

# muse®

## Inspired by Ants

Creepy, crawly, and definitely extraordinary! This month's issue of MUSE magazine is swarming with information about a variety of insects and the experts who study them. Grab your bug repellent and a magnifying glass and prepare to examine the tiny creatures that inhabit our world.

## CONVERSATION QUESTION

**How do entomologists help us to learn about the world?**

## TEACHING OBJECTIVES

- Students will learn about the life of world-renowned entomologist E.O. Wilson.
- Students will learn about the organization of ant colonies.
- Students will learn about New Zealand's interdependent ecosystem.
- Students will identify problem-and-solution relationships.
- Students will examine the structure and function of worker ants.
- Students will study cause-and-effect relationships that exist in the natural world.
- Students will write journal entries detailing a week in the life of a naturalist.
- Students will debate the efficiency of living in organized colonies.
- Students will create a travel brochure for New Zealand.



In addition to supplemental materials focused on core STEM skills, this flexible teaching tool offers vocabulary-building activities, questions for discussion, and cross-curricular activities.

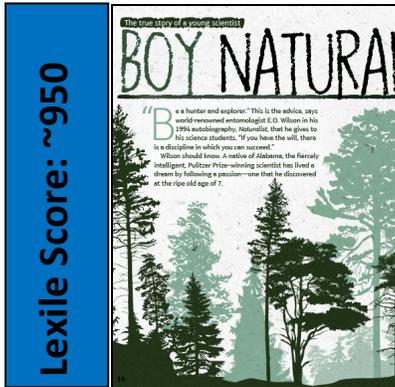
## SELECTIONS

- **Boy Naturalist**  
Expository Nonfiction, ~950L
- **Ants in Action**  
Expository Nonfiction, ~850L
- **Paradise Lost**  
Expository Nonfiction, ~950L

## Boy Naturalist

pp. 14–17, Expository Nonfiction

“Be a hunter and an explorer,” is the advice given by this Pulitzer Prize–winning entomologist. This article explores the wonders of the natural world and the life of an amazing man who made it his life’s work.



## RESOURCES

- “Natural” Reactions

## OBJECTIVES

- Students will learn about the life of world-renowned entomologist E.O. Wilson.
- Students will identify problem-and-solution relationships.
- Students will write journal entries detailing a week in the life of a naturalist.

## KEY VOCABULARY

- **entomologist** (p. 14) *a person who studies, or is an expert in, the branch of zoology concerned with insects*
- **omnivorous** (p. 16) *an animal feeding on food of both plant and animal origin*
- **stereoscopy** (p. 16) *a method of sound reproduction that creates an illusion of multidirectional audible perspective*

## ENGAGE

**Conversation Question:** How do entomologists help us to learn about the world?

Post the title of the article, “Boy Naturalist.” Read aloud the following statement made by E.O. Wilson, the article’s subject: “All creatures swell to magnificence when seen through the lens of a child’s eye.” Have students share their interpretations of this beautiful sentence. Is it possible for adults to maintain this same sense of appreciation for the world? Why or why not?

## INTRODUCE VOCABULARY

Introduce this as a *Jeopardy!*-style learning activity. Provide the class with only the definitions of the key vocabulary terms. Have them read and discuss. Inform students that they will revisit these definitions after reading and pose the proper question using words from the article. (What is an entomologist? What is omnivorous? What is stereoscopy?) Have them create seven more answers needing questions, for a total of ten, and share with other classes as a post-reading activity.

## READ & DISCUSS

Reinforce comprehension of the concepts in the article by using the following prompts to direct discussion.

- How did E.O. Wilson’s passion for studying animals and insects begin?
- What were some of the “true monsters” that Wilson saw during the summer of 1936?
- What does Wilson think are important traits in naturalists?
- How did Wilson earn a Pulitzer Prize?

## CONCEPT/SKILL FOCUS: Problems and Solutions

**INSTRUCT:** Inform students that they will be rereading the article with a partner and highlighting passages that depict how E.O. Wilson was able to overcome various obstacles in his life to become an expert in his field. Distribute copies of “Natural” Reactions, and tell students that they will be responsible for recording the problem/solution relationships from the article.

**ASSESS:** Review the information that the students listed on their charts.

## EXTEND

**ELA** The article states that Wilson started following his passion at a young age. Have students write a week’s worth of journal entries that depict the life of this young naturalist. Encourage them to be creative while also using facts. Suggest adding drawings to enhance entries.

# “Natural” Reactions

*Refer to the article, “Boy Naturalist,” to record how E.O. Wilson overcame obstacles in his life to become a world-renowned entomologist.*

<b>Problems</b>	<b>Solutions</b>
Wilson was a short, skinny, and “geekish” boy who had a troubled home life.	Nature became Wilson’s companion of choice because it was one part of his life that was dependable.

## Ants in Action

pp. 38–39, Expository Nonfiction

Peer into the glass enclosure of the leaf-cutter ant exhibit at the Smithsonian Institution’s National Zoo in Washington, D.C. Students will learn how worker ants serve the queen to establish an impressive, well-functioning colony.



## RESOURCES

- Colonized Critters

## OBJECTIVES

- Students will learn about the organization of ant colonies.
- Students will examine the structure and function of worker ants.
- Students will debate the efficiency of living in organized colonies.

## KEY VOCABULARY

- chamber (p. 38)** sections of an ant colony used for a specific purpose
- colony (p. 38)** the physical structure in which ants live, as well as the social rules by which ants organize themselves and work
- pheromones (p. 39)** chemical substances that trigger particular behaviors

## ENGAGE

**Conversation Question:** How do entomologists help us to learn about the world?

Take students on a virtual field trip of the Smithsonian Institution’s National Zoo in Washington, D.C. ([naturalhistory.si.edu](http://naturalhistory.si.edu)). Tell students that they will be reading an article about the zoo’s largest leaf-cutter ant colony, which lived at the Invertebrate Exhibit in the zoo until the exposition closed in 2014.

## INTRODUCE VOCABULARY

Invite pairs of students to find definitions for the key vocabulary terms. Then post the definitions provided so that students may check their work. Have the pairs choose seven additional words from the article and procure definitions. They will then create a crossword puzzle using all ten words. Share puzzles with another class for use as a prereading activity for this article.

## READ & DISCUSS

Pose the following questions to the students to facilitate meaningful discussion following the reading of the article.

- How many ants can live within a chamber?
- What happens if particular worker ants don’t do their job?
- How does the queen start off a colony in nature?
- How does an ant colony stay fed?
- Explain the difference between ants in nature and the ants at the Smithsonian Institution’s National Zoo.

## CONCEPT/SKILL FOCUS: Structure and Function

**INSTRUCT:** Elicit from students that the main idea of the article is to provide information that details how ants thrive within their organized colonies, with groups of ants having specific jobs. Present the graphic organizer, *Colonized Critters*, and tell students that they will be using information from the article to match the worker ants with their specialized function.

**ASSESS:** Collect and review the students’ graphic organizers, as well as their written answer to the final question.

## EXTEND

**Science** Discuss how well organized ant colonies need to be to function and thrive. Instruct students to research other insects that live in colonies. Scientists say that these colonies act as a “super-organism.” Debate the pros and cons of this existence in nature.

# Colonized Critters

Use information from the article, "Ants in Action," to correctly match the worker ant with its specific job.

- |                                 |  |
|---------------------------------|--|
| 1. _____ quality control ants   | A. ride on top of leaf-cutters and ward off parasite flies                           |
| 2. _____ nurses                 | B. protect the colony from invaders and are the largest, scariest ants in the colony |
| 3. _____ garbage collector ants | C. smaller ants that use the leaves to nourish the fungus for food                   |
| 4. _____ soldier ants           | D. inspect leaves before letting them into the nest                                  |
| 5. _____ bodyguard ants         | E. care for immature ants  |
| 6. _____ gardener ants          | F. remove debris throughout the colony   |

The queen is the most dominant ant in the colony. Explain her importance.

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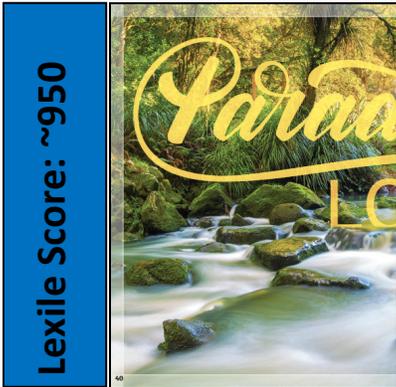
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## Paradise Lost

pp. 40–44, Expository Nonfiction

Students will study the lush lands of New Zealand and learn how such a delicate ecosystem exists on this isolated island. Why are the flora and fauna here threatened with extinction?



## RESOURCES

- A Delicate Balance

## OBJECTIVES

- Students will learn about New Zealand’s interdependent ecosystem.
- Students will study cause-and-effect relationships in the natural world.
- Students will create a travel brochure for New Zealand.

## KEY VOCABULARY

- **biodiversity** (p. 43) the variety of life in a particular habitat or ecosystem
- **biogeography** (p. 43) the study of the balance between immigration of a species and extinction
- **ecosystem** (p. 44) a biological community of interacting organisms and their physical environment
- **equilibrium** (p. 43) a steady-state number of species due to the balance between the immigration of new species and the extinction of old residents.

## ENGAGE

**Conversation Question:** How do entomologists help us to learn about the world?

Display the title of the article, “Paradise Lost.” Discuss how “paradise” can represent different things to different people. Consider a child’s paradise, a gamer’s paradise, an architect’s paradise, and finally, an ecologist’s paradise. What determines “paradise” for different people?

## INTRODUCE VOCABULARY

Review the key words and definitions with the class. Guide students to notice that all of the terms contain prefixes and/or suffixes. Have students work in pairs to identify the root words and prefixes/suffixes. Do students arrive at the correct definition when breaking up the words and defining each part? How can this be a useful skill, particularly when reading a science article?

## READ & DISCUSS

Post and discuss the questions prior to reading. Read the article aloud, pausing when answers to the questions are revealed and encourage students to elaborate.

- Use information from the article to describe the country of New Zealand.
- What is adaptive radiation? Give an example.
- Explain the direct relationship between *flora* and *fauna* according to Wilson and MacArthur.
- What is a species’ ability to survive & thrive dependent on?
- What is one of the most critical forces in extinction today?

## CONCEPT/SKILL FOCUS: Problems & Solutions

**INSTRUCT:** Lead the students in a discussion that guides them to recognize the many cause-and-effect relationships (in which one event makes another event happen) that are presented in this article. Introduce the graphic organizer, *A Delicate Balance*, and advise students that they will be recording such relationships. Allow students to share ideas and assist each other in locating suitable passages in the text.

**ASSESS:** Review the worksheets to evaluate student understanding of cause-and-effect relationships.

## EXTEND

**Geography** Have students locate New Zealand on a world map. Instruct them to fold a piece of paper into thirds and create a travel brochure. (Alternatively, many computer programs will have easy-to-use templates.) Using information from the article and other resources, students should include the following: location, climate, historic sites, recreation, culture, and visually appealing graphics.

# A Delicate Balance

Use information from the article, "Paradise Lost," to record the cause-and-effect relationships.

Page #	Cause/Behavior	Effect/Result
p. 42	Humans arrived on New Zealand.	Many species of birds, formerly with no predators, were slaughtered and became extinct.