### Don’t be a Luna-tic!

 **Leave Your Leaves Curriculum, 9-12: Lesson 2 with Activities**

**NC Essential Standards:**

* Bio.2.1.2 Analyze the survival and reproductive success of organisms in terms of behavioral, structural, and reproductive adaptations.
* Bio.2.2.1 Infer how human activities (including population growth, pollution, global warming, burning of fossil fuels, habitat destruction and introduction of nonnative species) may impact the environment
* Bio.2.2.2 Explain how the use, protection and conservation of natural resources by humans impact the environment from one generation to the next.
* Bio.3.4.2 Develop a cause and effect model for the process of natural selection.

### Objectives:

* Describe the importance of coloration in avoiding predation.
* Relate environmental change to changes in organisms.
* Explain how natural selection causes populations to change.

### Required materials (for a class of 30 students):

* Brown paper (could be old packing material or grocery bags) torn into small leaf-litter-like pieces and crumpled to mimic leaf litter
* 60 brown paper squares (about the size of a quarter) per group (420 total) – easy to cut with a paper slicer
* 7 shallow trays of some type (could be large rectangular plastic “Tupperware-type” containers, cafeteria trays, copy box lids, etc.)
* White paper for background (cut to the size of the trays), if the trays are not a contrasting color to the brown
* Forceps or tongs
* Timer (clock with second hand, stopwatch, etc.)

**Vocabulary:** predator, prey, pupa, adaptation, genetic variation, leaf litter, natural selection

\*This activity was adapted from an activity exploring peppered moths at http[s://w](http://www.biologycorner.com/worksheets/peppermoth_paper.html)ww[.biology](http://www.biologycorner.com/worksheets/peppermoth_paper.html)c[orne](http://www.biologycorner.com/worksheets/peppermoth_paper.html)r[.com/worksheets/peppermoth\_paper.html](http://www.biologycorner.com/worksheets/peppermoth_paper.html)

# Don’t be a Luna-tic!

## Luna moths (*Actias luna*) are beautiful, green silkworm moths with a wingspan of approximately 3.5-4 inches. Female Luna moths lay their eggs on host plant trees, such as sweetgum, persimmon, and hickories, over the few nights of their active flight. The eggs hatch, and the caterpillars (also known as larvae) eat leaves and grow over the course of 3-4 weeks. The caterpillars then construct a cocoon out of leaves and silk, and pupate until they



emerge as fully developed moths. There are generally at least two generations per year, with the fall generation overwintering in leaf litter until they emerge in the spring.

**Procedure:**

1. Place the white paper in the bottom of the tray and have one person spread 30 brown squares around the entirety of the bottom of the tray while the “predator” isn't looking.
2. The "predator" will then use forceps to pick up as many of the squares as possible in 15 seconds.
3. The number that are left are doubled to represent the next generation (add the number of squares necessary to equal the new population size).
4. Repeat for a total of 5 generations, recording data as you go. \*\*\***REMEMBER** to double your final population of the previous generation for the starting population size of each generation. \*\*\*
5. Remove the white paper background and any remaining squares. Replace with the leaf litter background and 30 squares. Remember to make sure the “predator” isn’t looking. Repeat steps 2-4.

 Data:

|  |  |  |
| --- | --- | --- |
|  | White Background | Leaf Litter Background |
|  | Starting Population Size | Final Population | Starting Population Size | Final Population |
| Generation |  |  |  |  |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |
| 5 |  |  |  |  |

**Analysis**

Graph your data. Remember that the Independent variable, generations, goes on the X axis and the dependent variable, population size, goes on the Y axis. Make sure your scales are consistent and give your graph an appropriate title, one that includes the variables being tested. You should have 2 lines on your graph, one for the data from the white background, and one for the leaf litter. Your lines should be labeled or identified using a key.



1. Contrast how the population of Luna moths changed over the course of several generations for both the white background and the brown paper background.

2. Which Luna moth cocoon coloring is the best adaptation for which background? How do you know?

3. Describe how this simulation models natural selection.

4. If your neighborhood HOA or town wanted to pass an ordinance that required residents to remove leaves in the fall, what could you respectfully say at a public interest meeting to convince them that this is not a good idea? Be sure to include facts to make your statement more effective.