

Bio 112 Handout for Ecology 4

This handout contains:

- Today's iClicker Questions
- Research #3

iClicker Question #32A - before lecture

Which of the following are examples of competition (in the Bio 112 sense)?

- A. A maple tree growing taller than and shadowing a shorter pine tree.
- B. Lions and cheetahs both eating gazelles.
- C. Two species of barnacles occupying the same part of a rock.
- D. All of the above
- E. None of the above

iClicker Question #32B - after lecture

When a forest borders an open grassland, small mammals (mice, moles, etc.) are only found in the forest. In the absence of predators, these small mammals are found in the grassland as well. Based on this, what is the fundamental niche of mice?

- (A) grassland only
- (B) grassland and forest
- (C) forest only
- (D) none of the above
- (E) I don't know

Beaming in your answers

1. Figure out your answer and select the appropriate letter (A-E).
2. Turn on your iClicker by pressing the "ON/OFF" button; the blue "POWER" light should come on. If the red "LOW BATTERY" light comes on, you should replace your batteries soon.
3. Transmit your answer as follows:
 - a. Press the button corresponding to the answer you've selected (A thru E).
 - b. The "STATUS" light will flash green to indicate that your answer has been received. If the "STATUS" light flashed red, your answer was not received; you should re-send it until you get a green "STATUS" light.

Bio 112 Research #3

- This assignment is designed to get you thinking about some of the data we'll be discussing in class.
- It is due at the start of class on Friday Ecology 6; they will not be accepted late.
- You should answer all of the questions that follow; your answer will be worth 10 points.
- Please put your answer on a separate sheet of paper with your name and your TA's name; it does not need to be typed.
- Your answer **must be in your own words**.
- You may need to consult Campbell for reference.
- These questions are challenging; we will grade your answers generously.
- We will discuss the answers to these questions in lecture on Ecology 6.
- Please bring this handout to lecture on Ecology 6.

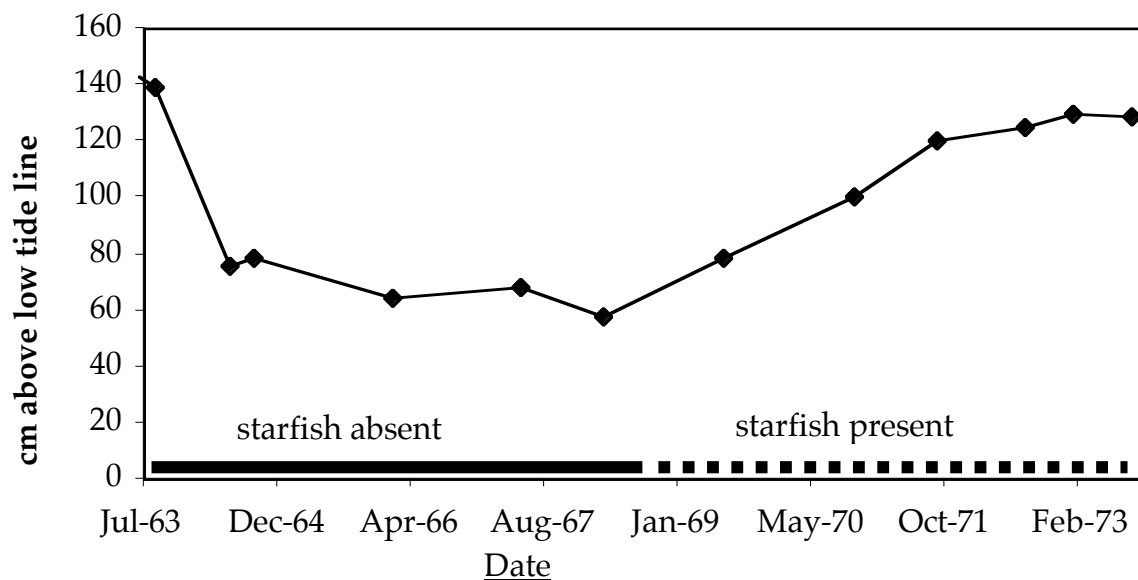
The rocky intertidal zone has been studied extensively by ecologists because it is complex, easily accessible, and the organisms that live there are easily manipulated (since they don't move around much). Campbell figure 52.18 shows a photograph of the intertidal zone; figure 54.3 shows a sketch of the same. A description of the experiments in this question can be found on page 1199-1200 of Campbell.

Briefly, the starfish *Pisaster ochraceus*, eats the mussel *Mytilus californianus* (see figure 54.15). *Pisaster* can come out of the water for only brief periods of time; *Mytilus* can be dry for longer periods, but must be wet for at least some of the day. Thus, they both occupy overlapping horizontal bands along the rocks.

Briefly, the starfish *Pisaster ochraceus*, eats the mussel *Mytilus californianus* (a mollusc that is similar to a clam). *Pisaster* can come out of the water for only brief periods of time; *Mytilus* can be dry for longer periods, but must be wet for at least some of the day. Thus, they both occupy overlapping horizontal bands along the rocks.

Robert Paine and his co-workers measured the lower limit of the *Mytilus* band from a particular region of the rocky intertidal zone in Washington State from July of 1963 to September 1973. From June of 1963 through June of 1968, they went out to the rocks every month and removed all the *Pisaster* they could find. After July of 1968, they let the *Pisaster* return. The upper limit of the *Mytilus* band did not change during this experiment. Their data are shown below:

Lower Border of Mussels



- 1) What is the approximate lower limit of *Mytilus*' Fundamental Niche?
- 2) What is the approximate lower limit of *Mytilus*' Realized Niche?
- 3) Why does the removal of the *Pisaster* only affect the lower border of the *Mytilus*

Paine et al also looked at the % of the total space on the rocks that was occupied by each different species before, during, and after the *Pisaster* removal. Their data are shown below:

Organism	July 1963	August 1966	March 1968	June 1971	April 1973
none	11	0	0	0	0
barnacles	47	5	5	0	0
mussels	1	95	95	100	100
seaweeds	30	0	0	0	0
sponges	5	0	0	0	0

On a similar plot, they did not remove *Pisaster* and they saw:

Organism	July 1963	August 1966	March 1968	June 1971	April 1973
none	10				14
barnacles	41				38
mussels	5				2
seaweeds	38				36
sponges	5				5

These data are related to the data presented in Campbell figure 53.16b.

- 4) Describe these results: what kinds of creatures were found on the rocks before the *Pisaster* were removed and what kinds were found during the removal?
- 5) Why did removing the *Pisaster* have the effect that you described in your answer to question (4)?
- 6) Why did they have to collect data from a plot where *Pisaster* were not removed? That is, what explanation(s) does the result of this control experiment rule out?

Note: you can find all these data in the original paper (which is quite readable) in the journal *Oecologia* (it is in the UMB library) volume 15, pages 93 to 120.

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