



Education and Research: Testing Hypotheses

Science Sleuths: Mystery Spill Investigators Extension Activity

Summary

Students will explore how a surfactant (egg white foam) removes the waterproofing from bird feathers by observing and identifying changes in waterproof characteristics of bird feathers.

Key Concepts

Students will be exposed to the investigatory and detective-like nature of science, and learn how science inquiry can help solve ecological mysteries.

Objectives

Students will be able to:

- *Formulate* a hypothesis
- *Test* their prediction
- *Identify* variables
- *Collect* data
- *Interpret* data
- *Form* a conclusion
- *Design* their own experiment (optional)

Materials

- Two beakers or plastic containers per student group
- Feathers
- Salt water or tap water
- Whipped egg whites (colored with blue and green food coloring, if desired)
- Paper towels
- Paper and pencils, or a science journal
- Optional: hand lenses or dissecting scopes

Procedure

1. Split students into small groups of 2-3. This activity can be student driven or performed as written below.
2. Give each group two feathers, and have students carefully observe the dry feathers. Direct students to write their observations down in science journals. Students may notice that the feathers seem “fluffy” or that the downy vanes point outward from the shaft. Teacher may record student observations on the blackboard if desired.

3. Give each group two beakers, one filled with salt water, one filled with salt water and the egg white mixture floating on top (to simulate the proteinaceous substance—or foam—released by decaying dinoflagellates as they are agitated by wave action). If desired, teacher can inform students that the water/egg white (foam) mixture is a water sample obtained from the affected ocean area where bird deaths occurred.
4. Explain to students that they will dip one feather in and out of the salt water and the other feather in and out of the egg white mixture, shake the feathers once, and lay them out to dry. Ask students to predict what they think will happen to each feather and why. Have students write their predictions in their science journals or on a piece of paper.
5. Using their prediction, ask students to identify their independent, dependent, and control variables.
6. Direct each group to test their predictions by dipping one feather in the salt water and one feather in the egg white mixture.
7. Have students shake each feather once or twice over a paper towel, the way one would shake a paintbrush, and then place feathers side by side on the paper towel.
8. Have students examine both feathers to observe differences in waterproofing characteristics. Students may note that egg white “foam” exposure coats the feathers, collapsing the down or “clumping the feathers together.”
9. Direct students to record the results in their science journals.
10. Have each group discuss their results and ask students why they think the egg white feather down seemed to collapse or clump, while the feather dipped in salt water retained most of its original waterproofing characteristics.
11. Ask students to determine how exposure to the egg white substance might effect the waterproofing capability of shore birds.
12. In a group discussion, invite students to share their ideas and observations. Explain that seabirds like fulmars, loons, grebes and scooters carry a wax-like waterproofing agent on their feathers which is removed by the egg whites which act as a surfactant. When this waterproofing agent is removed, water can reach the birds’ skin, causing many of them to die from hypothermia or, literally, to freeze to death.

Assessment

- **Performance**—Did student participate in group discussions? Was student able to identify independent, dependent and control variables and understand surfactant action on waterproof feathers?
- **Product**—Did student successfully complete science journal?

Additional Resources

www.peteducation.com

www.backyardnature.com/cgi-bin/gt/tpl.h,content=277