*Section 11.3 Factors that Regulate Natural Populations*

*ISP - Week 3*

*Read pg. 520-533 and answer the questions below.*

1. Explain how abiotic factors differ from biotic factors in limiting population growth. (K)
2. What generally happens to other populations in an environment when there is a change in one population? (K)
3. Songbirds live in a density-dependent population. Why does the population of the songbirds decline when population density gets to a certain point? (K)
4. Refer to the figure 11.31 in your textbook. Predict what would happen if biologists kept introducing hares into the environment to keep the hare population at a high and constant level. Predict what would happen if they kept only the lynx population at a high and constant level. (T)
5. How would you expect the growth of one population to affect the other in a mutualistic relationship? (T)
6. The bacterium Helicobacter pylori lives in the stomach of humans. This bacterium can prevent the development of esophageal cancer and acid reflux. However, it can also cause stomach ulcers. Identify the symbiotic relationships between this bacterium and humans. Explain your reasoning. (A)

ANSWER KEY

1. Abiotic factors generally cause a sharp drop in population growth before the habitat reaches carrying capacity. On the other hand, biotic factors slow the growth of the population when it becomes dense.
2. There is generally a “ripple effect” in which other populations grow or decline because of reduced competition, predation, or resources.
3. When density reaches a point at which biotic factors like competition for food supply begins, reproduction and the ability to survive are reduced. This results in a decline in the population.
4. If the hare population is kept at a high and constant level, the lynx population would increase to the carrying capacity and remain there. If the lynx population is kept at a high and constant level, the hare population would greatly decline. The lynx will have to compete for food and some will not survive, so the biologists would need to introduce enough of them into the environment to take the place of those that do not survive.
5. In mutualistic relationships, since both populations benefit from one another and neither is competing, an increase in one population provides more benefit to the other, and these benefits cause the other population to increase as well.
6. Mutualism is one of the symbiotic relationships described. Since the bacterium lives in the host, it benefits from the host, and since the bacterium prevents cancer and acid reflux, the host also benefits from the bacterium. Parasitism is the other symbiotic relationship described. Since the bacterium lives in the human stomach and causes harmful stomach ulcers, the parasitic bacterium is benefiting and the human host is being harmed.