Chapter 5 : Evolution
Reading Guide

Vocabulary

Learn the definition of each term. The **bold** words require you to know more than just the definition. The *italicized* words are not in the textbook (see lecture for explanations). For example: Ecosystem service - you should what they are, be able to name several types and describe how we benefit from those services.

Ecosystem Diversity	**Natural Selection**	Species Distribution
Species Diversity	Fitness	Generalists
Genetic Diversity	**Adaptations**	Specialists
Species Richness	Geographic Isolation	**Mass Extinction**
Species Evenness	Reproductive Isolation	Sixth Mass Extinction
Microevolution	**Genetically Modified**	*Background extinction*
Macroevolution	**Organisms**	*Coevolution*
Speciation	**Range of Tolerance**	*Resource Partitioning*
Mutation	**Fundamental Niche**	*Competitive Exclusion Principle*
Artificial Selection	**Realized Niche**	

Reading Outline
The Dung of the Devil
Covered in class as a warm-up

5.1 Earth is home to a tremendous diversity of species

1. Approximately how many species do scientists think live on earth? How many have been identified? Why is it hard to determine the number of species on earth?

2. Analyze the following data sets and rank (1 – most; 3 - least) each site in terms of richness, evenness and overall diversity. Explain your answer for the site that is most diverse.

Species	Absolute Abundance		
	Site A	**Site B**	**Site C**
Ant	76	8	143
Beetle	3	0	2
Centipede	8	0	3
Cricket	1	0	1
Earwig	39	7	75
Millipede	10	6	2
Pill Bug	20	9	3
Slug	1	0	0
Snail	2	0	1
Spider	1	6	2
Wood lice	53	0	68
Worm	2	0	1
Species richness			
Species evenness			
Overall diversity			

3. In your leaf litter lab, you measured two different forms of diversity: Shannon-Weiner and Simpson. Did the methods favor species richness, species evenness or include both? If you need a reminder of the methods, I put the lab on Edline for you.

5.2 Evolution is the mechanism underlying biodiversity

4. Define natural selection and artificial selection. What is the difference between natural selection and artificial selection? What are some concerns about artificial selection?

5. What are the 5 key elements of Darwin's Theory of Natural Selection?

5.3 Speciation and extinction determine biodiversity

6. Define geographic isolation and reproductive isolation. Describe how each results in speciation.

7. For each factor, determine which choice supports the claim

Factor	Species adapt fastest when [factor] is	Populations are most likely to survive when [factor] is
Rate of Environmental change	FAST or SLOW	FAST or SLOW
Genetic Variation	HIGH or LOW	HIGH or LOW
Population Size	LARGE or SMALL	LARGE or SMALL
Generation Time	LONG or SHORT	LONG or SHORT

8. Is Genetic engineering faster or slower than natural selection? Explain.

5.4 Evolution shapes ecological niches and determines species distributions

9. What is the difference between a fundamental and a realized niche?

10. What is the difference between a generalist and a specialist? List some characteristics of each.

11. Which type of species (generalist or specialists) do better when:
    a. Environmental conditions are changing?

    b. Environmental conditions are stable?

12. Use Figure 5.2 to explain how changing environmental conditions can cause the distribution of species to change.

13. Explain how climate change might impact the distribution of spruce trees. (You have to THINK – look at how the melting of the ice over the last 18,000 years changed the distribution and then apply that information to climate change). Would the range get larger or smaller? Would it be found in more places or less places? Where would the range be in the future?

14. What differences are there between the 5 previous mass extinctions and the one occurring now? How long does it typically take for biodiversity to "recover" after a mass extinction?