

Gymnosperms

Phylum Tracheophyta





cycad



Ginko plant

Characteristics of Gymnosperms

- Chloroplasts for photosynthesis
- Alternation of generations
- “Naked seeds” in cone like structures
- Vascular tissue
- Meristem tissue
- Roots cover a wide surface area – good for where soil is thin



Alternation of Generations - gymnosperms

- Male cones: meiosis occurs on spores to produce haploid ***pollen*** grains, each containing a male gametophyte called a ***microspore***.



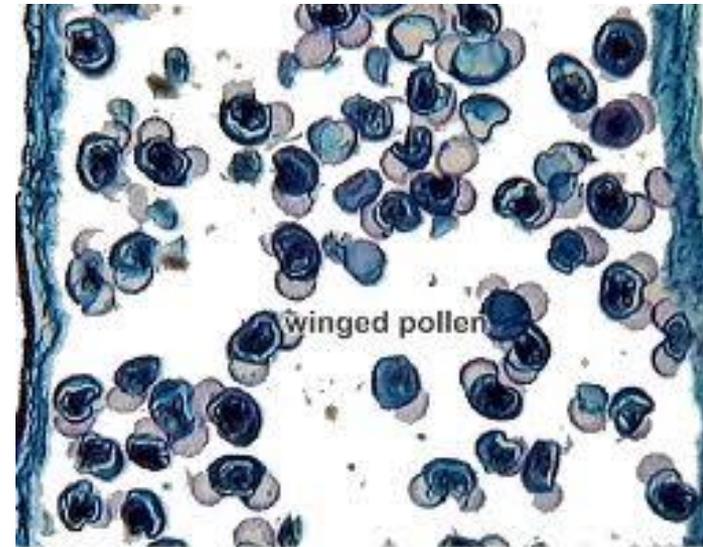
Alternation of generations continued

- Female cones – ovules – meiosis produces haploid spore (only one survives)
- Develops into the female gametophyte called a *megaspore*



Alternation of generations continued

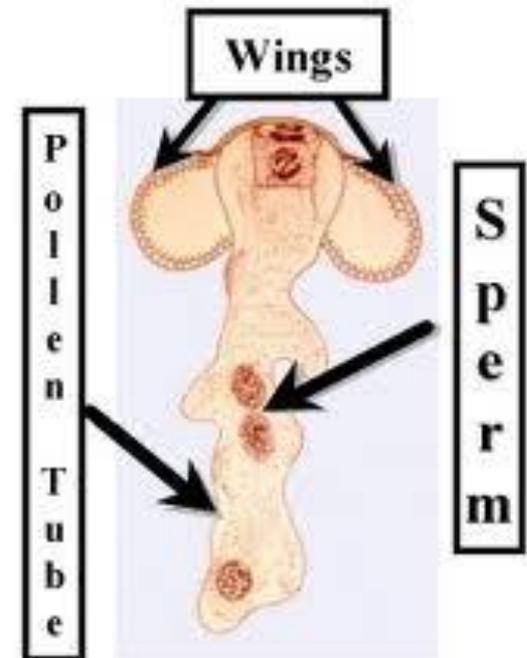
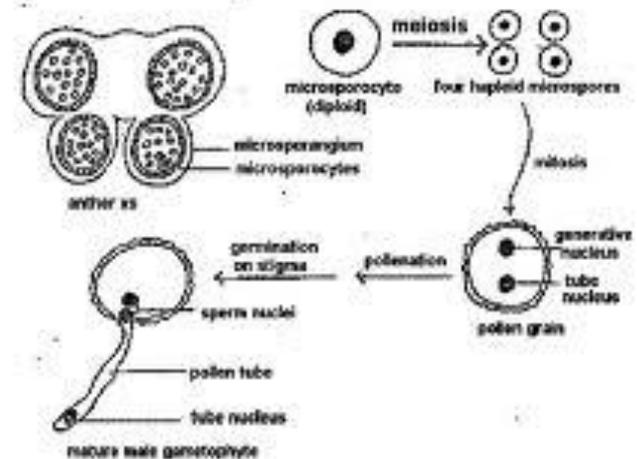
- Pollen grain has wing-like structures for easy dispersal by **wind**
- Pollen lands on female cone which has a sticky sap to “catch” pollen.
- As sap dries, pollen grain gets pulled towards ovule.

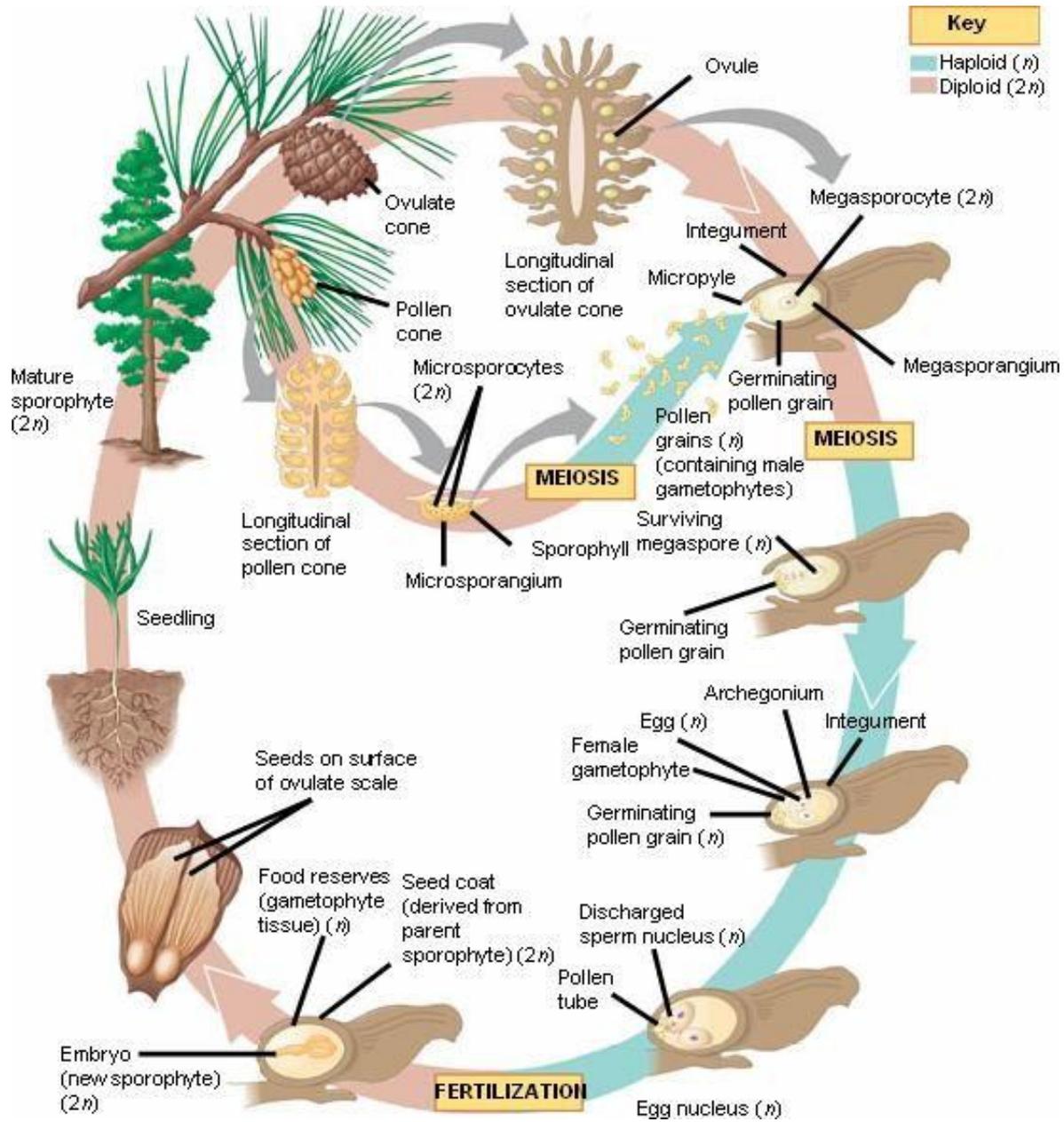


Alternation of generations continued

- Pollen tube grows from the pollen grain towards the egg to allow fertilization to occur to form a zygote.
- This may take a year
- After fertilization forms the zygote, an embryo develops
- The embryo is surrounded by a seed coat.
- Seeds are shed from the female cone (gametophyte)

Male sporangia



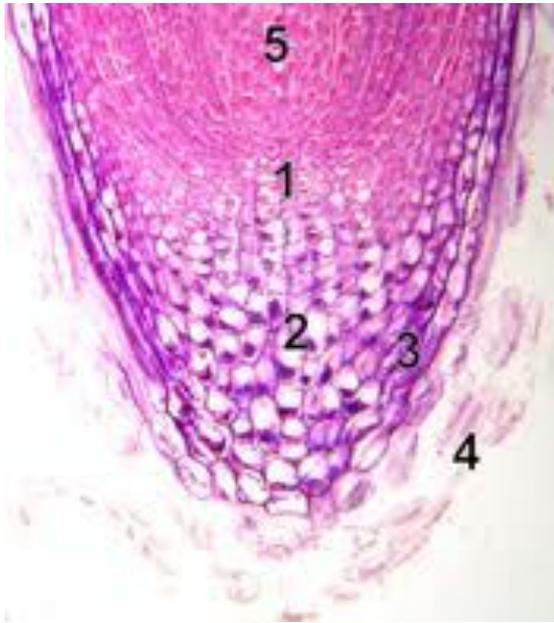


Meristem tissue

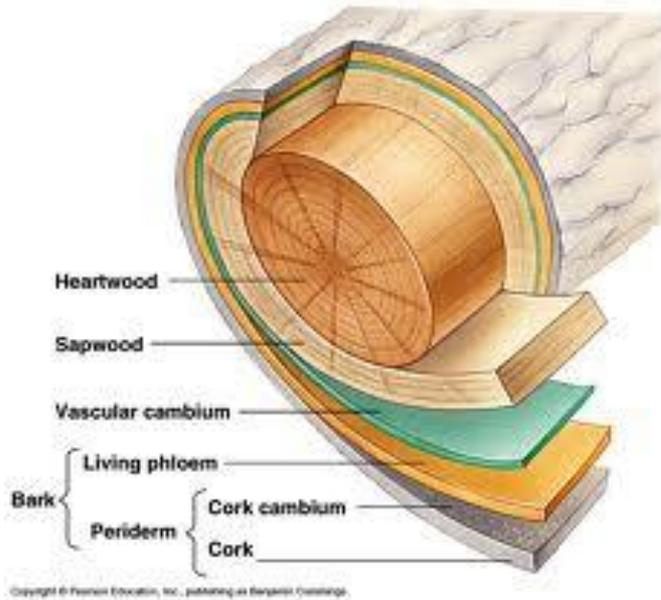
- **Meristem** = a region of the plant that continually divides.
- **Meristem tissue** is:
 - Embryonic tissue that is unspecialized and always capable of cell division by mitosis.
 - Later meristem tissue differentiates into the particular cell type.
 - Ex) vascular cambium and cork cambium

Two types of meristem tissue:

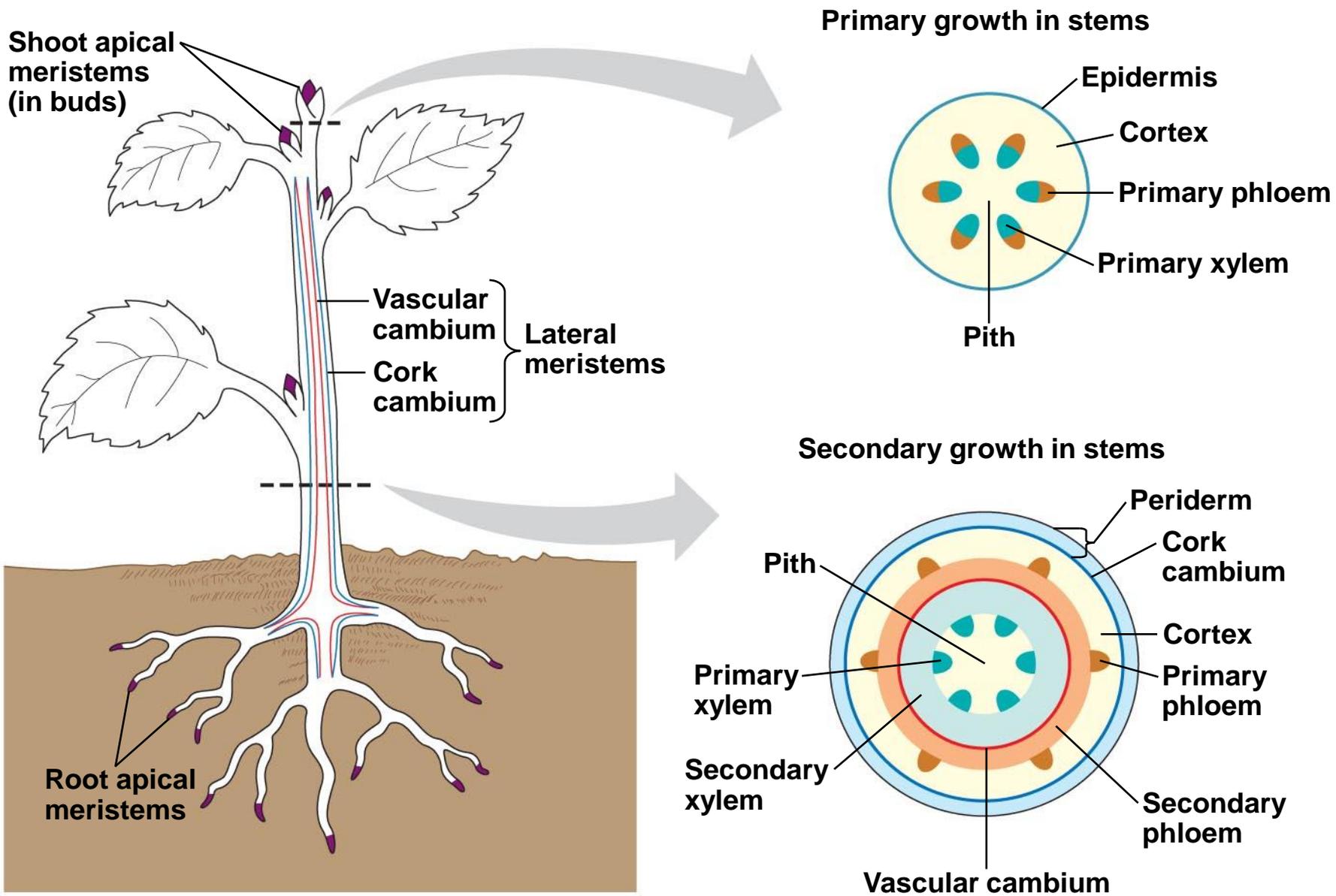
1. Apical meristem – located at the tips of roots and shoots.
 - Responsible for primary growth or growth in length
2. Lateral meristem – located at the outer portion of the stem
 - Responsible for secondary growth of growth in width.
 - “Lat” = “fat”



- Apical meristem



- Lateral meristem

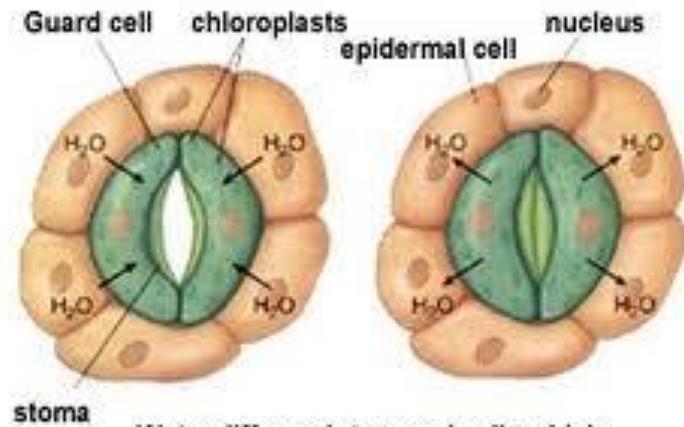


Stomata/ stoma

- Regulates gas and water exchange

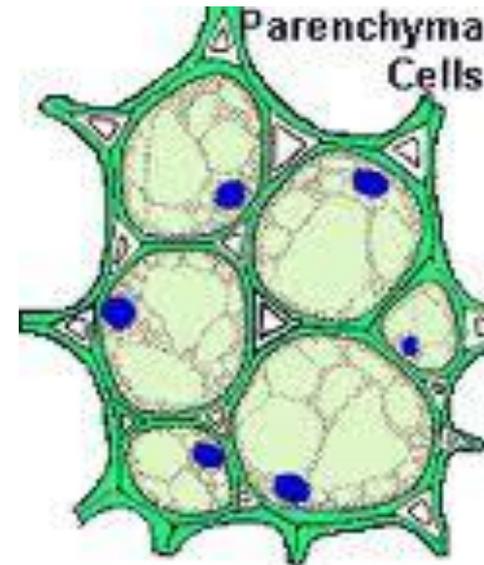
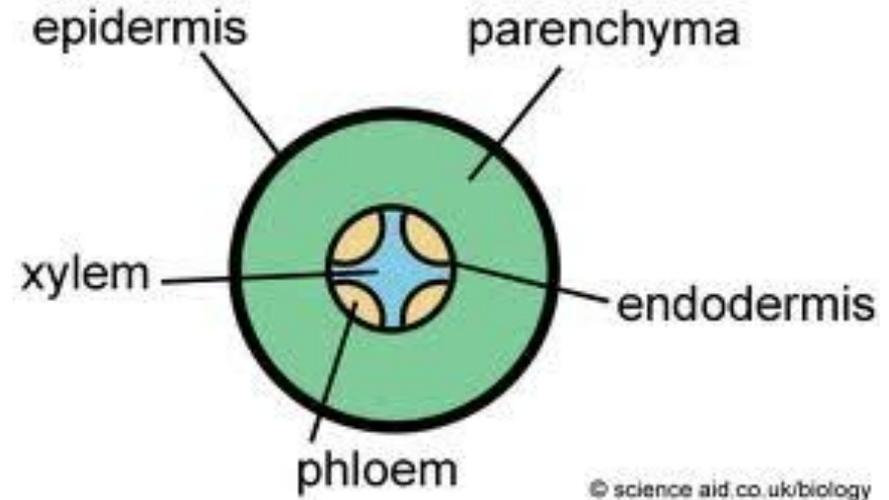
Guard cells

- Regulates the opening and closing of the stomata



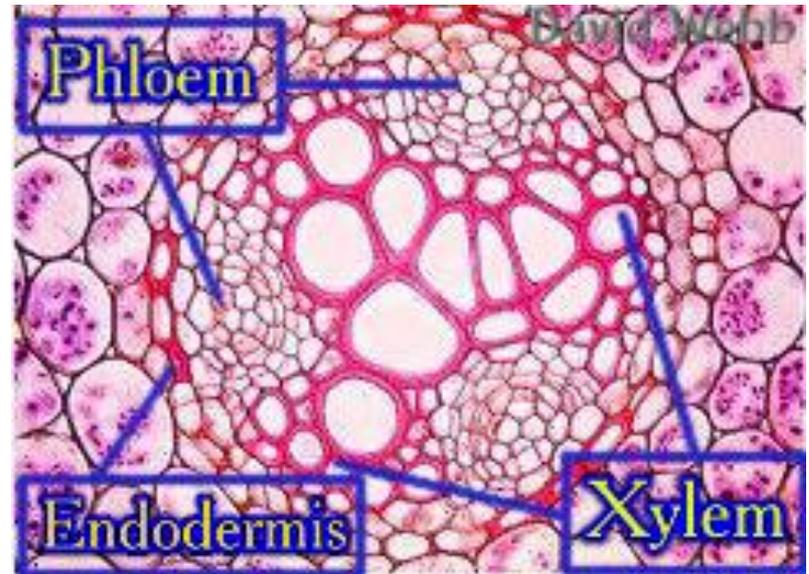
Water diffuses into guard cells which causes them to open. On hot/dry days, the guard cells have less water, they relax and the stoma close

- The **epidermis** forms the waxy cuticle
- **Parenchyma** – tissue that heals wounds, regenerates plant parts, photosynthesis, food and water storage



Vascular tissue

- Xylem – carries water and minerals to leaves from the roots for photosynthesis
- Phloem – distributes sugar / food throughout the plant



- Gymnosperms have woody tissue which is very strong.
- This allows gymnosperms to compete for sunlight and it allows the roots to penetrate the soil more deeply.