Animal Behavior – AP Lab 11

OVERVIEW (Part A) In this laboratory, you will observe the behavior of an arthropod and design an experiment to investigate its responses to environmental variables. (Optional Part B: describe the different types of insect mating behaviors *will be completed in genetics unit)

OBJECTIVES

Section A: Before doing this laboratory you should understand:

- the concept of distribution of organisms in a resource gradient
- the difference between a kinesis and a taxis

Section B: After doing this laboratory you should be able to:

- measure the effects of environmental variables on habitat selection in a controlled experiment


Design three experiments to determine a preferred environment for pill bugs in a resource gradient. Write a prelab report outlining your exact experimental design. This must include details of materials and quantities. Your prelab should include a hypothesis for each environmental factor tested. Be sure to include supporting statement for your hypothesis. If you predict the bugs will behave in a certain way, why? What knowledge are you basing your prediction on?

Prelab questions:

1) What Phylum and Class do pill bugs belong to? What are some typical feature of organisms that belong these phyla/class?
2) Where would you expect to find pill bugs – and why? Complete these statements – Pill bug behavior will locate them in places that are………… This is expected because ………
3) What is a resource gradient?
4) What type of resource gradient will you providing for pill bugs to choose from in your experiment? (remember you will have a minimum of 4 chambers in your shoe box)
5) How do you expect the pill bugs to behave in your resource gradient and why?
6) What do the terms orienting behaviors, kinesis, and taxis mean? Do you expect to see these behaviors in this experiment – if so, when and how?
7) What other kinds of social behaviors/cognitive behaviors do you expect to see?

Read specifications for experiment given below carefully (you will lose significant points if these are not demonstrated in your procedure/data):

a) You can make your own choice chamber, or use those provided. You will also need to select (or bring in) materials for 3 environments that can be placed inside the chamber. Remember you need to have a resource gradient in your choice chamber.
b) Resource gradient must be clearly quantifiable – this means the variable you choose must have a quantitative measure in the environments.
c) You will need at least ten pill bugs for each trial.
d) Three trials of the same experiment must be run.
e) Each trial will be 10 minutes long.
f) For each trial you need to observe and record data every 30 seconds. Use the same recording times for each trial – kinda obvious why…

- Think carefully about your environment choices.
• You may want to acclimate your pillbugs for a time period before running the experiment.

Lab report instructions

Please do not answer these questions one after another as though the report was a series of answers. Integrate and weave these answers into YOUR introduction based on YOUR research on this topic. Points will be taken off if you document answers one after the other – if you don’t know how to do this – ask.

Guideline questions for Introduction section: (apart from your own background research) – remember your prelab has a lot of the answers! Support your Introduction with internet research – read up and rephrase in your own words.

1) What Phylum and Class do pill bugs belong to? What are some typical features of organisms that belong this phyla/class – try to relate characteristics that may impact this lab
2) Where would you expect to find pill bugs – and why? Complete these statements – Pill bug behavior will locate them in places that are………… This is expected because ……….
3) What are orienting behaviors?
4) Why are they important?
5) Identify and describe the different orienting behaviors (include kinesis/taxis) that pills bugs demonstrate in nature.
6) Why do the pill bugs exhibit such orienting behavior – relate it to specific body structures/functions. (that is same as - what are the proximate and ultimate causes of orienting behaviors in pill bugs?)
7) What is a resource gradient?
8) What type of resource gradient will you providing for pill bugs to choose from in your experiment? How do you expect the pill bugs to behave in your resource gradient and why?
9) How does your resource gradient – or ingredient/s in your resource gradient relate to an environmental factor in the pill bugs natural environment; why would orienting behavior demonstrated in your choice chamber be of any value to the pill bug in its natural environment?
10) Describe briefly what you will do in this lab – give the principles of the design –how you set it up to reduce experimental errors. Keep this general. You’ll go into details in the Materials & Methods section.
11) Include a labeled picture of a pillbug.(Figure 1)

Materials and Methods section should follow Introduction section and should be a clearly written paragraph summarizing exactly what was done in the lab (in your own words) Your narrative should include a comprehensive, detailed account of all lab tools and reagents, properly identified, that were used, with all units and amounts properly documented

Provide a reference for ALL material that is not your original thought – there is a link on the AP Biology main webpage for how to reference citations.

Results
- Raw data presented in well organized tables with headings
- Raw data units present
- Raw data needs to be analyzed statistically using MS Excel/software – averages, standard errors calculated; t test or statistical analysis for significance performed
- Analyzed/summated data must be recorded in separate tables
- Qualitative data (personal observations) must accompany quantitative data whenever possible
- Insert your charts/tables into the word documents.
- Choose correct intervals for your axes so data is ‘squished’ or data points lie outside the axes.
- Be sure to include a title, labels on the axes, and the units of measurement on all graphs.
- Show calculations where warranted. Ask if you are not sure.
Conclusion and Discussion – in paragraph form

1) **SUMMARIZE** your results in clear statements free from opinions – don’t recount in words a long list of data points recorded, but integrate and make inferences from your data - what you can generalize from your results? **Conclusion statements must include evidences from your results.** Graphs and data should be referred to always. Examples: Table 11.1 or Graph 1.

2) Explicitly state what additional trends and relations can be noted between your independent and dependent variables in statement form – use your graphs as the basis and not your opinions. **Ex:** *It was noted that there was a trend for students to perform poorly (set at <20% of average) in the second half of the test with caffeine intake of more than 600 gms. This conclusion is based on the observation that 90% of these high caffeine group members received a score of 60% or less in the second half of the test* (see Table ....)

3) Is the pill bug behavior you observed best classified as kinesis or taxis? Why?

4) Did you see any other types of behavior during this experiment – describe them and their benefit to the pill bug?

5) Is your data reliable – based on sample size and number of trials you ran? How can you make it better? Did other lab groups get similar outcomes? Did you run controls for your experiment? Did you have one independent variable? If not, how are you able to make any conclusions about the preferred pill bug environment?

6) Discuss deviations from the expected result/hypothesis – provide scientific explanations **based on internet research** for these deviations – make sure these are not opinion based

7) Why did you obtain the results you observed - Give a physiological explanation (based on their body structure- function relationship) for ALL results expected or otherwise!

Lastly, you must include an **Abstract** (at the very beginning of your report) and a **References** section (at the very end of your report).

For **extra credit** attach on a post-it note to your finished lab report: How many **AP themes** does this lab connect to? State them (see home page in website if you don’t know the themes).