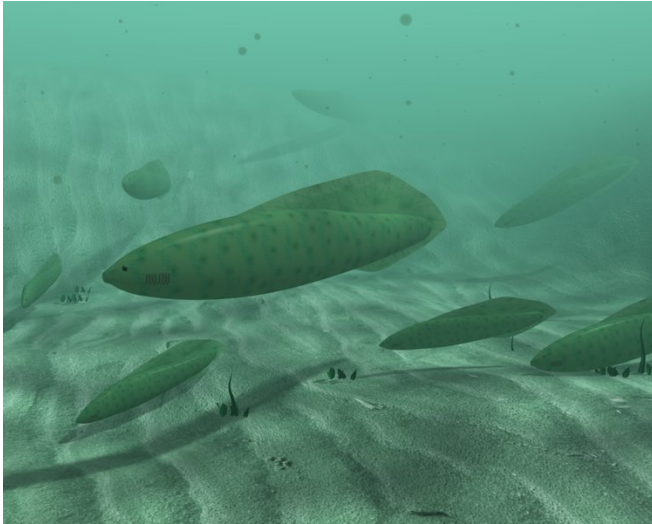
# Soft-bodied chordates



*Pikaia* from Burgess shale



# First fish-like animals: craniate *Haikouichthys*





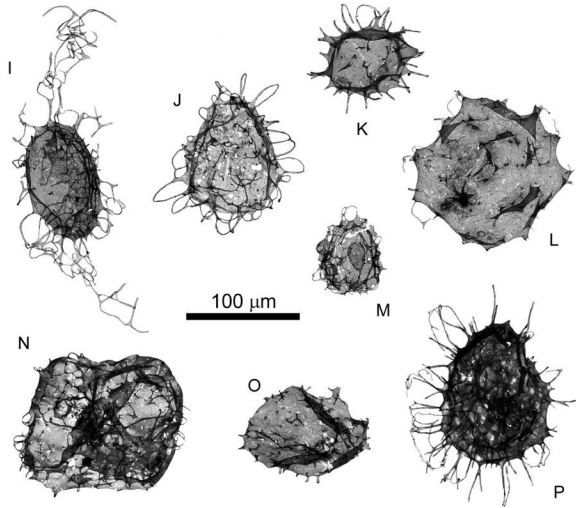
# Algae



*Yuknessia* is a fossil green alga from Utah



# Fungi



*Tappania* fungus was known even before Cambrian



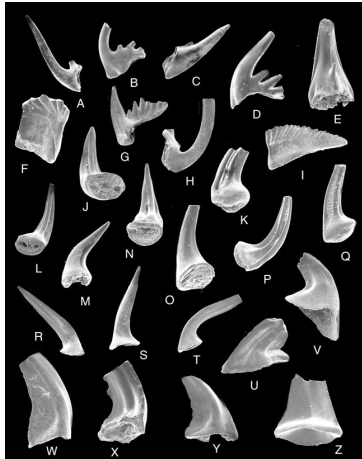
# Problematics: *Aldanophyton*



Terrestrial plant? Or alga?



# Problematics: conodonts



Conodonts are just teeth of unknown animal, it is still not clear what was it. Jawless fish?



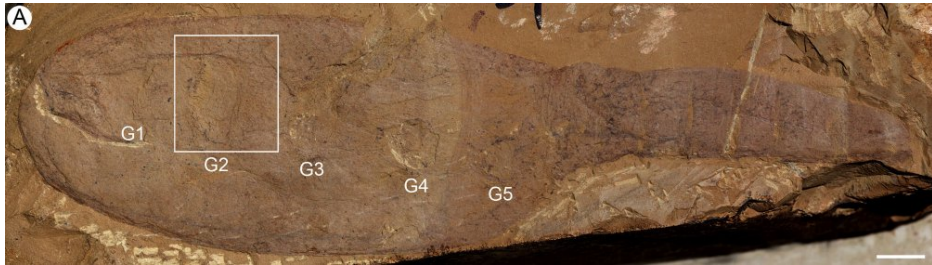
# Problematics: hyoliths



*Haplophrentis*, mollusk? Or separate branch on the tree of life?



# Problematics: vetulicolians



Ancestors of both echinoderms and chordates?

# Recently found *Saccorhytus*



Another possible ancestor of echinoderms and chordates?



# Summary

- Cambrian period started with massive appearance of skeletal fauna: “Cambrian explosion”





# For Further Reading



Cambrian explosion.

[http://en.wikipedia.org/wiki/Cambrian\\_explosion](http://en.wikipedia.org/wiki/Cambrian_explosion)

