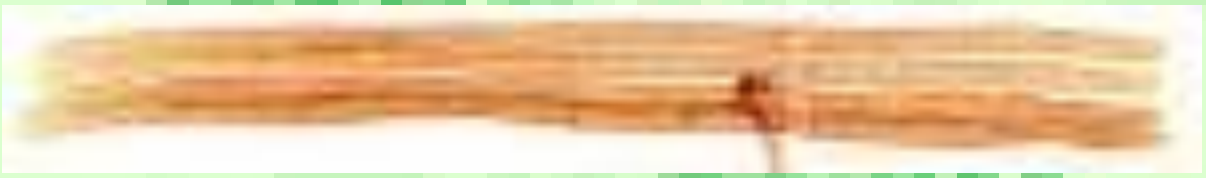
Seedless Vascular Plants
Section 22-3

Evolving about 420 million years ago were plants that contained vascular tissue, a type of tissue that is specialized to conduct water and nutrients through the body of the plant.

Evolution of Vascular Tissue

- **Tracheids are the key cells that make up the xylem.**
  - **a form of vascular tissue that carries water up from the roots.**

- are hollow cells with thick cell walls that resist pressure.
- connected end to end like a series of drinking straws.



- **Phloem is the second type of vascular tissue.**
  - **it transports nutrients and carbohydrates produced by photosynthesis**
- **Vascular plants also produce lignin, a substance that makes cell walls rigid. It allows the plant to grow upright and reach great heights.**

Ferns and Their Relatives

- **Seedless vascular plants include:**
  - **Club mosses**
  - **Horsetails**
  - **Ferns (most numerous)**
- **Ferns and their relatives have true roots, leaves and stems.**

- **Roots are underground organs that absorb water and minerals. Water conducting tissues are in the center of the root.**
- **Leaves are photosynthetic organs and contain one or more bundles of vascular tissue.**
  - **This vascular tissue is gathered into veins made up of xylem and phloem.**
- **Stems are supporting structures that connect roots and leaves, carrying water and nutrients between them.**

Club Mosses

- **Club mosses belong in the phylum Lycophyta**
- **They are small plants that live in moist woodlands and near streambeds and marshes.**

- ***Lycopodium*, the common club moss looks like a miniature pine tree**
- **Club moss is also called "ground pine"**

Horsetails

- **The only living genus in the phylum Arthrophyta is *Equisetum*.**
- **Its leaves are arranged in whirls at joints along the stem.**

- ***Equisetum*** **is called horsetail or scouring rush because its stem look similar to horses' tails and contain crystals of silica.**
- **During Colonial times, horsetails were commonly used to scour pots and pans.**

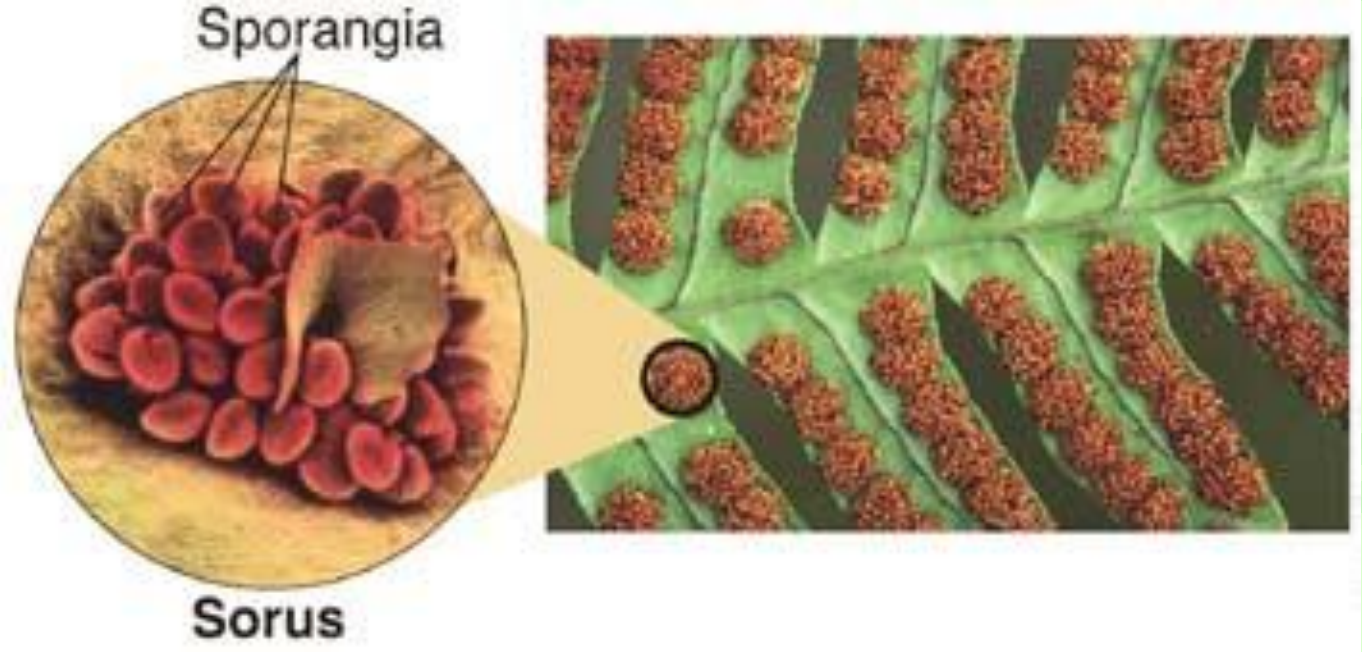
Ferns

- Ferns are members of the phylum Pterophyta
- They have true vascular tissue, strong roots, creeping or underground stems called rhizomes and large leaves called fronds.
- Thrive in areas with little light, found in shadows of forest trees and are abundant in the Pacific Northwest rain forests.

Life Cycle of Ferns

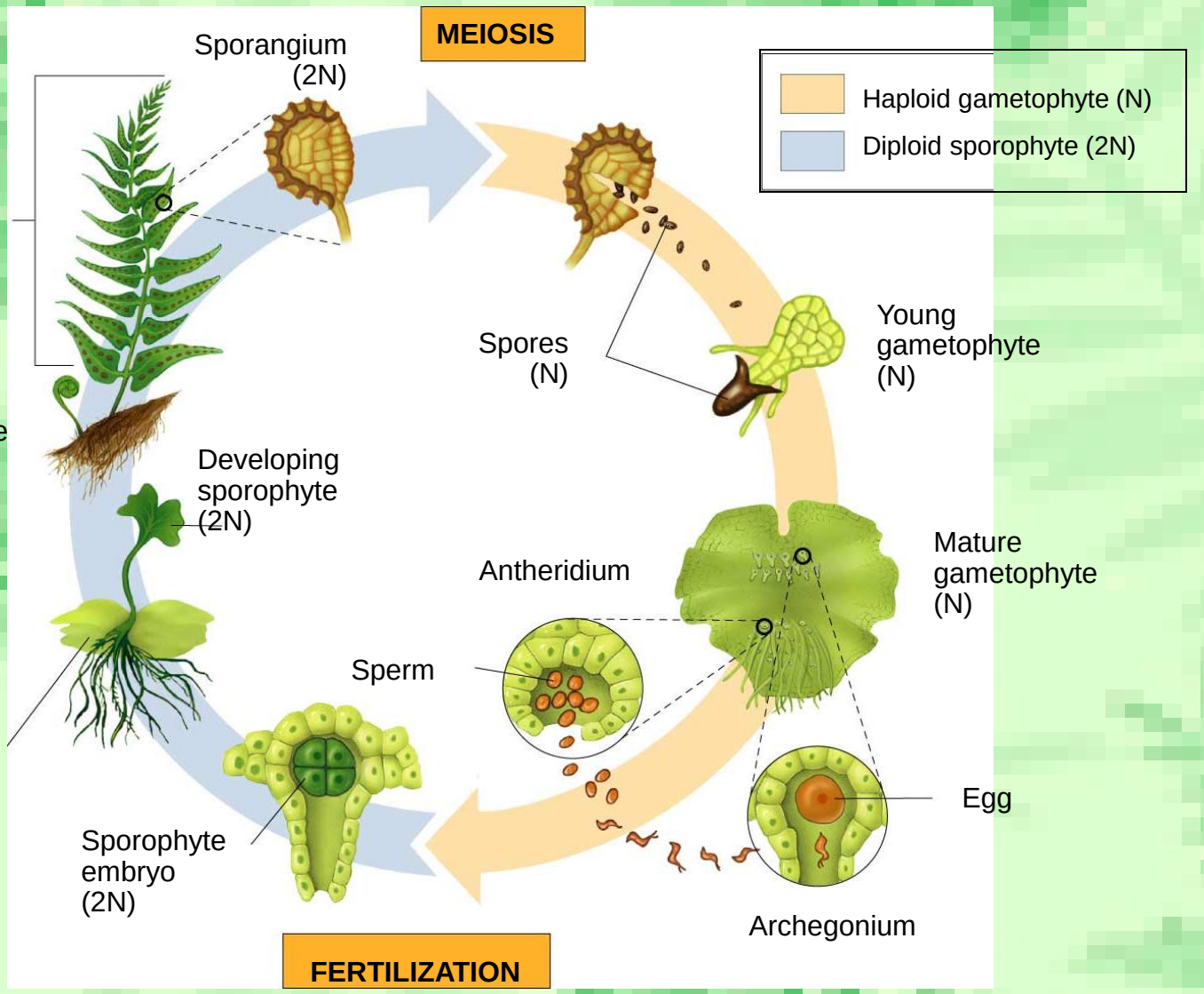
- **Ferns and other vascular plants have a life cycle in which the diploid sporophyte is the dominant stage.**
- **Fern sporophytes produce haploid spores on the underside of their fronds in tiny containers called sporangia.**

- **Sporangia are grouped into clusters called sori.**



1. When spores germinate, they develop into haploid gametophytes.
2. The small gametophyte first grows a set of rootlike rhizoids and then flattens into a thin, heart shaped, green structure that is the mature gametophyte.
3. The gametophyte grows independently of the sporophyte.
4. The antheridia and archegonia are found on the underside of the gametophyte.

Life Cycle of a Fern



5. Fertilization requires a thin film of water for the sperm to swim to the egg.

6. The diploid zygote immediately begins to grow into a new sporophyte plant.

7. As the sporophyte grows, the gametophyte withers away.