**Peppered Moth Natural Selection Lab**

The study of peppered moths in England during the 1800’s represents a classic example of evolution by natural selection. In this activity, you will use a computer simulation to model the changes that take place in the population of peppered moths.

For natural selection to occur, there must be:

* **Inherited variation:** Organisms are different, variation is genetic and can be passed on to offspring
* **Excess offspring-** Organisms produce more offspring than the environment can support
* **Adaptation:** Different traits offer an advantage in different environments
* **Inheritance**: Individuals that survive pass on their genes to their offspring

**Directions:**

1. **Open the website:** [**Pepper Moths Interactive**](http://www.techapps.net/interactives/pepperMoths.swf)
2. ***Read the info from the upper left hand circle: Life Cycle of the Peppered moth and answer the questions as you click on the arrow button.***
3. What are the predators of the peppered moth and how does the moth change its behavior to avoid being eaten?
4. Name an adaptation that the peppered moth has to avoid predation.
5. List each of the life stages of a peppered moth.
6. What is the lifespan of the moth?

***Click on the Pollution and peppered moth circle:***

1. What might have caused the first black moth to appear (think sources of genetic variation)?
2. What is the Industrial Revolution and how did it change the moths’ environment?

***Click on the Kettlewell’s Experiments circle:***

1. What did Dr. Kettlewell think was happening to change the populations of black and white moths?
2. **Partner with another student. Go to Bird’s Eye View circle and read the instructions. You are the blue jay. Pick a background (light or dark. Feed on moths (any you catch) for 1 min while your partner times you and record your data. Complete three trials**

***Table 1. Percent of Dark & Light Moths Remaining***

**Type of Background: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |  |
| --- | --- | --- |
| **Trial** | **% Light moths remaining** | **% Light moths remaining** |
| **1** |  |  |
| **2** |  |  |
| **3** |  |  |
| **Average** |  |  |

1. Make a bar graph with your average values.
	1. **Y-axis:** % of moths remaining
	2. **X-axis:** dark soot background, light lichen background. (You will have 4 bars- two for the averages from each environment.)
	3. Insert your graph below

**Analysis**

1. Explain how the color of the moth increases or decreases their chances of survival depending on the environment.
2. 500 light colored moths and 500 dark colored moths are released into a polluted forest. After 2 days, the moths were recaptured. Make a prediction about the number of each type of moth that would be captured and explain why.
3. Explain how the conditions for natural selection are met with the peppered moth population.
4. ***TURN-IN:***
5. *Rename your personal assignment in the following way: Class\_Last Name\_First Name\_Assignment Name*
6. *Example: 3B\_Rott\_Dan\_Assignment Name*
7. *Move or put your personal copy of the Lab into your “Biology Turn in Folder” Google Doc Collection/Folder.*
8. *Turn in your assignment to Mr. Rott by using the following turn in* [*link*](https://docs.google.com/spreadsheet/viewform?formkey=dElxQXE4WXREcHExVVVRbXMwb1VJNEE6MA)
9. *Turn in your assignment to Ms. Brill/Childers by using the following turn in link*

**Assessment:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Not Proficient** | **Proficient** | **Exceeds Proficiency** |
| **Data Collection & Processing:** | Missing some elements of proficient - please correct and turn back in within one class period. | Includes most of the following*Data Analysis and Conclusion:** Type of graph and/or table is appropriate for raw and calculated data
* Labeling of graph or table is correct (axis, units, and title)
 | Includes most of the following*Data Analysis and Conclusion:** Calculations are used when appropriate (mode, average, error or uncertainties)
 |
| **Conclusion & Evaluation:** | Missing some elements of proficient - please correct and turn back in within one class period. | Includes the following:* States an explanation, with justification, based on analysis of the data
* Links findings to original question or hypothesis
* States appropriate data to support the explanation
 | Includes most of the following:* Explains limitations, errors, or weaknesses (individual and procedural) of experiment and suggest improvement
* Apply related concepts to topics in the news, scientific community, or your life.
* At least one credible, external citation used (MLA format and not wikipedia, ask.com, or personal webpages) to cite specific examples of other areas in science or current events that this topic relates to; at least one citation used.
 |
| **Work Ethic:** | *Any of the following:** Missing elements listed in proficient
* JEOPARDIZES SAFETY.
* Work is late
 | Includes most of the following:* Student is on task and works consistently to complete lab during class period
* Student leaves lab area clean and prepared for next class
* Work is completed on time
 | Includes most of the following:* Student helps to clean common areas OR
* Student assists other students when appropriate OR
* Student attempts to find solutions to problems or questions independently, with group members, or research
 |
| **Teamwork:** | Missing elements listed in proficient. | Includes most of the following:* Works with group members by remaining positive
* Does not distract others
* Positively contributes to the group’s lab completion
 | Includes most of the following:* Student assists other group members as necessary
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