Insect Survival Activity

You are a hungry bird flying in a forest looking for moths to eat. Some moths are black, while some are “peppered” or black and white. Some moths have a black home, while some have a peppered home. All moths are equally tasty so it doesn’t matter which one you eat, you just want to eat as many moths as you can as fast as you can!

Procedure

1. Work in groups of 2, grab black construction paper for “black home” and newspaper for “peppered home”. Grab a bag of 20 black and 20 white newspaper or “peppered” moths.

2. For round 1, one team member stands up and closes their eyes. The other team member spreads the moths on the peppered home.

3. The first team member opens their eyes when the teacher says “EAT!” and picks up one moth and gives it to the other team member. Repeat for 20 seconds, picking up one moth at a time. During the 20 seconds, the second team member keeps count of how many moths the first team member is eating. Also record how many moths of each color are left at home by subtracting the number eaten from the original 20 that were there. (For example, if you ate 11, 20-11=9 left).

4. When the time is up, the second team member records how many black moths and peppered moths were eaten and how many are left at home in the table.

5. For round 2, the team members switch positions and the home is black. When the teacher says “EAT!”, the second team member picks up one moth at a time while the first team member keeps count and records how many black moths and peppered moths were eaten and how many are left at home in the table.

6. Once the activity is completed, the teacher will compile the data for the entire class to compare results.
### Round 1: Peppered Home

<table>
<thead>
<tr>
<th></th>
<th>By your team:</th>
<th>By the class:</th>
</tr>
</thead>
<tbody>
<tr>
<td># of black moths eaten</td>
<td></td>
<td></td>
</tr>
<tr>
<td># black moths left</td>
<td></td>
<td></td>
</tr>
<tr>
<td># of peppered moths eaten</td>
<td></td>
<td></td>
</tr>
<tr>
<td># of peppered moths left</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Round 2: Black Home

<table>
<thead>
<tr>
<th></th>
<th>By your team:</th>
<th>By the class:</th>
</tr>
</thead>
<tbody>
<tr>
<td># of black moths eaten</td>
<td></td>
<td></td>
</tr>
<tr>
<td># black moths left</td>
<td></td>
<td></td>
</tr>
<tr>
<td># of peppered moths eaten</td>
<td></td>
<td></td>
</tr>
<tr>
<td># of peppered moths left</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Directions:** Answer the following questions based on the activity.

1. In round 1, is it better to be a black moth or a peppered moth? Why?

   ________________________________________________________________
   ________________________________________________________________

2. In round 2, is it better to be a black moth or a peppered moth? Why?

   ________________________________________________________________
3. If the moths left in round 1 reproduced together, which kind of moth would have a higher population (higher number of moths)? Explain.

______________________________________________________________________________

______________________________________________________________________________

4. If the moths left in round 2 reproduced together, which kind of moth would have a higher population (higher number of moths)? Explain.

______________________________________________________________________________

______________________________________________________________________________

5. During round 2, what adaptation do the moths have? Why is this adaptation important?

______________________________________________________________________________

______________________________________________________________________________

6. If the home were suddenly changed white, what would the moths start to look like?

______________________________________________________________________________

______________________________________________________________________________

This activity happened in real life! In England, there is a species of moth that is white with black speckles, giving it the name of English Peppered Moth. Peppered Moths are well-camouflaged on speckled lichens (fungus like mushrooms, looks kind of like moss) on tree trunks, protecting them from predators so they can survive to reproduce.

In the 1800s, the factories in England were burning coal for heat and power, which polluted and killed the lichen and turned the tree trunks black. Black moths started appearing and the normal Peppered Moths started disappearing.

In the 1900s, England started cleaning things up, which allowed the lichen to grow on the trees. The Black moths started disappearing and the Peppered Moths reappeared. If this did not happen, there might have been two separate species of Moths in England (species are said to be different when they cannot reproduce).

This is the best documented example of **natural selection**, which is the survival and reproduction of organisms best adapted to their surroundings.
Darwin’s Natural Selection Theory

Charles Darwin published *On the Origin of Species* almost 150 years ago, which describes his theory of evolution. This view was profoundly different from anything known in nineteenth-century England and continues to be upheld by research today. Many would still agree with Darwin, who believed that natural selection could explain how all living organisms came from the simplest life form, bacteria, and all organisms continue to evolve, or change, today.

1. Individual organisms of a species in nature differ from one another. Some of this variation is inherited.
   Example: In the moths, some were naturally peppered, but some where naturally darker in color. Their offspring tended to be the same color as themselves.

2. Organisms in nature produce more offspring than can survive, and many of those that survive do not reproduce. Since so many offspring die, it is better to have lots of offspring with hopes that at least one will survive.
   Example: The moths have offspring that will be eaten by birds before they are able to reproduce.

3. Because more organisms are produced than can survive, members of each species must compete for limited resources.
   Example: The moths have to occupy the same space on a tree, but there is not enough room. They have to fight for their right on the tree. Same idea for food, for mates, etc.

4. Because each organism is unique, each has different advantages and disadvantages in the struggle for existence.
   Example: The peppered moths had the camouflage advantage on peppered lichen, whereas the black moths had the camouflage advantage on the polluted trees.

5. Individuals best suited to their environment survive and reproduces most successfully. The characteristics that make them best suited to their environment are passed on to offspring. Individuals whose characteristics are not as well suited to their environment die or leave fewer offspring. This is called survival of the fittest.
   Example: The peppered moths were eaten by birds when the lichen died since they were no longer camouflaged. The black moths were more fit; they survived long enough to reproduce.
6. Species change over time. Over long periods, natural selection causes changes in the characteristics of a species, such as in size or form. New species arise, and other species disappear.
Example: If enough time passed, eventually a new species would have emerged, the black moth, simply as a result of the color change.

7. Species alive today have descended with modifications from species that lived in the past.
Example: The peppered moth was probably modified from a non-peppered moth as a result of choosing to live on peppered lichen.

8. All organisms on Earth are united into a single tree of life by common descent.
Example: Moths, humans, plants, etc all come from a common ancestor, bacteria.

**NOTE** Natural selection occurs naturally, as a result of nature. However, new species can be created, which is called artificial selection. Humans use this technique to breed organisms with each other that have a desired trait. Examples are domestic dogs (large Saint Bernard and small Chihuahua) or vegetables (Brassicas: cabbage, broccoli, cauliflower, Brussels sprouts, collards, and kale are all members of the same species).