

Major lineages of prokaryotes:

DOMAIN ARCHAEA

3 clades defined by genetic characters (you don't need to know the clades)

DOMAIN BACTERIA (you only need to know these in the context of gram staining.)

- I. **Firmicutes** - low-GC gram positives
- II. **Spirochaetes**
- III. **Actinobacteria** - high-GC gram positives
- IV. **Chlamydiae**
- V. **Cyanobacteria** - also called blue-green algae - filamentous, autotrophs
- VI. **Proteobacteria**

Major lineages of eukarya:

DOMAIN EUKARYA (the main thing you need to know here is the where Animals, Plants, and Fungi reside.)

VII. Amoebozoa (clade, kingdom?)

- A. examples - *Amoeba*, slime molds
- B. no cell walls
- C. wide pseudopodia

VIII. Opisthokonta

- A. examples - choanoflagellates, animals, fungi
- B. flat cristae in mitochondria
- C. flagellated reproductive cells (as in sperm)
- D. **Kingdom Animalia**
 1. multicellular heterotrophs
 2. often motile
 3. unique extracellular matrix
- E. **Kingdom Fungi**

1. multicellular heterotrophs
2. chitinous cell wall
3. often sessile

IX. Excavata

- A. examples - *Euglena*, *Giardia*
- B. pronounced feeding groove
- C. modified mitochondria
 1. mitochondrial DNA found in nucleus

X. Rhizaria

- A. examples - foraminiferans, "shelled amoebas"
- B. slender pseudopodia
- C. no cell walls

XI. Alveolata

- A. examples - ciliates, dinoflagellates, apicomplexa (sporozoa), *Toxoplasma*, *Plasmodium* (causes malaria)
- B. spores
- C. sac-like structures beneath cell membrane (alveoli)

XII. Stramenopila

- A. examples - Diatoms, brown algae, water molds
- B. if flagella exist, usually paired (and branched)

XIII. Kingdom Plantae

- A. examples - green algae, bryophytes, vascular plants
general characteristics
- B. autotrophic - chloroplasts with double membrane
- C. cellulose-based cell wall
- D. alternation of generation
- E. Rhodophyta - red algae
- F. Green Algae (polyphyletic)

NON-VASCULAR PLANTS (paraphyletic)

G. Division Hepaticophyta

1. examples - liverworts (*Marchantia*)
2. grow along surface with broad leafy appearance
3. reproduce with gemmae cups

H. Division Bryophyta

1. true mosses
2. dominant gametophyte, nutritionally dependent sporophyte

I. Division Anthocerophyta

1. examples - hornworts

VASCULAR PLANTS

J. Division Lycophyta

K. Division Polypodiophyta

1. examples - ferns and horsetails
2. nutritionally independent sporophyte and gametophyte

Gymnosperms (extant groups probably monophyletic)

L. Division Ginkgophyta

1. examples - ginkgo
2. woody
3. previously large division

M. Division Cycadophyta

1. examples - queen sago palm
2. reminiscent of palm trees
3. previously large division, now restricted mainly to the tropics

N. Division Gnetophyta

1. examples - gnetae, *Ephedra*, "mormon tea"
2. often found in semi-arid habitats
3. formerly considered closest relatives to angiosperms; probably sister to the conifers

O. Division Coniferophyta

1. examples - pines, firs, spruce, cypress, "hemlock" trees, yew, larch

Angiosperms

P. Division Angiospermae

1. examples - flowering (fruiting) plants

2. Monocotyledons (monocots)

- a) only one cotyledon in seeds
- b) fibrous root systems
- c) parallel venation in leaves

3. Eudicots (Eudicotidae)

- a) two cotyledons in seeds
- b) taproot system
- c) reticulate venation