Muse® Teacher Guide: March 2020

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End of an Era

Travel back in time millions of years and discover a dramatically different planet Earth. This issue of MUSE will bring students through different geological time periods and introduce them to fantastical flightless birds, as well as teach them about the giant asteroid that altered the existence of life on our planet.

CONVERSATION QUESTION

What can we learn from studying our prehistoric past?

TEACHING OBJECTIVES

- **Students will learn about the history of the earth before, during, and after a giant asteroid slammed into the Yucatan Peninsula.**
- **Students will learn about the reign of the terror birds over 3 million years ago.**
- **Students will learn why scientists are debating renaming our current geologic epoch.**
- **Students will identify and record cause-and-effect relationships.**
- **Students will study the structure and function of the physical features that made terror birds such vicious predators.**
- **Students will analyze evidence from a scientific text.**
- **Students will plot relevant geographical locations on a map of the world.**
- **Students will practice converting measurements from standard to metric form.**
- **Students will create a visual model depicting the atmosphere layers of Earth.**

In addition to supplemental materials focused on core STEM skills, this flexible teaching tool offers vocabulary-building activities, questions for discussion, and cross-curricular activities.

SELECTIONS

- **The Day the Cretaceous Ended**
Expository Nonfiction, ~1050L
- **The Rise and Fall of the Terror Birds**
Expository Nonfiction, ~850L
- **Are We Living in the Anthropocene?**
Expository Nonfiction, ~1250L

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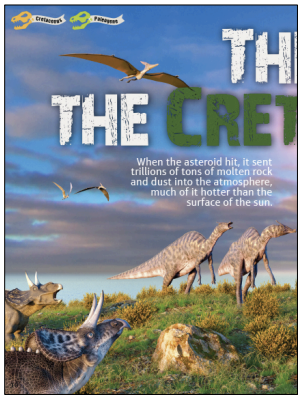
The Day the Cretaceous Ended

pp. 10–15, Expository Nonfiction

Take a journey back in time 66 million years ago and experience the day the Cretaceous geological period ended. Students will read about the cataclysmic changes that followed this life-altering event.

Lexile Score: ~1050



RESOURCES

- Crash Landing

OBJECTIVES

- Students will learn about the history of the earth before, during, and after a giant asteroid slammed into the Yucatan Peninsula.
- Students will identify and record cause-and-effect relationships.
- Students will plot relevant geographical locations on a map of the world.

KEY VOCABULARY

- ***cataclysm*** **(p. 12)** a large-scale and violent event in the natural world
- ***outcroppings*** **(p. 12)** rock formations; places on earth where the bedrock underneath shows through
- ***tektites*** **(p. 12)** tiny spheres of glass that form when molten rock is launched into the atmosphere by a cataclysmic event

ENGAGE

Conversation Question: What can we learn from studying our prehistoric past?

Distribute the article, "The Day the Cretaceous Ended," and instruct students to study the subheadings and graphics to activate prior knowledge. Create a Know, Want to Know, Learned (K-W-L) chart on the board with the question, "How did the impact of a giant asteroid change life on Earth?" At the conclusion of the reading and provided activities, refer back to the chart and add statements to the last column.

INTRODUCE VOCABULARY

Post and review the key terms. Instruct students to announce the end of the Cretaceous period in a tweet (280 characters or less). They must properly use the vocabulary words in their announcement. Challenge them to actually post it, if possible!

READ & DISCUSS

Pose the following questions to the students to facilitate meaningful discussion following the reading of the article.

- What is notable about the geological region, Hell Creek Formation?
- What is the significance of the K-Pg boundary?
- Explain the conclusion reached by DePalma and his team.
- What evidence was produced to support the team's interpretation of events?
- Why is it a hallmark of science that new findings are approached with a measure of distrust?

CONCEPT/SKILL FOCUS: Cause and Effect

INSTRUCT: Lead the students in a discussion that guides them to recognize the primary cause-and-effect relationship (a relationship in which one event makes another event happen) that is presented in this article. Introduce the graphic organizer, *Crash Landing,* and advise students that they will be searching through the article for information that demonstrates this relationship. Allow students to share ideas and assist each other in locating suitable passages in the text.

ASSESS: Circulate and converse with students as they are working. Collect and review the worksheets to evaluate individual understanding of cause-and-effect relationships. Consider arranging peer remediation groups if necessary.

EXTEND

Geography Instruct students to reread the article with a partner and to highlight all of the geographical locations contained in the article. Provide each pair of students with a blank map of the world and have them plot and label each location.

Crash Landing

Record the primary cause-and-effect relationship studied in the article, "The Day the Cretaceous Ended."

Cause	Effects
Sixty-six million years ago a giant asteroid slammed into the Yucatan Peninsula.	**1.** **2.** **3.** **4.** **5.**

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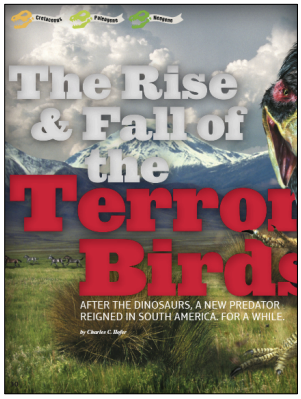
The Rise and Fall of the Terror Birds

pp. 30–33, Expository Nonfiction

With razor-sharp beaks, strong legs, and an appetite for fresh meat, terror birds ruled the land over 3 million years ago. Learn how these flightless creatures were fearless, unmatched predators.

Lexile Score: ~850



RESOURCES

- Beastly Birds

OBJECTIVES

- Students will learn about the reign of the terror birds 3 million years ago.
- Students will study the structure and function of the physical features that made terror birds such vicious predators.
- Students will practice converting measurements from standard to metric form.

KEY VOCABULARY

- ***continental drift*** **(p. 32)** the gradual movement of the continents across the earth's surface through geologic time
- ***ecosystem*** **(p. 32)** a biological community of interacting organisms and their physical environment
- ***Pangea*** **(p. 32)** the hypothetical landmass that existed when all of the continents were joined together

ENGAGE

Conversation Question: What can we learn from studying our prehistoric past?

Place the conversation question in the center of a brainstorming web. ("What can we learn from studying our prehistoric past?") Have the class discuss the question with a partner and volunteer information that can be recorded onto the web. After reading the article, challenge students to amend the web.

INTRODUCE VOCABULARY

Display and discuss the key vocabulary words. As a post-reading activity, instruct students to write a sentence that demonstrates how each term is directly related to the rise and fall of the terror birds. Require them to properly cite information from the text.

READ & DISCUSS

Read the article aloud with the class. Have students reread the article in small groups and answer the questions below. Have different groups present their answers to the class, so that students will have a comprehensive understanding of each concept.

- Define and describe "terror birds."
- What is adaptive radiation?
- When and where were the first terror bird fossils found?
- How does brain size usually relate to an animal's social life?
- What was the Great American Biotic Interchange?

CONCEPT/SKILL FOCUS: Structure and Function

INSTRUCT: Elicit from students that the main idea of the article is to provide information that details the prehistoric existence of the terror birds. Present the graphic organizer, *Beastly Birds,* and tell students that they will be using information from the article to record the special function of the physical features that made these terror birds such vicious predators. They should include specific details and feature sketches.

ASSESS: Collect and review the students' graphic organizers, as well as their answers to the questions from the Read & Discuss activity to determine understanding.

EXTEND

Mathematics Direct students to reread the first paragraph under the subheading "Big Birds" on page 33. Instruct them to highlight the standard to metric conversion measurements presented. Challenge the class to convert other measurements using the information presented here as a guide for base conversions.

Beastly Birds

Use the chart below to record the structure and function of each of the physical features that made terror birds such vicious predators.

Structure (Physical feature)	**Function** (How was it useful for hunting?)	**Sketch** (Drawing)
razor-sharp beaks		
long, strong legs		
giant, clawed toes		
10-foot-tall body		

After the reign of the terror birds, _____ became the Earth's dominant life form.

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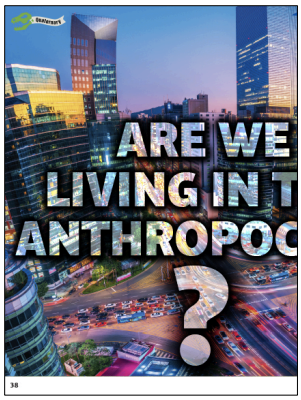
Are We Living in the Anthropocene?

pp. 38–41, Expository Nonfiction

"What is in a name?" Shakespeare famously lamented. This article debates the pros and cons of renaming our current geological epoch.

Lexile Score: ~1250



RESOURCES

- Time for a Change?

OBJECTIVES

- Students will learn why scientists are debating renaming our current geologic epoch.
- Students will analyze evidence from a scientific text.
- Students will create a visual model depicting the atmosphere layers of Earth.

KEY VOCABULARY

- ***Anthropocene* (p. 40)** the current geological age viewed as the period in which human activity has been the dominant influence on climate and the environment
- ***biosphere* (p. 40)** the living part of the Earth
- ***lithosphere* (p. 40)** the outer part of the Earth, consisting of the crust and upper mantle
- ***stratigraphy* (p. 39)** the structure of particular rock layers

ENGAGE

Conversation Question: What can we learn from studying our prehistoric past?

Read aloud the first paragraph of the article that ponders "names" and play a name game. Have students research the meanings of their own names and write it on a slip of paper, adding any personal details that might give their classmates clues as to who they are. Collect all strips of paper and draw one at a time, letting other students guess their identity from the clues.

INTRODUCE VOCABULARY

Post and discuss the key vocabulary terms. Have the students dissect the words, breaking them apart into their root words with suffixes and/or prefixes. Instruct pupils to list other words from the article that contain these parts.

READ & DISCUSS

Reinforce comprehension of the concepts in the article by using the following prompts to direct discussion.

- How does geologic time subdivide the Earth's history?
- Why have some scientists proposed a name change in our geologic epoch?
- Scientists agree that we are currently in the "sixth mass extinction." How is this different than the five other mass extinctions?
- What is the Columbian Interchange?

CONCEPT/SKILL FOCUS: Analyzing Evidence

INSTRUCT: This article presents the reader with an abundance of detailed information regarding the manner in which the Earth's history is subdivided by geologic time. Present the *Time for a Change?* graphic organizer and tell students that they will be collecting evidence that explains and supports the pros and cons of renaming our current geologic epoch. They will need to consult the article to gather accurate information.

ASSESS: The objective of this lesson is to help students practice the skill of collecting evidence from a science-based text. Facilitate dialogue and then collect organizers to evaluate individual understanding.

EXTEND

Science Use information from this article, as well as other resources, to study the atmosphere layers of the Earth. Have students work in small groups to create a 3D model or a poster that illustrates each layer. A descriptive paragraph for each layer should be included.

Time for a Change?

Collect evidence from the article, "Are We Living in the Anthropocene?" to support or reject the renaming of our current geologic epoch.

Should we rename our current geologic epoch?	
YES! Reasons to support the name change:	➢ ➢ ➢
NO! Reasons to reject the name change:	➢ ➢ ➢

Survey the class to see who supports the name change and who rejects it. Record the results below.

_____Yes _____No