



# What makes a bird a bird?

## Overview

Students will compare types of feathers by examining structure and function of each.

## California Science Standards

Grade 5: 6.g.-I&E

Grade 6: 7.b.-I&E

Grade 7: 7.a.-I&E

## Oregon Science Standards

Grade 3: 01,02-L.S.

Grade 5: 01,02-L.S.

Grade 8: 01,02-L.S.

## National Standards

Content Standard A:

Science Inquiry

Content Standard C:

Life Sciences

## Materials Included

\* Student Journal

\* Feathers

\* Hand lenses

## Materials Needed

\* Pencils

\* Colored pencils

## Activity Time

Preparation: 15 min.

Activity Time: 40 min.

## Best Season

All Seasons

## Vocabulary

\* Contour

\* Down

\* Barb

\* Barbule

\* Plumage

**Grade Level:** 3rd-8th (O.S.S.: 3rd-8th) (C.S.S.: 5th-7th)

## Learner Objectives

Student will:

- List characteristics of birds
- Compare and contrast contour and down feathers
- Draw and label a bird's contour and down feathers
- Discuss function of feathers

## Background Information

Birds are unique in the animal kingdom for many reasons, such as unique bone fusion, but one feature truly sets them apart: feathers! No other animals besides birds have feathers. They are similar to mammals, reptiles, fish, and amphibians in that they are vertebrates. They are warm blooded and have a four chambered heart that regulates their core body temperature just like mammals. However, feathers distinguish birds from the rest!

Feathers perform a variety of functions for a bird including insulation, protection, mate attraction, and flight management. In both warm and cold conditions, feathers help regulate the body temperature of a bird. For example, in warm climates feathers retract and provide a cooling mechanism for birds. In cold climates, birds will fluff out their feathers, trapping air and thus, retaining the heat supplied by the body. The color patterns of feathers, called "plumage," serve as camouflage, helping birds hide from predators, or as display mechanisms, helping birds attract mates.

In the late 1700s there was a great demand for feathers as a result of a fashion trend established by Marie Antoinette. Feathers were displayed in women's hats and hair styles. The amount of feathers displayed indicated a woman's social and financial status. As a result, birds were killed and shipped to England and sold at the markets. This lifestyle devastated some bird populations such as the Eskimo Curlew and a local Oregon bird—the Snowy Egret. On May 25, 1900 The Lacey Act was passed prohibiting the shipment of game such as birds taken illegally across state boundaries. However, this act was proven ineffective as the illegal plume trades continued largely because of the huge profits gained on the market. As a result, another act was issued called the Weeks-McLean Law, soon to be replaced by the Migratory Bird Treaty Act of 1918. The Migratory Bird Treaty Act proclaimed all migratory birds and their parts, including feathers, eggs, and nests, were fully protected.

# Lesson Plan

## Getting Ready!

1. Read background information & teacher tips.
2. Make copies of *Student Journal: What makes a bird a bird?*

## Discuss!

1. Ask students to think about what comes to mind when they hear the word “bird.”
2. List characteristics on the board. Make sure the following are included: flight, eggs, beaks, feet, crop, warm-blooded, gizzard, and feathers (see following page).
3. Ask students which of the characteristics listed are truly unique to birds. Discuss as you cross off from the list each characteristic that is not unique. The remaining feature should be feathers. No other animal on the planet has feathers!
4. Show feather pictures (in lesson plan) & discuss the basic structure of a feather.
5. Show students an example of contour and down feathers, define “plumage” and discuss functions of each (see right panel).

## Investigate!

1. Divide students into five groups.
2. Hand out feathers to each group and Student Journal sheets to each student.
3. Ask students to examine contour and down feathers closely with the hand lenses.
4. Allow students ample time to look at the feathers and draw them in their journal sheets.
5. After time has elapsed, ask students to share interesting observations with the group.

## Go Outside!

1. Take students on a field trip to observe the “plumage” of birds and to look for feathers (**Important:** It is illegal to take or possess a feather of a migratory bird [over 800 species are listed] due to the Migratory Bird Treaty Act of 1918).
2. Ask students to observe the different types of plumage and the function of plumage (e.g., birds camouflaged, displaying).
3. Have students fill out their Student Journal.

## Follow-Up!

1. Ask students 2-3 questions to re-cap lesson (see right panel).

### “Plumage”

Plumage is the coat of feathers on a bird. They can vary by age or season. Most flycatchers like the Willow Flycatcher have drab or plain- looking plumage. On the contrary, warblers like the Common Yellowthroat have brightly-colored plumage.



### Contour Feathers

Contour feathers are veined feathers of the body that are primarily used for flight and smooth body contouring.

### Down Feathers

Down feathers are very fluffy in appearance and are important for providing insulation from heat and cold.



### Suggested Questions

*What is the plumage?*

*What is the function of contour feather? Down feather?*

*Describe the function of the plumage of a local bird.*

# Teacher Tips

## Bird Characteristics

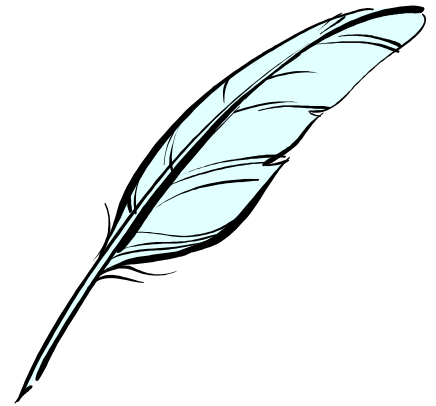
1. **Warm-blooded:** Birds, like mammals, are warm-blooded. This means their internal body processes control their body temperature regardless of external conditions. This allows birds to maintain high energy and metabolism which is a necessary component for flight. By comparison, reptiles and amphibians are cold-blooded, meaning they rely on external temperatures to regulate their body temperature.
2. **Eggs:** Like many other animals, including reptiles and amphibians, birds hatch from hard-shelled eggs.
3. **Beaks (or bills):** Birds use their beaks to get food, drink water, tear or break food into pieces, gather nesting material, preen, feed babies, and protect them from enemies.
4. **Feet:** Birds typically have four toes on each of 2 feet. An exception is the Three-toed Woodpecker. They use their feet to walk, stand, hop, perch, carry things, grab, kill their prey, swim, wade, and dig.
6. **Crop:** The crop stores food that will later be digested by the bird. It is located at the bottom of the bird's esophagus. It allows birds to eat really fast and then digest the food later. This can help decrease the exposure to predators while feeding. The crop is found in other animals such as insects, leeches, and earthworms.
7. **Gizzard:** The gizzard's main function is to grind and digest tough food. Birds will sometimes eat small rocks and grit to help the gizzard digest food. The grit grinds in the gizzard and smashes up the food. The gizzard is the second part of the bird's stomach. Earthworms, reptiles, fish, and other animals have gizzards as well.
8. **"Hollow" Bones:** Most major bones in a bird's body are virtually hollow and filled with air spaces connected to the respiratory system. They are considerably strong and lightweight. No other animals have hollow bones.
9. **Feathers:** Feathers are a unique feature only to birds. There are no other animals in the entire world that have them!

### Reading Application

This is a great lesson to read "Fine Feathered Friends" to Nestlings.

### What are feathers?

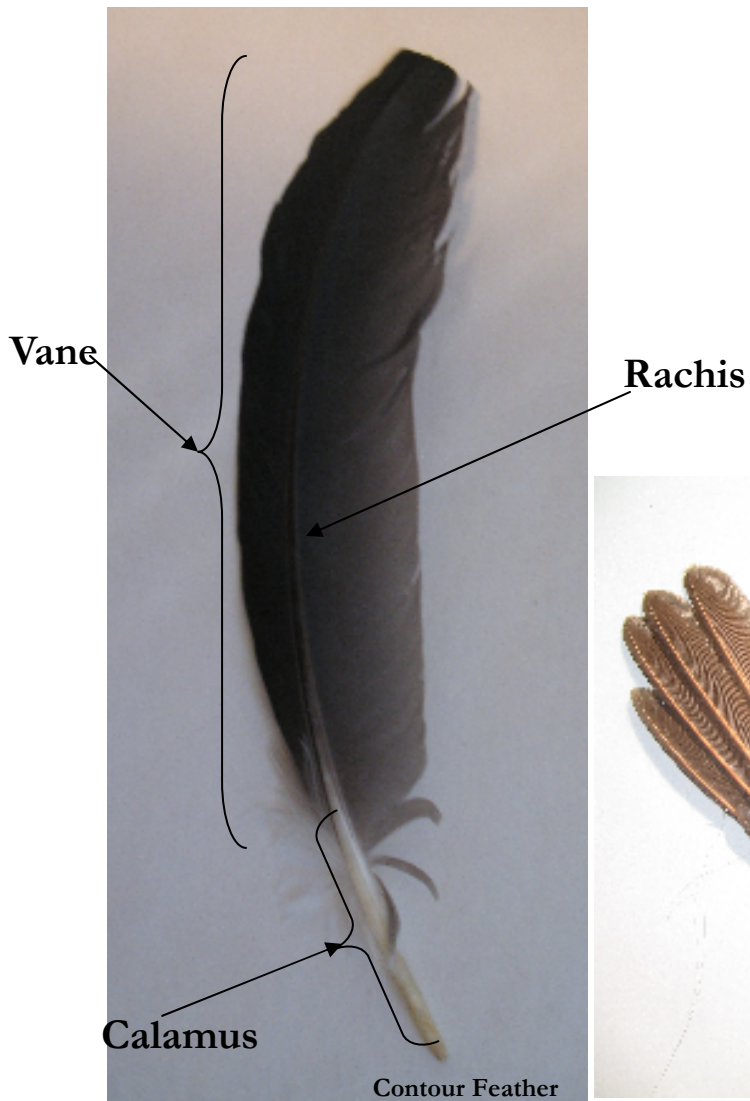
Feathers are one of the most complex structures found in all animals. They are formed from keratin, the same protein that makes up scales, beaks, and claws. Keratin proteins develop during the growth of cells in the epidermis or outermost skin layer. Once a feather is formed, it is inert and essentially a dead outgrowth of the skin. So it does not hurt a bird to molt (or shed) feathers.



### Extension

Have students research bird conservation in the early 1900's (related to feather use) and the Migratory Bird Treaty Act of 1918. Have them create a poster and share it with the class.

# Feather Structure



The basic structure of a feather consists of a central shaft and a vane (the part usually thought of as the feather). The part of the central shaft that the vane is attached to is called the rachis. The part below the vane is called the calamus. The vane of a feather is composed of tiny needle-like structures called barbs and barbules. Each barb is attached to each side of the rachis and points upward to form the contour of the feather. Off of each barb are smaller barbules with hooklets. These hooklets act like Velcro and hook onto neighboring barbs, which, in turn, hold the vane together. This is different for down feathers as they either lack a central rachis or have a very short rachis and the barbs often directly attach to the calamus of the feather.