

# IF BIRDS DON'T CHEW, WHAT DO THEY DO?

## Aim

To show that birds use their beaks, other body parts, behavior, and tools to capture and process food.

## INSTRUCTIONAL OBJECTIVES

### Students will be able to

1. explain how adaptations for flight influence the design of a bird's entire body, including capturing and processing food.
2. list ways to process food that do not involve use of teeth.
3. state that, as in human tools, beak shape is related to function.

### Motivation

1. How would you eat if you lost all of your teeth?
2. What foods can you swallow whole, without chewing?

## MATERIALS

### Day I

Discovery Card, Student Worksheet

### Day II

Optional: pellets, forceps, petri dishes (or other shallow dishes) of warm water.





### LESSON PROCEDURE

#### Day I

1. Introduce Motivation questions and discuss.
2. Have students read and examine Discovery Cards; then collect the cards from students.
3. Have students do worksheet.

#### Day II

1. Discuss bird pellets.
2. Optional: Have students dissect and examine pellets. See Technical Information for sources for owl pellets.

#### Summary

To compensate for the absence of teeth, a variety of beak shapes, body structures, and behaviors have evolved among birds. Each species solves its food processing problems in a unique way.

#### New Vocabulary

- gizzard
- pellet

### LESSON PROCEDURE DETAILS

#### Day I

1. Discuss Motivation questions and elicit answers. Answers should fall into two categories: one in which an individual changes its diet, the other in which the food items remain the same but their form has to be altered. Examples: switching to soft foods, using forks or your hands to shred food or pick off pieces.
2. Distribute Discovery Cards. Have student groups read the cards and answer the questions. Discuss how answers to the motivation questions compare to the methods of the birds. Collect the Discovery Cards before handing out the worksheets.
3. Distribute worksheets and have students complete these. If there is time, have students do the sheet as separate groups and then have groups compare and discuss answers.

#### Day II

1. Using the Technical Information, discuss the need for gizzards in digestion. This will help you start a discussion on pellet formation.
2. Optional: If available, distribute owl pellets, petri dishes with warm water, and forceps to student groups.

When properly dried, owl pellets will crumble into fragments when gentle pressure is applied. Soak the pellets in dishes of warm water to soften them sufficiently before tearing them apart by hand or with tweezers or forceps. Separate the hair or feathers from the bones and place every bone fragment on a separate plate to dry. When your students have amassed a sufficient amount of bones and skulls, have them glue the bones to a piece of cardboard. It is recommended that you duplicate and distribute a copy of an individual mouse skeleton as a guide. It is likely that the pellets in your kit are from barn owls, which eat mostly mice and rats.

### Answers to Discovery Card Questions

1. The anhinga flips its head up so that the fish slides off its bill and up into the air above its head. The bird then catches the fish in its open beak and swallows it head first.
2. It fishes with a net-like bill.

### Answers to Worksheet Questions

(Tools)	(Birds)
nutcracker	cardinal, parrot
fishhook	cormorant
spear	anhinga
tweezers	robin
strainer	flamingo
forceps	heron, cormorant
meat hook	hawk
fishnet	pelican
scissors	oystercatcher
(Foods)	(Birds)
Brazil nut	parrot
berry	robin
fish	anhinga, heron, pelican, cormorant
shrimp & algae	flamingo
frog	heron, pelican, anhinga
rabbit	hawk
insect	robin
sunflower seed	cardinal
oyster	oystercatcher





### TECHNICAL INFORMATION

#### Notes on gizzards

A bird's digestive tract includes the mouth, esophagus, crop, proventriculus, gizzard, intestine, and cloaca. The crop is a temporary storage organ where food is softened. Food then passes to the proventriculus or glandular stomach, which digests the food chemically. The next stop for food is the gizzard, which is the muscular stomach. Depending on a bird's diet, the gizzard can be an extremely powerful crusher or merely a storage organ for pellets (see further notes below). In most birds, the gizzard is a grinding mill for tough plant and animal parts. Mallard ducks swallow acorn and hickory nuts whole; other ducks, such as eiders, swallow mussels and other shellfish whole. The gizzards in the birds can grind and crush these hard foods so that the intestines can further digest them. Other birds with strong gizzards are seed and grain eaters. Birds pick up and swallow grit (course sand and pebbles) and are able to retain it in the gizzard to help the organ grind. In a sense, the gizzard serves a function similar to teeth.

#### Notes on pellets

Pellets are formed by a number of different kinds of predatory birds including hawks, owls, grebes, herons, cormorants, rails, gulls and terns, jays, most shorebirds, flycatchers, swallows, swifts, and others. Masses of indigestible animal parts, pellets may contain hair, bones, feathers, teeth, claws, insect or crustacean parts, even bird bands! As a bird eats, these bits accumulate in the gizzard and are later ejected through the mouth.

Most owls do not bother to tear small prey apart but instead swallow it whole. The bones of the prey animal are often undamaged, even after the owl swallows its food. Owls must regurgitate the indigestible remnants of their food. The pellet varies in size according to the species of owl.

Pellet dissection enables scientists to study the distribution of small mammals eaten by owls in a particular area by identifying the skulls, bones, and fur of the mammals in the pellets. Scientists also study pellets to learn about owls' feeding habits and territorial behavior.

Some bones are broken during ingestion. However, by working in small groups, students can reconstruct a skeleton of a mouse by using several owl pellets.

Owl pellets, kits, and guides for dissection can be obtained from the following selected vendors. Check availability and current prices before ordering:

Hawks, Owls, and Wildlife  
Russell Road  
Montgomery, MA 01085  
413-862-3273

Creative Dimensions  
P.O. Box 1393  
Bellingham, WA 98227

*Adapted from Wildlife Inquiry through Zoo Education: Diversity of Lifestyles (Grades 6 - 8).*



# Student Worksheet

## If Birds Don't Chew, What Do They Do?

**INSTRUCTIONS:** In the first column below there is a list of man-made tools. These tools have shapes which make them suited for certain kinds of work. These shapes are a clue to their function.

The birds in the second column are pictured on the Discovery Card. Their beaks have shapes which give clues to the kind of food they eat. First, match the beak of the birds listed below with a man-made tool similar in shape or function.

The third column shows food items in the diets of the

birds. From the Discovery Card and the matching you've already done, you should have some clues to the birds' diets. Now, match the birds in the second column with their diet in the third column.

Please note:

2 tools apply to 2 birds each

1 bird has a beak like a combination of 2 tools

4 birds eat 2 different food items

1 of the food items is used by 3 birds

1 of the food items is used by 4 birds

**TOOL**

Nutcracker



Fishhook



Spear



Tweezer



Strainer



Forceps



Meat hook



Fishnet



Scissors



**BIRD**

Anhinga

Hawk

Cardinal

Heron

Parrot

Robin

Pelican

Oystercatcher

Cormorant

Flamingo

**FOOD**

Brazil Nut



Berry



Fish



Shrimp & Algae



Frog



Rabbit



Insect



Sunflower seed

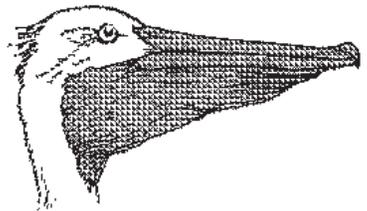


Oyster

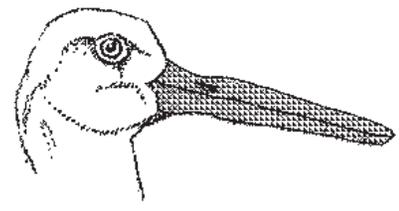




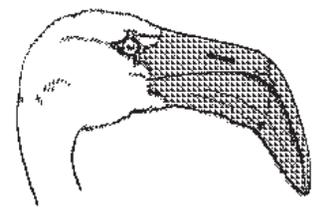
## If Birds Don't Chew, What Do They Do?



Pelican



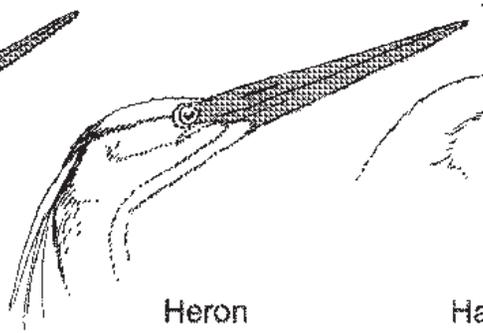
Oyster Catcher



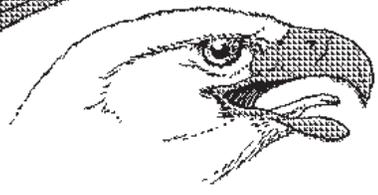
Flamingo



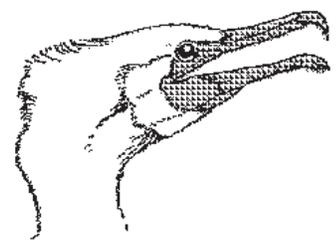
Anhinga



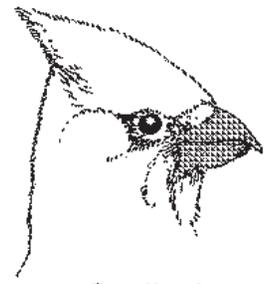
Heron



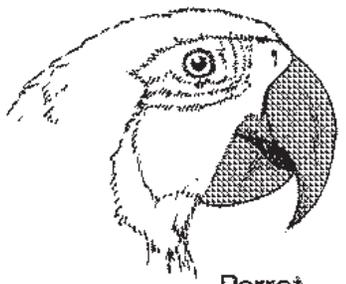
Hawk



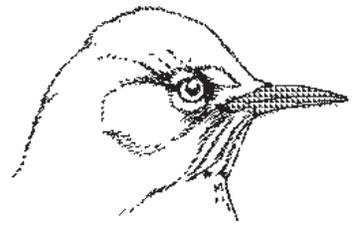
Cormorant



Cardinal



Parrot

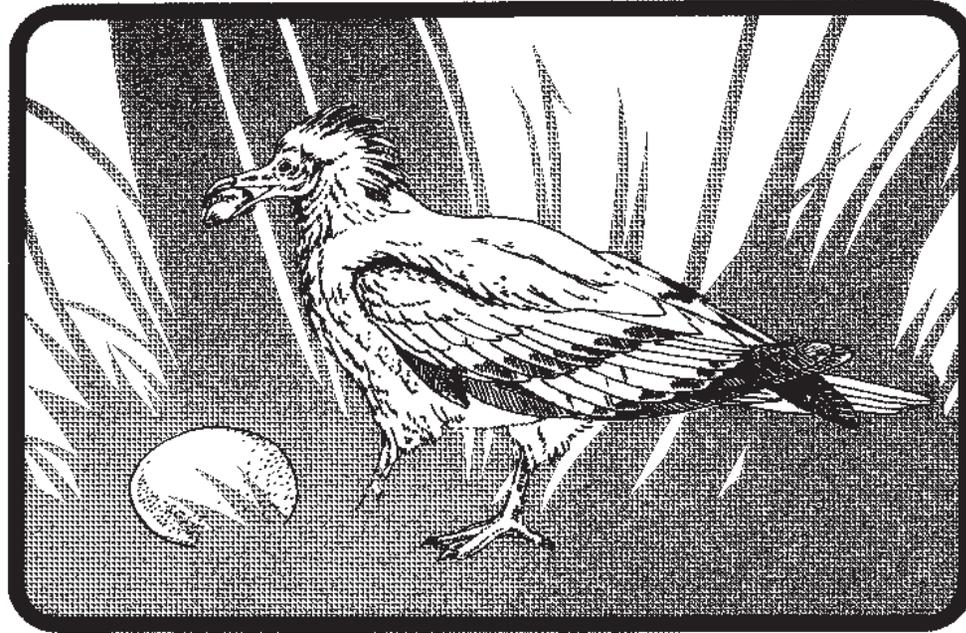


Robin

Have you ever wondered how birds, which have neither teeth nor hands, catch and eat their food? If you are a careful observer you may have noticed that bird beaks come in many shapes and sizes. The shape of a bird's beak is closely related to its function. Often, it can tell us what the bird eats and how it catches its food. These pictures are just a small sample of the many different beak shapes found in birds around the world.

Many birds have **hooked beaks**. The hooked beak of the hawk helps tear the flesh of its prey into small pieces. In fish-eating birds, such as cormorants, a beak with a small hook at the end helps hold onto slippery prey. A parrot uses its hooked beak to tear into fruit, crack nuts, and help it climb from branch to branch. Because seeds and nuts must be cracked or crushed before they can be eaten, many small seed-eating birds, like a cardinal, have **thick strong beaks** to get at their food.

Many other birds have **beaks that are long and slender**, designed for probing. A woodcock has a beak shaped like a long pencil. It uses this bill to probe into the ground for earthworms. The hummingbird inserts its long, needle-like bill deep inside a



Egyptian Vulture with Ostrich Egg

flower, where its long tongue laps up nectar.

Long beaks are often **flattened**. This shape can be used for many purposes. Some shorebirds, such as the oystercatcher, use it to pry apart clams; other birds use it to poke into crevices for insects. In herons and egrets, the beak can strike and grab fish and other animals under water. The anhinga, a swimming bird, uses its long bill as an underwater spear. The bird submerges, closes its beak, and spears a fish. It surfaces with a fish impaled on its closed beak.

**1** How does the anhinga get the fish into its mouth?

The pelican, a distant cousin of the anhinga, uses an entirely different method to catch fish.

**2** Can you guess what this method is?

Some foods require an extra-special beak design. The flamingo eats very tiny animals and plants that float in water. It has a **scooplike bill**, equipped with strainers, to filter its food out of the water. The flamingo must hold its head upside down when feeding for the filtering action to work. The crossbill eats seeds inside pine cones. It uses its unique bill to force open the cone scales so that its tongue can reach the seeds.

Birds that eat several different types of food have beaks with an **all-purpose tweezer shape**. A raven, for example, eats berries, shellfish, insects, rodents and carrion. Another example, the robin, uses its shorter all-purpose beak

to pick up worms and insects in the summer and berries in the winter. Like the woodcock, hummingbird, and oystercatcher, birds with very special beaks cannot eat as wide a variety of foods as the raven or robin.

Other birds **use their feet** to help process or catch food. Many birds of prey kill with their powerful feet and hold their prey down with their feet while feeding. Parrots can hold food in one foot and nibble small pieces off with their beaks. Blue jays place acorns between their toes and break them apart using their beaks like hammers.

Certain **behaviors** help some birds get at their food. Grosbeaks will take insects and smash them against trees or rocks to soften them. Gulls and crows will grab a clam or crab, fly high over rocks,

and drop the animal in order to break it open. Some hawks do the same with turtles. The song thrush of Europe picks up snails and strikes them against rocks to break the shells. This use of the environment is different from active **tool use**, which is defined as using an object for a purpose other than its natural one. The Galapagos woodpecker finch has a seed-eating beak but it eats insects. This bird takes a cactus spine in its beak and uses it as a tool to dig into bark and spear insects. Another tool-user is the Egyptian vulture. This species picks up a rock and drops it repeatedly onto a tough-shelled ostrich egg until the egg cracks.

Birds have developed many methods to process their food without using teeth.



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