

**Biology 1306/1406 – Modern Concepts in Bioscience II**  
Week of March 8, 2021

Hey everyone, I hope that the semester is going well for everyone. Even with the loss of Wellness Day, this can still be a fabulous week! Let's get started with this week's material:

**Keywords: Angiosperm life cycle, Seeds, Fruit, Evolution, Natural selection**

Our Group Tutoring sessions will be every **Thursday from 7:00-8:00 PM**. You can reserve a spot at <https://baylor.edu/tutoring>. I hope to see you there!

This week in Biology 1306, we will be covering Campbell Chapters ch 22, 23 and 38.1-2

**Evolution - Campbell Ch. 22, 23**

**Evolution** describes **Descent with Modification**, or the change in a species over time.

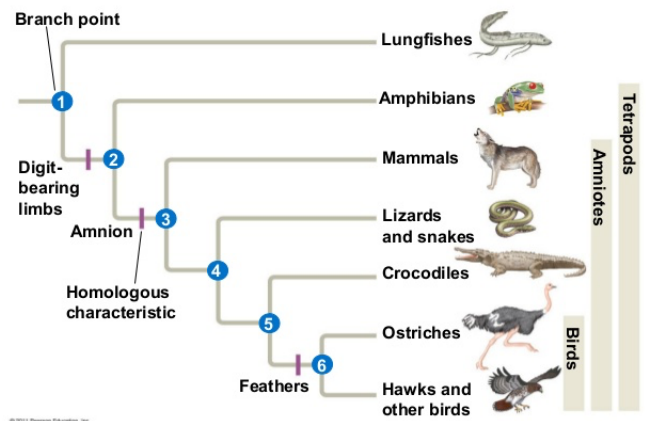
★ **While changes can occur in individual organisms, only populations can evolve.** ★

Evolution occurs through the action of **Natural Selection** in which individual organisms which are more suited to their environments are more likely to survive long enough to reproduce than other individuals of the same species who are less suited to the same environment. Over time, these individuals who survive to reproduce shape the characteristics of the population. Evolution is a **very slow process** but can produce **large changes** in a population **over time**.

**For natural selection to occur:**

- members of the same population must **vary in their inherited traits**
- individuals with favorable inherited traits must have a **higher probability of survival and reproduction**, therefore producing more offspring than other individuals
- the species must **produce more offspring than the environment can support**, meaning many "less fit" offspring die before reproducing.

Figure 22.17



**Outcome of Natural Selection:** Traits which are reproductively favorable accumulate in a population

**Some Terms to Understand:**

**Homology-** related species can have characteristics which function differently, but have an underlying similarity arising from a common ancestor ex. Human hand and bird wing

**Convergent Evolution-** independent evolution of similar features in individuals who do not share a common ancestor. These features are **Analogous**, meaning they have the same function, and likely are in response to similar environments, but are unrelated.

**Hardy Weinberg Equilibrium-** assesses whether evolution is occurring in a population.

•For a population to be in Hardy Weinberg Equilibrium there must be:

1. No mutations
2. No natural selection
3. Random mating
4. No gene flow between populations
5. A large population size.

•If these criteria are met, the population is **Not evolving**, and the following equation can be used:

• $p+q=1$  where  $p$  is the frequency of the dominant allele and  $q$ , the recessive allele

**Genetic Drift:** chance events which change allele frequencies unpredictably

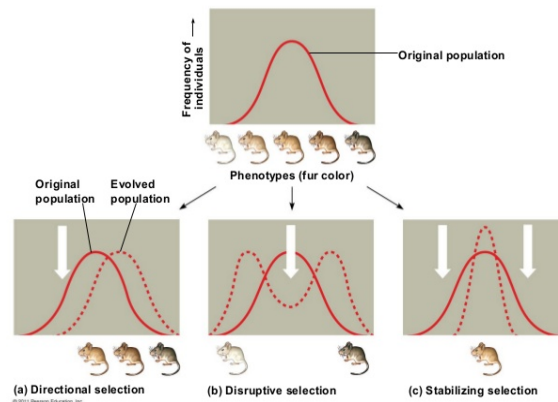
**Natural selection comes in three different “styles”:**

**Directional Selection-** one extreme phenotype is selected for

**Disruptive Selection-** the heterozygote, or median phenotype, is less advantageous than either extreme, so both extremes are selected for

**Stabilizing Selection-** an “in-between” phenotype is more advantageous than either extreme, so the median/middle phenotype is selected for

Figure 23.13



**Angiosperm Reproduction and Biotechnology - Campbell Ch 38.1-2**

**Flowers** are the sporophytic structures of angiosperms. They are **determinate shoots**, meaning they cease growing after the flower forms. **Complete flowers** have all 4 basic flower organs.

**Incomplete flowers** lack sepals, petals, stamens, or carpels. Here is some flower vocabulary that you should be familiar with:

**Receptacle:** where floral organs attach

**Sporophylls:** modified leaves for reproduction

**Simple pistil:** single unfused carpel

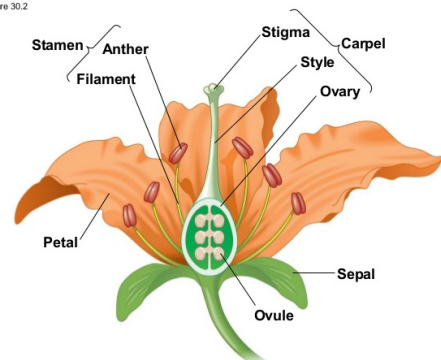
**Compound pistil:** multiple fused carpels; can have one loved stigma, or multiple stigma

**Inflorescences:** groups of flowers that grow in clusters ex. Sunflowers

**Stamen:** the male part of a flower

**Carpel:** the female part of a flower

Figure 30.2



***\*be able to recognize descriptions of each part of the flower shown in figure 30.2 (above)\****

**Pollination** is the transfer of pollen to the part of a seed plant containing the ovules. In angiosperms, the transfer is from an anther to a stigma. 80% of angiosperm pollination is biotic.

Among the abiotic, 98% is wind and 2% is water. The primary purpose of **nectar** is to reward the pollinators and **natural selection** favors derivations in floral structure of physiology that make it more likely for a flower to be pollinated.

#### **Wind Pollination-**

- Flowers are often small, green and inconspicuous because they do not need to attract pollinators. They often do not produce nectar or scent
- Wind is an inefficient pollinator, but this is compensated for by production of copious amounts of pollen grains

#### **Bee Pollination-**

- 60% of flowers use insect pollinators; bees are the most important and depend on nectar and pollen for food
- Bee pollinated flowers have a delicate, sweet fragrance, and bring colors, specifically yellow and blue
- Many bee pollinated flowers have ultraviolet markings called **Nectar Guides** to help bees find the flowers

#### **Moth and Butterfly Pollination-**

- Flowers are often sweetly fragrant
- Butterflies can perceive many bright colors, but moth flowers are typically white or yellow which stand out at night

#### **Bats Pollination-**

- Often light colored and aromatic flowers
- Bats transfer pollen when they eat the flowers

#### **Fly Pollination-**

- Reddish, fleshy flowers that resemble carrion or dead flesh

#### **Bird Pollination-**

- Large and bright red or yellow flowers with little scent because birds can't smell well
- The flower's sugary nectar meets the high energy requirements of birds

### **Angiosperm Life Cycle**

The **life cycle of an angiosperm** is extremely complex. Rather than go into detail in this resource about the specifics of this process, I will define the moving pieces. Please check out this video for a very good walk through of the process of **angiosperm reproduction and fruit development**: <https://www.youtube.com/watch?v=9F6TfdN4wU0>

#### **Female:**

**Embryo sac:** female gametophyte

**Micropyle:** the gap between the two integuments

**Megasporocyte:** the cell in the megasporangium of each ovule which enlarges and undergoes meiosis forming 4 haploid megaspores

**Megaspore:** of the four megaspores, only one survives before dividing three times with no cytokinesis to form a cell with 8 haploid nuclei.

**Synergids:** flank the egg and help guide the pollen tube toward the embryo sac

**Polar Nuclei:** share the cytoplasm of one cell in the embryo sac

**Integuments:** surround the ovule

**Ovary:** eventually becomes the fruit

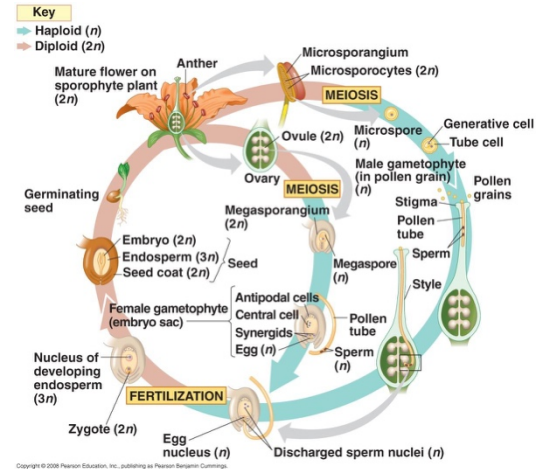
**Male:**

**Pollen sacs:** the microsporangia; each anther contains four

**Microsporocytes:** four are created within each pollen sac; each gives rise to a haploid male gametophyte, a pollen grain, which contains two cells: the generative cell and tube cell

**Generative cell:** passes into the tube cell during maturation; the cell which will fertilize the egg; this will divide mitotically into two cells prior to fertilization

**Tube cell:** the large cell which grows toward the micropyle in response to chemical attractants produced by the synergids and then kills one synergid in order to enter the embryo sac



**Endosperm:** the 3n cell fertilized by one of the generative cell nuclei; forms a milky which turns solid and serves as the nutrient source for a seed depending on whether the seed is a **Eudicot** or a **Monodicot**. See this video to learn more about the difference:

<https://www.youtube.com/watch?v=xe99TGccbxo>

**To learn about Seed Germination, check out this video:**

<https://www.youtube.com/watch?v=be5P30G36U&pbjreload=101>

**To learn more about fruit structure and function, check out this video:**

<https://www.youtube.com/watch?v=nax2mH1bFa4>

### Study Tips:

\*\*\* Review all vocabulary in each chapter and make sure you understand what the terms mean. Be sure that you can walk through the life cycle of an angiosperm. This should be a partial review from chapter 30\*\*\*

**That's all folks.**

**If you have any questions, feel free to reach out to the tutoring center or use the link at the top of the resource to make a Microsoft Teams appointment.**

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