

instructors preparing course work in marine ecology, and professionals seeking overviews of topics outside their own expertise.

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## Ecosystem Analysis

**Concepts of Ecosystem Ecology.** A Comparative View. L. R. POMEROY and J. J. ALBERTS, Eds. Springer-Verlag, New York, 1988. xii, 384 pp., illus. \$72. Ecological Studies, vol. 67. Based on a conference.

E. P. Odum has long been a creative and influential ecosystem ecologist. His publications are often provocative in the best sense of the word, in that they call forth experimental tests and competing syntheses. It would be asking a great deal to hope that this volume, a collection of papers honoring Odum on the occasion of his retirement from the University of Georgia, could synthesize the current status of ecosystem ecology or provoke a new round of research. Not surprisingly, the volume does a better

job reflecting modern ecosystem ecology in its strengths and weaknesses than it does of pulling the field together or pushing it forward.

Because of the way the volume is organized, the weaknesses are apparent first. Ecology has been accused of being the only field with the courage to call a spade a geotome, and we continue to find complex ways of making relatively simple points about energy flow, spatial and temporal scales, and hierarchies. More important, the book starts with too much amateur philosophy of science (fine between consenting adults in private), and, most serious, several of the contributions have a defensive tone about working in difficult-to-control complex systems, as against the supposed simplicity of subcellular biology.

The strengths of the field become evident later in the volume. Papers that exemplify them include an informed (although jargon-ridden) ecological analysis of conventional versus zero-tillage agriculture (Coleman and Hendrix), an interesting discussion of grazer-grassland interactions and the ways in which grazing could increase primary production (Detling), a provocative treatment

of alternative ways to analyze the dynamics of marine ecosystems (Mann), and an outstanding synthesis of the biogeochemistry of coral reef ecosystems (D'Elia). I don't know if a marine ecologist would be equally impressed with the last; to one who works in forests, it was extraordinarily instructive.

I mention these papers in particular among a number of good ones in the volume because they have several features more or less in common: first, a large and interesting question; second, the willingness and ability to pursue the answer whether it lies in physiological ecology, population biology, systems analysis, geochemistry, or interactions of any of these; third, an inclination to consider the consequences of human manipulations of ecosystems; and fourth, the courage to suggest tentative (and testable) generalizations based on controlling mechanisms. Add a developing concern with global change and with long-term ecosystem dynamics, and these papers represent many of the best features of modern ecosystem ecology.

Overall, I learned something from the papers in this volume; I believe that most ecologists would. However, I would not

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## AAAS Announces a Report on:

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**Graduate Education and Career Directions in Science, Engineering and Public Policy**, by *Albert H. Teich, Barry D. Gold, and June M. Wiaz*

Educational programs and professional practice in the field of science policy are continually evolving, shifting their focus in response to the changing demands of today's society. This study provides an up-to-date and comprehensive assessment of graduate education and career patterns in science policy. Conducted under the auspices of the AAAS Committee on Science, Engineering and Public Policy and supported by AAAS and the National Science Foundation, the project presents empirical data from the programs, graduates, and employers in the field.

*...a must for policy makers, students, employers, and anyone interested in gaining insight into science policy programs.*

1986; 168 pp.; softcover \$10.00 (\$8.50 for AAAS members).

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recommend the book as a way for newcomers to learn about the field; there is too much to wade through before one gets to the good stuff. Nonetheless, many of the chapters are first-rate; readers will want to assign some of them to their students and to debate others with colleagues.

PETER M. VITOUSEK  
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## Some Other Books of Interest

**Science in Ireland, 1800–1930.** Tradition and Reform. JOHN R. NUDDS, NORMAN D. McMILLAN, DENIS L. WEAIRE, and SUSAN M. P. McKENNA LAWLOR, Eds. Privately published, Dublin, 1988 (available from Department of Pure and Applied Physics, Trinity College, Dublin). 208 pp., illus. Paper, £10. Based on a symposium, Dublin, March 1986.

“Why did Ireland [in the late 18th and 19th centuries] produce so many notable figures in the history of science?” ask the editors of this volume. Recognizing the difficulties of answering such a question,

they here set out to achieve the “lesser, simpler goal” of establishing “a greater awareness of the fact itself.” The volume opens with a group of papers on mathematical activities: I. Grattan-Guinness on research and instruction “from the founding of the Royal Irish Academy in 1782 up to 1840, by which time Ireland possessed three figures of international repute,” namely William Rowan Hamilton, Humphrey Lloyd, and James MacCullagh; W. H. Brock on mid-19th-century reforms in mathematical education, featuring John Tyndall, George Salmon, and John Perry; and considerations by other authors of MacCullagh, Hamilton, George Boole, George Gabriel Stokes and William Thomson. A section on astronomy includes an overview by Lawlor and accounts by others of the Reverend John Brinkley’s tenure at Dunsink Observatory and of two enterprises of the Earls of Rosse, the six-foot reflecting telescope (once the largest in the world) and the “lunarscope,” intended for measuring lunar temperature by focusing infrared radiation. Finally, under the heading Experimental Science, are presented discussions of Humphrey Lloyd as a “scientific diplomat”; Heinrich Hertz’s correspondence with George Francis Fitz-

Gerald; the Reverend Samuel Haughton’s place “as a principal . . . alongside Kelvin” in the debate over the age of the earth; the careers of the “polymath” John Joly, of Mary Ward, “wife, mother, microscopist and astronomer,” and of Robert Woods, “a neglected biophysicist”; and events in the establishment of submarine telegraphy.

—K.L.

**The Art of Geology.** ELDRIDGE M. MOORES and F. MICHAEL WAHL, Eds. Geological Society of America, Boulder, CO, 1988. viii, 140 pp., illus. \$37.50. GSA Special Paper no. 225.

The “art” that this latest contribution from the Geological Society of America’s centennial publishing project most immediately demonstrates is that of photography. Composed primarily of illustrations submitted for the cover of the society’s journal *Geology*, the volume consists of some 70 groups of often spectacular color photographs chosen “to convey the visual beauty of Earth and its neighbors as seen from a geologic perspective.” A few satellite images and micrographs are included, but for the most part the scenes shown are such as to be observable under ordinary conditions. About half the groups show formations from parts of the United States, including Alaska, Hawaii, the Appalachians, and Central Park but with a preponderance of western formations—the San Andreas fault, the Grand Canyon, Utah’s sandstone arches, California’s tufa pinnacles, and Wyoming’s devil’s tower, among others. Additional areas of the world represented include China (tower karst), Indonesia (Tambora Volcano), the Philippines (Mayon Volcano), Iran (the Zagros Mountains), Egypt (the Suez rift), Spain (thrust faults), Iceland, Canada, Mexico, Brazil, Peru, Chile, and Antarctica. Venus, Mars, and Io, but not our Moon, are also represented. Incidental subjects of the photographs include a number of humans, some buildings, and at least one poodle but (for a geology book) relatively few rock hammers and pens. Brief, non-technical captions accompanying each group explain some of the relevant geology.—K.L.

## Books Received

**Agent Orange and Vietnam.** An Annotated Bibliography. Caroline D. Harnly. Scarecrow Press, Metuchen, NJ, 1988. xii, 401 pp. \$37.50

**Algebraic, Extremal and Metric Combinatorics, 1986.** M.-M. Deza, P. Frankl, and I. G. Rosenberg, Eds. Cambridge University Press, New York, 1988. x, 245 pp. Paper, \$34.50. London Mathematical Society Lecture Note Series, vol. 131. Based on a conference, Montreal, Quebec, July-Aug. 1986.

**Aneuploidy.** Part B, Induction and Test Systems. Bladev K. Vig and Avery A. Sandberg, Eds. Liss, New York, 1988. x, 342 pp., illus. \$160. Progress and Topics in Cytogenetics, vol. 7B.

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