Introduction to Biology. Lecture 9

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Outline

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First life

- In Mesoarchaean, cyanobacteria (fossilized as stromatolites) were first
- Photosynthesis changed the atmosphere
- Aerobic life respires to obtain more ATP

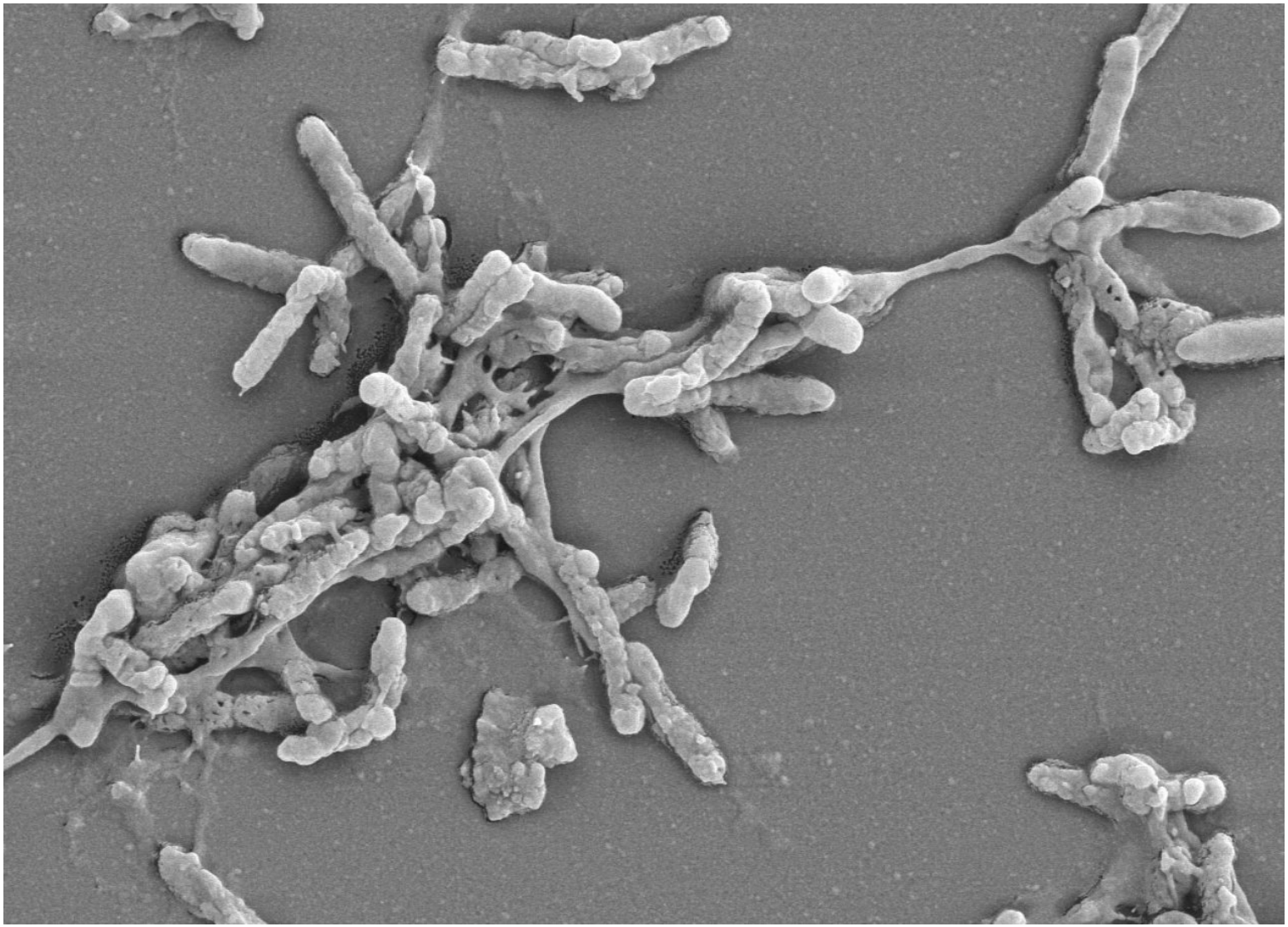
Who was first?

- Stromatolites: microbial mats from (mostly) cyanobacteria (photosynthetic bacteria)
- *Metallogenium* and others: proteobacteria (e.g., aerobic metal-oxidizing bacteria)

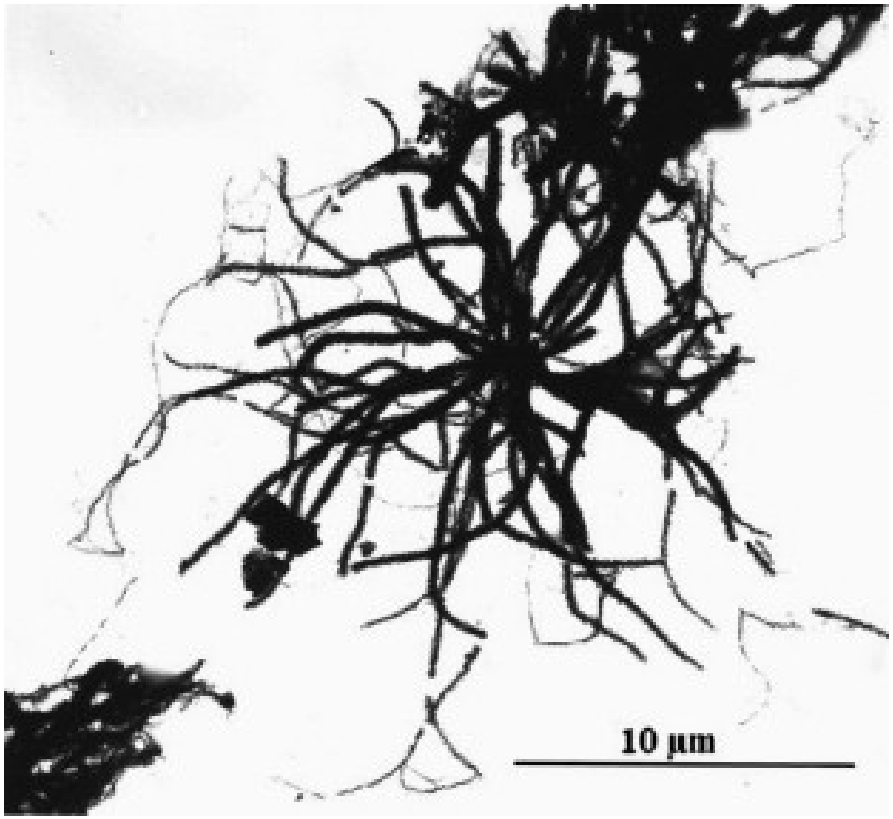
Fossil stromatolite

Pesent-day stromatolite (Shark Bay, Australia)

Present-day iron-oxidizing bacteria



Fossil *Metallogenium*



Cell
Prokaryotic cell

Prokaryotic cell

Main components of prokaryotic cell

- Cell wall
- Membrane
- Cytoplasm
- DNA
- Ribosomes
- Membrane folds and pockets
- Vesicles
- Flagella

Cell
How to be a prokaryote

How to make energy

- Cell respiration and other destructive processes make ATP for all cell
- Photosynthesis and other synthetic processes make ATP and spend it

How to make proteins

- DNA and RNA contain four types of nucleotides
- The sequence of nucleotides is a cypher
- Each tree nucleotides will encode amino acid (“genetic code”)
- Ribosomes translate triplets into amino acids and make proteins

How to take food

- Digestive proteins are transported outside membrane
- They destroy polymers into monomers
- Monomers then are pumping through membrane into the cell
- If cell is photosynthetic, it produce monomers itself

How to make body

- Monomers could be spend:
  - in destructive reactions to obtain ATP, **or**
  - in synthetic reactions to make new polymers. These reactions are using ATP

How to multiply

- DNA is a double helix which may copy itself
- Two copies of DNA untangled and separated, then cytoplasm and membrane divide
- Of course, these processes spend lots of ATP

Summary

- Bacteria were first
- Photosynthesis changed the atmosphere
- Aerobic life respires to obtain more ATP
- Prokaryotic cells are simplest cells
- They produce energy, obtain monomers, synthesize polymers, e.g. proteins from DNA and RNA, and sometimes also make monomers themselves (with photosynthesis), divide and even perform a sexual process (recombine DNA between cells)

For Further Reading

Genetic code.

`http://en.wikipedia.org/wiki/Genetic_code`

Protein biosynthesis.

`http://en.wikipedia.org/wiki/Protein_biosynthesis`