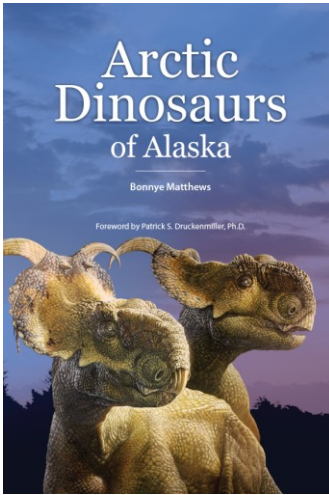


Arctic Dinosaurs of Alaska

by Bonnye Matthews

Teacher's Guide



Summary: *Arctic Dinosaurs of Alaska* by Bonnye Matthews is a Middle Grade fiction about Pakky, a young pachyrhinosaurus experiencing her first year of life in the far north. She discovers the wonders of the yearly cycles of life and migration, the dark of winter and the constant light of summer.

While the story is a product of the author's imagination and speculation, it is based on actual discoveries of dinosaur fossils above the Arctic Circle in the area known as the North Slope. Paleontologists have discovered multiple species of dinosaurs at the Prince Creek Formation along the Colville River as well as other locations throughout the Arctic.

Objectives: This book is a fun way for students to learn about Arctic dinosaurs and imagine what their lives might have been like. They will be introduced to a number of dinosaur species and learn some of their distinctive features. They will also learn about the yearly cycles of light and darkness experienced in the Arctic.

Teaching Activities: Supplement reading the book with these classroom or at-home activities designed to be adapted for grades 3 - 6 to promote the following:

- artistic expression
 - scientific exploration
 - creativity and comprehension
 - student engagement
- Printable materials are available at <https://fathompublishing.com/kids&teens/arcticdinosaurs>

Art Activities

Coloring Pages

The illustrations in the book are designed to be colored. If you do not have enough copies for each student to color their own book, you may print individual coloring sheets here:

<https://www.fathompublishing.com/kids&teens/arcticdinosaurs/dino-coloring/>

Draw a Pachyrhinosaurus

Have students draw their own pachyrhinosaurus one of two ways.

- Use pictures from the book as a guide.
- Follow a step-by-step video. There are a few to be found online, but this is a good option:
 - *EASY How to Draw Dinosaurs – Pachyrhinosaurus*
<https://www.youtube.com/watch?v=kjwUVI9f5zE>

Creativity and Comprehension Activities

What Happened Next?

- Have students write a paragraph or short story about what they imagine happens next in Pakky's life.

Ranny's Adventures

- Have students write a paragraph or short story about Ranny's adventures after he was swept away in the river and how he found his way back to the others.

Comprehension Crossword Puzzles

- Let the students work individually or in teams to complete one of the crossword puzzles provided.

Science Discussions & Activities

Light and Dark Cycles

Discussion: The chapter titles all involved descriptions of light and dark. Discuss with the class what those mean and what we can learn about daylight and darkness in the Arctic as a result of the tilt of the earth's axis toward and away from the sun over the course of the year.

- Constant Light – summer, when the sun never drops below the horizon
- Light-Moving-Toward-Dark – fall, when the sunlight hours decrease and the dark increases
- Constant Dark – winter, when the sun never appears above the horizon
- Dark-Moving-Toward-Light – spring, when the dark hours decrease and sunlight increases

Facts about Equinoxes and Solstices:

- During an equinox, the earth's equator is aligned with the sun so each hemisphere receives equal sunlight.
 - Spring equinox is around March 21
 - Fall equinox is around September 23
- During a solstice, one hemisphere is pointed towards the sun resulting in constant light at that pole, while the opposite pole is experiencing constant dark.
 - Summer solstice in the North is around June 21
 - Winter solstice in the North is around December 21

Example: The town of Utqiagvik, Alaska, formerly known as Barrow, is the farthest north town in Alaska. They experience the Midnight Sun in the Summer when the sun remains above the horizon from late May through early August. In the winter they experience Polar Night, when the sun stays below the horizon from mid-November to late January.

Science Discussions & Activities Continued

Fact or Fiction

Discussion: Discuss the difference between fact and fiction found in the book.

- Author Bonnye Matthews addresses this on page 88. You could read and discuss her comments.
- Read a section, phrase or concept from the book and ask students to identify it as fact or fiction. Remind them that sometimes fiction is a theory that is based on a reasonable assumption, but because it is not yet proven fact, it remains fiction.

Here are some suggestions:

- Pachyrhinosauruses lived in Alaska – FACT
- Pachyrhinosauruses and other dinosaurs migrated every year – FICTION
Migration among dinosaurs has been speculated, but is not proven.
- Dinosaurs hatch from eggs – FACT
- Pakky grieved the loss of Ranny – FICTION
- In the Arctic, the sun circles around above the horizon in the summer – FACT
- The green of the plants flies up to the sky in the time of dark – FICTION

Arctic Dinosaur Report

Have students select one of the Arctic dinosaurs from the book and complete the Arctic Dinosaur Report worksheet. Encourage them to use information found in the book, and if able, to research more information online.

Student Engagement Activities

➤ **Turn and Talk to a Friend**

- Share with each other some facts that you learned about Arctic Dinosaurs.
- What was your favorite part of the story?
- If you were a character in the story, who would you want to be, and why?

➤ **Interview with Pakky**

Have students prepare a skit with a partner. One of them is Pakky. The other is a news reporter interviewing Pakky about her experiences. Encourage them to use their imagination!

➤ **Personal Experience**

In the story, Pakky learns and experiences so many things that are a normal part of life, but are new to her. Discuss with the class some of these new experiences that stood out to them. Then have them each think about a new experience or something they learned how to do. Have them write a paragraph about it.

Interesting Videos & Webpages

- ❖ **CityNews Connect: Dinosaurs in Edmonton** <https://youtu.be/OUYXa6HTQ-c>
21:38 minute video about fossil excavation and collection in Alberta.
- ❖ **'Big Sam' pachyrhinosaurus skull unearthed in northern Alberta** https://youtu.be/Ge5LapfNU_I
2:51 minute interview with a paleontologist about the biggest pachyrhinosaurus skull discovered to date
- ❖ **Dinosaurs Lived—and Made Little Dinos—in the Arctic**
<https://www.scientificamerican.com/podcast/episode/dinosaurs-lived-and-made-little-dinos-in-the-arctic/>
- ❖ **The Polar Dinosaurs Revealing Ancient Secrets**
<https://www.bbc.com/future/article/20221130-the-polar-dinosaurs-revealing-ancient-secrets>
- ❖ **Dinosaurs of the Arctic Thrived in Cold Darkness**
<https://www.scientificamerican.com/article/dinosaurs-of-the-arctic-thrived-in-cold-darkness/>
- ❖ **How Dinosaurs Thrived in the Snow**
<https://www.smithsonianmag.com/science-nature/how-dinosaurs-thrived-snow-180976435/>

Teacher's Guide written by Wendy Kenny

Name _____

Date _____

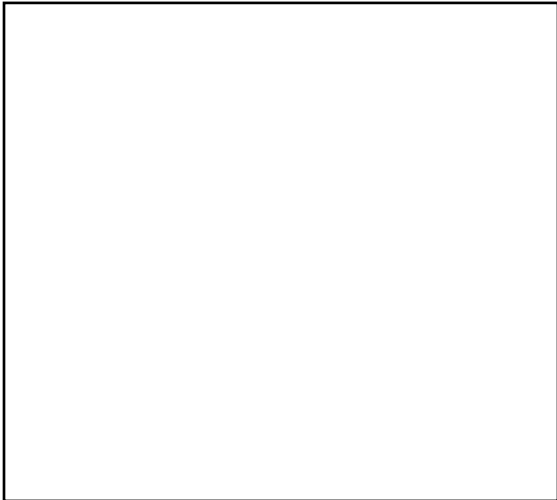
Arctic Dinosaur Report

Dinosaur: _____

Its name means: _____

Carnivore Herbivore Unknown

Height: _____ Length: _____



Draw a picture of your dinosaur

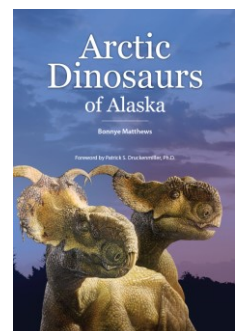
Distinctive features:

Other related dinosaurs: _____

Fossils have been discovered in: _____

Where I found my information: _____

Why I chose this dinosaur: _____



Name _____

Arctic Dinosaurs Crossword #1

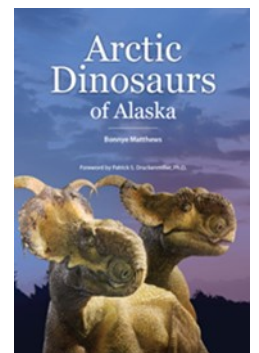
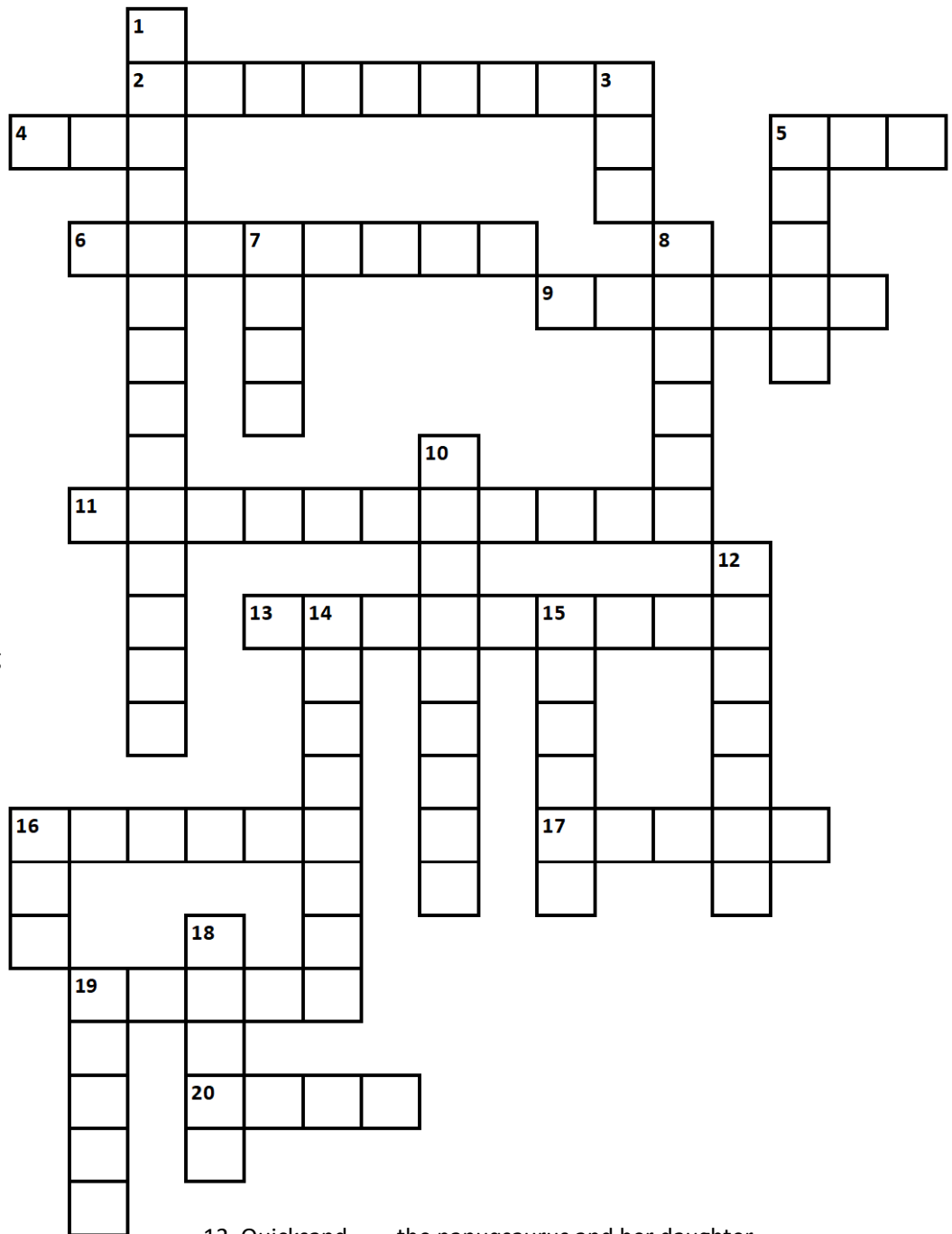
ACROSS

2. One way to survive the Arctic cold.
4. It clogged rivers in winter.
5. What pterosaurs did that Arctic dinosaurs couldn't do.
6. The type of earth environment referred to as ___ earth began 2.58 million years ago.
9. Pachyrhinosaurus in the story use what geometric shape for defense?
11. Dinosaur that strayed into the community looking for flesh to feed her daughter and herself.
13. These creatures could do something Arctic dinosaurs couldn't do.
16. What thescelosaurus cheeks did when they ate.
17. Fallen ___ protected hatchlings from predators flying overhead.
19. A large number of these animals together might be able to stand up against larger dinosaurs.
20. The sound organ we have both internally and externally that dinosaurs only had internally.

DOWN

1. The only Arctic dinosaur scientists think may have hibernated.
3. This held a dinosaur until it was ready for the world.
5. Headgear for pachyrhinosauruses.
7. Pakky thought of ice as ___ water.
8. Name of mountain range where dinosaurs in the story migrated to avoid winter's wind.
10. The name of the pachyrhinosaurus leader.

12. Quicksand ___ the nanuqsaurus and her daughter.
14. These dinosaurs may have done well at night with their large eyes.
15. Memory triggers.
16. A butting tool on the face of a pachyrhinosaurus.
18. What plant element Pakky thought moved to the aurora in winter.
19. The location of the sun ___ the horizon causes dark in the Arctic.



Name _____

Arctic Dinosaurs Crossword #2

ACROSS

2. Where did Pakky have to rest after being injured by dromaeosaurs?

7. Dinosaur known as "head banger."

8. City with climate most similar to what the Arctic Dinosaurs experienced.

9. How many times did they have to cross the river on their return trip?

10. When Matriarch prevented Pakky from going with her, how did Pakky feel?

13. The earth environment during which the dinosaurs lived.

14. How many dromaeosauruses attacked Pakky in the winter valley?

15. What insects did newly hatched pachyrhinosauruses learn to eat?

17. A colorful insect that Arctic dinosaurs saw that we still see in Alaska today.

19. The relation of the sun to Alaska's horizon in summer is ___ the horizon, making living things sleep in daylight.

20. This protected the tender neck of the pachyrhinosaurus when the nanuqsaurus tried to bite one behind the head.

21. ___ helped the injured ugrunaaluk leader get home.

22. ___ is not a character in the book, but it's responsible for when they do what they do. *Hint: comes from the sun*

DOWN

1. In the story, alskacephales were so hungry they tried eating ___, but it didn't make them feel good.

2. Pakky was astonished to see thescelosauruses disappear into a ___.

3. Pakky started to understand life cycles when she saw this color peeking from plants when they returned to their grazing ground.

4. Food for featherless Arctic dinosaurs.

5. What the pterosaur bodies were covered with.

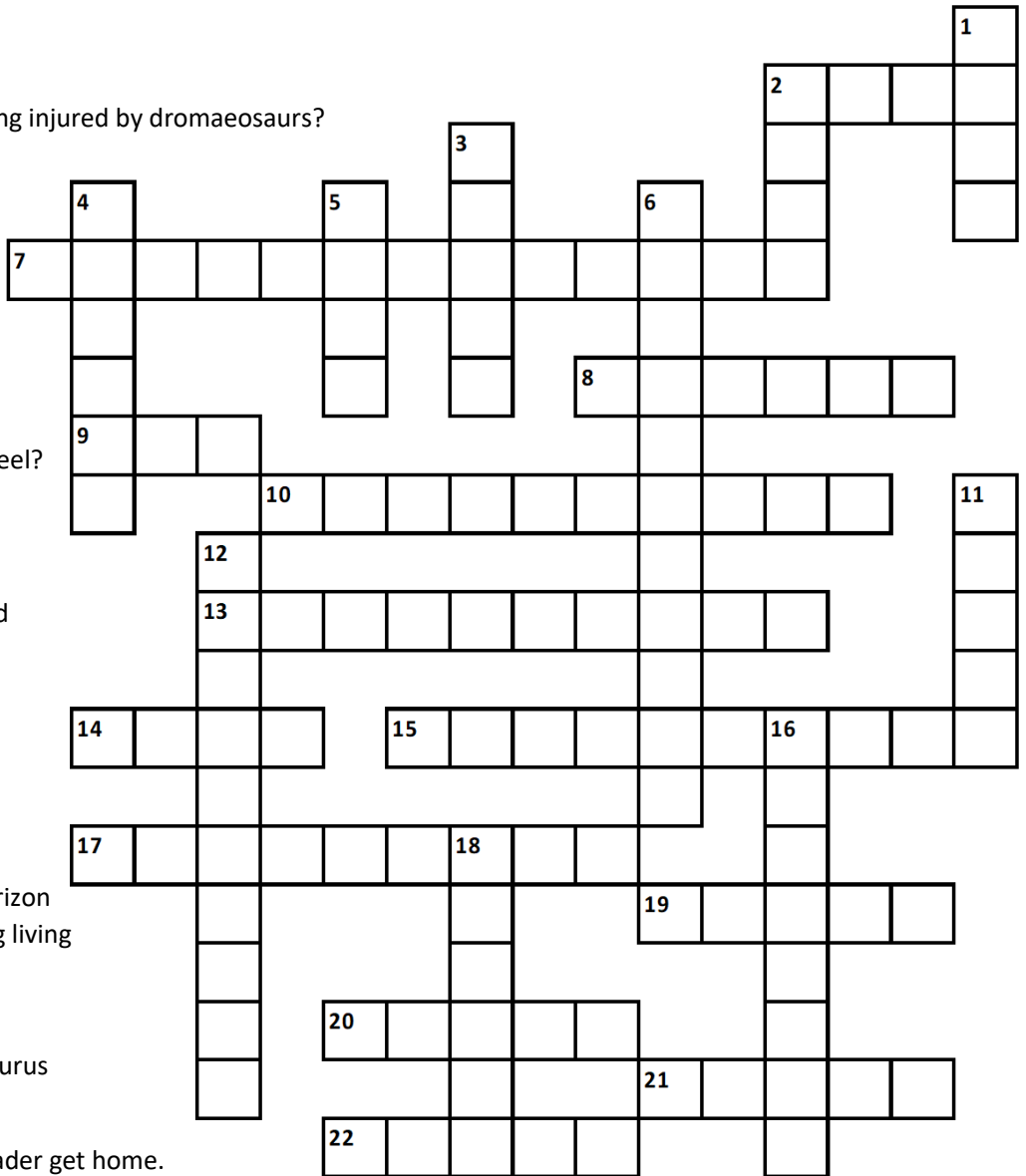
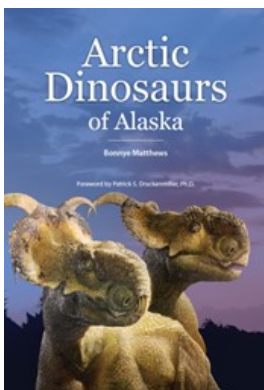
6. At the entrance to the valley, who killed some pachryhinosaurus guards?

11. When the sky was free of clouds in the time of dark, dinosaurs could count on light from the ___.

12. Dinosaur known as "ancient grazer."

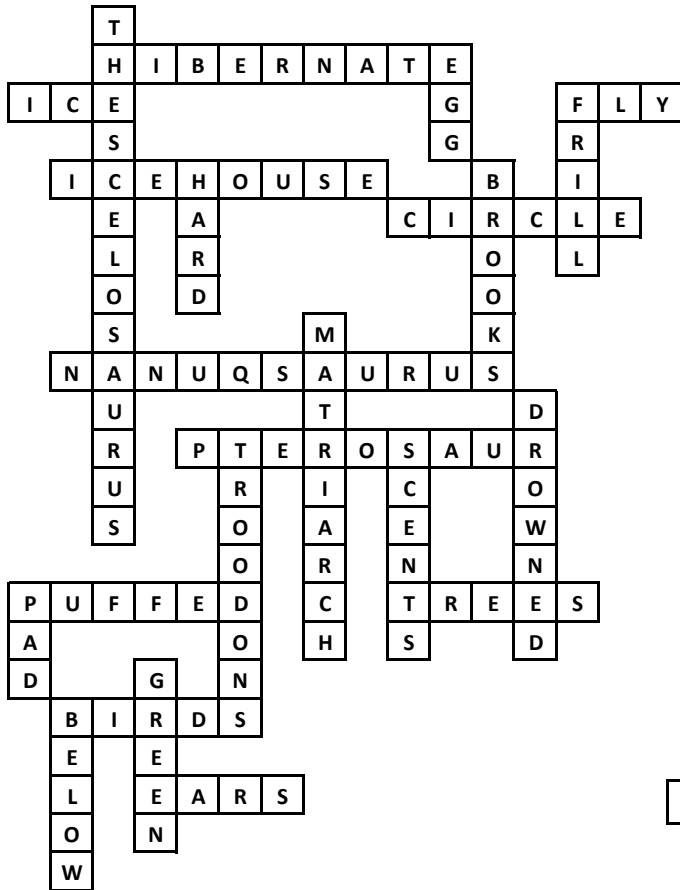
16. These dinosaurs feasted off hibernating thescelosauruses.

18. Pakky thought plants had this skill that dinosaurs lacked when she saw the wind lift a tangle of plants through the air.



Arctic Dinosaur Crossword Answer Keys

Crossword #1



Crossword #2

