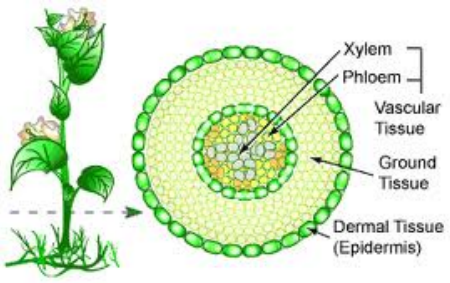
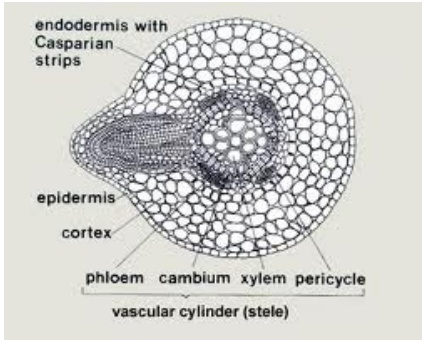
Biology 2201

vascular tissue

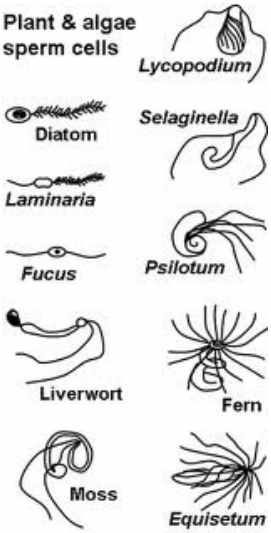
- Does the plant have vascular tissue?
- Plants with no vascular tissue get nutrition/water from **diffusion**
- **Vascular tissue**: tissue that transports materials in plants (made up of xylem and phloem)
- Plants that have this tissue will have true **roots** and **stems**





Dependency on water

- All life depends on water to survive
- But not all plants depend on water for reproduction (movement of sperm)



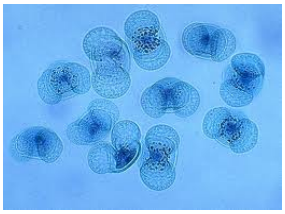
Dominant generation

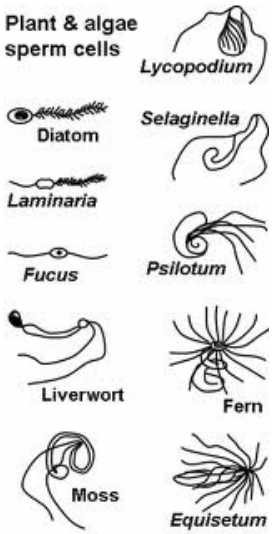
- Does it spend **most** of its life as a gametophyte or Sporophyte?
- **Gametophyte generation** - Makes the gametes (egg or sperm). Haploid (half DNA)
- **Sporophyte generation** - Makes spores (or sometimes seeds). Diploid (full DNA)

Details of reproduction

- Protection of the egg
  Is the seed bare or is it protected in a cone or fruit?

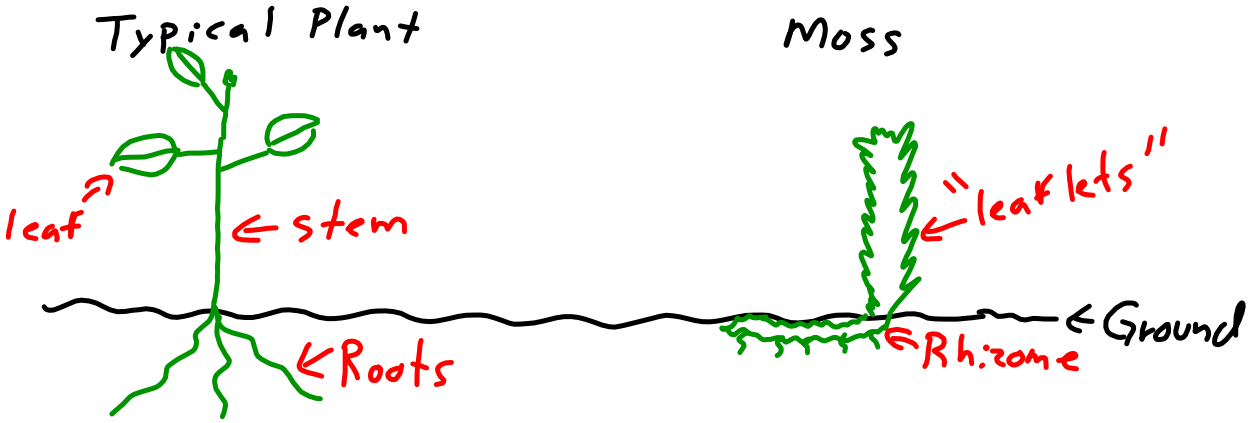
- How the sperm reaches the egg
  Does it use water, wind, or insects for transport?





Division Bryophyta p.169-171

- This group includes moss.
- All bryophytes are small, usually less than 10cm.
- They have no true roots, leaves, nor stems.



- They have no vascular (transport) tissue.
- They rely on diffusion to transport water and dissolved nutrients.
- Water cannot travel far vertically by diffusion alone, therefore these organisms do not grow tall.

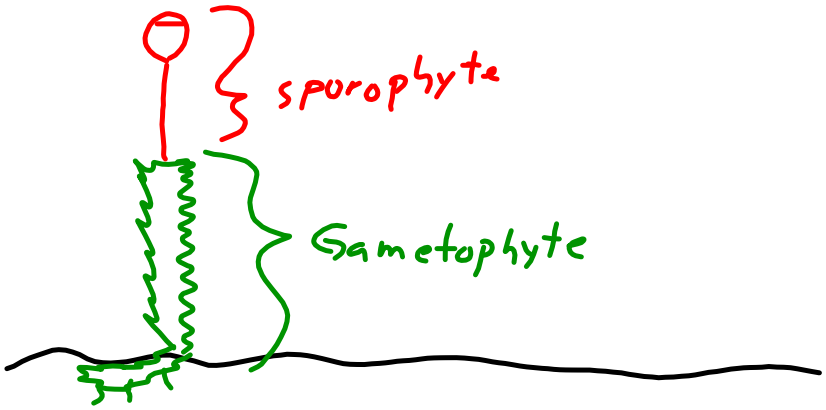
Division Bryophyta

- There are no specialized structures to support the plant, and this also limits their size.

- Bryophytes rely heavily on **water**, especially for reproduction.

- The dominant (largest) generation is the **gametophyte,** which looks "leafy" and green.

- The sporophyte is small and grows directly out of the gametophyte.



Division Bryophyta

- Bryophyte sperm **require water** in order to travel to the egg.

- **Neither** the egg nor the developing zygote has protection from the environment.

- E.g. Sphagnum

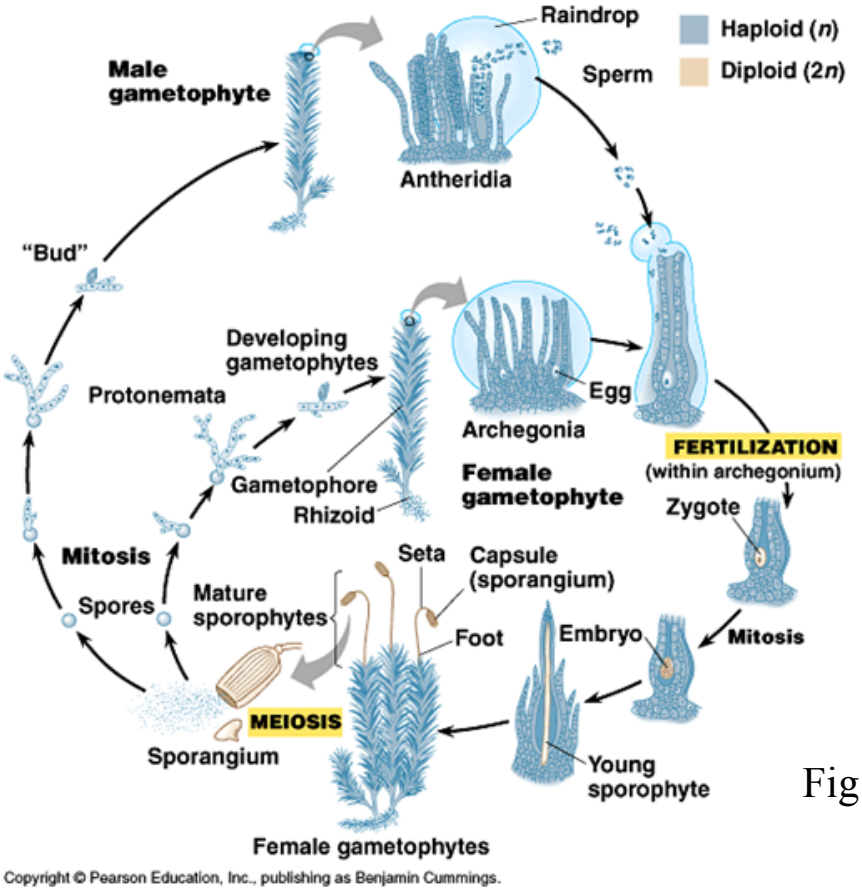


Fig. 29.16

Division Pterophyta p.171-173

- Seedless Vascular Plants
- This group includes ferns.
- This is the second largest plant division, with 20,000 extant species.
- Ferns range in size from a few cm high to 3m.
- During the time of the dinosaurs, tree ferns reached 25m.
- Ferns have specialized vascular tissue that allows them to transport water much higher than moss.

Division Pterophyta

- Vascular tissue also provides structural support for the plant, allowing it to grow larger.

- Ferns have true stems and leaves and root-like structures called **rhizomes**

- They require water for sperm to swim to the egg for fertilization.

- However, they can live in dryer habitats than the Bryophyta.

Division Pterophyta

- The dominant generation is the **sporophyte,** which is what we call a "fern."

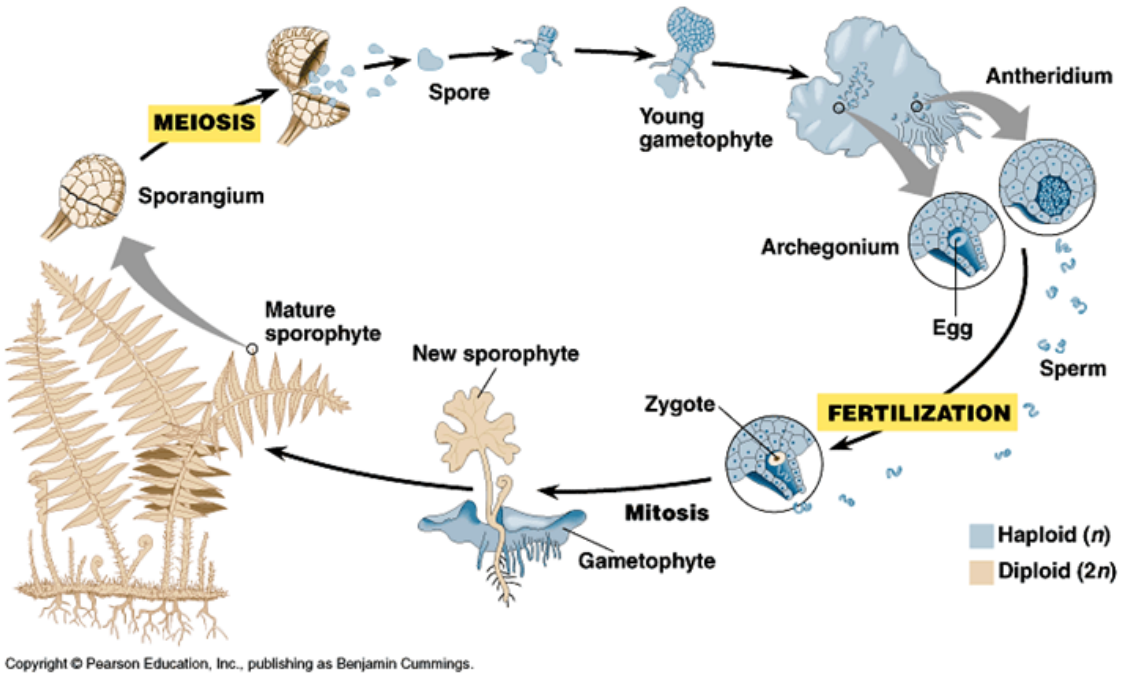
- The sporophyte is large and grows directly out of the small heart-shaped gametophyte.

- Unlike the bryophytes, fern gametophytes have both sexes present in the same individual.

- **Neither** the egg nor the developing zygote has protection from the environment.

- Like bryophytes, ferns use spores for dispersal.

- E.g. Maiden hair fern



Division Coniferophyta p.172-174

- This division is called gymnosperm (naked seed) because the seeds are naked - no fruit

- This group includes all cone-bearing plants, including "Christmas trees."

- There are about 650 extant species.

- They range in size from about 10cm to 100m (Redwood).

- This group contains the oldest known organisms, 4000 year old bristle-cone pines.

- Conifers have vascular tissue that can transport water great distances and helps to support the organism.

Division Coniferophyta

- They have true stems, leaves and roots.

- Like all plants, conifers need water to survive, but it is not needed for reproduction.

- The sporophyte is much larger than the gametophyte, which is only a few cells.

- The male gametophyte is a **pollen** grain produced by a cone.

- The female gametophyte (**egg**) is protected by a larger cone.

Division Coniferophyta

- Pollen grains are small and are blown to the egg by the wind.
- When pollen reaches the egg, it is **pollinated**.
- **Fertilization** occurs only if the egg and a pollen nucleus fuse.
- A seed develops around the developing zygote to protect it.
- Some seeds even protect the embryo from fire.
- After the seed has developed it is dispersed, generally by the wind.
- E.g. fir trees, spruce trees, juniper

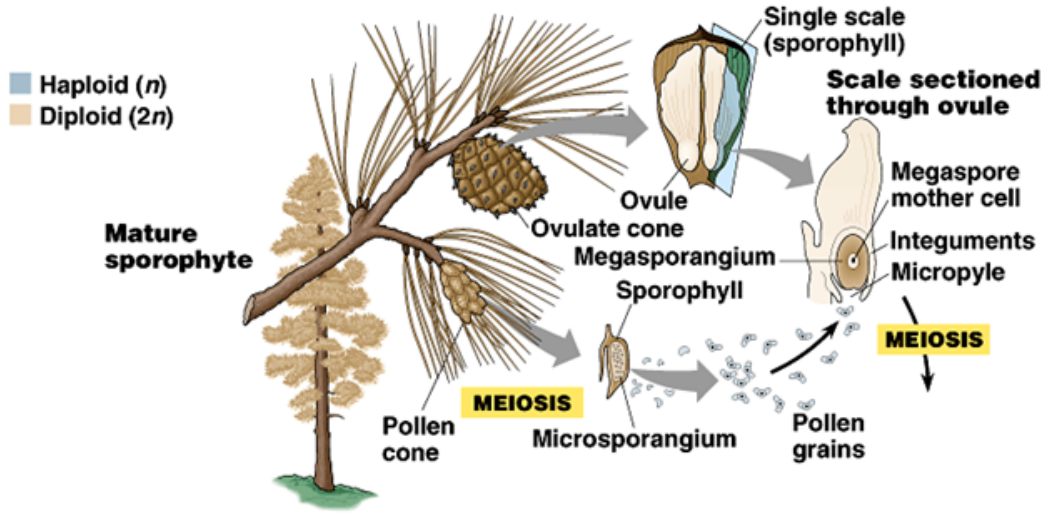


Fig. 30.9

Angiosperms p.174-179

- This group includes all flowers.

- This is the largest division of plants, with about 250,000 species.

- They range in size from 1mm to 100m high.

- Anthophytes have complex vascular tissue that also aids in support.

- They have true stems, leaves and roots.

- The need for water is very reduced, and some live in very dry habitats (i.e. cactus).

Angiosperms

- Like the Gymnosperms, the sporophyte generation is dominant and the gametophytes are reduced to pollen and eggs.

- Both the pollen and egg are produced in a specialized reproductive organ called a **flower**.

- Flowers may have only male or female parts, or contain both sexes.

- The egg is protected by the flower - then seed and sometimes fruit.

- Pollen reaches the egg either by wind (e.g. grass) or by attaching to animals (e.g. dandylion).
Does not require water.

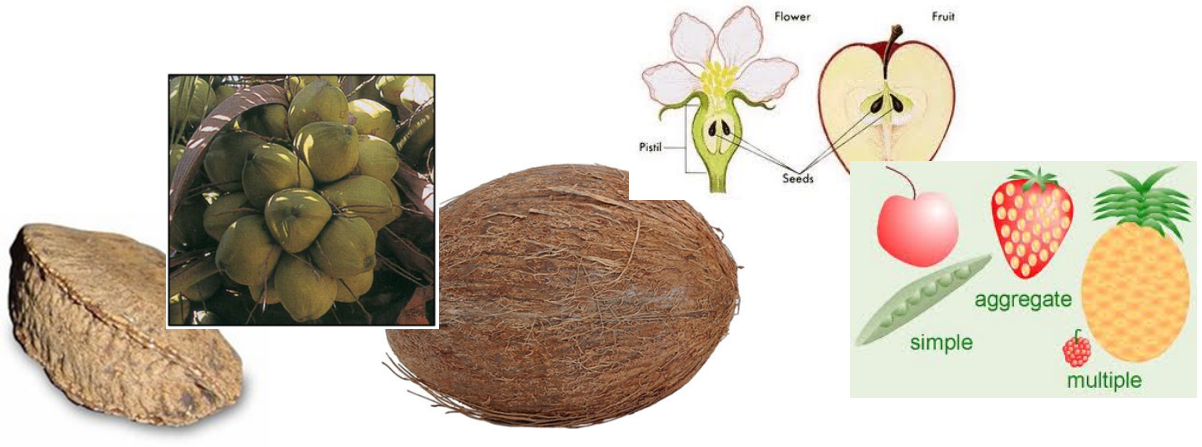
Angiosperms

- After pollenization and fertilization, a seed develops that protects the embryo.

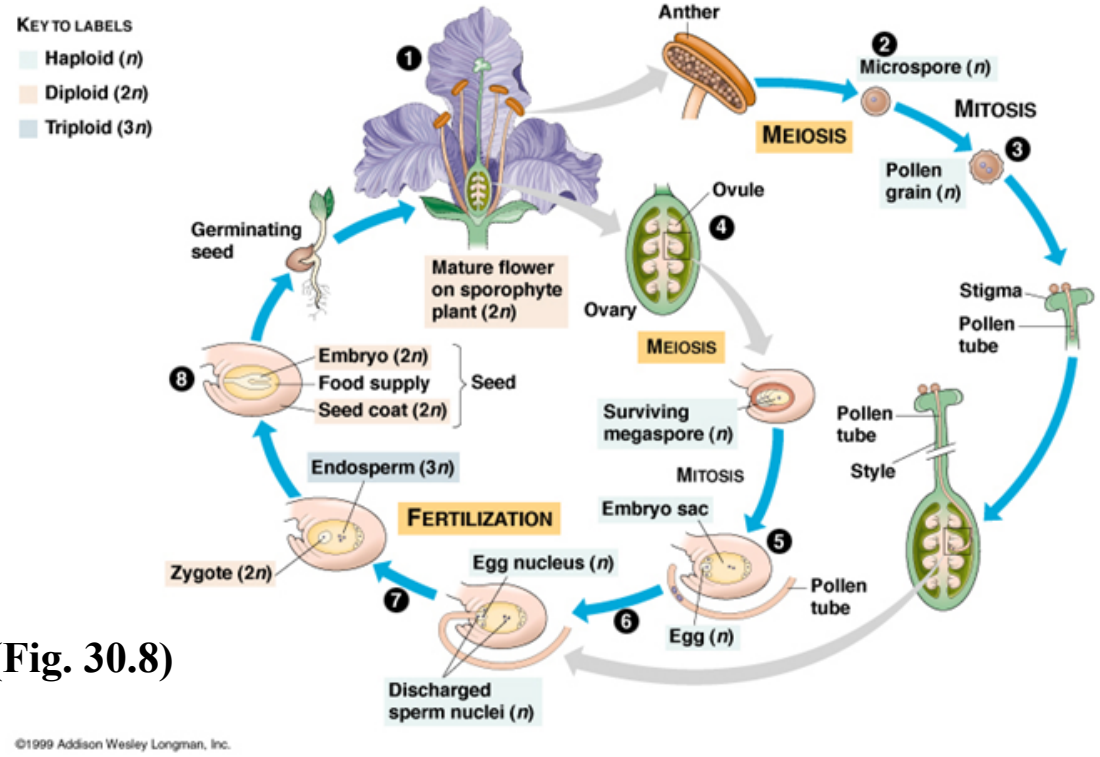
- Because the embryo is covered by a seed or fruit it is called “covered.”

- The term **angiosperm** is used for this division because it means “covered seed.”

- Fruit may help with protection (i.e. a hazel nut) or dispersal (i.e. berries).



Life Cycle of the Angiosperms



(Fig. 30.8)

Angiosperms are the most successful Plants p.175-179

- Anthophyta is considered a very successful group because it has so many species.

- If a taxon has many different species, it means there are many habitats that group can live in.

- There are several features of flowers that helped them adapt to many different habitats.

Angiosperms are the most successful Plants

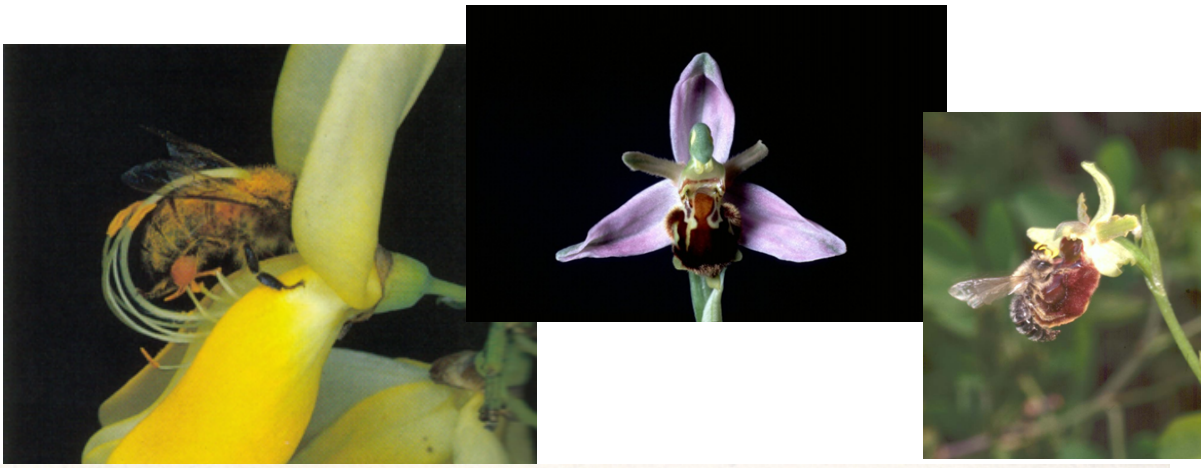
1. **Assistance of pollinators**– Wind is useful to disperse pollen but not as efficient as animal pollinators.

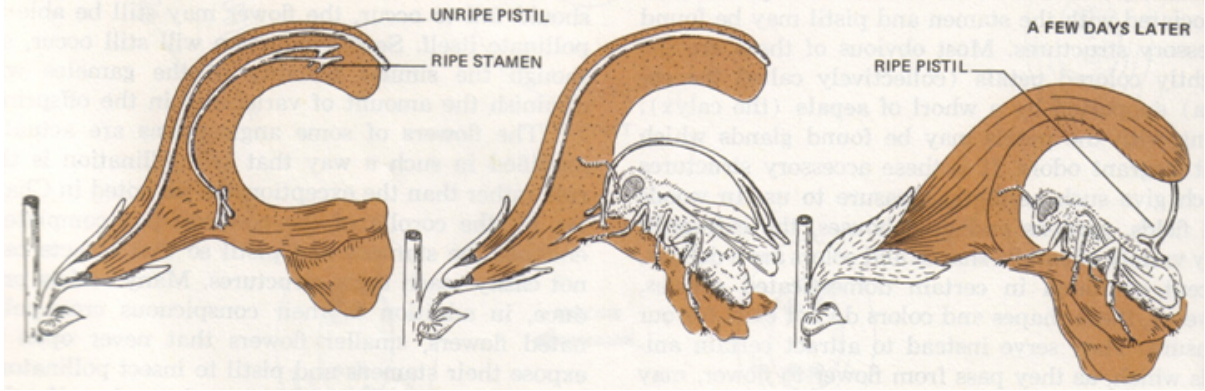
- Most of the Anthophyta use animals as pollinators.
    - Animal pollinators can be used to carry pollen directly from one flower to another.
    - This greatly increases the efficiency of pollination and reduces pollen wasted when wind is used.


Angiosperms are the most successful Plants

2. **Ability to attract pollinators**– Only the Anthophyta actively attract pollinating animals.

- Scent, colour, and nectar (high in sugar) have evolved to attract and reward animals.





Angiosperms are the most successful Plants

3. **Protection of seeds** – Some flowers have modified fruit that form a hard covering which protects the seed (nut).

Angiosperms are the most successful Plants

4. **Fruit** – Some fruit protect seeds, others are designed to disperse them.

- Fruit that is sweet, high in nutrients or water, will be eaten by animals.

- It takes time for seeds to pass through the digestive tract of animals.

- When the seed finally exits the animal's digestive tract, it is usually far from the parent plant.

Angiosperms are the most successful Plants

5. **Specialized tissues** – The Anthophyta have structures which can help them live in hot, dry, or cold habitats.

E.g. Thick outer of cells to prevent water loss in cacti.