

## 4 *The Dinosaur Heresies*

—Robert T. Bakker, Ph.D.

### Synopsis

When paleontologists first discovered dinosaur bones and fossils, they developed many theories about how dinosaurs lived and what their environment was like. By the early 1900s, the traditional theories regarding these animals and their extinction were established and, for the most part, unchallenged. *The Dinosaur Heresies* sets forth Robert Bakker's new theories, or "heresies," contradicting the established theories about dinosaurs' cold-bloodedness, activity, intelligence, and extinction. The evidence and logic he uses to refute orthodox theories are presented in a detailed, descriptive narrative along with his own illustrations depicting the dinosaurs' anatomical structure, appearance, movements, and changes through time.

Bakker refuses to view dinosaurs as a dynasty of flawed creatures. Bakker believes they were warm-blooded, agile, and intelligent. Although they are extinct, their long existence on the Earth attests to a highly successful segment of evolution. As evidence, he cites examples of fossils and draws parallels to modern animals. He asserts that birds are direct descendants of dinosaurs. Bakker feels that dinosaurs made a significant contribution to plant evolution as well.

Challenging the notion that dinosaurs are lowly reptiles, Bakker vigorously argues that they should be scientifically reclassified and that new terminology should be used to study them. He suggests and supports a theory that Dinosauria should be a separate classification containing all the known species of dinosaurs.

### Student Focus

As you read, you should be aware of Bakker's descriptions and details that employ the literary elements of imagery and analogy. How does the validity of the evidence and arguments that Bakker uses challenge orthodox dinosaur theories? What are the evolutionary implications of his theories?

### Correlation to Subject Matter

Paleontology, Evolution, Genetics, and Anatomy

## Analyzing the Book

### Identifying Facts

1. Describe how Bakker views the traditional dinosaur theory.

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2. What is the topic of Al Romer's *Osteology of the Reptile*? On what point does Bakker disagree with Al Romer?

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3. Describe the ecological success of the giant tortoise. How was its success compromised?

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4. What are the limitations of reptiles in relation to mammals? What implications does this have for the orthodox theory of dinosaurs?

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5. What is the difference between cold-bloodedness and warm-bloodedness? Describe the theory of mass homeothermy. Explain how some scientists use this theory to prove that dinosaurs were cold-blooded reptiles.

6. What is taphonomy? What factors can affect the location of dinosaur fossils?

7. What kind of food does the orthodox dinosaur theory suggest that plant-eating dinosaurs consumed? What differing opinion does Bakker have? List some of his reasons for disagreement.

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8. Describe the evolutionary relationship between plants and plant-eaters. What plant feature first appeared during the Mesozoic Era? What modern plant-animal interaction does Bakker think existed in the Cretaceous ecological system?

9. What anatomical features of the brontosaurus limited their speed? To what modern mammals can the brontosaurus' movements be compared? What are the similarities between the two?



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**13.** What is the theory of punctuated equilibria? Describe how brontosaurus support this concept.

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**14.** What are the characteristics of mass extinction?

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**Interpreting Meanings**

**15.** What criteria does Bakker use to identify the success of dinosaurs as a zoological dynasty?

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**16.** Why do reptilian survival features, or lack thereof, indicate that dinosaurs were not reptiles?

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**17.** Compare and contrast the orthodox dinosaur theory with Bakker's heresy regarding dinosaurs' speed.

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**18.** Why does the speed and movement of dinosaurs indicate that they were *not* cold-blooded animals?

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**19.** Why did angiosperms need a foothold in order to break into the ecosystem? How did dinosaurs help provide the foothold?

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**20.** How did plant-eating dinosaurs survive against the fighting meat eaters?

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## Writing About the Book

On a separate sheet of paper, write the answers to each of the following.

### Extending the Story

1. Bakker has suggested that the classification of dinosaurs be radically changed. Assume that his dinosaur heresies have become accepted theories in the twenty-first century. Write a brief, overall description of dinosaurs based upon his new theories.

### Thinking About Assumptions

2. Bakker writes, "Scientific thinking often benefits from the throwing of 'bombs'—the publication of ideas so revolutionary that one half of the profession is scandalized, while the other half is captivated. . . ." Do you think that Bakker is convinced by all of his own heresies? Explain how such a "bomb" benefits paleontology. Support your explanation by describing the effect of Bakker's scientific "bombs."

### Responding to a Review

3. Describing *The Dinosaur Heresies*, the *New York Times Book Review* states, "... his drawings of galloping dinosaurs are a splendid complement to his prose." Do you agree with this statement? Write an essay that explains whether Bakker's illustrations complement his writing. Use examples of specific drawings and descriptions to support your answer.

### Evaluating the Author

4. Robert T. Bakker challenges the work of many paleontologists. What qualifications and characteristics does he bring to this task? How do you think paleontologists feel about Bakker as a scientist?

### Writing a Scientific Letter

5. Suppose that you are a paleontologist studying dinosaurs. You have read Bakker's writings that dispute traditional dinosaur theories. Choose one aspect of dinosaur orthodoxy, and write a letter to Bakker in which you support or challenge his new theory. Cite specific points in his theory, and directly address each one.

### Analyzing the Theories

6. If you were Robert T. Bakker, what would you do to counteract the orthodox theories with which you disagree? Would you dismiss the work of scientists with which you disagree? Would you argue with them? Would you look for supporters of your own theories? What approach do you think is most beneficial for scientific progress?

## Testing on the Book

On a separate sheet of paper, write the answers to each of the following.

### Critical Thinking and Writing

1. To follow Bakker's ideas, scientists would need to restructure scientific animal classification. What would be required to accomplish this? What would the scientific implications be? Explain how this would affect biology in general.
2. Paleontology differs from many areas of science in that it is impossible to perform experiments directly on dinosaurs and other life forms contemporary to dinosaurs. Explain how the methods for drawing paleontologic conclusions differ from traditional scientific methodology. Cite examples in which experimentation can be used, and explain how it fits into the process of drawing conclusions.
3. The location and placement of fossils are key paleontologic factors. Explain how fossils found in different places contribute to a single theory regarding dinosaurs.
4. Anatomical capabilities provide important clues to understanding dinosaurs. Describe how these capabilities are determined. Explain how assumptions based on dinosaur anatomy give rise to theories. How are incorrect assumptions made?
5. The controversy over Darwin's *The Origin of Species* was tremendous and ongoing. How do Bakker's "heresies" impact the future of paleontology and other scientific areas?

