COLLECTION 2

The Natural World

We are intertwined with nature: We affect it as much as it affects us.

COLLECTION

PERFORMANCE TASK Preview

At the end of this collection, you will have the opportunity to complete two tasks:

• Write a research report about an interaction between humans and nature.

• Participate in a panel discussion exploring what we learn about ourselves through nature.

ACADEMIC VOCABULARY

Study the words and their definitions in the chart below. You will use these words as you discuss and write about the texts in this collection.

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
<th>Related Forms</th>
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<tr>
<td>advocate</td>
<td>(advə-'kat) v. to argue for or plead in favor of</td>
<td>advocacy, advocator</td>
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<tr>
<td>discrete</td>
<td>(di-'skri-t) adj. made up of separate or distinct things or parts</td>
<td>discretely, discreteness</td>
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<tr>
<td>domain</td>
<td>(do-'män) n. a sphere of activity</td>
<td>dominion</td>
</tr>
<tr>
<td>enhance</td>
<td>(en-'häns) tr.v. to make better, or add to the value or effectiveness.</td>
<td>enhancement, enhancer</td>
</tr>
<tr>
<td>scope</td>
<td>(sköp) n. the size or extent of the activity or subject that is involved</td>
<td>scope out</td>
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**Background** Desert plants have both beauty and clever mechanisms for survival. Despite extreme temperatures and scarce rain, they have thrived and adapted, ensuring that the desert will continue to bloom far into the future.

**Barbara Kingsolver** (b. 1955) was awarded the National Humanities Medal in 2000 for service to the United States through her writing. Writer's Digest named Kingsolver one of the 20th century's most influential writers. Much of her writing focuses on humans' relationship with the natural world.

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**Called Out**

Science Essay by Barbara Kingsolver  Written with Steven Hopp

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**AS YOU READ** Pay attention to how the author describes a series of events to show how desert plants adapt, survive, and thrive in the harsh desert environment. Note any questions you have as you read.

The spring of 1998 was the Halley's Comet\(^1\) of desert wildflower years. While nearly everyone else on the planet was cursing the soggy consequences of El Niño's\(^2\) downpours, here in southern Arizona we were cheering for the show: Our desert hills and valleys were colorized in wild schemes of maroon, indigo, tangerine, and some hues that Crayola hasn't named yet. Our mountains wore mantles of yellow brittlebush on their rocky shoulders, as fully transformed as eastern forests in their colorful autumn foliage. Abandoned cotton fields—flat, salinized ground long since left for dead—rose again, wearing brocade. Even highway medians were so crowded with lupines and poppies that they looked like the seedpacket promises come true: that every one came up. For weeks, each

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\(^1\) *Halley's Comet*: an orbiting comet that is only visible from Earth once every 76 years.

\(^2\) *El Niño* ([el neˈɲo]): a temporary change in climate caused by currents in the eastern Pacific Ocean.
day’s walk to the mailbox became a botanical treasure hunt, as our attention caught first on new colors, then on whole new species in this terrain we thought we had already cataloged.

The first warm days of March appear to call out a kind of miracle here: the explosion of nearly half our desert’s flowering species, all stirred suddenly into a brief cycle of bloom and death. Actually, though, the call begins subtly, much earlier, with winter rains and gradually climbing temperatures. The intensity of the floral outcome varies a great deal from one spring to another; that much is obvious to anyone who ventures outdoors at the right time of year and pays attention. But even couch potatoes could not have missed the fact that 1998 was special: Full-color wildflower photos made the front page of every major newspaper in the Southwest.

Our friends from other climes couldn’t quite make out what the fuss was about. Many people aren’t aware that the desert blooms at all, even in a normal year, and few would guess how much effort we devote to waiting and prognosticating. “Is this something like Punxsutawney Phil on Groundhog Day?” asked a friend from the East.

“Something like that. Or the fall color in New England. All winter the experts take measurements and make forecasts. This year they predicted gold, but it’s already gone platinum. In a spot where you’d expect a hundred flowers, we’ve got a thousand. More kinds than anybody alive has ever seen at once.”

“But these are annual flowers?”

“Right.”

“Well, then….” Our nonbiologist friend struggled to frame her question: “If they weren’t there last year, and this year they are, then who planted them?”

One of us blurted, “God planted them!”

We glanced at each other nervously: A picturesque response indeed, from scientifically trained types like ourselves. Yet it seemed more compelling than any pedestrian lecture on life cycles and latency periods. Where had they all come from? Had these seeds just been lying around in the dirt for decades? And how was it that, at the behest of some higher power than the calendar, all at once there came a crowd?

The answers to these questions tell a tale as complex as a Beethoven symphony. Before a concert, you could look at a lot of sheet music and try to prepare yourself mentally for the piece it inscribed, but you’d still be knocked out when you heard it performed. With wildflowers, as in a concert, the magic is in the

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3 **Punxsutawney Phil on Groundhog Day**: the “official” Pennsylvania animal whose shadow or lack thereof on February 2 forecasts the duration of winter.

4 **latency periods**: times when growth stops or pauses.
timing, the subtle combinations—and, most important, the extent of the preparations.

For a species, the bloom is just the means to an end. The flower show is really about making seeds, and the object of the game is persistence through hell or high water, both of which are features of the Sonoran Desert. In winter, when snow is falling on much of North America, we get slow, drizzly rains that can last for days and soak the whole region to its core. The Navajo call these female rains, as opposed to the "male rains" of late summer—those rowdy thunderstorms that briefly disrupt the hot afternoons, drenching one small plot of ground while the next hill over remains parched. It's the female rains that affect spring flowering, and in some years, such as 1998, the benefaction trails steadily from winter on into spring. In others, after a lick and a promise, the weather dries up for good.

Challenging conditions for an ephemeral, these are. If a little seed begins to grow at the first promise of rain, and that promise gets broken, that right there is the end of its little life. If the same thing happened to every seed in the bank, it would mean the end of the species. But it doesn't happen that way. Desert wildflowers have had millennia in which to come to terms with their inconstant mother. Once the plant has rushed through growth and flowering, its seeds wait in the soil—and not just until the next time conditions permit germination, but often longer. In any given year, a subset of a species's seeds don't germinate, because they're programmed for a longer dormancy. This seed bank is the plant's

\[5 \text{ germination: the process in which plants emerge from seeds.}\]
protection against a beckoning rain followed by drought. If any kind of wildflower ever existed whose seeds all sprouted and died before following through to seed-set, then that species perished long ago. This is what natural selection is about. The species that have made it this far have encoded genetic smarts enough to outwit every peril. They produce seeds with different latency periods: Some germinate quickly, and some lie in wait, not just loitering there but loading the soil with many separate futures.

Scientists at the University of Arizona have spent years examining the intricacies of seed banks. Desert ephemerals, they’ve learned, use a surprising variety of strategies to fine-tune their own cycles to a climate whose cycles are not predictable—or at least, not predictable given the relatively short span of human observation. Even in a year as wet as 1998, when photo-ops and seed production exploded, the natives were not just seizing the moment; they were stashing away future seasons of success by varying, among and within species, their genetic schedules for germination, flowering, and seed-set. This variation reduces the intense competition that would result if every seed germinated at once. Some species even vary seed size: Larger seeds make more resilient sprouts, and smaller ones are less costly to produce; either morph may be programmed for delayed germination, depending on the particular strategy of the species. As a consequence of these sophisticated adaptations, desert natives can often hold their own against potential invasion by annual plants introduced from greener, more predictable pastures. You have to get up awfully early in the morning to outwit a native on its home turf.

The scientific term for these remarkable plants, “ephemeral annuals,” suggests something that’s as fragile as a poppy petal, a captive to the calendar. That is our misapprehension, along with our notion of this floral magic show—now you see it, now you don’t—as a thing we can predict and possess like a garden. In spite of our determination to contain what we see in neat, annual packages, the blazing field of blues and golds is neither a beginning nor an end. It’s just a blink, or maybe a smile, in the long life of a species whose blueprint for perseverance must outdistance all our record books. The flowers will go on mystifying us, answering to a clock that ticks so slowly we won’t live long enough to hear it.

**COLLABORATIVE DISCUSSION** In what way is the desert bloom even more impressive when viewed with an awareness of the underlying science? With a partner, discuss the complex ways desert plants ensure their survival. Cite specific textual evidence to support your ideas.
Determine Central Idea

Barbara Kingsolver uses many specific details to shape her central idea in "Called Out." By analyzing these details, you can better understand how Kingsolver develops her central idea over the course of the essay. A graphic organizer can help you analyze details and determine a central idea. You can then use this information to write an objective summary of the text, one that captures the main ideas and most important details but does not express your opinions.

**Detail:** Some seeds are "programmed for a longer dormancy." (lines 79–80)

**Detail:** Seeds have different latency periods: "some germinate quickly" while others "lie in wait." (lines 66–67)

**Central Idea:**

**Detail:** Desert plant species vary their "genetic schedules for germination" to reduce competition. (lines 96–99)

**Detail:** "Some species even vary seed size: Larger seeds make more resilient sprouts..." (lines 99–100)

Determine Word Meanings

An author chooses words carefully to enhance the overall meaning and tone, or attitude, of a text. Kingsolver skillfully integrates figurative, connotative, and technical language to help convey her sense of wonder at the adaptability of desert plants.

<table>
<thead>
<tr>
<th><strong>Figurative</strong></th>
<th><strong>Connotative</strong></th>
<th><strong>Technical</strong></th>
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<tr>
<td>Figurative meanings go beyond the literal to make a striking comparison. If a word doesn't make sense at first, consider its figurative meanings. For example, when Kingsolver describes fields as &quot;wearing brocade,&quot; you can determine that the fields are not covered in elaborate fabric; this figurative use creates a vivid picture of how the fields look.</td>
<td>Connotative language is a writer's use of the feelings suggested by words to prompt an emotional response. Kingsolver uses connotative language to suggest awe at the ability of plants to survive in the desert. For example, describing the plants as &quot;fragile&quot; not only expresses their physical state but may make readers appreciate and want to protect them.</td>
<td>Technical words and phrases precisely describe complicated ideas or processes. Particularly in science writing, you may encounter unfamiliar words or technical meanings of familiar words, such as &quot;banks&quot; in line 90. Use footnotes or a dictionary as you read to be sure you understand technical meanings.</td>
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Analyzing the Text

1. **Cite Evidence** How does the author use figurative language to establish a tone of wonder in the first two paragraphs of the essay? Provide specific examples and explain how they provide the reader with a unique sense of the desert.

2. **Summarize** Reread lines 26–49. How does this passage help develop a central idea of Kingsolver’s essay? Explain that central idea in an objective summary.

3. **Cite Evidence** Throughout the essay, the author uses connotative words and phrases such as “treasure hunt” (line 13) that suggest a contest or competition is taking place in the desert. Find several other examples of language that suggests competition. Explain how these discrete, or separate, word choices work together to shape the overall meaning and tone of the essay.

4. **Compare** What is the difference between the “female rains” and the “male rains”? What are the effects of each type of rain on the desert, and why is this difference significant?

5. **Analyze** In the second half of the essay, the author uses technical words and phrases to provide a more scientific description of how plant seeds survive in the desert. Find some examples, and explain how this technical language helps refine, or sharpen, her ideas about desert seeds.

6. **Draw Conclusions** Reread the last paragraph of the essay. Why does the author conclude by stating that the “flowers will go on mystifying us”?

**PERFORMANCE TASK**

**Speaking Activity: Analysis** Kingsolver’s essay uses figurative, connotative, and technical language to give readers new perspectives on the desert ecosystem. Which kind of language is most effective in communicating scientific information to a general audience? Discuss this topic with a small group of classmates.

1. Working with a partner, review the text to find especially good examples of figurative, connotative, and technical language.

2. Form a small group to discuss the examples you have identified. Why is each one effective?

3. When you have discussed all the examples, take a vote on which kind of language best communicates information.

4. Write a summary of your group’s discussion that includes your conclusion, the reasons for it, and some examples from the text.
Critical Vocabulary

botanical  clime  prognosticate  benefaction  ephemeral

Practice and Apply  Complete each sentence stem so that your addition reflects the meaning of the Critical Vocabulary word.

1. To **prognosticate** the next big desert bloom is difficult because . . .

2. In the desert, rain is considered a **benefaction** because . . .

3. Kingsolver's essay could be called a **botanical** essay because . . .

4. It would be hard to plan a trip to see a particular desert **ephemeral** in bloom because . . .

5. People in a different **clime** might be surprised that the desert spring is so colorful because . . .

Vocabulary Strategy: Scientific Terms

Knowing the meanings of the scientific words and phrases used in Kingsolver's essay is essential for understanding her central ideas. For instance, Kingsolver uses the Critical Vocabulary word **ephemeral** several times in the second half of her essay. This word is more commonly used as an adjective meaning "lasting a short time." However, readers need to understand its scientific meaning as a very specific kind of desert plant to appreciate her discussion of these plants' survival mechanisms. The chart shows another example.

<table>
<thead>
<tr>
<th>Word</th>
<th>Example of Usage from Text</th>
<th>Significance</th>
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<tbody>
<tr>
<td>botanical</td>
<td>&quot;For weeks, each day's walk to the mailbox became a botanical treasure hunt, as our attention caught first on new colors, then on whole new species in this terrain we thought we had already cataloged.&quot;</td>
<td>The meaning of <em>botanical</em> (&quot;relating to plants&quot;) clarifies that the new colors and species are those of plants that have bloomed in the yard.</td>
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</table>

Practice and Apply  With a partner, review the text and identify three other scientific terms in Kingsolver's essay. With each word you choose, follow these steps:

1. Define each term. Use classroom and online resources for help, but write the definition in your own words.

2. Provide an example of how the term is used in the essay and explain its significance to Kingsolver's central ideas and her purpose for writing.

3. Use each word you chose in a sentence.
Language and Style: Participial Phrases

A participle is a verb form that functions like an adjective, modifying nouns and pronouns. Typically, a participle uses a present-tense verb form ending in -ing or a past-tense verb form ending in -ed or -en. Kingsolver uses participles to add vibrancy and specificity to her descriptions, as in "flowering species" (lines 17-18).

Participial phrases are made up of participles and their modifiers and complements. An example from Kingsolver's essay is "ground long since left for dead" (lines 9-10). In this example, the participle is left, and words that modify it are long since and for dead. The entire participial phrase modifies the noun ground.

Read the following sentence from the essay:

Some germinate quickly, and some lie in wait, not just loitering there but loading the soil with many separate futures.

Kingsolver could have expressed this idea using two separate sentences:

Some germinate quickly, and some lie in wait. These seeds do not just loiter there but load the soil with many separate futures.

While this version communicates the same idea, the wording is less engaging and creates a pause between linked ideas. The use of the participial phrase, not just loitering there but loading the soil with many separate futures, in the original version conveys a relationship more quickly and holds the reader's interest.

Practice and Apply  Understand and use participial phrases by following these steps:

1. Working with a partner, identify three additional participial phrases in "Called Out" and discuss how these phrases add to your understanding of the topic.

2. Then on your own, write a short paragraph on a topic of your choice. In your paragraph, include two sentences that contain participial phrases. Trade your paragraph with your partner. Identify the participial phrases in your partner's paragraph while your partner identifies the participial phrases in your paragraph.
Walt Whitman (1819–1892) ended his formal schooling and went to work at age 11. Apprenticing for a local newspaper, he discovered that he loved putting words to paper. In the 1840s he began writing poems for his masterpiece, Leaves of Grass. Because no publisher would accept his unorthodox poems, Whitman self-published his collection in 1855. He continued to revise and add to it for the rest of his life. Many modern critics view Whitman's poems as distinctly American, marked by democratic values, a love of nature, and optimism for the future.

When I Heard the Learn'd Astronomer

Poem by Walt Whitman

AS YOU READ Pay attention to contrasts in the poem. Jot down specific images that you find striking or interesting. Also, write down any questions you generate during reading.

When I heard the learn'd astronomer,
When the proofs,¹ the figures, were ranged in columns before me,
When I was shown the charts and diagrams, to add, divide, and measure them,
When I sitting heard the astronomer where he lectured with much applause in the lecture-room,
How soon unaccountable I became tired and sick,
Till rising and gliding out I wander'd off by myself,
In the mystical moist night air, and from time to time,
Look'd up in perfect silence at the stars.

COLLABORATIVE DISCUSSION With a partner, discuss the images you jotted down. Which images contrast with each other?

¹ proofs: formal scientific statements of evidence.
Determine Theme Through Objective Summary

The theme of a literary work is a message about life that the writer wants readers to understand. Because Whitman, like most poets, does not directly state his theme, readers must infer it from details in the poem. The poem's images, structure, symbolism, and other poetic devices can serve as clues. Sometimes, writing an objective summary—a brief statement of the most important events or ideas in the poem—can be a good starting point in determining the poem's theme. Once you have identified the key events and ideas, you can consider what deeper meaning the poet may be trying to convey. As you analyze Whitman's poem, consider how the speaker responds to the lecture and what changes occur by the end of the poem.

Analyzing the Text

Support your responses with evidence from the poem.

1. Analyze Whitman uses **parallelism**, the repetition of a grammatical structure, in lines 1–4. Describe what is parallel in these lines. What impression of the astronomer's lecture does the parallelism create?

2. Summarize Write a two-sentence objective summary of the poem. Summarize what happens or what is stated directly, without including any of your own opinions or interpretations.

3. Contrast How does Whitman's language describing the domain of science in lines 1–4 contrast with his language in lines 5–8? How does this contrast express a theme in the poem?

4. Draw Conclusions The speaker notes that the astronomer's lecture is greeted "with much applause in the lecture-room." What **tone**, or attitude, does the speaker have toward the other people in the room?

PERFORMANCE TASK

Writing Activity: Comparison Whitman's poem contrasts two different ways of viewing the natural world. Write a paragraph that similarly contrasts two ways of looking at something in your world.

1. Think of a place, event, or idea that people view in different ways. Create a T-chart to brainstorm details about the opposing views of your subject.

2. Write a paragraph that explores contrasting views of your subject, describing the view you hold last.

3. Share your paragraph with the class, and explain how it does or does not mirror Whitman's theme.
Jane Goodall (b. 1934) watched wild chimpanzees shaping twigs to dig for termites while on a field study in Africa at age 26. It was the first recorded observation of nonhumans making and using tools, and it rocked the scientific world. Since then, Goodall has become the world's leading expert on chimpanzees and an advocate for wildlife conservation. She spends much of her time giving lectures and writing about animals and the environment. Her books, including In the Shadow of Man and The Chimpanzee Family Book, have inspired readers around the world.

from
Hope for Animals and Their World

Argument by Jane Goodall

AS YOU READ Look for examples that show the role of the burying beetle and other insects in the environment.

American Burying Beetle
(Nicrophorus americanus)

The American burying beetle is but one of the millions of insects and other invertebrates that play such a major, though seldom acknowledged, role in the maintenance of habitats and ecosystems. Most people simply lump them all into the category "creepy-crawlies" or "bugs." Some, such as butterflies, are admired and loved for their beauty (though people tend to be less interested in or even repelled by their caterpillars). Others, such as spiders, are the inadvertent cause of fear—even terror. Cockroaches are loathed. Hundreds of species are persecuted for the role they play in damaging our food—such as the desert locust, which ravages crops across huge areas. And there are countless species such as loathe

(loath)  v.
to hate or despise.

1 invertebrates: animals without backbones or spinal columns.
mosquitoes, tsetse flies, fleas, and ticks that carry diseases that can devastate other creatures, including ourselves.

It is for these reasons that they have been attacked by farmers, gardeners, and governments. Unfortunately the weapons of choice have been chemical pesticides—and this has led to horrific damage of all too many ecosystems, either through directly killing countless life-forms in addition to the intended targets, or when poisoned insects are eaten by creatures higher up the food chain.

Yet for every species that harms us or our food, there are countless others that work away, sometimes unseen, for the good of the environment where they live. I first became aware of this when I was a small child, picking up every earthworm I found stranded on the road (as did Dr. Albert Schweitzer,² by the way), and then learning about the valuable contribution they make to soil health. Millions of invertebrates provide food for species—including our own—higher up the food chain.

In many places people feast on termites, locusts, and beetle larvae—even I have tasted these things! Bees pollinate the vast majority of our food crops, and the current devastation of hives in North America and Europe is causing real anxiety.

And what about the American burying beetle? What role, if any, does it play in our environment? This is what I learned about when, on March 18, 2007, I met with Lou Perrotti and Jack Mulvena of the Roger Williams Park Zoo in Providence, Rhode Island. Back in 1989, they told me, biologists had realized that the American burying beetle was fast declining, and it became one of just a few insect species to be listed under the Endangered Species Act. Then in 1993, the Roger Williams Park Zoo started a breeding program for the US Fish and Wildlife Service; in 2006, this beetle became the first insect species to be assigned a Species Survival Plan. Lou is currently the coordinator for the American burying beetle for the Association of Zoos and Aquariums.

As he began talking about the beetles, it was immediately apparent that they had the perfect spokesman! He is a man passionately interested in insects and, he told me, has “loved all things creepy-crawly” since he was a child. Like so many of the other people I have talked to while gathering information for this book, Lou had parents who were understanding and supportive of his fascination with invertebrates. (And other creatures, too—they allowed him to breed boa constrictors when he was nine years old!)

While we talked, Lou became increasingly animated. “Somebody needs to be out there saving these critters [the burying beetles],” he said. And that is just what he is doing. Let me share some of what I

² Dr. Albert Schweitzer (1875–1965) Australian physician and writer who operated a hospital in Africa.
Would the loss of the American burying beetle matter?

learned from him about these remarkable beetles. Most people have no idea how fascinating they are. Certainly I hadn’t.

The American burying beetle is the largest member of its genus in North America—it is sometimes called the “giant carrion beetle.” Once these beetles lived in forest and scrub grassland habitats—anyplace where there was carrion of a suitable size and soil suitable for burying it—in thirty-five states throughout temperate eastern North America. But by 1920, populations in the East had largely disappeared. By 1970 populations had also disappeared from Ontario, Kentucky, Ohio, and Missouri. And during the 1980s, the beetle declined rapidly throughout the American Midwest.

Today there are only seven places where they are known to exist—Block Island (Rhode Island), a single county in eastern Oklahoma, scattered populations in Arkansas, Nebraska, South Dakota, Kansas, and a recently discovered population on a military installation in Texas. One reason for the species’ precipitous decline across its historical range, in addition to habitat loss and fragmentation, is possibly connected with the extinction of the passenger pigeon and the greatly reduced number of black-footed ferrets and prairie chickens, all of which provided carrion of ideal size.

Why We Need the Burying Beetle

Let me return to the question I asked earlier—would the loss of the American burying beetle matter? The answer, stressed by Lou and Jack, is an emphatic yes. They feed on carrion—the flesh of dead animals. Lou calls them “nature’s most efficient recyclers” because they are responsible for recycling decaying animals back into the ecosystem. This returns nutrients to the earth, which stimulates the growth of plants. And by burying carcasses underground, this industrious beetle helps keep flies and ants from reaching epidemic proportions.

Lou explained how these beetles find their meals. They can “smell” carrion from as far away as two miles, by means of sensors

\^ genus: a category or group of species.
on their antennae. Flying noisily through the dusk, a male usually reaches the carcass he has located soon after dark. Then he—and any other males who have also discovered the feast—emits pheromones that are irresistible to females of the species. Thus, you’ll likely find a number of beetles gathered around any one corpse. It seems they form pairs, and there may be a good deal of fighting until one couple claims the prize. They then cooperate to bury it. This can be hard work: A carcass the size of a blue jay will take about twelve hours to bury.

**Beetle Co-Parenting**

Once the carcass is safely underground, the beetles strip it of feathers or hair and then coat it with . . . secretions, which help to preserve the flesh that will serve as food for their young. Next, the couple consummates their pairing, and within a day the female lays the fertilized eggs in a small chamber that they have dug out close to the carcass. Here both parents wait for their eggs to hatch, which will be in two or three days. Both mother and father carry the larvae to their “larder.” And then—and this really blew my mind away—the young beetles will stroke the mandibles of their parents to entice feeding, and the adults will regurgitate food for their young. How absolutely amazing—an insect species in which mother and father care for their young together!

Usually, by the time the carcass is safely underground, flies have already laid their eggs on it. These hatch quickly into hungry competitors for the young beetles. But help is close by: Riding on the bodies of the adult beetles are tiny orange mites that quickly climb onto the carcass, where they feed on fly eggs and maggots. In about two weeks, the sated beetle larvae burrow into the soil to pupate, and the parents move on. As they do so, the orange mites hop back on board. The young beetles will emerge about forty-five days later.

Lou and his team have been very successful with their captive breeding program—by the end of 2006, more than three thousand beetles had been reared and released into the wild on Nantucket Island. The captive-bred females (each paired with a genetically suitable mate) are transported to the release site in plastic containers. These are placed in an Igloo cooler, since the beetles cannot survive undue heat. A second cooler is used to transport dead quail, which the beetles will use as the carrion for their young. With a chuckle, Lou told us, “I can be traveling on a ferry during the height of tourist season and will still have room around me due to the terrible smell coming from the coolers.”

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*pupate:* grow from a larva to the next development stage.
At the release site, holes have been pre-dug for the beetles. The dead quail are placed into the holes with floss tied to their feet and attached to a small orange flag to assist the recovery team with finding the buried carcasses at a later date. The beetles are then released into the hole, where ideally they will realize that they have a jump start on the reproduction process! Lou said that Nantucket was chosen as a release site because, as with Block Island, there are no mammalian competitors present. After a while, though, birds such as crows and seagulls began to recognize that an orange flag represented a food source, and began to dig up the beetles' carrion, so the recovery team is now also placing a mesh screen over each brood to protect it.

Lou told me that he really enjoys teaching children about insects. We agreed that it does not take much to trigger their interest—children are naturally curious. And "creepy-crawlies," although they may elicit fear and horror, hold a real fascination for them. I told Lou I had spent hours as a child watching spiders, dragonflies, bumblebees, and the like. My son was fascinated as a little boy to watch ants as they set out in an orderly column to raid a termite nest, and returned each bearing an unfortunate victim in its mandibles. And my sister's three-year-old grandson, after
watching a snail crawling over the ground, suddenly placed it on
the windowpane and rushed indoors to look through the glass,
clearly fascinated and curious about the mechanism that enabled
the creature to glide forward, as if by magic.

Unfortunately, Lou finds it much harder to interest adults in
the efforts being made to save the American burying beetle. “So
often the first question,” he told me, “is ‘Will it eat my garden?’”
If only people would take the time to listen, retain the curiosity
and wonder of childhood, how much richer their lives would be.
Certainly during my short early-morning meeting with Lou and
Jack, I had been transported to a different and utterly fascinating
world, where giant insects nurture their young and tiny mites,
in exchange for a free meal and a ride to the restaurant, rid their
benefactors of their competitors.

After our visit, Lou sent me a beautiful print of an American
burying beetle, its orange and black colors vivid and glowing. It is
propped against the wall as I write, reminding me of all the magic
of the natural world.

**COLLABORATIVE DISCUSSION** What have you learned about the
burying beetle and other insects? With a partner, discuss how the author
makes a case for the burying beetle’s importance to the environment.
Cite specific evidence from the text to support your ideas.
Analyze Author’s Claim and Determine Purpose

In any kind of text, the author’s purpose is his or her reason for writing. An argument is a particular kind of writing in which the author states a claim, or a position on an issue, and then supports it with reasons and evidence. If the argument is well reasoned and provides sufficient evidence, readers are likely to accept the claim made by the author.

Some arguments begin with a clear statement of the author’s claim. Others develop a claim over the course of the argument through the presentation of information and through rhetoric, the art of using language effectively to appeal to an audience. When you read or listen to an argument, consider these two ways of developing a claim:

<table>
<thead>
<tr>
<th>Information in each section that contributes to an overall picture of the issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consider:</td>
</tr>
<tr>
<td>• In what order does Goodall present information about the beetles? How does this order build reader empathy for them?</td>
</tr>
<tr>
<td>• How does each section or subheading of the text contribute to Goodall’s larger claim about the beetles’ importance?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rhetoric that advances the author’s point of view on the issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consider:</td>
</tr>
<tr>
<td>• What words does Goodall choose when writing about the work done by the American burying beetle? Do her words suggest a positive or negative perspective on the beetles?</td>
</tr>
<tr>
<td>• Why do you think Goodall emphasizes the beetles as parents? What words link beetle parents to human parents?</td>
</tr>
</tbody>
</table>

The author of any argument bases his or her claim on a specific point of view, or perspective. If that point of view isn’t clear from the start, you will need to watch for clues as you read.

Keep in mind that the writer’s point of view drives both the information provided and the rhetoric used. For example, Jane Goodall has been concerned about animals and the environment throughout her life. Her passion for these issues gives her a particular point of view on every topic she writes about. However, what kinds of information and rhetoric would you expect in an argument about endangered beetles written from the point of view of a real-estate developer? Read with an awareness that the scope and substance of any argument depends on the writer’s perspective; this strategy will help you carefully evaluate the argument.
Analyzing the Text

1. **Analyze** Why does Goodall begin her argument by acknowledging that many people dislike insects? How does this order of ideas help her develop her claim?

2. **Cite Evidence** Identifying persuasive rhetoric can help readers understand an author’s point of view. In the second paragraph, how does the author use word choice to show her point of view on the use of pesticides against insects? Provide specific examples of word choice from the text to support your answer.

3. **Identify** In line 32, the discussion of insects returns to a focus on the American burying beetle. What rhetorical device does Goodall use to shift the discussion? How does this device help engage readers in her argument?

4. **Evaluate** Describe the importance of using Lou Perrotti and Jack Mulvena to tell the story of the American burying beetle. How does Goodall invite the reader to share her enthusiasm for the beetle? Describe the rhetoric she uses to persuade the reader.

5. **Draw Conclusions** What is Goodall’s point of view on insects generally and on the American burying beetle in particular? Given the way she expresses this point of view, what is her purpose for writing the selection? Give specific textual evidence to support your answer.

6. **Infer** Summarize the life cycle of the American burying beetle. Why does the author offer so much detail about the beetle’s life cycle? How does the information cited about the beetle support the author’s purpose?

7. **Analyze** Reread the first sentence of the selection and think of it as the “rough draft” of Goodall’s claim. What facts and reasons does she use to develop this claim throughout the text? After reading the entire selection, how would you state her claim in your own words?

PERFORMANCE TASK

**Writing Activity: Analysis** A key aspect of Goodall’s writing style is her enthusiastic tone. In two paragraphs, analyze how she creates this tone and what effect it has on her argument.

1. Review the text, noting word choices, punctuation, and other examples that contribute to Goodall’s tone. Summarize these techniques in your first paragraph.

2. Reflect on your response to Goodall’s tone as you read. Did her tone make you more or less receptive to her claim about the importance of the American burying beetle? Discuss this effect in your second paragraph.
Critical Vocabulary

loathe    pollinate    precipitous    sate

**Practice and Apply**  Answer each question with the appropriate Critical Vocabulary word and an explanation of why you chose the word you did.
1. Which Critical Vocabulary word goes with a cliff? Why?
2. Which Critical Vocabulary word goes with flowering plants? Why?
3. Which Critical Vocabulary word goes with a big meal? Why?
4. Which Critical Vocabulary word goes with something disgusting? Why?

**Vocabulary Strategy: Patterns of Word Changes**

Identifying patterns in the way a root word changes meaning when various word parts are added to it will help you clarify the meaning of unknown words. The Critical Vocabulary word *precipitous*, for example, is an adjective formed by adding the suffix -ous, meaning “full of,” to the root *praecept*, meaning “headlong or extremely steep.” Various suffixes indicate different meanings or parts of speech when paired with the same root. Note the underlined suffixes in the chart and how they affect the meaning and part of speech.

<table>
<thead>
<tr>
<th>Noun Suffix + Meaning</th>
<th>Verb Suffix + Meaning</th>
<th>Adjective Suffix + Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>precipitousness,</td>
<td>precipitate</td>
<td>precipitous</td>
</tr>
<tr>
<td>precipitation,</td>
<td>-ite: to act upon or</td>
<td>-ous: possessing, full of</td>
</tr>
<tr>
<td>precipitator</td>
<td>become</td>
<td></td>
</tr>
<tr>
<td>-ness: state, quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-ion: state, condition, action, process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-or: one that performs a specified action</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Practice and Apply**  Refer to both the chart above and a dictionary as needed to complete the following steps:

1. Choose two other words from the text that include suffixes. Identify and define the root—that is, the main word part without the suffix—for each word.
2. Combine each root word with a noun, verb, or adjective suffix to produce a new word. Write definitions for the words you produce.
3. Identify the parts of speech for the original words you selected from the text and the new words you created. Then, write an original sentence for each of the words, the two original words and the new words.
Language and Style: Relative Clauses

A relative clause is sometimes called an adjective clause because it can be used to describe a noun or pronoun. A writer's use of relative clauses can help readers better understand complex ideas. Relative clauses convey specific meanings and add variety and interest to writing. They are a type of subordinate clause because they cannot stand alone as sentences even though they include a subject and verb. In "Hope for Animals and Their World," Jane Goodall frequently links ideas by using relative clauses.

Read the following sentence from the selection. The relative clause is underlined.

Then he . . . emits pheromones that are irresistible to females of the species.

The author could instead have expressed the same ideas this way:

Then he emits pheromones. The pheromones are irresistible to females of the species.

Notice how the first example expresses the idea more clearly. Use of the relative clause allows the reader to more easily connect the noun, pheromones, with its modifying information: the fact that these pheromones are irresistible to female beetles.

Relative clauses can be signaled by relative pronouns, most often who, which, that, whose, or whom, and by relative adverbs, such as where, when, and why. The following chart shows examples of relative clauses from the selection:

<table>
<thead>
<tr>
<th>Signal Word</th>
<th>Relative Clause (underlined)</th>
<th>Word Modified</th>
</tr>
</thead>
<tbody>
<tr>
<td>who</td>
<td>Lou had parents who were understanding and supportive of his fascination with invertebrates</td>
<td>parents</td>
</tr>
<tr>
<td>where</td>
<td>Today there are only seven places where they are known to exist . . .</td>
<td>places</td>
</tr>
<tr>
<td>that</td>
<td>. . . within a day the female lays the fertilized eggs in a small chamber that they have dug out close to the carcass</td>
<td>chamber</td>
</tr>
</tbody>
</table>

Practice and Apply  Look back at the paragraphs you wrote for this selection's Performance Task. Find two places to add relative clauses to more clearly express your ideas. Trade papers with a partner and evaluate the clarity of each other's sentences before and after revision.