NAME _____ DATE _____ HOUR _____ BIOLOGY

PEPPERED MOTH SIMULATION LAB

Purpose

In this lab, you will simulate how predators locate prey in different environments. You will analyze how color affects an organism's ability to survive in certain environments.

Industrial melanism is a term used to describe the adaptation of a population in response to pollution. One example of rapid industrial melanism occurred in populations of peppered moths in the area of Manchester, England from 1845 to 1890. Before the industrial revolution, the trunks of the trees in the forest around Manchester were light grayish-green due to the presence of lichens. Most of the peppered moths in the area were light colored with dark spots. As the industrial revolution progressed, the tree trunks became covered with soot and turned dark. Over a period of 45 years, the dark variety of the peppered moth became more common.

Procedure

1. Count the number of light and dark moths you have to begin and record this in Trial 1 as the starting population. ***You should start each trial with equal amounts of dark and light.***
2. Place the light "tree trunk" paper on the table and have one person spread all of the light and dark moths over the surface while the other person isn't looking.
3. The "predator" will then use forceps to pick up ("eat") as many of the moths as he can in 20 seconds. Pick them up one at a time. Record the number of each color that has been "eaten".
4. Repeat steps 1-3 three more times, flipping to the dark "tree trunk" paper for trials 3 and 4. ***Each time, return the "eaten" moths back to the starting population.*** Recount your "starting population" each time, in case you have lost some moths. Record data in the chart below.

TRIAL	Background	Starting Population		Number "eaten"		Percent "eaten"	
		# Light	# Dark	# Light	# Dark	% Light	% Dark
1	White						
2	White						
3	Dark						
4	Dark						

Analysis

1. What did the experiment show about how prey is selected by predators?

2. What moth coloration is the best adaptation for a dark background? How do you know?

3. What would you expect the next generation of moths to look like after trial 1?

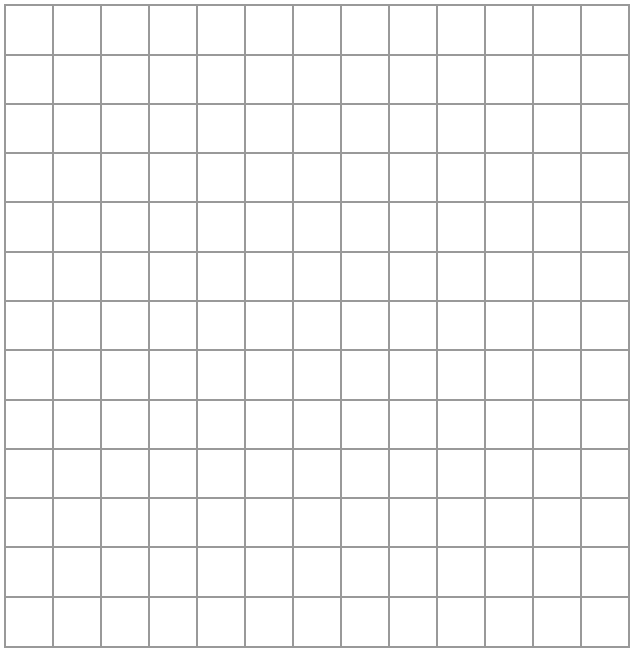
   a. What would you expect the next generation of moths to look like after trial 3?

4. How does the simulation model natural selection? *Think about our 4 requirements of natural selection.*

5. The table below represents data from a collection study of peppered moths during the industrial revolution. Examine the table and construct a ***line graph***. You should have 2 lines on your graph: one for light moths, and one for dark moths. Don't forget to ***label*** the graph!

   What is the independent variable? _____ Which axis does it go on? _____

   What is the dependent variable? _____ Which axis does it go on? _____



Year	# Light moths	# Dark moths
1	581	74
2	537	112
3	484	198
4	392	210
5	246	281
6	225	337
7	193	412
8	147	503
9	84	550
10	56	599

6. Explain in your own words what the graph shows.

7. Describe another situation in nature where this type of selection might occur. Describe something <u>different</u> than the peppered moth example—you can make up a fictional example if you like.