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**Station 4: Natural Selection and the Peppered Moth**

**Unit Essential Question:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Focus Question:** How can our understanding of adaptation and natural selection help us make predictions about populations?

**Task:** You will visit a website and collect information about peppered moths before completing an online simulation of the process of natural selection.

**Background Information:** Peppered moths are common insects living in England, Europe, and North America. They are small moths, only 1.5 to 2.5 inches across. Their light wings are “peppered” with small dark spots.

**Part I Directions:**

1. Get the Chromebook you are assigned and **go** to the blog.

2. Click on the link for the Peppered Moths website; it should take you directly to the page titled “Peppered Moth”.

3. You will use the different tabs to fill in the blanks and answer questions from each section; the titles on the webpage match the titles above the fill in the blank paragraphs and questions.

**Life Cycle**

Peppered moth eggs hatch during \_\_\_\_\_\_\_\_\_\_\_\_. Larvae (caterpillars) feed on the leaves of birch, willow, and oak trees. The larvae look much like a small branch. Having a body that looks like a stick helps the larvae hide from \_\_\_\_\_\_\_\_\_\_\_\_. The larvae can even adjust their color from brown to green to best match the branches they are feeding on.

Cold weather is difficult for insects. To avoid \_\_\_\_\_\_\_\_\_\_, peppered moth larvae change into pupae (cocoons) for the winter. In \_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_ the pupae open to reveal a new adult moth. These adults will lay eggs and die by the end of summer. No peppered moth lives for more than \_\_\_\_\_\_\_\_\_\_\_ year.

**Predators**

Predators of the peppered moth include flycatchers, nuthatches, and the European \_\_\_\_\_\_\_\_\_\_. Like most moths, peppered moths avoid \_\_\_\_\_\_\_\_\_\_\_\_\_ that hunt in daylight by \_\_\_\_\_\_\_\_\_ at night and \_\_\_\_\_\_\_\_\_\_ during the day. Any animal \_\_\_\_\_\_\_\_\_\_\_ still is harder to see than a moving one.

Peppered moths have extra \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to help them hide. The trees they live in have light-colored \_\_\_\_\_\_\_\_\_\_\_\_\_ and are covered with small lichens, organisms that are part \_\_\_\_\_\_\_\_\_\_\_and part algae or bacteria. The \_\_\_\_\_\_\_\_\_\_\_\_ on peppered moth wings looks very similar to lichens.

**Part II Directions:** Click on **Natural Selection** Tab to fill in the blanks and answer the questions below.

Who is RS Edleston and what was his unusual discovery?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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What was rare in 1848 that became common by 1900?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Industrial Revolution**

During that time, England was experiencing what is known as the\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_. Factories were being built, and they ran by burning \_\_\_\_\_\_\_\_\_\_\_\_ for fuel. The result was a dark smoke that covered the surrounding countryside. \_\_\_\_\_\_\_\_\_\_\_ that had been light and covered by lichens now were dark and bare. This clearly was having some impact on the moths. Scientists began to try to find out why.

### Genetic Changes

Some thought the adults were changing their \_\_\_\_\_\_\_\_\_\_ the same way the larvae could match the color of the twigs. Others thought the chemicals in the \_\_\_\_\_\_\_\_\_\_\_\_ darkened the moths.

Finally it was found that the color was \_\_\_\_\_\_\_\_\_\_\_. Moths passed their color to the next generation. Eggs from light moths developed into light moths and dark moth eggs turned to dark adults. The dark color was caused by a \_\_\_\_\_\_\_\_\_\_\_ in the DNA of a single moth, and the mutated gene had been passed to all its offspring.

This explained why the moths were \_\_\_\_\_\_\_\_, but not why the dark moths were taking over. Did the dark moths have an \_\_\_\_\_\_\_\_\_\_\_\_ in the dark forests? If so, the \_\_\_\_\_\_\_\_\_\_\_\_\_in the moths was a result of \_\_\_\_\_\_\_\_\_\_\_\_ selection.

### Natural Selection

Natural selection was proposed by \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ to explain how new species \_\_\_\_\_\_\_\_\_\_. All types of living things have small differences between the individuals in the species. If one of those differences allows the individual to live \_\_\_\_\_\_\_\_\_\_\_, they will likely have more offspring. As that trait is passed on, the population starts to look more like the successful individual. Over time, the species \_\_\_\_\_\_\_\_\_.

Who was J. W. Tutt? What did he suggest and recognize?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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All living things respond to natural selection. Over 100 other species of moth were observed to darken over time in polluted forests. Scientists call this effect \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Natural selection is still at work in the peppered moth. In the last 50 years, most industrial countries have significantly reduced their pollution. As predicted by the \_\_\_\_\_\_\_\_\_, the number of dark moths are \_\_\_\_\_\_\_\_\_\_\_\_\_ as the forests become cleaner.

**Part III Directions:** Click on the **Dr. Kettlewell** Tab to fill in the blank and answer the questions below.

### Dr. Kettlewell

Who is Dr. Kettlewell and what is his role in the evolution of peppered moths?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Hypothesis**

What did Dr. Kettlewell hypothesize? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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### Observation

What did Dr. Kettlewell observe? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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### Experiment/Conclusions

|  |  |  |  |
| --- | --- | --- | --- |
| Dr. Kettlewell’s Experiments | How his experiment was conducted | His Findings | His Conclusion |
| Bird predation on the moths |  |  |  |
| The idea that dark moths live longer in dark forests |  |  |  |

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Ms. Murphy approval**

**Part IV Directions:** Click on **How to Play** tab and read the directions; this will instruct you how to play the game in the next section.

**Part V Directions:** Click on **Play Game** Tab and play the game to watch natural selection in action! Play one game in the light forest and one game in the dark forest.

When your simulation in complete, fill in the blanks below:

**In the light forest:** You ate a total of \_\_\_\_\_\_ moths. Your forest started with 50% light moths and 50% dark moths in a light forest. There are now \_\_\_\_\_\_\_\_\_\_\_\_ light moths and \_\_\_\_\_\_\_\_\_\_\_\_\_ dark moths.

Because you could see the \_\_\_\_\_\_\_ moths more easily, you ate more \_\_\_\_\_\_\_ moths than \_\_\_\_\_\_\_\_ moths.

**In the dark forest:** You ate a total of \_\_\_\_\_\_ moths. Your forest started with 50% light moths and 50% dark moths in a light forest. There are now \_\_\_\_\_\_\_\_\_\_\_\_ light moths and \_\_\_\_\_\_\_\_\_\_\_\_\_ dark moths.

Because you could see the \_\_\_\_\_\_\_ moths more easily, you ate more \_\_\_\_\_\_\_ moths than \_\_\_\_\_\_\_\_ moths.