Wildlife Ecologist

Aldo Leopold. His Life and Work. CURT MEINE. University of Wisconsin Press, Madison, 1988. xvi, 638 pp., illus. $29.50.

Curt Meine's *Aldo Leopold: His Life and Work* is an excellent, full-length biography of a figure central to the environmental history of the United States. We have thus far had available only Leopold's own writings and Susan Flader's well-done study *Thinking Like a Mountain: Aldo Leopold and the Evolution of an Ecological Attitude Toward Deer, Wolves, and Forests*. Meine's volume is consequently a much-needed scholarly contribution. The book is beautifully written, descriptively analytical narrative history. It offers no dramatically new conceptual frameworks, yet Meine demonstrates a strong command of historiography, a nice sense of setting, and an eye for historical connections. He has immersed himself in the Leopold papers and interviewed liberally those who knew Leopold in his many guises: as naturalist, forester, game protector, wildlife manager, and finally ecologist.

A son of the late-19th-century Midwest, Leopold grew up a naturalist and hunter well schooled by his father—who had sold the barbed wire that subdued the plains—in sportsmanship. Like the other young men in the first generation of American forestry, Leopold became imbued with Gifford Pinchot's conservation vision at Yale University. Joining the U.S. Forest Service in 1909, he set out to impress on the still-wild national forests of the Southwest his training in progressive forestry. There he perfected the techniques of fighting forest fires and facilitating logging.

Strongly independent, however, Leopold expanded upon his professional training. Remaining in the Southwest until 1924, he watched its lands badly scarred by erosion. He learned that land has a carrying capacity; he studied the relationship of fire, grazing, logging, and erosion. His appreciation of the value of wilderness grew as he watched it disappear. Very early he deviated from mainstream forestry by moving into game management. His avocation as a naturalist vied and combined with his professional training to produce a new vision of wildlife refuges and wildnerness areas. He had a practical understanding of conservation as wise use as well as a sense of the aesthetic and idealistic; his evolving ecological reasoning bound these strains. His life is evidence that the traditional division between aesthetic preservationists and utilitarian conservationists is not as clear as historians have often portrayed it.

In 1924 Leopold moved to Wisconsin, where the changes wrought by industry and agriculture on the Midwest since his boyhood reinforced the ecological lessons he had learned in the Southwest. After a series of consulting jobs, he became in 1933 Professor of Game Management in the Department of Agricultural Economics at the University of Wisconsin. No science of game management existed then. Studying the farm belt Leopold developed the concepts of "game range" and the "edge effect" as building blocks of the new field.

Central to Leopold's growth as a scientist and philosopher, as Meine ably demonstrates, was his conversion on the subject of predators. During his years as a young forester and hunter in the Southwest, game management had meant to him, as with American conservationists in general, fostering those species that were of obvious benefit to man, especially game animals, and killing predators that competed with the hunter. Government hunters in the 1920s, however, rid the Kaibab range in the Grand Canyon Game Preserve of thousands of coyotes, lions, bobcats, and wolves, and the resulting deer explosion forced Leopold to reexamine his thinking. Similar explosions in the Southwest and northern Wisconsin reinforced the message. In the 1930s, despite a hostile reception from the conservation establishment and the public, Leopold began preaching that predators were a necessary part of land health. The predator now also defined for Leopold the meaning of wilderness. Danger was—as the green fire in the eyes of a shot and dying wolf had first told him—its essential element. Broadening his perspective to include nongame and predator species, Leopold in 1938 retitled himself Professor of Wildlife Management—the first such in the nation—and renamed his game management course "wildlife ecology."

During the 1930s and 1940s, Leopold drew upon his years of field experience, his research and that of his graduate students, and the growing literature of ecology to develop a philosophy that emphasized the concept of land health, the idea of conservation ethics, and the value of wilderness. By the time of his death in 1948, Leopold was well known nationally for his message that wilderness had not merely recreational but ecological and cultural significance. It was the control against which scientists could measure the experiment of civilization. It was a place that could continue to foster our culture's idea of freedom.

Because of Leopold's own stature and Meine's skill in placing his subject in a rich historical context, this book is a study in the evolution of ecology and American conservation. Clearly of value to historians of

Leopold towing the *Binnacle Bat II* on the Rio Grande, 1918. [Leopold Collection, University of Wisconsin Archives; from *Aldo Leopold: His Life and Work*]

"Leopold [second from left] and students prepare a restored prairie for burning at the University of Wisconsin Arboretum, about 1945." [Bradley Center Archives; from *Aldo Leopold: His Life and Work*]

science, western lands, and environmentalism, this definitive biography should be read as well by those interested in our nation's past in general, for it portrays the transformation of the United States from a frontier culture into an increasingly scientific society—a transformation which, as Leopold's life shows, has not been entirely detrimental to our environment.

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Research in Neuroscience

Fidia Research Foundation Neuroscience Award Lectures. Vol. 2, 1986–1987. ALFRED G. GILMAN, ERWIN NEHER, TOMAS HÖKFELT, JOSEPH B. MARTIN, and VIKTOR HAMBURGER. Raven, New York, 1988. x, 164 pp., illus. $39.

Recent advances in biophysical and molecular approaches to neuroscience have affected areas as distinct as signal transduction and inherited neurological disorders. This collection contains the lectures of the 1986 Fidia Foundation Award recipients, who represent a broad range of disciplines in neuroscience. The lectures honor Rita Levi-Montalcini, Luigi Galvani, Camillo Golgi, and Vittorio Erspamer. Dedicated as a whole to Levi-Montalcini, the volume commemorates her contributions to neuroscience by reprinting the report on the partial purification of nerve growth factor that she published with Stanley Cohen in the *Proceedings* of the National Academy of Sciences.

In addition to the diversity of subject matter, the lectures vary in approach, ranging from general reviews to outlines of the author's own work. Although some of them suffer from attempts to combine these approaches in too little space, their accessibility outweighs any deficiencies; the volume is well worth the reading, especially for nonspecialists.

In the first lecture, A. Gilman discusses the role of G proteins in transmembrane signaling. Then E. Neher describes his innovative patch clamp approach to solving the mechanisms of secretion. Hökfelt and colleagues analyze the ups and downs of various immunohistochemical approaches to determining peptide and transmitter phenotypes of central and peripheral neurons. This discussion is supplemented by summary tables that help the novice understand where particular transmitters and peptides are located. It includes a brief foray into the physiological implications of peptide and transmitter coexistence and speculation on their potential relevance to disease. J. Martin's lecture provides an excellent introduction to molecular genetic approaches to clinical neurology. The use of linkage analysis to locate the genes responsible for several inherited neurological disorders is described in a manner that conveys both the technical essentials and the excitement of this endeavor.

Each lecture is preceded by a biographical sketch of the neuroscientist for whom it is named. Pietro Corsi deftly condenses the lifelong contributions of Levi-Montalcini, Galvani, Golgi, and Erspamer into one-and-a-half-page essays. These summaries add a valuable dimension to the lectures that follow, since the work of each award recipient is somewhat related to that of the neuroscientist whom the lecture honors.

The final complement is a special lecture given by Viktor Hamburger on the occasion of his receiving the Fidia-Georgetown Award in Neuroscience, given every three years. Hamburger, the acknowledged father of neuroembryology, is the first recipient of this award in his field. His brief discourse—also preceded by a biographical sketch by Corsi—covers some of the first experiments of Mangold, Spemann, Harrison, and Detwiler on neural induction. Hamburger then traces the path of his investigations and collaborations that led to the discovery of the role of target tissue in neuronal survival, of naturally occurring neuronal cell death, and ultimately of nerve growth factor—an appropriate ending for this volume dedicated to Levi-Montalcini.

In sum, this collection is highly readable, bringing several key areas in neuroscience within easy reach of the newcomer. The volume also contains sufficient new perspective to be reasonably informative to the seasoned neurobiologist. One cannot, however, help being frustrated by the brevity of some of the contributions, given their high quality.

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Nucleosynthesis in Stars

Cauldrons in the Cosmos. Nuclear Astrophysics. CLAUS E. ROLFS and WILLIAM S. RODNEY. University of Chicago Press, Chicago, 1988. xviii, 561 pp., illus. $74.95; paper, $34.95.

In this book the authors effectively communicate their fascination with a subject that has motivated the large volume of experimental work produced in their respective careers. As is stated by William A. Fowler in the foreword, "*Cauldrons in the Cosmos* is a potent witches' brew distilled from the ferment in the authors' hearts and minds, stimulated by their joy and delight in the nature of the universe which they, and we, inhabit." The authors describe how nuclear astrophysics has developed as a merger of astronomy, astrophysics, and low-energy nuclear physics sustained by "two of the most fundamental traits of human character: the need to explore and the need to understand." The book is written in an informal style that those uninitiated in the jargon of nuclear astrophysics and astronomy will find readable and illuminating. It covers essentially every topic of relevance to nuclear astrophysics, with emphasis on those that are most readily studied by modern laboratory techniques.

Since the book is written from the viewpoint of experimentalists, it includes many intuitive discussions of astrophysical concepts in place of rigorous theoretical treatments. It is an excellent supplement to D. D. Clayton's *Stellar Evolution and Nucleosynthesis*, both because of its pragmatic viewpoint and because it updates a number of developments in nuclear astrophysics during the 20 years since that book was first published. The preface also includes an interesting historical overview of the development of modern astronomy.

A major fraction of the book is devoted to stellar reaction rates, with an in-depth discussion of the accelerator and detection techniques for measuring them. Indeed, I have not found such a thorough discussion of modern low-energy nuclear laboratory techniques even in textbooks on nuclear