

# Ch 16: Plant Taxonomy

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**Brief History**

Greek philosophers  
Kingdoms & Genera

**Carolus Linnaeus = Carl von Linne**

Inventions  
species - binomial formal names  
other taxonomic levels: plant classes




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So how many kingdoms?

1969: Whittaker 5  
1990's: Woese 6 (and 3 Domains)

TWO KINGDOMS (TRADITIONAL)	THREE KINGDOMS (HOGG AND HAMCKEL)	FOUR KINGDOMS (COPELAND)	FIVE KINGDOMS (WHITTAKER)	SIX KINGDOMS (WOESE ET AL.)	FEATURES
	Monera Bacteria	Monera Bacteria	Monera Bacteria	Archaea Archaeobacteria	Cells prokaryotic; lack membrane acid
Protocista Bacteria	Protocista Algae	Protocista Algae	Protista Algae	Bacteria True bacteria	Cells prokaryotic; have membrane acid
Algae	Slime molds	Slime molds	Slime molds	Protista	Cells eukaryotic
Slime molds	Flagellate fungi	Flagellate fungi	Flagellate fungi	Algae	
Flagellate fungi	True fungi	Protozoa	Protozoa	Slime molds	
True fungi	Protozoa	Sponges	Sponges	Water molds	
Protozoa	Sponges			Protozoa	
Sponges				Sponges	
		Fungi True fungi	Fungi True fungi	Fungi True fungi	Absorb food in solution
Plantae Bacteria	Plantae Bryophytes	Plantae Bryophytes	Plantae Bryophytes	Plantae Bryophytes	Produce food via photosynthesis
Algae	Vascular plants	Vascular plants	Vascular plants	Vascular plants	
Slime molds					
Flagellate fungi					
True fungi					
Bryophytes					
Vascular plants					
Animalia Protozoa	Animalia Multicellular animals	Animalia Multicellular animals	Animalia Multicellular animals	Animalia Multicellular animals	Ingest food
Sponges					
Multicellular animals					

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What's in Charge?  
International Code of Botanical Nomenclature

Other taxonomic levels  
Domain: Eukarya  
Kingdom: Plantae  
Phylum: Magnoliophyta  
Class: Liliopsida  
Order: Liliales  
Family: Liliaceae  
Genus: *Allium*  
Species: *Allium cepa* L.



common name: onion, cebolla, etc.

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TABLE 16.2 Classification of Organisms in Six Kingdoms	
<b>Domain Archaea</b> Kingdoms Phylum Archaeobacteria (methane, salt, and sulfur bacteria)	Copyright The McGraw-Hill Companies, Inc. Permission is granted for reproduction or display.
<b>Domain Bacteria</b> Kingdoms Phylum Eubacteria Class Eubacterium (ungrouped), purple, and green sulfur bacteria Class Cyanobacteria (cyanobacteria) Class Chlorobacterium (chlorobacteria)	
<b>Domain Eukarya</b> Kingdom Protista Phylum Chlorophyta (green algae) Phylum Charophyta (yellow-green, golden-brown, and brown algae) Phylum Rhodophyta (red algae) Phylum Euglenophyta (euglenoids) Phylum Diatophyta (diatoms) Phylum Cryptophyta (cryptomonads) Phylum Pyrenophyta (fungi) Phylum Chromista (chromists) Phylum Alveolates (dinoflagellates, ciliates, and apicomplexans) Phylum Dinoflagellates (dinoflagellates) Phylum Ciliates (ciliates) Phylum Apicomplexans (apicomplexans) Phylum Sporozoa (sporozoans)	
TABLE 16.2 Classification of Organisms in Six Kingdoms	
<b>Kingdom Fungi</b> Phylum Zygomycota (zygomycetes) Phylum Ascomycota (sac fungi) Phylum Basidiomycota (club fungi) Phylum Microsporidia (microsporidians) Phylum Stramenopila (stramenopiles) Phylum Rhizaria (rhizaria) Phylum Cercozoa (cercozoans) Phylum Alveolates (dinoflagellates, ciliates, and apicomplexans) Phylum Rhodophyta (red algae) Phylum Glaucocystophyta (glaucocystophytes) Phylum Charophyta (charophytes) Phylum Embryophyta (embryophytes) Phylum Glaucocystophytes (glaucocystophytes) Phylum Chlorophyta (chlorophytes) Phylum Charophyta (charophytes) Phylum Rhodophyta (red algae) Phylum Glaucocystophyta (glaucocystophytes) Phylum Charophyta (charophytes) Phylum Embryophyta (embryophytes)	Copyright The McGraw-Hill Companies, Inc. Permission is granted for reproduction or display.
<b>Kingdom Plantae</b> Phylum Charophyta (charophytes) Phylum Embryophyta (embryophytes) Phylum Glaucocystophyta (glaucocystophytes) Phylum Chlorophyta (chlorophytes) Phylum Charophyta (charophytes) Phylum Rhodophyta (red algae) Phylum Glaucocystophyta (glaucocystophytes) Phylum Charophyta (charophytes) Phylum Embryophyta (embryophytes)	
<b>Kingdom Animalia</b> Phylum Cnidaria (cnidarians) Phylum Mollusca (mollusks) Phylum Arthropoda (arthropods) Phylum Chordata (chordates) Phylum Vertebrata (vertebrates) Phylum Cephalopoda (cephalopods) Phylum Mollusca (mollusks) Phylum Annelida (annelids) Phylum Nematoda (nematodes) Phylum Rotifera (rotifers) Phylum Platyhelminthes (flatworms) Phylum Trematoda (trematodes) Phylum Platyhelminthes (flatworms) Phylum Ctenophora (comb jellies) Phylum Scyphozoa (scyphozoans) Phylum Cnidaria (cnidarians) Phylum Mollusca (mollusks) Phylum Annelida (annelids) Phylum Nematoda (nematodes) Phylum Rotifera (rotifers) Phylum Platyhelminthes (flatworms) Phylum Trematoda (trematodes) Phylum Platyhelminthes (flatworms) Phylum Ctenophora (comb jellies) Phylum Scyphozoa (scyphozoans) Phylum Cnidaria (cnidarians)	

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**Dichotomous Key of All Organisms (except animals): a document for identification (only 1st page of 2)**

**A KEY TO MAJOR GROUPS OF ORGANISMS (EXCLUSIVE OF KINGDOM ANIMALIA)**

1. Unicellular prokaryotes organisms with cell walls..... Domain: Bacteria
2. Cell walls without peptidoglycan..... Domain: Archaea
3. Unicellular eukaryotes organisms with or without cell walls..... Domain: Eukarya
4. Digestive organs located and usually must reproductive structures consist of a single cell or with sterile cells surrounding the specialized reproductive structures; organelles not developing into embryos..... Kingdom: Protista
5. Cell walls without chitin..... Kingdom: Fungi
6. Fungi with yellow, brown, or orange pigments more conspicuous than the chlorophyll pigments..... Kingdom: Plantae
7. Fungi with yellow, brown, or orange pigments more conspicuous than the chlorophyll pigments  
8. Food reserves starch; cells with a flagellum at one end and another at right angle to it in several genera..... Phylum: Charophyta
9. Food reserves mannitol; cells with a flagellum at one end and another at right angle to it in several genera..... Phylum: Embryophyta
10. Flagella not in three..... Phylum: Cryptophyta
11. Cells with radiating cellulose microfibrils..... Phylum: Chlorophyta
12. Cells not radiating cellulose microfibrils..... Phylum: Charophyta
13. Chlorophyll a and b..... Phylum: Embryophyta
14. Chlorophyll a and f..... Phylum: Charophyta
15. Chlorophyll a and b..... Phylum: Cryptophyta
16. Chlorophyll a and f..... Phylum: Charophyta
17. Chlorophyll a and b..... Phylum: Embryophyta
18. Chlorophyll a and f..... Phylum: Charophyta
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200. Chlorophyll a and f..... Phylum: Charophyta

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**Taxonomy:** study of classification & naming

**How do we determine how to group organisms?**

**Phylogeny:** actual relationships between organisms (a.k.a. lines of descent)

**Systematics:** study that generates possible phylogenetic relationships, 2 philosophical approaches to doing this:

- a) **Phenetics:** use observable similarities & differences (older and out of favor currently)
- b) **Cladistics:** use only shared, derived characteristics to infer an evolutionary pathway (currently the dominant approach)

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**Some characteristics that are used to figure out the pattern**

1. appearance/form of the organism: includes anatomy, morphology
2. physiology: includes biochemistry linked to structure
3. DNA: genetic information which shapes and controls some of the above

(epigenetics: information that can affect how the DNA is used – this is a relatively new field of study in biology)

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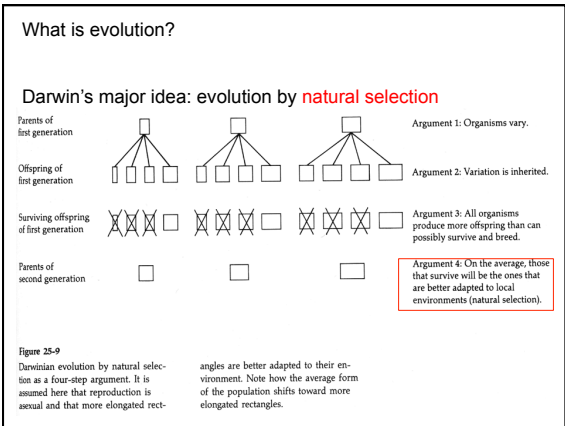
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So what is a **species**?  
It gets complicated...

Don't study "The Species Concept" on p292-296

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