**Adaptations of Land Plants**

For aquatic plants to evolve for life on land, they need to make four important adaptations. Roots, stems, leaves and a vascular system.

* + Roots carry water and nutrients up
	+ The stem is for support
	+ Leaves are for photosynthesis
	+ The vascular system carries water, nutrients and food throughout the plant.

Two other helpful adaptations were the cuticle and the stomata.

* + The cuticle is the thin waxy coat that plant leaves have that prevent the plant from dehydration.
	+ The stomata are tiny holes in a leaf that allow for gas exchange. CO2  in O2 out –also loses some water .

**Some demands of life on land are:**

* Cells need a constant supply of water.
* The parts of the plant that make food must be exposed to as a much sunlight as possible
* Land plants must transport water & nutrients upward and the products of photosynthesis downward.
* Land plants must exchange water and carbon dioxide with the environment without losing too much water.
* Fully terrestrial plants must be able to reproduce without standing water.
* The bryophytes have partially solved these problems. They no longer need to be submerged in water. However, they do need to be moist & must have standing water to reproduce.

**Ferns !**

THE MOST PRIMITIVE TRACHEOPHYTES (Phylum) ARE THE FERNS

* FERNS belong to Subphylum :PTERIDOPHYTA – “WINGED PLANT”

**Ferns in general**

* The most successful seedless plants belong to the subphyla Pteridophyta 🡪 the fern.
* Ferns range in size from 2mm to 15 m tall.
* Ferns play an important ecological role. They are pioneer plants.
* After a fire or some natural disaster wipes out the vegetation in an area, ferns are quite often the first plants to take root.
* Once ferns are established in an area, animals will come to them and other seeds will be dropped and germinate.
* Ferns have an economical role as well. Many people eat ferns 🡪 called fiddleheads. Also used as flora decorations.

**Characteristics:**

* Vascular system
* Underground stem = “rhizome”
* Leaves above ground = “fronds”
* 1 leaf! [divides into many segments]
* Most abundant in moist habitats
* possess a primitive vascular system with tracheids (elongated cells in the xylem)

**Adaptations**

* Most important adaptation is the vascular tissue.
* Two types of vascular tissue –
	+ xylem is dead tissue that moves water and nutrients up.
	+ Phloem is living tissue that moves the products of photosynthesis throughout the plant.
* True leaves – help in photosynthesis
* Roots(rhizomes) – the absorption of water, minerals and nutrients.
* Cuticle – waterproofing layer helps prevent plant from drying out.

**Reproduction:**

* dominant stage = sporophyte
* Spores released from sporangium
	+ Clustered in groups on underside of leaf; “sorus” [pl. sori]
* Sperm must still swim to egg
* The gametophyte is called a prothallus and is independent of the sporophyte.
* Sperm is produced in the antheridia and eggs are produced in the archagonia.
* The first cell produced after fertilization is called a zygote and forms the prothallus.

Asexual Reproduction of ferns:

* fragmentation - parts breaking off the plant
* gametophyte - sometimes live independently with no sporophyte generation

