

DINOSAURS OF ANTARCTICA



EDUCATOR GUIDE
LESSONS 2-3

DINOSAURS of ANTARCTICA

EDUCATOR GUIDE



DISCOVERY PLACE

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Educator Guide written by Candice Wilson-McCain, Ed.S.

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Dinosaurs of Antarctica Educator Guide

TABLE OF CONTENTS

INTRODUCTION TO GUIDE.....	4
BACKGROUND	5
LESSON 2.1 EXPLORING DINOSAURS	11
LESSON 2.2 COMPARING CONTINENTS.....	19
LESSON 2.3 CONSTRUCTING ANTARCTICA.....	26
WRITERS AND CONTRIBUTORS	33



Dinosaurs of Antarctica Educator Guide

INTRODUCTION TO GUIDE

The ***Dinosaurs of Antarctica*** Educator Guide, created by Discovery Place Education Studio in Charlotte, North Carolina, in partnership with Giant Screen Films, is appropriate for students in grades kindergarten through eighth. The guide is most beneficial when used as a companion to the film but also useful as an independent resource. Educators are encouraged to modify the learning activities included in this guide to meet the needs of their students' functional level and to support specific state standards. Activities developed for this guide support the Next Generation Science Standards (NGSS) and national Common Core ELA and math standards. However, educators will find that the ***Dinosaurs of Antarctica*** film and guide align with other content areas such as geography. This guide focuses on the scientific understanding of Antarctica's geological and ecological history while exploring the career understandings of scientists who studied Antarctica. Students will examine the roles of a climatologist, paleontologist, and geologist by completing hands-on activities related to work in the field. This guide consists of sixteen engaging lessons that have been approved by teachers.

Dinosaurs of Antarctica is a production of Giant Screen Films, directed by Dave Clark. The film has a run time of 40 minutes.

Dinosaurs of Antarctica is a story about Antarctica's geological and ecological history, specifically focusing on the Permian and Triassic extinction and Antarctica's climate transition from Icehouse to Greenhouse, creating a connection to present-day climate science. The film highlights the expedition to Shackleton Glacier featuring scientists from the Natural History Museum of Los Angeles and Field Museum, Chicago, along with other academic institutions. During the exploration, scientists uncover Antarctica's past through the discovery of ancient animal and plant fossils. Utilizing computer-generated imagery, ***Dinosaurs of Antarctica*** brings to life the eras of Antarctica's history and utilizes attributes of the giant screen to convey challenging scientific concepts such as plate tectonics, geological time, climate processes, etc. During the film viewers will shadow a team of scientists as they encounter extreme weather conditions to excavate fossils that will deepen our understanding of life on Earth.



Dinosaurs of Antarctica Educator Guide

BACKGROUND

ABOUT ANTARCTICA

Antarctica is the coldest, windiest, and driest southernmost continent near the South Pole and contains 90% of all of the ice on Earth. Antarctica is a desert because it only receives two inches of rain per year. The small amount of rainfall received each year does not soak into the ground, causing it to accumulate as ice and snow. The Antarctic ice sheet is the largest single piece of ice in the world, covering more than 5 million square miles. Although Antarctica's temperature makes it difficult for many animals to survive, it is still home to some animals such as seals, whales, penguins, fish, and krill. Also, organisms such as algae and moss can survive the icy conditions. No permanent residents are living in Antarctica. However, Antarctica attracts thousands of scientists each year during the summer months to conduct research. Scientists and early explorers have been researching Antarctica since the late 1800's and each century uncovers new findings.

Although 98% of Antarctica is covered in snow and ice making it an icehouse, 200 million years ago, it was a greenhouse with wooded, lush habitat where dinosaurs and other living things thrived. Scientists have discovered fossils and other data that confirm the theory of plate tectonics, the movement of continents over time, and the impact on Antarctica's climate. Fossil records provide paleontologists a global perspective to dinosaur origin, enhancing their understanding of the End-Permian and End-Jurassic extinction events.

BACKGROUND

ANTARCTIC GEOLOGICAL TIMELINE

Geologists have divided Earth’s history into a series of time intervals known as a geological time scale. The geological time scale consists of three eras: Cenozoic, Mesozoic, and Paleozoic. Each era splits into periods. Fossils found in Antarctica provide clues to the changing climate and position of the continent during each phase of the geological time scale.

ERA	PERIOD	ABOUT ANTARCTICA	TIMEFRAME
Paleozoic	Permian	The continents were connected as Pangaea. Scientists found fossils of the same species on all continents, including Antarctica.	299-252 million years ago
Mesozoic	Triassic	Antarctica plants and animals experienced climate patterns similar to today, consisting of sunlight in the summer and darkness in the winter.	252-201 million years ago
	Jurassic	Over time, Pangaea split into two supercontinents, Gondwana and Laurasia. Antarctica became part of Gondwana.	201-145 million years ago
	Cretaceous	Antarctica split away from Africa but was still connected to South America and Australia which created a gap filled by the ocean over time.	145-66 million years ago
Cenozoic	Paleogene	Antarctica began transitioning from a greenhouse to an icehouse.	62-23 million years ago

BACKGROUND

ANTARCTIC EXPEDITIONS

Antarctica has been an area of interest for explorers for hundreds of years. Antarctica was the last of the seven continents discovered, and early explorers were interested in learning more about the continent's natural resources. Some early explorers hoped to find new locations to hunt for whales and seals, while others wanted the glory of being the first to visit the continent. Regardless of the reason for expeditions to Antarctica, explorers faced incredible hardships, and many lost their lives in the process. Modern scientists utilize early explorers' findings to conduct further research to understand the history of Earth.

THE EARLY 1900S EXPEDITIONS

to Antarctica focused on competition to reach the South Pole.

1900

1901

British Discovery Expedition: Captain Scott and his team led their first Antarctic expedition with the goal of reaching the South Pole. The scientists turned around due to the extreme weather they encountered.

1907-1909

Ernest Shackleton led an expedition to the South Pole but was forced to turn around after he runs out of supplies.

1910

1910-1912

Norwegian Antarctic Expedition: Roald Amundsen and his team became the first group of people to reach the South Pole.

1910-1913

Terra Nova Expedition: Captain Robert Falcon Scott, along with his team, set out to reach the South Pole again, hoping to be the first people to accomplish the task, but they found out they were a couple of months too late. Scott and his team reached the South Pole but perished during the return trip home.

1915-1917

Endurance Expedition: Ernest Shackleton and his team set out on a journey to reach Antarctica again with the goal of crossing the continent. However, his ship was crushed by ice and destroyed. The team was rescued five months later.

1920

BACKGROUND

THE MID 1900'S EXPEDITIONS

to Antarctica focused on research and scientific exploration.

1950

1957-1958

McMurdo Station, the first permanent research station in Antarctica, was built by the U.S. military to support the scientific study of over sixty nations.

1959

The Antarctic Treaty was established to make Antarctica a scientific preserve that banned military activity but supported freedom of research.

1960

THE LATE 1900'S & EARLY 2000'S EXPEDITIONS

to Antarctica focused on understanding Antarctica's past and present environment and excavating fossils.

1990

1990

Geologist, David Elliot, and his team discovered a set of large bones on Mount Kirkpatrick in Antarctica.

1994

Dr. William Hammer, along with other scientists, began excavating Mount Kirkpatrick and retrieved a skull and thigh bone of a dinosaur described as *Cryolophosaurus ellioti*.

2000

2003

Scientists continued to excavate *Cryolophosaurus* bones but ended the expedition early due to harsh weather.

2010

2011

Dr. Nate Smith and Dr. Pete Makovicky, along with other scientists, retrieved the remaining fossils of the dinosaur, *Cryolophosaurus*, and discovered new dinosaur fossils.

BACKGROUND

ABOUT THE SCIENTISTS IN THE FILM

DR. NATHAN SMITH

**Paleontologist, Associate Curator, Dinosaur Institute
Natural History Museum of Los Angeles County**

Originally from Crystal Lake, Illinois, Nate grew up fascinated with dinosaurs, science, and baseball. He received his B.A. in Biology from Augustana College, a M.S. in Geoscience from the University of Iowa, and a Ph.D. in Evolutionary Biology from the University of Chicago. Nate also served as a Postdoctoral Research Scientist at the Field Museum of Natural History and an Assistant Professor of Biology at Howard University before joining the Natural History Museum of Los Angeles County in 2015.

Nate conducts paleontological research for the museum's Dinosaur Institute, focusing on the evolution and biogeography of Triassic–Jurassic dinosaurs, among other topics. He has made many significant finds in Antarctica and is responsible for naming *Glacialisaurus* (featured in ***Dinosaurs of Antarctica***). Nate's work has taken him to Antarctica, Argentina, China, and the southwestern and western United States, and he appeared in the giant screen film *Dinosaurs Alive*, featuring his collaborative dinosaur dig at Ghost Ranch in New Mexico.

LIBBY IVES

**PhD Student, Geosciences—Physical Sedimentology
University of Wisconsin—Milwaukee**

Libby grew up in Wisconsin and always had a strong love of the outdoors. She spent many summers camping and exploring wilderness areas as a counselor at YMCA camps. She completed a B.S. in Earth Science at Northern Michigan University, and holds an M.S. in Geology from Iowa State University. She has studied geological formations across the world, from volcanoes in Russia to Ice Age deposits in Argentina. Libby is trained as a Wilderness First Responder, a special type of medical certification that's useful for remote field work expeditions.

As a PhD student, Libby is studying the sedimentology and stratigraphy of Late Paleozoic (320 – 250 million year old) Ice Age deposits at sites in Antarctica (Transantarctic Mountains), Tasmania (Wynyard Formation), and Argentina (Tepuel Basin). Her aim is to better understand the type, timing, and extent of glaciation during the Late Paleozoic.



*Dr. Nathan Smith.
Photo courtesy of Akiko Shinya.*



*Libby Ives.
Photo courtesy of Dr. John Isbell.*

BACKGROUND

DR. PATRICIA RYBERG

**Paleobotanist, Associate Professor of Biology; Honors Academy Director
Park University**

Although she was on a pre-med career track as an undergraduate student, Dr. Ryberg found her passion for paleobotany on a biology class field trip in Nebraska, where on an excursion to find fossil shark teeth, she also discovered fossil plants. She realized that field research would allow her to travel and spend time outside, discovering plants that are totally unlike anything that exists today. Dr. Ryberg's bachelor's degrees are in biological sciences and history from the University of Nebraska, and she completed her doctoral degree in botany at the University of Kansas.

Dr. Ryberg specializes in studying *Glossopteris*, an extinct plant species from about 260 million years ago. She's especially interested in ecology and the evolution of plant life at high latitudes, and what the ancient past might signal about the future. Her work has taken her on research adventures around the world, from South Africa to Australia to Antarctica.



Dr. Patricia Ryberg

DR. PETER MAKOVICKY

**Paleontologist, Professor, Department of Earth and Environmental Sciences,
University of Minnesota**

Dr. Makovicky is a paleontologist whose research focuses on dinosaur evolutionary history. He received his PhD in Earth and Environmental Sciences from Columbia University, and spent 18 years as a Curator of Paleontology at the Field Museum in Chicago, where he was the lead curator of the Antarctic Dinosaurs exhibition. Prior to that he received his BSc and MSc degrees from Copenhagen University in Denmark, where he grew up.

He has conducted fieldwork on four continents and described more than 15 new dinosaur species from the US, China, Mongolia, Argentina, and Antarctica. Dr. Makovicky uses dinosaurs as model systems to study broader topics in evolutionary biology. His current research focuses on understanding how carnivorous dinosaurs evolved herbivory, and how dinosaur evolution and biogeography were shaped by major geological events. He has also studied biomechanics, scaling, dinosaur trackways, and behavior.



Dr. Peter Makovicky

LESSON 2.1 EXPLORING DINOSAURS

GRADE LEVEL 2-3



DINOSAURS OF ANTARCTICA EDUCATOR GUIDE



Dinosaurs of Antarctica Educator Guide

LESSON 2.1

EXPLORING DINOSAURS

GRADE LEVEL 2-3
(1) 45 MINUTE LESSON

STANDARDS:

- CCSS.ELA-LITERACY.RI.3.3. Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.

FROM THE FILM:

In the film *Dinosaurs of Antarctica*, you will learn that Antarctica has been an area of interest for hundreds of years. The film provides several timelines, a representation of important events in the order in which they occurred, to help viewers understand more about research efforts in Antarctica. We are able to use explorers' research to make new discoveries about Antarctica.

LESSON OVERVIEW:

In this lesson, students will explore the purpose of documenting important events by creating a timeline of historical moments.

MATERIALS:

- My life: Great Things That Happened Student Resource Sheet 2.1
- Exploring Dinosaurs in Antarctica Timeline Student resource Sheet 2.1A
- Exploring Dinosaurs in Antarctica Student Resource Sheet 2.1B
- Cover of the Educator Guide



LESSON 2.1

EXPLORING DINOSAURS

EDUCATOR PREP:

Based on your class size, print copies of “My life: Great Things That Happened Student Resource Sheet 2.1” and “Exploring Dinosaurs in Antarctica Timeline Student Resource Sheet 2.1A” for each student. To save paper, print both documents double-sided on one sheet. Print a copy of the “Exploring Dinosaurs in Antarctica Student Resource Sheet 2.1B” for students. It’s possible for two students to share one document. To save paper, utilize technology to display “Exploring Dinosaurs in Antarctica Student Resource Sheet 2.1B” for students to view as a class.

EDUCATOR GUIDE:

1. In the film *Dinosaurs of Antarctica*, students will learn that Antarctica has been an area of interest for explorers for hundreds of years. Explain to students that Antarctica was the last of the seven continents discovered and that early explorers were interested in learning more about the continent’s natural resources. Tell students that some early explorers hoped to find new locations to hunt for whales and seals while others wanted the honor of being the first to visit the continent. Ask students: Based on the title, *Dinosaurs of Antarctica*, and the picture what do you think scientists in the film were researching in Antarctica? Show the cover of the educator guide.

2. Tell students that scientists and explorers often participate in expeditions, a journey or voyage taken by a group of people with a particular purpose to research something. Introduce the vocabulary word *explore* to students. Ask students to raise their hands if they remember hearing the word explore before.

What does the word explore mean?

To explore means to investigate, study, test or experiment with the goal of learning something new about the subject.

What does the word explorer mean?

An explorer is a person who investigates unknown regions in search of geographical or scientific information.

3. Explain to students that scientists sometimes participate in explorations, expeditions or field observations with the goal of learning something new or to prove something they believe to be true. Ask students to name a situation when they have conducted research with the goal of learning something new. Students may share school-related research experiences such as work done in science and language arts class. Encourage students to provide examples of when they engaged in research outside of class.



Frank Wild and Ernest Shackleton during the Imperial Trans-Antarctic Expedition.

LESSON 2.1

EXPLORING DINOSAURS

4. If students are unable to come up with an example, lead a think-pair-share discussion about researching entertainment options. Ask students:

Take 30 seconds to think about a situation when you desired a particular toy, game, book or perhaps wanted to attend somewhere that seemed fun.

Partner with the person beside you and share what was it that you wanted and why.

Who would like to share the type of research you conducted about the topic?

For example, students should be able to share that they may have originally heard about a game from a television commercial. After becoming interested in the game, they may have asked other kids if they had the game and to share their thoughts about it. Due to positive comments, they may have visited a website to learn more about it or traveled to a game store to read a description of it. Ensure students understand that people conduct research often.

5. Share with students that they will have an opportunity to view the film ***Dinosaurs of Antarctica*** and that by now they may have guessed that scientists were interested in researching dinosaurs. Explain to students that they will complete a timeline activity to learn more about the dinosaur expeditions that occurred in Antarctica.

6. Explain to students that they will create a timeline, a tool that people use to help understand history, by showing how much time occurred between a set of events. Tell students that they will first create a timeline about their life to become familiar with the process. Provide each student a copy of “My life: Great Things That Happened Student Resource Sheet 2.1” and review how to complete the assignment.

7. The assignment instructs students to think about four important events that occurred in their life for the following years: 2016, 2017, 2018, and 2019. Students are guided to create a timeline of their life events. Tell students that they will have fifteen minutes to create their personal timeline. Circulate to provide assistance when necessary. After the designated time has expired, allow students the opportunity to share their timeline with a peer.

Educator Notes:

LESSON 2.1

EXPLORING DINOSAURS

8. Remind students about their predictions for the film *Dinosaurs of Antarctica*. Provide each student with a copy of “Exploring Dinosaurs in Antarctica Timeline Student Resource Sheet 2.1A” and “Exploring Dinosaurs in Antarctica Student Resource Sheet 2.1B”. Tell students that using the resources provided, they will create a timeline documenting dinosaur fossil findings in Antarctica. Quickly review how to complete the assignment.

9. The assignment instructs students to think about five dinosaur fossil finding events that occurred in history; however, they will only utilize four events to complete the assignment. Students are asked to organize the events by date, write a statement about what happened and draw a picture that represents the occasion. Read the events aloud for students. Tell students that they will have fifteen minutes to create the timeline with a partner. Circulate to provide assistance when necessary. After the designated time has expired, review the timeline to ensure the accuracy of sequencing events.

10. To conclude the lesson, say to students that in the film *Dinosaurs of Antarctica*, they will learn more about the timeline of expeditions in Antarctica.



A Cryolophosaurus female sleeps in the fern forests of Gondwana – prehistoric Antarctica. These giant meat-eaters survived in an eerie world of winter polar night and summer midnight suns.

Exploring Dinosaurs in Antarctica

2011

Dr. Nate Smith and Dr. Pete Makovicky, along with other scientists, retrieved the remaining fossils of the dinosaur, *Cryolophosaurus*, in Antarctica.

1990

Geologist, David Elliot discovered a set of large bones on Mount Kirkpatrick in Antarctica.

1994

Dr. William Hammer, along with other scientists, began excavating Mount Kirkpatrick and retrieved a skull and thigh bone of a dinosaur later named *Cryolophosaurus*.

2008

Rodolfo Coria, a paleontologist and paleo technician Juan J. Moly discovered a partial skeleton of a small beak dinosaur later named *Trinisaura*.

1986

Scientists found the first dinosaur fossils in Antarctica on James Ross Island.

My life: Great things that happened

Think of something good that happened in your life during the years listed below.

Draw a picture that represents that memory in the box.

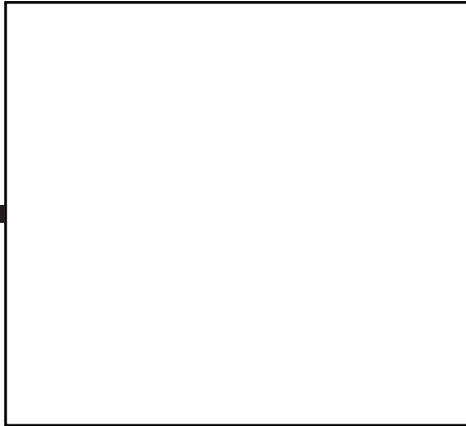
Write a sentence to describe the memory.

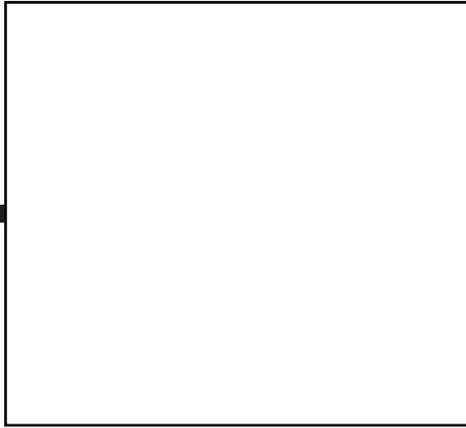
2016

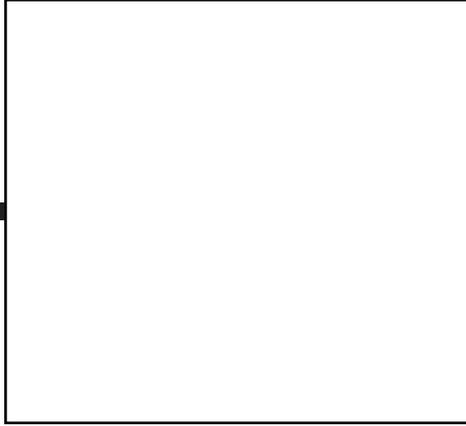
2017

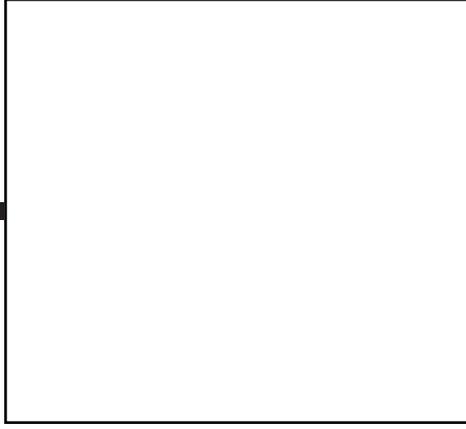
2018

2019









Exploring Dinosaurs in Antarctica Timeline

Using the “Dinosaur Exploration in Antarctica” resource sheet, sequence the events in the order they occurred. Draw a picture to represent that event in the box.

Write a sentence to summarize what happened.

1986

1994

2008

2011

LESSON 2.2

COMPARING CONTINENTS

GRADE LEVEL 2-3



DINOSAURS OF ANTARCTICA EDUCATOR GUIDE



Dinosaurs of Antarctica Educator Guide

LESSON 2.2

COMPARING CONTINENTS

GRADE LEVEL 2-3
(1) 45 MINUTE LESSON

STANDARDS:

- CCSS.ELA-LITERACY.W.3.8. Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.

FROM THE FILM:

The film *Dinosaurs of Antarctica* showcases Antarctica's uncommon landscape. Antarctica is the coldest, windiest and driest southernmost continent. Scientists and tourists who visit Antarctica describe a unique experience making the continent an interesting place to visit.

LESSON OVERVIEW:

In this lesson, students will continue to learn about Antarctica's unique landscape and explore North America's scenery to discover similarities and differences between the two continents.

MATERIALS:

- Comparing Antarctica vs. North America Student Resource Sheet 2.2
- Comparing Antarctica vs. North America Venn Diagram Student Resource Sheet 2.2A
- Access to technology to show the following video clips:

Antarctica: Destination World by National Geographic Kids
<http://bit.ly/DestinationAntarctica>

North America: Destination World by National Geographic Kids
<http://bit.ly/DestinationNAmerica>



LESSON 2.2

COMPARING CONTINENTS

EDUCATOR PREP:

Based on your class size, print a copy of “Comparing Antarctica vs. North America Student Resource Sheet 2.2” and “Comparing Antarctica vs. North America Venn Diagram Student Resource Sheet 2.2a” for each student. To save paper, print the documents double-sided on one sheet. Test your visual and audio equipment to ensure students are able to view and hear the videos.

EDUCATOR GUIDE:

1. In the film *Dinosaurs of Antarctica*, students learned that Antarctica is the coldest and windiest place on Earth. Students discovered that Antarctica is an ice desert, making it difficult for most plants and animals to survive. Ask students to raise their hands if they remember hearing the word *climate* before.

What does the word climate mean?

Climate refers to the average condition of the weather at a place usually over a period of years as described by temperature, wind velocity, and precipitation.

What are scientists that study weather called?

Meteorologists predict the weather and study how the atmospheric conditions affect the earth and its human inhabitants.

What does the word weather mean?

Weather is what’s happening in the atmosphere over a short period of time with respect to heat or cold, wetness or dryness, and clearness or cloudiness.

What are scientists that study climate called?

Climatologists study climate patterns to provide an understanding of the conditions of a particular area to help residents adapt to their surroundings.

From the film who can recall the landscape of Antarctica millions of years ago?

Antarctica was not covered in ice therefore it was a warmer place with more living creatures such as dinosaurs.

From the film what is Antarctica’s landscape like now?

Antarctica is considered an icy desert and home to a few animals that mostly live near or in the water.



Antarctica is an ice desert making it difficult for most plants and animals to survive.

LESSON 2.2

COMPARING CONTINENTS

2. Tell students that today they will compare two continents: North America and Antarctica. Explain to students that they will explore the similarities and differences between the continents by learning more about both places through video. Provide each student with a copy of “Comparing Antarctica vs. North America Student Resource Sheet 2.2.” During this assignment, students will watch a short video about Antarctica and a short video about North America. Students will fill in the blank spaces on the chart as they watch the videos.

3. Optional: To ensure students are able to complete their chart, it may be necessary to allow students to watch the video once without pausing. Replay the video for students and pause at key points to allow students to complete the chart.

During the video, “Antarctica: Destination World,” pause at the following markers to allow students to fill in their chart.

30 seconds [land size & physical features of Antarctica]

65 seconds [average temperature of Antarctica]

2:10 minutes [animals of Antarctica]

During the video, “North America: Destination World,” pause at the following markers to allow students to fill in their chart.

28 seconds [land size of North America]

60 seconds [physical features of North America]

2:18 minutes [population of North America]

3:08 minutes [popular attractions of North America]

Educator Notes:

LESSON 2.2

COMPARING CONTINENTS

4. After students complete their chart, tell students that they will summarize their findings by creating a Venn diagram, an illustration that uses circles to show the relationships among things. Tell students in a Venn diagram, circles that overlap indicates that both subjects share the same trait while circles that do not overlap mean they do not share that particular trait. Instruct students to use information from “Comparing Antarctica vs. North America Student Resource Sheet 2.2” to compare and contrast North America and Antarctica. Demonstrate how to create a Venn diagram by reviewing the example of “Comparing Antarctica vs. North America Venn Diagram Student Resource Sheet 2.2a.” Permit students ten minutes to complete the assignment. Circulate to provide assistance if needed.

5. To conclude the lesson, show an example of a completed Venn diagram. Lead a class discussion using the following question prompts:

What do Antarctica and North America have in common?

What’s different about Antarctica and North America?

What did you learn that surprised you?

After completing this activity, what do you wonder?

Do you want to visit Antarctica?

Why or why not?



Satellite image of Antarctica.

Comparing Antarctica vs. North America

View the videos *Antarctica: Destination World* and *North America: Destination World* and fill in the blank spaces by recording facts about the two continents.

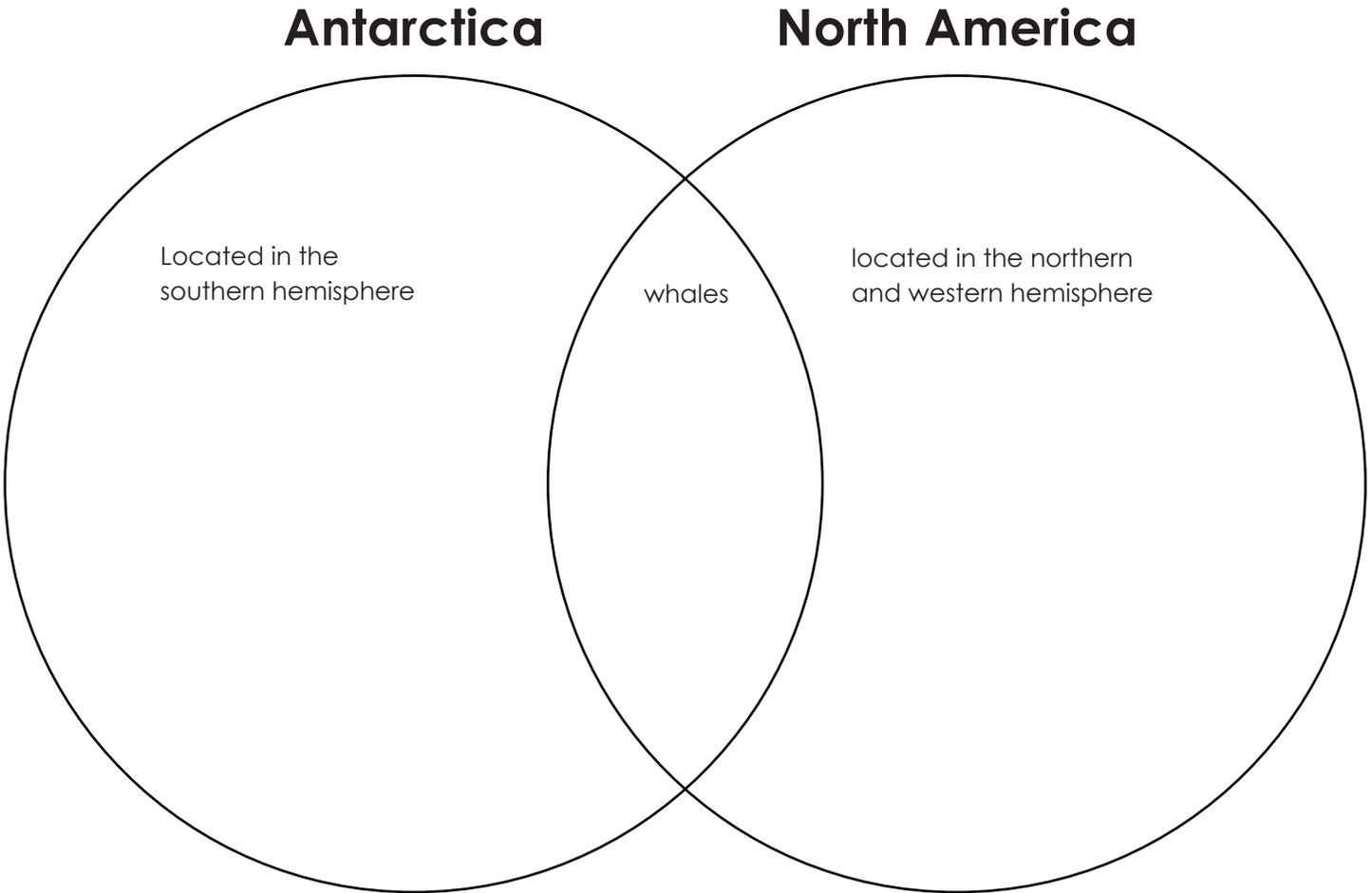
	Antarctica	North America
Location	Southern most continent near the South Pole	Northern & Western hemisphere
Land Size	_____ largest continent 5.5 million square miles	_____ largest continent 9.5 million square miles
Physical features		
Temperature		varies by location
Population	No permanent residents but _____	
Common animals		
Popular attraction		

1. What did you learn about Antarctica that surprised you?

2. After completing this activity, what do you wonder about Antarctica?

Comparing Antarctica vs. North America Venn Diagram

Using the “Comparing Antarctica vs. North America” table, summarize your findings by creating a Venn diagram.



What do Antarctica and North America have in common?

How are Antarctica and North America different?

LESSON 2.3 CONSTRUCTING ANTARCTICA

GRADE LEVEL 2-3



DINOSAURS OF ANTARCTICA EDUCATOR GUIDE



Dinosaurs of Antarctica Educator Guide

LESSON 2.3

CONSTRUCTING ANTARCTICA

GRADE LEVEL 2-3
(1) 60 MINUTE LESSON
RESEARCH

STANDARDS:

- 2-ESS1. Use information from several sources to provide evidence that Earth events can occur quickly or slowly
- 2-ESS2. Develop a model to represent the shapes and kinds of land and bodies of water in an area.

FROM THE FILM:

In the film *Dinosaurs of Antarctica*, students learned that over time, natural occurrences changed the Earth's landscape impacting animals and plants. Antarctica transitioned from being a greenhouse to the icehouse it is today. While Antarctica has the harshest climate in the world, it is still home to some living organisms.

LESSON OVERVIEW:

In this lesson, students will develop a model to represent Antarctica's current landscape.

MATERIALS:

- Constructing Antarctica Student Resource Sheet 2.3
- Various craft or recycled materials



LESSON 2.3

CONSTRUCTING ANTARCTICA

EDUCATOR PREP:

Determine if your students will complete the assignment individually, as partners or within small groups. Print copies of the “Constructing Antarctica Student Resource Sheet 2.3” and gather enough supplies to accommodate your chosen group size.

EDUCATOR GUIDE:

DAY 1

1. In the film *Dinosaurs of Antarctica*, scientists were researching how the changes in the climate affected animal and plant life in ancient Antarctica. Explain to students that based on fossil findings, scientists discovered that Antarctica once had a more extensive plant and animal life suggesting that the climate was much warmer than it is today. Tell students that scientists are still working to understand how Antarctica’s past climate shifted from a greenhouse to an icehouse.

2. Ask students to recall what they learned about Antarctica’s previous environment from the film. Ask students:

What was ancient Antarctica’s landscape like millions of years ago?

Students should be able to describe that the climate was warmer, which led to more plants, dryer land, increased sunlight, and animals that no longer exist today such as dinosaurs.

What is Antarctica’s landscape like today?

Students should be able to share that the climate is much colder and the continent is covered in ice, making it difficult for most animals and plants to survive.

Tell students that scientists continue to study the causes of the climate shift in Antarctica and have found evidence that the environment changed due to a variety of natural causes.

3. Share with students the following theories:

Millions of years ago, the atmospheric carbon dioxide levels declined steadily, preventing the melting of snow and causing ice sheets to form in Antarctica.

Millions of years ago, the changes in land and ocean configurations due to the widening of the ocean between South America and the Antarctic Peninsula created a current that circulates clockwise around the continent, preventing warm water from reaching the coast.



Dinosaurs of Antarctica was filmed in New Zealand to capture a similar landscape to that of ancient Antarctica.

LESSON 2.3

CONSTRUCTING ANTARCTICA

4. Explain to students that they will create a diorama, a miniature display representing a scene from nature or a historical event. For the assignment, students should understand that they will research Antarctica’s current geography. Based on their research, students will use their creativity to model the continents’ landscape. Provide students with a copy of the “Constructing Antarctica Student Resource Sheet 2.3.” Allow students 15 minutes to begin planning their diorama. It may be beneficial to allow time for students to conduct research. Remind students that they can also utilize “Comparing Antarctica vs. North America Student Resource Sheet 2.2” chart that they completed as a reference.

5. Offer students the opportunity to write down possible supplies they may need and have at home to create their diorama. One item you may encourage students to bring is a shoebox or large tissue box. Inform students that they will have time to create their diorama in class and that some materials will be available for them to use.

DAY 2

1. Remind students that in the film *Dinosaurs of Antarctica*, they learned that Antarctica’s climate was much warmer than it is today. Ask students to recall the assignment that they started the previous day which was researching Antarctica’s current climate, plants, and animals so they can create a diorama of the continent. Ask students to access “Constructing Antarctica Student Resource Sheet 2.3” and review the tasks with them to ensure they understand expectations.

2. Show students an example of a completed diorama but encourage them to use their creativity to design something unique. Present the supplies and materials available to students and review expectations of usage. Using the “Constructing Antarctica Student Resource Sheet 2.3” as guidance, allow students 30 minutes to craft their model of Antarctica. Circulate to provide support when necessary.

3. After the allocated time, conclude the lesson by hosting a gallery walk. Ask students to display their diorama around the classroom. Permit students to circulate the room so they can view their classmates’ creations. To keep the process organized, tell students you will play music and when the music stops, they should rotate to the next display. Continue the process until students view every model. Tell students where they can expect to see their diorama in public such as in the media center or wherever peers outside their classroom can view their work.

4. To conclude the lesson, ask students to share something new that they learned about Antarctica through research for this learning activity.

Educator Notes:

Constructing An Antarctica Diorama

Use your creativity and knowledge about Antarctica's landscape to create a diorama.

Sketch your model diorama on paper.

Search for inspiration online if necessary. When drawing your diorama, make sure the miniatures will be appropriate to the scale of the entire scene. For example, a bird should not be the same size as a whale. The diorama should look as real as possible.

Make a list of items you will need to create your diorama based on your sketch.

Consider common school supplies or easily accessible materials such as construction paper, cotton balls, glue, paint, felt, clay, craft sticks, etc. Determine if you want miniature figures (ex: animals) or objects such as rocks, printed pictures, magazine pages, etc.

Gather the materials for your diorama.

Finalize which elements you will make and which components you can purchase (with caretaker approval). For example, you may decide to buy animal figures but create fake snow using cotton balls.

Create your diorama.

- Configure the box in a position where it has a back, four sides, and an open front (ex: a shoebox turned on its side without the lid).
- Design a creative background to represent Antarctica's landscape by decorating all sides of the box (ex: sky, ocean, ice, etc.).
- Add details to make the scene appear realistic. Place objects and figurines in a visually appealing manner while being intentional about the scale of your design. For example, work from the back of the box to the front, placing smaller items in front of larger ones. Be sure you have the entire scene completed before you glue it to the box, allowing the option to change your mind.
- Confirm the design and glue the objects into place to ensure that it doesn't move.
- Attach a title to the box where it can be easily seen.

Word Search

Using the word bank below, find the hidden words in the puzzle.

Hint: The same letter can be used for more than one word.



Word Bank:

- | | | | |
|-----------------|------------------|------------|--------------|
| • Antarctica | • continent | • penguins | • forecast |
| • South pole | • climatologist | • whales | • ocean |
| • precipitation | • meteorologist | • seals | • ice desert |
| • fossils | • paleontologist | • climate | • volcano |
| • expedition | • dinosaurs | • weather | • mountain |

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Dinosaurs of Antarctica Educator Guide

WRITERS AND CONTRIBUTORS:

LESSON PLAN DEVELOPER:

Candice Wilson-McCain, *Ed.S in Curriculum & Instruction*
Discovery Place, Inc.

EDUCATION EVALUATOR:

Karen Elinich, *Ed.D in Educational Technology*

PROJECT MANAGEMENT:

Joanie Philipp
Discovery Place, Inc.

Heather Norton
Discovery Place, Inc.

Deborah Raksany
Giant Screen Films, Inc.

GRAPHIC DESIGN:

Althea Holenko
Discovery Place, Inc.

Andrew Crews
Discovery Place, Inc.

WRITERS AND CONTRIBUTORS

LESSON PLAN REVIEWERS:

DISCOVERY PLACE TEACHER ADVISORY COUNCIL

Stacie Bunn, *M.Ed in Elementary Education*
Kannapolis City Schools District

Anita Cathey, *MS in Information Systems*
Charlotte Mecklenburg School District

Toni Hall, *MA in Leadership*
Charlotte Mecklenburg School District

Robert Leichner, *M.Ed in Curriculum & Supervision*
Charlotte Mecklenburg School District

Meredith Katz, *B.S. in Elementary Education*
Kannapolis City Schools District

Kim Mayes, *BA in Anthropology*
Charlotte Mecklenburg School District

Aeronia Poole, *M.Ed in Curriculum & Instruction*
Charlotte Mecklenburg School District

Danielle Redmond, *MS in Education*
Charlotte Mecklenburg School District

Jill Staton, *M.Ed in Elementary Education*
Cabarrus County School District

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DISCOVERY PLACE



DINOSAURS
OF ANTARCTICA