



Life Science
Mr. Galloway
Chapter Nine
Seed Plants

9.1 Characteristics of Seed Plants
9.2 Gymnosperms
9.3 Angiosperms
9.4 Plant Responses and Growth

Recommended Website:

Genesis 1:11-13

11 Then God said, "Let the earth bring forth grass, the herb *that* yields **seed**, and the fruit tree *that* yields **fruit** according to its kind, whose **seed is in itself**, on the earth"; and it was so.

12 And the earth brought forth grass, the herb *that* yields seed **according to its kind**, and the tree *that* yields fruit, whose seed *is* in itself according to its kind. And God saw that *it was* **good**.

13 So the evening and the morning were the **third day**.

9.1 Characteristics of Seed Plants

Two Characteristics:

- * Vascular Tissue
- * Seeds to Reproduce

Example: Dandelion's "seed head"
= hundreds of fruits, each with a seed.

<http://themindunleashed.org/wp-content/uploads/2014/05/dandelion.jpg>
<http://themindunleashed.org/wp-content/uploads/2014/05/dandelion.jpg>


Vascular Tissue (Two Types)

1. **Phloem** to transport (move) food made in leaves to the rest of the plant.
2. **Xylem** to transport water and nutrients from the roots into the plant.

<http://www.whalecoastconservation.org.za/images/imglib/picraw202.jpg>

Seeds = structures that contain a young plant inside a protective covering.

- * Seed plants do not need water in the environment to reproduce.
- Sperm cells are delivered directly to the area where the eggs are.
- Fertilized eggs (zygotes) develop into seeds.
- seed covering keeps it from drying out.


Seed Parts:

(see the pictures on p. 276 of your book, & PowerPoint Online)

1. **Embryo** = the zygote, which is a tiny plant inside the covering.
2. **Cotyledons** = one or two seed leaves which store food for growth.
3. **Seed Coat** = keeps it from drying out (some last thousands of years).

<http://facultyweb.cortland.edu/klotz/Seeds/BeanSeed.jpg>

Seed Dispersal = scattering seeds away from parent plant. **Look up a pic on the web**

- * Animals eat fruit and seeds exit their digestive tract.
- * Some seeds have hooks to stick to animal fur.
- * Water and wind disperse other seeds
(Pine seed helicopters)
- * Some shoot out their seeds when the drying seed pod burst open.

<https://s-media-cache-lak0.pinnimg.com/564x/a5/db/0d/a5db0d7c440737add4bc6acb54e401e6.jpg>

Germination = early growth stage of the plant embryo.

- * Begins when the seed absorbs water.
- * Then the embryo uses the stored food (cotyledon) for energy.

<http://facultyweb.cortland.edu/klotz/Seeds/BeanGermination.jpg>

Leaves: Many different sizes, shapes. (Pine needles, cabbage, oak, etc.)

- * Capture sun's energy for photosynthesis
- * Structure of a leaf: (see p. 279, & PowerPoint Online)
 - Upper surface cells
 - Chloroplasts
 - Veins with xylem and phloem
 - Underside surface cells
 - Stomata

("stoma" in Greek means "mouth", opening)

<http://www.eschooltoday.com/photosynthesis/images/structure-of-a-leaf.png>

Transpiration = the process of water evaporation from leaves.

- * Too much evaporation and the plant shrivels and dies
- Closing the stomata helps slow down **transpiration**.

<http://techalive.mtu.edu/meec/module01/Transpiration.htm>

Stems: support the plant and carry substances between the roots and leaves.

- * Some stems also store food (starches) like in asparagus.

- * They vary in size and shape:
 - Boabab tree has a huge stems.
 - Cabbage have short, hidden stems.



- * Structure of stems/trunks: (see diagram p. 281.)

Look up a pic on the web

- Herbaceous (soft) [dandelions, tomato plants]
- Woody (hard) like trees and rose bushes
- Both have xylem and phloem, but woody stems have extra layers:

Outer Bark

Inner Bark (*phloem*)

Cambium (to produce new phloem and xylem)

Sapwood (active *xylem* - still transporting)

Heartwood (inactive *xylem*); just gives strength

Pith (center storing food & water in young trees)

<http://media.web.britannica.com/eb-media/51/72251-035-01722E17.jpg>

Annual Rings = xylem rings

- * Spring Xylem is wide & light brown (grows rapidly)
- * Summer Xylem is thin & darker (grow slower)
- Each pair of light & dark rings = one year's growth.

<http://www.geoffswoodwork.co.uk/tree02.gif>

Roots: (Anchors. Absorbs water & nutrients from soil)

*** Two Types**

1. **Taproot** = deep into soil
2. **Fibrous** Roots = several branching main roots

<http://www.garden.org/about/courseweb/course1/week1/images/c1w1-f.gif>

*** Root structure**

- **Root Cap** the rounded tip containing dead cells.
- **Root hairs** increase surface absorption area
- Cambium produces xylem and phloem tissues.
- Xylem transports substances up to the plant
- Phloem brings food down to the growing root

<http://www.biologyjunction.com/images/partsofroots.jpg>

9.2 Gymnosperms

Gymnosperm = seed plant that produces naked seeds.

* Many have needlelike or scalelike leaves and deep root systems.

* Note the book on p. 285 says fossils indicate there were many more gymnosperms in the past than today. This is because the global flood 4,000 years ago wiped out many plants.

(The dates given by your book of millions of years are false guesses. See the booklet by Dr. Humphreys.)

***Types of Gymnosperms:**

- **Cycads** (look like palm trees with large cones)
- **Ginkgo** (only the *Ginkgo biloba* survives today)
- **Gnetophytes** (found only in deserts)
- **Conifers** (largest & most common, pines, cedars, etc.)

[Conifers are evergreens, keeping needles growing all year]

<https://upload.wikimedia.org/wikipedia/commons/4/40/Gymnospermae.jpg>

**Oldest living organism
– “Bristlecone Pine”
around 4,000 years old.
Began growing just after
the flood of Noah.**

<https://upload.wikimedia.org/wikipedia/commons/e/e2/BristleConePine.jpg>

Reproduction of Gymnosperms:

* **Cones** – covered in scales, both male and female cones are produced.

- **Pollen** is produced by male cones, and pollen are tiny cells that later become sperm cells.

- **Ovule** is a structure containing an egg cell.

- **Pollination** = transfer of pollen from male structure to female part.

(Pollen falls from a male cone to a female cone and fertilizes an ovule, which develops into a seed, with the zygote as the embryo part of the seed. It can take two years for seeds to mature, then the cones open & wind carries the seeds off.)

http://www.mhhe.com/biosci/genbio/maderbiology7/graphics/mader07b/online_vrl/images/0561a1.jpg

9.3 Angiosperms

Angiosperms – Two characteristics: flowers and fruit

(To remember, think: “Angie” likes flowers, but “Gym” does not.)

* They produce seeds inside a fruit.

* **Flower** = the reproductive structure of an angiosperm.

* **Fruit starts as an Ovary** = where the seeds develop

Flower Structure: Not all flowers have same parts. Some have only male parts.

- * **Sepals** = leaflike structures covering an enclosed bud.
- * **Petals** = colorful structures easily seen when a flower opens.
- * **Stamens** = the male parts (thin stalks topped by small knobs)
- * **Pistils** = the female parts in the center of the flower.
 - **Stigma** = sticky tip of the pistil
 - **Style** = tube connecting the stigma to the ovary.

The Structure of a Flower

http://biology4igcse.weebly.com/uploads/9/0/8/0/9080078/886383640_orig.jpg?380

Reproduction of Angiosperms:

- * **Pollination** = Pollen falls on a stigma when wind, bees, or bats carry it. (Sugar-rich nectar in the flower attracts bees or bats.)
- * **Fertilization** = sperm & egg join together in the flower's ovule.
 - The zygote develops into the embryo part of the seed.
 - The ovary around the seed develops into a **fruit**. (Apples, cherries, tomatoes, squash, etc. are all fruit.)
- * **Dispersal** – animals eat the fruit and the seeds come out the other end.

Two types of Angiosperms:

1. **Monocots** – have only one seed leaf (cotyledon) (grasses, corn, wheat, rice, lilies, tulips) (flowers have either 3 petals or a multiple of 3 petals) (long slender leaves with veins parallel like train rails) (vascular tissue scattered randomly in the stem)
2. **Dicots** – have two cotyledons (roses, violets, plus oak, maple, bean, and apple trees) (flowers have 4 or 5 petals or multiples of these numbers) (leaves are wide, with veins branches off one another) (vascular tissue bundles arranged in a circle)

Angiosperms are used for food, clothing (cotton), Michael's medicine (digoxin)

Life Cycle of an Angiosperm

http://www.vcbio.science.ru.nl/images/pollen/pollen-lifecycleplant_eng.gif

9.4 Plant Responses and Growth

Did God make plants like the bladderwort and venus fly trap to eat insects?

<http://botany.org/bsa/misc/carn.html>

Tropism = a plant's growth response toward or away from a stimulus. https://www.youtube.com/watch?v=zotM_TWq5Ik

* **Positive** tropism is when it grows toward a stimulus.

* **Negative** is when it grows away from it.

* **Stimuli can be light, touch, and even gravity.**

- Touch (**thigmotropism**) vines coil around anything they touch.

https://upload.wikimedia.org/wikipedia/commons/b/b3/Brunnichia_ovata.jpg

- Light (**phototropism**) leaves, stems, etc, grow toward light.

- Gravity (**gravitropism**)

(Positive) roots grow toward gravity's pull

(Negative) stems grow away from gravity's pull

Hormones = a chemical that affects how the plant grows and develops, & make tropism possible.

* Hormones also control germination, formation of flowers, stems, and the shedding of leaves and ripening of fruit.

* **Auxin** is an important hormone that speeds up plant cell growth rate.

- If light shines on one side of a stem, auxin moves to the shaded side and causes that side to grow faster so the stem bends toward the light as it grows.

Life Spans of Angiosperms:

* **Annuals** = complete a life cycle in one year.
(pansies, wheat, tomatoes, cucumbers, etc)

* **Biennials** = complete life cycle in two years.
(Second year they produce flowers and seeds.)
(Parsley, celery, etc)

* **Perennials** = live for more than two years
(Oak tree, honeysuckles, etc)
(Roots and stems survive the winter)