Chapter 31 **Reptiles and Birds** **Name _____**

Lab Examining Bird Adaptations

Background Information

All birds are grouped in the class Aves. Birds are endothermic, or warm-blooded, vertebrates. The streamlined shape of their feather-covered bodies enables them to fly efficiently. Although a number of modern birds cannot fly, all birds are descended from ancestors that were capable of flight. The forelimbs of birds are wings, which are used for flight in most birds. Birds also have a four-chambered heart and a closed circulatory system.

There are many different types of birds. Each type of bird has special adaptations that enable it to live successfully in its environment. The mouth of a bird is formed by a toothless projecting beak. The various shapes and sizes of beaks are adaptations for eating different kinds of foods. The bird's legs and feet also exhibit adaptations based on the bird's natural environment. Birds can also have different types of feathers. These feathers, which are actually modified scales, serve many different functions.

In this investigation, you will examine some of the general characteristics of birds. You will also observe how the feathers, legs, feet, and beaks of various birds enable them to survive in their environments.

Problem

In what ways are various birds adapted to different environments?

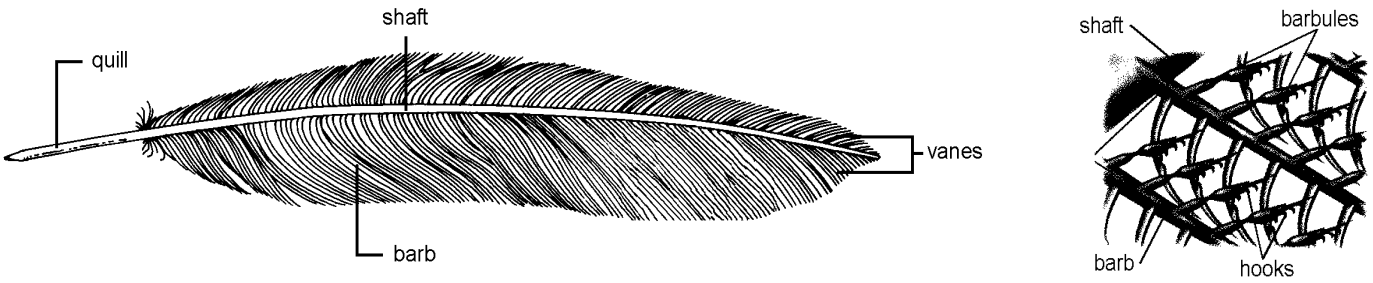
Materials (per group)

contour feather down feather dissecting microscope
mounted bird specimens

Procedure
Part A. Examining Feathers

1. Obtain a contour feather. Use Figure 1 to locate the different parts of the feather. The shaft is the main structure that supports the hair-like barbs that make up the vane. Notice that the portion of the vane on one side of the shaft is narrower than the vane portion on the other side of the shaft. In a bird's wing, the narrow portion of the vane on one feather overlaps the wide portion of the vane on the feather next to it. This slight overlap allows for a smooth, continuous wing surface.

Figure 1



2. Use the dissecting microscope to closely examine the quill. Answer question 1 in Observations.

3. Use the dissecting microscope to examine the feather's vane. Gently ruffle the edge of the feather, and find the barbules on the barbs. Smooth the feather with your finger. Notice how easily the barbs can be smoothed back into place.

4. Obtain a down feather. Identify the quill, shaft, and barbs of this feather.

5. Notice the length, width, and flexibility of the shaft of the down feather. Answer question 2 in Observations.

6. Examine the down feather with a dissecting microscope. Try to smooth the down feather as you did the contour feather. Answer question 3 in Observations.

Part B. Examining Adaptations of Bird Feet

1. Observe the drawings of the birds in Figure 2 on the next two pages. Examine the toes of each bird. Count the number of toes on the foot of each bird and record this information in Data Table 1. Answer question 5 in Observations.

2. Examine the foot of each bird in Figure 2 and indicate the position (front or back of foot) of the toes. Record this information in Data Table 1. Also examine the relative size of the talons, or toe nails. Describe them as large, medium, small, long, thin, etc. Record this information in Data Table 1.

3. Determine the structure and function of each foot from the following list. Record this information in Data Table 1.

   - **Scratching foot**: rake-like toes for finding food in soil
   - **Perching foot**: long back toe that can hold on to a perch tightly
   - **Swimming foot**: webbed, paddle-like
   - **Running foot**: three toes rather than four
   - **Wading foot**: large foot and long leg for wading in shallow water
   - **Specialized foot**: long talons and toes for running over leaves of large water plants
   - **Climbing foot**: two hind toes for support when climbing upward to prevent falling backward
   - **Grasping foot**: large curved claws to grab and hold such prey as fish, mice, and other small animals

Part C. Examining Adaptations of Bird Beaks

1. Examine the relative shape and size of the beak of each bird in Figure 2. Determine the structure and function of each beak from the following list. Record this information in Data Table 2.

   - **Chisel**: used for drilling into trees
   - **Short and stout**: used to eat insects, seeds, small crustaceans; multipurpose
   - **Tubular**: used to obtain nectar from flowers
   - **Hooked**: used to tear flesh
   - **Flat, broad, and slightly hooked**: used to strain algae and small organisms from water
   - **Cracker**: used to crack seeds; short and stout; sometimes curved upper portion
   - **Scoop**: used to scoop fish from water; long and stout
   - **Spear-shaped and stout**: used to spear fish
   - **Trap**: used to trap insects in midair

Figure 2

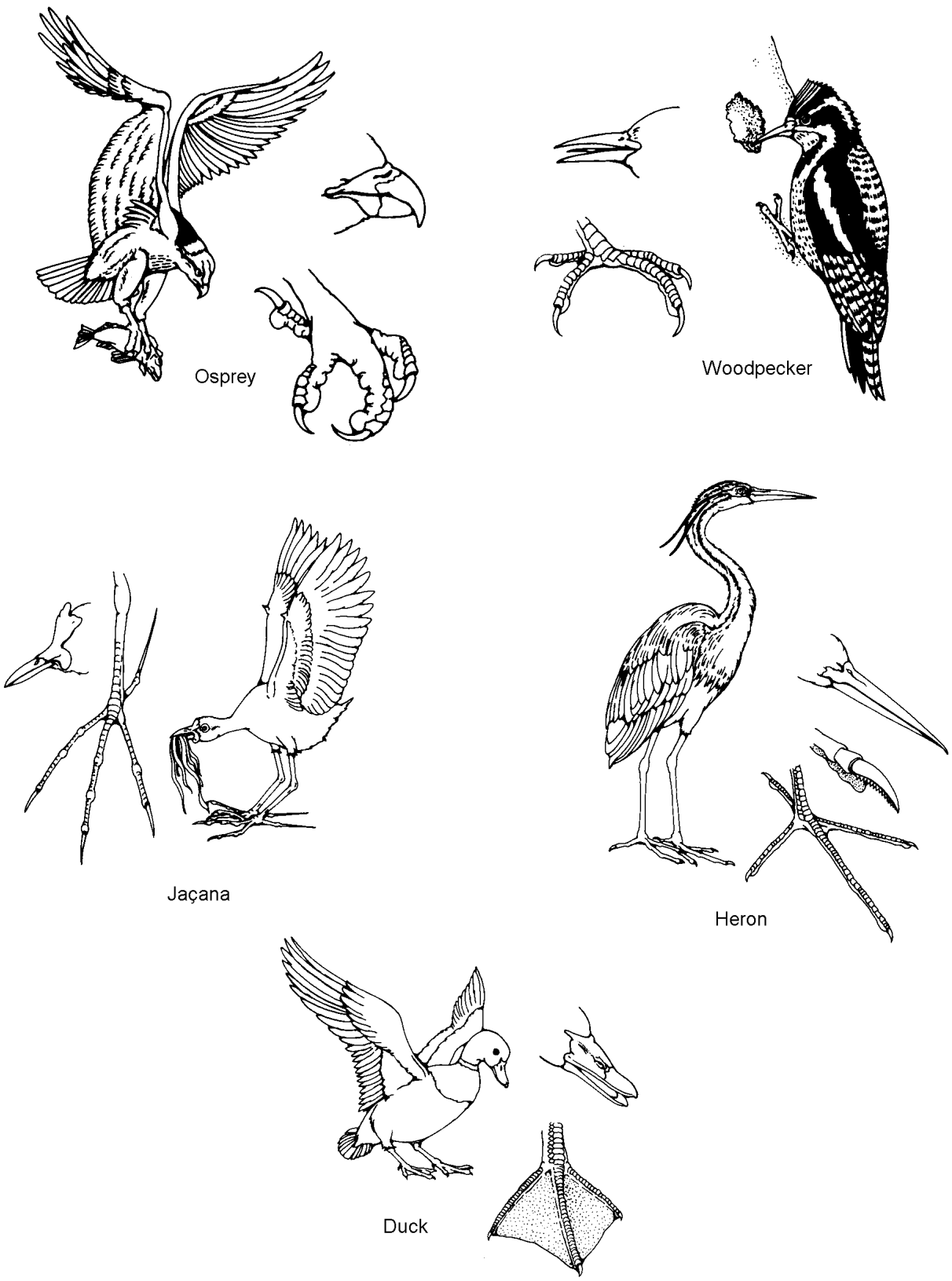
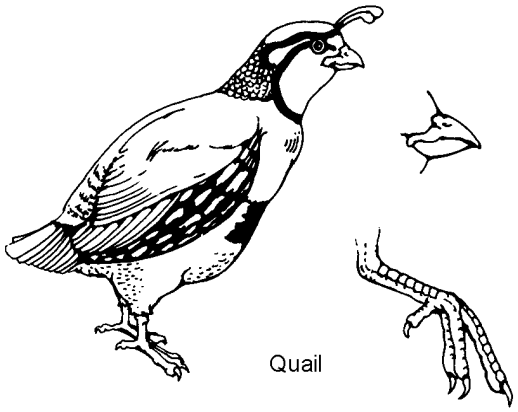
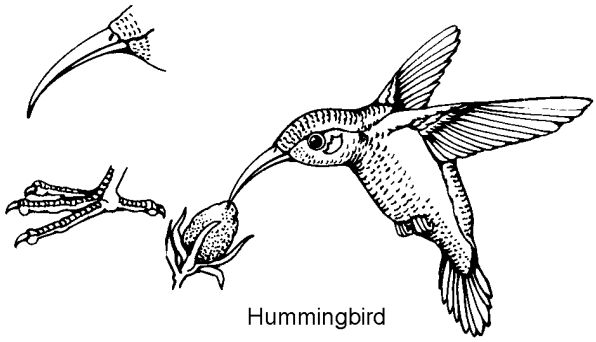


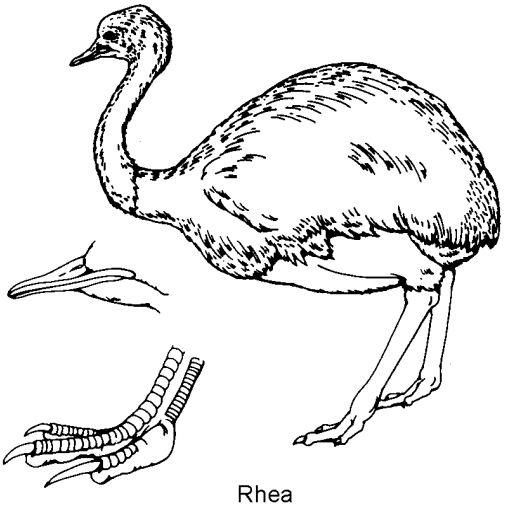
Figure 2 (cont.)



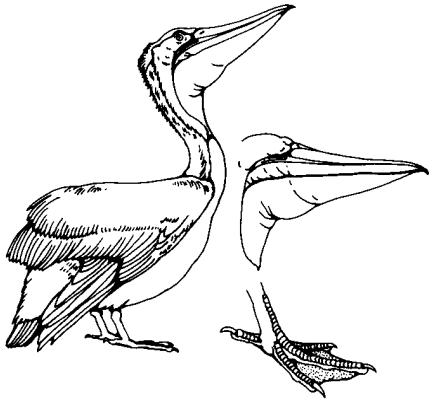
Quail



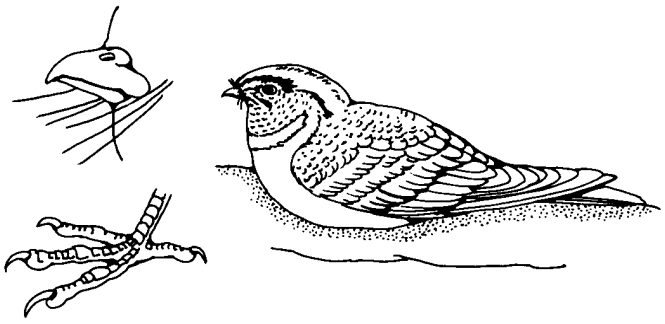
Hummingbird



Rhea



Pelican



Whippoorwill

Observations

Data Table 1

Bird	# of Toes	Toe Position	Size of Talons	Type or Function
Heron				
Osprey				
Woodpecker				
Duck				
Jaçana				
Quail				
Pelican				
Hummingbird				
Rhea				
Whippoorwill				

Data Table 2

Bird	Structure of Beak	Function of Beak
Heron		
Osprey		
Woodpecker		
Duck		
Jaçana		
Quail		
Pelican		
Hummingbird		
Rhea		
Whippoorwill		

1. Is the quill of the contour feather solid or hollow?

2. How does the down feather shaft compare to the contour feather shaft?

3. Do the barbs of the down feather stick together when you smooth it?

4. How many toes do most birds have?

Analysis and Conclusions

1. How does the structure of a contour feather shaft make it well adapted for flight?

2. How do hooks increase the strength of a contour feather?

3. Down feathers are found underneath a bird's contour feathers. What is the function of this type of feather?

4. How are a bird's bones well adapted for flight?

5. In what way are the feet of the hawk or eagle adapted to its feeding style?

Critical Thinking and Application

1. What characteristics of the down feather make it useful as a stuffing for pillows and sleeping bags?

2. A biologist found the skeleton and feathers of a bird. The bones were solid and heavy, and the forelimbs were short. Do you think that this bird was able to fly well when it was alive? Explain your answer.

3. Write a description of the beak and feet of each of the following:

   a. an American Avocet (wading bird)

   b. a Golden Eagle (bird of prey)

   c. a flicker (woodpecker)