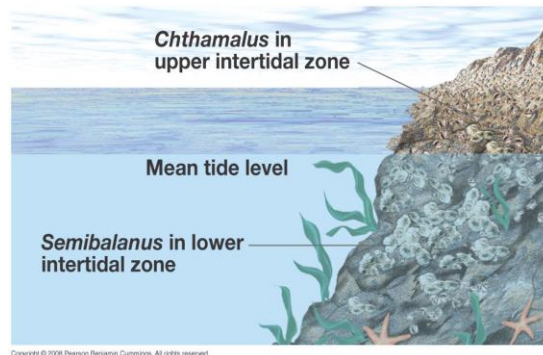


Ecology Practice Exam Questions: Ecology & Evolution

1. In a given population, some barnacles have thick “shells” and some have thin “shells”. Suppose that shell thickness is determined by the alleles of a gene, *T*. Barnacles with the $T1/T1$ and $T1/T2$ genotype have thick shells, while those with $T2/T2$ genotype have thin shell.
 - a. In a population of barnacles at Towers Beach you find 82 individuals with a thin shell and 18 with a thick shell. If this population is in equilibrium, what proportion of the barnacles are expected to be heterozygous?

- b. Do you actually expect this particular population to be in equilibrium? Explain why or why not, making specific reference to the criteria/assumptions required for equilibrium.

2. Consider the barnacles in the image below. In general, barnacles of the genus *Chthamalus*, which are quite small, are found in the upper intertidal zone. While barnacles of the genus *Semibalanus*, which are larger in size, are found in the lower intertidal zone.



- a. Several ecologists found that, in the absence of *Semibalanus*, *Chthamalus* colonizes and lives in both the lower and upper intertidal zone. However, in the absence of *Chthamalus*, *Semibalanus* still only colonizes the lower intertidal. What do you conclude about the respective niches of these two organisms?

- b. What do the data reported in part a suggest about the interaction between the two barnacles in the lower intertidal zone? Include how the interaction affects their fitness.
- c. A similar experiment was carried out using a two species of sea snails, and it was found that the “upper intertidal” species always moved to, and lived in the upper intertidal even in the absence of it “lower intertidal” competitor. This was interesting, because this “upper intertidal” species was known to be able to live, grow and reproduce in the lower intertidal too, if forced to by the experimenter. Propose how competition could have driven the evolution of these “upper intertidal” sea snails from a population of sea snails that lived both in the upper and in the lower intertidal.