

Florida Welcomes Stella!

Incredible Insulation - Blubber Function

(This lesson is adapted from the Right Whale Lesson Plan Book published by Florida Atlantic University's Harbor Branch Oceanographic Institute.)

Learning Outcome:

- Students will learn the function of blubber and discover how fat helps a body trap heat
- Grade levels: 5-8

Materials Needed: (\$2.00 a student)

- Baking pan (one per group)
- Rubber gloves (one pair per group)
- Ice
- Vegetable shortening (blubber)
- Spoon (one per group)
- Water (12-16 oz)

Time Needed:

- 45 minutes

Part One: Introduction and Background

Begin the discussion by explaining what a mammal is, show pictures of mammals that live in the arctic vs. tropics. Mention that both animals need insulation in order to stay warm. For example you may explain that polar bears, seals and whales all have strategies to stay warm. However, blubber is the primary insulating strategy for whales. As you show the pictures, ask your students: Are you a mammal, too? Some of them may be surprised!

During this time, you can let your students know that this activity is messy, fun and exciting. A true "hands-on" experience!

Part Two: Keywords

Blubber helps insulate the blood vessels against the cold water. The thickness of an animal's blubber depends on the environment. These words will help your students learn more precisely what blubber is and how it helps trap body heat.

Blubber: A thick layer of vascular (i.e. containing blood vessels) fat found under the skin of all marine mammals. It covers the whole body, except for the appendages; it is loosely attached to the musculature of the animal. Blubber can make up to 50% of the mass of some marine mammals! Blubber is different from other adipose (body fat) tissue in that it serves as an efficient thermal insulator. This makes it valuable for thermoregulation. (Imagine how having blubber is almost like having a thick coat to wear.)

Warm-blooded (endothermic): Warm-blooded animals maintain thermal homeostasis, a system that requires they keep their body temperature at a constant level. This system allows the body the ability to cool down or produce more body heat. The primary way that warm-blooded animals control their body temperature is by regulating their metabolic rate.

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Cold-blooded (ectotherms): Cold-blooded animals maintain their body temperature much differently than mammals and birds. It used to be the thought that these animals were “slaves” to their environment (meaning the outside temperature and their body temperature were always the same). Now, these animals are called ectotherms. This is because now body temperature types are not as clearly defined. Most creatures are in line with a graded spectrum from cold-blooded to warm-blooded.

Thermoregulation: Thermoregulation is the ability of an organism to keep its body temperature within certain boundaries, even if the surrounding temperatures are very different.

Thermal insulation: Thermal insulation refers to the materials or processes that are used to reduce the rate of heat transfer

Stella's Fun Fact:

Stella and other right whales can have blubber up to 1.5 feet thick that can be 40% of their body weight! As we have learned- blubber is the insulation for whales. This is especially important because heat loss in water is greater than 25 times that in air!



Part Three-Experiment

1. Divide your students into groups of 2-4 students.
2. Have your students fill their baking pan with about 2-4 inches of cold water.
3. Add ice to each baking pan.
4. Have one student in each group put on a rubber glove.
5. One of the other students in the group needs to cover the gloved hand with shortening. (This is fun and messy!)
6. The gloved student will now dip each hand in the ice water bath — the bare hand and the shortening-covered hand.
7. Each student in the group should have an opportunity to experience the feeling of the “blubber-covered” hand; this glove can be shared among the group.
8. Next, have your students discuss the differences. Was there a big difference?

Part Four: Review

After each group has finished the experiment part and cleaned up, gather your class together. Then ask your students the following questions. This will allow you to know if they grasped this amazing concept of blubber.

1. What is blubber?
2. What is thermoregulation? Discuss the different methods animals use when they need to thermoregulate.
3. Compare warm blooded to cold blooded (ectotherms), what are the differences?
4. Ask your students to brainstorm different ways that all animals can stay warm in their environment. Examples: sunning, blubber, fur, etc.
5. Does Stella have blubber?