Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Block: \_\_\_\_\_\_

**MYP Biology 9: Peppered Moth Simulation**

**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
Forceps
Clock with Second Hand
30 newspaper circles

30 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.

**Problem Statement:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Independent variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Dependent variable:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Background Information:** 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.

**Hypothesis: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Procedure**

1. Place a sheet of white paper on the table and have one person spread 30 white circles and 30 newspaper circles over the surface while the other person isn't looking.
2. The "predator" will then use forceps to pick up as many of the circles as he can in 15 seconds.
3. The number that are left are doubled to represent the next 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.
5. Graph the Data in Table #1 and #2 to show the trend over 5 generations. (Make sure you have units and a title that include both variables)

**Data Table #1 Title**:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
|  | Populations Start on White Background |
|  | Starting Population | Final Populations (how many of the original were left ) |
| Generation | Newspaper | White | Newspaper | White | Double these final numbers to get your starting population for the next generation |
| 1 | 30 | 30 |   |   |
| 2 |   |   |   |   |
| 3 |   |   |   |   |
| 4 |   |   |   |   |
| 5 |   |   |   |   |

**Data Table #2 Title**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
|  | Populations Start on Newspaper Background |
|  | Starting Population | Final Populations (how many of the original were left ) |
| Generation | Newspaper | White | Newspaper | White | Double these final numbers to get your starting population for the next generation |
| 1 | 30 | 30 |   |   |
| 2 |   |   |   |   |
| 3 |   |   |   |   |
| 4 |   |   |   |   |
| 5 |   |   |   |   |

**Conclusion & Analysis: *(type a one page conclusion for the lab)***

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 and the concepts in evolution?