

Natural History Report

Topic Proposal due week of April 03

Report due week of May 01

Details

- 2 pages max, double spaced
- 1 inch margins
- You must follow the formatting instructions below.

General Instructions: In general goal of this assignment is to practice *thinking like a scientist*, where a question is proposed, an observation is made, and then you carefully work out how you would test possible mechanisms that resulted in the observed pattern.

Making an observation: The first step is to go out into the world - preferably an environment or setting that you find interesting, and to observe an ecological *pattern*. Note the emphasis on pattern: a single observation of something doesn't make a pattern. Example: I observed in Africa that lianas (long vine-like plants that crawl through the canopy) don't tend to grow on palm trees. This wasn't an isolated incident, and I repeatedly noted that lianas - though in the same area as palm trees - were never growing on them, though they were could be found on the other trees in the forest. This is my observation.

Propose different mechanisms that might explain the observation: This takes some thought, and it helps to make a list of *Alternative Hypotheses*. **Hypothesis 1:** This anti-association of lianas and palms is due to chance, and maybe I just missed it. **Hypothesis 2:** Perhaps palms alter the soil, which prevents lianas from rooting nearby. **Hypothesis 3:** Palms have an adaptation to prevent lianas from connecting to the tree. The possible adaptation is a leaf-shape that generates strong up-and-down movements in the wind that tend to knock away liana tendrils as they branch out. All appear to be possible mechanisms that produce the pattern I observe. **You need to have at least 2 alternative hypotheses**

You must now consider how to test the potential mechanisms proposed to lead to the observed ecological pattern, and describe how you would carry this out. For example, **Test 1:** the first hypothesis could be shown to be false by randomly selecting different forest patches with and without palms, and quantifying the presence/absences/amount of lianas in each patch. **Test 2:** Hypothesis 2 could be falsified by doing the same thing, but by sampling the soil in patches with/without palms. **Test 3:** For hypothesis 3, we would have to determine whether palm leaves moved differently in the wind relative to other leaves (I would need to think about how to do this). If they did, this offers support for this hypothesis. Note that you can never **prove** a hypothesis to be *true*, you can only show that others are *false*, and to build support for the one

that ends up being the most likely cause of the observed pattern.

Finally, since you are not actually testing each hypothesis, consider what it means if each hypothesis were found to be the most likely driver of the observed pattern. What might this mean for the system that you are investigating?

Instructions for the Topic proposal

Describe in a few words the observed pattern that you want to report. If you have a few ideas on the potential mechanisms behind this pattern, those can be included as well. No more than a few sentences.

Instructions for the format of the Report

Name

Section

Pattern This is a short paragraph describing the pattern...

Hypotheses

H1: This is hypothesis 1

H2: This is hypothesis 2

H3: This is hypothesis 3

Tests

T1: This is how I would test hypothesis 1. This is how I would interpret the different potential results of this test.

T2: This is how I would test hypothesis 2. This is how I would interpret the different potential results of this test.

T3: This is how I would test hypothesis 3. This is how I would interpret the different potential results of this test.

Note: a carefully devised test provide clues to more than one hypothesis. If this is the case, it must be clearly described. You are welcome to provide figures that illustrate different outcomes of tests, but these are to be included as attachments to the report.

Consequences This is a short paragraph describing the potential consequences if each respective hypothesis were found to be the cause of the observed pattern.