



## What is a Dinosaur? Part I: Birds and Dinosaurs

Adapted from original *What is a Dinosaur?* Activity from MOR Dinosaur Trunk

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Grade Level: K-8

Preparation Time: 5 minutes or less (after background material is understood)

Activity Duration: 30 minutes

### Objectives

The student will:

- Observe characteristics of different animals.
- Determine which characteristics define avian dinosaurs.
- Determine which characteristics define non-avian dinosaurs.
- Categorize animals as avian dinosaurs or non-avian dinosaurs.
- Be able to explain why each animal was categorized as it was.
- Be able to list reasons why birds are now considered to be dinosaurs.

### Materials Included

- Plastic animals labeled 2, 3, 5, 6, 11, and 14-19 (11 total)
- Two Plastic bins
- Laminated signs—"Avian Dinosaur" and "Non-Avian Dinosaur"
- *What is a Dinosaur?* Notes

### Background

Science, by its very nature, corrects itself. Scientists study the evidence they have to come up with the best understanding they can. Sometimes, new discoveries provide new evidence that can really change our understanding drastically. A good example of this process of science is the series of discoveries that have led scientists to accept birds as dinosaurs. In fact, most of the scientific community has accepted that birds are living dinosaurs for the past several decades! So why is the topic of birds and dinosaur relationships still so misunderstood by the public? There are several reasons: 1. sometimes it takes a very long time for a confusing topic in science to become publicly understood, 2. many movies, books, news stories and teaching materials still avoid this topic or present it incorrectly, 3. because dinosaur and bird relationships are based on evolution the topic may be also be avoided. It is time to change our and our students, perception of dinosaurs based on the best scientific data that we have.

Dinosaurs are a unique type of reptile whose legs support their bodies from directly underneath, not sprawled out to the side. Dinosaurs can be large like *T.rex* or *Triceratops* (as we often think of them) or small like *Velociraptor*. As scientists have made discoveries and learned

more about dinosaurs, they have realized that dinosaurs of the past and modern birds have very similar features. Birds have similar skeletal structure, similar bones that no other animals have and unique features like feathers (paleontologists have found fossils of feathered dinosaurs). More and more evidence indicates that dinosaurs of the past and modern birds are not only related, but that birds evolved from a certain kind of dinosaur during the Mesozoic era.

Leading paleontologists now use the terminology “non-avian dinosaurs” and “avian dinosaurs”. Non-avian dinosaurs are those dinosaurs that lived during the Mesozoic Era and that are now extinct. Avian dinosaurs are a type of dinosaur that have feathers, can fly and that managed to survive the extinction event at the end of the Mesozoic era that killed all of the non-avian dinosaurs.

Non-avian dinosaurs can also be called non-flying dinosaurs, and avian dinosaurs can also be called flying dinosaurs. However, this can lead to confusion because many people think of animals like Pterodactyl and Pteranodon when they hear the words “flying dinosaur”. Actually, avian dinosaurs such as early and modern birds have much more similarity to non-avian dinosaurs than Pterodactyls and Pteranodons have to either avian or non-avian dinosaurs. We consider animals like Pterodactyls and Pteranodons to be “flying reptiles”.

In addition to the terminology above, by accepting birds as dinosaurs which are classified as reptiles, we must also now accept birds as reptiles. This seems strange to us because we have an idea in our head about what a reptile should be. We need to be open to changing our understanding based on the evidence provided by the natural world—science.

So, stop thinking about dinosaurs as creatures that roamed long ago and that are now extinct. **Start thinking of modern birds as dinosaurs that came into existence as avian dinosaurs alongside the non-avian dinosaurs of the past and then survived extinction to live through to the present.**

For more information about this topic refer to the books *Boy Were We Wrong About Dinosaurs* by Kathleen V. Kundlinski and *How Dinosaurs Took Flight* by Christopher Sloan both found in this trunk.

In this activity, students simply observe and categorize plastic toys as “avian dinosaur” or “non-avian dinosaur”. There are no tricks, it is just to begin to familiarize your students with the concept and terminology.

#### Procedure

1. Lead a discussion about dinosaurs and birds and their new classifications as avian and non-avian dinosaurs.
2. Spread the provided plastic toys across a table at the front of the room.
3. Place the two plastic boxes on the table, as well. Label one with the sign “avian dinosaurs” and the other with the sign “non-avian dinosaurs”.

4. As a class, hold up one animal at a time and ask the class to classify it as an “avian dinosaur” or “non-avian dinosaur”.

#### Assessment

- Instead of doing this activity aloud as a class, have the students number and record their answers and turn them in to be assessed.

#### Extensions

- This topic can lead to much confusion for teachers and students. The Museum of the Rockies would like to act as a resource to aid understanding. As an extension to this activity, your class can visit the Bone Blog on the Museum of the Rockies website at <http://www.museumoftherockies.org/Home/EXPLORE/Paleontology/PaleoResources/BoneBlog/tabid/91/Default.aspx> and post questions to be answered by MOR paleontologists and educators.

### What is a Dinosaur? Notes for Parts I and II

Number	Animal	Part I	Part II	Explanation Part I	Explanation Part II
1	Dimetrodon		Not a Dinosaur		A Dimetrodon is not a dinosaur. It is a reptile with legs sprawled to the sides of its body that lived during the Mesozoic Era that is now extinct.
2	<i>Stegosaurus</i>	Non-Avian Dinosaur	Dinosaur	A <i>Stegosaurus</i> is a non-avian dinosaur. It is a reptile with legs directly beneath its body. It lived during the Mesozoic Era and is now extinct.	A <i>Stegosaurus</i> is a dinosaur--a non-avian dinosaur that lived during the Mesozoic Era and is now extinct.
3	Snowy Owl	Avian Dinosaur	Dinosaur	The Snowy Owl is an avian dinosaur. It is a reptile with legs directly beneath its body. It lives now but evolved from avian dinosaurs that lived during the Mesozoic Era.	A Snowy Owl is a dinosaur--an avian dinosaur that evolved from avian dinosaurs from the Mesozoic Era and lives today.
4	Elasmosaurus		Not a Dinosaur		An Elasmosaurus is not a dinosaur. It is a marine reptile that lived in the shallow inland seas during the Mesozoic Era.
5	Pelican	Avian Dinosaur	Dinosaur	The Pelican is an avian dinosaur. It is a reptile with legs directly beneath its body. It lives now but evolved from avian dinosaurs that lived during the Mesozoic Era.	A Pelican is a dinosaur--an avian dinosaur that evolved from avian dinosaurs from the Mesozoic Era and lives today.
6	<i>Apatosaurus</i>	Non-Avian Dinosaur	Dinosaur	An <i>Apatosaurus</i> is a non-avian dinosaur. It is a reptile with legs directly beneath its body. It lived during the Mesozoic Era and is now extinct.	An <i>Apatosaurus</i> is a dinosaur--a non-avian dinosaur that lived during the Mesozoic Era and is now extinct.
7	Saber-Toothed Tiger		Not a Dinosaur		A Saber-toothed Tiger is not a dinosaur. It is a mammal that lived after the Mesozoic Era. Although this animal is extinct, it is not a dinosaur.
8	Mososaurus		Not a Dinosaur		A Mososaurus is not a dinosaur. It is a marine reptile that lived in the shallow inland seas during the Mesozoic Era.
9	Crocodile		Not a Dinosaur		A crocodile is not a dinosaur. It is a reptile that lives today. Its legs sprawl out to the sides of its body. Although it may seem more like a non-avian dinosaur to you than a bird does, when closely compared a crocodile is much less similar to a non-avian dinosaur than a bird is.

10	Pteranodon		Not a Dinosaur		A Pteranodon is not a dinosaur. It is a flying reptile that lived during the Mesozoic Era with avian and non-avian dinosaurs. Although this reptile can fly, it is very different than both non-avian and avian dinosaurs. It has a much different skeleton and it does not have feathers.
11	Penguin	Avian Dinosaur	Dinosaur	The Penguin is an avian dinosaur. It is a reptile with legs directly beneath it's body. It lives now but evolved from avian dinosaurs that lived during the Mesozoic Era.	A Penguin is a dinosaur--an avian dinosaur that evolved from avian dinosaurs from the Mesozoic Era and lives today.
12	Iguana		Not a Dinosaur		An Iguana is not a dinosaur. It is a reptile that lives today. It's legs sprawl out to the sides of it's body. Although it may seem more like a non-avian dinosaur to you than a bird does, when closely compared a crocodile is much less similar to a non-avian dinosaur than a bird is.
13	Wooly Mammoth		Not a Dinosaur		A Wooly Mammoth is not a dinosaur. It is a mammal that lived after the Mesozoic Era. Although this animal is extinct, it is not a dinosaur.
14	Chicken	Avian Dinosaur	Dinosaur	The Chicken is an avian dinosaur. It is a reptile with legs directly beneath it's body. It lives now but evolved from avian dinosaurs that lived during the Mesozoic Era.	A Chicken is a dinosaur--an avian dinosaur that evolved from avian dinosaurs from the Mesozoic Era and lives today.
15	<i>Allosaurus</i>	Non-Avian Dinosaur	Dinosaur	An <i>Allosaurus</i> is a non-avian dinosaur. It is a reptile with legs directly beneath it's body. It lived during the Mesozoic Era and is now extinct.	An <i>Allosaurus</i> is a dinosaur--a non-avian dinosaur that lived during the Mesozoic Era and is now extinct.
16	Parrot	Avian Dinosaur	Dinosaur	The Parrot is an avian dinosaur. It is a reptile with legs directly beneath it's body. It lives now but evolved from avian dinosaurs that lived during the Mesozoic Era.	A Parrot is a dinosaur--an avian dinosaur that evolved from avian dinosaurs from the Mesozoic Era and lives today.
17	<i>Velociraptor</i>	Non-Avian Dinosaur	Dinosaur	A <i>Velociraptor</i> is a non-avian dinosaur. It is a reptile with legs directly beneath it's body. It lived during the Mesozoic Era and is now extinct.	A <i>Velociraptor</i> is a dinosaur--a non-avian dinosaur that lived during the Mesozoic Era and is now extinct.

18	Duck	Avian Dinosaur	Dinosaur	The Duck is an avian dinosaur. It is a reptile with legs directly beneath it's body. It lives now but evolved from avian dinosaurs that lived during the Mesozoic Era.	A Duck is a dinosaur--an avian dinosaur that evolved from avian dinosaurs from the Mesozoic Era and lives today.
19	<i>Triceratops</i>	Non-Avian Dinosaur	Dinosaur	A <i>Triceratops</i> is a non-avian dinosaur. It is a reptile with legs directly beneath it's body. It lived during the Mesozoic Era and is now extinct.	A <i>Triceratops</i> is a dinosaur--a non-avian dinosaur that lived during the Mesozoic Era and is now extinct.
20	Alligator		Not a Dinosaur		An alligator is not a dinosaur. It is a reptile that lives today. It's legs sprawl out to the sides of it's body. Although it may seem more like a non-avian dinosaur to you than a bird does, when closely compared a crocodile is much less similar to a non-avian dinosaur than a bird is.