

STEAM Subject: Ecology

Lab: Blubber Gloves

Grades: 2-5

Learning objective:

Students will demonstrate an animal adaptation that can help you survive in a cold habitat.

ENGAGE:

Ask students the following questions:

- What are some things that you do to stay warm in the winter?
 - You may turn on the heater in the house.
 - You may wear several layers of clothing, like a sweater and a jacket.
 - You may live somewhere that is warm all year
- Are there any animals you know of that live in really cold places? How do those animals withstand the cold?
 - Those animals have special features and behaviors, called adaptations, that help them survive.

EXPLORE:

Blubber Gloves Activity

We will be exploring one structural adaptation called blubber. Blubber is a thick layer of fat that Arctic and Antarctic animals rely on to stay warm. You can think of it like a really warm jacket that they never take off. In this experiment, we will see for ourselves how effective blubber is at keeping animals warm.

Materials needed per student:

- 2 Quart-sized Ziploc bags
- Shortening (ex: Crisco)
- Duct Tape
- Ice
- Large Bowl or Container
- Timer or stop-watch

Directions for Making Blubber Gloves:

Tip: Parents and older students may want to prepare the gloves as this can get messy!

1. Get 2 quart-sized Ziploc bags, shortening, and duct tape.
2. Slide one open Ziploc bag into the other.
3. Create a layer of shortening in the space between the outer and inner bag.

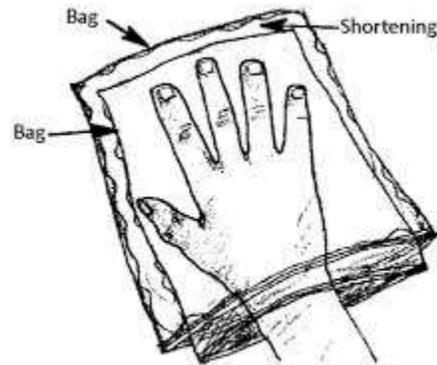


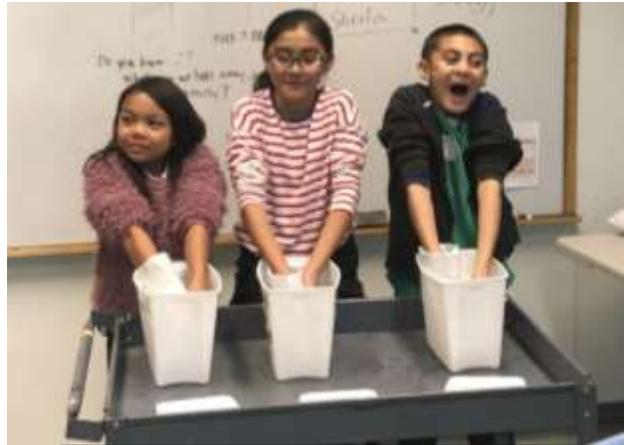
Image credit:

<https://www.seattlemca.org/sites/default/files/2019-11/Blubber%20Glove.pdf>

4. Tape the top edges of the outer bag to the inner bag so that no shortening can leak out. This may take multiple layers of tape.
5. Keep the opening in the middle of the inner bag tape-free so you can stick your hand into the glove.)

Experiment Procedure:

1. Fill a large bowl or bucket with ice and water. A tray or towel may be placed underneath in case of a spill.
2. Set a timer for two minutes.
3. Put a blubber glove on one hand and keep the other hand bare. You will want to compare how the ice water feels with and without the glove.
4. Start the timer and stick both hands in the bowl. (Tip: make sure that you don't dip the opening of the blubber glove below level of the water, as water will spill in.)



Students pictured at EIS testing the Blubber Gloves experiment. Photo taken by EIS.

Parent supervision is required.

Safety note: Do not keep the non-gloved hand in the bowl for more than two minutes. Stress to the students that if their non-gloved hand becomes too cold or begins to feel numb, they should remove it from the bowl immediately.

5. Compare how the water feels with and without the blubber glove. Are you able to endure the whole two minutes with both hands? Do you need to take one hand out? Which one?

EXPLAIN:

Blubber vs no blubber

- Was there a noticeable difference between the tolerability of the gloved hand and non-gloved hand?
 - You should find that the gloved hand remains comfortable even when submerged in the ice water, while the non-gloved hand feels unbearably cold.
- Why do we find such a strong difference?
 - We see this difference because blubber is an effective insulator. An insulator is a material that prevents the movement of heat. Mammals, like you, are warm blooded, so they produce their own body heat. This heat is lost to their surroundings unless they have an insulating layer of blubber, fur, or another material that prevents the heat from escaping. Note that insulators do not generate any heat of their own, but rather they conserve the heat that is already there.
 - Think of when you wear a jacket to keep you warm from the cold outside. The jacket insulates your body and keeps your heat from escaping.

Adaptations

Adaptations are an animal's characteristics that help it survive. For example, one adaptation the camel has is its ability to store fat in its hump. This allows it to go for long periods of time without eating. This adaptation is especially handy in the desert where food is scarce. Some adaptations may be behavioral, and some may be structural. Let's look at some behavioral and structural animal adaptations for surviving the winter.

Behavioral adaptations:

- These are an animal's behaviors that increase its chances of survival.
 - Example: Birds avoid the freezing cold of winter by migrating south. Some bears hibernate during winter to save energy.



Image credit:
<https://www.allaboutbirds.org/news/the-basics-how-why-and-where-of-bird-migration/>

Structural Adaptations:

- These are the specialized body parts that help animals survive.
 - Polar Bears have thick fur and blubber to endure the freezing cold.
 - Marine mammals such as whales, walrus and seals rely on this layer of fat to survive. California Sea Lions have a thick blubber layer to help with temperature control.



Image credit: Wikipedia



Image credit: <https://www.rcinet.ca/en/wp-content/uploads/sites/3/2019/11/bear-polar-mom-2-cubs-walking-shore-chruchill-cbc.jpg>

- Review STEAM vocabulary:
 - **Adaptation:** A handy feature that helps an animal survive in its environment.
 - **Structural Adaptation:** An animal's specialized body parts that help them survive.
 - **Behavioral Adaptation:** An animal's specialized behaviors that help them survive.
 - **Blubber:** A thick layer of fat that conserves heat.
 - **Insulation:** The process by which a material traps heat.

EVALUATE:

- How does blubber keep Arctic and Antarctic animals warm? Try to name as many animals as you can that have blubber!
- What could we fill the gloves with, instead of blubber, that could also keep our hands warm?
 - Feathers, cotton, anything that could provide a layer of insulation.
- What other adaptations do animals have? Can you name adaptations from animals other than those in the Arctic or Antarctic?

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