

NARWHAL

REVEALING AN ARCTIC LEGEND

Activity for Students and Families

Exploring Narwhal Adaptations

Lesson 1: Tusk

Lesson 2: Lungs

Lesson 3: Fins

Created and field tested by: Smithsonian's National Museum of Natural History

Purpose: Assist with participants' understanding of narwhal survival in one of the harshest environments on Earth. Participants will touch, inquire, hypothesize, and make conclusions about narwhal anatomy and how these physical adaptations help narwhals survive the Arctic. These activities can easily be set up on a cart or table in the exhibition.

Target Ages: Can be used for multigenerational families, student groups, or the generally curious.

Content Standards: *NGSS*

2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.

3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

Lesson 1: Tusk

Purpose: Participants will examine the narwhal tusk models on display in the exhibition. They will wonder whether the tusk is flexible or stiff and what adaptive advantage a flexible tusk might have.

Goals: In this activity, participants will:

- Understand a narwhal has a flexible tusk
- Identify reasons why having a flexible tusk could be an advantage

Materials: Models can be made in advance, or as part of a longer workshop.

- Stiff model



- Flexible model

Script:

Ask participants to wonder:

- Do you think a narwhal tusk is stiff or flexible?
- Why do you think that?

Let participants handle the two models and discuss:

- What are the advantages and disadvantages of each for a narwhal swimming in the ocean? What happens if a narwhal hits a large piece of ice?

Once they have given their response, explain:

- A nine-foot narwhal tusk can bend up to 12 degrees! (Show with your hands.) Narwhals swim very deep and in icy locations. If the tusk were stiff, hitting rocks, sea bottom, or ice would break the tusk. Having flexibility allows the tusk to be protected from breaking or other damage.

Instructions for building stiff and flexible tusk models:

The models can be made from everyday materials. The goal is to have one model that is stiff and the other that is flexible. Examples for solid materials include a wooden dowel or plastic rod. Examples of flexible materials include pieces of rubber or PVC pipe. Round materials are best because they look more “tusk like.” The materials can be encased in clay or other sculptable material to make them seem more like tusks.



Lesson 2: Lungs

Background: One of the narwhal's main predators is the orca, an incredibly fast-moving whale. Narwhals are not known for their speed. By allowing visitors to see how long a narwhal can hold its breath, this activity can help explain why narwhals are able to escape orcas.

Purpose: Participants can do this activity on their own if a large timer is mounted somewhere in the exhibit, or a facilitator can time them.

Goals: In this activity, participants will:

- Examine one of the ways narwhals escape predators
- Understand that narwhals can hold their breath for long periods of time

Materials:

- 20-minute timer

Script:

Ask participants to wonder:

- Narwhals are mammals and so they need to breathe air.
- How long do you think a narwhal can hold its breath underwater?
- Why would a narwhal need to hold its breath for a long time?

Have participants consider:

- Can you hold your breath as long as a narwhal?
- Have a participant begin the timer and try to hold their breath as long as they can.

After the participant has failed to beat the timer, explain:

- Narwhals are not very fast swimmers. In fact, they are pretty slow especially compared to their biggest predator, orcas. Narwhals have adapted a way to outmaneuver their fast-moving enemy by being able to hold their breath for up to 20 minutes and dive deeper into the water than orcas can. This ability also helps narwhals hunt prey in deep waters.

Lesson 3: Fins

Purpose: Narwhals are specially adapted to live under the ice. Animals like orcas do not have this ability. Participants can compare the shape of narwhal and orca fins to better understand how the narwhal's fins are advantageous for swimming under the ice.

Goals: In this activity, participants will:

- Compare the fins of a narwhal to the fins of an orca
- Identify the similarities and differences
- Consider how the fin shape is advantageous to narwhals

Materials:

- Narwhal model in the exhibition
- Purchased orca model or photograph

Sources:

- <https://www.turbosquid.com/3d-model/killer-whale>
- <https://www.leaveonlybubbles.com/product/orca-adult-model/>

Script:

Guide participants to compare the similarities and differences between a narwhal and orca.

- What do you notice is different between a narwhal and orca? (The first response is usually the tusk, but keep pushing for more observations by asking things like "And what else do you notice?")
- Do you notice anything different between the fins? What are they?

Ask participants to wonder why the narwhal does not have a dorsal fin on the top of its body.

- Why could that be an advantage?

Once participants have shared their ideas, explain:

- The large dorsal fin prevents orcas from maneuvering under the ice. Narwhals can easily slip under the ice and escape hungry orcas.