

Rock, Paper, Evolution!

(an evolution game)



Grade: 1, 3, 4

Length: 20-30 Minutes

Big Ideas: Evolution

Topic: The evolution of birds

Summary: Students will play a game modeling the basic evolution of birds. Everyone will start at the same stage and make their way through the evolutionary stages by playing games of rock-paper-scissors one on one.

First Grade Strand 1.2 – The Needs of Living Things and Their Offspring

Living things (plants and animals, including humans) depend on their surroundings to get what they need, including food, water, shelter, and a favorable temperature. Plants and animals have external features that allow them to survive in a variety of environments. Young plants and animals are similar but not exactly like their parents. In many kinds of animals, parents and offspring engage in behaviors that help the offspring to survive.

Standard 1.2.3

Obtain, evaluate, and communicate information about the patterns of plants and nonhuman animals that are alike, but not exactly like, their parents. An example could include that most carrots are orange and shaped like a cone but may be different sizes or have differing tastes. (LS3.A, LS3.B)

Third Grade Strand 3.2 – Effects of Traits on Survival

Organisms (plants and animals, including humans) have unique and diverse life cycles, but they all follow a pattern of birth, growth, reproduction, and death. Different organisms vary in how they look and function because they have different inherited traits. An organism's traits are inherited from its parents and can be influenced by the environment. Variations in traits between individuals in a population may provide advantages in surviving and reproducing in particular environments. When the environment changes, some organisms have traits that allow them to survive, some move to new locations, and some do not survive. Humans can design solutions to reduce the impact of environmental changes on organisms.

Standard 3.2.2

Analyze and interpret data to identify patterns of traits that plants and animals have inherited from parents. Emphasize the similarities and differences in traits between parent organisms and offspring and variation of traits in groups of similar organisms. (LS3.A, LS3.B)

Fourth Grade Strand 4.1: Organisms Functioning in Their Environment

Through the study of organisms, inferences can be made about environments both past and present. Plants and animals have both internal and external structures that serve various functions for growth, survival, behavior, and reproduction. Animals use different sense receptors specialized for particular kinds of information to understand and respond to their environment. Some kinds of plants and animals that once lived on Earth can no longer be found. However, fossils from these organisms provide evidence about the types of organisms that lived long ago and the nature of their environments. Additionally, the presence and location of certain fossil types indicate changes that have occurred in environments over time.

Standard 4.1.3

Analyze and interpret data from fossils to provide evidence of the stability and change in organisms and environments from long ago. Emphasize using the structures of fossils to make inferences about ancient organisms. Examples of fossils and environments could include comparing a trilobite with a horseshoe crab in an ocean environment or using a fossil footprint to determine the size of a dinosaur. (LS4.A)

Essential Questions:

- How have birds changed physically since the dinosaurs?
- Why are changes over time important?

Enduring Understandings:

- Birds evolved from dinosaurs
- Birds changed physically over time to become what they are today

Objectives:

Students will...

- Identify *Archaeopteryx* as a type of feathered and scaled dinosaur that was the precursor to birds. Students should be able to list 2-3 difference between *Archaeopteryx* and modern day birds.
- Identify the Dodo as a large, feathered but flightless bird that existed after *Archaeopteryx* and is now extinct. Students should be able to list 2-3 differences between the Dodo and *Archaeopteryx* or modern day birds.
- Identify a Golden eagle and Bald eagle as modern day birds that are covered in feathers and are able to fly very well. Students should be able to list 2-3 differences between these modern day birds and Dodo birds or *Archaeopteryx*
- Interact with their fellow students in an activity that represents the changes birds went through to become what they are today.

Materials:

- Images of *Archaeopteryx*, a Dodo, a Bald eagle, and a Golden eagle. (Provided)
- *Archaeopteryx*, Dodo, and Eagle coloring sheets. (Provided)

Background Information:

Archaeopteryx: 150 million years ago (during the late Jurassic period) there lived what has been called “the first bird”. The name *Archaeopteryx* means “old wing” and is a genus of bird-like dinosaurs that were transitional between feathered dinosaurs and modern day birds. Based on fossil evidence, scientists think they were magpie/raven sized (about 1-1.5 feet in length) and could fly. Drawings have been made depicting what scientists believe *Archaeopteryx* may have looked like but no one knows for sure.

Dodo bird: Dodo’s are a medium sized flightless bird that are now extinct. Recorded sightings of the Dodo range from 1598-1662. They were native to an island in the Indian Ocean. Dodo’s are in the same family as pigeons though they are much larger (about 3 feet tall). Unlike the *Archaeopteryx* which was never seen alive by human eyes, there are many illustrations and written descriptions of the Dodo. Because cameras weren’t available while the Dodo was alive these accounts vary and it’s hard to know the most which are the most accurate depictions of this bird.

Eagles: Eagles are a modern day bird of prey that have become specialized and adapted over time to survive well in their habitat. Both Golden eagles and Bald eagles prefer partially open to open habitats where they can better spot their prey from high above. Golden eagles live in a wide variety of habitats such as tundra, grasslands, desert, mountains, and cliffs. Bald eagles prefer to live around wetlands (marshes, rivers, oceans, etc.) where there is an abundance of fish. Eagles are excellent fliers and soar high in the sky and are able to observe everything below them. They are expert hunters with sharp eyesight and deadly talons meant for grabbing and crushing their prey. We know much more about these modern day birds than the *Archaeopteryx* and Dodo birds because of technological advances and more in depth research. Golden eagles and Bald eagles are native to Utah and can be seen in the wild if you know where to look. You can see Golden eagles in most open country in Utah (roadsides, fields, desert, etc.), especially mountains. In the fall, Golden eagles migrate to the more southern regions of their range for the winter (i.e. Southern Arizona, northern Mexico). If you want to spot a bald eagle you’ll have to look near wetlands since fish is their main diet. They migrate south in February and are best spotted in that month. Eagles are the largest birds of prey found in Utah (up to 3 feet tall and have a wingspan of 6-8 feet).

Key Vocabulary:

- Archaeopteryx: “The First bird”-a genus of prehistoric bird that lived with the dinosaurs
- Dodo: a flightless bird (now extinct) that lived until the mid-1600’s
- Eagle: A large raptor that can be found in Utah
- Evolution: the change in a species over time

Procedure: (If completing at home with less than 8 people, see home procedure)

1. Pull out graphics of *Archaeopteryx*, a Dodo, and a Golden eagle and Bald eagle.
2. Start by asking students if they can list off some dinosaurs (brontosaurus, T-rex, etc.). Now ask them if they know of any flying dinosaurs (pterodactyl). Lastly, ask them if they know of any dinosaurs that had feathers. Dinosaurs that they may know about have

scales and no feathers, but did they know that there were birds that existed at the same time the dinosaurs did? Birds are some of the oldest existing creatures!

3. Show them the graphic of an *Archaeopteryx* fossil and an artist's rendition of how it may have looked. Write the name of this prehistoric genus on the board and have the students practice saying it (are-kee-ahp-trix). What do they notice about this creature? It has scales AND feathers! It's a relative of dinosaurs and birds. Explain that like all the other dinosaurs, it is no longer alive and scientists don't know for sure how it looks. But they can guess based on fossil evidence. They believed it was about 1 foot tall and close to the size of a raven or magpie.
4. Ask the class if they have ever heard the word evolution. It's a really big word that means that animals have changed over time to look like what they do now. Ask them if they've seen birds that live now that have scales. Most birds we see are almost totally covered in feathers (though there are birds that have retained featherless parts of their body like dinosaurs). Feathers are something that birds *evolved* since the time that *Archaeopteryx* was alive. Show them the picture of the Dodo. Explain that this bird was covered in feathers but had wings that were small and it couldn't fly. It no longer exists but when it did live it spent all its time on the ground like we do because it didn't need to fly to get its food like some birds do. Note its big beak and explain how that was perfect for eating large fruit that fell off trees and onto the ground. Also note that it was much bigger than *Archaeopteryx* and was believed to be about 3 feet tall (almost as tall as you all are!).
5. Finally, show the class the pictures of the Golden eagle and Bald eagle. Ask if anyone knows what these birds are or if they have ever seen them in the wild. These eagles are birds that live today! They have also evolved and have feathers all over their bodies and they have giant wings perfect for soaring and flying. Like the Dodo, these eagles have very large beaks used for tearing apart their food. Unlike the Dodo, they also evolved very sharp talons on their feet that are perfect for grabbing their prey (other animals) for their meal. They are the largest flying predators in Utah and are almost 3 feet tall like the Dodo (though they don't walk on the ground as much) and their wing span is 6-8 feet!
6. Next it's time to play a game and see if we can evolve to eagles! Here is how to play: Everyone starts off as *Archaeopteryx*.
 - a. The motion for *Archaeopteryx* is to tuck your arms next to your sides and flap only your hands like wings. Each student is to find another *Archaeopteryx* to battle. To "battle" have the two students play rock-paper-scissors. The winner gets to evolve to a Dodo. The loser has to remain an *Archaeopteryx* and find another student who is *Archaeopteryx* to battle with until they are able to evolve.
 - b. If they evolve to a Dodo, they change their motion. The motion for the Dodo is to tuck your fists under your arms and flap your elbows (much like the chicken dance motion). Once they have evolved to a Dodo they have to find another Dodo to battle. Once they do they play rock-paper-scissors again. The loser stays a Dodo and the winner becomes an Eagle. The remaining Dodo has to go find other Dodos to battle until they become an Eagle.

- c. If they evolve into an Eagle, they change their motion. The motion for the Eagle is to spread your arms out wide like giant wings and flap them up and down. Eagles find other Eagles to battle. They play rock-paper-scissors. The winner goes on to be a King Eagle. While the rest of the students finish playing they are to fly in a circle around the rest of the group flapping their wings like an eagle. (If desired, a sticker or other small prize can be given to the students when they reach King Eagle status.)
 - d. The game continues until everyone has had a chance to become a King Eagle! If there are students left over that don't have matching partners to play with you can still have them play against each other until everyone can be a King Eagle. The last student can play with the teacher until they also become a King Eagle.
7. Once the game is complete have students sit back down and ask if they would rather be an *Archaeopteryx* with scales and feathers, a Dodo living on the ground and eating fruit, or an eagle flying high in the air and catching and eating mice, rabbits, and fish? Based on what they choose hand them a coloring sheet with the bird they want to be on it and allow time to color and draw on their bird. First have students draw the kind of habitat they would live in and the food they would eat. Then after they have done this have them take time to color the rest of their bird.

Alternate Activity Activity Procedure

Materials: (5 per person playing)

(Disclaimer: these are recommendations, use whatever works and is available to your family)

- Anything tube-like that could represent a snake or reptile (string, rope, etc., reptile toys would work great if available)
 - o Represents reptile or snake
- Rocks, golf balls, decorative fruit, etc.
 - o Represents rocks, nuts, bulbs, roots, seeds or fruit
- Sponges, bean bags, cotton balls, stuffed animals
 - o Represents fish, birds, and rodents

Procedure

1. Pull out graphics of Archaeopteryx, a Dodo, and a Golden eagle and Bald eagle.
2. Start by asking student(s) if they can list off some dinosaurs (brontosaurus, T-rex, etc.). Now ask them if they know of any flying dinosaurs (pterodactyl). Lastly, ask them if they know of any dinosaurs that had feathers. Dinosaurs that they may know about have scales and no feathers, but did they know that there were birds that existed at the same time the dinosaurs did? Birds are some of the oldest existing creatures!
3. Show them the graphic of an Archaeopteryx fossil and an artist's rendition of how it may have looked. Write the name of this prehistoric genus on the board and have the students practice saying it (are-kee-ahp-trix). What do they notice about this creature? It has scales AND feathers! It's a relative of dinosaurs and birds. Explain that like all the other dinosaurs, it is no longer alive and scientists don't know for sure how it looks. But they can guess based on fossil evidence. They believed it was about 1 foot tall and close to the size of a raven or magpie.

4. Ask the student(s) if they have ever heard the word evolution. It's a really big word that means that animals have changed over time to look like what they do now. Ask them if they've seen birds that live now that have scales. Most birds we see are almost totally covered in feathers (though there are birds that have retained featherless parts of their body like dinosaurs). Feathers are something that birds evolved since the time that Archaeopteryx was alive. Show them the picture of the Dodo. Explain that this bird was covered in feathers but had wings that were small and it couldn't fly. It no longer exists but when it did live it spent all its time on the ground like we do because it didn't need to fly to get its food like some birds do. Note its big beak and explain how that was perfect for eating large fruit that fell off trees and onto the ground. Also note that it was much bigger than Archaeopteryx and was believed to be about 3 feet tall (almost as tall as you all are!).

5. Finally, show the student(s) the pictures of the Golden eagle and Bald eagle. Ask if anyone knows what these birds are or if they have ever seen them in the wild. These eagles are birds that live today! They have also evolved and have feathers all over their bodies and they have giant wings perfect for soaring and flying. Like the Dodo, these eagles have very large beaks used for tearing apart their food. Unlike the Dodo, they also evolved very sharp talons on their feet that are perfect for grabbing their prey (other animals) for their meal. They are the largest flying predators in Utah and are almost 3 feet tall like the Dodo (though they don't walk on the ground as much) and their wing span is 6-8 feet!

6. Next it's time to play a game and see if we can evolve to eagles! Here is how to play: Everyone starts off as Archaeopteryx. The goal of the game is to collect enough food to evolve into the next animal. The student(s) have to walk around like the animal while searching for food. They have to collect five of each food.

1. Hide the "food" around the house and outside (weather permitting). Though not much is known about the Archaeopteryx diet, many scientists believe that they most likely ate smaller lizards and snakes. The motion for Archaeopteryx is to tuck your arms next to your sides and flap only your hands like wings. Each student is to find another five "snakes" or "reptiles" before they can evolve into a Dodo.

2. If they evolve to a Dodo, they change their motion. The motion for the Dodo is to tuck your fists under your arms and flap your elbows (much like the chicken dance motion). They have to walk around like this while they try to find their "food". Dodos had a very odd diet that consisted of rocks (think of the dodos in the movie *Ice Age*), fruit, seeds bulbs and fallen fruit. Once they have collected all their food they can evolve into an eagle. If they evolve into an Eagle, they change their motion. The motion for the Eagle is to spread your arms out wide like giant wings and flap them up and down. Eagles, depending on their habitat will eat something different (eagles near oceans will eat fish, eagles in desert areas may eat reptiles, eagles near plains may eat rodents or smaller birds, etc.). The sponges could represent fish, cotton balls and bean bags can represent rodents or birds, etc. Once the student(s) collect their five food items they evolve into a King Eagle! (If desired, a sticker or other small prize can be given to the student(s) when they reach King Eagle status.) If you have more than one student, the game can continue until everyone meets King Eagle status.

7. Once the game is complete have student(s) sit back down and ask if they would rather be an Archaeopteryx with scales and feathers, a Dodo living on the ground and eating fruit, or an eagle flying high in the air and catching and eating mice, rabbits, and fish? Based on what

they choose, hand them a coloring sheet with the bird they want to be on it and allow time to color and draw on their bird. First have students draw the kind of habitat they would live in and the food they would eat. Then after they have done this have them take time to color the rest of their bird.

Additional Activity/Extension:

This activity can be applied to many different creatures and scenarios. Some examples could be life cycles, the water cycle, the evolution of other species, etc.

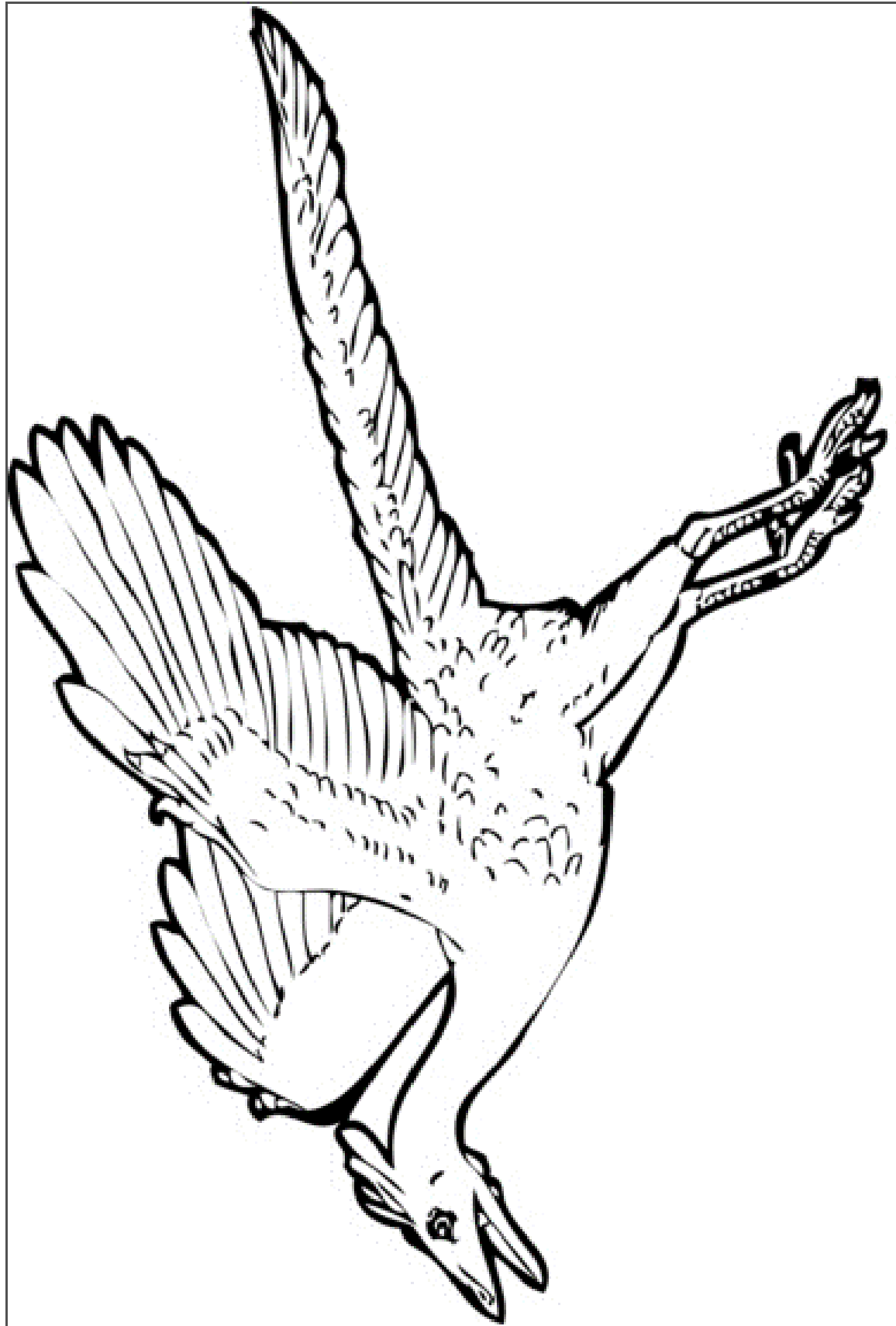


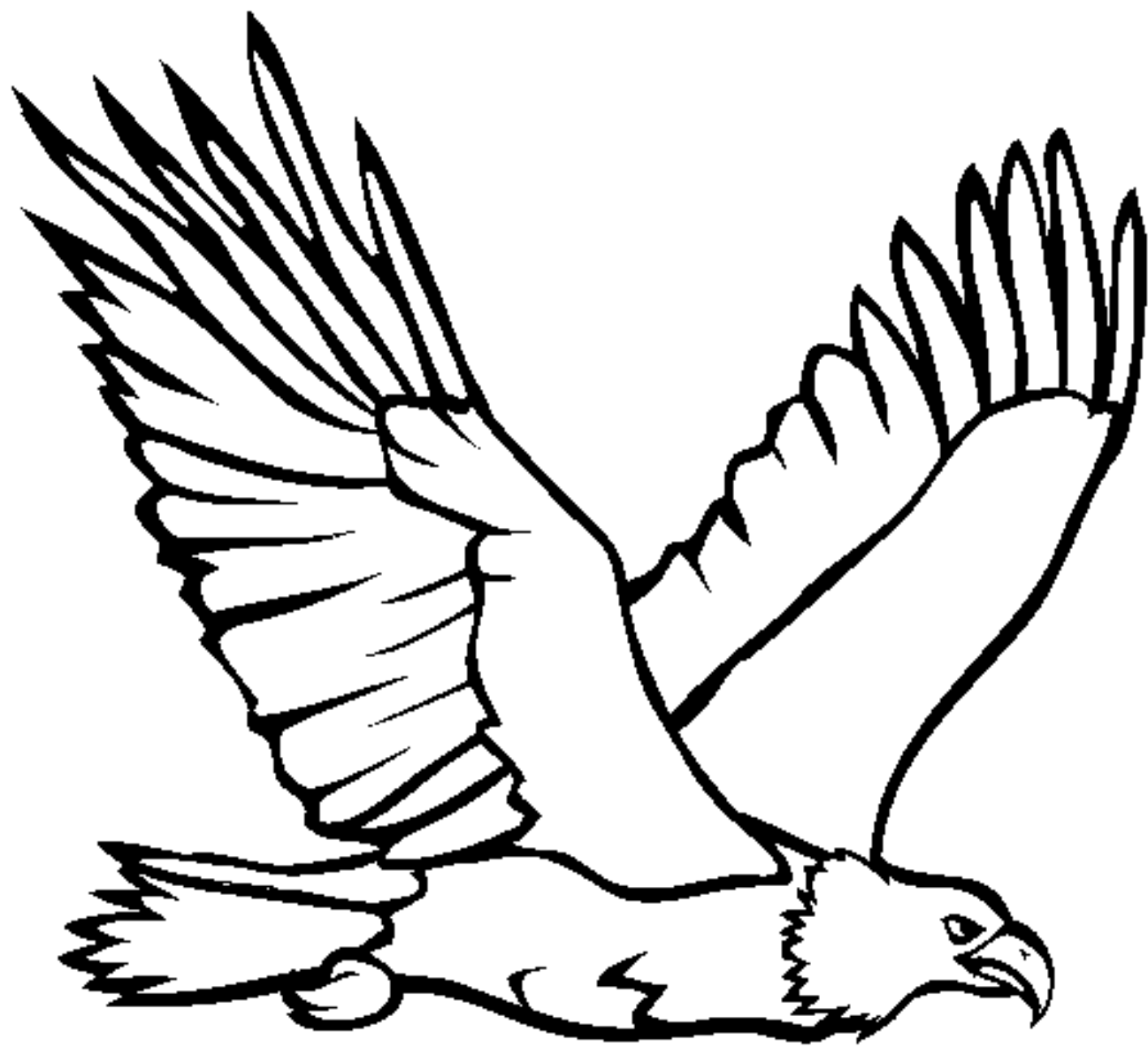


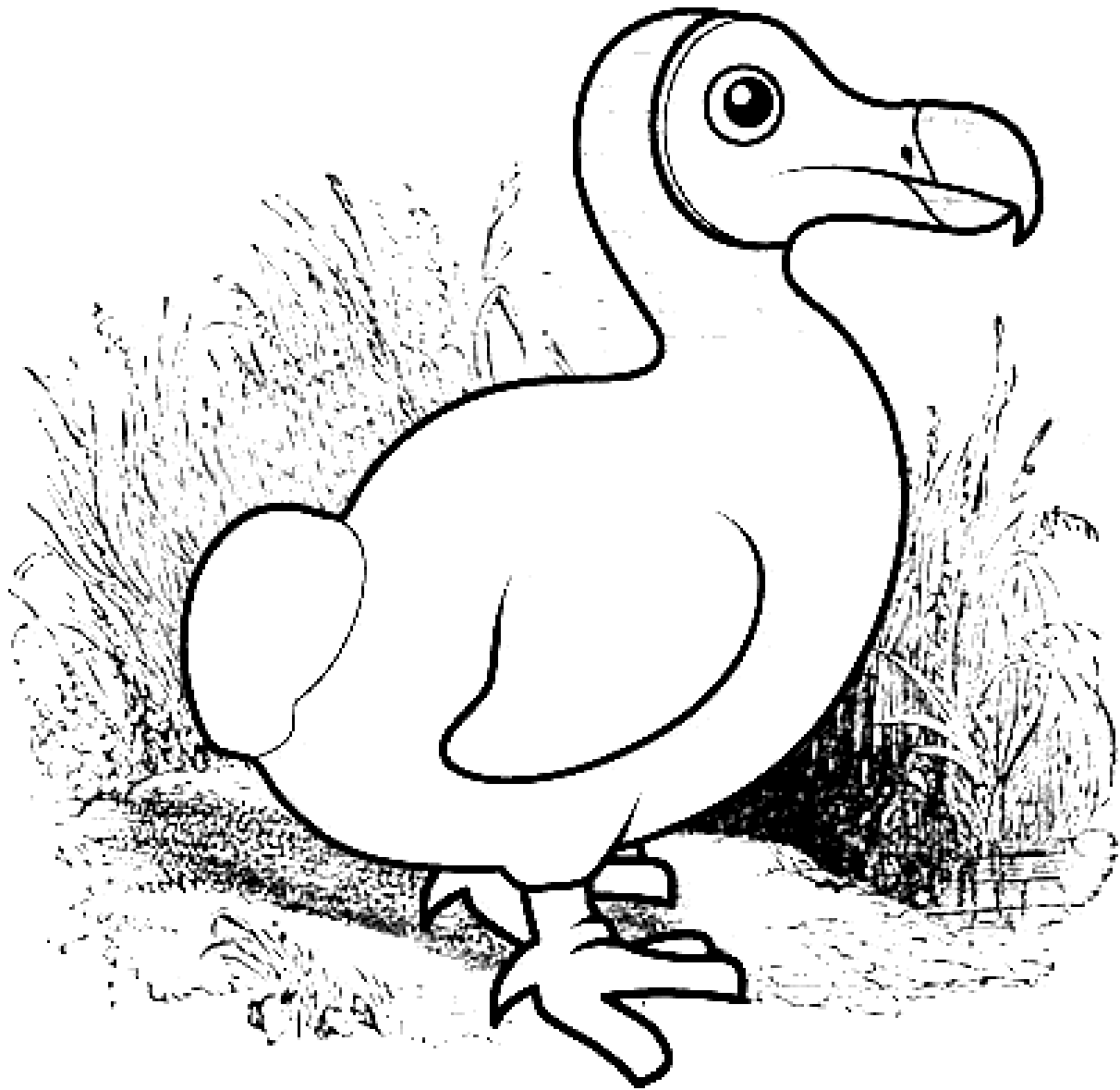












THE DODO.