



— Lisa S. Bircher —

“**M**rs. Bircher, do we have a story today?” This is not a question that a high school science teacher typically expects from her sophomore biology students, but I have been asked this question often since I began reading juvenile trade books with my students.

We may assume that high school students are too “old” to enjoy simple, juvenile reading—but why? Even as an adult, I enjoy hearing a story read aloud, especially by someone with a flair for reading. High school students also enjoy being read to, especially when the reading is fun and engaging, which

READING ALOUD:

A SPRINGBOARD TO INQUIRY

*Trade books in the
science classroom*

is the case in most high-quality juvenile literature. Reading these simple books with students not only captures their attention, but also allows them to focus on larger science concepts and can introduce them to new science content (Madraza 1997; Cerullo 1997). In addition, reading aloud helps students develop better fluency and prosody, which may lead to improved comprehension of difficult science concepts (Brassell 2006).

This article presents suggestions for incorporating juvenile trade books into instruction and for selecting appropriate books for each science class. I offer instructions for reading aloud based on my own experience teaching high school biology students.

Engaging students

Many resources for science teachers recommend reading books aloud to students (McKee and Ogle 2005; Douglas

FIGURE 1

Suggested reading list.

The following is a list of juvenile trade books that may be used to introduce various topics in Earth and space, physical, and biology high school science classes. (**Note:** The * symbol denotes a book from the *Let's-Read-and-Find-Out Science Books* series.)

Earth and space science

The rock cycle

- Bailey, J. 2003. *The rock factory: The story about the rock cycle*. Minneapolis, MN: Picture Window Books.
- Cole, J. 1987. *The magic school bus inside the Earth*. New York: Scholastic.
- Gans, R. 1997. *Let's go rock collecting*. New York: Harper Collins.*
- Hiscock, B. 1988. *The big rock*. New York: Simon and Schuster.

Plate tectonics

- Branley, F.M. 1990. *Earthquakes*. New York: Thomas Y. Crowell.*
- Gibbons, G. 1995. *Planet Earth: Inside out*. New York: Morrow Junior Books.
- Hooper, M. 2004. *The island that moved*. New York: Viking.
- Zoehfeld, K.W. 1995. *How mountains are made*. New York: HarperCollins.*

Astronomy

- Branley, F.M. 1972. *The beginning of the Earth*. New York: Thomas Y. Crowell.*
- Branley, F.M. 1981. *The sky is full of stars*. New York: HarperCollins.*
- Branley, F.M. 2007. *Gravity is a mystery*. New York: HarperCollins.*
- Cole, J. 1990. *The magic school bus lost in the solar system*. New York: Scholastic.
- Gibbons, G. 1992. *Stargazers*. New York: Holiday House.
- Gibbons, G. 1997. *The Moon book*. New York: Holiday House.
- Gibbons, G. 2004. *The planets*. New York: Holiday House.
- Gibbons, G. 2007. *Galaxies, galaxies!* New York: Holiday House.
- Kortenkamp, S. 2007. *Why isn't Pluto a planet? A book about planets*. Mankato, MN: Capstone Press.

Weather

- Branley, F.M. 1988. *Tornado alert*. New York: Thomas Y. Crowell.*
- Gibbons, G. 1987. *Weather forecasting*. New York: Simon and Schuster.
- Gibbons, G. 1990. *Weather words and what they mean*. New York: Holiday House.
- Gibbons, G. 1995. *The reasons for seasons*. New York: Holiday House.
- Rabe, T. 2004. *O say can you say what's the weather today?* New York: Random House.

Physical science

Atoms

- Cox, P.R., and M. Parsonage. 1992. *Atoms and molecules*. Tulsa, OK: EDC.
- Richardson, H. 2001. *How to split the atom*. Danbury, CT: Franklin Watts.
- Stewart, M. 2003. *Atoms*. Minneapolis, MN: Compass Point Books.

The periodic table

- Dingle, A. 2007. *The periodic table: Elements with style*. Boston: Kingfisher.
- Tocci, S. 2004. *The periodic table*. New York: Children's Press.

Chemicals

- Ditchfield, C. 2002. *Water*. New York: Children's Press.
- Kurlansky, M. 2006. *The story of salt*. New York: G.P. Putnam's Sons.
- Zoehfeld, K.W. 1998. *What is the world made of? All about solids, liquids, and gases*. New York: HarperCollins.*

Newton's laws

- Dalton, C.D. 2001. *How can I experiment with...? Gravity*. Vero Beach, FL: Rourke.
- Gianopoulos, A. 2007. *Isaac Newton and the laws of motion*. Mankato, MN: Capstone Press.
- Gordon, M. 1995. *Push and pull*. New York: Thomson Learning.
- Parker, S. 1995. *Isaac Newton and gravity*. Philadelphia: Chelsea House.

et al. 2006; Matthews 2006; Madrazo 1997; Brassell 2006); however, most of them target elementary and middle school levels. High school students can also benefit from being read aloud to or even reading text aloud to their classmates (Delo 2008; Cerullo 1997). The practice of reading aloud fits well into the first stage of the 5-E instruction model: It is a springboard to *engage* students in scientific inquiry (Vasquez 2008; NRC 2000).

The 5-E instructional model—engage, explore, explain, extend, and evaluate—is a mechanism to draw students into deeper learning about a concept. In the engagement phase, the teacher initiates the learning, determines what students already know about the topic, and provides motivation for learning about the scientific concept (Vasquez 2008). During this first phase, reading a short juvenile text aloud can be a unique way to pique students’

Waves

Cole, J. 1997. *The magic school bus makes a rainbow: A book about color*. New York: Scholastic.

Cole, J. 1999. *The magic school bus gets a bright idea: A book about light*. New York: Scholastic.

Johnston, T. 1988. *Light! Color! Action!* Milwaukee, WI: Gareth Stevens.

Electricity

Berger, M. 1989. *Switch on, switch off*. New York: Thomas Y. Crowell.*

Johnston, T. 1988. *Electricity turns the world on!* Milwaukee, WI: Gareth Stevens.

Inventors and scientists

Adler, D.A. 1996. *A picture book of Thomas Alva Edison*. New York: Holiday House.

Anderson, M.J. 1996. *Isaac Newton: The greatest scientist of all time*. Springfield, NJ: Enslow.

Barretta, G. 2006. *Now and Ben: The modern inventions of Benjamin Franklin*. New York: Henry Holt.

Brown, D. 2004. *Odd boy out: Young Albert Einstein*. New York: Houghton Mifflin.

Gherman, B. 1994. *The mysterious rays of Dr. Röntgen*. New York: Atheneum.

Mortensen, L. 2007. *Thomas Edison: Inventor, scientist, and genius*. Minneapolis, MN: Picture Window Books.

St. George, J. 2002. *So you want to be an inventor?* New York: Philomel Books.

Schaefer, L.M., and W. Schaefer. 2005. *Marie Curie*. Mankato, MN: Capstone Press.

Biology

Cells

Balkwill, F. 1990. *Cells are us*. Minneapolis, MN: Carolrhoda Books.

Balkwill, F. 2002. *Enjoy your cells*. Woodbury, NY: Cold Spring Harbor Laboratory Press.

Wells, R.E. 1995. *What’s smaller than a pygmy shrew?* Morton Grove, IL: Albert Whitman and Company.

Genetics

Balkwill, F. 2002. *Gene machines*. Woodbury, NY: Cold

Spring Harbor Laboratory Press.

Bardoe, C. 2006. *Gregor Mendel: The friar who grew peas*. New York: Abrams Books.

Nicolson, C.P. 2001. *Baa! The most interesting book you’ll ever read about genes and cloning*. Tonawanda, NY: Kids Can Press.

Patent, D.H. 1989. *Grandfather’s nose: Why we look alike or different*. New York: Franklin Watts.

Evolution

Cole, J. 1987. *Evolution*. New York: Thomas Y. Crowell.*

Hooper, M. 1996. *The pebble in my pocket: A history of our Earth*. New York: Viking.

Jackson, E. 2005. *The tree of life: The wonders of evolution*. Amherst, NY: Prometheus Books.

Jenkins, S. 2002. *Life on Earth: The story of evolution*. Boston: Houghton Mifflin.

Peters, L.W. 2003. *Our family tree: An evolution story*. San Diego, CA: Harcourt.

Sis, P. 2003. *The tree of life: A book depicting the life of Charles Darwin, naturalist, geologist, and thinker*. New York: Frances Foster Books.

Ecology

Baines, C. 1990. *The old boot: An ecology story book*. New York: Crocodile Books.

Berger, M. 1994. *Oil spill!* New York: HarperCollins.*

Cole, J. 1996. *The magic school bus gets eaten: A book about food chains*. New York: Scholastic.

Gibbons, G. 1994. *Nature’s green umbrella: Tropical rain forests*. New York: Morrow Junior Books.

Gibbons, G. 1996. *Deserts*. New York: Holiday House.

Gibbons, G. 1998. *Marshes and swamps*. New York: Holiday House.

Gibbons, G. 2007. *Coral reefs*. New York: Holiday House.

Lauber, P. 1995. *Who eats what? Food chains and food webs*. New York: HarperCollins.*

Seuss, T.G. 1971. *The lorax*. New York: Random House.

Plant life

Gibbons, G. 1991. *From seed to plant*. New York: Holiday House.

Worth, B. 2001. *O say can you seed?* New York: Random House.

interest, which is especially helpful when beginning a new unit; it can also motivate students to learn more sophisticated content about topics as diverse as plate tectonics, genetics, or atomic theory.

The Library of Congress considers materials “juvenile” if they are intended for children through age 15 or grade 9 by the author or publisher—in fact, the terms *children’s literature* and *juvenile literature* are often used interchangeably (Fountain 2006). A number of juvenile trade books allow teachers to introduce complex topics in a minimum amount of classroom time (Figure 1, pp. 30–31). Reading juvenile books aloud in the classroom allows students to improve reading fluency (the ability to read quickly, effortlessly, and with the desired expression); prosody (reading aloud with proper stress, pitch, phrasing, and rate) (Rasinski and Fawcett 2008); and comprehension.

These books also require a lower reading level and therefore can engender confidence in reluctant readers. Research has shown that by middle school, students are able to decode individual words but may have difficulty putting it all together, or comprehending what is read (Thier and Daviss 2002). Therefore, it makes sense to present lower-level reading material to students who struggle with reading comprehension before they are required to read a higher-level textbook. In this way, students are prepared for the difficult reading in the textbook after having the opportunity to read something less arduous. Furthermore, reading aloud can benefit diverse types of learners; for example, low-reading level students, English language learners, and auditory learners may understand more of what they hear than what they read (Delo 2008). It also provides a common experience with sophisticated science concepts that students can refer back to later in their inquiry processes.

Selecting books

There are a number of biology, Earth and space, and physical science books that are appropriate for reading aloud in the high school science classroom. I have created a list of books in these categories that weave a story with science content and can be read aloud in a limited amount of classroom time (Figure 1). These books are engaging, accurate, clearly written, up-to-date, well-organized, and avoid stereotypes (Cerullo 1997). Students are often eager

to read these books aloud to their classmates.

Many books on my list are from the *Let’s-Read-and-Find-Out Science Books* series. I have found that these books, many of which are written by series originator Franklyn M. Branley,

are succinct but also advanced enough to appeal to high school students. The classroom time needed to read them aloud may only amount to 15–20 minutes—time well invested if it engages students in learning about complex science concepts.

The list in Figure 1 also includes a few books from the *Magic School Bus* series by Joanna Cole. However, I would caution teachers who have students read aloud: The many dialogue and other text boxes may make the books challenging reading for students, although they do present high-quality science concepts.

Books written and illustrated by Gail Gibbons have also been a delight for my class. These children’s books cover a wide variety of topics about science, and the text is economical without being patronizing; the illustrations are also well done. Many of her books work well for reading aloud in the science classroom. The Outstanding Science Trade Books for Students K–12 lists compiled by NSTA and the Children’s Book Council (CBC) each year also provide many good options—lists from 1996 on are available online (see “On the web”).

Another way to find appropriate books for your classroom is to spend some time talking with your school or public librarian about juvenile literature and how you want to use it in your class. Librarians can be your greatest resource because, unlike the average high school science teacher, they are aware of the excellent trade books that are available and have the time and ability to obtain them. I was amazed at the diversity and quality of books my local librarian was able to find for my classroom.

Reading aloud

The first book that I read aloud with my biology class was Cheryl Bardoe’s *Gregor Mendel: The Friar Who Grew Peas* (2006). Students sat in a circle and passed the book around as they took turns reading aloud in “round robin” fashion; however, I felt that my students were missing out on the artwork in the text when we read aloud like this. To address this problem, it would be helpful to obtain a classroom set or have students read aloud in small groups so that everyone has the opportunity to see the text and the artwork while reading. This helps keep students on-task and enables them to experience the trade book as it was meant to be read.

Some teachers may be hesitant to read aloud in the science classroom because they think it is not the best use of precious classroom time. However, as a teaching strategy in the engage phase of the 5-E model, it has been suggested that the teacher determine students’ prior knowledge as well as any misconceptions they may hold (Vasquez 2008). The interactive read-aloud may be one way to accomplish this before the teacher allows students to explore, explain, extend,



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and evaluate as part of the scientific inquiry cycle. Inquiry is an essential part of the science classroom, and reading aloud provides one tool to engage students in inquiry that is meaningful.

I have found student reaction to this activity quite remarkable. Some students that are reluctant to read aloud from the textbook are *not* reluctant to read aloud from a juvenile trade book. At my parent-teacher conferences, many parents were pleasantly surprised to learn that their children were eager to read aloud from these books in front of the class, and I was pleased to have found a way to make eager readers out of reluctant ones.

On several occasions, students who were absent on the day we read the trade books aloud in class were more than willing to read the book when they returned to school. One student had to leave school for an appointment and insisted on taking the actual text home to read. Other students have commented that they cannot believe there is so much science to read and learn about in children's books. **(Editor's note:** For suggestions on how to organize and maintain a classroom library, see "Start a Classroom Library!" by Terence Cavanaugh in the Idea Bank on p. 60 of this issue.)

Conclusion

The *National Science Education Standards* state: "Science content must be embedded in a variety of curriculum patterns that are developmentally appropriate, interesting, and relevant to students' lives" (NRC 1996). Reading juvenile science books aloud can serve as a springboard to inquiry and higher-level investigation and study; it can also be an invaluable way to introduce a new science concept or unit and spark students' interest in learning about a particular topic. It is important to note that this technique is intended to initiate the 5-E instructional model for meaningful scientific inquiry, not to serve as a replacement for rigorous science content teaching.

Using juvenile literature in the classroom has allowed my students to become interested in difficult concepts from the first day of study and has provided greater incentive to engage in scientific inquiry. Even my honors students continue to reference the trade books as they move through their inquiry on any given topic. One student told me that "reading aloud is the best way to hear and understand what we are trying to learn about." It is a great way to provide a teachable moment that will lead to more meaningful inquiry. ■

Lisa S. Bircher (lbircher@kent.edu) is a science teacher at East Palestine High School in East Palestine, Ohio, and a doctoral student in the College of Education, Health, and Human Services at Kent State University in Kent, Ohio.

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On the web

NSTA/CBC Outstanding Science Trade Books for Students K–12: www.nsta.org/publications/ostb

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