Feathers Through Time

Trace bird ancestry and explain adaptation to changing environments.

ZOO.9.1 "Trace the evolutionary history of modern birds beginning with the theropods. Relate how today's birds have adapted to changing environments."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Number three stages in the bird lineage, starting with theropods and ending with modern birds. Underline two places where the text connects a bird trait to an environment.

From Theropods to Today's Birds

1. Picture a small theropod dinosaur moving through a forest about 150 million years ago. Theropods were a group of two-legged dinosaurs. Some had feathers before birds evolved; feathers could help with warmth or display, not just flight. Over many generations, one branch of feathered theropods gave rise to early birds. Archaeopteryx, an early bird, had wing feathers like a bird but also teeth and a long bony tail. It provides evidence of a mix of inherited dinosaur traits and newer bird traits, not proof that this fossil species was the direct ancestor of modern birds.

2. Early birds did not all survive to the present. About 66 million years ago, a mass extinction wiped out nonbird dinosaurs and many bird lineages. Some bird lineages survived, and their descendants diversified into modern birds. Modern birds share traits inherited from their theropod ancestors, including feathers and lightweight, air-filled bones. Yet their bodies also differ in ways tied to habitats. A duck's webbed feet push against water as it swims, while a shorebird's long bill reaches food buried in wet mud. These features did not arise because individual birds decided to change; inherited variation and natural selection shaped populations across generations.

3. Environmental change continues to shape bird populations. On some Galápagos islands, finches face years with little rain. When small, soft seeds become scarce, harder seeds may remain. Finches with inherited deeper, stronger beaks can crack those seeds more easily, survive, and leave more offspring. If drought continues, deeper beaks can become more common in the next generation. When conditions shift again, a different beak size may offer an advantage. This is evolution within modern birds, not a new bird appearing overnight. From feathered theropods to diverse birds today, inherited traits and changing environments have shaped the lineage.

2 ANSWER WITH EVIDENCE

Use the passage

1. How does Archaeopteryx help trace birds to theropods without being identified as the direct ancestor of living birds?

2. What happened between early birds and today's diverse birds about 66 million years ago?

3. How do two modern bird traits in the passage fit different habitats?

4. How could a drought change beak depth in a finch population across generations?

3 YOUR TURN

Your own words

Imagine a population of ground-dwelling birds with inherited differences in feather thickness. In four or five sentences, trace their ancestry to theropods and predict what could happen to feather thickness over generations if the climate becomes colder. Explain the role of survival and offspring.

ANSWER KEY

Feathers Through Time

HIGH SCHOOL · ZOO.9.1

PART 1 · READ AND MARK

Number three stages in the bird lineage, starting with theropods and ending with modern birds. Underline two places where the text connects a bird trait to an environment. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How does Archaeopteryx help trace birds to theropods without being identified as the direct ancestor of living birds?	**Its wing feathers and dinosaur traits, including teeth and a long bony tail, provide evidence of the evolutionary connection. The passage does not identify it as a direct ancestor.**
2	What happened between early birds and today's diverse birds about 66 million years ago?	**A mass extinction eliminated many bird lineages. Surviving lineages later diversified into modern birds.**
3	How do two modern bird traits in the passage fit different habitats?	**A duck's webbed feet help it swim in water, while a shorebird's long bill helps it reach food in wet mud.**
4	How could a drought change beak depth in a finch population across generations?	**If hard seeds remain during drought, finches with inherited deeper beaks can crack them more easily. Those birds may survive and leave more offspring, making deeper beaks more common in later generations.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

These ground-dwelling birds descended from a branch of feathered theropods through early bird lineages. Some birds in the population inherit thicker feathers than others. In a colder climate, thicker feathers may help those birds retain heat, survive, and leave more offspring. Over generations, thicker feathers could become more common in the population.

Accept accurate descriptions of Archaeopteryx as evidence of a shared evolutionary history, not as a proven direct ancestor. In Part 3, look for inherited variation and a change in the population across generations rather than individual birds growing thicker feathers because they need them.