Plant Diversity

The Evolution of the Photosynthetic Terrestrial Plants

Land plants Origins

- Shared ancestor with green algae.
- Researchers have identified green algae called charophyceans as the closest relatives of land plants.

Unique Plant Adaptations

Adaptations for a terrestrial existence

1) Roots - anchor the plant and absorb water & nutrients from the soil.
2) Cuticle - a waxy coating to prevent drying out
3) Stomata - pores in the leaves and stems that allow for gas exchange.
4) Conducting vessels - for transport of water, minerals, and sugars through the plant body.
5) Lignin - stiffening and support of stems.
6) Unique reproductive structures e.g. pollen - for transporting gametes.

First true land plants were short and required water for reproduction

Alternation of Generations

The alternating life cycle of plants that involves changes between a:

1) Sporophyte generation

And.......... 2) Gametophyte generation

Alternating Generations

In more advanced plants sporophyte generation dominant.
Contrasting the Generations

**Sporophyte**
- Diploid state (double set of chromosomes in cells – full set)
- Produces seeds in seed bearing plants
- Makes spores
- Predominant form in higher plants e.g. trees.

**Gametophyte**
- Haploid state (half the amount of chromosomes in cells)
- Produces the gametes i.e. (sperm & egg).
- Predominant form in mosses & ferns (lower plants).

Mosses & nonvascular plants have life cycles dominated by gametophytes

**Characteristics of Mosses**

**Division Bryophytes**
- The sporophyte forms on, and is nourished by, the dominant gametophyte
- Nonvascular (don’t have special methods of conducting water & minerals) – tend to be very small.
- Sperm swim through water to eggs (require moist areas e.g. under-story of forest to grow).
- Spores (rather than seeds) are the dispersal form

**Characteristics of Ferns & their kin**

**Vascular Plants**

On the path to getting tall
Adaptation for competing for sunlight

- Most *sporophytes* have *leaves and roots* that grow out from rhizomes (underground stems).
- Spores are dispersed from clusters of sporangia (called SORI) on lower surfaces of frond leaves. Spores give rise to gametophytes.
- *Gametophytes* make sperm & egg – still require moist environments to reproduce.
Fern Life Cycle

In Ferns the Sporophyte generation is dominant. (this is the part we see in a forest)

Common Terms in Plant Reproduction

Archegonia – Enclosed female structure where eggs develop.

Antheridia – Enclosed male structure where sperm develop.

Why are lower plants important?

- Producers in the food chain (make oxygen).
- Provide shelter to small animals e.g. invertebrates like snails & insects.
- Retain moisture – this can be a bad thing for roofs on our houses. Insurance companies recommend removal.
- Ferns used in florist industry $$$
- Peat moss in bogs is used as fuel source & burned in some northern countries e.g. Ireland.
- Mosses in tundra climates hold in CO2 & methane gasses so may play important role in greenhouse gas regulation.