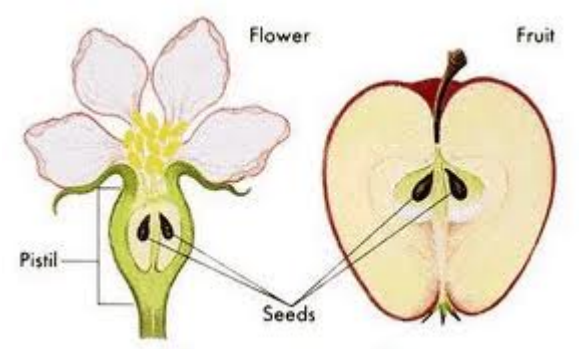


from..... 22-2 Evolution of Seed Plants

III. Angiosperms









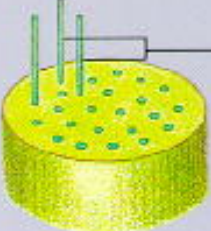

- A. These are flowering plants. They reproduce sexually through their flowers in a process called pollination. Angiosperm seeds are contained within a protective wall that develops into a fruit.
- B. Angiosperms are the most widespread of all land plants. They range from frigid mountains to blazing deserts. Some even live under water.



C. There are two main subclasses:

Subclass	Monocots	Dicots
Number of cotyledons (seed leaves)	One.	Two.
Leaves	Veins are parallel.	Veins are branching.
Flower	Parts in threes or multiples.	Parts in fours or fives or multiples.
Xylem/Phloem	Scattered throughout.	Arranged in a ring.
Stems	Stems do not thicken from year to year.	Stems grow thicker every year.
Examples	Corn, wheat, palms, orchids, lilies.	Roses, tomatoes, oaks, daisies, sunflowers.

C. There are two main subclasses:

MONOCOTS	DICOTS
 <p>one cotyledon</p>	 <p>two cotyledons</p>
 <p>floral parts in threes</p>	 <p>floral parts in fours or fives</p>
 <p>parallel leaf veins</p>	 <p>netlike leaf veins</p>
 <p>pollen grain has one pore or furrow</p>	 <p>pollen grain has three pores or furrows</p>
 <p>vascular bundles throughout stem's ground tissue</p>	 <p>stem's vascular bundles arranged in a ring</p>

from 25-1 Cones & Flowers as Reproductive Organs

III. Structure of a Flower

A. Typical Flower

1. produces both male and female gametes

B. Other 'strategies':

1. specialized male and female flowers on same plant (e.g. corn)

2. male and female flowers on separate plants (e.g. willow)

C. Flower Parts

1. Are specialized leaves
2. Arranged in circles
3. Four kinds



NAME	LOCATION	DESCRIPTION	FUNCTION	GROUP NAME
Sepals	Outermost	Green Leaflike	Protect flower while developing	Calyx
Petals	Just inside the sepals	Often brightly coloured	Attract pollinators	Corolla
Stamens	Just inside the petals	Long thin filament supporting the anther on the top	Makes, releases male gametophyte(pollen)	
Carpels	Center	Ovary, the base Style: Stalk Stigma: where the pollen lands; often sticky and rough surfaced	Makes, houses, female gametophyte (ovules)	Pistil

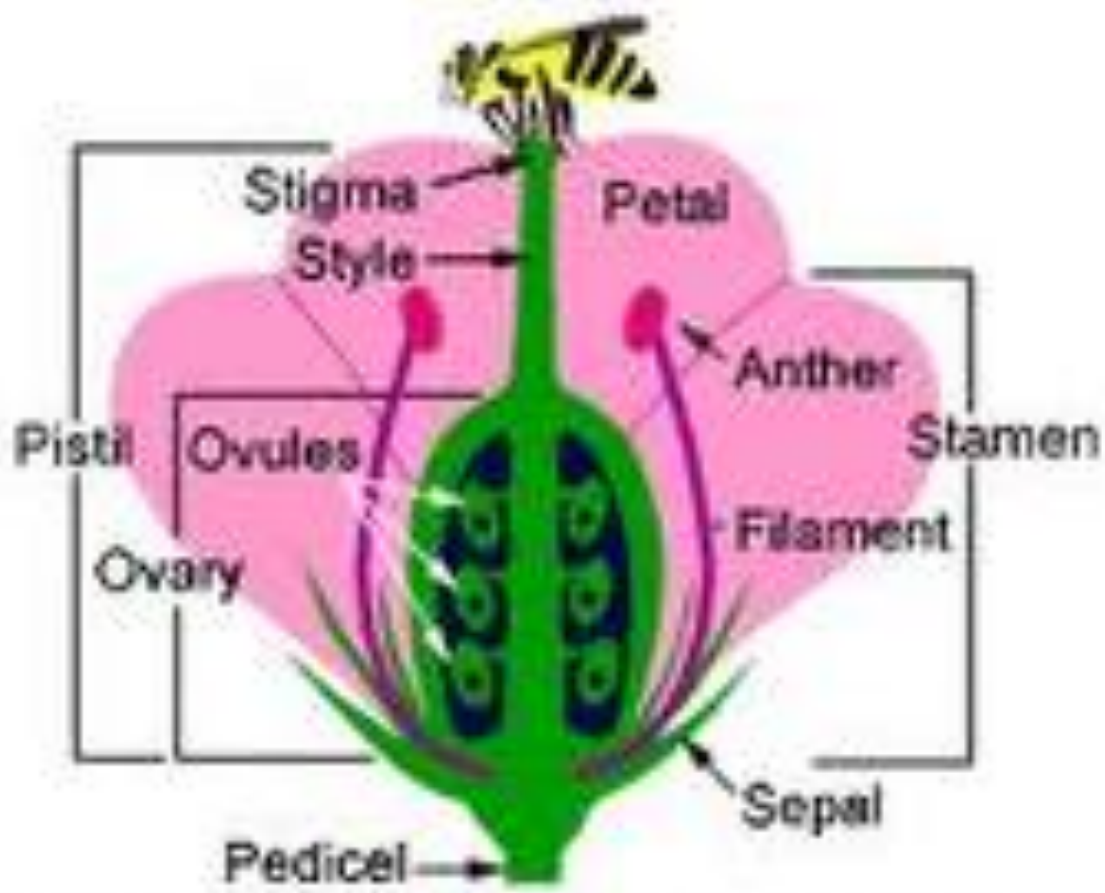


Figure 19. Complete flower structure

IV. Pollination

A. Definition: *the transfer of pollen from anther to stigma*

B. Two types:

1. Self-pollination: *when pollen comes from the same flower*

2. Cross pollination: *when pollen comes from a different plant*

C. Most plants cross-pollinate, which increases variation in their offspring

Animation

VIII. Fertilization

A. Process

1. Pollen grain lands on stigma of same species
2. Pollen tube grows down the style, following a chemical trail
3. Tube reaches ovary and enters the ovule
4. Inside pollen tube are two sperm nuclei

(Note: no tails needed; don't need propel themselves!)

- a) one sperm fuses with egg to form the zygote
 - b) other sperm fuses with spare female nuclei to form endosperm (3N)
5. Endosperm = food source for baby plant

B. Ecological Importance

1. Endosperm is rich in important nutrients
2. Examples: grass endosperm: corn, wheat, rice

c. After fertilization

1. Outer parts of ovule toughen into seed coat
2. Ovary wall thickens, merges with other parts to become fruit
3. Plants may use bright colours and sweet tastes to make fruit attractive to animals

Fruit Formation



IX. Formation of Seeds

- A. The evolution of seeds was: a major factor in the success of angiosperms on land
- B. Seeds assist embryos by providing:
 - 1. *nourishment*
 - 2. *protection*
- C. Structure
 - 1. Cotyledon= seed leaf; they contain stored food that is used when seed germinates
 - a) monocots (e.g. corn) have *one*
 - b) dicots (e.g. beans) have *two*
 - 2. Seed coats: Function: to protect seed from
 - a) environment: (e.g. dryness, salt water)
 - b) animal teeth, digestive chemicals

D. When animals eat seeds:

1. They germinate after their trip through the digestive tract
2. Animal waste acts as fertilizer
3. Usually deposited some distance away from where fruit was eaten
4. Reduces competition between adult (plant) and offspring (seeds)

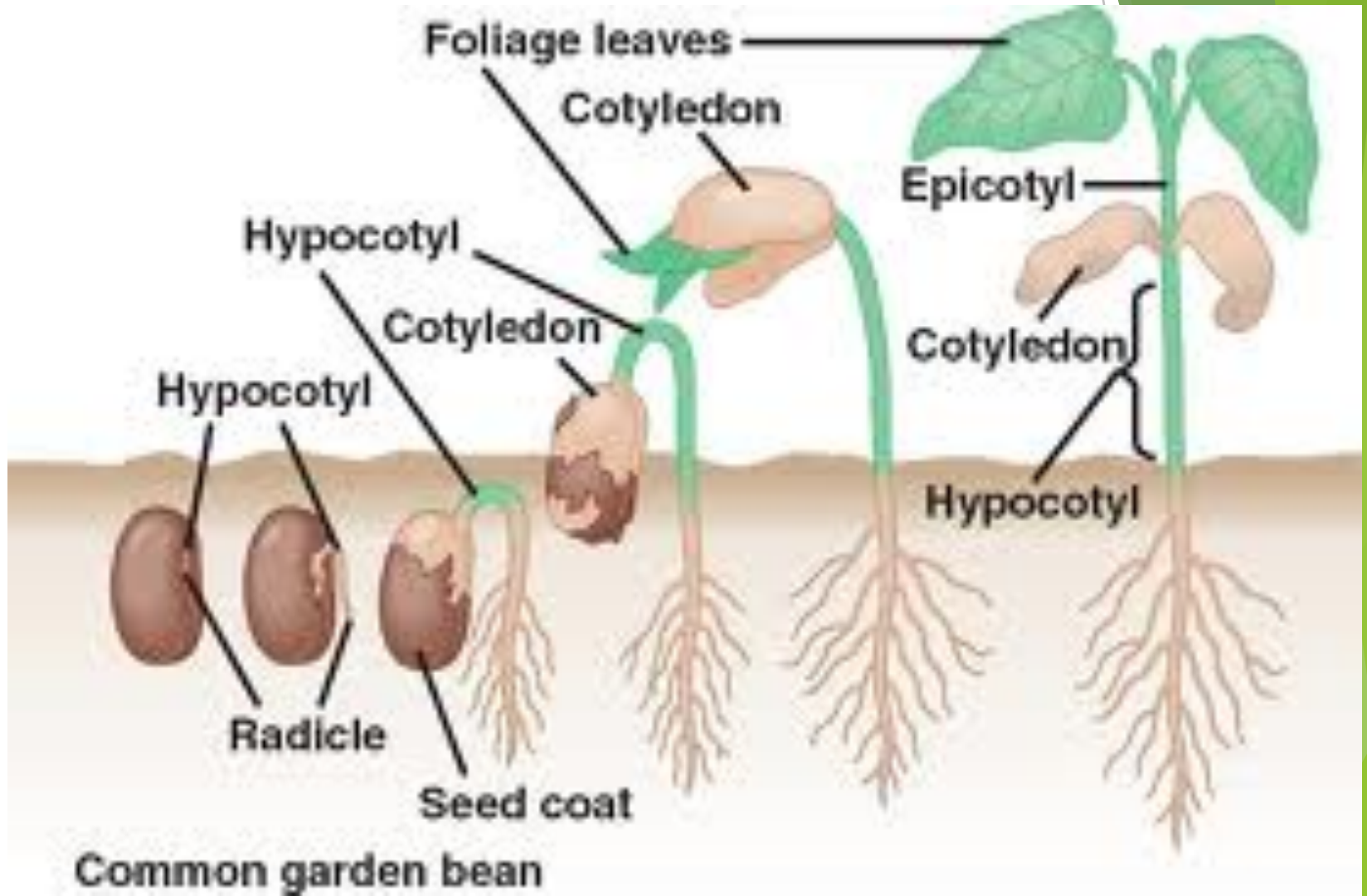


25-2 Seed Development

I. Germination

A. Process:

1. Water absorption causes endosperm & cotyledons to swell
2. seed coat cracks open
3. Radicle emerges; grows into primary root
4. Growing shoot pushes up through soil



III. Seed Dormancy

A. Definiton: *A period during which the embryo is alive but not growing*

B. Purposes:

1. A long time required for dispersal

a) e.g. coconut

2. To wait until environmental conditions will support plant growth

a) e.g. plants from temperate regions; dormant in winter, germinate in spring

22-3 Coevolution of Flowering Plants and Animals

- Coevolution: *the process by which two organisms evolve structures and behaviours in response to changes in each other over time.*
- The first flowering plants evolved at about the same time as the earliest mammals, shortly after birds and a while after the earliest insects.
- Evolution of angiosperms with modern insects, birds and mammals is very important.

I. Flower Pollination



- A. **Wind: *small, plain simple flowers with little or no fragrance.***

- B. **Birds, insects, mammals: *carry pollen from one plant to another.***
 - 1. Plants provide food in the form of *pollen or nectar.*
 - 2. Animals provide direct *transportation* between male and female *gametophyte.*



	Pollinator	Flower
Attractants for Pollinators	Bee	Special ultraviolet color.
	Moth	Fragrance.
	Fly	Bad odor.
	Bird	Bright red and orange colours.



Fly on corpse flower



II. Seed Dispersal

The process of distributing seeds away from parent plants. There are 2 reasons for dispersal:

1. *Prevent competition with parent plants for resources.*

2. *Colonize new environments*



Dispersal Method	Description
Wind	Blown to different places.
Pressure	Fruit 'explodes', spreading seeds.
Barbed or hooked fruits	Attach to animal fur or feathers and are carried to new habitat.
Tasty Fruit	Digested by animals, carried to new habitat, seeds 'deposited' with fertilizer.






Seed dispersal

Seeds can be dispersed in various ways.


Expulsion

The sticky seed capsule of a sour fig releases its seeds when it rips.




sour fig

An african violet sheds its seeds when they are ripe.




african violet

The squirting cucumber plant fills up with water and squirts its seeds out.



squirting cucumber

Peas are dehiscent fruits which are dry, single fruits that usually have seeds. The seeds are dispersed when the fruit splits open. Other pod families and silensed helices are also dehiscent fruits.



peas

Animals

Animals, especially birds, eat the fruit off trees. The seeds are carried for a long distance inside their bodies. The seeds are passed out of their faeces.



bird

Burrs and hooks enable the fruit to cling to the fur of animals or to people's clothing.



cocklebur

Apples are harvested by people for food. Their seeds are replanted to produce more food.



apple

The unicorn seed has spines that grip onto animal's fur. They can be carried for some distance.



unicorn seed

Wind

Some seeds have "wings" that help them float on the wind for some distance.



pine



sycamore



dandelion

The wind catches the feathery glumes of the dandelion seed.




poppy

As the wind shakes the capsule, poppy seeds fall to the ground or the wind carries them away.


Water

The fruit of the water lily floats on the water until it reaches some mud in which it will grow.



water lily

A coconut may float on the current of the ocean for many kilometers. The new plant could grow in another part of the world, far away from the parent plant.



coconut

