

Science & Literacy Activity

ACTIVITY OVERVIEW

This activity, which is aligned to the Common Core State Standards (CCSS) for English Language Arts, introduces students to scientific knowledge and language related to how fossil evidence allows paleontologists to conclude that birds are dinosaurs.

This activity has three components:

- BEFORE YOUR VISIT**, students will read a content-rich article about how fossil evidence allows paleontologists to conclude that birds are dinosaurs. This article will provide context for the visit, and also help them complete the post-visit writing task.
- AT THE MUSEUM**, students will read and engage with additional texts (including printed text, digital and physical/hands-on interactives, video, diagrams, models). This information will help them complete the post-visit writing task.
- BACK IN THE CLASSROOM**, students will draw on the first two components of the activity to complete a CCSS-aligned explanatory writing task about how fossil evidence allows paleontologists to conclude that birds are dinosaurs.

Materials in this packet include:

For Teachers

- Activity Overview (p. 1-2)
- Article (teacher version): “Shedding Light on the Dinosaur-Bird Connection” (p. 3-7)
- Answers to student worksheets (p. 8-10)
- Assessment rubric for student writing task (p. 11-12)

For Students

- Article (student version): “Shedding Light on the Dinosaur-Bird Connection” (p. 13-16)
- Student worksheet for the *Dinosaurs Among Us* exhibition visit (p. 17-19)
- Student writing task and rubric (p. 20-22)

1. BEFORE YOUR VISIT

Students will read a content-rich article about how fossil evidence allows paleontologists to conclude that birds are dinosaurs. This article will provide context for the visit, and help them complete the post-visit writing task.

Preparation

- Familiarize yourself with the student writing task and rubric (p. 20-22).
- Familiarize yourself with the teacher version of the article (p. 3-7), and plan how to facilitate the students’ reading of the article.

Instructions

- Explain the goal: to complete a writing task about how fossil evidence allows paleontologists to conclude that birds are dinosaurs.
- Tell students that they will need to read an article before visiting the Museum, and read additional texts during the visit.
- Distribute the article, student writing task, and rubric to students.

Common Core State Standards

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.

RST.6-8.2 Determine the central ideas or conclusions of a text, provide an accurate summary of the text distinct from prior knowledge or opinions.

WHST.6-8.2 Write informative/explanatory texts, including the narration of scientific procedures/experiments.

New York State Science Core Curriculum

LE3.2c

Next Generation Science Standards

DCI: LS4.A: Evidence of Common Ancestry and Diversity

Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record, enable the reconstruction of evolutionary history and the inference of lines of evolutionary descent.

SEP 8: Obtaining, Evaluating, and Communicating Information

- Critically use scientific texts adapted for classroom use to determine the central ideas and/or obtain scientific information to describe evidence about the natural world.
- Communicate scientific information in writing

- Review the rubric with students and tell them that it will be used to grade their writing.
- Read and discuss the article, using the teacher notes to facilitate.

2. DURING YOUR VISIT

At the Museum, students will read and engage with additional texts (including printed text, digital and physical/hands-on interactives, video, diagrams, models). The information they'll gather from these multiple sources will help them complete the post-visit writing task.

Preparation

- Review the educator's guide to see how themes in the exhibition connect to your curriculum and to get an advance look at what your students will encounter. (Guide is downloadable at amnh.org/dinosaurs-among-us/educators)
- Familiarize yourself with the student worksheets (p. 17-19) and the map of the exhibition.

Instructions

- Explain the goal of the Museum visit: to read and engage with texts (including printed text, digital and physical/hands-on interactives, video, diagrams, models), and to gather information to help them complete the post-visit writing task.
- Distribute and review the worksheet and map. Clarify what information students should collect, and where.

Additional Suggestions for Facilitating the Museum Visit

- Have students explore the exhibition in pairs, with each student completing his or her own student worksheet.
- Encourage student pairs to ask you or their peers for help locating information. Tell students they may not share answers with other pairs, but may point each other to places where answers can be found.

3. BACK IN THE CLASSROOM

Students will use what they have learned from the pre-visit article and at the Museum to complete a CCSS-aligned explanatory writing task about how fossil evidence allows paleontologists to conclude that birds are dinosaurs.

Preparation

- Plan how you will explain the student writing task and rubric (p. 20-22) to students.

Instructions

- Distribute the student writing task and rubric. Explain that they will use it while composing, and also to evaluate and revise what they have written.

Suggestions for Facilitating Writing Task

- Before they begin to write, have students use the writing task to frame a discussion around the information that they gathered at the Museum. They can work in pairs, small groups, or as a class, and can compare their findings.
- Referring to the writing prompt, have students underline or highlight all relevant passages and information from the article and from the notes taken at the Museum.
- Students should write their essays individually.

Supports for Diverse Learners

This resource has been designed to engage all learners with the principles of Universal Design for Learning in mind. It represents information in multiple ways and offers multiple ways for your students to engage with content as they read about, discuss, view, and write about scientific concepts. Different parts of the experience (e.g. reading texts, or locating information in the Museum) may challenge individual students. However, the arc of learning is designed to offer varied opportunities to learn. We suggest that all learners experience each activity, even if challenging. If any students have an Individualized Education Program (IEP), consult it for additional accommodations or modifications.

Alternate Version of Article

Another version of the same article with a lower lexile level is available for download at amnh.org/dinosaurs-among-us/educators. You can use this same activity with that article.

ARTICLE: TEACHER VERSION

About this Article

Lexile: 970

Wordcount: 916

Text Complexity: The Lexile level for this text falls towards the low end of the grades 6-8 CCSS text complexity band. This text is suitable as an interactive read-aloud. Teachers should use their professional judgment and knowledge of students' independent reading levels regarding assigning this text for independent reading.

Notes: Students should be sitting with elbow partners for this interactive read-aloud. Whenever the teacher notes suggest **Think/Pair/Share**, it is generally followed by instructions to "listen in" to student conversations. This enables the teacher to select students to share out thinking that would benefit the whole group to hear. Additionally, it allows the teacher to informally assess student thinking about the text. The teacher can follow up with a think aloud to help clarify parts of the text as needed. At times, the teacher may want to facilitate whole class discussion after **Think/Pair/Share**.

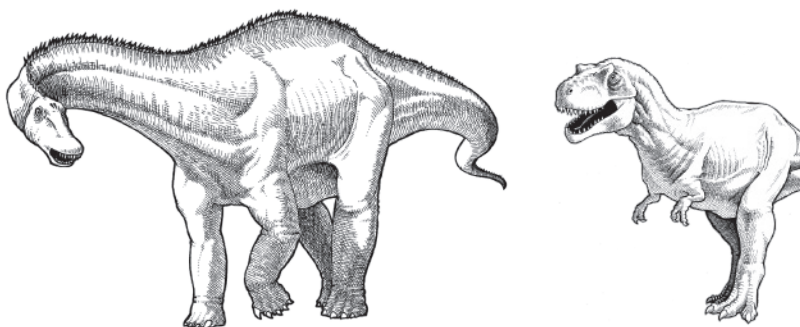
These teacher notes allow for frequent stopping for partner talk and sharing out. Individual teachers should modify this interactive read-aloud in a way that suits the needs of their students. For instance, teachers may want to have students read parts of the text independently, depending on students' reading levels. A strategy that teachers might consider using throughout this text is annotating in the margins. After stopping to talk with a partner and/or engage in whole group discussion, students can jot a phrase that expresses the main idea ("gist statement") in the margin. Teachers can demonstrate this for the first few paragraphs and then ask students to jot gist statements in partners or independently as the read-aloud progresses.

Key for Teacher Notes

- **Green text**
specific strategies
- Regular text
instructions for teachers
- *Italicized text*
teacher's instructions to students
- Underlined text
important domain-specific words

Shedding Light on the Dinosaur-Bird Connection

When people think of dinosaurs, two types generally come to mind. There were the huge herbivores, like *Apatosaurus*, with their small heads and long tails. There were also those fearsome carnivores, like *Tyrannosaurus rex*, that walked on two legs and had a mouthful of teeth like kitchen knives.



Living Dinosaurs

These large dinosaurs are no longer around, but dinosaurs still live among us today. They are the birds. It's difficult to imagine that a bird on your window sill and a *T. rex* have anything in common. One weighs less than a pound. The other was the size of a school bus, tipping the scales at eight tons. But for all their differences, the two are more similar than you might think. In fact, birds and *T. rex* are close relatives. They all belong to a group of dinosaurs called theropods.

Think Aloud: *Wow. It sounds like we just learned about the central idea of this article.*

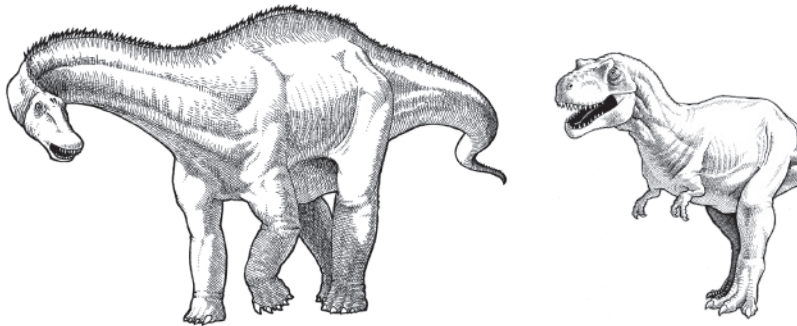
Think/Pair/Share: *Can you turn and tell your partner what you think the central idea is so far? Go back to the text and reread first if you'd like. Listen in and select a pair to share out.*

Think/Pair/Share: *With your partner, underline the sentences that support the idea that we just discussed (Birds are actually dinosaurs). Listen in and select a pair to share out.*

Optional: *Scribe notes on chart paper or smartboard throughout the read aloud. You might start by writing and underlining the central idea and adding bullet points below, taken from the sentences that students shared. You might choose to have students make notes as well. You can start them off and then ask them to note make more independently—in partners or independently.*

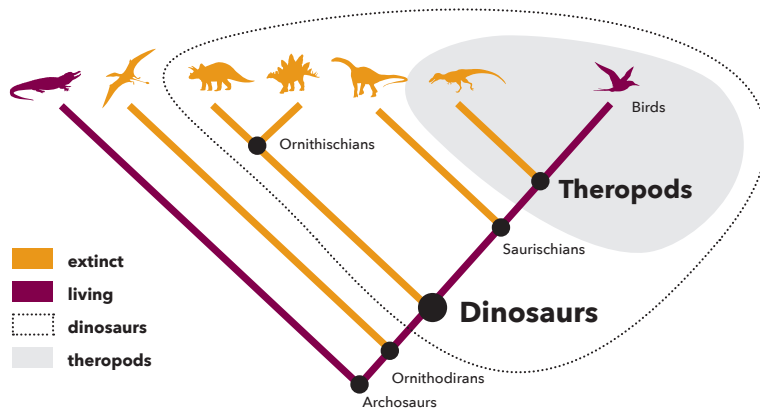
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This is a cladogram, a “tree” showing the relationships among organisms. The group called dinosaurs includes the extinct dinosaurs and all their living descendants. All its members, including living birds, descended from the very first dinosaur—their common ancestor. That’s why birds are a kind of dinosaur (just as humans are a kind of primate).

Think/Pair/Share: What do you notice about this image? Read the caption with your partner and discuss what this image is showing you.

Finding the Evidence

To better understand the link between non-bird dinosaurs and birds, scientists look for features they share. When studying living birds, they can observe their behavior and study their anatomy. It's a different story altogether when it comes to long-extinct dinosaurs. Behavior cannot be observed, and all that's left of these animals are the clues found in ancient rocks. This evidence includes fossilized bones, teeth, eggs, footprints, teeth marks, and even dung.



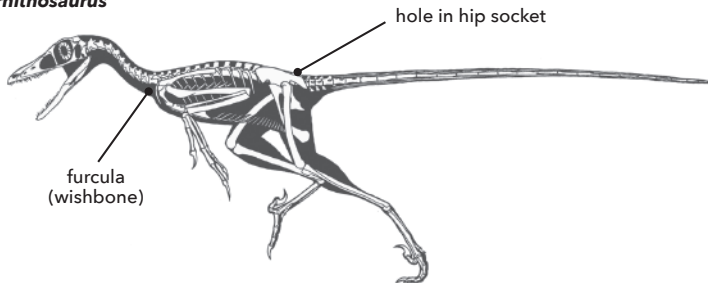
Think/Pair/Share: How does studying extinct animals differ from studying living animals? Listen in and select a pair to share out.

Optional: Add to notes.

Skeletal Evidence

When paleontologists compare a skeleton of a living bird to the fossilized skeleton of a non-bird theropod, like *Sinornithosaurus*, they see many similarities. They both have a hole in the hipbone, a feature that distinguishes most dinosaurs from all other animals. This feature allows an animal to stand erect, with its legs directly beneath its body. All theropod dinosaurs, including birds, have a furcula, also known as a wishbone. Another shared characteristic is the presence of hollow bones. Hollow bones reduce the weight carried by an animal. This feature enables the animal to run faster. It probably also played a role in the evolution of flight.

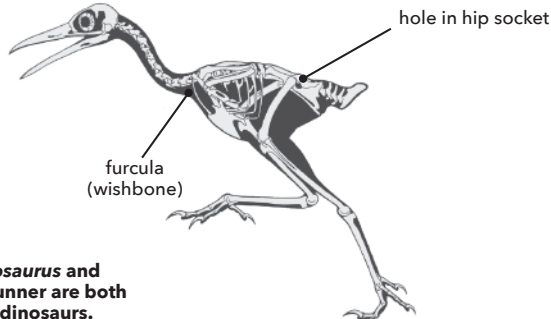
Sinornithosaurus



Think/Pair/Share: Based on this paragraph and the illustrations, what are the similarities between *Sinornithosaurus* and the roadrunner? Listen in and select a pair to share out.

Optional: Add to notes.

roadrunner



***Sinornithosaurus* and the roadrunner are both theropod dinosaurs.**

Behavioral Evidence

Birds build nests, lay eggs, and brood their nests. When scientists look at some non-bird theropod fossils, they see evidence of these same behaviors. The first discovery of this evidence was in 1993 in the Gobi Desert in Mongolia. Scientists unearthed a *Citipati* fossil brooding a cluster of eggs. Its limbs were folded back against its body. It is one of the few fossils ever found that demonstrates behavior. In this case, parental care. It shows that the behavior of brooding the nests that we see in living birds was already present in the non-bird ancestors of birds.



Citipati fossil nest

Citipati, like many other non-bird dinosaurs, had feathers. Yet it could not fly. Feathers were once thought to have evolved for flight. The discovery of more and more non-flying dinosaurs with feathers disproved that explanation. For these dinosaurs, feathers may have served other functions, like gliding, insulation, protection, and display. Feathers play that same role in many bird species today.

Based on the evidence of shared characteristics, scientists have concluded that birds are a type of theropod dinosaur.

Brain Evidence

Birds are the only dinosaurs with the ability to fly. This is very interesting to scientists who want to know when the



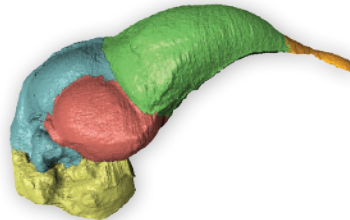
Sinornithosaurus had feathers similar to those of modern birds—even though it could not fly.

Think/Pair/Share: Discuss the two pieces of behavioral evidence that are explained in this section. Listen in and select a pair to share out.

Optional: Add to notes.

capability of flight emerged. To find out, some scientists study the brains of bird and non-bird dinosaurs. Soft tissue, such as brains, is almost never preserved in the fossil record. What is preserved is the imprint the brain left on the inside of the skull. Now scientists are using computed tomography (CT) scanners to create endocasts. These are detailed, three-dimensional reconstructions of the interiors of fossilized skulls.

In a recent study, researchers were able to peer inside the braincases of more than two dozen specimens. “Technology allows us to look inside these specimens without destroying them,” says Dr. Amy Balanoff, a Museum research associate. “It’s a non-destructive way to basically slice up a dinosaur brain. We look inside and see what it can tell us about the evolution of the brain within dinosaurs. Most of us grew up thinking that dinosaurs had tiny brains, but actually some had really big brains.”



Scientists use computed tomography (CT) scans of dinosaur skulls to create detailed, 3-D reconstructions of their interiors. This one shows the space inside the skull of *Archaeopteryx*.

The endocasts allow Balanoff and other researchers to explore the outer shape of the brain in more detail. In addition, the casts also provide new information about the volume and shape of different regions of the brain. For example, scientists looked at a detailed view of the dinosaur cerebrum, a region of the brain related to cognition and coordination. They found that this region was very large in non-bird dinosaurs closely related to birds. Dr. Balanoff’s research suggests that these dinosaurs developed big brains long before flight and that these bigger brains prepared the way for them to fly.

When examining skeletal, behavioral, and brain evidence, scientists see that birds and non-bird dinosaurs share many features. This helped them conclude that dinosaurs aren’t extinct after all. They’re living among us today.

Think/Pair/Share: How are scientists able to study the brains of long extinct dinosaurs? Listen in and select a pair to share out.

Think/Pair/Share: What did scientists discover when they looked at a detailed view of the dinosaur cerebrum? Listen in and select a pair to share out. Why was this important? Listen in and select a pair to share out.

Think/Pair/Share: Turn and talk to your partner about what you learned in this article. Listen in and select one or two pairs to share out.

Think/Pair/Share: What questions do you have after reading this article?

Optional: Write a summary (no more than eight sentences) describing what you learned.

Image Credits

Apatosaurus, *T. rex*, and cladogram, © AMNH; pigeon, © Pamala Wilson; *Sinornithosaurus* and roadrunner, © AMNH / Sean Murtha; *Citipati* fossil nest and *Sinornithosaurus* fossil, © AMNH / Mick Ellison; *Archaeopteryx* skull, © AMNH / Amy Balanoff.

STUDENT WORKSHEET

Name **ANSWER KEY**

Welcome to the *Dinosaurs Among Us* exhibition! Today, you'll investigate how paleontologists use fossil evidence to conclude that birds are living dinosaurs.

Directions: In each section of the exhibition, select one or more fossils to examine. Observe them closely and record the fossil evidence in the data table below.

	<i>sample answers below, other answers possible</i> Fossil information (e.g. name, age, location)	Sketch the fossil and label parts that provide evidence that birds are living dinosaurs.	How does this fossil evidence help paleontologists conclude that birds are living dinosaurs?
Nests, Eggs, and Babies	<p><i>Sample answer:</i> Name: Citipati osmolskae ("Big Mama")</p> <p><i>Age: Late Cretaceous; 80 million years ago</i></p> <p><i>Found: Gobi Desert, Mongolia</i></p>	<p><i>Students will include a sketch of each fossil with labels showing behaviors or body parts that provide evidence that birds are living dinosaurs.</i></p>	<p><i>This fossil shows nesting behavior. A parent dinosaur is laying over a nest of eggs to protect and keep them warm, just like many birds do today.</i></p>
Brains, Lungs, and Hearts	<p><i>Sample answer:</i></p> <p><i>Name: Mei Long</i></p> <p><i>Age: Early Cretaceous; about 128 million years ago</i></p> <p><i>Found: Liaoning, China</i></p>		<p><i>This tiny dinosaur died while sleeping with its head tucked back like modern birds.</i></p>

STUDENT WORKSHEET

	<i>sample answers below, other answers possible</i> Fossil information (e.g. name, age, location)	Sketch the fossil and label parts that provide evidence that birds are living dinosaurs.	How does this fossil evidence help paleontologists conclude that birds are living dinosaurs?
Bones, Beaks, and Claws	<p><i>Sample answer:</i></p> <p><i>Name: Khaan McKennai ("Sid and Nancy")</i></p> <p><i>Age: Late Cretaceous; 75 million years ago</i></p> <p><i>Found: Mongolia</i></p>		<p><i>These two dinosaur fossils show that some ancient dinosaurs had beaks and claws like modern birds.</i></p>
Feathers	<p><i>Sample answer:</i></p> <p><i>Name: Yutyranus huali ("Beautiful feathered tyrant")</i></p> <p><i>Age: Early Cretaceous; about 125 million years ago</i></p> <p><i>Found: Liaoning Province, China</i></p>		<p><i>This fossil shows that many non-bird dinosaurs had feathers, even some very large ones. Only dinosaurs are known to have had feathers.</i></p>
Flight	<p><i>Sample answer:</i></p> <p><i>Name: Confuciusornis sanctus</i></p> <p><i>Age: Early Cretaceous; 130-120 million years ago</i></p> <p><i>Found: Liaoning Province, China</i></p>		<p><i>This fossil shows that birds have existed for at least 130 million years and that they lived along with other non-bird dinosaurs. This early bird could fly well, but probably not as well as modern birds.</i></p>

STUDENT WORKSHEET

	<p><i>sample answers below, other answers possible</i></p> <p>Fossil information (e.g. name, age, location)</p>	<p>Sketch the fossil and label parts that provide evidence that birds are living dinosaurs.</p>	<p>How does this fossil evidence help paleontologists conclude that birds are living dinosaurs?</p>
<p>Additional fossil of student's choice.</p>			
<p>Additional fossil of student's choice.</p>			

ESSAY SCORING RUBRIC: TEACHER VERSION - page 1

	Exceeds	Meets	Approaches	Needs Additional Support
	4	3	2	1
Research: "Shedding Light on the Dinosaur-Bird Connection" Article	Accurately presents information relevant to all parts of the prompt with effective paraphrased details from the article	Presents paraphrased information from the article relevant to the prompt with sufficient accuracy and detail	Presents information from the article mostly relevant to the purpose of the prompt with some lapses in accuracy or completeness AND/OR information is copied from the text	Attempts to present information in response to the prompt, but lacks connections to the article or relevance to the purpose of the prompt
Research: Dinosaurs Among Us Museum Exhibition	Accurately presents information relevant to all parts of the prompt with effective paraphrased details from the exhibition	Presents paraphrased information from the exhibition relevant to the prompt with sufficient accuracy and detail	Presents information from the exhibition mostly relevant to the purpose of the prompt with some lapses in accuracy or completeness AND/OR information is copied from the text	Attempts to present information in response to the prompt, but lacks connections to the exhibition content or relevance to the purpose of the prompt
Science Explanations	Integrates relevant and accurate science content with thorough explanations that demonstrate in-depth understanding of similarities between birds and extinct dinosaurs	Presents science content relevant to the prompt with sufficient accuracy and explanations that demonstrate understanding of similarities between birds and extinct dinosaurs	Presents science content mostly relevant to the prompt; shows basic or uneven understanding of similarities between birds and extinct dinosaurs, some errors in explanation	Attempts to include science content in explanations, but understanding of similarities between birds and extinct dinosaurs is weak; content is irrelevant, inappropriate, or inaccurate
	Consistent and effective use of precise and domain-specific language	Some or ineffective use of precise and domain-specific language	Little use of precise and domain-specific language	No use of precise and domain-specific language
	Uses labeled illustrations of at least three fossils to effectively communicate relevant information	Uses labeled illustrations of at least three fossils to sufficiently communicate relevant information	Illustrations are unlabeled /uncaptioned OR only two fossil are illustrated	Only one illustration OR No illustrations

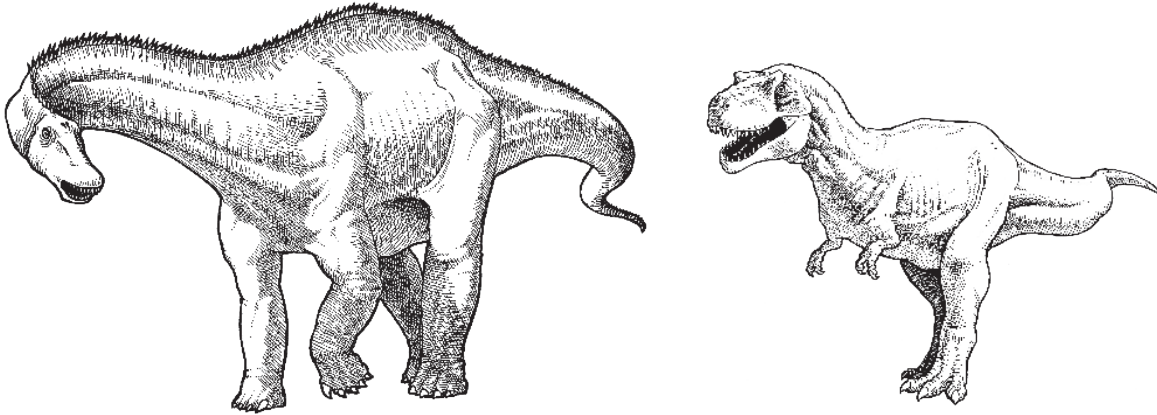
ESSAY SCORING RUBRIC: TEACHER VERSION - page 2

	Exceeds	Meets	Approaches	Needs Additional Support
	4	3	2	1
Development	Includes an opening section that clearly introduces how fossil evidence allows paleontologists to conclude that birds are dinosaurs	Includes an opening section about how fossil evidence allows paleontologists to conclude that birds are dinosaurs	Includes an opening section that is insufficient or irrelevant	Does not include an introduction
	Includes more than sufficient highly detailed examples to address the writing prompt	Includes sufficient examples to address the writing prompt	Includes examples, but not sufficient to fully address the prompt	Does not include any examples
	Provides a concluding section that follows from and effectively supports the information or explanation presented	Provides a concluding section that follows from and sufficiently supports the information or explanation presented	Provides a concluding section that mostly supports the information or explanation presented	Provides a concluding section that does not support the information or explanation presented OR provides no concluding section
Conventions	Demonstrates and maintains a well-developed command of standard English conventions and cohesion, with few errors; response includes language and tone consistently appropriate to the purpose and specific requirements of the prompt	Demonstrates a command of standard English conventions and cohesion, with few errors; response includes language and tone appropriate to the purpose and specific requirements of the prompt	Demonstrates an uneven command of standard English conventions and cohesion; uses language and tone with some inaccurate, inappropriate, or uneven features	Attempts to demonstrate standard English conventions, but lacks cohesion and control of grammar, usage, and mechanics

STUDENT READING

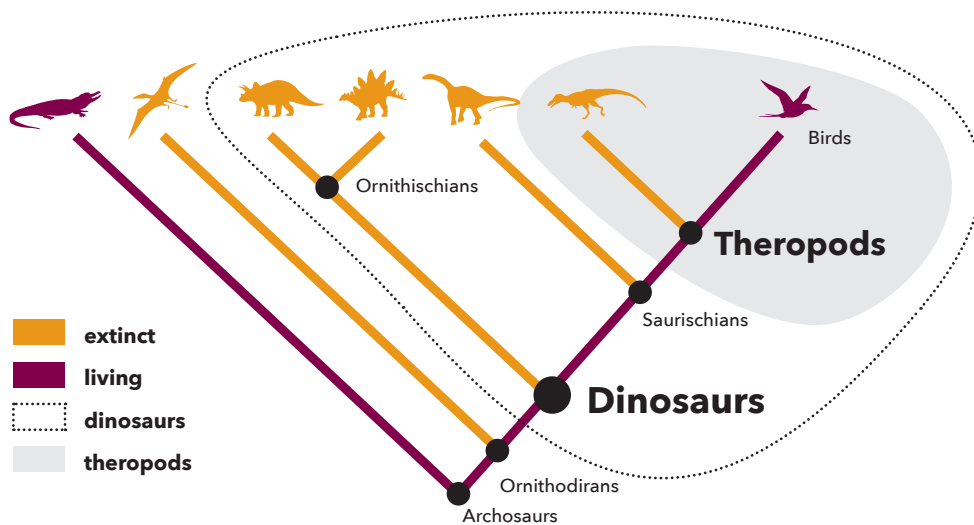
Shedding Light on the Dinosaur-Bird Connection

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Living Dinosaurs

These large dinosaurs are no longer around, but dinosaurs still live among us today. They are the birds. It's difficult to imagine that a bird on your window sill and a *T. rex* have anything in common. One weighs less than a pound. The other was the size of a school bus, tipping the scales at eight tons. But for all their differences, the two are more similar than you might think. In fact, birds and *T. rex* are close relatives. They all belong to a group of dinosaurs called theropods.



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Finding the Evidence

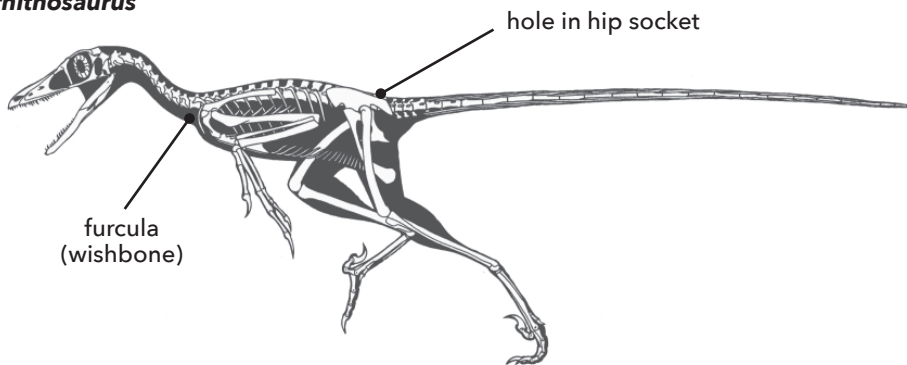
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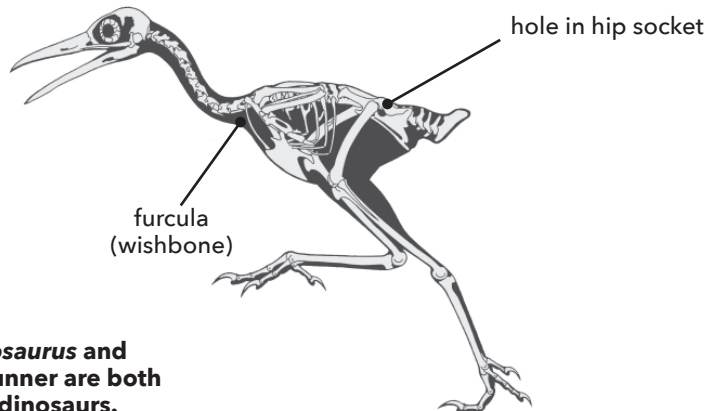
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When paleontologists compare a skeleton of a living bird to the fossilized skeleton of a non-bird theropod, like *Sinornithosaurus*, they see many similarities. They both have a hole in the hipbone, a feature that distinguishes most dinosaurs from all other animals. This feature allows an animal to stand erect, with its legs directly beneath its body. All theropod dinosaurs, including birds, have a furcula, also known as a wishbone. Another shared characteristic is the presence of hollow bones. Hollow bones reduce the weight carried by an animal. This feature enables the animal to run faster. It probably also played a role in the evolution of flight.

Sinornithosaurus



roadrunner



***Sinornithosaurus* and the roadrunner are both theropod dinosaurs.**

Behavioral Evidence

Birds build nests, lay eggs, and brood their nests. When scientists look at some non-bird theropod fossils, they see evidence of these same behaviors. The first discovery of this evidence was in 1993 in the Gobi Desert in Mongolia. Scientists unearthed a *Citipati* fossil brooding a cluster of eggs. Its limbs were folded back against its body. It is one of the few fossils ever found that demonstrates behavior. In this case, parental care. It shows that the behavior of brooding the nests that we see in living birds was already present in the non-bird ancestors of birds.



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Brain Evidence

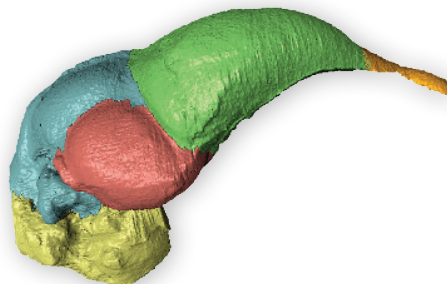
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The endocasts allow Balanoff and other researchers to explore the outer shape of the brain in more detail. In addition, the casts also provide new information about the volume and shape of different regions of the brain. For example, scientists looked at a detailed view of the dinosaur cerebrum, a region of the brain related to cognition and coordination. They found that this region was very large in non-bird dinosaurs closely related to birds. Dr. Balanoff’s research suggests that these dinosaurs developed big brains long before flight and that these bigger brains prepared the way for them to fly.

When examining skeletal, behavioral, and brain evidence, scientists see that birds and non-bird dinosaurs share many features. This helped them conclude that dinosaurs aren’t extinct after all. They’re living among us today.

Image Credits

Apatosaurus, *T. rex*, and cladogram, © AMNH; pigeon, © Pamala Wilson; *Sinornithosaurus* and roadrunner, © AMNH / Sean Murtha; *Citipati* fossil nest and *Sinornithosaurus* fossil, © AMNH / Mick Ellison; *Archaeopteryx* skull, © AMNH / Amy Balanoff.

STUDENT WORKSHEET

Name _____

Welcome to the *Dinosaurs Among Us* exhibition! Today, you'll investigate how paleontologists use fossil evidence to conclude that birds are living dinosaurs.

Directions: In each section of the exhibition, select one or more fossils to examine. Observe them closely and record the fossil evidence in the data table below.

	Fossil information (e.g. name, age, location)	Sketch the fossil and label parts that provide evidence that birds are living dinosaurs.	How does this fossil evidence help paleontologists conclude that birds are living dinosaurs?
Nests, Eggs, and Babies			
Brains, Lungs, and Hearts			

STUDENT WORKSHEET

	Fossil information (e.g. name, age, location)	Sketch the fossil and label parts that provide evidence that birds are living dinosaurs.	How does this fossil evidence help paleontologists conclude that birds are living dinosaurs?
Bones, Beaks, and Claws			
Feathers			
Flight			

STUDENT WORKSHEET

	Fossil information (e.g. name, age, location)	Sketch the fossil and label parts that provide evidence that birds are living dinosaurs.	How does this fossil evidence help paleontologists conclude that birds are living dinosaurs?

STUDENT WRITING TASK

After reading “Shedding Light on the Dinosaur-Bird Connection” and taking notes in the *Dinosaurs Among Us* exhibition, write an essay in which you explain how fossil evidence allows paleontologists to conclude that birds are dinosaurs.

Be sure to:

- Discuss the similarities between birds and extinct dinosaurs using evidence from at least three fossils found in the *Dinosaurs Among Us* exhibition.
- Draw and label three or more fossils from the exhibition.

ESSAY SCORING RUBRIC: STUDENT VERSION

	Exceeds	Meets	Approaches	Needs Additional Support
	4	3	2	1
Research: "Shedding Light on the Dinosaur-Bird Connection" Article	I have used information correctly from the article to write my essay; I have given a lot of detail to explain the information in my own words.	I have used information correctly from the article to write my essay in my own words.	I have used information from the article to write my essay, but not all of my information is correct AND/OR I didn't use my own words.	I did not use information from the article to write my essay.
Research: Dinosaurs Among Us Museum Exhibition	I have used information correctly from the exhibition to write my essay; I have given a lot of detail to explain the information in my own words.	I have used information correctly from the exhibition to write my essay in my own words.	I have used information from the exhibition to write my essay, but not all of my information is correct AND/OR I didn't use my own words.	I did not use information from the exhibition to write my essay.
Science Explanations	All of the information I included about what the fossils show about the connections between birds and other dinosaurs is correct.	Most of the information I included about the connections between birds and other dinosaurs is correct.	Some of the information I included about the connections between birds and other dinosaurs is correct.	None of the information I included about the connections between birds and other dinosaurs is correct.
	I used relevant science vocabulary whenever possible, and I used all words correctly.	I used most science vocabulary words correctly.	I used some science vocabulary words correctly.	I did not use any science vocabulary words.
	I included labeled illustrations of three or more fossils that help the reader understand how birds are similar to other dinosaurs.	I included labeled illustrations of three dinosaur fossils.	I included labeled illustrations of only two dinosaur fossil.	I included one illustration OR did not include any illustrations.

ESSAY SCORING RUBRIC: STUDENT VERSION

	Exceeds	Meets	Approaches	Needs Additional Support
	4	3	2	1
Development	I included a clear introductory paragraph on how fossil evidence allows paleontologists to conclude that birds are dinosaurs.	I included a relevant introduction in the essay.	I included an irrelevant introduction to the essay.	I did not include an introduction.
	I included more than enough examples to fully explain how fossil evidence allows paleontologists to conclude that birds are dinosaurs.	I included enough examples to explain how fossil evidence allows paleontologists to conclude that birds are dinosaurs.	I included examples of how fossil evidence but not enough to show how it allows paleontologists to conclude that birds are dinosaurs.	I did not include any examples.
	I have written a concluding paragraph that relates to all of the information in my essay.	I have written a concluding paragraph that relates to some of the information in my essay.	I have written a concluding paragraph or sentence at the end of the essay.	I have not written a concluding sentence at the end of the essay.
Conventions	I have edited my essay for spelling, punctuation, and grammar; there are no errors.	I have edited my essay for spelling, punctuation, and grammar; there are some minor errors but the reader can still understand my writing.	I have not carefully edited my essay for spelling, punctuation, and grammar; there are errors that may make the essay hard for readers to understand.	I have not edited my essay for spelling, punctuation, and grammar; there are many errors that make the essay hard for readers to understand.