Objectives:
1) Learn that Monera and viruses have important impacts on plants
2) Learn the basic characteristics of prokaryotes and viruses
3) Recognize that some Monera do photosynthesis
4) Recognize that Monerans reproduce through binary fission

The Botanical Interplay of Bacteria and Plants

Nutrient Cycling
- Decomposers
- Nitrogen-fixing bacteria (e.g. Rhizobium)

Infections
- Viral infection is Common
- Virulent infections can cause disasters

Evolutionary Connections
- Plants’ evolutionary ancestors were Monerans
- Chloroplasts & Mitochondria are thought to have arose through endosymbiosis

Characteristics of Monera
- Often referred to as bacteria
- Mostly single celled organisms, but many form colonies
- Structurally simple
  - No major membrane bound organelles
  - Some have thylokoid like structures
- Notable occurrences of cell specialization

- Have cell walls of various thickness
  - Made of glycoproteins
  - Provide structural support and infection barriers
  - Some antibiotics inhibit proper cell wall formation

“Chromosomes” are:
1) Circular
2) Small
3) Attached to the plasma membrane
4) Complemented by plasmids

Reproduction by Binary Fission
Plasmids are not attached and may not be evenly distributed
No genetic variation in the daughter cells, otherwise.

Genetic variation can occur through
Mutation (passive)
Transformation (passive)
Conjugation (active)
Transduction (unintentional)

Generation times are typically 1-3 hours
Some can divide every 20 minutes
If sustained for 24 hours the colony would weigh 1 million kg

So how do you identify if two bacteria are the same species?

**Spore Formation**
Some types of monerans form resistant spores
Spores characteristics
Small
Specialized hardened cell wall
Desiccated, in “suspended animation”
Can be boiled or exposed bleach and remain viable!
Can remain in spore formation for centuries
Colonies can work together to disperse spore

**Monerans are Abundant and Diverse**
Obtain energy in very different ways
Heterotrophs: Derive energy from producers or other consumers.
Chemoautotrophs: Utilize energy from inorganic compounds
Photoautotrophs: Utilize energy from sunlight
Various photosynthetic metabolic pathways
Haloacterium halobium

Cyanobacteria: Have thylakoids and Chlorophyll a
They also have specialized cells for nitrogen fixation
Viruses

[see handout and figure 19.16]