HOW DO WHLAES STAY WARM?

SOCIETY FOR
EXPERIMENTAL
BIOLOGY

BELUGA WHALES

Beluga whales are marine mammals that live in the Arctic Ocean. They can grow up to 6 meters long, which is not very big compared to other whales. In fact, they are the smallest of all the whale species. Although their habitat provides them with lots of food such as salmon, cod, octopus, and squid, but it is also incredibly cold. The water can reach 0°C!

Belugas live in these freezing waters all year round. Most other mammals would eventually get too cold and die of hypothermia, but Belugas can maintain a constant warm body temperature. How do they do this? To help them keep warm, Beluga whales have a thick layer of fat and connective tissue under their skin called blubber. This accounts for more than 40% of the Beluga whales' weight and is an excellent source of insulation. It also stores energy for when there isn't much food about.

DESIGN YOUR OWN EXPERIMNT

A layer of fat or blubber helps the beluga whales keep warm. Think about what experiment you would design to see if fat is good at insulating against ice-cold water.

To help you design your experiment think about the following points:

- What is your Research Question? what do you want to find out?
- In your experiment what is the one thing will you change, and what will you keep the same?
- What data will you collect and how will you record it?
- What is your hypothesis? How will you know if the data supports your hypothesis or opposes it?

AN IDEA FOR AN EXPERIMENT

If you couldn't think of an experiment, or you didn't have all the equipment you needed, here is an idea for an experiment you could try instead. Make sure you have asked permission and have an adult on hand to help!

YOU WILL NEED:

- A large sandwich bag or freezer bag
- A bucket or sink A block of lard or solid cooking fat
- Ice
- Water

WHAT TO DO:

1. Place the lard or solid cooking fat in a large plastic sandwich bag
2. Fill a sink or bucket with ice and water.
3. Place your bare left hand in the cold water
4. Use a timer to see how long you can keep your hand in there
5. Now wrap your right hand in the sandwich bag containing the lard or solid cooking fat
6. Place your right hand in the cold water
7. Use a timer to see how long you can keep your hand in there
8. Draw a table like the one below and fill in your data as you go along
9. See if the other people in your household will take part. Do you think you will all have the same results or different ones?

EXAMPLE OF A TABLE TO RECORD YOUR DATA IN:

	Name 1	**Name 2**	**Name 3**	**Name 4**
Left hand	*(length of time they kept their left hand in the water)*			
Right hand	*(length of time they kept their right hand in the water)*			

HOW DOES BLUBBER HELPS TO KEEP THE BELUGA WHALES WARM?

Just like the cooking fat in your experiment, blubber is a thick layer of fat or "adipose tissue". Adipose tissue has a low thermal conductivity, which means that it does not transfer heat very well. This means that the cold water of the arctic ocean doesn't freeze the warm organs and muscles underneath the blubber layer. In this was the blubber helps to insulate an animal's body.

To understand thermal conductivity, think about a metal cup with hot water inside. It would be too hot to touch the outside of the cup because metal has a high thermal conductivity. Now think about a Styrofoam cup with hot water

inside. You would be able to touch the outside because Styrofoam has a low thermal conductivity. Understanding how blubber keeps whales warm has helped humans develop insulating materials for our own daily use. For example, insulated cups for hot drinks, or insultation to keep our houses warm in the winter.

QUESTIONS TO THINK ABOUT

Before you start the experiment, think about what your hypothesis is?
After the experiment take a look at your data, does the data support your hypothesis or oppose your hypothesis?
Why do you think you got this result?

FURTHER RESEARCH

As well as designing and running their own experiments, scientists must learn what other scientists have already found out. This means reading books and scientific articles on the subject, speaking to other experts in the field, and going to conferences hear other scientists talk about their work. It's important to know everything you can about the topic you are researching. This helps us to know which questions still need to be answered or a problem that needs to be fixed. It also makes it easier to understand the results from your own experiments.

If you have an adult to help you, try going on the internet or to your local library to answer the following questions:

What else can you find out about Beluga whales? Name three other facts you learnt:
1) 2) 3)
Are there any other animals that have blubber? How does it help them to live in their habitats?
The blubber helps keep the Beluga whales warm, does it have any other purposes?