Hands-On

QuickLab

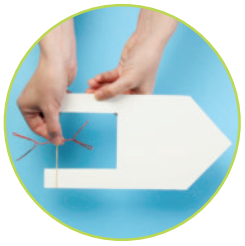
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Webbed Feet

How much of an advantage do webbed feet give swimming water birds? In this lab, you will find out.

Procedure

1. Use a **knife** to cut the chevron shape shown above out of a piece of **foam core.** Stretch a **rubber band** across the cutaway end of the foam. Bend a **wire** that is 25 cm long into a Y shape at each end. Wrap the wire around the rubber band.
2. Wind up the wire. Place this device in a **pan** filled with **water,** and release the wire. What happens?
3. Completely cover both Y-shaped gaps at the ends of the wire with **aluminum foil.** Repeat step 2.



Analysis

1. **Explain** what the bent wire represented in the model. What did the aluminum foil represent?
2. CRITICAL THINKING **Making Inferences** Use your observations to explain how webbed feet give water birds an advantage.

Water Birds Swans, geese, and ducks are water birds, or birds found in or near the water. Water birds have webbed feet for paddling and long, flattened beaks with rounded tips. This beak is ideal for feeding on a variety of foods, from small insects and fish to grass. An unrelated group of birds, called *seabirds,* also exploits open waters, but these birds are found in the oceans. Like water birds, they have webbed feet. But unlike water birds, the beaks of seabirds are longer and are made for catching their typical meal of fish or squid.

Wading Birds Herons, storks, flamingos, and egrets are examples of wading birds. These birds feed in shallow waters that are rich with fish and invertebrates. In order to feed in a range of depths, wading birds have long, slender legs. Their long toes keep these birds from sinking into the mud. Many waders have spear-shaped beaks for fishing. Fishing waders often stand motionless as they wait for fish. When they see a fish, they quickly snatch it in their beak or they may even spear it. Waders that feed on invertebrates in the mud may have beaks that are built for stabbing into the mud to find their prey.

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Section 4 Review

KEY IDEAS

1. **Relate** the bald eagle's methods of hunting and feeding to its external body features.
2. **Compare and Contrast** the foot structure of water birds and wading birds.

CRITICAL THINKING

3. **Classifying** Classify a bird that has delicate, curved feet with slender toes and a small, pointed beak.
4. **Making Inferences** Like most birds, penguins have large, keel-shaped sternums, but ostriches do not. Provide an explanation for this difference.

ALTERNATIVE ASSESSMENT

5. **Synthesizing Information** Pick a type of ecosystem, and design a bird that could successfully live in that ecosystem. Draw a picture of your bird, and write a short paragraph explaining your design.

Answers to Section Review

1. The bald eagle has strong feet with sharp talons for grabbing prey, and a massive, hooked beak for tearing prey into pieces it can eat.
2. Water birds have webbed feet for swimming, and wading birds have long legs with long, thin toes for wading in water without sinking into the mud.
3. The small, pointed beak indicates that it is not a seedeater because seedeaters have thick beaks for crushing seeds. The foot structure, however, is consistent with perching bird anatomy.
4. Keel-shaped sternums support powerful breast muscles during flight. Even though penguins don't fly, they still use their wings to swim. Ostriches don't fly and rarely use their wings. Therefore they do not need as much structural support for their wing muscles.
5. Students' designs will vary based on the ecosystems they choose.

QuickLab

Teacher's Notes When choosing a pan, consider the water depth needed for unobstructed rotation of the feet. Make sure students anchor the wire firmly to the center of the rubber band. Students should wear goggles.

Materials

- aluminum foil
- knife or box cutter
- foam core, small piece
- pan or plastic tub
- rubber band
- water
- wire, 25 cm

Answers to Analysis

1. wire: bird feet without webbing; foil: webbing between the digits
2. Webbed feet allow water birds to swim rapidly through water.

Close

Formative Assessment

Which of these adaptations of bird beaks and feet *are not likely* to be found together on a bird?

A. feet adapted for perching and beaks adapted for eating insects (Incorrect. Many perching birds eat insects, so these adaptations are found together.)
B. feet adapted for hunting and beaks adapted for tearing (Incorrect. Birds of prey have both of these characteristics.)
C. webbed feet and beaks adapted for eating insects (Correct. Most water birds are not insect eaters.)