

Chapter 15 Darwin's Theory of Evolution**Comparing Adaptations of Birds****Introduction**

When Charles Darwin explored the Galápagos Islands, he noted the great variety of beak shapes on the finches there. It was later determined that Darwin's finches made up 13 separate species. The similarities among the species suggested a common ancestor: A single species of finch that came from the mainland of South America. How did these birds evolve into genetically unique groups? With few native competitors and a wide variety of food sources, the newcomers were able to establish niches based on variations in beak shape and size. Finches with beaks that could exploit a particular food source—insects in the bark of trees, for example—established their own niche in the new habitat. Natural selection thus favored beak specialization because it enabled many birds to coexist within the same ecosystem. Many birds also show specialization of other body parts, including legs, feet, wings, and eyes. In this investigation, you will examine some bird characteristics. What are the survival benefits of each bird's adaptations?

Problem

What adaptations have evolved among modern birds that enable them to survive in diverse habitats?

Pre-Lab Discussion

Read the entire investigation. Then, work with a partner to answer the following questions.

1. What can you learn from observing and comparing specific physical traits of different birds?

2. What are some terms you can use to describe the size and shape of a bird's beak?

3. How does a bird's beak help you identify its habitat?

4. A certain bird ordinarily lives in or near water and spends much of its time swimming. Based on Data Table 1, what type of feet would you expect this bird to have?

5. Birds that spend much time perching have three front toes and one back toe. Based on Data Table 1, how is this different from the feet of birds that are better adapted for climbing than for perching?
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Materials *(per group)*

specimens or illustrations of birds detailing their physical adaptations, field guides to birds

Procedure

1. Look carefully at the diagrams of birds in Figure 1. Notice the details of each bird's feet and beak. Using the diagrams, complete Data Table 1 by filling in one or more examples of birds that exhibit each of the beak and foot adaptations described.
2. **Inferring** In Data Table 2 on page 134 consider the adaptations of the birds listed and then describe their likely habitat. Check your answers using a field guide.

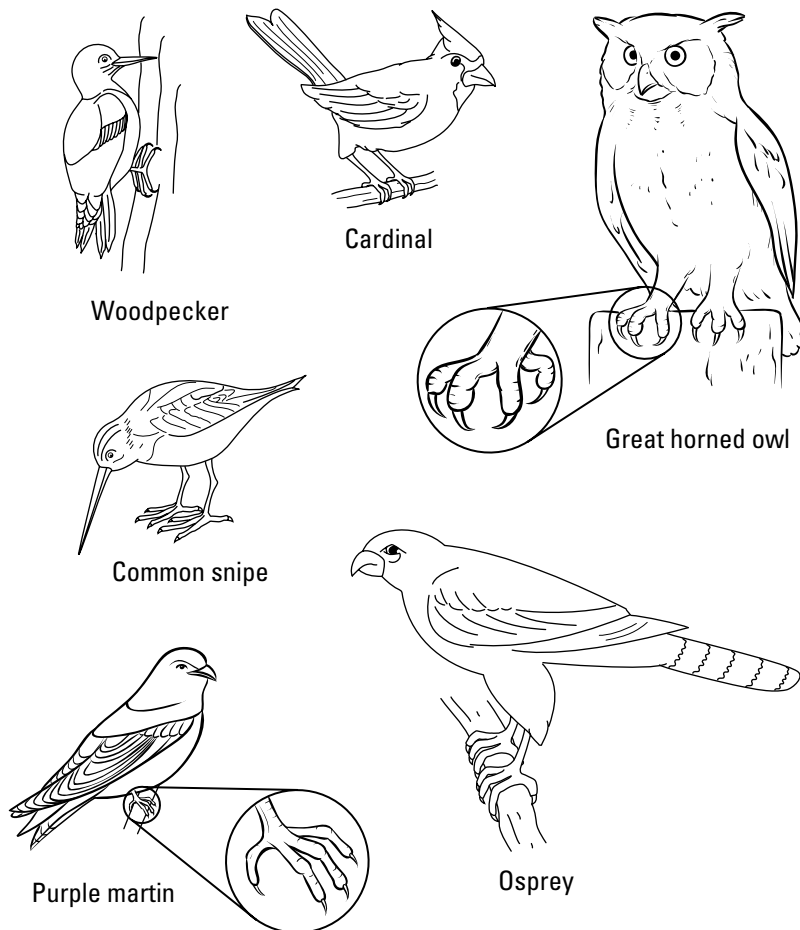
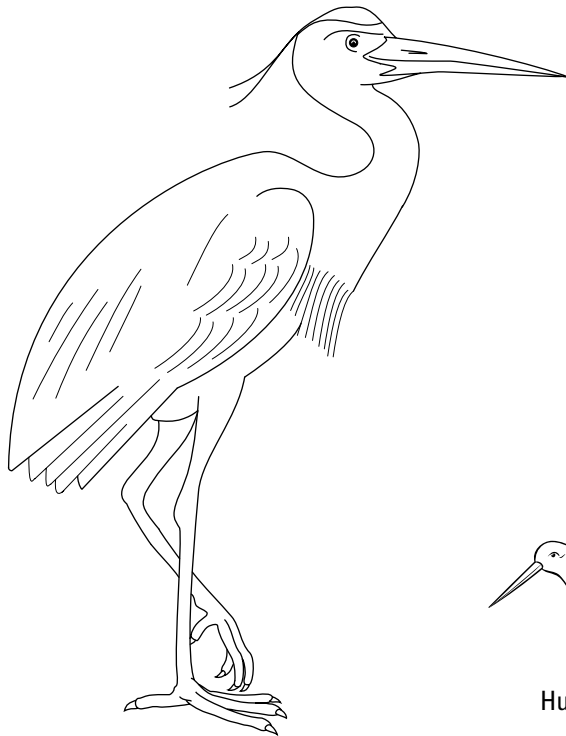
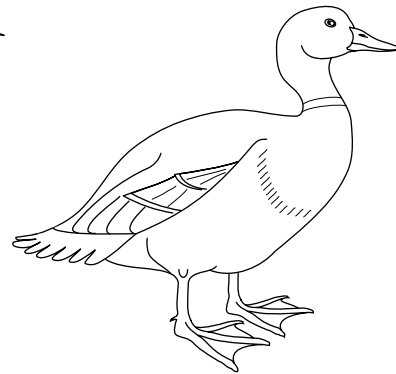


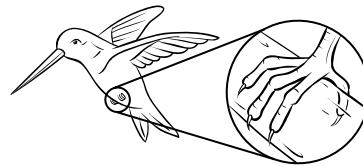
Figure 1 (Diagrams are drawn in approximate, not exact, scale.)



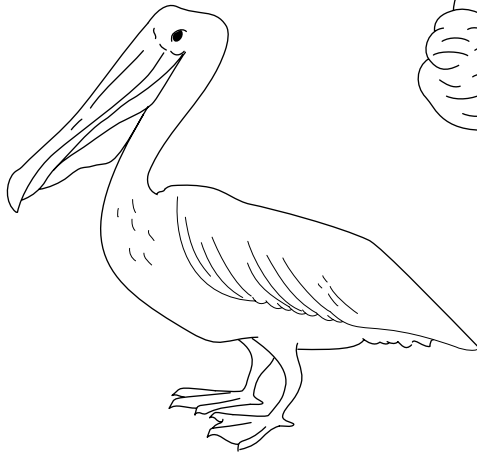
Great blue heron



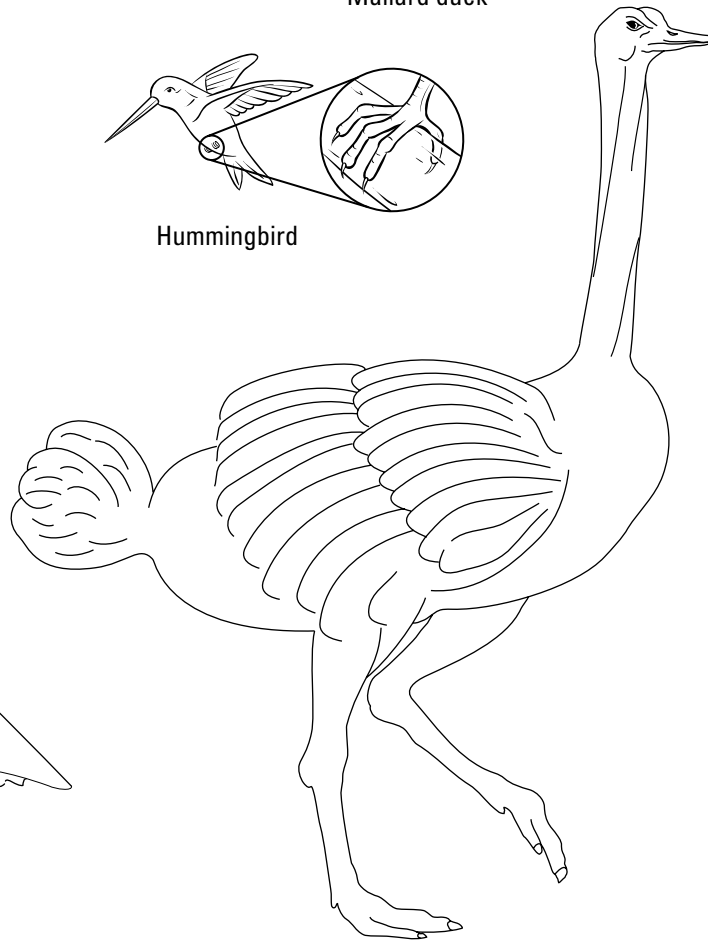
Mallard duck



Hummingbird



Pelican



Ostrich

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Figure 1 *continued*

Data Table 1

| Body structure | Adaptation for | Type of bird |
|--|--|---------------------|
| Short, wide, pointed beak | cracking seeds and nuts | |
| Medium-length, chisel-shaped beak | breaking into tree bark for insects | |
| Long spear-shaped beak with wide base | spearing fish | |
| Sharply hooked beak | tearing animal tissue | |
| Beak with pouch | holding fish | |
| Long, very narrow beak | probing flowers for nectar | |
| Long, straight, medium-wide beak | probing for soft-ground food | |
| Very short, slightly curved beak | catching insects in midair | |
| Large, forward-looking eyes | binocular and night vision for spotting prey | |
| Long, thick, powerful legs and two thick toes | running; defense (kicking) | |
| 2 front toes/2 back toes | holding onto side of tree without falling back | |
| 3 short front toes/1 back toe without claws or webbing | perching on branches | |
| Long foot with 3 front toes/ 1 back toe | wading; walking on mud; walking on sand | |
| 3 front webbed toes/1 back toe | swimming | |
| 3 front clawed toes/ 1 back clawed toe | catching, grasping, and carrying prey over distances | |

Data Table 2

| Bird | Habitat |
|------------------|---------|
| Osprey | |
| Great horned owl | |
| Woodpecker | |
| Purple martin | |
| Great blue heron | |
| Common snipe | |
| Mallard duck | |
| Pelican | |
| Cardinal | |
| Hummingbird | |
| Ostrich | |

Analysis and Conclusions

1. **Comparing and Contrasting** Each pair of birds mentioned below shares some characteristics. Yet they each have their own niche; they do not compete directly for the same resources. For each pair, describe how the birds are similar and how they are different. How might their differences enable them to occupy different niches?

a. osprey and great horned owl

b. woodpecker and purple martin

c. great blue heron and common snipe

2. **Inferring** Birds have hollow bones. Explain how this is adaptive.

3. **Observing** The hummingbird's beak is adapted to getting its food. Describe another adaptation of the hummingbird that enables it to get the food it needs.

4. **Inferring** Birds such as Darwin's finches are adapted to occupy highly specific niches. Would this adaptation make it easy or difficult for such birds to adapt to environmental change? Explain your answer.

5. **Formulating Hypotheses** Why might a particular bird be found in more than one habitat?

6. **Inferring** Birds are well-adapted to their habitats, yet some birds are considered members of endangered species. Infer why certain birds are endangered.

Going Further

Based on the results of this investigation, develop a hypothesis about the physical characteristics and habitat requirements of birds that live in hot, dry climates such as the desert. When developing a hypothesis, consider sources of food, water, shelter, nesting materials, and other factors. To test your hypothesis, with your teacher's permission, use various resources to learn about the physical characteristics and the habitat of one or more desert-dwelling birds.