- classes into kingdoms
- classes into phyla
- phyla into kingdoms/domains

All organisms are classified into three domains

Traditional systems recognized eukaryotes and prokaryotes; this is inappropriate because prokaryotes are too diverse

Base sequence of ribosomal RNA determines that there are two distinct groups of prokaryotes; Eubacteria and Archaea

Systems now classify three domains: Eubacteria, Arcahea, and Eukaryota

Archaeans are found in a broad range of habitats such as the ocean surface, deep ocean, and oil deposits; even hostile water environments

Methanogens are obligate anaerobes and give off methane as a waste product; life in cattle and termite guts and are responsible of marsh gas in marshes

Viruses are not classified in any three of the domains; they have gene coding for proteins and the same genetic code but follow too few of the characteristics of life

Feature	Domain		
	Bacteria	Archaea	Eukaryota
Histones associate with DNA			
Presence of introns			
Structure of cell wa			
Cell membrane differences			

Reclassify groups of species when new evidence shows that previous taxon contains species that evolved from different ancestral species

When new evidence shows that members don't have a common ancestor; taxa are split up;

Taxa can also be united, or species are moved from one genus to another or between higher taxa

Classification of humans has caused more controversy than any other species; humans are assigned the order primates and the family Hominidae

There is debate about which of the apes to include in this family; research shows that chimps and gorillas are closer to humans than orangutans

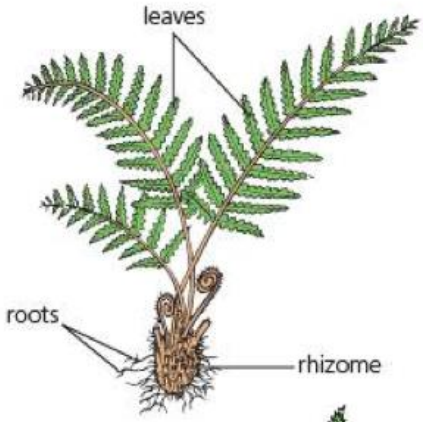
Natural classifications help in identification of species and allow the prediction of characteristics shared by species within a group

Identification of species is easier

- If an organism is found and its not obvious which species it is in; one can assign it to the different levels of taxonomy to narrow it down and learn more about it; dichotomous keys can be used, but this would not work with artificial classification as it is empirical

- Allows for prediction of the characteristics of a species within a group; if a chemical that is useful as a drug is found in one plant in a genus, it is likely to be found in the other species of a genus;

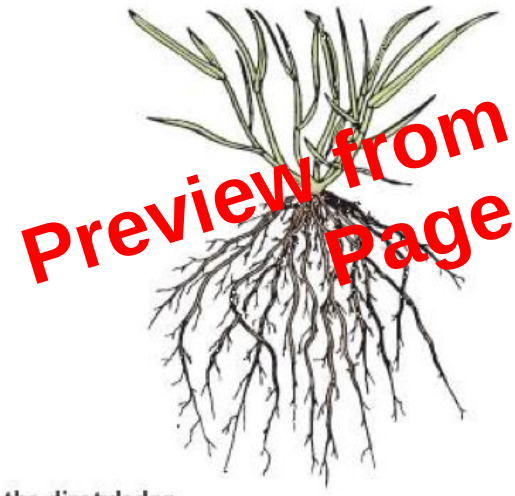
the fern *Dryopteris*



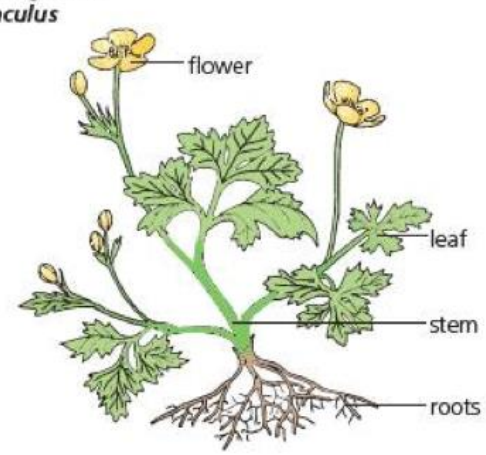
the fern Bracken

Introducing the filicinophytes

- Ferns are green plants with stems, leaves and roots and are well-adapted to terrestrial conditions. (Stems growing just below ground are called rhizomes.)
- Within stem, leaves and roots is vascular tissue for conducting water and nutrients around the plant.
- The leaves are elaborate structures that form tightly coiled up, and uncoil in early growth.
- Leaves are covered by a waxy cuticle that protects against water loss by evaporation.
- Spore-producing structures (sporangia) occur in clusters on the under-surface of the leaves, protected below a flap of tissue.
- Spores are released explosively, thrown some distance, and then germinate to produce a tiny, independent leaf-like plant.
- This tiny gamete-forming plant (haploid) is where the zygote is formed that then grows into a new fern plant.
- Present day ferns are relatively small survivors of an ancient group, dominant within the Carboniferous period (about 355 million years ago). Huge forests grew across a swampy land, with tree-like ferns – now present in today's fossil fuels.



the dicotyledon
Ranunculus



Introducing the angiospermophytes

- The angiospermophytes are the dominant group of land plants. Many are herbaceous (non-woody) plants; others are trees (hard woods) or shrubs.
- The stem, leaves and roots contain vascular tissue (xylem and phloem) that delivers water and nutrients all around the plant.
- Leaves are elaborate structures with a waxy, waterproof covering and pores (stomata) in the surface.
- Flowers are unique to the angiospermophytes, and from them seeds are formed. Seeds are enclosed in an ovary and, after fertilization, the ovary develops into a fruit.
- With development of the flower have come complex mechanisms of pollen transfer and seed dispersal, often involving insects, birds, mammals or wind and water.
- The angiospermophytes are divided into the monocotyledons and dicotyledons.

  The monocotyledons (e.g. the grasses) mostly have parallel veins in their leaves and have a single seed-leaf in the embryo in the seed.
- The dicotyledons (the broad-leaved plants) have net veins in their leaves and two seed leaves in the embryo.

Cladograms are tree diagrams that show the most probable sequence of divergence in clades.

Cladograms are based on similarities and differences between the species in a clade, which is based on amino acid sequences

The principle of parsimony is used by computer programs to show or predict how a species may have evolved; the principle of parsimony is similar to “occam’s razor”, the basic idea is that the explanation or cladogram with the smallest number of base sequence changes or the