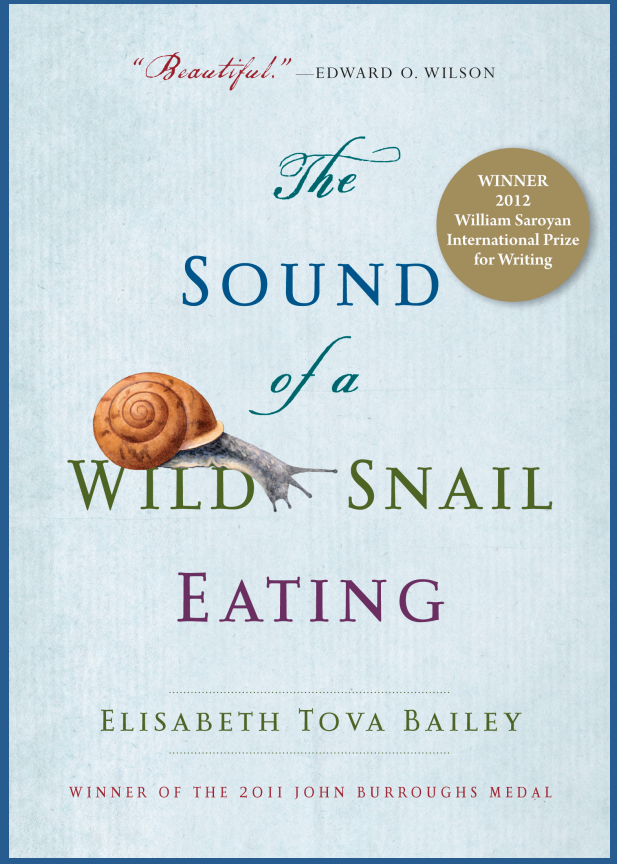
Linking Literature and Science

The Sound of a Wild Snail Eating in the Classroom



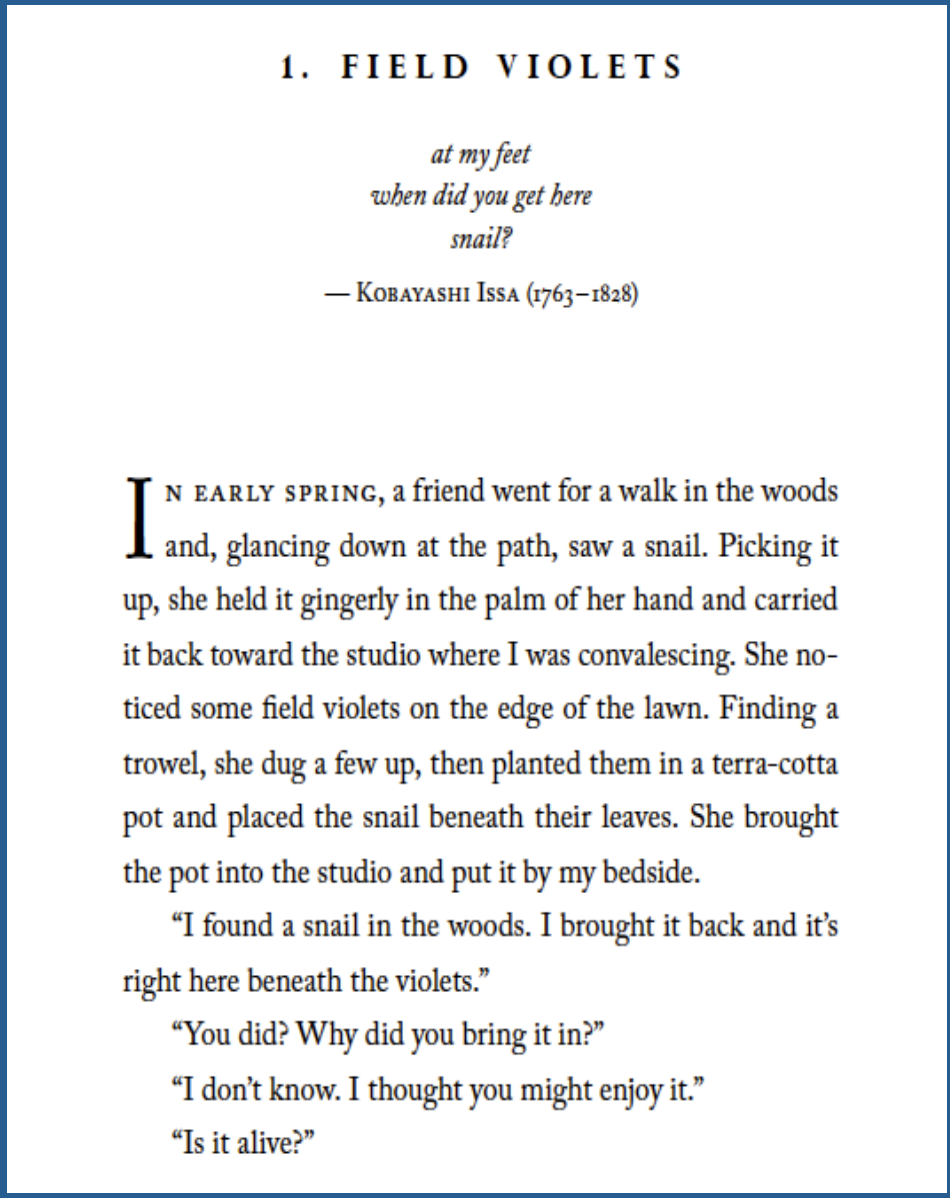
A content-rich nonfiction trade book that integrates natural history, literature, and medical humanities.

www.elisabethtovabailey.com

This is how the true story begins . . .

The author is bedridden with a chronic illness. A friend arrives bringing a wild snail that she has found in the forest.

The author begins to observe the snail as it lives at her bedside. She watches its nocturnal adventures and soon finds herself inhabiting its world as she learns about the many fascinating aspects of a snail's life.



1. FIELD VIOLETS

at my feet
when did you get here
snail?

— Kobayashi Issa (1763–1828)

In early spring, a friend went for a walk in the woods and, glancing down at the path, saw a snail. Picking it up, she held it gingerly in the palm of her hand and carried it back toward the studio where I was convalescing. She noticed some field violets on the edge of the lawn. Finding a trowel, she dug a few up, then planted them in a terra-cotta pot and placed the snail beneath their leaves. She brought the pot into the studio and put it by my bedside.

"I found a snail in the woods. I brought it back and it's right here beneath the violets."

"You did? Why did you bring it in?"

"I don't know. I thought you might enjoy it."

"Is it alive?"

The *WILD SNAIL* Book Is Being Used at All Education Levels (K-16) and in many science disciplines

- to address Common Core standards for literacy
- to illustrate many of the Next Generation Science Standards
- for its unique integration of literature, natural history, and medical humanities
- as a model for interdisciplinary writing
- as a way to teach compassion for the natural world

Here's what you'll find in the *Wild Snail* book . . .

Part I: The author begins to observe the snail, as it lives in a flower pot.

Part II: The snail is moved into a terrarium with woodland plants.

Part III: The snail's remarkable anatomy and amazing slime-making abilities are examined.

Part IV: An investigation into a snail's social life, its ability to think, how it evolved, and its hibernation methods.

Part V: The snail's physiology, love life, and defense systems are explored.

Part VI: The snail is finally released back to the wild in the spring.

The Sound of a Wild Snail Eating

Table of Contents

The Sound of a Wild Snail Eating Is an Interdisciplinary Book

Natural History

- The book tells the true story of the life of a real snail via a personal story, direct observation, and the history of science, as it explores in detail all the dimensions of a snail's life. *A rounded scientific overview of one animal group.*

Medical Humanities

- The backdrop for this story is human illness. How a person finds hope and thus survives adversity. *The narrative can increase compassion and understanding in students as they learn about the impact of illness and also how pathogens can be beneficial or harmful.*

Literature

- The author's carefully crafted sentences and philosophical insights are interwoven with quotes from poets, philosophers, and thinkers. *A strong literacy narrative for increasing reading comprehension and a model for scientific writing.*

Illustrations

- The snail's world is shown in exquisitely detailed illustrations.

The *Wild Snail* book includes many voices . . .

- Early scientists such as Charles Darwin, Karl von Frisch, and their colleagues
- Contemporary scientists such as Tim Pearce (malacologist), Richard Dawkins (evolutionary biologist), Edward O. Wilson (biologist and naturalist), and Neil Shubin (paleontologist)
- Other thinkers and writers, including Florence Nightingale, A. A. Milne, Hans Christian Andersen, Edgar Allan Poe, and Gerald Durrell
- Poets including Elizabeth Bishop, Billy Collins, Emily Dickinson, Rainer Maria Rilke, and haiku poets Kobayashi Issa and Yosa Buson

A sample of the book's illustrations of a *Neohelix albolabris,* a wild Maine forest snail . . .

Part 6

FAMILIAR TERRITORY

The crucial first step to survival in all
organisms is habitat selection.
If you get to the right place,
everything else is likely to be easier.

—Edward O. Wilson, *Biophilia,* 1984

Illustration by Kathy Bray, copyright Elisabeth Tova Bailey, from *The Sound of a Wild Snail Eating*

Another illustration from *The Sound of a Wild Snail Eating . . .*

Part 5

LOVE AND MYSTERY

Every single species of the animal kingdom
challenges us with all . . . the mysteries of life.

—KARL VON FRISCH, *A Biologist Remembers*, 1967

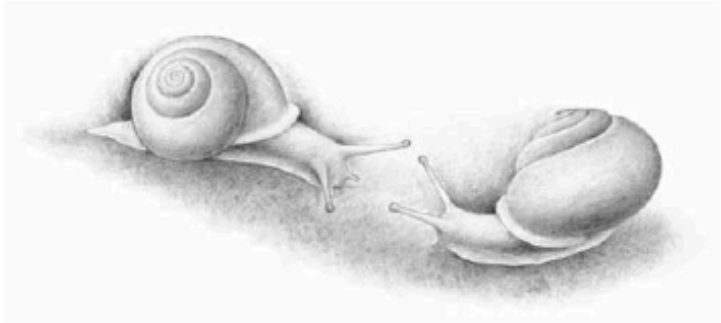


Illustration by Kathy Bray, copyright Elisabeth Tova Bailey,
from *The Sound of a Wild Snail Eating*

The *Wild Snail* Book's Accolades in the Education Field

- AA rating for 9th-12th grade, Hawaii Children's Science Book Project.
- National Youth Selection, The Korean Ethics Commission.
- Best Non-Fiction Titles for Young Readers, Taipei Public Library, capital of Taiwan.

The *Wild Snail* Book's Awards & Recognitions

- *Top Ten Science & Technology Books for 2010, BOOKLIST editors (American Library Association)*
- National Outdoor Book Award in Literature/Natural History
- John Burroughs Medal Award for Distinguished Natural History
- William Saroyan International Prize/Nonfiction
- Memoirs That Will Last*, Library Journal*
- Gold Foreword Book of the Year Award for Autobiography/Memoir

Primary School Uses for the *Wild Snail* Book

Primary education teachers share book excerpts with their students who then:

- Create terrariums in the classroom
- Practice their observational skills
- Monitor the terrarium's ecosystem

5th-grade gifted-and-talented students in Meg Shevenock's school, The Lyceum, read most of the book then:

- Discuss their responses to the readings
- Write reflective interdisciplinary and philosophical essays
- Write poems from the snail's perspective
- Visit a natural history museum with a malacological collection

Middle and High School Uses for the *Wild Snail* Book

- Ryan Bromwell, a science teacher at the Loyola Blakefield High School, has designed and implemented a teaching unit based on the *Wild Snail* book for his 9th-grade advanced biology class.
- The students read the entire book and participate in weekly assignments that involve writing, discussion, and related science activities and experiments.
- Ryan presented on his six-week *Wild Snail* curriculum at the Jesuit Secondary Education Association Colloquium in June 2013.
- See Ryan's PowerPoint and information flyer documenting how to use the *Wild Snail* book in your classroom. Available on the author's website: www.elisabethtovabailey (click on the classroom page)

The *Wild Snail* Migratory Book Project

Exploratory Project

- Ryan's students leave copies of the *Wild Snail* book in public places for anyone to pick up, read, and pass on.
- What will happen?
- Who will read it?
- Can the books be tracked on their journey into the world and from reader to reader?

How do books move through society?

- How does the book's location influence whether it is read and who will read it?
- Will person to person transfer be more effective than asking a reader to leave it in a public place again?
- How long will the project be tracked? A year?

The Sound of a Wild Snail Eating in the Classroom

Teachers looking for a versatile natural history trade book to engage their students will delight in *The Sound of a Wild Snail Eating* by Elisabeth Tova Bailey. This little book tells the captivating story of a woman's convalescence and the ordinary woodland snail that becomes her recuperation companion. Bailey's exhaustive research makes the book detailed enough for use in Advanced Placement, university, and medical school classrooms. At the same time, her prose and narrative are accessible even for Middle School teachers to excerpt. Below are a few ways you might include *The Sound of a Wild Snail Eating* in your curriculum.

In the Science Classroom:

- Great discoveries in biology can be made by anyone! This book illustrates how much one can learn about the natural world just from carefully observing it. Works well with entry level high school students for this purpose.
- The book includes detailed accounts of snail (gastropod) biology, life history, reproductive, and behavior — a perfect supplement for AP/IB Biology, Comparative Anatomy, or entry level college Biology courses.
- The background narrative of Ms. Bailey's health would be of interest to teacher's in Biotechnology or Environmental Science courses where virology, bacteriology, or epidemiology are discussion topics.

Humanities, Medicine, Language Arts, and More!

- From its cliff-hanging prologue to its reflective epilogue, Bailey's book provides wonderful examples of different types of writing within a natural history context.
- The book is infused with literary excerpts, haiku, poetry, and historical vignettes. Her compilation affords teachers a good reference for natural history themes.
- Medical professionals recommend Bailey's story as a marvelous example of how biophilia — the human connection to the natural world — can be an important element in patient care, an unexplainable panacea that picks up where modern medicine leaves off.
- The vivid accounts of her terrarium and the curious going's on of snails would be a great example of creative nonfiction for the English or Language Arts classroom or inspiration for student artists of all types.

For more information on how you might incorporate *The Sound of a Wild Snail Eating* into your classroom or curriculum contact Ryan Bromwell at rbromwell@loyolablakefield.org

Ryan Bromwell teaches Advanced Biology, AP Environmental Science, and Marine Science at Loyola Blakefield High School in Towson, MD. He recently collaborated with Ms. Bailey in using her book with 9th grade students.

How will the Wild Snail book be relevant to readers?

- Natural history—the story of the snail's life
- Literary memoir—quality of the writing and author's story
- Pet story—interspecies connection involving an unusual animal
- Medical humanities, a story about facing adverse circumstances and surviving

The *Wild Snail* Is Being Used in University and College Curricula

University of Washington—Seattle

- *"Monsters & Aliens: Encountering Others" and "The Politics of Life," senior thesis classes. Anthropology Professor Maria Elena Garcia, Comparative History of Ideas & Jackson School of International Studies.*

Princeton University

- *"What Makes for a Meaningful Life? A Search," a freshman seminar. Professor of Russian Literature, Ellen Chances, Department of Slavic Languages and Literatures.*

State University of New York, Purchase Campus

- *"Science & Writing," adjunct professor Katherine Hurley.*

Common Core: Literacy in Science

Vocabulary instruction is supported throughout the *Wild Snail* book through very specific common word use such as:

baffling, discernible, impenetrable, ephemeral

As well as utilizing scientific words such as:

tentacles, radula, estivate, nocturnal,
logarithmic spiral, evolution, epiphragm

Common Core: Literacy in Science

The sentences in the *Wild Snail* book are carefully crafted:

"After being transported from the woods, the snail had emerged from its shell into the alien territory of my room, with no clue as to where it was or how it had arrived; the lack of vegetation and the desertlike surroundings must have seemed strange."

"A snail's navigation is complex, based on ever-changing odors, sources of darkness and light, a tactile sense of air movement, and, through the touch receptors on its single body-foot, a response to vibrations and types of terrain."

The sentences build into paragraphs in interesting ways:

"In the fourth century BC, in the History of Animals, Aristotle noted that snail teeth are 'sharp, and small, and delicate.' My snail possessed around 2,640 teeth, so I'd add the word plentiful to Aristotle's description. The teeth point inward so as to give the snail a firm grasp on its food; with about 33 teeth per row and maybe eighty or so rows, they form a multitoothed ribbon called a radula, which works much like a rasp."

Common Core: Literacy in Science

- Each of the book's essay-like chapters serve as a model text for research and writing.
- Relevant information from multiple sources is integrated into an original text.
- The book is an example of analysis, research, and reflection.
- The book's source material and permissions show evidence of the writing process.

The *Wild Snail* source materials . . .

The *Wild Snail* book has an extensive list of source materials, which can be studied in their own right or can be used as a model for how to research and write a paper.

Dawkins, Richard. *The Ancestor's Tale: A Pilgrimage to the Dawn of Evolution.* New York: Mariner Books / Houghton Mifflin, 2005.

DeBlieu, Jan. *Wind: How the Flow of Air Has Shaped Life, Myth and the Land.* Emeryville, CA: Shoemaker and Hoard, 2006.

Freedman, David H. "In the Realm of the Chemical." *Discover* 223, June 1993.

Gawande, Atul. "Hellhole." *The New Yorker,* March 30, 2009.

Heidmann, Thierry. "Darwin's Surprise." *The New Yorker,* December 3, 2007.

Huxley, T. H. *A Course of Elementary Instruction in Practical Biology.* London: Macmillan, 1902.

Keller, Helen. *The World I Live In.* New York: Century, 1908.

Kellert, Stephen R., and Edward O. Wilson, eds. *The Biophilia Hypothesis.* Washington DC: A Shearwater Book / Island Press, 1995.

Kirby, Rev. William. *On the History, Habits and Instincts of Animals.* The Bridgewater Treatises, Treatise VII. 1835. Philadelphia: Carey, Lea and Blanchard, 1837.

Some quotes in the *Wild Snail* book needed permissions; others are in the public domain.

Google Books was a free source for many public domain quotes (pre-1923).

Students can learn how to access historic books.

PERMISSIONS

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Rainer Maria Rilke. From *Letters to a Young Poet* by Rainer Maria Rilke, translated by Stephen Mitchell. Copyright © 1984 by Stephen Mitchell. Used by permission of Random House, Inc. *(Pages 1, 31, 163.)*

Kobayashi Issa. Translations by David G. Lanoue. From his Web site *Haiku of Kobayashi Issa*. http://haikuguy.com/issa/. *(Pages 3, 85, 95, 149, 155.)*

Next Generation Science Standards

Applying "The Framework" to the *Wild Snail* book

- Scientific Practices
- Crosscutting Concepts
- Life Sciences Core Ideas

1) Scientific Practices

Consider how the *Wild Snail* book is a model for many of these practices

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Practice 8:

Obtaining, Evaluating, and Communicating Information

This practice is at the heart of the *Wild Snail* book.

NGSS Science and Engineering Practices* (March 2013 Draft)

Science and Engineering Practices	K–2 Condensed Practices	3–5 Condensed Practices	6–8 Condensed Practices	9–12 Condensed Practices
Obtaining, Evaluating, and Communicating Information Scientists and engineers must be able to communicate clearly and persuasively the ideas and methods they generate. Critiquing and communicating ideas individually and in groups is a critical professional activity. Communicating information and ideas can be done in multiple ways: using tables, diagrams, graphs, models, and equations as well as orally, in writing, and through extended discussions. Scientists and engineers employ multiple sources to obtain information that is used to evaluate the merit and validity of claims, methods, and designs.	Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.	Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.	Obtaining, evaluating, and communicating information in 6–8 builds on K–5 experiences and progresses to evaluating the merit and validity of ideas and methods.	Obtaining, evaluating, and communicating information in 9–12 builds on K–8 experiences and progresses to evaluating the validity and reliability of the claims, methods, and designs.
	• Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).	• Read and comprehend grade-appropriate complex texts and/or other reliable media to summarize and obtain scientific and technical ideas and describe how they are supported by evidence. • Compare and/or combine across complex texts and/or other reliable media to support the engagement in other scientific and/or engineering practices.	• Critically read scientific texts adapted for classroom use to determine the central ideas and/or obtain scientific and/or technical information to describe patterns in and/or evidence about the natural and designed world(s).	• Critically read scientific literature adapted for classroom use to determine the central ideas or conclusions and/or to obtain scientific and/or technical information to summarize complex evidence, concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
	• Describe how specific images (e.g., a diagram showing how a machine works) support a scientific or engineering idea.	• Combine information in written text with that contained in corresponding tables, diagrams, and/or charts to support the engagement in other scientific and/or engineering practices.	• Integrate qualitative and/or quantitative scientific and/or technical information in written text with that contained in media and visual displays to clarify claims and findings.	• Compare, integrate and evaluate sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a scientific question or solve a problem.
	• Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question and/or supporting a scientific claim.	• Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem.	• Gather, read, synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. • Evaluate data, hypotheses, and/or conclusions in scientific and technical texts in light of competing information or accounts.	• Gather, read, and evaluate scientific and/or technical information from multiple authoritative sources, assessing the evidence and usefulness of each source. • Evaluate the validity and reliability of and/or synthesize multiple claims, methods, and/or designs that appear in scientific and technical texts or media reports, verifying the data when possible.

2) Crosscutting Concepts

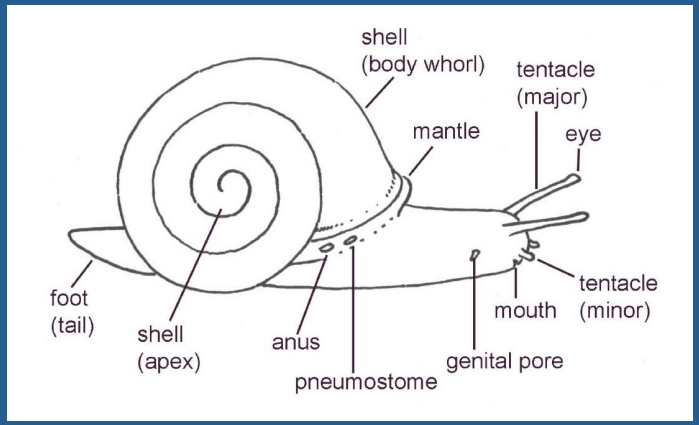
There are ways to apply all of these concepts
to the *Wild Snail* book

1. Patterns (spiral shell, pattern on snail foot, pattern of radula—snail teeth)
2. Cause and effect (night time brings a humidity increase and the snail becomes active)
3. Scale, proportion, and quantity (snail/human comparisons)
4. Systems and system models (ecosystem in the terrarium, reuse of slime)
5. Energy and matter (snail locomotion, slime conservation, terrarium ecosystem)
6. Structure and function (snail foot and shell, tentacles that telescope, renewable teeth, slime and its many recipes and uses)
7. Stability and change (snail evolution, hibernation, estivation)

3) Life Sciences—Core Ideas

The *Wild Snail* book can be used to address these ideas

- LS 1: From molecules to organisms: Structures and processes
- LS 2: Ecosystems: Interactions, energy, and dynamics
- LS 3: Heredity: Inheritance and variation of traits
- LS 4: Biological evolution: Unity and diversity



Here is just one Life Science Core Idea . . .

LS1.A Structure & Function

- Structure and Function
- Growth and Development of Organisms
- Interdependent Relationships in Ecosystems
- Social Interactions and Group Behavior
- Inheritance of Traits
- Natural Selection
- Adaptation
- Biodiversity and Humans

All the ideas above can be applied to many chapters of The Sound of a Wild Snail Eating

Other Core Ideas can be applied as well . . .

For instance, Physical Science Core Ideas can be applied to the waves created by the snail's foot as it locomotes through slime.

Physical Sciences

- PS 1: Matter and its interactions
- PS 2: Motion and stability: Forces and interactions
- PS 3: Energy
- PS 4: Waves and their applications in technologies for information transfer

Throughout the *Wild Snail* Book there are observations of two animal groups. Structural and physiological differences, similarities, and contrasts are noted.

Kingdom	Phylum	Subphylum	Class	Subclass	Order	Family	Genus	Species
Animalia	Mollusca	Conchifera	Gastropoda	Pulmonata	Stylommatophora	Polygyridae	*Neohelix*	*albolabris*
Animalia	Chordata	Vertebrata	Mammalia	Theria	Primates	Hominidae	*Homo*	*sapiens*

Similarities:
heart, brain, lung, gastrointestinal system

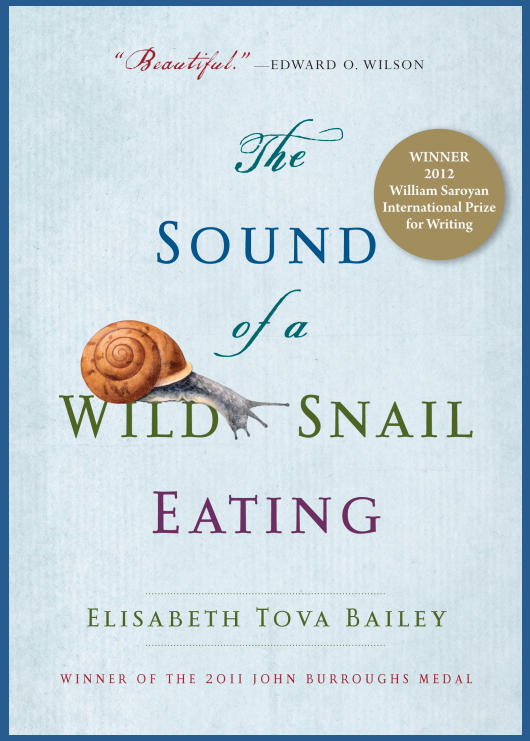
Contrasts:
slimy skin/dry skin, external shell/internal spine

Differences:
one foot versus two feet, four senses versus five senses,
nocturnal versus diurnal

Author's Website

- Teaching resources can be found on the author's website, including additional PowerPoints and activities by and for teachers, a book trailer, a slide/talk, links to snail research sites, author interviews, and much more.

- Check out the book's website page titled "In the Classroom." More teaching materials will be added in the future.



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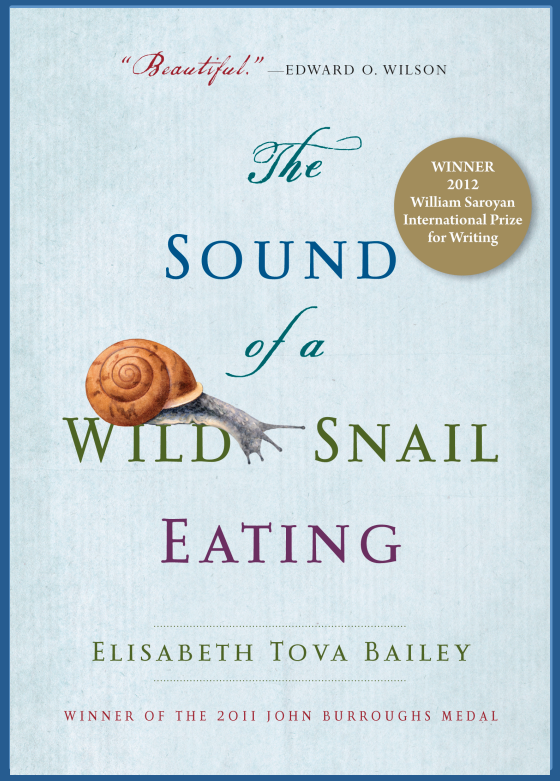
Obtaining a Desk Copy for Curriculum Consideration



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mrockliff@workman.com