

# Vascular Plants...

Part 1:  
Introduction and  
Lycophyta, Sphenophyta, Pterophyta,  
Psilophyta

Comparing Spore-Bearing Vascular Plants

Psilophyta	Lycophyta	Sphenophyta	Pterophyta
Whisk Ferns	Club Mosses	Horsetails	Ferns
Vascular tissue	By vascular tissue	By vascular tissue	By vascular tissue
Underground rhizomes	Look like miniature pine trees; scalelike leaves	True leaves, stems, and roots	Creeping or underground rhizomes (stems); fronds (leaves); some have no roots or leaves
No true roots			
Few if any stems			

## Vascular tissue:

- Tissues that transport materials throughout the plant.
- Extend from the root tips through the stem and into the leaves of vascular plants.
  - Xylem
    - Series of dead tubular cells that are joined end to end.
    - Transport materials upward from the roots
  - Phloem
    - Series of live tubular cells that are joined end to end.
    - Transport materials downward from the leaves

## Lycophyta:

- Ancient Lycophytes
  - Appeared 390 million years ago (mya)
  - Grew to 30 m tall
  - Extremely abundant due to the moist warm environment
  - Most died out 280 mya due to a new drier cooler environment



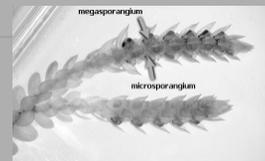
## Lycophyta:

- Modern Lycophytes
  - Much smaller than ancestors
  - Grow close to the ground
  - Found mainly in moist/damp forests
    - Can be found in deserts and mountains though
  - AKA the Club mosses and Spike mosses because they look like the moss gametophytes—but they are NOT MOSSES!
  - Sporophyte generation is dominant
    - Have roots, stems, leaves



## Lycophyta Leaves and reproduction?

- Leaves protect the reproductive cells
- Leaves occur in spirals, whorls, pairs
- Leaves form clusters called STROBILUS at the end of stems.



## Lycophyte Reproduction/Life Cycle:

- Sporangium burst and release spores
- Prothallus: gametophytes formed from spores; relatively small; lives in or on the soil; form both archegonia and antheridia;
- In some lycophytes, 2 types of spores form
  - Small spores: become male prothallus
    - Form antheridium
  - Large spores: become female prothallus
    - Form archegonium
- Sperm from the antheridium swim through a film of water on the prothallus to the egg in an archegonium and fertilize the egg.
- Then a sporophyte plant grows from the zygote.

## Sphenophyta:



- Horsetails or Scouring rushes
  - Look like horsetails and contain silica that helped to scour dishes and utensils.
- Ancient members were tree sized, today, they grow only to a maximum of 1 m.
- Sphenophytes have jointed stems
- Leaves form strobillus at the tips of some stems
- Most grow in marshes, stream banks; damp soil
- Some grow in fields, roadsides; in drier areas
- Reproduction very similar to Lycophytes.

## Pterophyta:

- True ferns
- Appeared ~400 mya
- Again, ancient ferns grew tall and tree-like while today's ferns are much smaller and shrub sized.
- Sporophytes dominant
  - Contain leaves, stems, roots
  - Leaves are called fronds and are divided into leaflets called pinnae (newly opening leaves are nicknamed fiddleheads)
  - In most ferns, the stems are underground and are called rhizomes
- Live in multitudes of environments
  - Damp forests, dry areas, rocky cliffs, float in water, mud
- Life cycle similar to other spore producing vascular plants
  - Spores produced in sporangia
  - Clusters of sporangia form a sorus (sori plural) which are found on pinnae in most ferns.

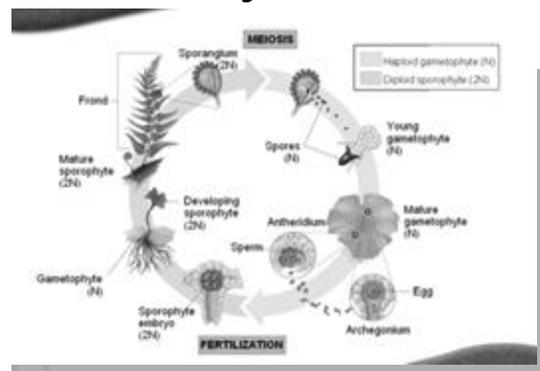


## Fern Reproduction and Life Cycle:

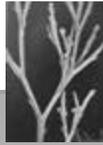


- Sporangium burst and release spores
- Prothallus: heart-shaped gametophytes formed from spores; relatively small; lives in or on the soil; form both archegonia and antheridia;
- In some ferns, 2 types of spores form
  - Small spores: become male prothallus
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- Sperm from the antheridium swim through a film of water on the prothallus to the egg in an archegonium and fertilize the egg.
- Then a sporophyte plant grows from the zygote.
- Sporophytes mature and roots and fronds grow from rhizomes.
- Pinnae (frond leaflets) and Sori (clusters of sporangia) develop.

## The Life Cycle of a Fern



## Psilophyta



- Live in tropical area
- Very hard to grow
- People are asked not to remove them from their natural habitat—because of how hard it is to get them to grow.
- Called the living fossils because they are very similar to the earliest tracheophytes from the silurian and devonian periods.

## Psilophyta



- Have underground stems called rhizomes
- Have no true stems
- Have few if any true leaves
- Hawaiians use the spores as talcum powder
- Two genera remain
  - Psilotum
  - Tmesipteris

