

Ask students if they have seen what comes from a fireplace chimney or what is left behind when you burn something? The answer is soot and ash. When materials like wood or coal are burned, they leave behind a heavy black powder that falls to the ground and covers surfaces. In England, in the 18th century, many people and factories burned coal to help make goods. These conditions created a unique environment for scientists to observe adaptation in action!

- Ask them if they have any guesses why this might be.
- Tell students you aren't going to give them the answer; instead, they will do an experiment and will collect evidence to support a claim about why the color of moths changed during this time in history.

Exploration:

1. Explain to the students that you will simulate the moths in England with white and black paper and that one of the partners will act as the predator hunting the moths.

2. In pairs, have students tear ten approximately one-inch by one-inch squares of black paper (about the size of your thumb) and ten equal squares of white paper.

3. Now have one partner turn away from the desk and cover their eyes while the other partner places the "moths" on the white paper.



4. The partner who hid the moths can now give the other partner permission to turn back around. The partner who had the moths now counts to 10 or uses the stopwatch while the other person uses the tweezers or just the thumb and forefinger, on one hand, to pick up as many moths as they can during the time. You may only pick up one moth at a time.

5. Record the number of black "moths" and the number of white "moths" caught in that round.

- 6. Switch partners and repeat on the white paper.
- **7.** Repeat steps 3-6 but this time, hide the moths on the black paper.

Explanation:

• What did students notice about the experiment? What evidence can they give to support their claim? For example: "Black moths are easier to spot on the clean white surface (claim) because



What You Will Need:

- Butcher paper or two pieces of printer paper taped together
- Large sheet of grey or black

• Torn bits of white and black

• Ooptional: Tweezers

• Optional: Stop wathces

paper

paper



both times the partner who was the bird got a lot more black moths than white (evidence)." **Explanation continued:**

• Before the industrial revolution, trees were covered by a white plant called lichen that helped hide the white speckled moths. You could find black peppered moths, but they were rare. When surfaces got covered in dark-colored material, it made the white moths easier for birds to spot. They got eaten up while the black moths were more likely to survive. Since moths only live for a short period, the total number of white moths decreased, and black moths increased.

• Later, in the 1950s, when pollution was reduced, the light-colored ones again became the most common of this species.

Extension:

Have students write the protocol for their experiment. Have them then switch experiments to see if they can duplicate the results from the previous test.

Other Resources:

Evolution of the Peppered Moth https://youtu.be/LyRA807djLc Living Things Change: Crash Course Kids #41.1 https://youtu.be/xDSFIRunIrU



* Many students may not have experience with soot. Option 1 - to build up this prior knowledge are to show them a picture like the one listed under other resources. Option 2 - show them a video clip that shows it. Option 3 - brings in a candle and show students what