Changes in Winogradsky column microbial diversity when limiting nutrients are introduced to environments with varying carbon sources– a descriptive title

Your Name

April 15th, 2012 – *date of completion*

AP Biology *– Course Title*

INTRODUCTION

 *This section should contain the research question(s) being addressed. Justify each question (purpose) with the objectives of the lab. Avoid being too vague by giving as much depth in your explanation as possible.*

HYPOTHESES

 *Introduce both your research (alternative) hypothesis and your null hypothesis in this section. Use an ‘If, then, because’**format whenever possible. Identify the scientific reasoning behind your hypothesis. This should be a brief paragraph of explanation behind your hypothesis. Use concepts from biology to support your prediction. The null hypothesis basically states the opposite of the research hypothesis. The null can also state that there is no relationship between the tested variables. A null hypothesis is a statistical hypothesis that is tested for possible rejection under the assumption that it is true. Ex: If your research hypothesis begins as “If plants receive only green light, overall growth will be reduced, because…”, your null hypothesis could state “The color of light received by a plant will have no effect on the rate of growth.”*

EXPERIMENTAL DESIGN

VARIABLES

 *Use this section to describe the independent, dependent, and controlled variables of your experiment. Remember that controlled variables are any aspect that is kept constant throughout the experiment. You should also give a detailed description of your control group and how it is used for purposes of comparison.*

MATERIALS

*Give a brief list of important materials used during the experiment. You can either literally list materials or describe them in a short paragraph. Pictures or sketches made in your lab notebook do not necessarily need to be included in this final report. If you do decide to insert a digital image, be sure it is given a proper figure title as demonstrated later in the results section.*

PROCEDURES

 *Unlike in your pre-lab, this should not be a list of numbered steps. Instead, this should be a detailed recounting of the experiment that takes the reader through every step. Be sure your descriptions include how all of the above listed materials are used. This description should be easy to follow to the point of being easily reproduced by another student.*

RESULTS

 *Create data tables to record your data in an organized fashion throughout the lab. This includes quantitative AND qualitative data. Qualitative data should be described in paragraph form. Avoid discussing the data here. Just state it as an observation, and save discussions for later in the conclusion section. Be sure to label units to be recorded. Data table borders should be formatted to appear similar to the example shown. Tables should be numbered (Table 1) and given a descriptive title. Note that table titles appear above the table while titles for figures appear at the bottom.*

Table 1. Column contents after eight weeks of incubation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Column 1(no carbon added) | Column 2(newspaper) | Column 3(leaf litter) | Column 4(CaCO3 - chalk) |
| Algae (*Chlorella*) | **+++** | **+** | **+** | **++** |
| Algae (*Chlamydomonas*) | **++** | **−** | **−** | **+** |
| Algae (*Euglena*) | **+** | **−** | **−** | **+** |
| Algae (diatoms) | **+** | **++** | **++** | **+** |
| Protozoa | **++** | **+** | **+** | **++** |
| *Chlorobium* | **++** | **+** | **+** | **+** |
| Ferrous sulfide or oxide | Dark sides | All sides | Dark sides | Dark sides |
| Iron oxide | Light sides | Light sides | Light sides | Light sides |

*+ through +++ indicates degree of organism observed, − indicates organisms not found*



Figure 1. Dormant *Euglena* from water surface (left) and active *Euglena* from upper sediment layer (right).

Figure 2. Changes in allelic frequencies over six generations experiencing selective pressure against the homozygous recessive genotype

CONCLUSION

 *Link your hypothesis, your reasoning, and this analysis together. Use your brain, your book and the internet to analyze your results. You should NOT simply say what the results are. I am looking for you to understand WHY that occurred. What are the biological explanations? Or what are the reasons for unexpected results? A continuation of your analysis should focus on how reliable/correct your data is. Identify what the expected results of the lab were and whether or not the observed results matched the expected results. Were differences due to error in method or reasoning? According to your data, do you support or reject your research hypothesis? Remember, if you reject your research hypothesis, you have most likely failed to reject your null hypothesis.*

REFERENCES

 *You should always follow APA guidelines. Use websites like* [*http://www.bibme.org/*](http://www.bibme.org/) *or* [*http://citationmachine.net/*](http://citationmachine.net/) *to generate your citations in the correct formatting. List them as the sources are listed below in alphabetical order. Notice that references are not double-spaced when they exceed more than a single line. Only double space between the references.*

Adelstein, D., & Texley, J. (2006). A platform to stand on. *The Science Teacher*, *73*(7), 30-32.

Agamba, J., & Keengwe, J. (2012). Course management systems integration into course instruction .  *International Journal of Information and Communication Technology Education*, *8*(2), 72.

Brooks-Young, S. (2008). Got moodle? The free, open source program enjoys great appeal among K-12 teachers, as it allows them to get the upper hand on course management and assessment .  *T H E Journal (Technological Horizons In Education)*, *35*(4), 28.