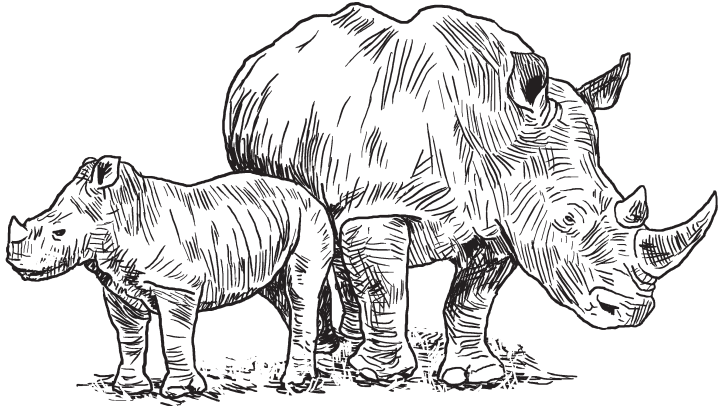


LAST ^{OF} THE GIANTS



THE RISE AND
FALL OF EARTH'S MOST
DOMINANT SPECIES

BY JEFF CAMPBELL

STUDY GUIDE

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ABOUT THE BOOK:

Last of the Giants explores humanity's role in the world's current extinction crisis by telling the stories of thirteen once-dominant, giant animals. Each story describes how the animal evolved to dominate its environment and how conflicts with people eventually led to its decline and demise. Along the way, readers discover the reasons species are going extinct today, why it matters, and what we are doing to conserve endangered species, resurrect extinct species, and repair damaged ecosystems. Ultimately, *Last of the Giants* drives home the compassionate yet cautionary message that human actions and attitudes now determine the fates of many species, but especially those of the charismatic giants we know and love best.

ABOUT THIS STUDY GUIDE:

This study guide is designed to help teachers, educators, and parents further explore the book's topics with students in grades 5 to 10, though the material can be adapted to any context. The guide is divided into three themes—evolution, extinction, and conservation—that each have four sections. "Keywords & Concepts" provides a text cross-reference where central terms and ideas are explained. "Reading Response" offers questions that check for comprehension. "Group Discussion" provides prompts for small-group or class discussions that personalize the issues and encourage self-reflection. "Papers & Projects" suggests ideas for further research for individuals and small groups.

A small selection of online resources for educators is provided. Many more can be found in the book's "Call to Action" and "Sources" sections.

COMMON CORE LITERACY STANDARDS:

Each section in the study guide is aligned with the following science-related Common Core standards (CSS.ELA-Literacy):

Common Core Standard Grade 6-8: RST 6-8.1, RST 6-8.2, RST 6-8.4, RST 6-8.5, RST 6-8.6, RST 6-8.8

Common Core Standard Grade 9-10: RST 9-10.2, RST 9-10.5, RST 9-10.6, RST 9-10.8

EVOLUTION

KEYWORDS & CONCEPTS:

adaptive radiation (page 24); convergent evolution (page 24); domestication (page 38-39); evolution, theory of (page 94-96); hybrids (page 172-73); island dwarfism (page 28); megafauna (page 11); megaherbivore (page 80); species distinctions (page 172-73); taxonomy (page 22); top or apex predators (page 11)

READING RESPONSES:

- For the red wolf (page 170), the author discusses the main ways that scientists define species. What are they?
- “The Pros and Cons of Being Giant” (page 80) describes the advantages and disadvantages of becoming a giant animal. What are they? Illustrate with examples from the book’s species.
- The aurochs (page 34) and the passenger pigeon (page 100) were species whose lives shaped their ecosystems. How? In what ways have other giant species shaped their ecosystems?
- The giant tortoise (page 84) and the baiji (page 208) were large animals whose evolution was shaped by their habitats. In what ways? How were other giant species shaped by their environments?
- The giant tortoise (page 84) helped inspire Charles Darwin to conceive of the theory of evolution. What did Darwin notice about this species? What shocked people at the time about this theory?
- The moa (page 20) was an example of adaptive radiation. What is this, and which other species exhibited this process?
- The Steller’s sea cow (page 66) and the thylacine (page 138) were examples of convergent evolution. What is this, and which other species exhibited this process?

GROUP DISCUSSION:

Imagine you’re a Cro-Magnon meeting woolly mammoths, sabertooth cats, and carnivorous kangaroos for the first time. How would you react? What problems would giant animals pose? How would you solve those problems? How would you hunt these animals? Why might you draw about them on a cave wall?

The book suggests that, unlike other animals, ancestral humans developed skills and tools that allowed them to grow beyond the limits of specific habitats, and then to shape habitats to their needs. In what ways is this true where you live? Are there ways in which your community *does* adapt to its landscape? In what ways are humans limited by the larger dynamics of nature?

PAPERS & PROJECTS:

How Big Is Giant: For small groups, visualize and compare the actual size of giant animals, both extinct and living. Gather measurements and re-create them as life-size chalk outlines on the playground or as lengths of string on the classroom floor. Or, create half-size paper cut outs for comparisons. See “The Biggest Living Species” (page 234).

A Species’ Family Tree: Research and chart the evolution of one of the book’s species. Describe and date the significant points in its development and how it changed over time. Include a family tree of related species and subspecies, living and extinct. See individual chapters for resources.

Darwin’s Impact: Research and describe how Charles Darwin developed the theory of evolution and the impact this theory had on society and science in the 19th century. To start, see the chapter on the giant tortoise (page 84).

Understanding Cave Art: Research and describe the cave art in Chauvet Cave. Include both the established theories of what drawings of megafauna might mean and the student’s own thoughts. To start, see “Chauvet Cave” (page 38).

EXTINCTION

KEYWORDS & CONCEPTS:

Anthropocene (page 241-42); extinction (page 15); extirpation (page 239); keystone species (page 81); Late Pleistocene extinctions (page 48-53); mass extinctions (page 146-47); overkill theory (page 135); the sixth extinction (page 238-41); trophic cascade (page 182)

READING RESPONSES:

- The Introduction (page 7) overviews the main causes of extinctions today. What are they? Give examples of species affected by each impact.
- “Written in the Earth” (page 238) describes the sixth extinction: what is it, why is it difficult to measure extinctions, and why are scientists concerned today?
- Three boxed texts discuss the Late Pleistocene extinctions (pages 48-53, 132-37, and 186-91): when and where did these occur, what animals were affected, and what are the theorized causes?
- Choose a species: describe the impacts that caused its decline and extinction, and discuss the ways human actions and attitudes contributed.
- “The Pros and Cons of Being Giant” (page 80) describes keystone species: what defines them, and why do extinctions of keystone species affect ecosystems more than others?
- The chapter on the red wolf (page 170) discusses trophic cascades and how top predators affect ecosystems. What is a trophic cascade? Describe how ecosystems have been impacted by the elimination and later restoration of red and gray wolves in America.
- The moa (page 20) and the passenger pigeon (page 100) went extinct primarily because of overconsumption. Describe how and why. What attitudes led to overconsumption? What other species have suffered from overconsumption?

GROUP DISCUSSION:

Share first-hand experiences with wildlife. What’s the biggest animal you’ve seen in the wild? How did you feel? Then ask: What if these animals had already been extinct and you’d never encountered them? Would it make a difference? Discuss how people would be impacted by the loss of these species. Which of the book’s extinct animals do you wish was still alive?

Choose a species and discuss whether it was inevitable that it suffered extinction. What attitudes and actions contributed to the species’ decline, and could people have acted differently before it was too late? If certain subspecies still exist, what actions and attitudes still need to change to ensure their survival?

PAPERS & PROJECTS:

The Sixth Extinction by the Numbers: Research and quantify the sixth extinction. Discuss the total numbers and the types of species being lost and their extinction rates. Include an explanation of how scientists calculate these numbers and why they disagree about how to count extinctions and species. See “Written in the Earth” (page 238).

Comparing Mass Extinctions: Create a graph that compares our current extinction crisis to the other five mass extinctions in Earth’s history. Compare the different causes of each mass extinction and the types of species that were most affected. This could also include graphs showing the species that were least affected and a chart showing how long biodiversity took to recover each time. See “It’s Happened Before” (page 146).

Restoring Extinct Species: Choose one of the book’s seven extinct species — the moa, Steller’s sea cow, elephant bird, aurochs, passenger pigeon, thylacine, or baiji — and discuss what problems would arise if the species still existed. If it returned, how would you solve those problems of coexistence? Account for everyone who might be impacted.

CONSERVATION

KEYWORDS & CONCEPTS:

biodiversity (page 212-13); captive breeding (page 236); cloning (page 104-5); crossbreeding (page 46); conservation, reasons for (page 17-19); frozen arks (page 105); poaching (page 201); rewilding (page 46-47)

READING RESPONSES:

- The Introduction (page 7) lists several reasons or motivations for conserving giant animals. What are they? Are there others? How do these reasons apply to this book's species?
- For the rhino (page 222), describe the various methods used to conserve this species and contrast their effectiveness. Which of these methods have been used with other species?
- The aurochs (page 34) was the first species to be protected in the wild. What was done, why did this fail, and in what ways do these same problems exist today?
- Tigers (page 192) and rhinos (page 222) are endangered today mainly due to poaching. Why do people poach protected wildlife, and what is being done to stop it?
- Baiji (page 208) went extinct mainly due to indirect human impacts. What were they, and how do similar impacts affect other species today?
- The thylacine (page 138) and the red wolf (page 170) were once believed to be too dangerous for humans to live with. How did they get this reputation, and what was true and false about it? What other species have suffered from exaggerated fears?
- Historically, lions (page 154) and grizzlies (page 116) have been admired by people and venerated in mythology. In what ways and why? How does this relate to their status as prized hunting trophies?
- The passenger pigeon (page 100) and the woolly mammoth (page 206) are currently being cloned. Describe the process and some of its challenges. If it works, what are the potential benefits and problems of resurrecting these extinct species?
- Re-creating the extinct aurochs (page 34) is considered critical to an effort to rewild Europe. What is rewilding, and why is restoring the aurochs important in Europe?

GROUP DISCUSSION:

Imagine you live next to a big-game preserve. What challenges would this pose to your current life? How would you protect yourself from predators or megaherbivores? Do you feel the government would be obligated to help and protect you? How? Would you ever feel it was justified to kill or "poach" a protected animal?

The book suggests that the extinction crisis is a "crisis of coexistence." Do you think this is true? How well do large animals and people coexist in your community? How do people impact nature where you live? Does wildlife cause conflicts or lead to controversy? How might these conflicts be solved?

What wild animals do humans hunt and/or consume as food where you live? For each, discuss when this is and when it might not be acceptable. What qualifies as sustainable consumption and what as overconsumption or waste? Who decides?

PAPERS & PROJECTS:

Saving Endangered Species: Choose one of the six endangered species — giant tortoise, grizzly, lion, wolf, tiger, or rhino — and discuss the threats facing them and the conservation efforts to protect them. Discuss any poaching, why it occurs, and how it's being addressed. Offer further solutions that would foster sustainable coexistence.

Rewilding the World: Research and describe either the Yellowstone to Yukon Conservation Initiative (page 129) or Rewilding Europe (page 46). What animals are involved, what progress has been made, and what challenges remain?

(CONTINUED ON NEXT PAGE)

Rewild Your Community: Pretend that your job is to “rewild” where you live. Research the animals that once existed there, and create a plan to restore them. Using a map of your home county, redesign the landscape. How would roads, homes, and industry need to adjust so people and wildlife could coexist?

Interview a Conservationist: Contact a local conservation organization or park and interview a ranger or conservationist. Ask them what the local conservation issues are, how they are being addressed, and to describe successes and challenges.

Urban Planning for Predators: Research a major city where a large predator exists, such as coyotes in Chicago, leopards in Mumbai, or wolves near Rome. What problems does the predator cause, and what solutions are being tried? How are people adjusting their lives to coexist with predators safely?

ONLINE RESOURCES

- **Bagheera**, www.bagheera.com
- **EDGE, Evolutionary Distinct & Globally Endangered**, www.edgeofexistence.org
- **International Union for Conservation of Nature (IUCN) Red List of Threatened Species**, www.iucnredlist.org
- **The Sixth Extinction**, www.petermaas.nl/extinct
- **US Fish & Wildlife Service (USFWS), Endangered Species**, www.fws.gov/endangered
- **Wildscreen Arkive**, www.arkive.org

