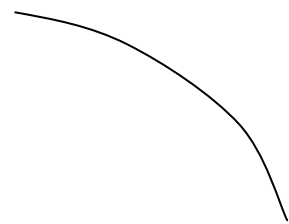


Prokaryotes  
**Bacteria**



Eukaryotes (single-celled)

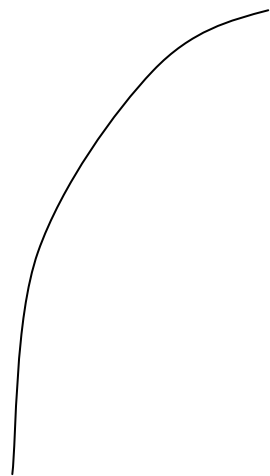
**Protista**

Slime molds

Algae

Protozoans

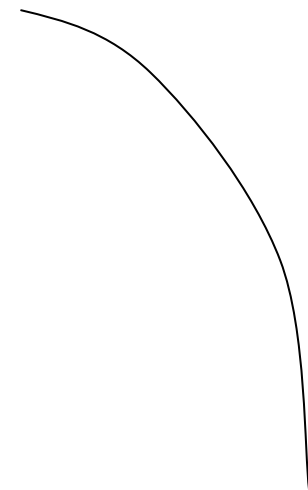
Eukaryotes (multicelled)



**Fungi**



**Plantae**



**Animalia**

**Domain Archaea** – prokaryotic cells, photoautotrophs,  
chemoautotrophs

**Domain Bacteria** – prokaryotic cells, photoautotrophs, heterotrophs

**Domain Eukarya** – eukaryotic cells, multiple organelles

**Kingdom Protista** – single-celled, or conglomerates of  
single cells, heterotrophs and autotrophs

**Kingdom Fungi** – multicelled, heterotrophs with cell walls

**Kingdom Plantae** – multicelled, photoautotrophs with cellulose  
cell walls

**Kingdom Animalia** – multicelled, heterotrophs with  
no cell walls

# Kingdom Archaeobacteria



**Methanogens:** anaerobic metabolic pathway for creating ATP ends with methane ( $\text{CH}_4$ )

ruminant guts, termite guts, swamps, rice paddies, landfills release 2 billion tons of methane per year

# Kingdom Archaeobacteria

**Extreme halophiles:** exceptionally saline environments – even dried, salted fish and salt preserved food can spoil

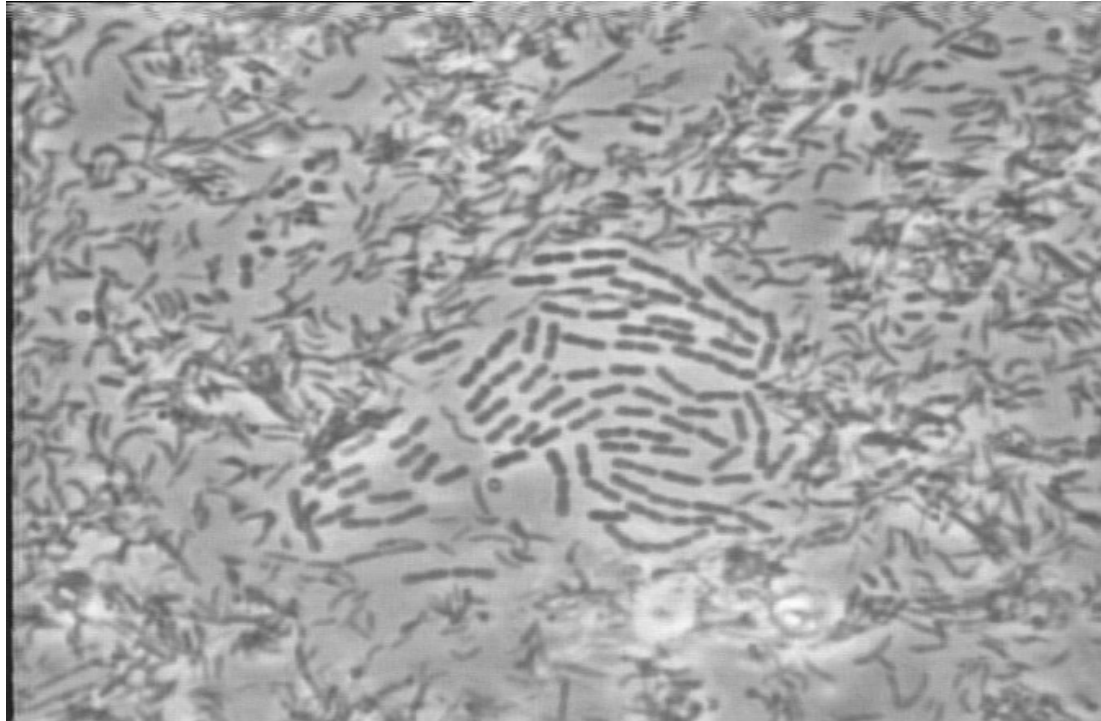
**Extreme thermophiles:** exceptionally hot environments, such as deep sea vents where bacteria may use  $H_2S$  to create ATP; evidence that life may have originated near deep sea vents

# Kingdom Eubacteria



**Cyanobacteria:** blue-green algae may photosynthesize using  $H_2O$ ,  $H_2S$  or  $H_2$ ; also fix nitrogen into ammonia for proteins

# Kingdom Eubacteria



**Chemoheterotrophs:** major symbiotic nitrogen fixing bacteria associated with plants; fermenters of yogurt; plague

Fungi responsible for much of nutrient cycling in forest ecosystem

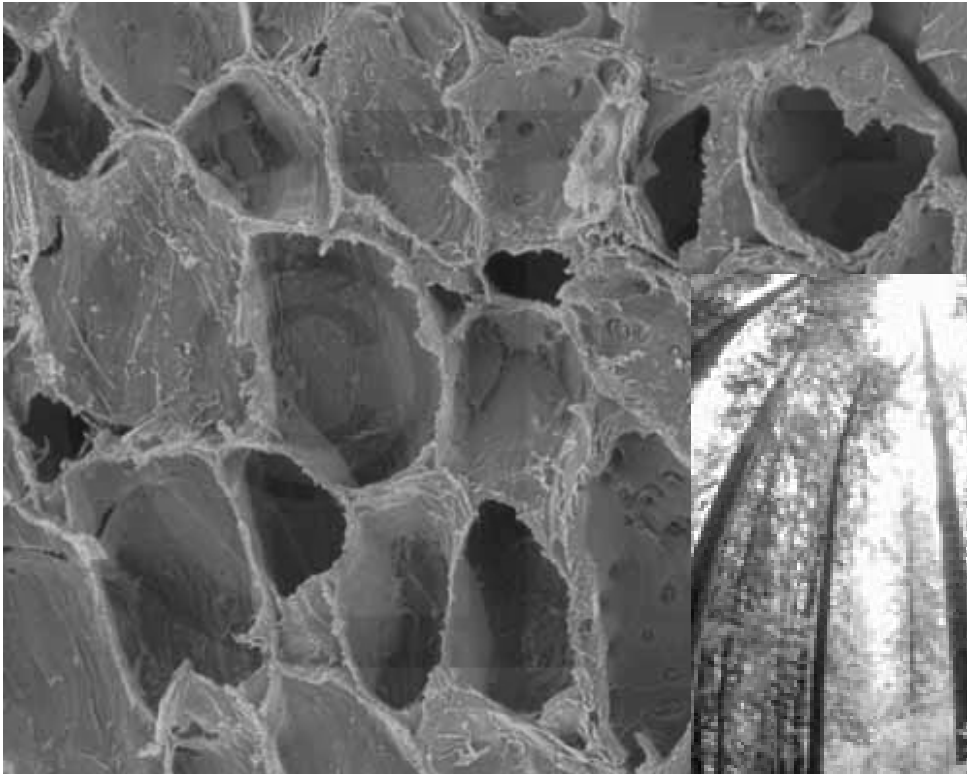
Some trees, once dead, will take several centuries to decompose completely.

Fungi decompose directly as hyphae intercalate into dead cellulose walls

Fungi decompose indirectly through symbiosis in termite guts

# Domain Eukarya

## Kingdom Plantae



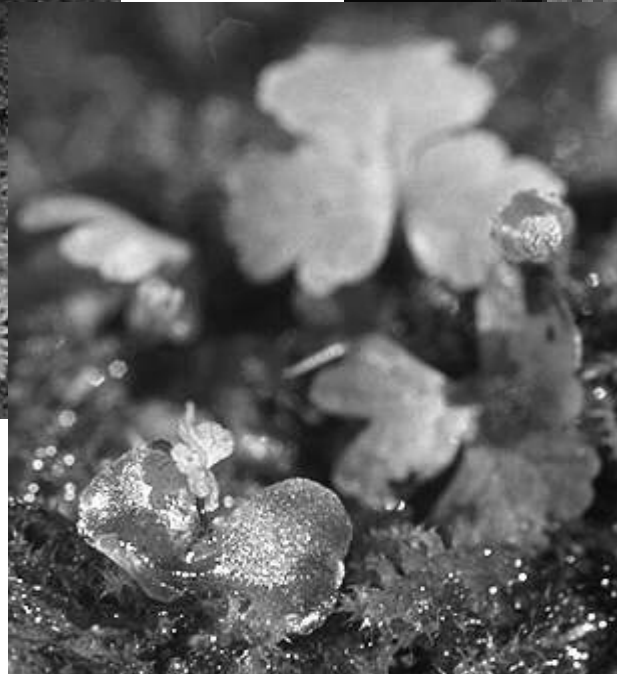
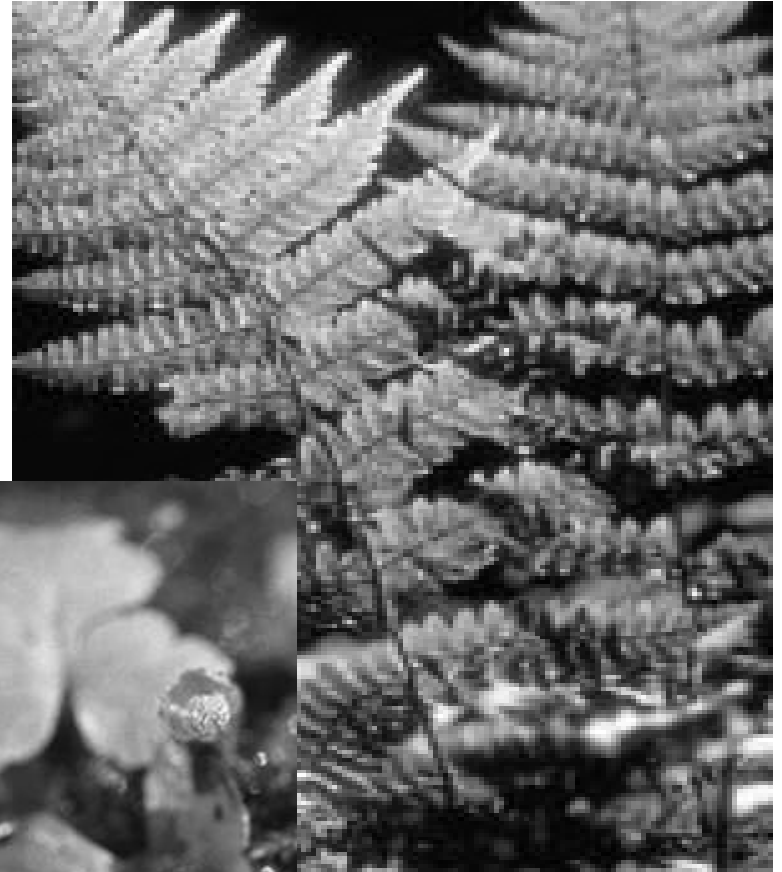
**Colonization of land:**  
originally tied to water-land interface



Advantage in covering the most two-dimensional area

# Domain Eukarya

## Kingdom Plantae



**Ferns – roots, vascular tissues, no seeds**



# Domain Eukarya

## Kingdom Plantae



**Gymnosperms – increase of height,  
gamete dessication resistance, seeds**

# Domain Eukarya

## Kingdom Plantae



**Angiosperms – specialization of focus for reproductive effort, coevolution with insects, increased efficiency of photosynthesis**

