

## Plant reproduction:

Flowers are reproductive structures in plants [Fig. 31.9A, p. 634]:

Sepals - cover/protect the flower before it opens.

Petals - the brightly colored parts of the flower (if it is colored).

Stamens - male reproductive parts. Composed of:

anthers - where pollen develop and are stored

filaments - structures holding up anthers

Carpels - female reproductive parts. Composed of:

stigma - at tip of carpel, where pollen are placed.

ovary - contain ovules, which hold eggs and supporting cells.

Fertilization [Fig. 31.10, p. 635]:

- egg or sperm are also known (in plants) as gametophytes. These are haploid (have half the number of chromosomes).

- in this case, though, the gametophytes generally make just sperm and/or egg. They don't make an "individual".

- sperm formation is pretty straight forward. By meiosis, four haploid "spores" develop.

- but again, in this case, the "spores" don't really make an "individual" like in mosses or ferns - instead they go almost directly to making egg or sperm (and a few associated structures)

- each spore then divides again, forming a tube cell and generative cell.

- the tube cell eventually forms a tube leading to the ovary

- the generative cell eventually divides yet again, and forms two "sperm" cells.

- but before this happens, the tube cell and generative cell are put together in a pollen grain.

- Pollen grains are distributed either through:

- wind, or

- insects (hence the bright colors & nectar associated with flowers).
- Pollination occurs if the pollen lands on the stigma of the correct species (lots of variation in this, though).
  - once this happens, the tube cell begins to make it's tube, and the generative cell divides to make two sperm cells.
  - tube grows downwards towards ovary and ovules.
    - grows around (underneath) one ovule, and enters the "embryo sac"
- In the ovule:
  - a central cell divides into four haploid spores (through meiosis).
    - three of these degenerate
    - remaining one survives, enlarges, and divides, making:
      - an embryo sac
        - this has a large central cell with two haploid female nuclei.
        - and an haploid egg
- as sperm enter ovule:
  - one fertilizes the egg (now diploid)
  - one fertilizes the central cell.
    - note that since this contains TWO haploid nuclei, the resulting cell is actually triploid (has two haploid copies of the female genes, and one haploid copy of the male genes)
  - this process is termed double fertilization.

**Seed development [Figs. 31.11A & 31.11B, p. 636]:**

- the triploid central cell divides and forms the "endosperm", which is rich in nutrients for the embryo
- the zygote (fertilized egg) develops into the embryo. This will have either one or two leaves, based on whether or not it's a monocot or dicot.

- the ovule forms a seed coat that protects and encloses both the endosperm and embryo.
- the seed can then lie dormant until conditions are right for germination (i.e., embryo grows out of seed coat).
  - some seeds can be dormant for many years (hundreds or more).

**Fruit development [Figs. 31.12 A & B, p. 637]:**

- The ovary develops into a structure that stores and protects seeds.
- Apples, raspberries, pineapples are all examples of different kinds of fruit.
  - edible fruits are designed to be attractive so that animals will spread the seeds around.
    - seeds usually survive the trip through the digestive system, and are then deposited with rich fertilizer.
  - in lab the differences in fruit types will be examined (see also p. 635 / 5th: p. 639).

**Seed germination [Fig. 31.13A & B, p. 638]:**

- seeds often germinate in response to water. Water ruptures the seed coat, and allows the embryo to start growing.
  - embryo starts to use food and grow
  - dicots: generally, root starts to grow downwards, followed shortly by the shoot.
    - shoot has a hook in it (tip is bent over) to prevent damage to the tip before it breaks the soil surface.
      - hook straightens out in response to light
  - monocot: root starts only just before shoot.
    - shoot is covered in protective sheath
      - once through the surface, the shoot grows through the sheath (the sheath is used like a “tunnel”).

Asexual reproduction:

plants readily grow by asexual reproduction:

- fragmentation
- runners
- root sprouts
- cuttings
- much of our agriculture depends on asexual (vegetative) reproduction
  - fruit trees in particular, but also raspberries, potatoes, etc.