

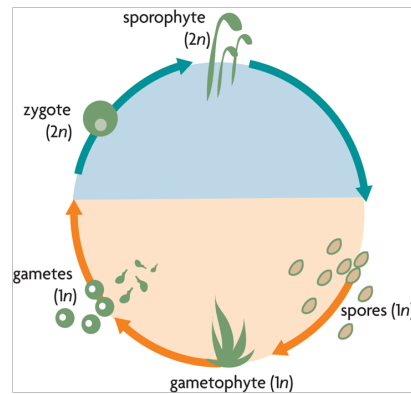
## Chapter 22 - Plant Growth, Reproduction, & Responses

### Section 22.1 Plant Life Cycles

- Plant life cycles alternate between producing spores and gametes.

A two-phase life cycle is called *alternation of generations*.

- haploid phase
- diploid phase
- alternates between the two



- The **spore-producing** plant is the mature *sporophyte*.
  - sporophyte phase is diploid
  - begins with *fertilized* egg
  - spores produced through meiosis*
- The **gamete-producing** plant is the mature *gametophyte*.
  - gametophyte phase is haploid
  - begins with *spore*
  - gametes produced through mitosis*



## I. Life cycle phases look different among various plant groups.

### A. Nonvascular plants have a *dominant gametophyte* phase.

-moss *gametophytes* look like green carpet

-moss *sporophytes* shoot up as stalklike structures



1. Nonvascular plant divisions include the only plants that have a *dominant* gametophyte generation.
2. *Sporophytes* grow attached to and depend on gametophytes to take in *water* and other substances.

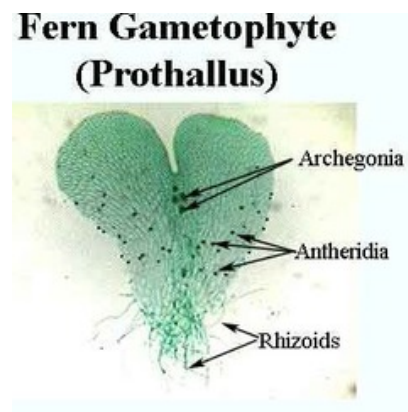
3. Gametophytes of nonvascular plants produce two kinds of *sexual* reproductive structures.
  - a. *antheridium* = the male reproductive structure in which *sperm* are produced.
  - b. *archegonium* = the female reproductive structure in which *eggs* are produced.

### B. Adaptations in Bryophyta (mosses)

1. *Bryophytes* are the most familiar of the nonvascular plant phyla.
2. Are small plants with *leafy* stems.



- C. The **sporophyte** is the *dominant phase for seedless vascular* plants.
- Fern spores form in sacs, **sori**, on underside of mature sporophytes (fronds).
  - A fern *gametophyte, or prothallus*, produces sperm and eggs.
  - A **zygote forms on the prothallus**, growing into the sporophyte.

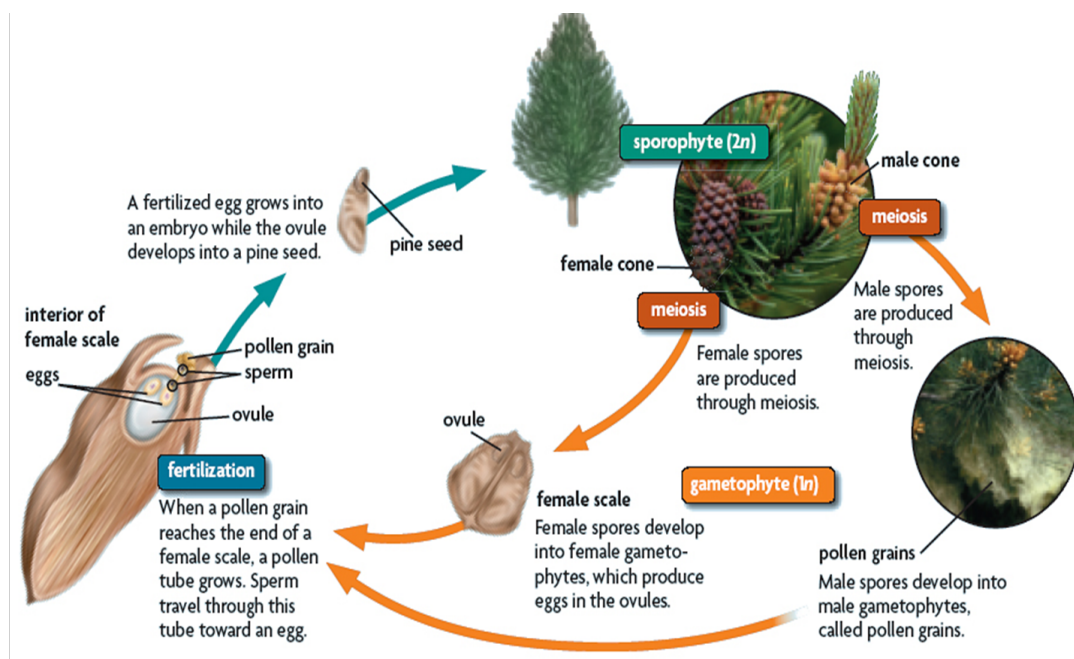


1. The *sporophyte* does not depend on the gametophyte for water or nutrients.
2. **Vascular** tissues provide the structural *support* that enables **vascular** plants to grow *taller* than **nonvascular** plants.
3. Another important advance in *non-seed vascular* plants was the adaptation of *leaves* to protect the developing reproductive *cells*.



D. The sporophyte is the *dominant phase for seed plants*.

- pine trees** are typical seed plant sporophytes
- female **spores** produced in *female cones*
- male **spores** produced in *male cones*
- male **spores** develop into *pollen grains*, the male **gametophytes**
- female **spores** develop into female **gametophytes** that produce *eggs*
- sperm* from pollen travel down pollen tube toward egg
- fertilized egg develops into embryo*
- ovule* develops into protective pine seed





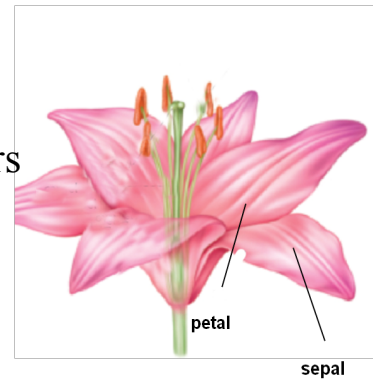
## Section 22.2 Reproduction of flowering plants takes place within flowers.

- Flowers contain reproductive organs protected by specialized leaves.

-Sepals and petals are *modified leaves*.

-Sepals are outermost layer that *protects* developing flower

-Petals can help to *attract* animal pollinators



- A *stamen* is the **male** structure of the flower.

-**anther** produces *pollen* grains

-**filament** *supports* the **anther**

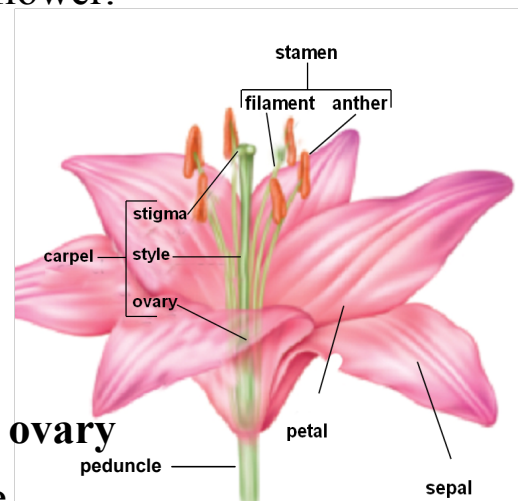
- The *innermost* layer of a flower is the **female** *carpel (pistil)*.

-*stigma* is sticky tip

-*style* is tube leading from **stigma to ovary**

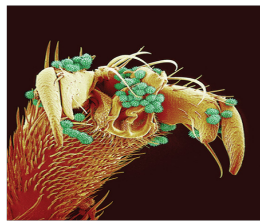
-*ovary* produces female gametophyte

-the **flower stem** is called the *peduncle*.



- **Complete flower** - has all parts, petals, sepals, pistil, & stamen.
- **Incomplete flower** - doesn't have all four parts listed above.  
Ex: walnut tree has separate male & female flowers and corn has no petals or sepals.
- **Perfect flower** = refer to the sexual organs of the plant both being present.
- **Imperfect flower** = refer to only male or female organs on a plant.

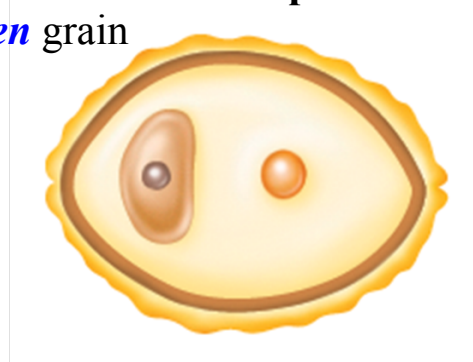
- **Flowering plants can be pollinated by wind or animals.**
  - Flowering plants **pollinated** when **pollen grains land** on **stigma**.
  - Wind** pollinated flowers have **small flowers** and **large amounts of pollen**.



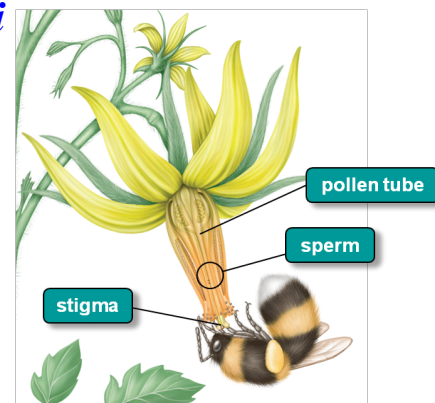
- **Animal** pollinated flowers have **larger flowers** and **less pollen**.

- many flowering plants pollinated by animal pollinators
- pollination occurs** as **animal feeds** from flower to flower
- animal** pollination **more efficient** than **wind** pollination

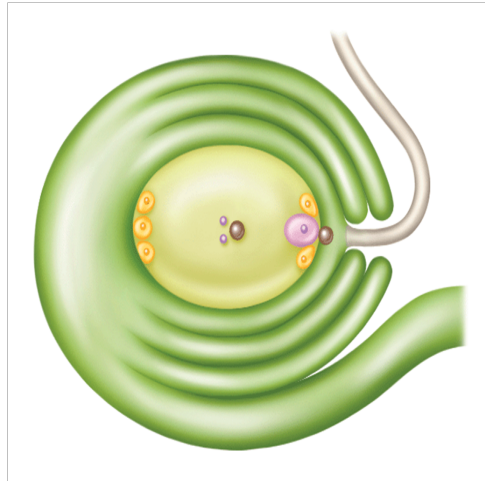
- **Fertilization** takes place within the flower.
- Male gametophytes, or **pollen grains**, are produced in the anthers.
  - male spores produced in anthers by **meiosis**
  - each spore divides by **mitosis** to form two **haploid cells**
  - two cells form a single **pollen** grain



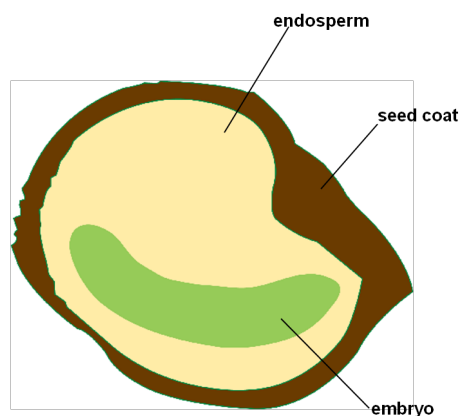
- One female gametophyte can form in **each ovule** of a flower's ovary.
  - four female spores produced in **ovule** by **meiosis**
  - one spore develops into female **gametophyte**
  - female gametophyte contains **seven cells**
  - one cell has two nuclei, or **polar nuclei**
  - one cell will develop into an **egg**
- **Pollination** occurs when a pollen grain lands on a stigma.
  - one cell from pollen grain forms **pollen tube**
  - other cell forms **two sperm** that travel down tube



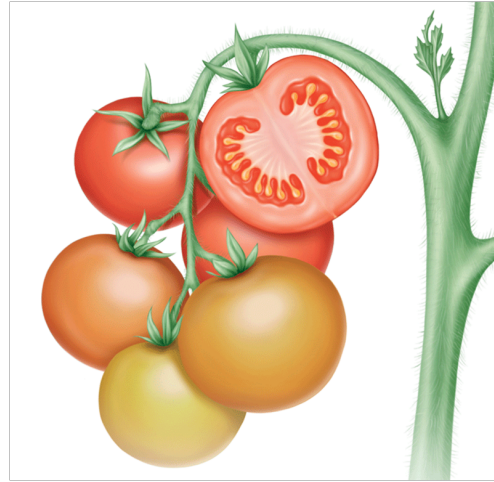
- Flowering plants go through the process of *double fertilization*



- one sperm *fertilizes* the egg
- other sperm unites with polar nuclei, forming *endosperm*
- endosperm provides *food* supply for **embryo**



- Each *ovule* becomes a **seed**.
- The surrounding *ovary* grows into a **fruit**.

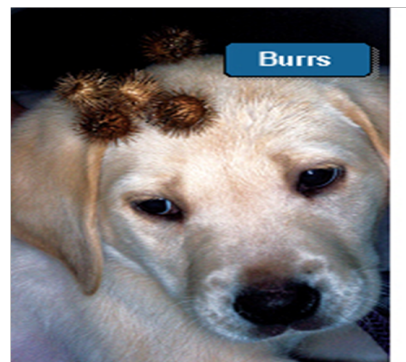


### Section 22.3 Seed Dispersal and Germination

- **Different plants have adaptations for pollination:**
  - \* *Wind* pollinated flowers - lack structures that block wind currents.



- \* *Animal* pollinated flowers - produce nectar or brightly colored petals or scents to attract.



- \* *Water* pollinated flower - have structures that allow them to float.



- **Dormancy** = period of inactivity for a seed.

\*ends when the seed is ready to **germinate** or is ready to begin the development of a new embryo.

\*ends when **water** softens the seed coat, **oxygen** is present and **temperatures** are favorable.



- **Germination**

- Once softened by water, the **embryo** starts to come out of the seed.
- First part of the embryo to appear in the **embryonic root** is called the **radicle** - which grows downward becoming the root.
- The part closest to the seed is called the **hypocotyls**.
- As the **hypocotyls** grows, and in **dicots**, brings the cotyledons (**which feed the new plant until able to photosynthesize on own**) and leaves above ground. (**Monocots** cotyledon remains underground)



-*leaves* emerge last

-once *photosynthesis* begins, the plant is called a *seedling*.

