Dino Duel

A Reading A–Z Level Z Leveled Book
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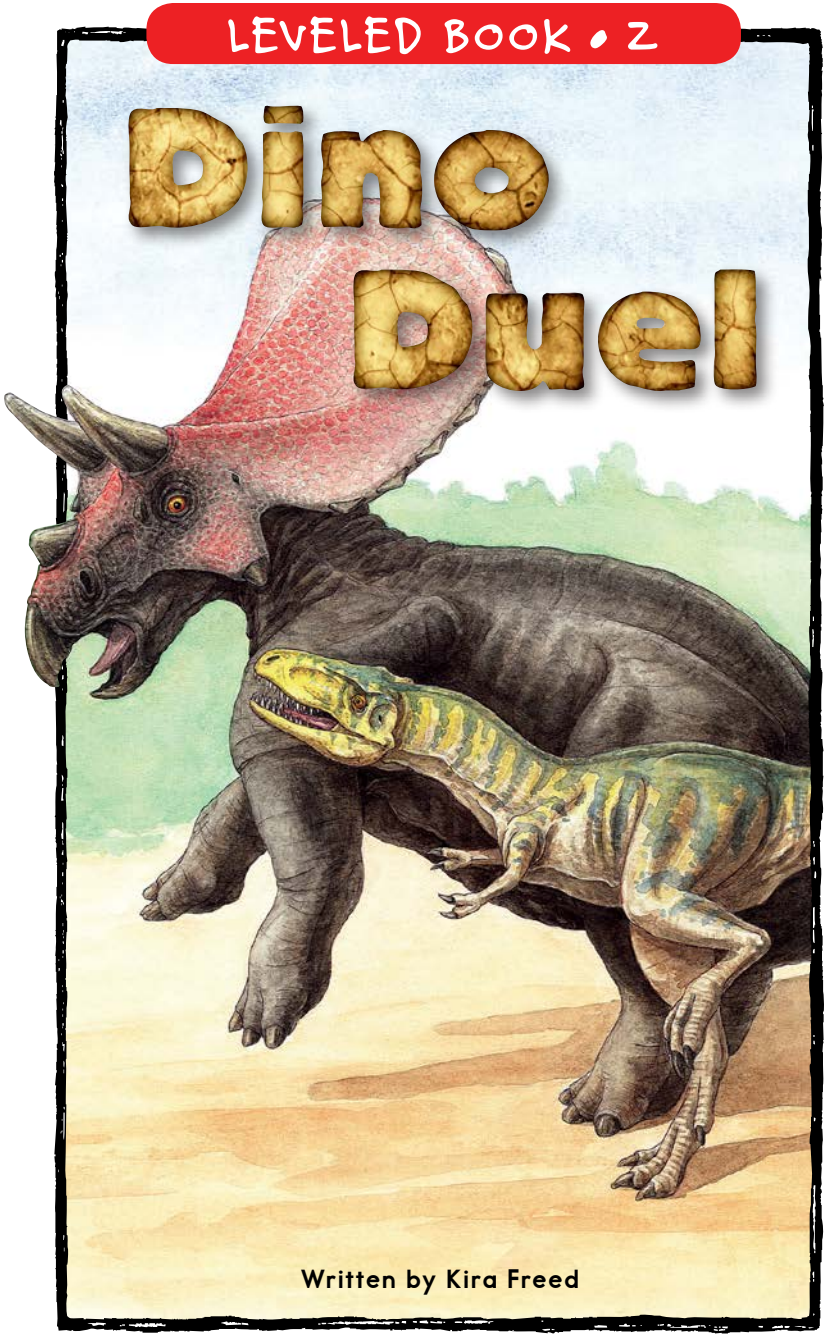

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Dino Duel

Written by Kira Freed

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Front cover: The two "Dueling Dinosaurs" are thought to be a smaller relative of the *T. rex* and a newly discovered relative of the Triceratops.

Back cover: Paleontologists work on dinosaur fossils that will go on display at the British Museum in London, England.

Title page: Pete Larson of the Black Hills Institute in South Dakota uses LEGOs to make a mold for a cast of a *T. rex* vertebra.

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Correlation

LEVEL Z	
Fountas & Pinnell	U–W
Reading Recovery	N/A
DRA	50

Table of Contents

Clayton Phipps poses with one of the fossils he discovered in Montana.

Dueling Dinosaurs

One day in 2006, Clayton Phipps and Mark Eatman were **fossil** hunting on a neighbor's land in eastern Montana. The area is known for its many dinosaur fossils. Before long, Eatman found a huge pelvis sticking out of the side of a canyon. Soon after, Phipps found an enormous thighbone nearby. That's when he started to suspect that they might have found a complete dinosaur skeleton.

They got to work **excavating** the bones, which belonged to a plant-eating horned dinosaur. After a couple of weeks of work, they were surprised to discover the claw of a meat eater. (Horned dinosaurs didn't have claws.) It soon became clear that Phipps and Eatman had found something important: the almost-complete fossilized skeletons of two dinosaurs that died and were buried together.

A plaster cast shows how the Dueling Dinosaurs were found lying next to each other with their tails overlapping.

The skeletons were removed from the ground, still encased in blocks of rock and soil (called *matrix*), and taken to a laboratory. When the matrix was removed, fifteen carnivore teeth were found embedded in the herbivore, which indicated that the herbivore had been attacked. The carnivore had cracked ribs and a crushed skull, suggesting that the herbivore had kicked it in response. The evidence pointed to the two dinosaurs having killed each other.

Each dinosaur was also an important find on its own. The carnivore, which is about the size of a polar bear, is similar in many ways to a small *Tyrannosaurus rex*. It could help scientists answer a question they've long had about whether this kind of dinosaur is a new species or simply a young *T. rex*. The herbivore—about the size of an elephant—appears to be a new species of horned dinosaur.

Unlike most fossil finds, both skeletons have all their bones, and the bones of each skeleton were found connected rather than separate and scattered. The remains are so well preserved that they include patches of skin, which is practically unheard of among fossils.

You'd think that museums across the country would be racing to get their hands on these rare **specimens**. But you'd be wrong.

The story of the "Montana **Dueling** Dinosaurs" illustrates a **debate** in the field of **paleontology** that has stalled a great deal of scientific research.


An artist's illustration shows how the Dueling Dinosaurs may have looked.

At the center of the debate are these questions: Should dinosaur bones belong to the world or to the people on whose land they're found? And who should be allowed to collect them?

To understand why scientists and museums aren't scrambling to buy these fossils, let's begin by looking at how and by whom they were found.

Dueling Humans

Clayton Phipps, who first introduced Mark Eatman to fossil hunting, is a "**commercial** fossil hunter"—also referred to as a "commercial collector" or "independent collector." Both men live in Garfield County, Montana, where the Dueling Dinosaurs were found—an area with about 1,200 people scattered across roughly 4,800 square miles. Most people who live there are ranchers or farmers. Average incomes are low, and many families struggle to make a living.

Dinosaur bones are one of the few plentiful resources in the area. In fact, the entire eastern portion of Montana and the western Dakotas contain many fossils. Fossil hunters such as Phipps and Eatman ask landowners for permission to search for fossils and split the profits with them when the fossils are sold. Phipps and Eatman earn money with each find. But for the landowners, a discovery such as the Dueling Dinosaurs can be a once-in-a-lifetime chance for financial security.

"On private lands, whoever owns the land owns the fossils and can manage them any way they want."

—Michael Triebold, founder, Rocky Mountain Dinosaur Resource Center

Many scientists who heard about the Dueling Dinosaurs wanted these extraordinary specimens to be available for study. Phipps tried to sell the fossils to three museums but did not succeed. Phipps's asking price was $15 million—far too much for a museum to afford on its own. The three museums also turned down Phipps's offer because the specimens were excavated by commercial fossil hunters rather than by academically trained scientists working for a museum or university. The three museums were concerned that the excavation wasn't done properly.

Why is careful excavation so important? Fossils must be handled with extreme care so they're not damaged when being removed from the ground. In addition, many details must be recorded, including their position in the ground, the material they were buried in, and whether other fossils were nearby. Those details, as well as others, might hold clues that can help paleontologists piece together the conditions under which an animal lived and died. Careless excavation can result in precious data being lost forever. In the words of paleontologist David Trexler, "Collecting fossils is a one-shot event; if you mess up, there's no do-over."

Paleontology Techniques

Excavating fossils is painstaking and time-consuming. The process—when done correctly—generally involves leaving bones in their original positions and removing entire blocks of matrix. The blocks are wrapped in plaster jackets for safe transport to a lab. During the excavation, paleontologists create maps, take photographs, and obtain soil samples in order to preserve as much information as possible. At the lab, the fossils are "prepared," which involves removing them from the matrix; cleaning, repairing, and strengthening them; and getting them ready for storage or display.

(Left) A university student cleans part of a fossilized tree discovered in Germany. The tree was once part of a 290-million-year-old forest.

(Right) A paleontologist uses a tool in a lab to free a fossil from the rock that surrounds it.

Think About It

Should anyone be allowed to collect and prepare fossils? Should training be controlled in some way? If so, should it be limited to academic training? Who should decide?

Proper excavation techniques can be learned in places other than colleges and universities, and some commercial fossil hunters may have excavation skills that are as good as or better than those of university-trained paleontologists. However, some paleontologists don't trust reports of careful commercial excavations and suspect they're just a way commercial fossil hunters try to drive up the prices for their discoveries. In addition, some scientists and institutions are opposed to buying specimens, even if they were collected properly, because paying money for fossils encourages more people to become commercial fossil hunters.

"Collecting fossils is a one-shot event; if you mess up, there's no do-over."

—David Trexler, paleontologist, Two Medicine Dinosaur Center

Paleontologist Robert Bakker states that the Dueling Dinosaurs excavation was conducted according to professional standards. He claims that the opposition to the specimen is due to some academic paleontologists being **biased** against commercial fossil hunters.

Another point in the debate centers around how plentiful dinosaur fossils are. Some people argue that dinosaur fossils are scarce and that only formally trained scientists should be able to excavate and study them. Others argue that dinosaur fossils are so plentiful that most would be worn away by wind, water, and other natural forces if only a few trained scientists were allowed to collect them.

Fossils that have existed for more than 160 million years underground can disappear quickly once exposed to the elements.

People on both sides of the debate care about where fossils such as the Dueling Dinosaurs end up. Some academic paleontologists are opposed to commercial collection because of the risk of fossils being bought by wealthy **private** collectors rather than by institutions that will make the fossils available for ongoing scientific study. One important principle of science is that scientific evidence should be available for study by other scientists. In the case of dinosaur bones, scientists want to be able to compare new discoveries with specimens found long ago as well as with future finds.

Think About It

If you discovered an amazing dinosaur specimen worth thousands or even millions of dollars, would you donate it to a museum? Try to sell it? How important would it be to you where it ended up?

Students look for fossil remains while visiting Dinosaur Provincial Park in Alberta, Canada.

Fossils can end up in one of several places. A museum might buy the fossils, which would allow them to be both displayed and available for scientific research. A generous buyer might donate them to a scientific institution. A private collector might allow scientific study before displaying the fossils or might display the fossils privately and not allow scientific study.

Even when scientists aren't initially given access to a particular specimen that's privately owned, they sometimes get another chance later as the fossil is passed down to other family members. That process can take decades, or generations, however, and is never guaranteed.

The Dueling Dinosaurs were found on private land, so, according to current Montana law, they belong to the landowners, who can do as they please with them. Since Phipps was unsuccessful in selling them to a museum, the fossils went to **auction** in November 2013. They were expected to sell for between $7 and $9 million. However, no bidder offered enough money to meet the auction house's minimum.

Think About It

Who should be allowed to own fossils? Should ownership of important fossils be limited to museums and universities? Should wealthy private citizens be allowed to buy fossils for private collections? Who should decide?

"Sue" is a world-famous fossil on display at the Field Museum in Chicago, Illinois. She is the largest, best preserved, and most complete *Tyrannosaurus rex* ever found.

Whose Fossils?

Fossil collecting in the United States is restricted only on public lands, and then only sometimes. Some laws **regulate** the collection of archaeological remains—those associated with humans and too recent to become fossils—but laws about fossil collecting aren't always clear or consistent. If found on private lands, fossils belong to the landowner, who can keep the fossils or get rid of them as desired. This includes auctioning them off to the highest bidder, regardless of where they will end up.

The laws about fossil collecting vary in other countries. In Germany, a professional paleontologist must inspect every fossil that is collected. Scientifically important finds become the property of the government, with the finder paid a fee. Unimportant finds are returned to the finder, who is free to keep or sell them. Some people involved with the paleontology debate consider Germany's policy to be one that the United States should adopt. Others think it would be a mistake for the United States to follow Germany's example. They believe such strict policies would be expensive and inconvenient to enforce and would violate the property rights of American citizens.

Fossils such as this one, discovered in Germany in 1951, helped scientists understand the connection between feathered dinosaurs and modern birds.

Imagine that you're out on a nature hike and you come across a fossil. Should you pick it up and take it home? Report your find? Leave it alone?

Children and adults are generally curious about the natural world, and picking up rocks, fossils, and other objects can be fun. These items reflect the history of our planet—its geological cycles as well as its diverse life forms, many of which are now extinct. According to the Black Hills Institute of Geological Research, more than four-fifths of all important fossils have been found by **amateurs**.

The Dueling Dinosaurs aren't the last amazing fossil discovery that will take place in your lifetime. Many others will no doubt be made, some by academic scientists, others by commercial fossil hunters, and still others by everyday citizens on nature outings. What will the fate of those fossils be?

Glossary

amateurs *(n.)* people who do an activity for fun or as a hobby instead of as professionals (p. 15)

auction *(n.)* a sale of goods or property at which buyers bid against each other, and the buyer who offers to pay the most wins (p. 13)

biased *(adj.)* having or showing unfair support for one opinion, group, or set of beliefs over another (p. 10)

commercial *(adj.)* relating to buying and selling (p. 7)

debate *(n.)* a discussion between people or groups who have different opinions on an issue (p. 6)

dueling *(v.)* fighting one-on-one (p. 6)

excavating *(v.)* uncovering or digging out (p. 4)

fossil *(n.)* the remains of a plant or animal that turned to stone over time (p. 4)

paleontology *(n.)* the study of plant and animal fossils (p. 6)

private *(adj.)* not public or meant to be shared with others (p. 11)

regulate *(v.)* to control or maintain the amount, rate, speed, or behavior of something so it works right or obeys laws or rules (p. 14)

specimens *(n.)* examples of something used for comparison, study, or display (p. 6)