

Natural Selection and Adaptations Center #1

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.

In this investigation, 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.

Read:

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.

Instructions:

With a partner:

1. One person will spread 20 white circles and 20 newspaper circles provided (in the plastic bags) over a piece of white paper while the other person is not looking.

The person that is not looking is the predator.

2. The "predator" will then use forceps to pick up as many of the circles as he can in 15 seconds and drop them in the cup. The partner will time

3. The number that are left are doubled to represent the next generation.

4. Repeat the trial 5 times on the white background. Switch partners and do the same thing with the newspaper background.

Record your data below.

Populations on white background

Generation	Starting Population		Final Populations	
	Newspaper	White	Newspaper	White
1	20	20		
2				
3				
4				
5				

Remember to double the final populations each time to get the next starting population!

Populations on newspaper background

Generation	Starting Population		Final Populations	
	Newspaper	White	Newspaper	White
1	20	20		
2				
3				
4				
5				

Answer these questions:

1. From your results, how did the populations of moths change in each generation for both the newspaper and the white moths?

2. Which moth coloration is best adapted for the newspaper background? How do you know?

3. How does this simulation model natural selection?

Natural Selection and Adaptations Center #2

Create the Perfect Organism

Objectives

- Demonstrate the concept of adaptation by developing an organism based on a given environment.
- Relate environmental change to changes in organisms

In this activity, you will model your own organism with adaptations to succeed in one of the environments provided. You may use play-doh to create your organism, or you can draw it.

Please pick one of the environments below for your organism to live in:

1. This environment is dark and cold most of the time. It is very mountainous. It rains almost all day. Because of the wet, dark conditions, the only plants that grow well are small mosses and funguses. Animals here include a type of mouse, a nocturnal hunting large cat, fish, and a variety of insects.

2. This environment is dry, hot, and flat. Water is found in underground streams but there is little water on the surface. Most of the surface is covered in sand, although there are patches of dry grass. When plants can get their roots down into the water table, they grow into tall trees with leaves at the top but not along the trunk. Plants which are not connected to the water table are small and dry, but they are edible. Animals here include insects, a species of birds which roost in the high trees, a sand-colored lizard and a type of rat.

3. This environment is tropical: wet and hot. It is mostly rainforest and very flat. Water collects in large pools and lakes which have water in them all year 'round. A species of poisonous plant grows thickly on the ground. The spines of this plant are poisonous, and any animal which steps on one is sure to die. The vegetation is plentiful, and includes leaves, fruits and nuts. Animals include carnivorous snakes, varieties of insects, monkeys, fish and birds.

4. This environment has a moderate climate. It never gets very hot or very cold, but stays mild all year 'round. It rains for part of the year and the water forms pools and lakes which dry up towards the end of the year and then the planet is very dry. The land is partly mountainous and partly flat. Vegetation includes tall trees with high leaves and fruit, and a smaller plant which bears nuts. However, these nuts are inside hard shells which need to be removed before the nut can be eaten. Animals include rats and mice which live underground, insects, birds that nest in the tall trees, slow moving mammals which also live in the trees and a species of carnivorous nocturnal wolf.

When you are designing your animal consider the following:

- Size
- Adaptations for food gathering: how and what does it eat?
- Adaptations for defense and protection
- Adaptations for seasonal changes
- Where will it shelter?
- How will it keep warm/cool?

Draw a labeled picture of your creature, or create a model out of clay. Answer the following questions.

- Which environment did you select?
- Give your organism a name.
- Please list your animals adaptations. How do these adaptations help your organism survive? (where does it live?, how and what does it eat?, what kind of organism is it?, what color? etc..)