

Chapter 56: Community Ecology

1. Describe the concept of a biological community and be able to cite several examples.
 - a. First of all, let's start simply, what does it mean to describe a concept? There are two things I am asking you to learn about from this question. First, when an instructor asks you to **describe** something, what are they asking you to do?

The second part of this question is really important, just what is a **concept**?

- b. There are two primary ways that we can describe the characteristics of a community. What are those two ways and what significantly different things do they tell us about community?
2. Distinguish between individualistic concept of community and the holistic concept of community.
 - a. I think your book should have used the word “theory” in this context, because it is theories which allow us to make predictions. The two most historically significant theories presented by the textbook were meant to predict what would happen to a community if it was essentially wiped out and had to start over again. Such as a fire going through a prairie community.

I had a hard time understanding this concept when I read it in the Raven textbook. When I read a section of the textbook, and it's not clear to me I go to a different textbook or some other source to see if another source can help me understand the idea. The following quote is from a textbook authored by Freeman.

“If communities are highly structured entities, then their makeup is predictable. Specifically, the diversity and abundance of species at a particular site should be identical before a disturbance and after recovery (Clements). But if communities are merely artificial constructs that give biologists a convenient way to categorize the vast diversity of species in nature, then community composition is unpredictable. The diversity and abundance of species found in a region may vary substantially before and after disturbance. (Gleason).”

Here's a thought experiment with some data to help you understand these two theories. Construct 12 identical ponds. Fill them all at the same time with sterile water so there are no pre-existing organisms. After one year, examine the water

samples from each pond and count the number of different plankton species in each sample pond.

Clement hypothesis: Biological communities have a predictable composition.

Gleason hypothesis: The composition of biological communities is largely a matter of chance.

SPECIES CODE	Pond											
	1	2	3	4	5	6	7	8	9	10	11	12
A	X	X	X	X	X	X	X	X	X	X	X	X
B	X	X	X	X	X	X	X	X	X	X	X	X
C		X	X	X	X	X	X	X	X	X	X	X
D	X		X	X	X			X		X		X
E	X	X	X	X	X	X	X	X	X	X	X	X
F	X	X	X	X	X	X	X	X	X	X	X	X
G	X	X	X	X		X	X		X	X	X	X
H	X	X	X	X	X	X	X	X	X	X	X	X
I	X		X	X	X	X	X		X		X	
J	X	X	X	X	X		X	X		X	X	X
K	X	X	X	X	X	X	X	X	X	X	X	X
L				X	X			X		X		
M	X	X				X			X			X
N	X		X	X			X					
P				X				X				

Using these data, which hypothesis is supported and which hypothesis is rejected? Explain how you came to your conclusion.

3. Explain how an organism's fundamental niche differs from its realized niche.
 - a. Before we tackle this question. I think we should first start with understanding the difference between a question that asks you to describe and a question that asks you to explain.
To describe something you:

To explain something you:

- b. The concept of niche is fundamental to an understanding of the study of ecology. But first define the term habitat and give some examples.
- c. Now define the term niche, but try and use words different than those used by your textbook. Can you come up with some sort of analogy for a niche? For example, if your family is a community how might you describe a niche?

- d. Go to page 1194 and read the section **Limiting nutrients in ecosystems are those in short supply relative to need.** Just the first paragraph is enough. Now explain the difference between a fundamental and realized niche and explain why they are usually different.

There are a couple of terms I want to make sure you are clear on. When the book uses the term “inter-specific” the word “specific” here is referring to species. Inter-specific means between two different species. An inter-specific competition would be like a football game between the Vikings and Green Bay (Green Bay having limited resources though would lose, of course.) Whereas an intra-specific competition would be a scrimmage between the offence and defense of the Vikings. Intra-specific competition is an important concept when we consider the mechanism of natural selection (i.e. survival of the fittest) for the evolution of a species. As you will see in the following section, inter-specific competition also has an impact on the evolution of a species, however a different mechanism comes into play and the effect may be greater than the evolution of a single species.

4. Describe the effects of inter-specific competition and how it can lead to competitive exclusion or species adaptation.
 - a. What is competitive exclusion?

 - b. What is another term for species adaptation?

- c. There is a third possible outcome to inter-specific competition. What is it?
5. Understand the principle of competitive exclusion and how there can be niche overlap where both species coexist.
 - a. Two species cannot exist for an extended period of time within the same niche. Why not?
 - b. One of my professors was a herpetologist (a snake guy in this case). He told us of finding a couple of hog nosed snakes he thought were different species but he could not find any differences in their niches. During his research he found that the snakes ate the same food (frogs mostly), lived in the same area, reproduced at the same time of year, and looked very much alike. He finally discovered that one species of snake ate at night, whereas the other fed during the day. What principle of community ecology, was he looking for to determine these were different species? How does this explain the many examples of two or more similar species being able to survive with nearly identical niches’?
6. Give examples of the various forms of symbiotic relationships and identify the category into which each should be placed.
 - a. The science of biology is known to create new terms for every new concept, more so than any of the other sciences. Most of the terms come from the Greek language. Knowing some of the key prefixes and suffixes from the Greek you should help to determine and remember the definition of new terms. Use a dictionary to look up the term symbiotic. You probably already know that “bio-“means life or living. What does sym- mean?
 - b. Name some forms of symbiotic relationships and give an example.

7. Understand how predation affects prey population and ultimately evolution.
 - a. The above statement is really incomplete. The real question is: Describe how predators and prey affect each other's population within a community.

8. Be able to cite examples of the co-evolutionary arms race.
 - a. In relationship to predators and prey, what does this co-evolutionary arms race refer to? List 2 examples.

9. True or false. Mimicry is an evolutionary response to the predator-prey relationship.
 - a. Does the predator or prey evolve? (Warning that's a trick question). Explain.

 - b. In our region there is a mimic of the Monarch butterfly called the Red Admiral. Explain why the Red Admiral would not have evolved as a mimic if a bird died after eating a Monarch butterfly or caterpillar?

10. Describe and give examples of the importance of a keystone species.

11. Differentiate between primary and secondary succession and give examples of each.