

recovery of snow geese and prairie ducks and the discovery by hawks of a new food source—bird feeders.

This book exemplifies popular science writing at its best. The articles do an excellent job of presenting current scientific research and of conveying the creativity and enthusiasm of the scientists involved. The writing is aimed toward the layperson and is fast-paced and interesting without being condescending or simplistic. An article on the importance of symmetry in mate selection, for example, includes discussions of the theories behind the research, interviews with the leading scientists involved, descriptions of their experiments, and references to the importance of symmetry in human art and culture. This article, like others in the book, also touches on controversy surrounding the issue at hand and presents the views of critics as well as of advocates of the symmetry theory.

This book would be of value to any biology teacher. It is a good way to quickly catch up on some of the most interesting new research on birds. Many of the articles could be used as a basis for class discussions or as a source of new ideas and examples for enriching existing lessons on ecology, evolution, behavior and conservation.

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ANIMAL BEHAVIOR

In Quest of the Sacred Baboon: A Scientist's Journey. By Hans Kummer. 1998. Princeton University Press (Princeton, NJ). 364 pp. Paperback \$19.95.



In this memoir, noted primatologist Hans Kummer provides a personal account of his interactions with Hamadryas baboons, both in captivity and in the wild. He begins the book with a chapter on folklore concerning the baboon, and continues with a summary of the natural history, including ecology, social structure, and geographical range of the hamadryas. Succeeding chapters include a more detailed account of hamadryas society, with observations of Zurich Zoo animals and of baboons in the Ethiopian desert. What distinguishes Kummer's account from others dealing with animal behavior is his emphasis on what his research has meant to him. He writes "the skeleton of our research papers was not enough; I wanted to

give some idea of the effects our discoveries had on the way I experience the world."

The hamadryas have a unique social system described as the "fusion-fission system." For protection against predators, the baboons may associate with each other in groups as large as 100 or more. In contrast, baboons may be found in groups of two to five when feeding areas are far apart and the food available at the site is limited. Kummer distinguishes four levels of hamadryas social organization: the *troop* consisting of 100 or more individuals; the *band* of about 50; the *clan* consisting of approximately 15 individuals; and the *family*, with a male at its head, consisting of five baboons.

Kummer's story is one of discovery. He discovers that he is not alone on this planet. As a result of his studies of the hamadryas, his sense of loneliness has diminished and he feels "at home in the realm of nonhuman life." Project Hamadryas, as Kummer's study was called, began in the 1960s and came to an end in 1977. The political situation in Ethiopia became very unstable, and Kummer was advised to leave Ethiopia by the Swiss ambassador. Kummer did not return to his Red Rock study site. But this book surely was a chance for Kummer to relive those memorable moments among the hamadryas; a chance to bring alive for others his experiences and impressions of the sacred baboon.

In Quest of the Sacred Baboon is written for a popular audience and would be compelling reading for anyone with an interest in animal behavior.

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ENVIRONMENTAL SCIENCE & RELIGION

Green Space, Green Time: The Way of Science. By Connie Barlow. 1997. Copernicus Springer-Verlag (175 Fifth Ave., New York, NY 10010). 329 pp. Hardback \$25.00.



Evolution is a majestic series of events that results from changes in the genetic constitution of populations of organisms leading to biodiversity. The history of life and the cosmos, the parade of organisms in their unique environments, and the triumphant march of humankind are all part of the grand "evolutionary

epic"—a phrase the author borrowed from E.O. Wilson. On this great pageant of life, Connie Barlow developed the theme of her book. In her words, "this book explores new ideas about meaning and value that might improve the human-to-Earth bond. Here lies the mythopoeic and ethical frontier. If we can better our human-to-Earth relations to the point where waters regain their health, eroded hillsides recover, and the terrain is not scavenged for every last burnable and edible, then the human-to-human tensions will all be the fewer."

In Chapter 1, man is accused of "crimes against creation." Using religion to address human values related to these crimes, Carl Sagan in 1990 persuaded 32 prominent scientists to write a manifesto titled, "An Open Letter to the Religious Community." The manifesto was an appeal to the world religious community, "to commit, in word and deed, and as boldly as required, to preserve the environment of the Earth." The appeal was the basis for the coalition that produced opportunities in religious networking and environmental education. The author gives accounts of the enlightening conference on "The Epic of Evolution" held in 1996 by the Institute on Religion in an Age of Science. At this conference, she led a conversation on "the evolutionary epic for a greener future," with a philosopher, two historians of religions, and two scientists. The intense discussions generated by participants from different areas of interest revealed a passion for the health of the Earth.

Chapters 2 through 5 present the author's engaging conversations with noted scientists, naturalists, environmentalists, philosophers, and religious leaders that celebrate the themes of biodiversity, bioregionalism, and the revival of Gaia. She gives vivid accounts of various species like the zebra mussels, the cottonwood, and other stories of organisms that left their imprints in the history of creation. The last chapter of the book revisits the meaning of the evolutionary epic, biodiversity, bioregionalism, and Gaia along with humankind's psyche and commitment to values toward Earth and the cosmos.

Connie Barlow masterfully presents arguments for preserving the health of the Earth through an understanding of the way of science—notably evolutionary biology, conservation biology, ecology and geophysiology. These branches of science allow us "to know and witness the immense and fecund journey of life on Earth. . . and to aug-

ment folk wisdom of ecosystems and to begin to learn the physiology of the whole earth, Gaia." Science, combined with other paths of ecoreligious experience, can be used to nurture reverence for the natural world. Throughout this book, the author expresses her passionate dedication to biodiversity and her belief that the natural world is sacred. She argues that science can help humankind understand the sacred nature of Earth. . . . she leads a movement to connect science and religion. In several sections of the book, the conversations about religion and the evolutionary epic became lengthy and involved. Despite occasional digressions, she redirects the conversation to the theme.

This book is a great work on understanding evolution, biological diversity, and humankind's role in the stewardship of Earth. Some individuals who perceive that the dichotomy between science and religion exists may have problems with this book. Otherwise, the book provides entertaining reading for naturalists, environmentalists, and graduate students in biology and natural resource management. The book can also be a precious gift for a friend who has a passion for life in the natural world.

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YOUNG SCIENCE— Grades 3-6

ENVIRONMENTAL HANDS-ON ACTIVITIES

Schoolyard Ecology. By Barrett and Carolyn Willard. 1998. GEMS (Lawrence Hall of Science, University of California, Berkeley, CA 94720). 116 pp. Paper \$16.00.



Creeping, crawling things fascinate children. There is no better way to capture their interest in science than to first focus it on the small animals living secretive and fascinating lives all around us. It is surprising how much life can be found in the relatively barren confines of a schoolyard. Even a field of asphalt surrounded by a chain link fence will have a few weeds, ants and spiders and this is all you need to carry out the five investigations in this book. The basic goal of these activities is to introduce children in grades three through six to key ideas in ecology. The investigations include exploring and mapping physical features of the study area, locating and observing spiders, sampling animals living on plants, studying ant behavior, and making detailed observations of a small study site.

Children will love these activities. There are certain to be a few students in every group who will be excited about looking for spiders and their enthusiasm will spread as everyone realizes that it's actually fun and that no one is expected to touch the spiders. One of the best outcomes of this investigation is getting children to appreciate a creature that many will initially regard with fear or disgust. Ants are less likely to evoke fear and the students will quickly become involved in a series of interesting activities on ant behavior including experimenting with different types of food. The children will also love using the 'shake box' to collect insects off plants in the Animal Community investigation. This clever tool is made out of a shirt box and a plastic bag. It is much cheaper than an insect net and much less damaging to plants and delicate insects. The insects are easy to view through the bag and can be let go in the same spot afterwards.

An excellent feature of the book is the 'Going Further' section at the end of each investigation. This includes ideas for students or teachers wanting

to extend the investigation. The ant section, for example, suggests an interesting experiment on the use of common household substances such as cinnamon and baking soda as ant deterrents.

The investigations are accompanied by detailed instructions for teachers of grades three through six on how to prepare for, present and supervise each activity. No detail has been left out from what to tell the class when introducing the activity to what kind of questions to ask when it is over. This approach is especially advantageous for teachers with little background in science. There are some excellent suggestions for introducing activities, such as beginning the spider activity with stories and amazing facts about spiders to encourage positive feelings about them. At times, however, the endless lists of instructions verge on being tedious and condescending. Must we be reminded to duplicate a few extra copies of activity sheets "in case they're needed" and not to schedule an activity during gym or lunch? Must we be told in every activity to hand out the clipboards if they were collected at the end of the last activity? Is it necessary to explain the pun in spiderweb sites?

In addition to the activities, this curriculum guide includes a number of resource sections. Particularly helpful is a "Behind the Scenes" section that explains basic ecological concepts, describes how to recognize poisonous spiders and ticks, and lists some interesting spider and ant facts. The illustrated guide to small common animals and the spiderweb identification key are also useful. The least helpful resource is the listing of videos. Only two videos are listed when, in fact, there are a number of fine nature videos now available about spiders and ants.

Overall this is a very thorough presentation of five excellent ecological activities for children. This is the way science should be taught. The investigations encourage children to learn by "doing" and to discover for themselves how organisms interact with each other and their environment. The activities are also invaluable because they foster in children an appreciation and stewardship for other living things. If they can be taught to value spiders and ants, the rest will be easy.

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**Biology: A
Century of
Discovery**

NABT's National
Convention
October 27-30,
1999 at Tarrant
County Conven-
tion Center,
Fort Worth, Texas

*See this issue
for details...*