# Feathers and Fossils

Trace bird evolution and connect adaptations to survival.

**ZOO.9** "Students will understand the structure and function of phylum Chordata, class Aves, and how they demonstrate the characteristics of living things. Trace the evolutionary history of modern birds beginning with the theropods…"

NAME _____ DATE _____

## 1 READ AND MARK

Read it twice

**YOUR JOB** Underline two fossil clues that link birds to theropods. Circle three traits of living birds that help them fly or stay warm, then write F for flight or W for warmth beside each one.

### From Theropods to Today's Birds

1. On a limestone slab, a fossil of Archaeopteryx shows feather impressions around a body with teeth and a long, bony tail. Fossils of other small, two-legged theropod dinosaurs also preserve feathers. Bird skeletons and theropod fossils share a wishbone and similar wrist bones that let the forelimb fold. These clues support the conclusion that birds evolved from theropods, although one fossil need not be a direct ancestor of living birds. Early feathers may have helped with insulation or display before some feathered lineages used them in flight.

2. Flight in modern birds depends on a combination of traits. As a wing moves through air, its feathers help produce lift and control direction. Large breast muscles power wingbeats; in many flying birds, they attach to a deep ridge on the breastbone. Lightweight bones reduce mass, while air sacs help move air through the lungs in one direction, supporting the high energy demand of flight. Birds are endothermic: they produce most of their body heat inside the body. Fluffed feathers trap air near the skin, slowing heat loss when the air is cold.

3. On Arctic tundra, a snowy owl uses keen vision to spot a vole against the ground, then grips it with sharp talons. Dense feathers, even on its feet, reduce heat loss in bitter wind. Elsewhere, Arctic terns travel between northern and southern feeding areas as seasons change; migration lets them follow seasonal food supplies. Their travel is guided partly by inherited behavior, though experience also matters. A bird cannot evolve a new body feature during one storm. Across many generations, inherited traits that improve survival and reproduction can become more common in a population as environments change.

## 2 ANSWER WITH EVIDENCE

Use the passage

1. How do feathered theropod fossils and shared wrist bones support the evolutionary link between birds and theropods?

2. Explain how one wing trait and one internal trait work together to support sustained flight.

3. How does one snowy owl trait help it hunt, while another helps it stay warm?

4. Why do Arctic terns migrate, and what part of that behavior is inherited?

## 3 YOUR TURN

Your own words

Design a bird for a windy island where fish are plentiful in summer but scarce in winter. Describe a beak or foot adaptation for catching fish, a way the bird stays warm, and a seasonal behavior; explain how natural selection could spread its feeding adaptation.

ANSWER KEY

# Feathers and Fossils



## PART 1 · READ AND MARK

Underline two fossil clues that link birds to theropods. Circle three traits of living birds that help them fly or stay warm, then write F for flight or W for warmth beside each one. Accept any marking that follows this job and points at the right text.

## PART 2 · ANSWERS

| # | QUESTION | ANSWER |
|---|---|---|
| 1 | How do feathered theropod fossils and shared wrist bones support the evolutionary link between birds and theropods? | **Feathers in theropod fossils and similar wrist bones in theropods and birds are shared features that support their evolutionary relationship.** |
| 2 | Explain how one wing trait and one internal trait work together to support sustained flight. | **Wing feathers help produce lift, while air sacs help move air through the lungs to support the energy demands of repeated wingbeats.** |
| 3 | How does one snowy owl trait help it hunt, while another helps it stay warm? | **Keen vision helps the owl spot a vole, while dense feathers reduce heat loss.** |
| 4 | Why do Arctic terns migrate, and what part of that behavior is inherited? | **They migrate to follow seasonal food supplies. Their tendency to travel is guided partly by inherited behavior.** |

## PART 3 · YOUR TURN (SAMPLE ANSWER)

A long, pointed beak would help my island bird catch small fish in shallow water. Dense feathers would trap air and slow heat loss during storms. When fish become scarce in winter, the bird would migrate to a coast with more food. Birds that inherit the pointed beak might catch more fish and raise more young, making that beak more common over generations.

Accept other plausible wing and internal trait pairs for question 2 if the student explains each trait's role. For Your Turn, look for a feeding adaptation suited to fish, a workable response to cold, a seasonal behavior, and natural selection acting across generations.