

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 14** 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 or call our drop in center during open business hours (M-Th 9am-8pm on class days at 254-710-4135).

Keywords: Speciation, Animal Form and Function, Community Ecology, Symbiosis, and Phylogenetics.

Topic of the Week:

This week in Biology 1306, we will be covering Animal Form and Function, Community Ecology, Ecosystems and Phylogenetics.
Campbell Chapters 40, 54, 55 and 26.

Basic Principles of Animal Form and Function: Campbell chapter 40

This chapter is very definition heavy. One thing that is important to remember as we learn different types of cells is the order of different levels of body plan organization. In order of increasing complexity, they are **cells, tissues, organs, organ systems and bodies**. By increasing complexity, organisms are able to maximize their **Surface Area to Volume** ratios. This is important because it enables organisms to exchange nutrients, water and other materials with their environment.

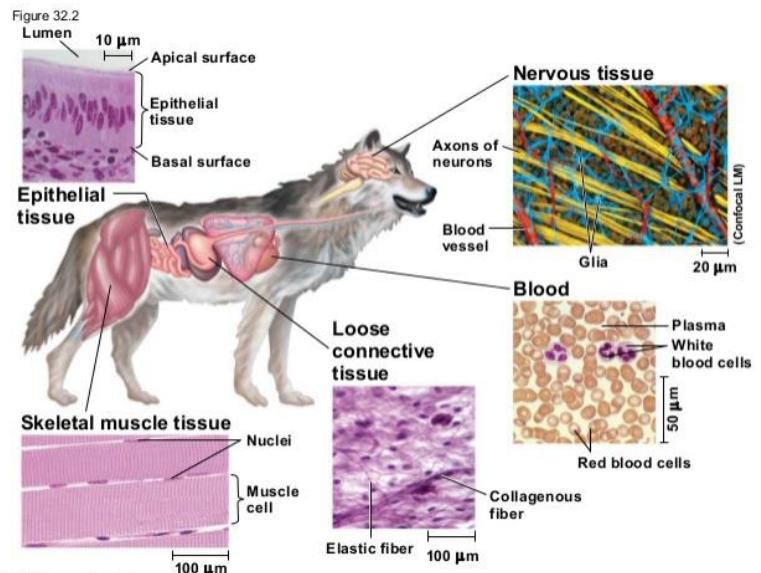
Within these complex organisms are different tissues:

Epithelial Tissue- lines organs, covers the body and is held together by tight junctions

- **Polarized:** when something is found on one side and not the other, meaning that there is an apical and basal side
- Functions as a barrier
- Avascular (no blood vessels)
- Stratified squamous, cuboidal, simple columnar, simple squamous, pseudostratified

Connective tissue- lies underneath epithelial tissue, has blood vessels (vascular)

- Blood, cartilage, adipose (fat), bone, fibrous



(tendons and ligaments), and loose (found in skin)

- **Collagenous fibers:** provide strength and flexibility
- **Reticular fibers:** join connective tissue to adjacent tissue
- **Elastic Fibers:** make tissue elastic

Muscle Tissue- all muscle cells consist of filaments containing the proteins **actin** and **myosin** which enable the muscles to contract

- Skeletal muscle, smooth muscle, and cardiac muscle

Nervous Tissue- makes up the Central Nervous System and the Peripheral Nervous System

- Neurons and Glia (the support cells which make up myelin)

Animals must also balance heat gain and heat loss. Different animals do this in different ways, but for the purposes of this class, we will focus on specific terms including:

Poikilotherm: organism which has a varying body temperature

Homeotherm: organism which has a constant body temperature

Exotherm: organism which gains their heat from external sources

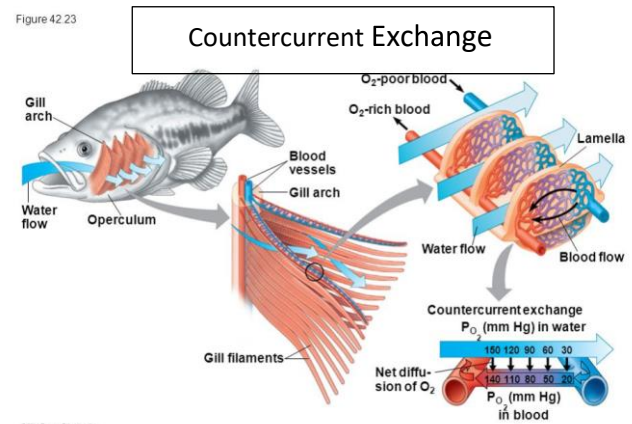
Endotherm: organism which is warmed by heat generated through metabolism

All endotherms are homeothermic, but some exotherms can be as well, depending on their external environments.

Insulation: prohibits heat loss, ex. Blubber or fur

Circulatory Adaptations: changing the width of blood vessels to conserve heat through Vasoconstriction and Vasodilation

Countercurrent Exchange: arterial and venous blood flow close to each other in two different directions, allowing for thermoregulation, gas exchange, and fluid exchange.



Community Ecology – Campbell Ch. 54

This chapter focuses on interactions within a **Biological Community**, or a group of populations of different species living in close enough proximity to interact. We call these interactions **Interspecific Interactions**.

There are 5 types of interspecific (between species) interactions:

Competition- hurts both organisms

Exploitation- helps one organism and harms the other

Parasitism- parasite derives its nourishment from another organism, the host, which is harmed in the process

Herbivory- *helps the animal, hurts the plant*; animal eating a plant

Mutualism- *both species benefit*; the benefits to each partner must exceed the costs

Commensalism- *helps one organism and does not affect the other*; turns into mutualism

Symbiosis- *helps both organisms*, direct intimate contact between species

Facilitation- *has a positive effect without being in direct contact* with another organism; can either help both partners, or help one and not affect the other

Some Terms to understand:

Competitive Exclusion- the theory that even a slight reproductive advantage will eventually lead to local elimination of the inferior competition;

<https://www.youtube.com/watch?v=Ddq5tXVZ2HA>

Ecological Niche- the organism's ecological role or how they fit into the ecosystem; the specific set of biotic and abiotic resources and organism uses in its environment. Two species cannot coexist forever in the same community if their niches are identical. They can only coexist if a significant difference in their niches occurs over time

Resource Partitioning- the differentiation of niches that enable similar species to coexist in a community, ex. Lizards living in different levels of a canopy

Fundamental Niche- niche potentially occupied by a species

Realized Niche- portion of the fundamental niche that a species occupies

Character Displacement- the tendency of characteristics to diverge more between sympatric populations than between allopatric populations of two species

Allopatric populations- similar resources and niches with geographic isolation

Sympatric populations- differences in body structure and resources they use; geographically overlapping

Predation- interaction between species where *one species eats the other*

Predator- acute senses, claws, fangs, poison to hunt and catch prey

Prey- behavioral defenses (hiding, fleeing, forming herds)

Aposematic Coloring- coloring that warns the prey has chemical defenses (poison dart frog, skunk)

Cryptic Coloration- camouflage

Batesian Mimicry- when a harmless species mimics a harmful species in behavior or appearance

Mullerian Mimicry- harmful species that resemble each other (ex. Bee and yellow jacket)

Endoparasites- live in the body

Ectoparasites- feed on the external surface of the body (tick, larva)

Obligate mutualism- host needs the other to survive

Facultative mutualism- both host and parasite live independently

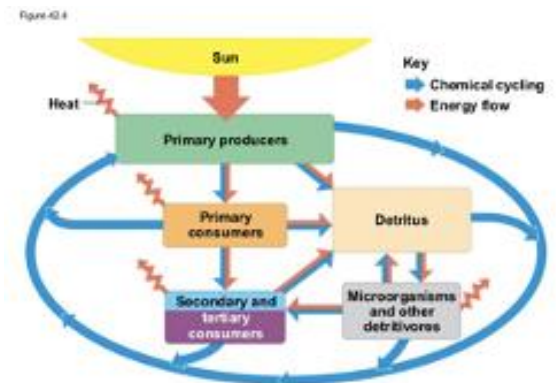
Ecosystems and Restoration Ecology – Campbell Chapter 55

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%



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- 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:

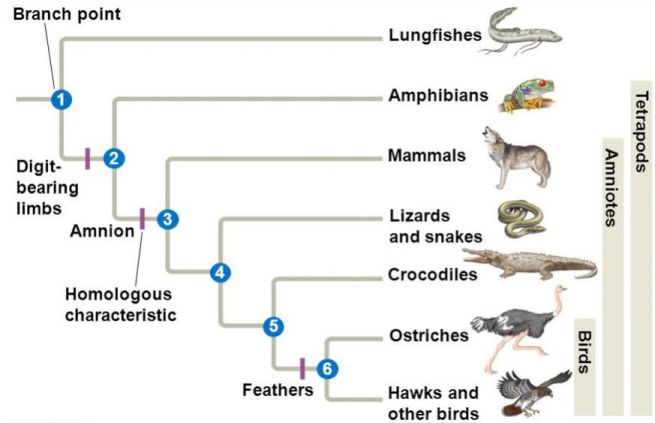
Ecological Succession: a sequence of changes in community composition following a disturbance. Succession can be PRIMARY or SECONDARY.

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.

**Highlight #1
Phylogenetics Campbell
Chapter 26**

Phylogenies show evolutionary relationships between organisms. **Phylogenetic trees** show a hypothesis about the evolutionary history of a group of organisms. Each **branch point** represents common ancestry (see right).



**Highlight #2
Geologic Record
Campbell Chapter 26**

The Geologic Record- a time scale which divides the history of Earth into four eons and further subdivisions.

Watch this video, starting at 3:30: <https://www.youtube.com/watch?v=rWp5ZpJAIAE> to review the geologic record.

Table 25.1 The Geologic Record

Relative Duration of Eons	Era	Period	Epoch	Age (Millions of Years Ago)	Some Important Events in the History of Life		
Phanerozoic	Cenozoic	Quaternary	Holocene	0.01	Historical time		
			Pleistocene	2.6	Ice ages; origin of genus <i>Homo</i>		
		Neogene	Pliocene	5.3	Appearance of bipedal human ancestors		
			Miocene	23	Continued radiation of mammals and angiosperms; earliest direct human ancestors		
		Paleogene	Oligocene	33.9	Origins of many primate groups		
			Eocene	55.8	Angiosperm dominance increases; continued radiation of most present-day mammalian orders		
		Proterozoic	Mesozoic	Cretaceous	65.5	Flowering plants (angiosperms) appear and diversify; many groups of organisms, including most dinosaurs, become extinct at end of period	
					Jurassic	145.5	Gymnosperms continue as dominant plants; dinosaurs abundant and diverse
					Triassic	199.6	Cone-bearing plants (gymnosperms) dominate landscape; dinosaurs evolve and radiate; origin of mammals
				Paleozoic	Permian	251	Radiation of reptiles; origin of most present-day groups of insects; extinction of many marine and terrestrial organisms at end of period
Carboniferous	299				Extensive forests of vascular plants form; first seed plants appear; origin of reptiles; amphibians dominant		
Devonian	359				Diversification of bony fishes; first tetrapods and insects appear		
Silurian	416				Diversification of early vascular plants		
Ordovician	444				Marine algae abundant; colonization of land by diverse fungi, plants, and animals		
Cambrian	488				Sudden increase in diversity of many animal phyla (Cambrian explosion)		
Ediacaran	542				Diverse algae and soft-bodied invertebrate animals appear		
Archaean		2,100	Oldest fossils of eukaryotic cells appear				
		2,500					
		2,700	Concentration of atmospheric oxygen begins to increase				
		3,500	Oldest fossils of cells (prokaryotes) appear				
		3,800	Oldest known rocks on Earth's surface				
		Approx. 4,600	Origin of Earth				

CHECK YOUR LEARNING

1. What is the difference between Batesian and Mullerian Mimicry?
2. What is the main difference between primary and secondary succession?
3. What is a poikilotherm and how does that relate to a homeotherm?

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. Types of succession: Starting from soil is secondary, if there is no soil, it's primary, and soil must be created.
3. The amount of content in these chapters. Take a deep breath and study a little bit each day. You'll be thankful when the test rolls around!

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. Mullerian Mimicry is when harmful species mimic each other. Batesian mimicry is when a harmless species mimics a harmful species.
2. Primary succession occurs when there is no soil. Secondary succession occurs when soil or some other substrate is present.
Poikilotherms have varying body temperatures and Homeotherms have constant body temperatures.