



# Feather Biology

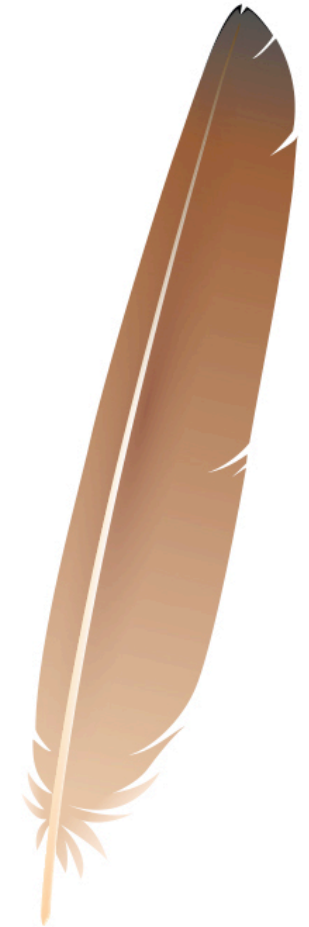


Written by Richard K. Simpson

For more information on feathers, visit:

<http://askbiologist.asu.edu/explore/feather-biology>

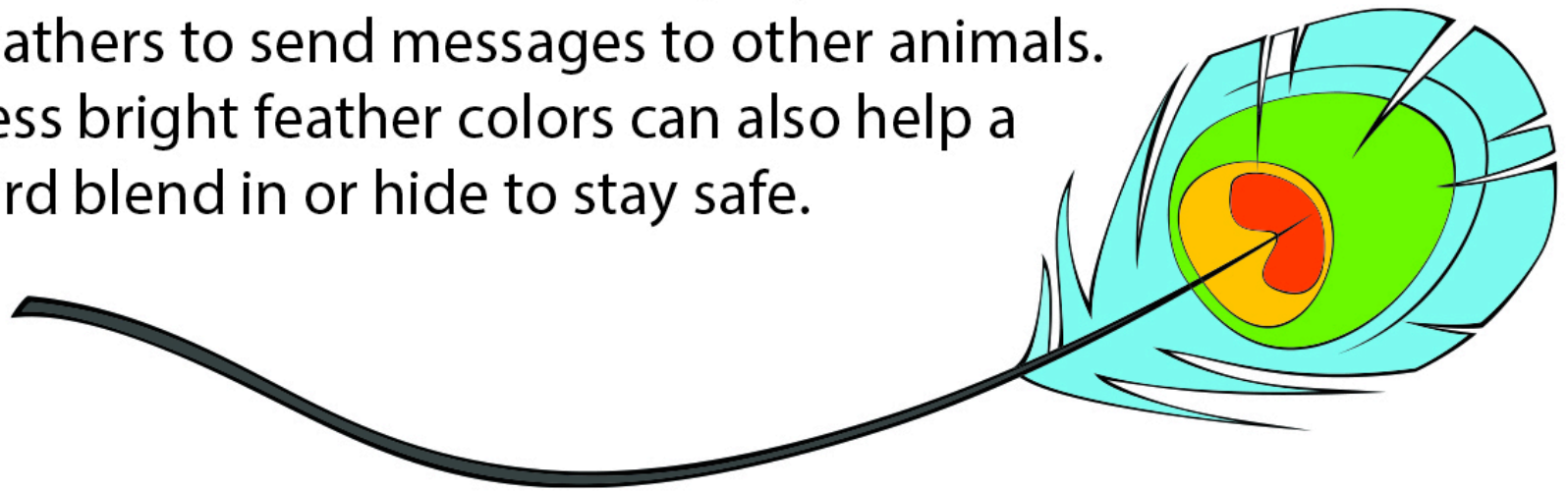
When you think about birds, you probably think about feathers. All birds have feathers. But not all birds fly. So what else do feathers do? Feathers help all birds stay at the right temperature. They help protect birds from water, wind, and too much sun. Birds that swim use their feathers to move and to keep their skin dry when they are underwater. Other birds, like ducks, use feathers to trap air, helping them to float.



An owl flaps by in silence. A hummingbird dips its beak into a flower and its head picks up pollen. What do feathers have to do with these actions? Feathers can be used to find or eat food. Feathers help keep owls silent so they don't scare off prey. Some birds even use feathers around their mouths to sort food. Feathers of birds that eat nectar also carry pollen from flower to flower. This helps the plants reproduce.

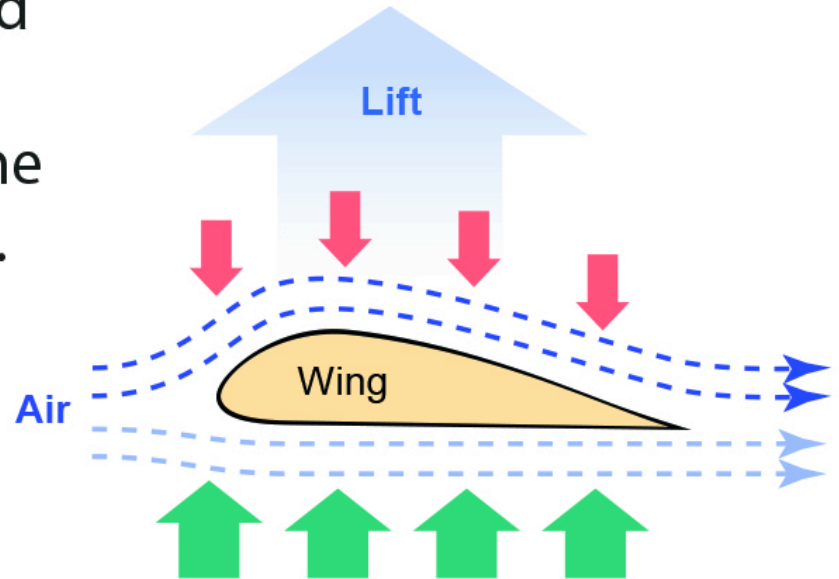


Feathers can help birds feel or hear what is going on around them. Some feathers can help birds change position during flight. Others can move sound into a bird's ears. Feathers can even be used to make noise. There are some birds that use their brightly colored feathers to send messages to other animals. Less bright feather colors can also help a bird blend in or hide to stay safe.

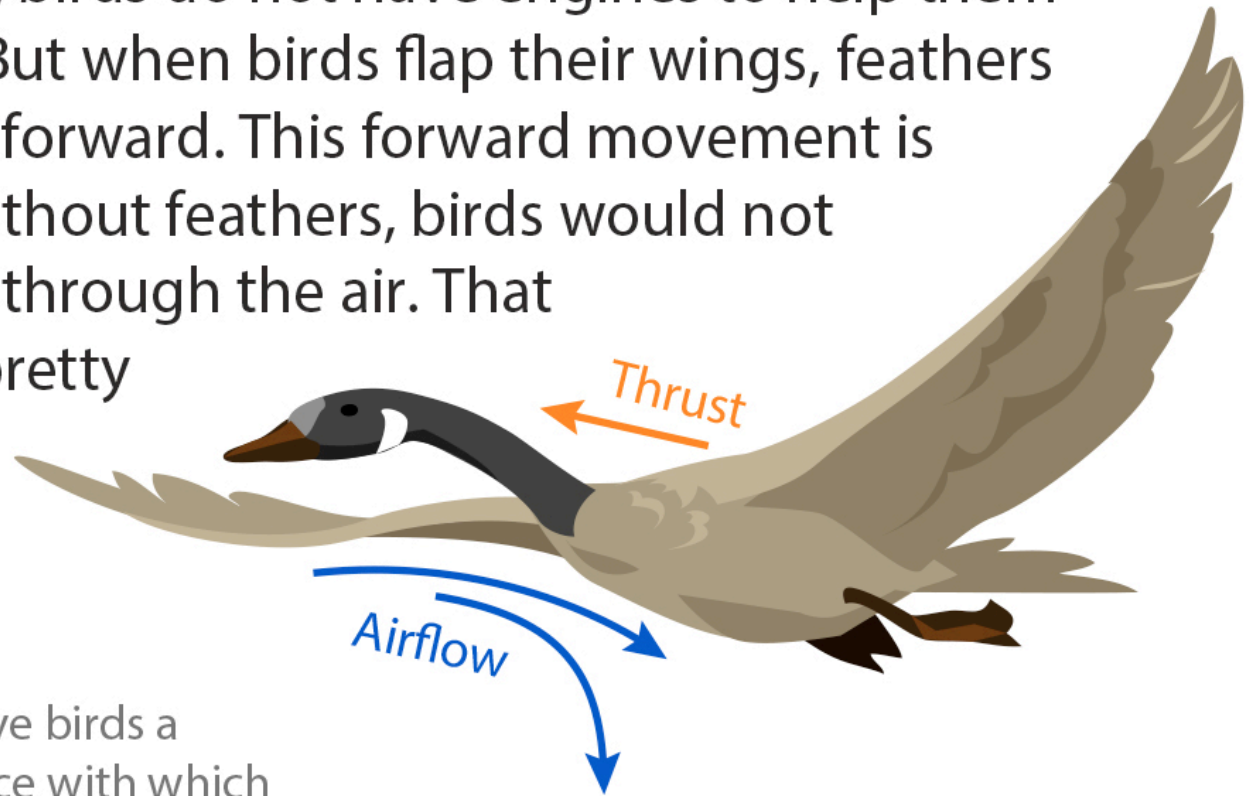




How do feathers help some birds fly? Feathers help birds move air with every flap, so they can lift themselves off the ground. While birds fly, bird feathers and wings act like airplane wings. As the bird moves forward, air moves faster over the wing and slower under the wing. This makes more pressure under the wing, and less pressure above. The difference in pressure creates lift and lets the bird stay in the air.



Unlike airplanes, birds do not have engines to help them move forward. But when birds flap their wings, feathers help push birds forward. This forward movement is called thrust. Without feathers, birds would not be able to push through the air. That would make it pretty hard to fly.



Feathers give birds a larger surface with which they can push air.

When you look at a bird, you might see many different feathers. But are they all the same type? There are actually many different types of feathers. Most birds use tail and wing feathers to fly. Ducks use feathers called semiplumes to float on water. Flying birds use filoplumes to help them change position in the air. Bristle

feathers keep small objects out of a bird's eyes or nose. Baby birds use downy feathers to keep warm. Downy feathers are also used in some pillows.



Semiplume



Filoplume

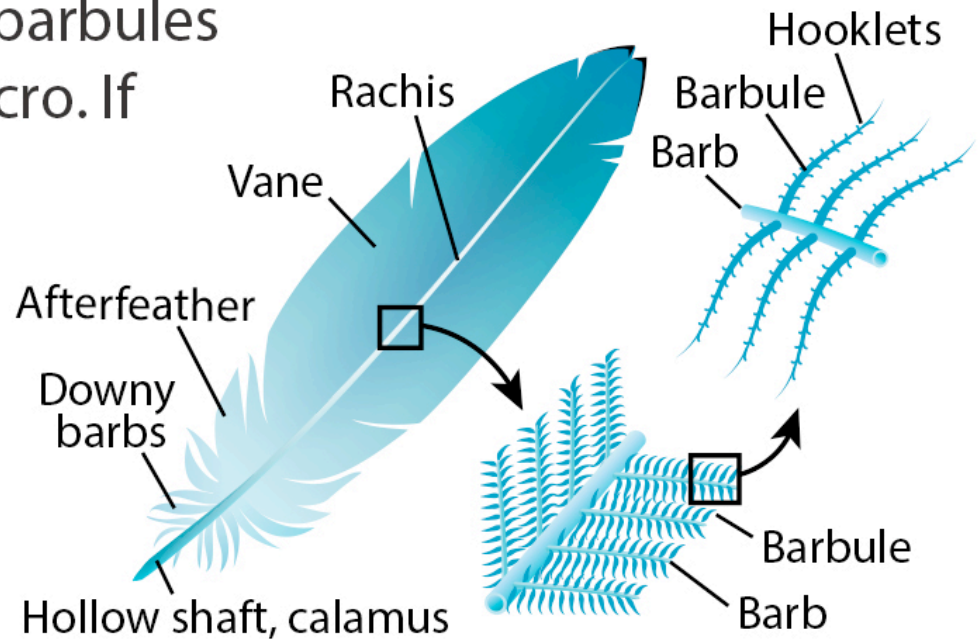


Bristle



Downy

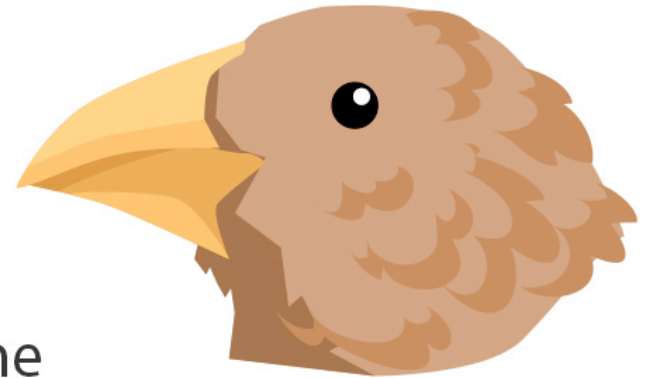
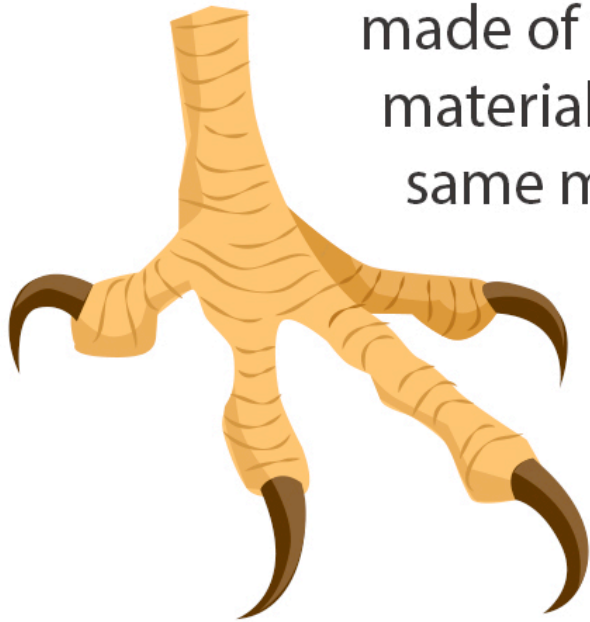
When you look more closely at a feather, you can see it has many parts. The central line is called the rachis. Connected to the rachis is the soft vane. The vane is made of barbs and smaller barbules. The barbules hook together just like Velcro. If you've played with a large feather before, this is why the vane often sticks together in one sheet. The feather connects to the bird's body at the tip, called the calamus.





To be able to fly, it is helpful to be light. Birds have hollow bones to help stay light. Bird beaks and claws are also light. Beaks and claws are made of the same material—keratin. This is the same material that is in our

fangernails. Bird feathers are also made of keratin. Keratin is a great, strong material even though it doesn't weigh much. It helps keep birds light so they can fly.



Parrots and hummingbirds don't seem to have much in common. But both birds are colorful. Parrot feathers are colored by molecules we call pigments. These also give rise to our hair color. Some color is a bit different, though. Many hummingbird feathers change color as you look at them from different angles. Such a color is called iridescence. Iridescence depends on the structure of the feather. These feather structures allow some hummingbirds to have every color of the rainbow in their feathers.





**How do  
you say?**

**Bristle** – [bris-uhl]

**Calamus** – [kal-uh-muhs]

**Filoplume** – [fill-uh-ploom]

**Iridescence** – [ear-i-des-uhns]

**Keratin** – [care-uh-tin]

**Pigment**– [pig-muhnt]

**Pressure** – [presh-er]

**Propeller** – [pruh-pell-er]

**Rachis** – [ray-kiss]

**Semiplume** – [sem-ee-plume]

**Vane** – [vayn]