

Penguins are birds, but they look very different from the birds we see in our neighborhoods. Let's get our hands dirty (or oily) and investigate some of penguins' unique traits! You will conduct four mini-experiments to learn about different penguin adaptations and record your findings. If you cannot find all the materials needed for each experiment, it is okay to skip an experiment, but we encourage you to do as many as you can.

At the end of each of the explorations in this activity sheet there are data sheets so you can record your predictions and results (pages 5, 8, 11, and 15). Print and fill out the data sheets as they are, or cut and glue them into your science journal or copy their contents directly into your science journal. If you have not created a science journal but would like to, instructions can be found at sheddaquarium.org/stayhome.

These activities are designed for families with children in grades 3-5. Educators can see an overview of all activities and classroom recommendations at sheddaquarium.org/files/penguin-teachers-guide.



Adaptation Explorations



PENGUIN FOOT EXPLORATION PART 1/3

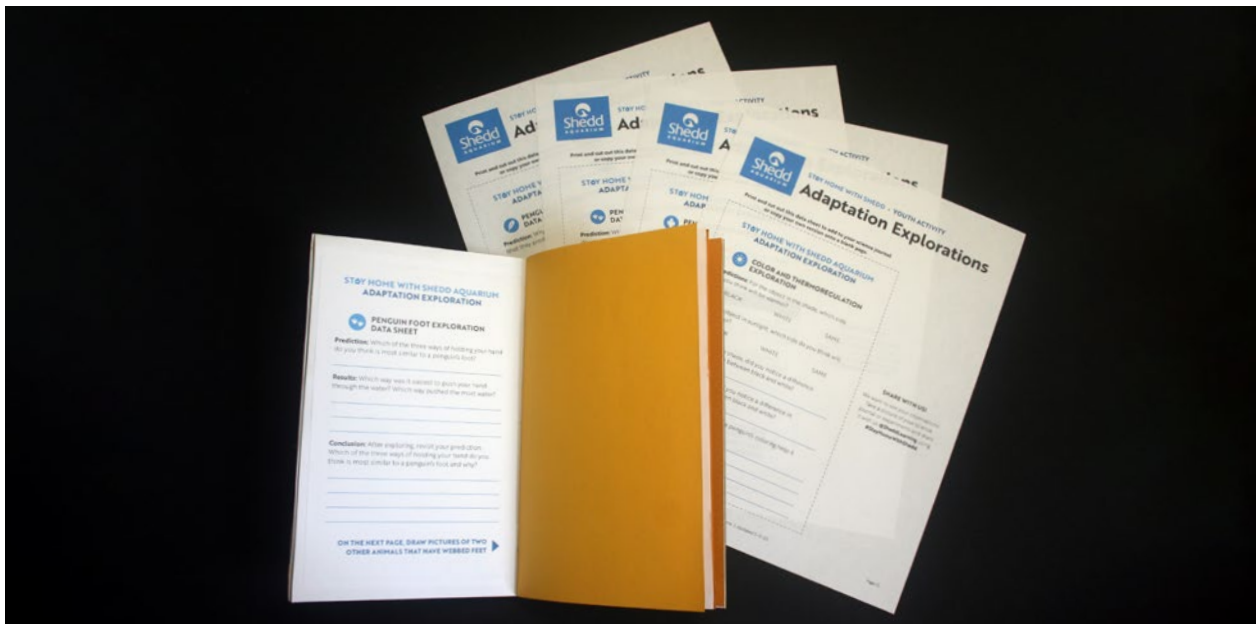
During this investigation, we will explore one feature that helps penguins navigate through the water to hunt for food and avoid predators—their feet!

MATERIALS

- A bucket, a large container, or a sink or bathtub with a plug
- Water
- A small plastic bag or plastic wrap
- Writing and coloring devices: pencil, pen, markers, crayons, or colored pencils



Step 1 • Science journal: Gather your materials. Set up the materials somewhere easily cleaned if water spills or splashes! Print out the science journal materials on page 5 and glue them into your science journal, or copy them down by hand as we go along.



Adaptation Explorations

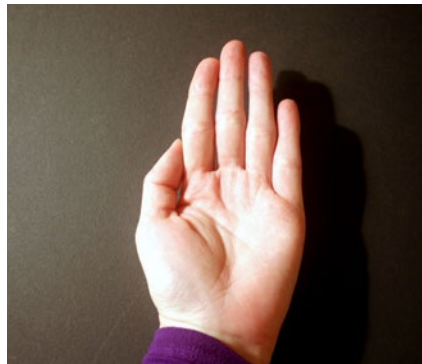


PENGUIN FOOT EXPLORATION PART 2/3

Step 2: Fill up the bucket (or sink/bath) with water high enough so that you can submerge your whole hand vertically. During this experiment, you will move your hand through the water three times in three different ways: with your fingers spread apart, with your fingers pressed together, and with your hand covered in plastic with your fingers spread apart. Hold your hand up and practice these three positions.



Fingers spread apart



Fingers pressed together



Hand covered in plastic with fingers spread apart

Step 3 • Science Journal: Before we dive into the water like a penguin, make a prediction: *Which of the three ways of holding your hand do you think is most similar to a penguin’s foot?* Record this prediction in your science journal or [on the data sheet on page 5!](#)

Step 4: Now, push your hand through the water a few times in each of the three ways listed in step 2—try it enough times that you can really tell how each way felt.

Step 5 • Science journal: After you have dried your hands, let’s go back to your science journal or data sheet.

- Which way was it easiest to push your hand through the water?
- Which way moved the most water?
- Revisit your prediction: *Which of the three ways of holding your hand do you think is most similar to a penguin’s foot? Why?*



STAY HOME WITH SHEDD • PENGUIN ACTIVITY

Adaptation Explorations



PENGUIN FOOT EXPLORATION PART 3/3

Last Step • Science journal: On the data sheet or in your science journal, *draw two other animals that have webbed feet.*



SHARE WITH US!

We want to see your exploration! Take a picture of your experiments or drawings and share it with us [@SheddLearning](#) using [#StayHomeWithShedd](#).



Adaptation Explorations

Print and cut out this data sheet to add to your science journal or copy your own version onto a blank page.

STAY HOME WITH SHEDD AQUARIUM ADAPTATION EXPLORATION



PENGUIN FOOT EXPLORATION DATA SHEET

Prediction: Which of the three ways of holding your hand do you think is most similar to a penguin’s foot?

Results: Which way was it easiest to push your hand through the water? Which way pushed the most water?

Conclusion: After exploring, revisit your prediction. Which of the three ways of holding your hand do you think is most similar to a penguin’s foot and why?

ON THE NEXT PAGE, DRAW PICTURES OF TWO
OTHER ANIMALS THAT HAVE WEBBED FEET 

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Adaptation Explorations

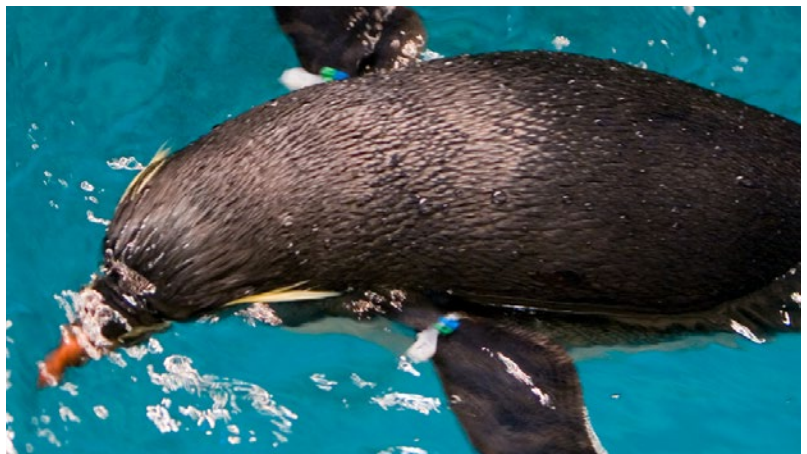


PENGUIN FEATHERS EXPLORATION PART 1/2

Ever wonder what penguins feathers feel like? Many people are surprised to find that they are very oily! Why do penguins have oily feathers? Let's investigate why this adaptation might help them survive in their environment.

MATERIALS

- **½ cup of any cooking oil**
(vegetable oil, olive oil, canola oil, vegetable shortening ,etc.)
- **A bowl or small bucket**



Step 1 • Science journal: Gather your materials near a working sink. Print out the science journal materials on page 8 and glue them into your science journal, or copy them down by hand as we go along.

Step 2 • Science journal: On the data sheet or in your science journal, predict:
Why do penguins rub oil (that they produce) all over their feathers?

Step 3: Stand over a sink or bathtub and measure ½ cup of cooking oil into a bowl.

Step 4: Dip one hand into the bowl of oil and notice how your hand feels coated in oil.





STAY HOME WITH SHEDD • PENGUIN ACTIVITY

Adaptation Explorations



PENGUIN FEATHERS EXPLORATION PART 2/2

Step 5: Wash your oily hand off with water under the faucet, without using soap. Keep washing until you get all the oil off. Then dry your hands.

Step 6 • Science journal: On the data sheet or in your science journal answer the following: *What was it was like to wash the oil off your hands? How might oily feathers help penguins?*



Last Step • Science journal: Look at the picture of the penguin above. Penguins have a special oil gland at the base of their tail that produces oil that they use to coat their feathers. *How do you think they get oil over every feather?* Record your ideas on the data sheet or in your science journal.

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Adaptation Explorations

Print and cut out this data sheet to add to your science journal or copy your own version onto a blank page.

STAY HOME WITH SHEDD AQUARIUM ADAPTATION EXPLORATION



PENGUIN FEATHERS EXPLORATION DATA SHEET

Prediction: Why do you think that penguins rub oil (that they produce) all over their feathers?

Results: Describe what it was like to wash the oil off of your hands.

Conclusion: How do oily feathers help penguins?

How do you think penguins coat their feathers with the oil produced from the gland at the base of their tail?

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Adaptation Explorations



PENGUIN BEAK EXPLORATION PART 1/2

During this investigation, we will explore how birds' beaks help them acquire and eat different kinds of foods!

MATERIALS

- **Large tongs**
to represent a penguin's beak
- **Tweezers, a clothespin or needlenose pliers**
to represent a cardinal's or robin's beak
- **A handful of one of the following:**
rice, sunflower seeds, oats, or sprinkles to represent small foods like seeds or insects
- **Several of one the following:**
pickle spears, baby carrots, green beans, pretzel sticks to represent larger, slippery foods like fish
- **A timer that can count seconds**



Step 1 • Science journal: On a flat surface like the floor or a table, gather your materials: tongs, tweezers, a handful of rice and a several pickle spears (or any of the alternative materials listed above). Print out the science journal materials on page 11 and glue them into your science journal, or copy them down by hand as we go along.



Adaptation Explorations



PENGUIN BEAK EXPLORATION PART 2/2

Step 2 • Science journal: On the data sheet, or in your science journal, predict: *Why do you think penguins have larger beaks than a bird like a cardinal or robin?*

Step 3 • Grab a friend or family member: Hold the larger “beak” (tongs) in one hand and set the “seed” food in front of you. Grab a family member or friend and give them the the smaller “beak” (tweezers) and the “fish” food. Both of you should keep your other hand behind your back. Compete! Using your “beak”, gather seeds into a pile in front of you, trying to gather as much food as possible in 15 seconds. After 15 seconds, count how many individual pieces of food each of you has in front of you and record it on your data sheet or in your science journal..



Step 4 • Switch and repeat: Switch tools with your partner and repeat step 3.

Step 5 • Science journal: On the data sheet or in your science journal answer the following. *Which item was easier to pick up with which tool? Did the tool you used have an effect on how much food you gathered?*

Last Step • Science journal: Show your learning. *Draw a picture of a penguin using its beak to catch fish in the ocean and draw a picture of a cardinal using its beak to eat a sunflower seed.*



Adaptation Explorations

Print and cut out this data sheet to add to your science journal or copy your own version onto a blank page.

STAY HOME WITH SHEDD AQUARIUM ADAPTATION EXPLORATION



PENGUIN BEAK EXPLORATION DATA SHEET

Prediction: Why do you think penguins have larger beaks than a bird like a cardinal or robin?

Contest Results	BIG BEAK	SMALL BEAK
Round 1	_____ seeds	_____ fish
Round 2	_____ fish	_____ seeds

Results: Which item was easier to pick up with which tool? Did the tool you used have an effect on how much food you gathered?

ON THE NEXT PAGE, DRAW A PENGUIN USING ITS BEAK TO CATCH FISH IN THE OCEAN AND DRAW A CARDINAL USING ITS BEAK TO EAT A SUNFLOWER SEED.



SHARE WITH US!

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Adaptation Explorations



COLOR AND THERMOREGULATION EXPLORATION PART 1/3

This exploration will help us understand the way that light interacts with different colors, and how animals can use color for thermoregulation. Thermoregulation is a big word, so let's break it down so that we can better understand what it means. *Thermo*-simply means heat, while *regulation* is the act of controlling or setting. Putting those two words together we can see that thermoregulation means controlling heat or controlling temperature.

MATERIALS

- **Black marker or paint**
(Sharpie preferred)
- **Two popsicle sticks OR two strips of white paper**
- **Thermometer** (optional)
- **Sunlight**
- **A timer**



Step 1 • Science journal: Gather your materials. Print out the science journal material on page 15 and glue them into your science journal, or copy them down by hand as we go along.

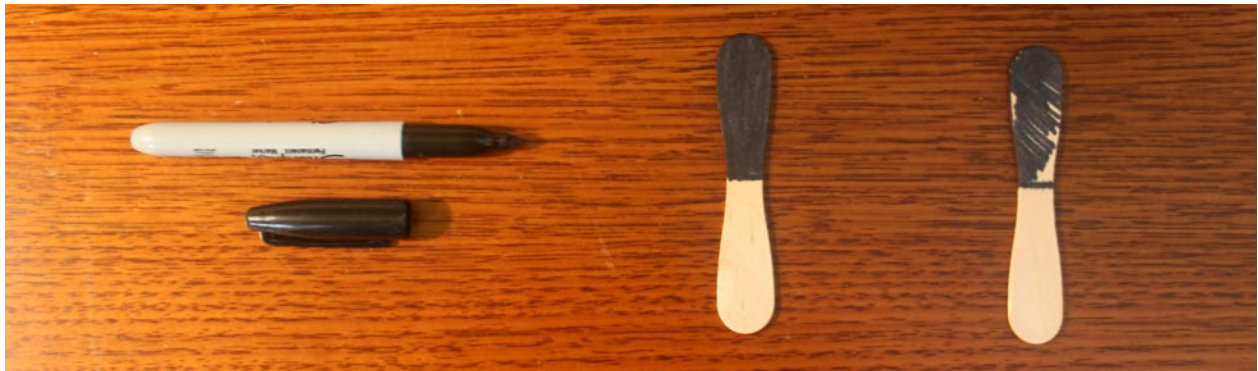


Adaptation Explorations



COLOR AND THERMOREGULATION EXPLORATION PART 2/3

Step 2: With your black marker, color one half of two popsicle sticks black (or one half of two strips of paper).



Step 3: Place one popsicle stick or piece of paper in direct sunlight and place the other somewhere out of the sun. Set a timer for ten minutes and proceed to step 4.



Step 4 • Science journal: While you are waiting, make some predictions and record them on your data sheet or in your science journal!

- *For the object in the shade, which side do you think will be warmer?
The black side, the white side, or will they both feel the same?*
- *For the object in sunlight, which side do you think will be warmer?*



STAY HOME WITH SHEDD • PENGUIN ACTIVITY

Adaptation Explorations



COLOR AND THERMOREGULATION EXPLORATION PART 3/3

Step 5 • Science journal: After ten minutes, check on your objects and record your observations. You can use your hand to gather data or record the temperature of each side using a thermometer. Record the results on your data sheet or in your science journal.

- *In the shade, did you notice a difference in temperature between black and white?*
- *In the sunlight, did you notice a difference in temperature between black and white?*



Last Step • Science journal: Using your observations, consider: *How does a penguin's coloring help it thermoregulate?* In your science journal or on a piece of paper, write down your thoughts and any questions you can research later.

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Adaptation Explorations

Print and cut out this data sheet to add to your science journal or copy your own version onto a blank page.

STAY HOME WITH SHEDD AQUARIUM ADAPTATION EXPLORATION



COLOR AND THERMOREGULATION EXPLORATION

Predictions: For the object in the shade, which side do you think will be warmer?

BLACK WHITE SAME

For the object in sunlight, which side do you think will be warmer?

BLACK WHITE SAME

Results: In the shade, did you notice a difference in temperature between black and white?

In the sunlight, did you notice a difference in temperature between black and white?

Conclusion: How does a penguin's coloring help it thermoregulate?

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