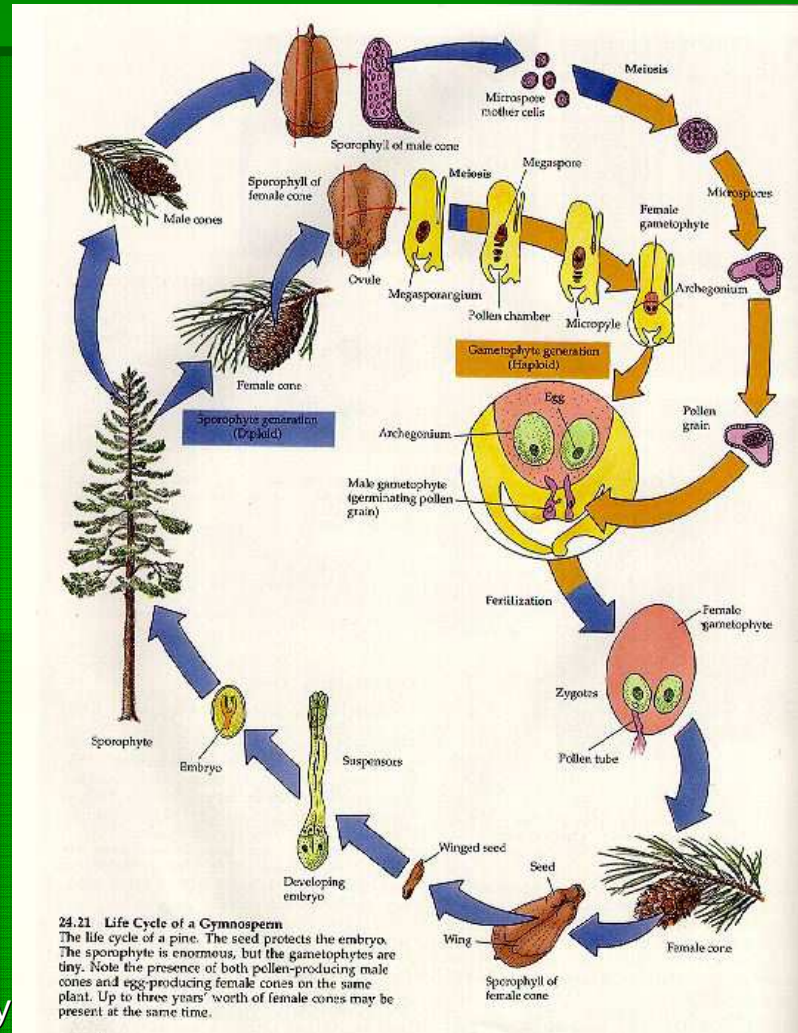
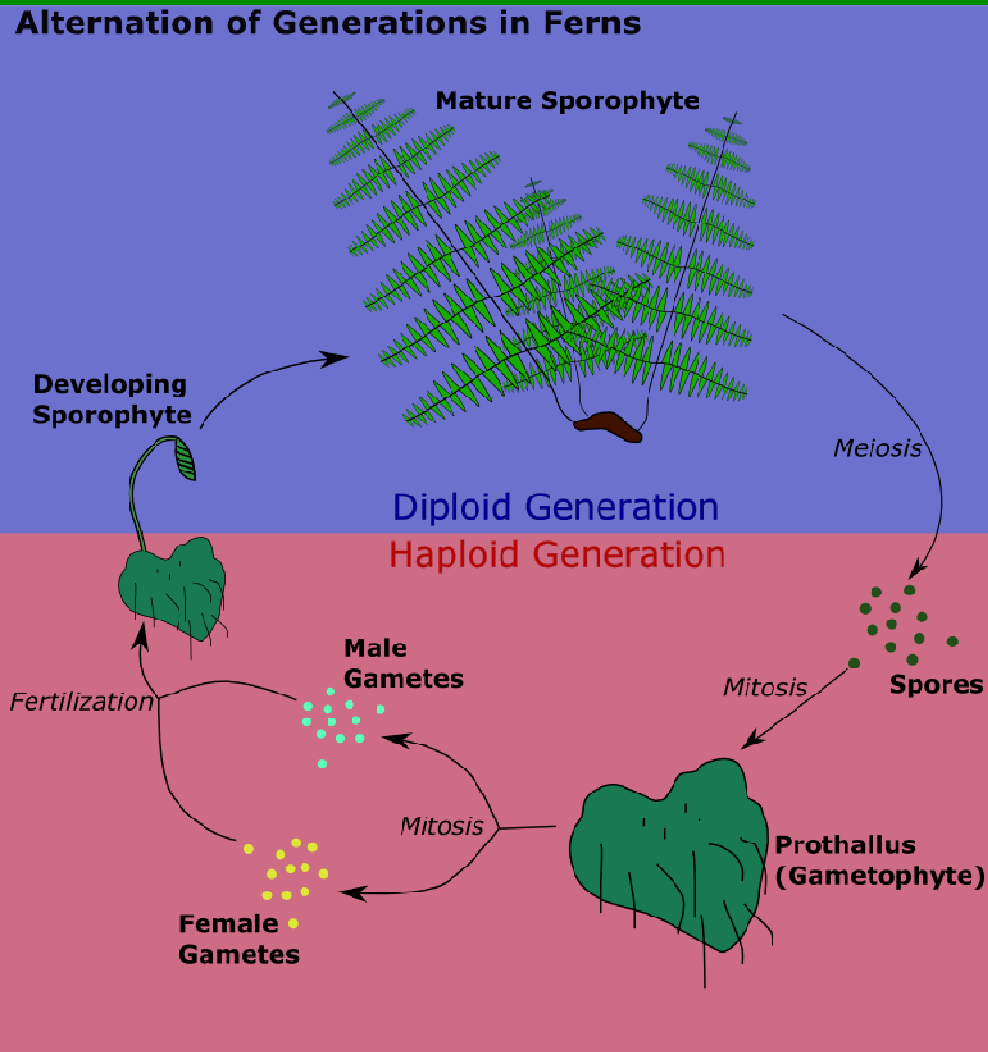


# Plant reproduction

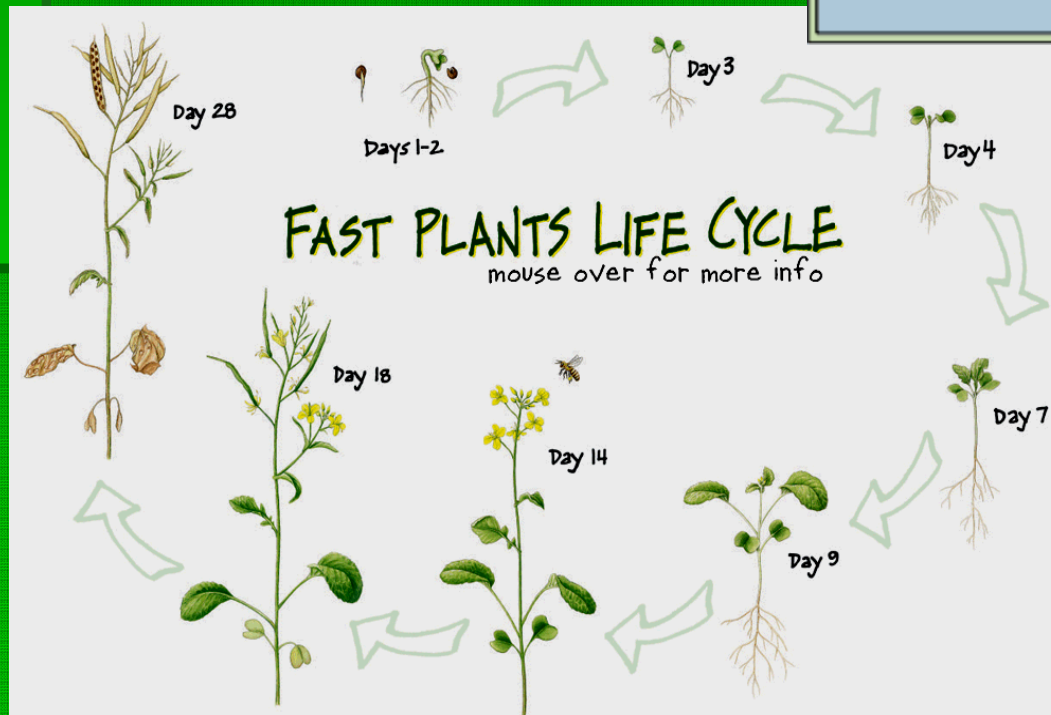
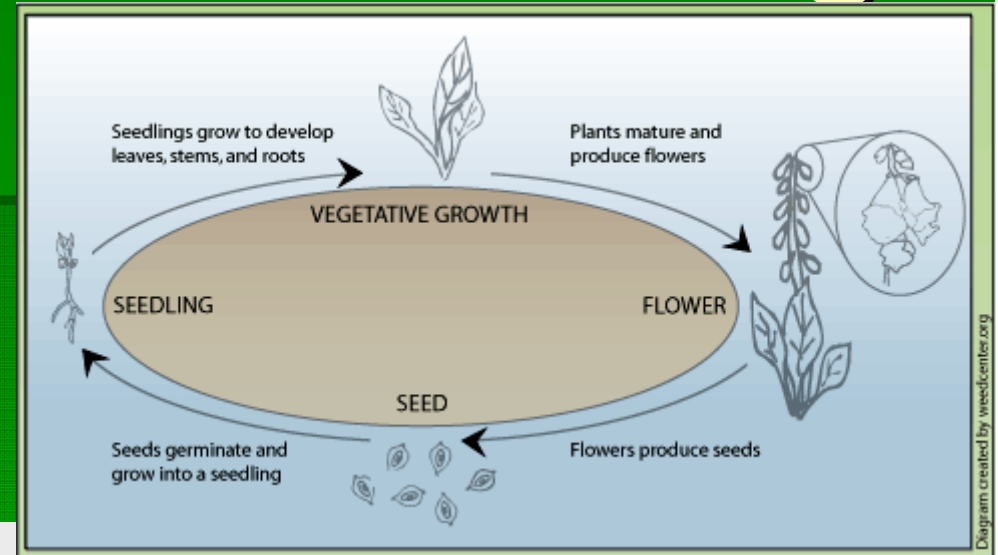
- The plant cycle
- Asexual reproduction
- Sexual reproduction:
  - The flower
  - Pollination
  - Fruit and seed formation
  - Seed dispersal
  - Seed germination

# The plant cycle in non flowering plants



**24.21 Life Cycles of a Gymnosperm**  
 The life cycle of a pine. The seed protects the embryo. The sporophyte is enormous, but the gametophytes are tiny. Note the presence of both pollen-producing male cones and egg-producing female cones on the same plant. Up to three years' worth of female cones may be present at the same time.

# The plant cycle in flowering plants

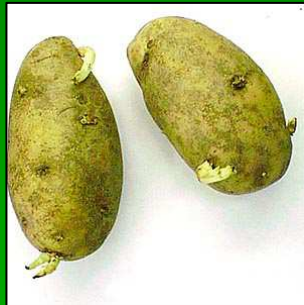


# Asexual reproduction in plants

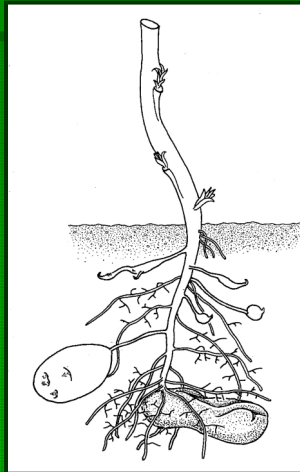
- By stolons and runners (as in grasses)
- By spores (as in ferns and mosses)
- By tubers (as in potatoes)
- By bulbs (as in onions)
- By grafts (used mostly in gardening)

**In this case, all individuals are genetically identical to the parent plant.**

# Examples of asexual reproduction in plants



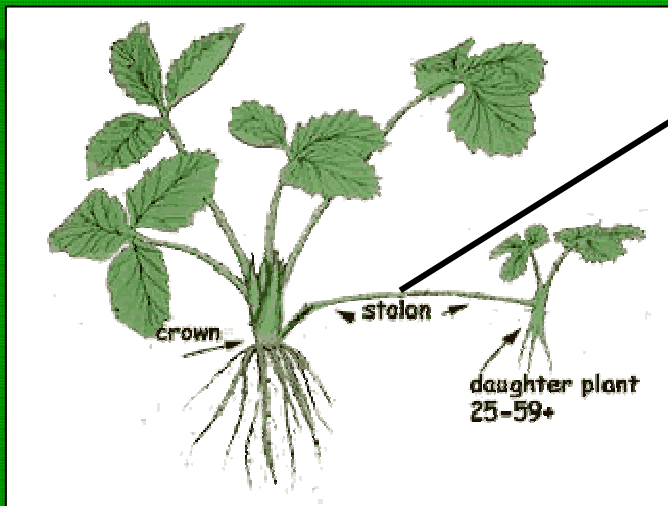
tubers



bulbs



Fern spores



stolons

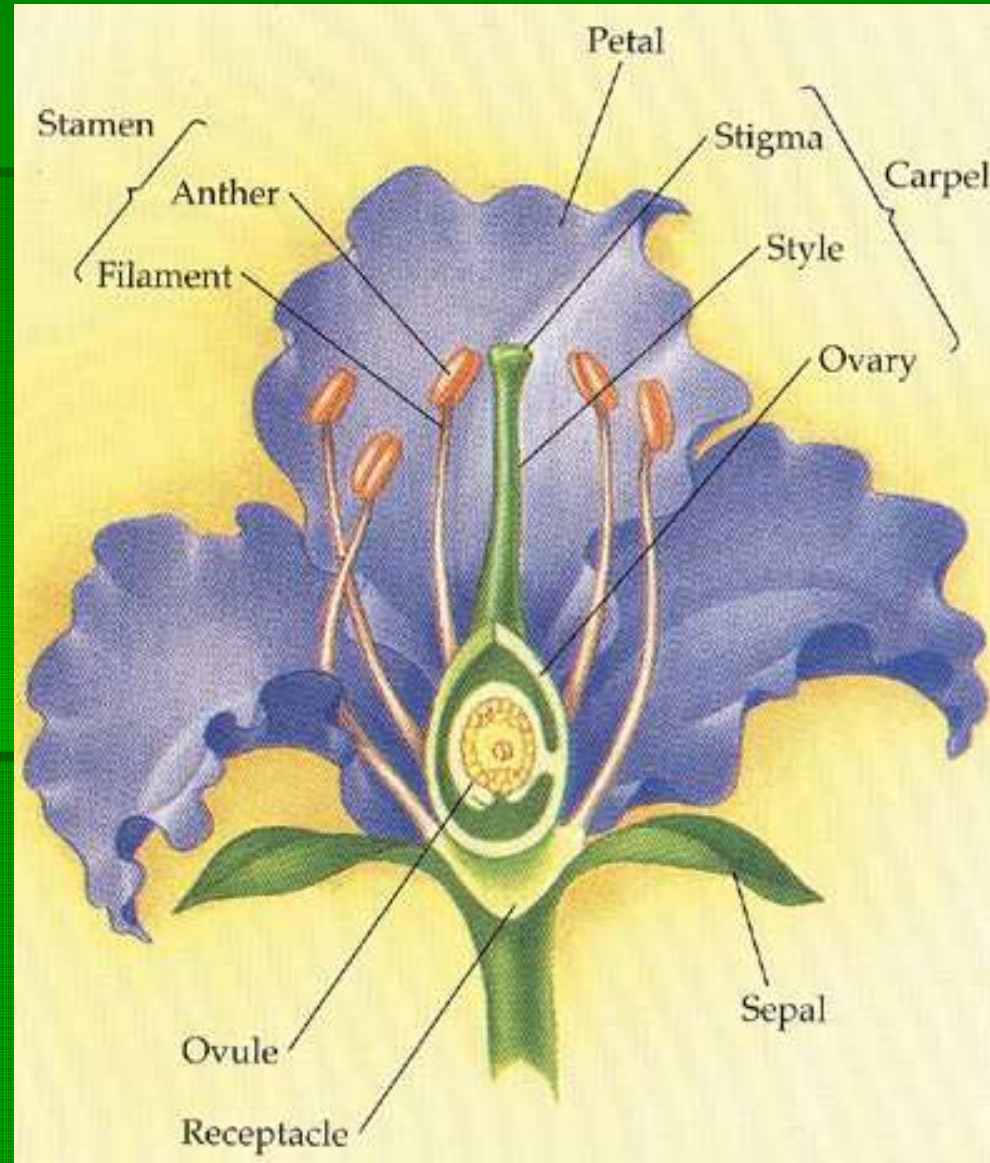




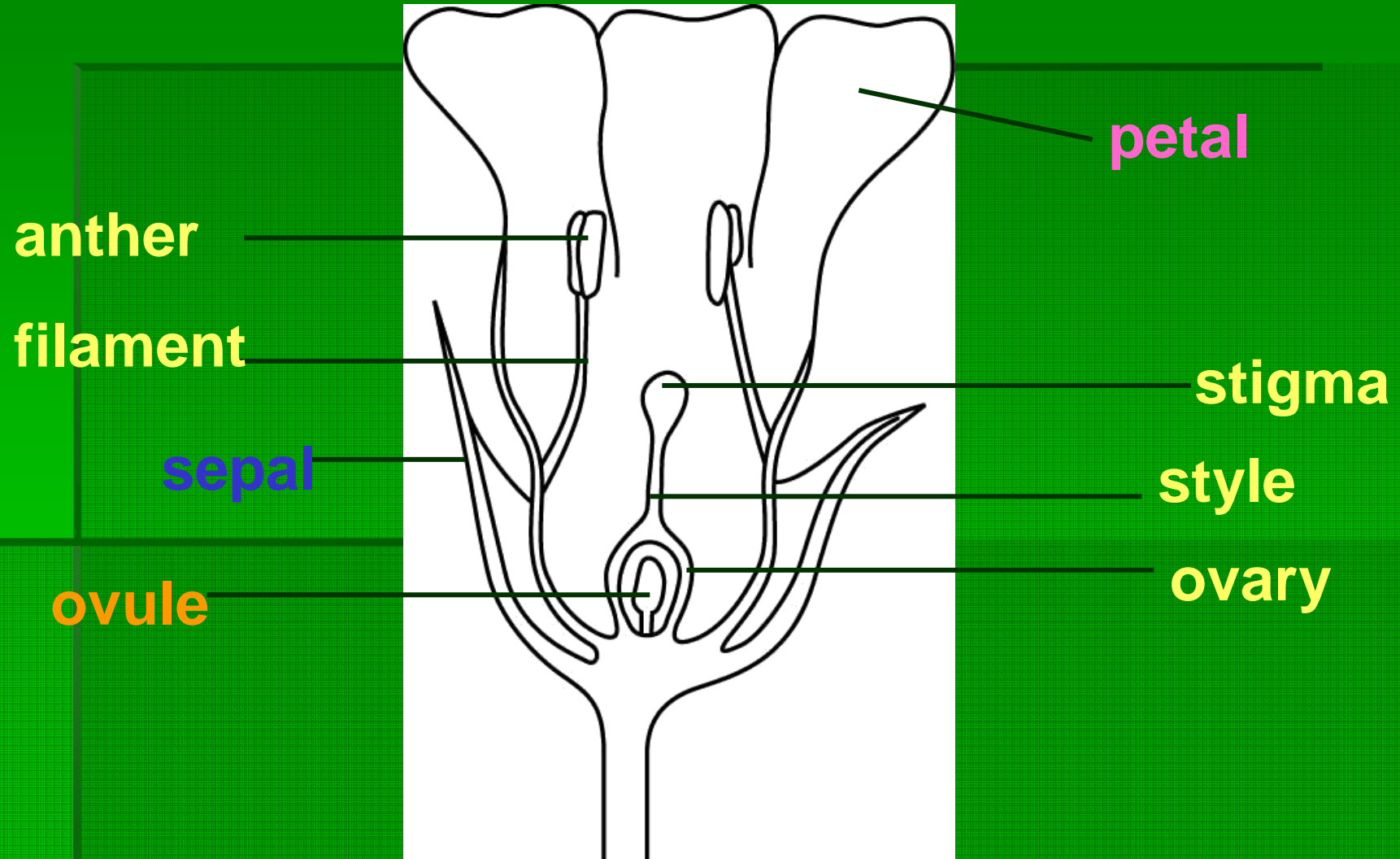
# Sexual reproduction in flowering plants

- Plants produce reproductive organs called **flowers**.
- These flowers have **specialised structures** which are either **female** or **male**.
- Sexual cells called gametes are made in the reproductive organs.
- The gametes fuse in a process called fertilisation.
- Following fertilisation, fruits and seeds develop from parts of the former flower.

# Parts of the flower



# Parts of the flower

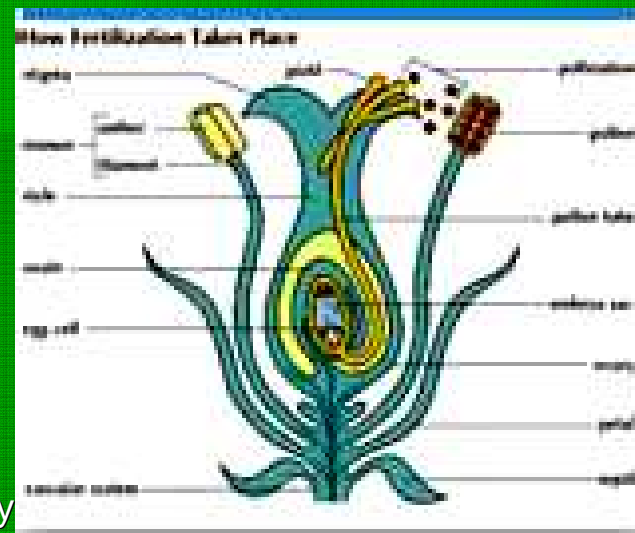
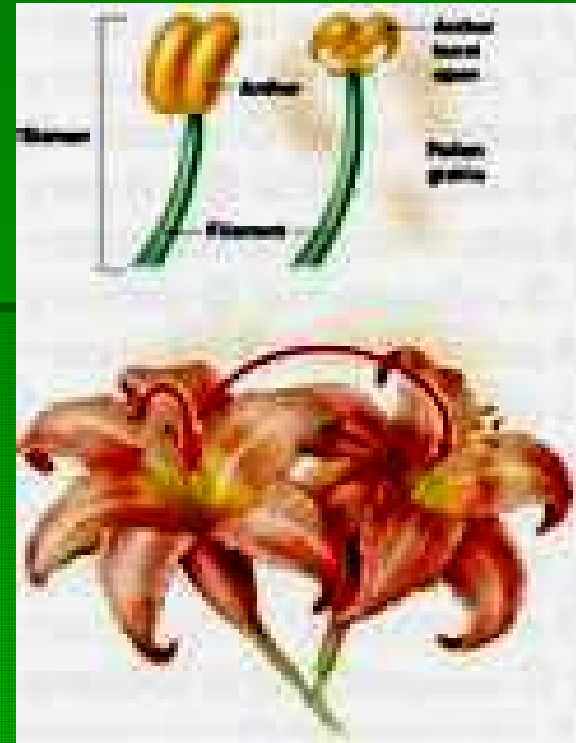




# Pollination

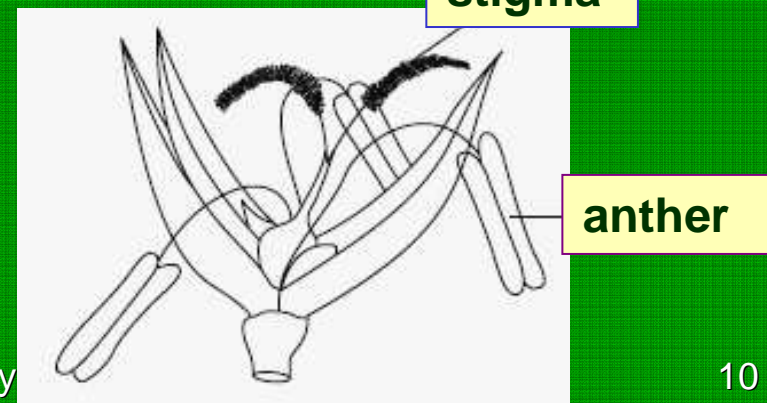
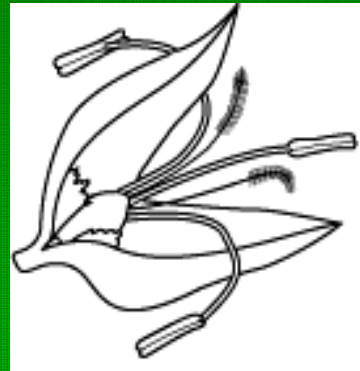
It is the transfer of the pollen grain from the anther to the stigma.

This can be done in the same flower (self-pollination) or in different flowers (cross-pollination).



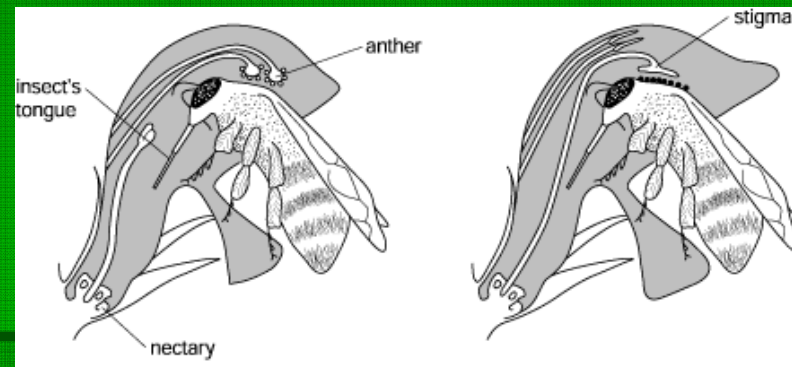
# Wind-pollinated flowers

- Flowers are usually very small, with no petals and no scent.
- Anthers and stigmas are exposed to the wind.
- Stigmas are hairy or feathery to trap the pollen grains blown by the wind.
- Pollen grains are smooth, light and very small to be easily carried by the wind.
- Example: grasses



# Insect-pollinated flowers

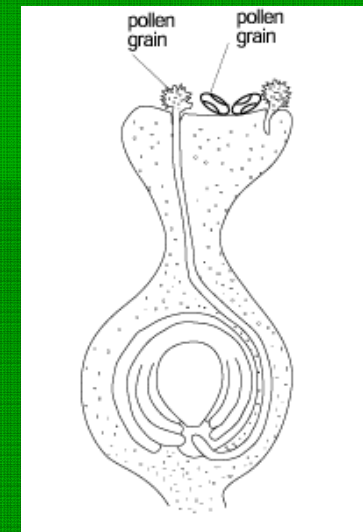
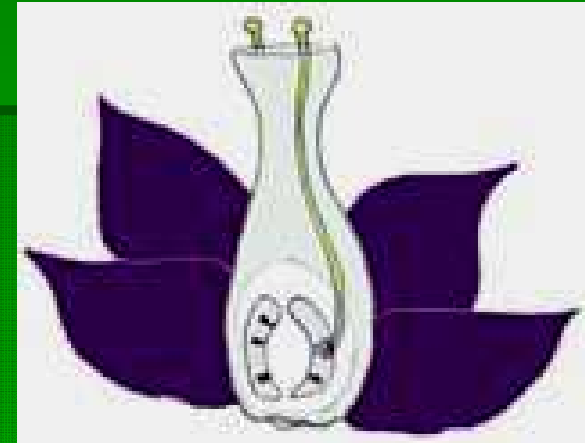
- Have big, **colourful petals** to attract insects.
- Have **nectar** and/or **scent** to attract insects or hummingbirds.
- Stamen and stigmas inside the corolla.
- **Pollen grains are big, and with hooks to attach to insect's legs.**



# Fertilisation

The pollen grain grows a **pollen tube** which will carry the nucleus of the male gamete to the ovule, to meet the female egg cell.

Fertilisation is the fusion of the nucleus of the male gamete with the nucleus of the female gamete.

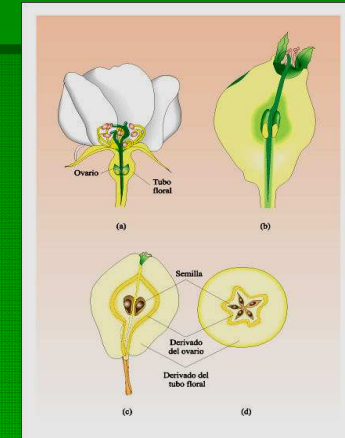
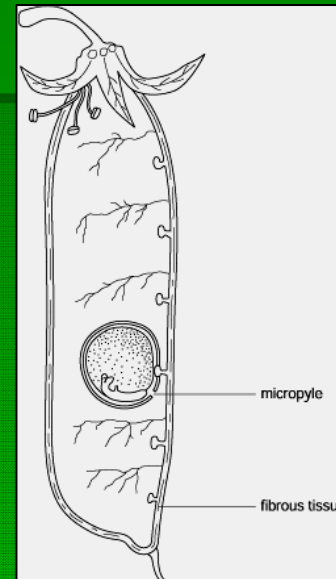




# Fruit and seed formation

Once fertilised,

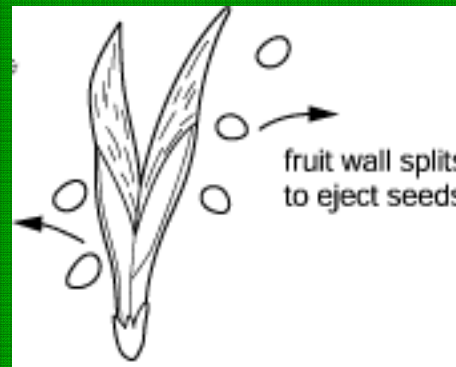
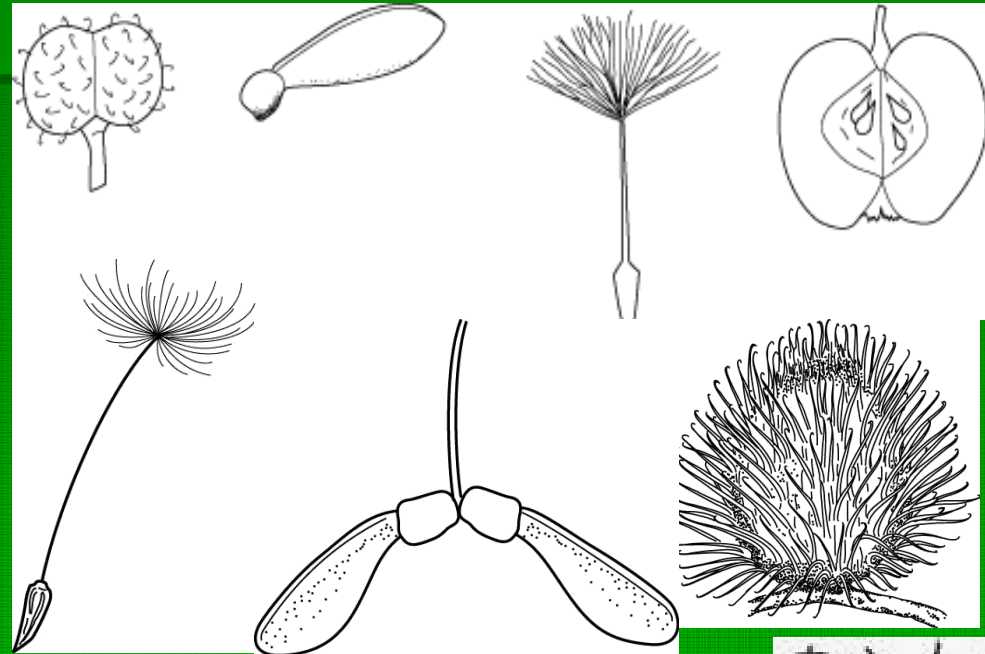
- The **OVARY** develops into the **FRUIT**.
- The **OVULES** become the **SEED**.
- The petals, stamen and stigma shrivel and fall.



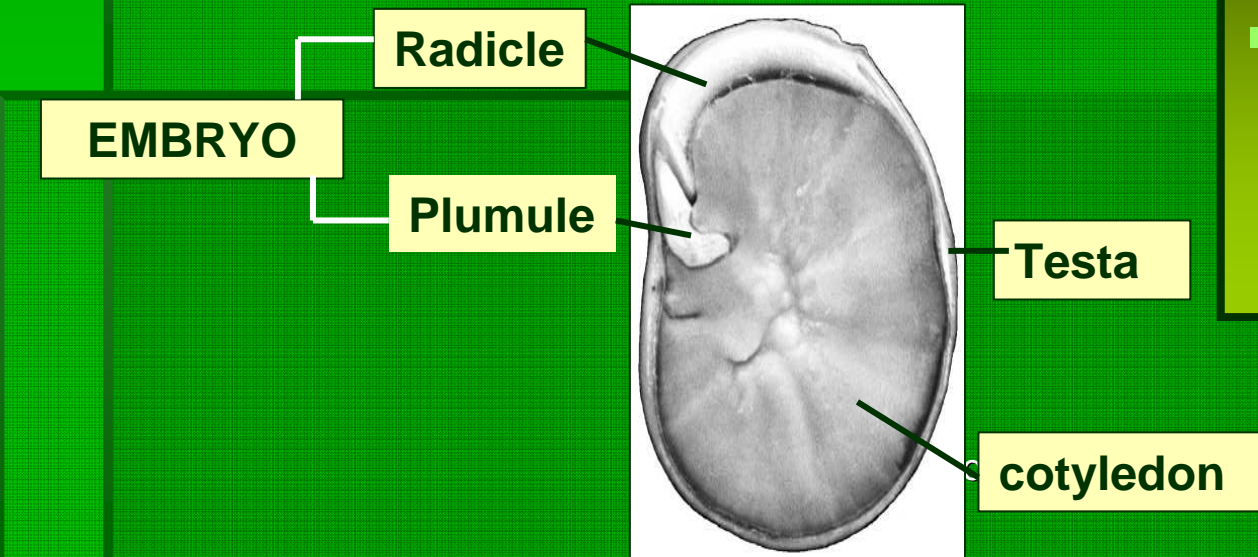
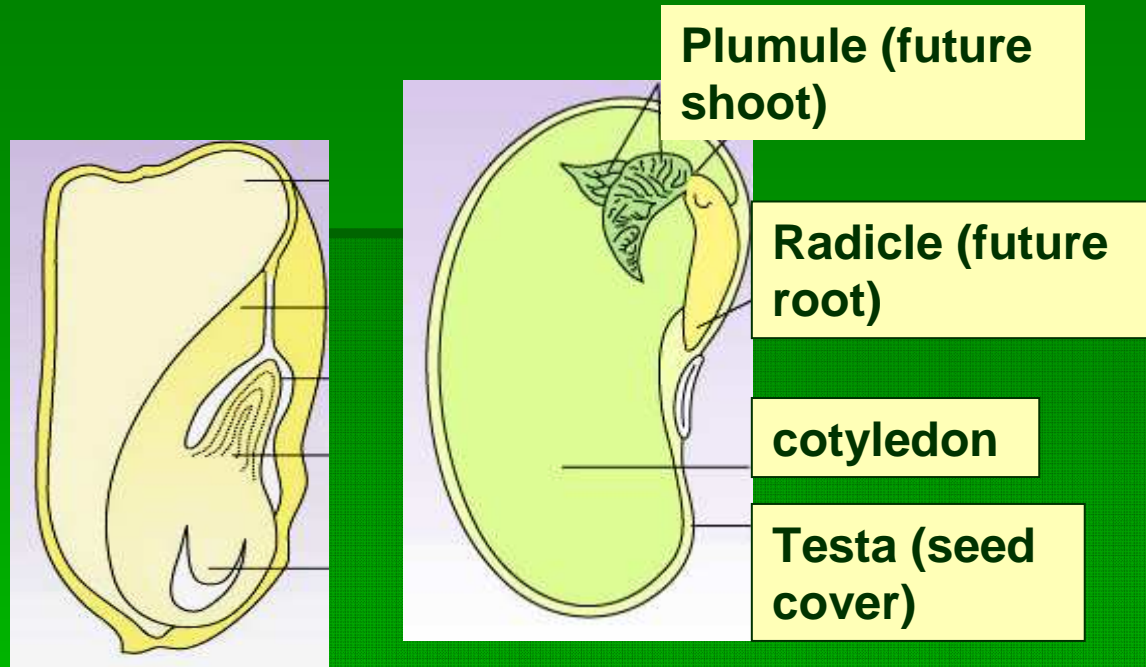


# Fruit and seed dispersal

- Seeds need to be dispersed away from the parent plant.
- This can be achieved by wind, water, animals, or self-explosion.
- Each seed has special structures adapted to the way it is dispersed.

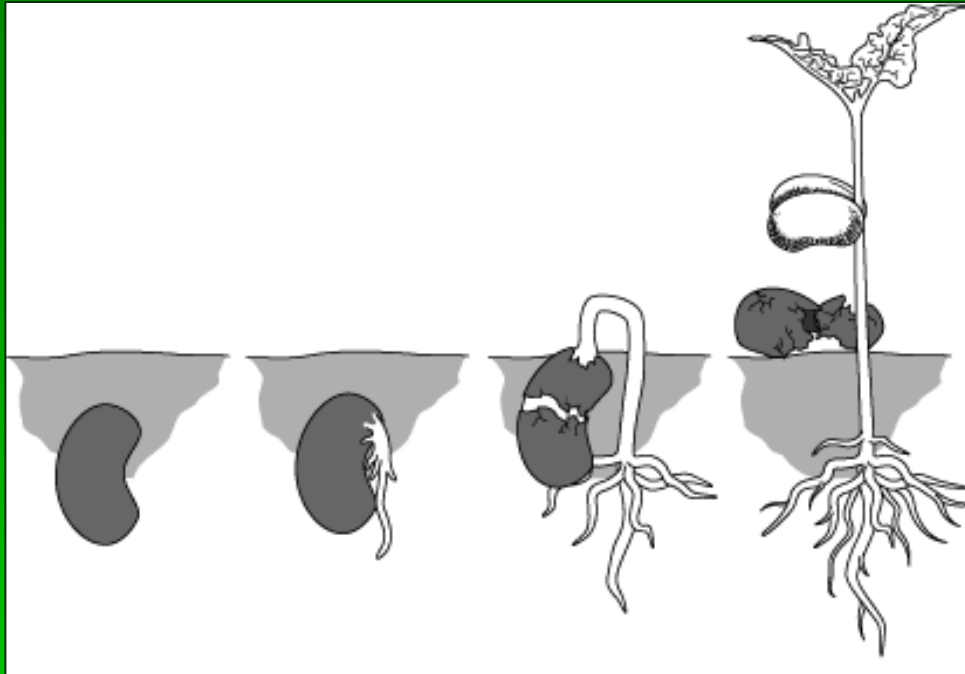


# Seed structure

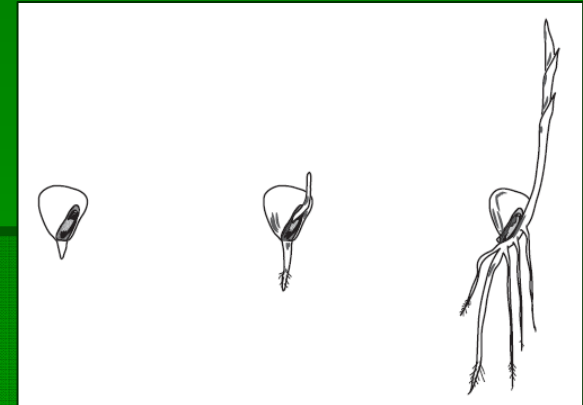


- Seeds are protected by the **testa**.
- All seeds have a food reserve (**cotyledon**).
- The embryo is formed by the **plumule** and the **radicle**.

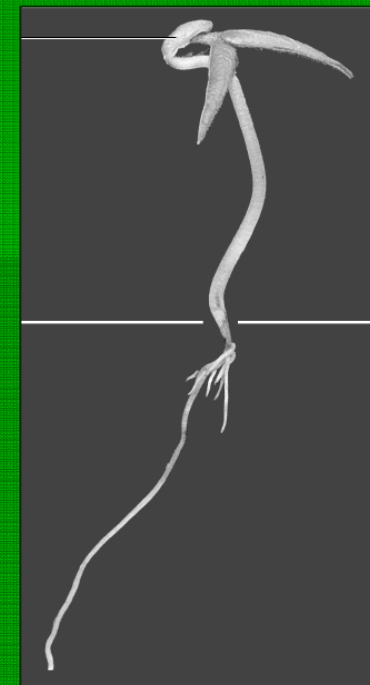
# Seed germination



Germination in a dicot plant (bean)



Germination in a monocot plant (wheat)



All seeds must have **water**, **suitable temperature** and **oxygen** to germinate.

Some seeds may also need light to activate the germination process.