Week 5
BIO 1306/1406 – Modern Concepts in Bioscience II

Hello and Welcome to the weekly resources for Biology 2!

This week is Week 5 of class, and typically in this week of the semester, your professors are covering these 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 254-710-4135.

Keywords: Animal Form and Function, Community Ecology, Ecosystems 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 muscles 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.

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

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**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](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)

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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%
   - 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 above).

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.

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.

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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***

Thanks for checking out these weekly resources!
Don’t forget to check out our website for group tutoring times, video tutorials and lots of other resources: www.baylor.edu/tutoring! Answers to check your learning questions are below!

**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.
3. Poikilotherms have varying body temperatures and Homeotherms have constant body temperatures. THIS DOES NOT NECESSARILY CORRELATE WITH WHETHER THE ORGANISM IS AN ENDO THERM OR ECTOTHERM.