

## Biology Books for Young People

SECTION EDITOR: JENNIFER A. WILLIAMS

### PLANTS AND INVADERS

**Alien Invaders: Species that Threaten Our World.** Jane Drake and Ann Love. Tundra Books, Plattsburgh, NY, 2008. 56 pp., illus. \$19.95 (ISBN 9780887767982 cloth).

**Aliens from Earth: When Animals and Plants Invade Other Ecosystems.** Mary Batten. Peachtree, Atlanta, 2008. 32 pp., illus. \$15.95 (ISBN 9781561452361 cloth).

**Amazing Plants.** Honor Head. Gareth Stevens, Strongsville, OH, 2007. 32 pp., illus. \$24.00 (ISBN 9780836888973 cloth).

**The Charcoal Forest: How Fire Helps Animals and Plants.** Beth A. Peluso. Mountain Press, Missoula, MT, 2007. 64 pp., illus. \$12.00 (ISBN 9780878425327 paper).

**Don't Touch That! The Book of Gross, Poisonous, and Downright Icky Plants and Critters.** Jeff Day. Chicago Review, Chicago, 2008. 112 pp., illus. \$9.95 (ISBN 9781556527111 paper).

**Monarch and Milkweed.** Helen Frost and Leonid Gore. Atheneum Books for Young Readers, New York, 2008. 40 pp., illus. \$17.99 (ISBN 9781416900856 cloth).

**Photosynthesis.** Alvin Silverstein, Virginia Silverstein, and Laura Silverstein Nunn. Lerner (Twenty-First Century Books), Minneapolis, MN, 2007. 80 pp., illus. \$31.93 (ISBN 9780822567981 cloth).

**A Seed Is Sleepy.** Dianna Hutts Aston. Chronicle Books, San Francisco, 2007. 40 pp., illus. \$16.95 (ISBN 9780811855204 cloth).

**Winter Trees.** Carol Gerber. Charlesbridge, Watertown, MA, 2008. 32 pp., illus. \$15.95 (ISBN 9781580891684 cloth).

The relation between picture and text has been an issue in scientific publishing for centuries. Biologists like Carl Linnaeus thought words were important in describing species characteristics, whereas pictures were misleading or at least of less significance than words. On the other hand, the 19th-century biologist Ernst Haeckel, who was himself an artist, used pictures and diagrams liberally in his books. At that time, there were two schools of thought on illustrations. Some scientists saw them as essential to scientific communication, while others regarded them as relatively trivial and more suited for communicating science to the general public. This divide led to a split in the type of illustration found in scientific and popular publications. In the former, there was usually a focus on a particular species or a portion thereof, while in the latter, scenes were often presented and stories told through images.

This same dichotomy is seen in the books under review here. Many of the images in *Photosynthesis*, for example, provide information rather than tell

stories, whereas the books with “alien” in the title present whole environments, just the type of thing not usually found in scientific papers. Yet these scenes with their narrative style are attractive to young readers and support the text in a different way than more Spartan images do.

What all these books do have in common is that they in some way deal with the green world. In the scientific realm, plants have gotten short shrift for ages. Since the dawn of molecular biology, botany has been shoved to the sidelines, and plant scientists have even complained of the public’s “plant blindness,” the inability to appreciate the green world and its significance. This situation now seems to be changing as a result of global warming and the energy crisis. All of a sudden, plants matter. People are beginning to appreciate that trees use up prodigious amounts of carbon dioxide and that plants can be renewable sources of energy.

This increased interest in the green world is reflected in the publishing world with a significant crop of new books

that concentrate on plants, although these books, in most cases, do not deal with them exclusively. This makes sense; plants live in communities and have a host of relationships with the animal world. It would give children a false sense of the living world to focus too narrowly on the botanical. The one book in this collection that deals only with plants is also the most technical: *Photosynthesis* (ages 11 to 14), by Alvin Silverstein, Virginia Silverstein, and Laura Silverstein Nunn. Clearly written, it has a textbook style of prose and format; photos and simple diagrams augment the text. It’s a competent production and would be a useful supplement for eager biology students in junior high school. Like many books for older children, this one has a glossary.

For slightly younger readers, the emphasis seems to be on the dangerous, the strange, and the alien. *Don't Touch That!* (ages 9 to 12) is subtitled “The

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Book of Gross, Poisonous, and Downright Icky Plants and Critters.” This volume is not for children—or adults—who are fearful or have a tendency toward hypochondria. It is obviously aimed at adolescents who are fascinated by the disgusting. Written by a physician, Jeff Day, it takes a lighthearted and corny approach to the dangers lurking in the natural world. The text is peppered with many brightly colored and rather “icky” cartoons. The information is sound, and there’s a great deal of it. The book begins with plants, concentrating on poison ivy, moves on to insects and spiders, and ends with vertebrates, particularly ones that bite.

Two other books play up kids’ fascination with aliens, though they deal not with visitors from other planets but with species from other ecosystems. These books discuss invasive species of plants and animals. *Alien Invaders* (ages 9 to 12), by Jane Drake and Ann Love, and *Aliens from Earth* (ages 8 to 12), by Mary Batten, cover similar territory. Both stress the role of humans in the movement of organisms far from their native terrains, and they are liberally illustrated with art having a slightly menacing cast. *Alien Invaders* has the more sophisticated text, and at the end of each two-page spread is a list of the species, together with their sizes, areas of origin, and means of spread to other areas. *Aliens from Earth* places more emphasis on preventing further invasions and stemming the damage done by present ones.

*Amazing Plants* (ages 7 to 10), by Honor Head, takes a fun approach to the green world, focusing on the variety of adaptations to be found in this kingdom. It has at least as much space devoted to photos as to text, but the problem is that the text amounts to little more than explanations of the pictures. There is little background information, so without some prior knowledge of plants, the text may not be very illuminating, aside from the “wow” factor provided by the odd properties discussed.

Beth A. Peluso does a better job of providing sufficient information to make her beautiful illustrations under-

standable. She has chosen a narrow topic for *The Charcoal Forest* (ages 4 to 8), namely, how a forest fire can be beneficial for many plants and animals. Her text aspires to be interesting rather than amazing. Although the book’s vocabulary is rather sophisticated, which isn’t always necessary, Peluso does highlight difficult words in the text and define them, and a glossary is included.

One reason Peluso is so successful at integrating illustrations and text may be because she has produced them both. This blend of talents is obviously useful, but it isn’t essential for producing outstanding books for children. There are also excellent writer/illustrator teams, and three of them noted below have produced beautiful and varied books on plants for younger readers. It seems as if it is easier to integrate word and image for this age group, perhaps because the word-to-image ratio favors the latter. Or perhaps publishers see images as more important for this audience and therefore take greater care and put more resources into the production of quality pictures.

*Winter Trees* (ages 4 to 8), by Carol Gerber, is simply written and crisply illustrated. A child and his dog share a walk through a snowy woods, inspecting a variety of trees. At the end, there’s a review of the different characteristics of these trees in winter. This book is a nice introduction to the art of observing nature. It also sends the message that humans are part of nature—they move and act in it. This is not apparent in the two books reviewed below; in those, there is no hint of the human species. Each pictures a world in which other species exist without relation to us, thus sending a very different message about the living world, and perhaps reinforcing the view that humans really are apart from the rest of nature.

Diana Hutts Aston’s *A Seed Is Sleepy* (ages 5 to 8) takes a slightly more fanciful approach, and as the title implies, it is definitely more anthropomorphic. Seeds aren’t just sleepy, they are secretive, adventurous, and generous. This may make some biologists uncomfortable—they are usually careful to avoid such language—but this book is for children,

who look at the world differently and need a vocabulary that allows them to relate to seeds, which can be seemingly lifeless objects. Yet this language, geared to young children, often shares the page with some difficult vocabulary that seems beyond the reach of the intended audience. The illustrations, however, make up for any deficiencies in the text. They are stunning and varied, from the interior of a bean seed to a stately redwood. At the beginning and end of the book are double-page spreads. The first shows a variety of seeds, each labeled with the name of the plant that produced it. The spread at the end of the book displays all the plants, also labeled. I can see a child spending pleasant time matching seed and plant—learning about plant identification and the art of observation at the same time.

*Monarch and Milkweed* (ages 6 to 9), by Helen Frost and Leonid Gore, is a gem. It presents the yearly life cycle of the monarch butterfly and of the milkweed plant on which it lays its eggs. The monarch’s migration north from Mexico in the spring and back south in the fall is presented both in the text and in two simple but effective maps on the endpapers—the only volume in this collection to make educational use of a book’s endpapers. The text is simple and straightforward, a good example of how science can be presented clearly to the young. This book would make a lovely gift for a youngster, and it would be a joy for an adult to read to a child. *Monarch and Milkweed* provides a beautiful example of the interrelationship between species in nature, a lesson that a child is never too young to learn. In fact, all these books are reminders of how dependent species are on one another, and especially on the plant kingdom.

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Include this information when citing this material.

MYSTERIES OF THE DEEP

**Coral Reefs.** Gail Gibbons. Holiday House, New York, 2007. 32 pp., illus. \$16.95 (ISBN 9780823420803 cloth).

**Discovering Underwater Secrets with a Nature Photographer.** Patricia J. Murphy. Enslow, Berkeley Heights, NJ, 2007. 24 pp., illus. \$21.26 (ISBN 9780766028166 cloth).

**Fabulous Fishes.** Susan Stockdale. Peachtree, Atlanta, 2008. 32 pp., illus. \$15.95 (ISBN 9781561454297 cloth).

**I Wonder Why Whales Sing: And Other Questions about Sea Life.** Caroline Harris. Macmillan, New York, 2008. 32 pp., illus. \$6.95 (ISBN 9780753462331 paper).

**Marshes and Swamps: A Wetland Web of Life.** Philip Johansson. Enslow, Berkeley Heights, NJ, 2007. 48 pp., illus. \$23.93 (ISBN 9780766028142 cloth).

**Oceans.** Beverly McMillan and John A. Musick. Simon and Schuster Books for Young Readers. New York, 2007. 64 pp., illus. \$16.99 (ISBN 9781416938590 paper).

**Secrets of the Deep: Marine Biologists.** Mike Unwin. Heinemann-Raintree, Chicago, 2008. 32 pp., illus. \$19.75 (ISBN 9781403499523 cloth).

The history of human survival can be traced to our dependence on the ocean, with its lunar tides, marine life, and minerals. And yet today, because of climate change and other human factors such as water pollution and overfishing, our interconnected system is threatened. A call to action, spurred by a clear understanding of our relationship to the ocean, is imperative in order to protect this vital resource for future generations. This process of awareness is seeping into our global conscience, where it will no doubt take root in our children.

Today's political current has helped to produce a tide of children's books about oceans and wetlands. The following titles include examples of some of the best tools to introduce young minds to the bounty and biodiversity of these ecosystems. Several of these books also strive to educate students about the effects oceans have on daily life.

**For the younger reader**

Young children will be fascinated by Susan Stockdale's picture book *Fabulous Fishes* (ages 2 to 6) as they observe exotic species in their habitats. The illustrations are magnificent, their colors bold and bright. The use of terms that are familiar to young children—"sand," "round," and "land," for example—provides a comfort level that will facilitate learning, while phrases such as "fish that ride" and "fish that flash lights" will

pique their curiosity. This would be a valuable resource in preparing for a visit to an aquarium. An afterword lists pictures, names, and interesting facts about each fish, enabling children to associate names with pictures. Several reference books are also listed, and the child pictured on the last page may encourage underwater explorations—starting, perhaps, in the bathtub.

*Coral Reefs* (ages 4 to 8) is by Gail Gibbons, who has written and illustrated more than 135 books. Vivid pictures of life in the underwater world are displayed in brilliant color as daytime turns to nighttime. Information is presented clearly (the bold red type introducing each topic is a strength of the book), and the brevity of each statement is a plus for young readers. However, I feel that the number of pictures on each page is sometimes overwhelming, and some of the more difficult concepts will need to be explained to young readers. A thorough discussion of the formation, location, and types of reefs, as well as the life cycles and the adaptations of their inhabitants, is included. Overall, *Coral Reefs* is both fascinating and unique; however, perhaps because the book's audience is young children, the issue of global warming as a threat to the survival of this biome is given limited space. Problems such as pollution and physical destruction caused by boats are absent completely.

*I Wonder Why Whales Sing* (ages 4 to 8) may be used at home or in classroom enrichment activities to introduce young readers to marine life. Children are naturally curious about water, sand, and marine creatures, and author Caroline Harris highlights this curiosity by asking why, how, where, and what. This format comes naturally to Harris, who is a journalist. Colorful, detailed pictures invite further questions, and in this interactive process, a child may enjoy developing a personal glossary. Again, however, information about factors threatening the oceans is very limited.

*Discovering Underwater Secrets with a Nature Photographer* (ages 5 to 9) is a collection of striking images by leading underwater photographer Norbert Wu, presented in a question-and-answer format by Patricia Murphy. Wu combines an artistic eye and a desire to teach, presenting photos both exquisite and educational. The text makes a strong case in favor of underwater photography as a career or a hobby (and it may well motivate its young readers to learn how to swim). The book displays Wu's equipment and tools, clearly labeled, and offers a map showing where his photographs were taken. This makes for an excellent geography lesson, as he has traveled around the world. Additional facts, books, and Web sites about the photographer are listed at the end of the book, as well as an activity that

challenges young readers to be scientists. *Discovering Underwater Secrets* serves as an inspiring first glance into our underwater world; it may also work as a first step toward a deeper involvement and greater interest in preserving our oceans.

Philip Johansson has written a four-book series called *Wonderful Water Biomes*, each title focusing on a unique ecosystem and the flow of energy and life within it. In *Marshes and Swamps: A Wetland Web of Life* (ages 8 to 10), readers are taught the physical characteristics of wetlands, as well as the adaptations and interdependence of its plants and animals, in order to foster an understanding of the fragility of this rapidly disappearing biome. New terms are well defined, appealing photos complement the text, and a salt-marsh food web makes the concept of interdependence easier to comprehend. A shortcoming of the book is the limited space given to the role that wetlands play in our lives—preventing erosion, controlling flooding, and protecting our groundwater by filtering pollutants. Johansson states that many wetland species are disappearing, and that we depend on many of these for food; however, a discussion of human activities that threaten the wetlands—or a plea for action to help save them—would greatly enhance this book.

### For the older reader

*Oceans* (ages 9 to 12), by Beverly McMillan and John A. Musick, is a picturesque book presented in two sections. In the first section, the topics introduced are consistent with basic principles of oceanography. The second section focuses on ocean habitats such as beaches, estuaries, and coral reefs. Major concepts (e.g., the formation and re-formation of Earth's oceans, the oceans' relationship to climate, factors threatening the oceans' ability to be self-sustaining) are clearly addressed, although some readers may require further explanation. Each topic begins with a concise overview that helps encourage students to embark on their reading, and labeled illustrations keep their interest and attention. One of 12

books on various subjects forming this *Insiders* series, *Oceans* uses three-dimensional model imagery to display a “cross-section” of an underwater lab. A reference section, glossary, and index are all included, adding to the extensive study that can be done using this book.

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The history of marine biology probably began with ocean voyages by the Phoenicians, although Aristotle first recorded descriptions of a variety of species, among them mollusks and crustaceans. Later came Captain James Cook, who logged descriptions of numerous plants and animals during his voyages. Of course, Charles Darwin collected and studied marine organisms on the *HMS Beagle* and sent them to the British Museum for cataloging, and Sir Charles Thomson, on the *HMS Challenger*, plotted ocean currents and temperatures while collecting and analyzing thousands of marine specimens. Now it is your child's or student's turn. *Secrets of the Deep: Marine Biologists* (ages 9 to 12) takes a conceptual approach to learning about the ocean. Author Mike Unwin uses a question-and-answer format in his content-rich book, with each answer proving to be specific and readily comprehended. The reader instantly becomes involved. Beginning with the history of marine biology, Unwin lists pioneers in the field, moves on to describe the working environments of marine biologists, then explains why this area of study is so vital to our existence. Young people need to be made aware of the threat to this ecosystem, which affects climate change and global warming. That is why Unwin emphasizes, throughout the book, the factors threatening the survival of oceans. A glossary, index, suggested

further readings, and Web sites are included. The illustrations and well-defined topics make this book appealing, and it conveys a serious message.

### Lessons for learning

From the beginning of civilization, oceans have produced food, transportation, medicine, recreation, and an aura of mystery. Our quest for adventure, knowledge, and riches has led to exploration, and technology has allowed our explorations to deepen, literally, and expand exponentially, resulting in an explosion of information and a surge in careers in marine biology and related fields. Yet we face unlimited challenges in this ecosystem, and, like the early explorers, we are in awe of the mysteries that lie below. It is still a vast frontier with many unknowns, and the mystery makes for books that are tantalizing while also being highly educational for children.

With all of our technology and exploration, we have discovered only a minuscule portion of what the oceans offer. The future of younger generations depends on what we know and what we have yet to learn of the dynamics of this ecosystem. With the availability of books for every reading level that are accurate and enticing, children will be both informed and enthralled as they learn the oceans' secrets. If we introduce the ocean world to children at an early age, perhaps we can teach them to appreciate this vital natural treasure; if we introduce our older children to its complexities and its threats, perhaps they will strive to protect it and learn to adapt their own life styles to ensure its survival.

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GROWING UP GREEN

**A Clean Sky: The Global Warming Story.** Robyn C. Friend and Judith Love Cohen. Cascade Pass, Marina del Rey, CA, 2007. 48 pp., illus. \$13.95 (ISBN 9781880599822 cloth).

**The Down-to-Earth Guide to Global Warming.** Laurie David and Cambria Gordon. Scholastic, New York, 2007. 128 pp., illus. \$15.99 (ISBN 9780439024945 paper).

**The Forever Forest: Kids Save a Tropical Treasure.** Kristin Joy Pratt-Serafini and Rachel Crandell. Dawn Publications, Nevada City, CA, 2008. 32 pp., illus. \$16.95 (ISBN 9781584691013 cloth).

**How We Know What We Know about Our Changing Climate: Scientists and Kids Explore Global Warming.** Lynne Cherry and Gary Braasch. Dawn Publications, Nevada City, CA, 2008. 66 pp., illus. \$17.95 (ISBN 9781584691037 cloth).

**One Well: The Story of Water on Earth.** Rochelle Strauss. Kids Can Press, Tonawanda, NY, 2007. 32 pp., illus. \$17.95 (ISBN 9781553379546 cloth).

**The Sky's Not Falling! Why It's OK to Chill about Global Warming.** Holly Fretwell. World Ahead Publishing, Los Angeles, 2007. 128 pp., illus. \$10.99 (ISBN 9780976726944 paper).

**Tracking Trash: Flotsam, Jetsam, and the Science of Ocean Motion.** Loree Griffin Burns. Houghton Mifflin, Boston, 2007. 64 pp., illus. \$18.00 (ISBN 9780618581313 cloth).

**E**nvironmental conservation and global warming are two of the hottest topics in science today, and among the hottest resources for children are the following new titles, which target various age groups but have a common goal of developing environmental consciousness in our kids. These books range from providing a basic understanding of environmental issues to showcasing a specific aspect of our environment that needs focused consideration. The books are meant to stir awareness by using the full gamut of motivational techniques, from soft cliché to hard statistic. Their goal is to fuel motivation, some by suggesting tried and true conservation practices, and others by leaning more heavily on scientific evidence and the evaluation of it. And with one exception, they serve as seeds for planting the idea of growing up “green.”

**Water conservation**

The idea of water as a valuable resource and the related issues of water access, pollution, and depletion are thoughtfully discussed in *One Well: The Story of Water on Earth* (ages 9 to 14). Author Rochelle Strauss, an environmental education consultant based in Toronto, focuses the reader on the importance of water conservation by using the analogy of one global well. Renowned artist

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Rosemary Woods illustrates in rich detail the concept of water as the strand of life that connects everything on Earth. The book is filled with facts and percentages, but the statistics are paired with easy-to-understand descriptions of tangible objects that readers can wrap their heads around. Toward the end of the book are notes to parents and teachers; this is a well-written section that provides helpful ideas, not strident ultimatums, for water conservation. Once children learn about the multiple roles of water in sustaining life, they will be more inclined to view this resource as worthy of protection. Furthermore, once they are imbued with a global sense of community, they may be more inclined to view themselves as having their own responsible roles.

**Ocean pollution**

The ultimate reservoir of Earth's water is the ocean, and ocean pollution is the

cornerstone of *Tracking Trash: Flotsam, Jetsam, and the Science of Ocean Motion* (ages 10 to 14). The collaborative efforts of three scientists to “track trash” through their understanding of wave dynamics, ecological interactions, and biodegradation make the book part data analysis and part detective story. Readers gain insight into climate patterns and the variability of ocean currents, which can lead to better pollution prevention techniques and easier cleanup efforts.

First-time author Loree Griffin Burns also discusses an important aspect of ocean pollution: plastics. Her description of the ubiquitous contamination of ocean water with plastic materials, and the resulting threat to marine life, constitutes a valuable lesson in responsible management of trash. Through the use of scientific supporting evidence, the book further illustrates how damaging the use of plastics can be to the environment. Burns traces the effects of polluted ocean waters and shows how these ultimately lead to changes in our climate and to serious consequences for marine biodiversity. The glossary is helpful since several technical terms are used, and a list of other books and Web resources is also included at the end of the book.

### Rainforests and species protection

The concept of conservation is often demonstrated through efforts that begin locally, but children may also be inspired to participate in conservation efforts by reading about an exotic place in Costa Rica called the Children's Eternal Rainforest. This 54,000-acre reserve is the backdrop to the story of *The Forever Forest: Kids Save a Tropical Treasure* (ages 5 to 11). Well known children's author Kristin Joy Pratt-Serafini collaborated with author and rainforest conservationist Rachel Crandell to highlight the significance of the rainforest ecosystem and to send an effective message that the determined actions of children all over the world can be relevant to even large-scale preservation projects. The story is well crafted, full of information, and beautifully enhanced by illustrations. Readers learn that the rainforest provides the habitat for numerous species that face extinction as their food webs are disrupted and forest area is reduced by logging and other intrusive human activities. Species protection through reforestation is paramount, and by explaining the importance of these unique tropical forest dwellers in their habitat, the authors are promoting environmental awareness at a young age, which Pratt-Serafini states is "the key to preserving our world."

Large-scale conservation efforts, such as protecting an ecosystem as wide as the ocean or as complex as the rainforest, are under way throughout the world. Educational outreach programs for children are excellent ways to emphasize the important work that volunteers do and to develop children's commitment to protect natural habitats.

### Global warming

Growing environmental concern has recently spiked as a result of our gradual understanding and acknowledgment of global warming. The term itself has become part of the lexicon in both scientific and political arenas. Major socioeconomic decisions affecting not just the United States but the world have already been made, and will increasingly be made, on the basis of judgments about global warming. The topic

is rife with controversy. Nonetheless, an introduction to global warming for children can take a direct and scientific approach. *A Clean Sky: The Global Warming Story* (ages 9 to 12) does just that. It is an appealing 48-page primer on global warming that young readers will enjoy. The book provides an objective understanding of a complex issue without adopting political overtones. Robyn C. Friend and Judith Love Cohen

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*Although the issues of global warming and conservation may always be subject to interpretation and political bias, these topics in children's literature should be presented as objectively as any piece of scientific information.*

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(an aerospace engineer) are accomplished writers of children's books on a variety of empowering subjects. Their approach to global warming is to discuss it from a can-do perspective: first explain the nature of the problem—how does global warming take place over time?—and then offer some possible solutions to fix it. For example, the term "greenhouse gases" is adequately defined along with the need to curb emissions, then terminology such as "carbon capture" and "geological storage" is introduced as alternative methods for reducing greenhouse gases. The result is a book that is both rational and engaging—optimism served objectively.

### Documented evidence of climate change

Another approach to understanding global warming is to learn about the work being done by an international selection of scientists. Evidence-based knowledge of global climate change is the focus of the book *How We Know What We Know about Our Changing Climate: Scientists and Kids Explore Global Warming* (ages 10 to 14). Studies by more than 40 biologists, as well as student researchers, are documented in this collection of evidence that climate change is real, and that plants and animals are reacting to it. Through clear descriptions of actual scientific

studies, a young reader absorbs clues that are symptoms of global warming—rainforest deforestation, rising sea levels, and changing carbon dioxide levels, to name a few. Lynne Cherry, an accomplished writer of environmental books, and photojournalist Gary Braasch teamed up to write this book, which not only presents a convincing argument, although its advocacy is subtle, but also illustrates the collaborative spirit of scientific research that is required to further our understanding of the long-ranging effects of global warming.

Science, after all, is about asking questions, exploring problems, and searching for adequate answers that cannot always be found in a classroom or textbook. This book encourages scientific curiosity and takes a multidisciplinary approach to learning about our environment. Additional resources are plentiful. Instead of waving the banner of environmental consciousness, *How We Know* demonstrates ways to take active roles in the community to solve a problem that affects all of us.

### Activism

In comparison, *The Down-to-Earth Guide to Global Warming* (ages 9 to 12) highlights the importance of environmental awareness and describes ways for young readers to become engaged in conservation efforts. The premise is that peer-reviewed studies have already identified solutions to global warming; therefore, the task at hand is to become an environmental activist to learn how to combat this very serious problem. The book can be somewhat misleading in its use of quotes from celebrity role models. Although it is important to provide our children with incentives for becoming concerned about environmental issues, this book is less a guide than it is a call-to-action. Coauthors Laurie David and Cambria Gordon are environmental activists (and David is also the producer of *An Inconvenient Truth*, among other documentaries). Parents may well want their children to become similarly engaged in environmental activism, but this book blurs the distinction between becoming better informed and becoming an advocate.

### Media bias

While most scientists and environmental activists argue that global warming is taking place at an accelerating pace, a few others claim that the warming trend observed over the past decades is part of a cycle between cooling and warming periods. From this perspective, another issue emerges: media bias. *The Sky's Not Falling! Why It's OK to Chill about Global Warming* (ages 9 to 14) is offered as an alternative "to the overwhelming number of liberal kids' books on the market," according to the press release from the publisher. Holly Fretwell, a faculty member at Montana State University, centered her book around the thesis that media concern with climate change is exaggerated. Fretwell states that "without greenhouse gases the earth would be a very cold place to live." This is true but seems misleading, given that the concern arises because concentrations of such gases are rapidly increasing. Her arguments are not very convincing when

she claims that warmer temperatures could mean "better food growth per acre." No references are cited with this claim. Fretwell also considers biofuels to be an unrealistic option as energy alternatives. They may be too costly to taxpayers since "ethanol is not as efficient at producing energy as fossil fuels" and "the costs to society may be greater than the benefits." Fretwell's "solution" is economic growth (perhaps at the expense of more fossil fuels), and she encourages us not to fall under the restrictions of the Kyoto Protocol. Clearly, the child is not the target audience at this point.

### Lessons for learning

Environmental issues will continue to hold center stage in our scientific, socioeconomic, and political milieu. If we want our future citizens to make well-informed decisions about issues related to the environment, then we need to ensure that scientifically accurate, non-biased sources of information are avail-

able to them. Although the issues of global warming and conservation may always be subject to interpretation and political bias, these topics in children's literature should be presented as objectively as any piece of scientific information. Given the vulnerability of young readers as consumers of information (scientific and otherwise), children's books about environmental awareness should promote a clear understanding of these issues, thereby offering our next generation the opportunity not only to learn about science but also to apply scientific information to real-life problems.

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## EVOLUTION AND ADAPTATION FOR YOUNG SCIENTISTS

**Adaptation.** Alvin Silverstein, Virginia Silverstein, and Laura Silverstein Nunn. Lerner (Twenty-First Century Books), Minneapolis, MN, 2007. 112 pp., illus. \$31.93 (ISBN 9780822534341 cloth).

**Finding Home.** Sandra Markle. Charlesbridge, Watertown, MA, 2008. 32 pp., illus. \$15.95 (ISBN 9781580891226 cloth).

**Great Extinctions of the Past.** Randi Mehling. Chelsea House, New York, 2007. 72 pp., illus. \$30.00 (ISBN 9780791090497 cloth).

**Hello, Bumblebee Bat.** Darrin Lunde. Charlesbridge, Watertown, MA, 2007. 32 pp., illus. \$15.95 (ISBN 9781570913747 cloth).

**Hide and Seek: Nature's Best Vanishing Acts.** Andrea Helman. Walker and Company, New York, 2008. 40 pp., illus. \$16.95 (ISBN 9780802796905 cloth).

**Please Don't Wake the Animals: A Book about Sleep.** Mary Batten. Peachtree, Atlanta, 2008. 32 pp., illus. \$16.95 (ISBN 9781561453931 cloth).

**Stones and Bones.** Char Matejovsky. Polebridge Press, Santa Rosa, CA, 2007. 32 pp., illus. \$19.00 (ISBN 9781598150049 cloth).

**Super Crocs and Monster Wings: Modern Animals' Ancient Past.** Claire Eamer. Annick Press, Toronto, Ontario, 2008. 96 pp., illus. \$19.95 (ISBN 9781554511303 cloth).

**Twilight Hunt.** Narelle Oliver. Star Bright Books, Long Island City, NY, 2007. 40 pp., illus. \$16.95 (ISBN 9781595721075 cloth).

**When Rain Falls.** Melissa Stewart. Peachtree, Atlanta, 2008. 32 pp., illus. \$16.95 (ISBN 9781561454389 cloth).

**Where in the Wild? Camouflaged Creatures Concealed...and Revealed.** David M. Schwartz and Yael Schy. Tricycle Press, Berkeley, 2007. 44 pp., illus. \$15.95 (ISBN 9781582462073 cloth).

From the scientist's standpoint, evolution and adaptation are the forces underlying all of biology. Understanding these basic processes is a critical part of the development of a young scientist's mind. Animal and plant physical and behavioral adaptation, ecological interactions, and evolutionary change are fascinating science topics that deserve exploration and demand explanation. To encourage the interests of young readers—and to get our earliest readers started—a selection of excellent titles are offered here, which focus both on process (e.g., evolution, geological change) and on product (i.e., physical and behavioral adaptations).

For the very youngest readers and listeners, three different picture books combine a focus on adaptation and behavior with the gentle cadence of a bedtime story. *When Rain Falls* (ages 3 to 6) opens with two children running from a rainstorm into their house, then turning to peer out the window and

wonder what happens to animals as the rain comes down. Author Melissa Stewart presents animal behavior from four different habitats: field, forest, wetlands, and desert. Animals include not just those foremost in a child's mind of what "wildlife" may be (squirrels, deer, chickadees, perhaps foxes) but also examples that may appear less noticeable



(beetles, spiders, ants, and bees, among others). The easy text, simple concepts, and focus on the diversity of the natural world all capture the attention of young

readers and listeners. Lovely watercolors by Constance Bergum illustrate the book. (Her picture of whirligig beetles circling on the surface of a green pond as the drops come down makes you feel as if you are standing at the pond's edge in the storm.)

The book's sole focus on the reaction of animals to the rainstorm, although an engaging premise, becomes the book's single flaw: it lacks any discussion of the role of rain in an ecosystem, the importance of water conditions in defining types of biomes, and the interdependence of water and plants within the four chosen habitats. (I waited in vain for a page on the famous desert bloom following a rainstorm.)

For the slightly older listener or reader, the book *Finding Home* (ages 4 to 7) is a beautifully illustrated tale of a koala bear and her baby, driven from their forest home by a brush fire. As they hunt for new eucalyptus trees for food and shelter, various dangers created

by humans threaten them at each turn, yet it is the care of humans that enables the koala and her joey to find their new home. Skillful watercolor illustrations by Alan Marks place the reader alongside the koalas as they flee the fire and shy away from barking dogs and glaring flashlights. The concept of animal adaptation to a particular environment is certainly emphasized by the mother koala's desperate search for a suitable home, checking the air constantly for the scent of her much-needed eucalyptus trees. Reading this book would provide an excellent opportunity for discussion of both the negative impacts humans have on the environment and the positive steps that individuals can take to protect it—even such a gentle, small action as standing back quietly to allow a koala and her baby to cross a road to safety.

The night world and sleep are the focus of *Hello, Bumblebee Bat* (ages 3 to 6), a perfect bedtime book for a very young reader. Written in a soothing question-and-answer chant, mammalogist Darrin Lunde describes the habits and adaptations of the smallest variety of bat. The book has a quiet, contemplative feel, with nighttime illustrations of bats as they soar over grasses and roost in caves. The charm of these watercolor and ink drawings by scientific illustrator Patricia J. Wynne will appeal to readers of any age. The book offers an excellent introduction to the natural history of this animal, including the threat of habitat destruction by humans.

Lunde and Wynne have deliberately kept the text and illustrations simple for their audience, perhaps at times to the detriment of clarity. For example, the page describing the bat's measurements cries out for the "actual size," and the illustration depicting echolocation lacks significant explanation. Overall, however, *Hello, Bumblebee Bat* offers a wondrous first glimpse at the concept of wild animal behavior and specific adaptation.

Another bedtime book for a broader age range is *Please Don't Wake the Animals: A Book about Sleep* (ages 3 to 8), written by Mary Batten and illustrated by Higgins Bond. Depending on the age

of the reader, the child can choose between the larger text accompanying each illustration or the short, informative paragraphs found on each page. The sleep habits of a multitude of animals are discussed, ranging from well-known ones (horses sleep very little, and do so standing up; bats sleep a lot, and do so upside-down) to those less familiar and quite amazing (swifts sleep while flying as high as 10,000 feet;



parrotfish build mucus cocoons in which to sleep; and the impressively large giant weta, a six-inch cricket-like insect from the mountains of New Zealand, freezes solid each night, thawing each morning to resume its normal activities). Beautiful and detailed illustrations fill each two-page spread. This handsome and informative book would be a valued addition, as well as a useful nonfiction resource, to any child's library.

The following three books take advantage of the parallels between a child's fondness for hide-and-peek games and the very real necessity for concealment and camouflage in the natural world. *Hide and Seek: Nature's Best Vanishing Acts* (ages 4 to 7), by Andrea Helman, is the most straightforward of these. Photographs are arranged by habitat ranging from grassland to ocean to the Arctic. The bottom of each page discusses the animal in its environment, and additional information about each animal can be found in the back of the book. Snakes, sea otters, owl butterflies, tigers, sloths, and praying mantids are a few of the animals shown. These beautiful photographs of animals in their habitats are captured by Gavriel Jecan, whose images appear regularly in publications like

*National Geographic*, *Outside*, and *International Wildlife*.

Two other hide-and-peek books capitalize on the game of trying to find what is well concealed. The award-winning book *Where in the Wild? Camouflaged Creatures Concealed...and Revealed* (ages 4 to 8) takes this theme to a new dimension. An "eye-tricking" photograph by Dwight Kuhn showcases each scene of a camouflaged animal, opposite an "ear-tickling" poem by David M. Schwartz and Yael Schy. The pictures then fold out to reveal the location of the hidden animal and information on each one (a wolf, a crab spider, deer fawns, pepper moths, and plover eggs, among others). Well-written factual comments keenly identify the characteristics of each animal and the relation to its habitat, emphasizing the importance of camouflage to survival in the natural world.

Also beautifully presented is Narelle Oliver's *Twilight Hunt* (ages 4 to 8). Readers follow a screech owl on her night hunt as skillful linocut illustrations depict hidden surprises in each picture. Insects, frogs, moths, and lizards are cleverly rendered, as is the owl herself, flying off one page and onto the next to hide with the other creatures in the ecosystem. Young readers will love the treasure hunt as they learn the importance of camouflage to surviving in the wild. They can also begin to get the idea of searching carefully, perhaps taking this developing skill of observation outside. Index pages provide keys to finding all the hidden animals and, for older readers, information on camouflage, disguise, and animal behavior. This is a picture book to be enjoyed repeatedly and at many levels—it is excellent science in tandem with excellent artistic presentation.

*Super Crocs and Monster Wings: Modern Animals' Ancient Past* (ages 9 to 12) and *Great Extinctions of the Past* (ages 10 to 14) are two highly informative, enjoyable books on evolution and evolutionary change for upper-elementary and middle-school readers. *Great Extinctions* is part of an eight-volume set produced with assistance from *Scientific American*, the oldest con-

tinuously published magazine in the United States (the entire set is written by authors affiliated with the magazine or approved by its editors). This book by Randi Mehling gives a clear presentation of fossils, extinctions (including a careful and detailed explanation of the evidence surrounding the Chixalub crater), survival of mass extinction, and Earth's current extinction crisis. The sophisticated yet readable text is accompanied by a glossary, a bibliography, a list of references for further exploration, and an index. *Great Extinctions* would be a useful addition to any middle-school library and interesting to any student learning about geologic history.

*Super Crocs*, by Claire Eamer, is a less conventional but equally good presentation of both adaptation and the scientific process. The book is so much fun that readers may not realize how much they are learning. Both ancient and modern creatures are depicted, as well as the connections between them. ("These animals didn't vanish altogether. Their distant relatives live among us today.") Jazzy layouts with varied fonts, colors, and images highlight several ancient animals (e.g., giant dragonflies, giant sloths, and giant armadillos, as well as the book's namesake) together with their modern relatives. Geological history, the process of fossilization, and many fascinating details about these individual creatures (including the amazing Devil's Corkscrew) are easily digested, and if a child wants more, the book suggests further reading. An index and a bibliography are also included. A particular strength of *Super Crocs* is its presentation of how paleontologists work: carefully observing modern animal anatomy and behavior, thoroughly comparing this with fossil evidence, and thoughtfully coming to conclusions.

*Adaptation* (ages 11 to 14), part of a 10-book series called Science Concepts, is an excellent, straightforward text that presents adaptations to a variety of conditions: extreme habitat, seasonal

change, predator-prey interactions, and nocturnal life. The solid writing and skillful presentation allow readers to absorb numerous and fascinating aspects of the topic. It is also pleasing to see plant adaptations discussed as well as the more "exciting" animal adaptations. This book by the Silversteins is another valuable reference for a child's science book collection.

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Children's books about evolution would not be complete without a title about dinosaurs. *Stones and Bones* (ages 4 to 8), by Char Matejovsky, is appealing to both the eyes and the ears of younger readers. Its text is geological history told in rhyme, and each page visually presents significant events in geologic history and evolution as items in Darwin's library. The reader finds a list of dinosaur names, a time line of evolution, and the scientific classification of man spelled out on lettered building blocks. These illustrations are charming, but without further information from a parent or a teacher, they can become an unexplained display of facts. To add to the appeal, the book is accompanied by a compact disc of the "Stones and Bones" song, performed by the Santa Rosa Children's Chorus. It is a gentle rendition of the book's text.

Evolution, adaptation, and the history of Earth are well represented in this collection of children books. There is much to choose from; all of these books are cleverly executed, reader-friendly, and beautiful in their visual presentations and their depth of focus. A common theme runs through these titles, one of encouraging children, as young scientists, to practice careful observation and to thoughtfully consider organisms both living and dead, each being an essential part of the evolutionary journey of the natural world.

I cannot end without mentioning 2003's *The Tree of Life* by Peter Sis, a beautifully illustrated biography of Charles Darwin that discusses his public life, his private life, and the development of his scientific ideas. This book would be a wonderful way for any child to start learning about this great figure of biology. (I use it as a reference with my 11th and 12th grade students in advanced placement biology.)



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**MICROBIOLOGY FOR CHILDREN: WHAT ARE THEY LEARNING?**

**Cells.** Darlene R. Stille and Carol Ryback. Gareth Stevens, Strongsville, OH, 2008. 48 pp., illus. \$27.00 (ISBN 9780836884371 cloth).

**Germ Stories.** Arthur Kornberg. University Science Books, Herndon, VA, 2008. 84 pp., illus. \$22.50 (ISBN 9781891389511 cloth).

**Microquests: Mighty Animal Cells, Powerful Plant Cells, Daring Cell Defenders, Amazing DNA, and Ultra-Organized Cell Systems.** Rebecca L. Johnson. Millbrook Press, Minneapolis, MN, 2008. 48 pp. per book, illus. \$29.27 each (ISBN 9780822571360 cloth).

**Sneeze.** Alexandra Siy. Charlesbridge, Watertown, MA, 2007. 45 pp., illus. \$16.95 (ISBN 9781570916533 cloth).

**A World of Microorganisms.** Robert Snedden. Heinemann-Raintree, Chicago, 2007. 48 pp., illus. \$22.00 (ISBN 9781403495624 cloth).

Children are captivated by animals—both the creepy, crawly ones and the furry, cuddly ones. They often have knowledge of plants from collecting autumn leaves or from growing garden tomatoes. But how much experience do children have with the microbial world? And how well are children’s science authors addressing this knowledge gap by stimulating a child’s curiosity about the invisible living world? The following four books and one book series relate to microbiology. All but one present their material in an engaging and highly readable fashion. Most do an excellent job of educating—delivering information in a clear, accurate, and stimulating way.

I was most impressed with *A World of Microorganisms* (ages 11 to 13), by Robert Snedden. It is an excellent introduction to and comprehensive survey of the microbial world. The book contains information on cell structure, viruses, prions, bacteria, archaea, protists, and fungi. Even though no one category of microbe is treated in great depth, the detail provided for each type of microbe is impressive. For example, in the virus section Snedden covers virus anatomy, the requirement of a host cell for replication, dormancy, coevolution of virus and host, and retroviruses. More pages of the book are devoted to bacteria than to any other type of microbe. Besides basic information on bacteria, Snedden also covers the endosymbiotic theory, quorum sensing, transformation, transduction, conjugation, plasmids, and different types of bacterial metabolism. These are among the ad-

vanced topics in bacteriology, but Snedden explains them simply and succinctly and gives the reader a concise and contemporary introduction to bacteria. Additionally he includes information on the Archaea, extremophiles, nanobes, and the possibility of microbial life on Mars. I was quite pleased to see these often-neglected microbes included in his book.

*A World of Microorganisms*, from the *Microlife* series (second edition), is dense with information but still very readable. The pages include numerous color photographs and stunning electron micrographs of microbes. Although overall the book is very timely, I was surprised to see the terms “archaeobacteria” and “eubacteria” still being used. Both are outdated, and microbiologists use “Archaea” and “Bacteria” instead. Snedden also uses units of microinches rather than metric units. Other than these minor drawbacks, the book is an excellent children’s microbiology resource. If a young person has a keen interest in microbiology and would like a solid introduction to it, this book is the place to start. It is a minitextbook of microbiology for kids.

Another title that presents itself as a minitextbook is *Cells* (ages 9 to 12), by Darlene R. Stille and Carol Ryback. This book is a dense and disappointing introduction to cells. It includes five chapters: “What Is a Cell,” “Animal Cells,” “Plant Cells,” “How Cells Reproduce,” and “Cells as Factories.” Unfortunately, I found it to be short on depth and long on breadth, which led to an unfocused

and choppy writing style. The book is detailed and text heavy—yet 19 of its 40 pages of information have no illustrations or photographs. Most children would find this book to be very dry and unengaging.

Unlike *A World of Microorganisms*, which covers the full range of basic microbiology beautifully, *Cells* gives little attention to single-cell organisms such as bacteria, protists, and yeast. The only mention of bacteria is in two paragraphs of the first chapter. My belief is that a book about cells should devote an entire chapter to single-cell organisms. In most of the chapter on animal cells, Stille and Ryback describe different cell types such as skin and muscle, yet little attention is given to the overall basic, common anatomy of animal cells. This highlights a consistent problem throughout the book: more attention is given to advanced details than to basic biological principles.

Additionally, new terms are periodically introduced without a description of the concepts related to those terms. For example: “Biologists once thought the amoeba was an animal. We now classify amoebas as organisms called protozoans. Some amoebas can cause serious diseases in humans.” The term “protozoan” is never mentioned anywhere else in the book, not even in the glossary. And: “Bacteria can also exchange genetic information during a process called conjugation. It does not involve sex cells.” There is no other mention of “conjugation” or an explanation of what it is, nor is it defined in the glossary.

The Microquests series (ages 8 to 11), by Rebecca L. Johnson, includes five books that examine animal cells, plant cells, the immune system, DNA, and human-body systems. Although the series is termed “microquests,” most subjects studied by microbiologists (e.g., bacteria, viruses) are not included, except for a cursory introduction to germs in the immune system book. The series is nonetheless informative and extremely readable. Johnson does an excellent job of explaining the biology covered in her books. Her writing style is succinct, clear, and enthusiastic, and each book is filled with colorful diagrams, drawings, and photographs to reinforce the material. The series should be readily accessible and appealing for most children who are interested in cells.

The structure and organization of *Mighty Animal Cells* and *Powerful Plant Cells* are very similar. Both cover cell organelles, cell division, different cell types, and meiosis. Stem cells and their unique properties are included in the former title; photosynthesis and the differences between plant and animal cells are covered in the latter. Both volumes serve to stimulate a young mind as they explain the basics.

*Daring Cell Defenders* is a terrific introduction to the immune system and how it works. Besides describing innate immunity and the different cell types involved in the immune system, Johnson is superb in conveying the timing of a response and the order in which different immune cells respond to microbial invaders. She explains the body’s immune response to an infected puncture wound of the skin, introducing neutrophils, macrophages, helper T-cells, killer T-cells, B-cells, and memory cells. After reading this volume, I was ready to assign it to my college immunology class because it captures the essence of the immune response so succinctly. Anyone looking for a clear, readable introduction to the immune system would be wise to consult this book.

Continuing in her entertaining and educational fashion, Johnson completes the series with *Amazing DNA* and *Ultra-Organized Cell Systems*. Both are excellent, albeit not extremely relevant to

microbiology. *Amazing DNA* includes information on DNA structure, replication, transcription, translation, gene expression, mutation, and alleles; *Ultra-Organized Cell Systems* describes different types of human cells, tissues, and body systems.

The books and series above all aim to give readers a comprehensive picture of cells in microbiology. These next two titles are just as readable and educational, but they are more specialized and even more entertaining. *Sneeze* (ages 7 to 10), written by Alexandra Siy and illustrated by her former collaborator, Dennis Kunkel, is a delightful book that first examines items that trigger sneezes and then explains the neurological and physiological mechanisms of the body that produce a sneeze. This book is a fascinating read with lots of visual appeal. Kunkel cleverly captures the why’s and how’s of sneezing, as Siy beautifully conveys the biology behind the behavior.

The first half of *Sneeze* focuses on nine different irritants that cause sneezing, such as dust and pollen. Two facing pages are devoted to each—the verso page contains a black-and-white picture of a child in a situation that may trigger a sneeze (pillow fighting, looking under a couch, dusting, etc.), and a detailed caption describes the irritant or allergen causing the response; a beautifully colored electron micrograph of each irritant, including its magnification size, is on the opposite page. Taken together, the effect is both educational and visually stunning.

The second half of the book details the neurological response that leads to a sneeze. The biology of neurons and the way in which they transmit signals are explained well, and the respiratory system is briefly covered. Again, explanations are enhanced by beautiful electron micrographs of neurons and alveoli. The book includes additional information on sneezing and electron microscopy, and also offers relevant Web sites and a glossary. This visually stimulating volume with its interesting subject matter would appeal to most children.

Finally, the poetic gem titled *Germ Stories* (ages 4 to 12) is Nobel prize-

winner Arthur Kornberg’s last book, and it is a fanciful delight. Written “to all, young and old, who adore ‘the little beasties,’” it suits microbiologists of any age. Kornberg used to entertain his three sons at bedtime with educational rhyming stories about germs. When the boys grew up, they encouraged him to continue the tradition with his eight grandchildren. That is what spurred Kornberg to pen these germ stories.

The book contains twelve stories—one an introductory “germ parade,” seven about bacteria, two about viruses, and two about fungi. All are educational rhyming tales, and most describe a microbe and the disease it causes. The rhymes are supplemented with both colorful artistic drawings of the microbes as well as photographs of macroscopic microbial growth, or colored micrographs of individual microbes. The strength of the stories is that they are simultaneously fun to read and educational. Any child (or adult) fascinated by germs will enjoy reading this wonderful book.

In this assortment of children’s books on microbiology, clearly the vantage point lies at the cellular level. It is unfortunate, however, that these authors describe plant and animal cells almost exclusively. These books introduce children to nuclei, mitochondria, and chloroplasts, but what about the bacteria, fungi, protists, and viruses of the world? Are they not just as deserving of attention? And when microbes are the focus, as in the specialized books *Sneeze* and *Germ Stories*, they are portrayed only as causes of disease. Any future microbiologist should learn that the vast majority of microbes do *not* cause disease. A book describing the amazing properties of microbes would be a spectacular discovery for a child—I am still waiting to read one.

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**A SENSE OF THE BEAUTIFUL: LIFE CYCLES AND INSECTS**

**Bugs Up Close.** Diane Swanson. Kids Can Press, Tonawanda, NY, 2007. 40 pp., illus. \$16.95 (ISBN 9781554531387 cloth).

**Face to Face with Caterpillars.** Darlyne A. Murawski. National Geographic Children's Books, Washington, DC, 2007. 32 pp., illus. \$16.95 (ISBN 9781426300523 cloth).

**The Insect World Series.** Sandra Markle. Lerner, 2007. 48 pp., illus. \$27.93 each (ISBN 9780822572947 cloth).

**It's A Butterfly's Life.** Irene Kelly. Holiday House, New York, 2007. 32 pp., illus. \$16.95 (ISBN 9780823418602 cloth).

**What Lives Under the Carpet?** John Woodward. Gareth Stevens, Strongsville, OH, 2007. 48 pp., illus. \$27.00 (ISBN 9780836878622 cloth).

I still remember vividly my preschool and kindergarten students' reactions almost 20 years ago when I read aloud *Ladybugs and Other Insects* from the Scholastic First Discovery series (Jeunesse and Peyrols 1989). The book, still in print, has transparent overlays that reveal with each page turn the fascinating life cycle of ladybugs. The pages are filled with abundant white space, drawing the young reader to the details of the insects. This was the first science book that had my students absolutely mesmerized. They often wanted to hear works of fiction read aloud again, but this was the first time they begged to be read a science book over and over again. And even though they couldn't yet read many of the words by themselves, they poured over the illustrations during free reading time.

We looked for and carefully netted insects on our walks around the schoolyard and through the adjoining woods. Our classroom filled with terrariums fashioned into temporary insect abodes and observatories. We cowrote observations in an oversized science notebook. We wondered together about all sorts of entomological questions that, in turn, led us to read more books about insects. This single book fueled an explosive interest in insects; it tapped into the children's sense of wonder about the natural world in a way that had a profound impact on our classroom. Good books have amazing potential for connecting with children.

For most scientists and educators, Rachel Carson's famous words about nurturing a child's thirst for learning ring true and familiar: "If a child is to

keep alive his inborn sense of wonder..., he needs the companionship of at least one adult who can share it, rediscovering with him the joy, excitement and mystery of the world we live in" (Carson 1965).

What is often overlooked, however, is that Carson wasn't speaking merely about helping children gain scientific understandings about biology. Carson goes on to say:

It is not half so important to *know* as to *feel*. If facts are the seeds that later produce knowledge and wisdom, then the emotions and the impressions of the senses are the fertile soil in which the seeds must grow. The years of early childhood are the time to prepare the soil. Once the emotions have been aroused—a sense of the beautiful, the excitement of the new and the unknown, a feeling of sympathy, pity, admiration or love—then we wish for knowledge about the object of our emotional response. Once found, it has lasting meaning. (p. 42)

While scientific accuracy is critical, other things matter when evaluating children's science trade books. It was not simply a factually accurate book that inspired my students; it was a book that aroused emotion by incorporating beautiful visual elements into an innovative graphic design—all contributing to a child's scientific understanding. With the limited amount of time for reading these days, it is imperative that the books we make available to our children have all these qualities.

How do we evaluate "quality"? The National Science Teachers Association

and the Children's Book Council collaborate annually to name the Outstanding Science Trade Books for K–12. The books are evaluated on the basis of three primary criteria: accuracy and readability, quality of format and illustrations, and content reflecting current scientific understanding of the topic. (The Robert F. Sibert Informational Book Award and the Orbis Pictus Award for Outstanding Nonfiction for Children each have separate criteria for evaluating books, but both committees evaluate accuracy, organization, design, and style.)

Awards such as these emphasize the need for high-quality science in non-fiction books for children. As Temple and colleagues (2006) point out in *Children's Books in Children's Hands*: "Even though informational books have a long history, they have often been relegated to second-class status. For much of its history, the genre had the reputation of being boring, best used mainly for report work, and unpleasantly difficult for children to read. In other words, applying the term 'nonfiction' to a book was like adding 'unsweetened' to chocolate—likely as not, synonymous with 'disappointment'" (p. 428).

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the first consideration.*

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Elia T. Ben-Ari (1998) argues in “The Ideals and Realities of Science Books for Children” that children will find science texts more engaging if the authors convey their passion and excitement for the subject, and if the information is conveyed in a way that highlights how things are interrelated and connected. One book that does this beautifully is *Face to Face with Caterpillars*, by Darlyne A. Murawski (ages 9 to 12). Named as an Outstanding Science Trade Book for K–12, it presents the world of caterpillars with multiple layers and connections, moving beyond the traditional approach of showing just the life cycle to also include rich information about a caterpillar’s habitat, diet, defenses, and behaviors. Photographs provide closeups of these tiny creatures in the stunning detail that so fascinates children.

Another book that uses illustrations not simply to support text but to create something more powerful than words alone is *It’s a Butterfly’s Life* (ages 4 to 8), written and illustrated by Irene Kelly. The visual elements, from the delicate drawings and watercolor paintings to the stylized font and notebook layout, immediately draw the reader into the world of the butterfly.

*Bugs Up Close* (ages 7 to 11), by Diane Swanson, also provides outstanding visual images of insects to accompany accurate and engaging text. The photographs by Paul Davidson bring even the smallest insect details into our view. The text provides a helpful discussion of how to distinguish insects from other small creatures; these explanations are too often missing from children’s picture books that deal with entomology. *Bugs Up Close* emphasizes the forms and functions of insect anatomy using imagery to effectively illustrate points from the text.

One book that understands a child’s fascination not just with “pretty” insects but also with those often maligned by society is John Woodward’s *What Lives Under the Carpet?* (ages 8 to 11). The book explores insects and arachnids that can be found around the home. Arranged by location (in the carpet, under the sink, in the basement, etc.), the

book combines a scrapbook layout with greatly enlarged photos, electron microscope images, and text boxes to bring into focus the tiny animals all around us. Youngsters will pour over these images, amazed at the creatures that share their homes—and even their beds.

It is rare to find an entire children’s book devoted to a particular species of insect, but each volume in the Insect World series (ages 7 to 11), by Sandra Markle, does so. Books such as *Termites: Hardworking Insect Families*, *Luna Moths: Masters of Change*, and *Praying Mantises: Hungry Insect Heroes* provide in-depth explorations of the species’ anatomy, behavior, life cycle, and habitat. The eight books in the series are filled with closeup photographs, interesting facts in text boxes, rich glossaries, reference lists, and suggested activities to inspire young entomologists. The text and visual elements of this series weave together beautifully.

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*Carson was right when she argued that an aesthetic and emotional response to nature can ignite a hunger for deeper scientific understanding. Shouldn’t our children’s science books also evoke such responses?*

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As Diane L. Barlow (1991) noted in “Children, Books, and Biology,” trade books often provide a child’s introduction to scientific concepts. Read aloud by a teacher or caregiver, or perused by the child on his or her own, trade books can play an important role in developing scientific understandings and interests. The use of trade books for science education has grown, and quality trade books can be useful tools for learning in and out of the classroom (Bamford and Kristo 2000, Galda and Cullinan 2006). This learning can be facilitated not only by a book’s text but also by its illustrations, design, and graphic elements.

With a wealth of science trade books being published today, it is important to look for more than accuracy. Yes, accuracy must always be the first consideration. If a book is not accurate, it doesn’t

much matter how engaging the writing or visual elements are. However, accuracy is not enough; we need to consider the quality of writing and how all the elements of design motivate a child’s understanding of scientific concepts. How much richer and more exciting the world of science can be when facts are presented in a book that also engages children’s sense of wonder.

Carson was right when she argued that an aesthetic and emotional response to nature can ignite a hunger for deeper scientific understanding. Shouldn’t our children’s science books also evoke such responses?

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