

Week 3

BIO 1306/1406 – Modern Concepts in Bioscience II

Hello and Welcome to the weekly resources for Biology 2!

This week is Week 3 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 of 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.

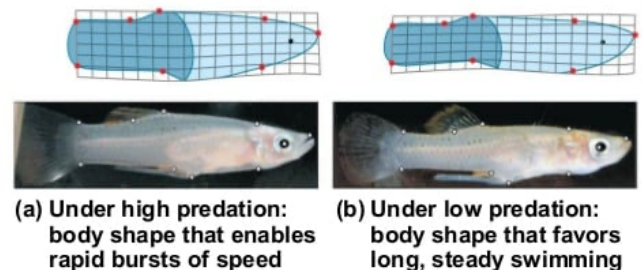
Keywords: Evolution, Natural Selection, Ecology, Biomes, Climate

Topic of the Week:

This week in Biology 1306, we will be covering Evolution, Natural Selection, and Ecology!
Campbell Chapters 22, 23, and 52.

Evolution Campbell Chapters 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.



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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.

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

Now for some definitions:

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 no mutations, no natural selection, random mating, no gene flow, and 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

- genotypic frequencies can be found using $p^2 + 2pq + q^2 = 1$; p^2 represents homozygous dominant individuals, $2pq$ represents heterozygous individuals, and q^2 represents homozygous recessive individuals

Genetic Drift: chance events which change allele frequencies unpredictably

Ecology and the Biosphere **Campbell Chapter 52**

Like many chapters in this course, 52 is very definition heavy. To start, we must be able to differentiate between different types of **ecology**:

Organismal: how an organism's structure, physiology and behavior meet

Population: factors affecting population size and why it changes

Community: interactions between species (competition and predation) affect the community

Ecosystem: energy flow and chemical cycling between organisms and environment

Landscape: factors affecting and controlling the exchange of materials, energy and organisms

Biome: major life zones characterized by vegetation type in terrestrial biomes or physical environment in aquatic biomes

Understand the differences between:

Abiotic: non-living factors

Biotic: living factors

Microclimate: fine, localized patterns ex. Shade under a canopy

Macroclimate: global, regional and landscape level patterns ex. Mountain sides

Climograph: plot of the annual mean temperature and precipitation in a particular region.

DETERMINES WHAT TYPE OF BIOME WILL EXIST IN THAT AREA

Thermocline: abrupt temperature changes between warm upper layer of water and cooler deeper water

Seasonal Turnover: semiannual mixing of water due to climate change causes oxygen rich surface water to go to the bottom and nutrient rich water to the surface

Disturbance: an event (storm, fire, etc.) which changes a community, removing organisms from it and altering resource availability

Climate: the most significant influence on the distribution of organisms in the area; long term prevailing weather conditions in an area

Climate change: change in global climate lasting 3 decades or more

Iteroparity- organisms that reproduce a few offspring more than once ex. Dogs

Semelparity- organisms that reproduce once but have many offspring ex. Salmon

Bodies of water and mountain ranges can affect regional climate conditions. Ocean currents heat or cool overlying air masses that pass across land. The high specific heat of water helps moderate the climate. Similarly, **mountains** can influence the air flow over land. Warm air goes up the mountain, cools and rains. The **leeward side** doesn't get much moisture, so a desert is made on the other side of the mountain.

To learn more about major aquatic biomes, check out this video:

<https://www.youtube.com/watch?v=4fMemcd-VXw>

To learn more about terrestrial biomes, check out this video:

<https://www.youtube.com/watch?v=4kQSXIWsUtg>

CHECK YOUR LEARNING

1. Does it rain more on the windward or leeward side of a mountain?
2. What does it mean for a population to be in Hardy Weinberg equilibrium?
3. Is genetic drift selective?
4. T/F : Individuals evolve slowly over time.

THINGS YOU MAY STRUGGLE WITH

1. Hardy Weinberg Equilibrium problems: Practice, practice, practice! Memorize the two equations and if needed, find practice problems online! With repetition, and understanding of the concepts, you'll become proficient in this type of problem!
2. Differentiating between biomes: Make flashcards, draw pictures, and learn the distinct features of each biome. Learning the type of animals which lived in the biomes helped me differentiate between them. Be patient with yourself and spend time on this.

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!

1. Windward
2. The population is not evolving.
3. Nope! Genetic drift is caused by chance events that do not select for traits. Each member of the population is equally likely to be affected!
4. F! Populations evolve, individuals do not.

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