

## Biology 1306/1406 – Modern Concepts in Bioscience II

Hello and welcome to the weekly resources for BIO-1306/1406 - Biology 2

This week is **Week 10** of class, and typically in this week of the semester, your professors are covering the topics below. If you do not see the topics your particular section of class is learning this week, please take a look at other weekly resources listed on our website for additional topics throughout the semester.

We also invite you to look at the group tutoring chart on our website to see if this course has a group tutoring session offered this semester.

If you have any questions about these study guides, group tutoring sessions, private 30 minute tutoring appointments, the Baylor Tutoring YouTube channel, or any tutoring services we offer, please visit our website [www.baylor.edu/tutoring](http://www.baylor.edu/tutoring) or call our drop in center during open business hours (M-Th 9am-8pm on class days at 254-710-4135).

**Keywords:** Restoration Ecology, Ecosystems, Colonization of Land, Alternation of Generations, Vascular Plant Life Cycles

### Topic of the Week:

Plant Life Cycles  
Campbell Chapters 29, 30, and 55.

#### **Plant Diversity I: How Plants Colonized Land – Campbell Ch. 29**

There is a significant amount of evidence indicating that **plants descended from Charophytes** (green algae). This evidence includes: 1) Rings of proteins that synthesize the cellulose microfibrils of the cell wall; 2) Structure of **flagellated sperm**; 3) Formation of a **phragmoplast**-structure of microtubules that forms between the 2 splitting daughter nuclei in cell division

Traits that are **specific to Plants:**

#### 1. **Alternation of Generations**

Check out this video:

<https://www.youtube.com/watch?v=iRKu2MN4T04>

#### 2. **Multicellular, dependent embryos**

#### 3. **Walled spores produced in sporangia**

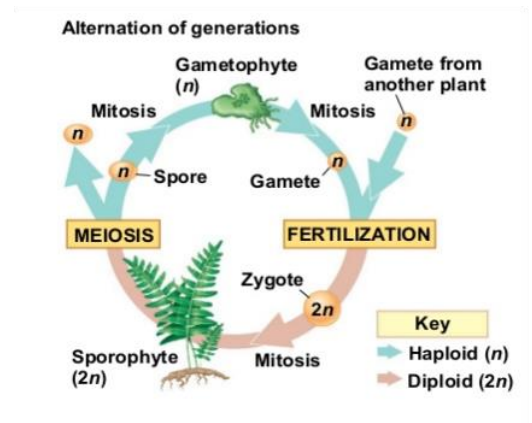
#### 4. **Multicellular gametangia**

**Gametangia**- gametes within multicellular organs

**Archegonia**- female gametangia; releases a single egg that is kept in the bulbous part of the organ

**Antheridia**- male gametangia; produces sperm and releases them into the environment

#### 5. **Apical meristems (described in chapter 30)**



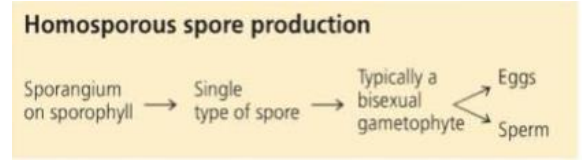
**Lycophytes (Phylum LycopHYta)**- require a host to grow (**epiphyte**); sporophytes can have upright stems with many small leaves or can have ground-hugging stems; contains **Club Mosses, Spikemosses, and Quillworts**

**Monilophytes (Phylum Monilophyta)**- megaphyll leaves and branching roots; contains Ferns, Horsetails and Whisk Ferns

### Vascular and Non-vascular Plant Life Cycles

**Vascular Plants:** Lycophytes and Monilophytes

**Non-Vascular Plants (Bryophytes):** Liverworts, Mosses, Hornworts



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**Non-Vascular (MOSS) Plant Life Cycle: haploid (n)**

**gametophytes** are the **dominant stage** of the life cycle  
**Protonema**- small filaments with a large surface area to increase water and nutrient absorption; protonema produces buds which go on to produce the antheridia (male structure)

**Gametophore**- gamete producing structure

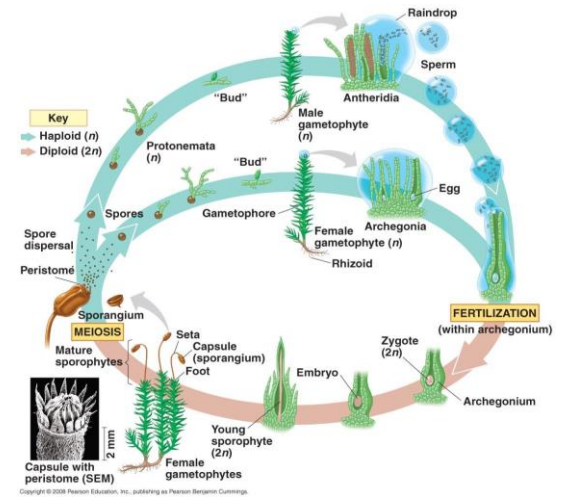
Gametophyte anchored by **rhizoid** (similar to roots except they are not composed of tissues and do not play a primary role in water and nutrient absorption)

**For fertilization to occur, moisture/a film of water is required**

**Sporophyte**- consists of a **foot, a seta, and a sporangium**

**Peristome**- teeth-like structures open and close to allow for intermittent dispersal of the spores

**For a further explanation of the Life Cycle of a Moss, check out this video: <https://youtu.be/o1z0Vfo62Lg>**



**Seedless Vascular Plant Life Cycle:**

**Xylem**- brings up the water and minerals with tracheids

**Tracheids**- lignified vascular tubes that carry water and minerals from the roots into the leaves

**Phloem**- stacked cells (tube) that distribute sugars, amino acids

**Roots**- absorb water and nutrients and anchor the plant in the soil

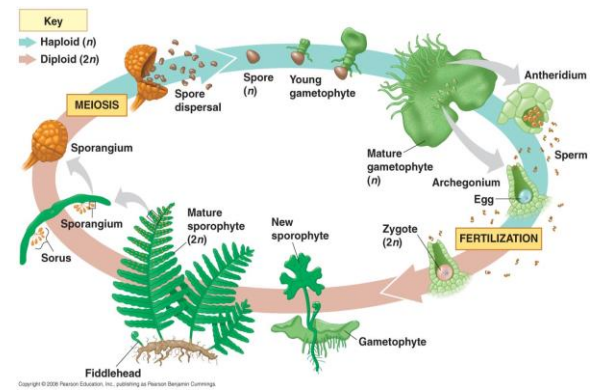
**Leaves**- primary photosynthetic organ

Lycophytes have **microphylls** (small, spine shaped leaves)

All other vascular plants have **megaphylls** (larger and highly branched leaves)

**Sporophylls**- leaves with sporangia

**For a further explanation of the Life Cycle of a Fern and the differences between the Moss Life Cycle, check out this video: <https://youtu.be/Fhk-Y0duNjg>**



**Plant Diversity II: Evolution of Seed Plants – Campbell Ch. 30**

**Seed Plants:** larger, more complex plants displaying sporophyte dom  
**Sporophyte:** the **diploid (2n)** stage of the seed plant’s life cycle whic  
 ‘structure’ we associate with a plant

using  
 d is the

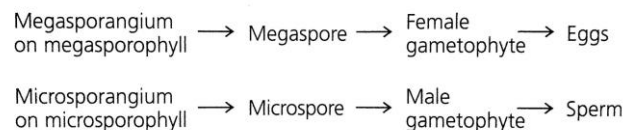
**Gametophyte:** the **haploid (n)** stage of the seed plant’s life. The mal  
 containing *pollen grain* and the female is the egg-  
 containing *archegonia/ovules*

s the sperm-

**Seed:** a plant embryo and its food supply stored within a

**Heterospory:** describes the fact that seed plants produce multiple types of gametes\*\*

**Heterosporous spore production**  
 (all seed plants)



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## Important Characteristics of Seed Plant Evolution:

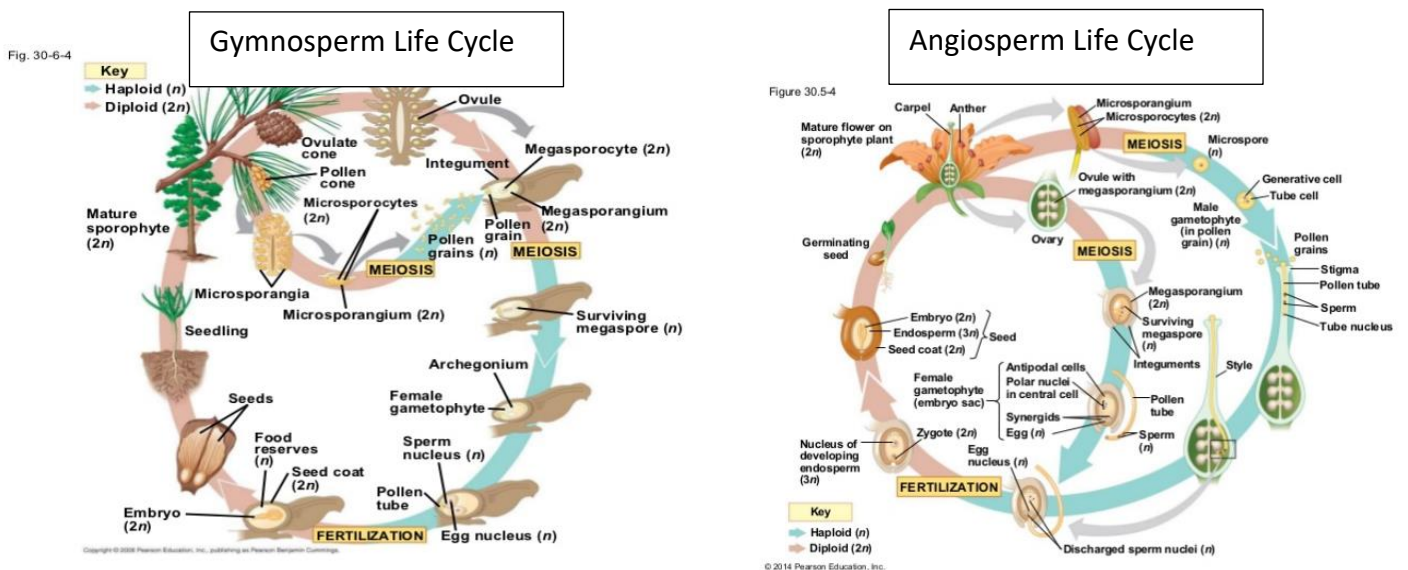
Evolution of seed plants is a result of the development of protective seeds and the continuing decrease in the size of gametophytes. The reduced **gametophyte** is better protected from the environment (ex. UV radiation) due to the larger **sporophyte**. This **prevents dehydration and potential UV damage** of the gametic genome. Seeds allow plant embryos to be **dormant**, meaning they only grow when the conditions are correct to foster development. This and other structural features allow for the *transport* of seeds to better growing environments.

**Gymnosperm:** naked seed of **conifers**. The mature **sporophyte** ( $2n$ ), bear pollen cones ( $\sigma$ ) and ovulate cones ( $\rho$ ), where **gametophytes**( $n$ ) are formed. **Check out this video to learn more about gymnosperm life cycles:** <https://www.youtube.com/watch?v=2gWEgrMwMe0>

**Angiosperms:** flowering plants, which utilize male and female components of the sporophyte (**stamen** and **carpels**, respectively) to form the male and female gametophytes. A pollen grain (2 components: the **tube cell** ( $n$ ) and the **generative cell** ( $n$ )) from an anther may be transferred to a stigma. The tube cell forms a tube down the style to an ovule while the generative cell divides *mitotically* to form 2 sperm nuclei. At the female gametophyte, one sperm nucleus will fertilize the egg, and the *discharged* nucleus will fertilize the **polar nuclei** to form the **endosperm** ( $3n$ ). **Double Fertilization:** the two sperm nuclei fertilize the egg and polar nuclei of the female gametophyte

**Cotyledon:** one or two embryonic seed leaves

For **Monocots** vs. **Eudicots** or more about **double fertilization**, please check out these videos: <https://www.youtube.com/watch?v=xe99TGcbxg>; (**double fertilization {4:38-6:38}**) <https://www.youtube.com/watch?v=HLYPm2idSTE>

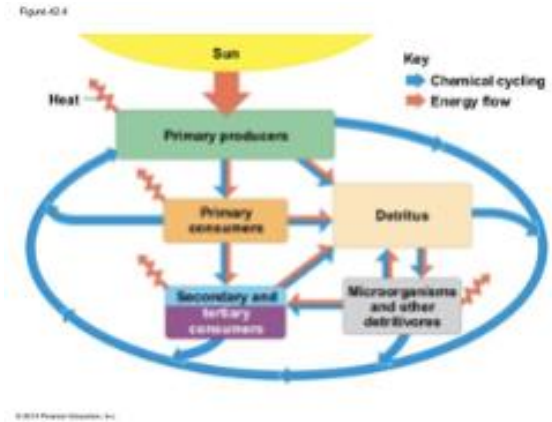


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### Highlight 1:

## Ecosystems and Restoration Ecology – Campbell Chapter 55

**Ecosystems** consist of all of the biotic and abiotic factors in an area. Within an ecosystem, there is a **flow of energy** from the sun to the heat that is eventually lost to the environment. Throughout this process, detailed below, energy is conserved. Similarly, the chemical elements that enter and leave an ecosystem are conserved according to the law of conservation of mass. How much energy is available at each trophic level is determined by:



**Net primary production:** the energy accumulated in plant biomass

**Production efficiency:** the efficiency of turning chemical energy into biomass at each level of the food chain; how effectively energy level is maintained

**Trophic Efficiency:** the percentage of energy that is transferred from one trophic level to the next in a food chain; this is usually 10%

- For example, when a lion eats a gazelle, the lion is only going to get 10% of the energy held in the gazelle's organic matter

### Finally, we will briefly touch on the concept of ecological succession:

**Ecological Succession:** a sequence of changes in community composition following a disturbance. Succession can be PRIMARY or SECONDARY.

**Primary Succession:** this occurs when no soil or any other substrate exists, and therefore it must be created. Examples are volcanic islands and moraines left by glaciers melting

**Secondary Succession:** this occurs when soil or any other substrate exists, but it cannot support life (no nutrients). Examples include agricultural fields that have been exploited and abandoned, and areas that have burned.

### **CHECK YOUR LEARNING**

1. What is the difference between a sporophyte and a gametophyte?
2. What is Alternation of Generations?
3. What kind of plants have double fertilization?

### **THINGS YOU MAY STRUGGLE WITH**

1. Vocabulary! These chapters are all about memorization. Make sure that you can differentiate between the similar concepts presented by your professor.
2. The Plant Life Cycles. Grab a white board and draw out the processes. If you are struggling with any of the concepts on particular, check out the Baylor Tutoring Center YouTube page under the biology 2 folder!

### **Study Tips:**

**\*\*\* Review all vocabulary in each chapter and make sure you understand what the terms mean\*\*\***

**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 an appointment.**

Answers:

1. Sporophytes are diploid and divide meiotically to produce spores. Gametophytes are haploid and divide mitotically to produce gametes
2. Alternation of Generations is when an organism alternates between a haploid life cycle and a diploid life cycle.
3. Angiosperms

