Living Bubbles

Introduction

Understanding the characteristics of life is a key element in appreciating biological structures, processes, and relationships. The characteristics of life are common to all living things, but are not exclusive to the biotic world. Nonliving things may express some of the characteristics of life, but this does not mean they are living organisms. In this lab, students will investigate the question of what it means to be alive by observing and manipulating bubbles and using evidence to argue what distinguishes the living from nonliving.

Lab Objectives

* To become familiar with the characteristics of life.
* To practice utilizing good observation skills and record keeping as a means to gather data.
* To review the principles needed to design an effective experimental protocol.
* To use evidence to develop a scientific argument.

Procedure

* Blow bubbles and record observations.
* Based upon your observations, determine which bubble features are the same to those expressed by living organisms and what characteristics of life are not displayed.
* Develop ways in which a scientist could gather evidence to argue that bubbles are living/nonliving. Record your testing protocol.
* Test your bubbles to gather evidence to support/refute the argument that bubbles are living/nonliving. Record your data.
* Based on your evidence, write an argument to support/refute the idea that bubbles are living/nonliving.

Observations – *record a minimum of 10 observations that you notice about the bubbles that you blow.*

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| **Observations** | **Characteristic of Life?** |
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Hypothesis

* If… then…because
* If bubbles are **alive/not alive** then …. because...
* Your hypothesis: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Experimental Design

* What data will you collect to support/refute your hypothesis?
* How will you gather the data needed to support/refute your hypothesis? *Be sure to include an independent and dependent variable, control, constants, and trials.*
* Why will this data be useful in supporting/refuting your hypothesis?
* How will you record your data? *Create a data table on a separate sheet of paper.*

Data Analysis and Conclusion

* What evidence did you gather that is meaningful in supporting/refuting your hypothesis?

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| **Evidence** | **Examples from Data** | **Meaning/Connection to Hypothesis** |
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* Write an argument that refers to the collected data to support/refute your hypothesis.