Strong Inference Worksheet

Due Friday September 17th

(5% of total DS grade)

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For all DS or ADA assignments we encourage active collaboration and discussion with your fellow classmates. While collaboration is encouraged, you are required to submit your own work for this assignment. This assignment is designed to help you address a research question by composing testable alternative hypotheses. Briefly address each of the following questions in either point form or with a few sentences.

1. **What is your research question?**

What factors drive the relatively high species abundance of *Fucus distichous* found in high intertidal regions of the Pacific Northwest.

**2. List three alternative hypotheses that could address this question.**

1. *Fucus distichous* will dominate high intertidal regions because of its ability to tolerate desiccation stress through saccate mucus secretion.
2. *Fucus distichous* will dominate high intertidal regions because it is able to tolerate wider variations in salinity between rainfall and seawater through osmotic regulation than competing species.
3. *Fucus distichous* will dominate high intertidal regions because of chemical defenses used to deter terrestrial herbivores that habituate the high intertidal regions.

1. **To the best of your ability, how could a crucial experiment disprove one or more of the alternative hypotheses above? You are welcome to draw a logical tree if you like!**

Summary: To disprove the hypothesis A, the experiment would have to demonstrate that Fucus Distichous still has the highest proportional species abundance in high intertidal regions despite being inhibited from producing mucus.

Example Experiment:

1. Using a series of transects in the high intertidal zone, determine the species abundance of each algal species in each transect.
2. Have X amount of treatment transects where the Fucus Distichous is treated by poking a hole in the saccate and depleting the mucus.
3. Have X amount transect for the two control treatment types.

a) no interference treatment

b) poking a hole in the saccate without squeezing out the mucus (this is to ensure that damage to the saccate isn’t a confounding variable)

1. Continue depletion treatments for several months and then recount species abundance in the transects.
2. Compare species abundance before and after treatments. If *Fucus distichous* is still the most abundant species despite being inhibited from secreting its mucus coat, then you can provide evidence to disprove hypothesis A.

1. **What are some barriers/challenges to testing the hypotheses listed above?**

Challenges with addressing this hypothesis are that the mucus could have functions within the algae that are unrelated to desiccation such as reproduction and structure. Removing the mucus to see its effects on desiccations resistance could interfere with the life history of the alga and alter your results. Additionally, removing the mucus from the algae is time consuming and logistically challenging as the saccate can be small and difficult to manipulate in some cases.

**5. How might alternative hypotheses avoid confirmation bias in scientific research?**

Hypotheses are often developed using knowledge from previous established scientific literature. There for, our assumptions about why things happen are based off each other. This can create a positive feedback loop. Exploring alternative hypothesis ensure that scientists explore a diversity of reasonings for why a certain event may occur.

Score \_\_\_\_\_\_\_\_ / 5