**Peppered Moth Simulation** Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

**Materials**

Sheet of white paper and newspaper  
Fingers  
Clock with Second Hand  
  
50 newspaper circles 50 white circles (made with hole punch)

**Purpose**In this lab, you will simulate how predators locate prey in different environments. You will analyze how color affects and 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. Place a sheet of white paper on the table and have one person spread 50 white circles and 50 newspaper circles over the surface while the other person isn't looking.  
2. The "predator" will then use fingers to pick up as many of the circles as he can in 15 seconds. They may only “eat” one moth at a time and they must be picked up (not slid off the paper).  
3. Count the number of each color that were “eaten” in each generation as record it in the data table. Use this data to figure out how many would be left in for your next starting generation.    
4. This trial will be repeated with white circles on a newspaper background, newspaper circles on a white background, and newspaper circles on a newspaper background. Record the data in chart below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Populations Start on White Background | | | | |
|  | Starting Population | | Number Eaten of each Population | | |
| Generation | Newspaper | White | Newspaper | White |  |
| 1 | 50 | 50 |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |
| 5 |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Populations Start on Newspaper Background | | | | |
|  | Starting Population | | Number Eaten of each Population | | |
| Generation | Newspaper | White | Newspaper | White |  |
| 1 | 50 | 50 |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |
| 5 |  |  |  |  |

**Analysis**

1. Describe how the population of moths changed in each generation for both the newspaper and the white moths.

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

3. How does the simulation model natural selection?

4. How could this experiment be improved to show reproduction rates?

5. What was the independent variable? What was the dependent variable?

6. Examine the table and construct a graph. Plot the years of the study on the X-axis, and the number of moths captured on the Y axis. You should have 2 lines on your graph - one for light moths, and one for dark moths.

|  |  |  |
| --- | --- | --- |
| Year | # of Light Moths Captured | # of Dark Moths Captured |
| 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 |

7. Explain in your own words what the graph shows. What type of environment do you think these moths live in? What happened to the two populations? What would have caused the change? Be specific.