



Teacher Guide

UNIT 2 LESSON 1: FEATHERS

Theme

Feathers are what set birds apart from other animals and are essential for their survival.

Missouri Science Standards: LS4.B.1

Vocabulary



Feather - Growth from the skin of a bird composed of keratins that is both lightweight and durable. Can be very diverse in structure, but all types contain the same basic parts. A feature that is unique to birds and their dinosaur ancestors; the single external feature that distinguishes birds from other vertebrates.

Vane - The flattened, weblike part of a feather, consisting of a series of barbs on either side of the shaft. The part of the feather that unzips and rezip. The vanes give the feather its overall shape.

Flight Feathers - Wing feathers and tail feathers. These are the flying surfaces that make flight possible. Wing feathers, also called remiges, have a branched structure that interlocks like Velcro to create a uniform windproof surface that allows lift in flight. The main wing feathers are typically asymmetrical with a shorter leading edge for improved aerodynamics. Most tail feathers, or rectrices, feature a branched structure that interlocks like Velcro to create a uniform surface helping birds to steer in flight.

Contour Feathers - Are lightweight and strong; they cover the bird's body to create its streamlined shape. The vane is structured to help keep the bird dry. At the base of the feather is a downy section that traps heat.

Semiplume - These feathers are hidden beneath other feathers on the bird's body and have a loose structure that helps the bird stay warm.

Down Feathers - Small, soft, fluffy feathers under the contour feathers. The loosely branching structure and short or absent rachis of down feathers, allows birds to trap body heat and stay warm.

Plumage - Refers both to the layer of feathers that cover a bird and the pattern, color, and arrangement of those feathers.

Molting - Shedding of the outer layer of old feathers and formation of new feathers to replace them on a regular cycle.

Preening - Bird behavior for maintaining health and structure of the feathers through extensive grooming with the beak to position feathers, interlock barbules, and clean plumage.

Camouflage - Protective coloration to blend in with surroundings.

Common Misconceptions to Watch Out For:



- **Feathers are delicate.** Feathers are strong, flexible, and replaceable.,
- **Only male birds have bright, colorful feathers.** In some species of birds, the females are more colorful and ornamented, especially in tropical species, larger species, and those who are cooperative breeders.

Video 1: What makes a bird, a bird? Webinar

Video Description: There is nothing else in the world quite like feathers in their structure and functions. In this webinar we cover the seven broad types of feathers and the function of each to serve as an introduction to feathers. Made by the Missouri River Bird Observatory.

Video Link: <https://www.youtube.com/watch?v=1jrQTsw2jYM>

Teacher Notes:

- There is a resource announced at the end to go to the resource below and watch videos under section 4: "Meet a Feather Scientist". Students will cover this part of the resource in lesson 4: Bird Language.

Follow- up Questions:

1. True or False? Contour feathers cover the bird's body like shingles and streamline its shape.
2. Fill in the Blank. Filoplume feathers act like a mammal's _____ to sense the position of the contour feathers.
3. True or False? Down feathers are stiff and mostly flat with many hooks on the barbules that interlock to form a barrier.

Online Interactive Tutorial: All About Feathers

Description: The Cornell Lab of Ornithology has developed this interactive online tutorial to teach learners all about feathers by going through how feathers are unique to birds, five of the seven feather types, and their structure, the functions of each feather type, and how feathers evolved.

Video Link: <https://academy.allaboutbirds.org/features/all-about-feathers/#what-is-unique-to-birds.php>

Teacher Notes:

- *There are six sections to this tutorial, but for this lesson students will only complete sections 1-4. They will stop when they get to section 5 "Meet a Feather Scientist". This section will be covered in Lesson 4: Bird Language.*

Activity: Comparing Feathers

Activity Summary: In this activity, students will examine pictures and read about feather anatomy and structure. Then they will choose two feather types (wing, tail, contour, semiplume, or down), draw them, and answer questions about them.

Teacher Notes:

- *Students can examine photos and learn about the feather types at*
 - <https://academy.allaboutbirds.org/features/all-about-feathers/#what-is-unique-to-birds.php>
 - <https://academy.allaboutbirds.org/features/all-about-feathers/#how-feathers-are-built.php>
- *Follow-up questions (for each feather):*
 - *Where is this type of feather on the bird's body?*
 - *What is the function of this feather?*

Video 2: Animal Coloration

Video Description: From brightly colored feathers that make a bird stand out, to mottled camouflage to help an animal hide, different colors serve different purposes throughout the animal kingdom. This video was made by Texas Parks and Wildlife.

Video Link: https://www.youtube.com/watch?v=KE_ZcKn-AXk

Teacher Notes:

- Students can learn more about why birds are colorful at: <https://celebrateurbanbirds.org/faq/why-are-birds-colorful/>
- and how birds make their colorful feathers at: <https://academy.allaboutbirds.org/how-birds-make-colorful-feathers>

Follow- up Questions:

1. Protective coloration to blend in with your surroundings is also known as _____.
2. True or False? Two of the reasons birds have colorful feathers are to attract mates and for courtship displays.
3. True or False? Coloration helps birds to identify other birds of their species.

Bonus Video: The Facts About Dinosaurs & Feathers

Video Description: Over the past 20 years, dinosaurs of all types and sizes have been found with some sort of fluff or even full-on plumage. These fuzzy discoveries have raised a whole batch of new questions so we're here to tell you everything we know about dinosaurs and feathers. Produced for PBS Digital Studios.

Video Link: https://www.youtube.com/watch?v=aOeFRg_1_Yg

Concluding Questions/Assessment

*Student worksheet included in packet.

1. What feather type is most interesting to you? Describe its structure and function.
2. Describe four ways that feathers help a bird survive in its environment.
3. Describe one specific example of how a bird's feather coloration can help it survive and reproduce?
4. What surprised you the most about feathers that you didn't know before? Be specific.

