Book Reviews

A Record of Achievements

A History of Scientific Endeavour in South Africa. A Collection of Essays Published on the Occasion of the Centenary of the Royal Society of South Africa. A. C. BROWN, Ed. Published by the Royal Society of South Africa, c/o the University of Cape Town, Rondebosch, 1977. xii, 516 pp., illus. $22.50.

In these days when it is fashionable to denigrate South Africa and all its works this volume commemorating the centenary of the Royal Society of South Africa is a salutary reminder of the complexities of the situation, to say nothing of the work of a large band of liberal-minded savants concerned only for the welfare of the society in which they lived. The book is not a monument to apartheid.

White settlement in southern Africa dates from 1651 and was motivated by the need for provision of fresh fruits and vegetables (sources of the as yet undiscovered vitamin C) as an antiscorbutic for the ships of the Netherlands East India Company bound for what is now Indonesia. A permanent settlement gradually took shape, and early in the 19th century, in consequence of the Napoleonic wars, the Cape Province was established as a British colony. Previous to that time there had been a few notable scientific visitors, such as the astronomer Lacaille and the botanists Sparrman and Thunberg. The first permanent scientific institution came in 1820, with the foundation of the Royal Observatory. Since that time scientific progress and the growth of scientific institutions have been continuous and indeed highly enlightened, but the initial growth must be seen in the context of an extraordinary isolation. For some half a century from the time of its foundation the Cape Observatory was the only scientific institution within a radius of perhaps 8000 kilometers, and for southern Africa some degree of physical isolation of intellectual activity still remains.

The leading scientific achievements of South Africa have been in petrochemistry (notably the complex at Sasolburg) water treatment, thunderstorm research, paleontology, medicine (from nutrition to organ transplantation), mining technology, geodesy (including the tellurometer), nature conservation, veterinary research, and astronomical research (especially the determination of the distance to the Magellanic Clouds, which revamped the scale of the universe). These are almost all described in the 21 essays that make up the book. The essays vary considerably in readability for the nonspecialist, who will find the section on organic chemistry hard going in contrast to the more general historical essays. The essay on astronomy is disappointing in its concentration on somewhat anecdotal past history and its lack of a critical assessment of the important influence that modern work done in South Africa has had on the progress of that science. This is a pity considering that astronomy was the most important seed science in the area.

Understandably there are touches of parochialism in the book, and one wonders why so many of the excellent photographs should be full-page ones of the essays' authors and their immediate colleagues. But as a piece of production this is a noble reference work. The record is one to be proud of and compares excellently with the achievements of any population group of similar size anywhere in the world.

DAVID S. EVANS
Department of Astronomy, University of Texas, Austin 78712

Episodes in Ecology

Nature's Economy. The Roots of Ecology. DONALD WORSTER. Sierra Club Books, San Francisco, 1977. xii, 404 pp. $15.

Donald Worster is an intellectual historian who rejects the view of progress in science as separated from the rest of cultural history. He prefers to approach scientific ideas as products of specific cultural conditions, and often finds that scientific "truth" is more a matter of contemporary personal and social needs than most scientists are willing to recognize. Although he sees this in all the natural sciences he finds it strongest in ecology, because ecology "has never been far removed from the messy, shifting, hurly-burly world of human values." A major purpose of this book, written at a time when ecology burgeons as both a science and a cult, is to show that ecological science has always been shifting ground.

Many ecologists recognize that their views about society tend to be consistent with their work in ecology. Human societies evolved out of natural systems and show many parallels with such systems in structure and function. More than most natural sciences, ecology seems directly transferable to societal problems. Less obvious is the truth of the reverse statement, that ecologists hold views about ecology that reflect their cultural experience and background. Worster demonstrates this effect in each period of the history of the discipline.

Because science and society are always interacting Worster believes that different cultures can produce different scientific traditions, and he limits his analysis to the development of ecology in England and America. Continental events are included only when they had significant effects upon British or American ecologists. At times Worster notes differences between cultures—for example, he notes that Darwin's ecological perceptions were products of Anglo-American Victorian society that would not have been possible in France or Germany at that time.

The early development of ecology is traced by intimate examinations of a few individuals. Linnaeus and Gilbert White represent the 18th century, Darwin and Thoreau the 19th. These four studies are enriched with many flashbacks and sideglances to other people and events that were significant in the interplay between ecological ideas and the rest of culture. Many threads are traced into modern times, leading the reader again and again from the past into the present.

Cultural shifts in attitude are followed, the most prominent being repeated swings between the urge to dominate and reorder nature and the desire to live as part of it. Such opposing views have not been reconciled in society, either under the assumption of divine creation or after the acceptance of evolution. Most interesting is evidence that opposing ideas can persist without reconciliation within individuals (as in the case of Thoreau). Indeed, the espousal of clashing paradigms is sometimes thought appropriate as a way to comprehend nature. Worster shows that dilemmas in society are also found in ecologists and in ecology, a perception that should help us to understand much better problems in the modern ecological movement.

Ecology in this century begins with the

work of Frederic Clements, portrayed as a botanist living in a midwestern world of rapid agricultural expansion and change and seeing change as a strong and vital process in natural plant communities. Next is a study of Aldo Leopold, whose ideas on wildlife management show a strong shift from an early emphasis on control over nature to a final eloquent position of "ecological conscience." This personal evolution is in tune with societal changes since the days of Teddy Roosevelt.

The book closes with brief reviews of two sequences. One begins with the philosophy of A. N. Whitehead and continues with the "superorganism" approach to populations and communities fostered by W. M. Wheeler at Harvard and a large group led by W. C. Allee at Chicago. With Allee's retirement in 1950 this organicist movement disappeared, an event Worster finds consistent with changes in other sciences and in society.

The other sequence gives rise to present-day ecology. It begins with Charles Elton's emphasis on general principles governing the dynamics of populations and continues with A. G. Tansley's formalizations of ecosystems as systems of exchanges of energy and matter. Meanwhile, others began to measure energy efficiencies in communities, and in 1942 Raymond Lindeman put it all together. The author shows how the present dominance of this approach mirrors many recent changes in other sciences and in society. Therein he finds both strengths and weaknesses in modern ecology.

Worster's style is warm, intellectually strong, and eloquent without sentimentality. I found the work stimulating and constructive, offering new perceptions about ecology and ecologists, including myself.

FREDERICK E. SMITH
Graduate School of Design,
Harvard University,
Cambridge, Massachusetts 02138

Alkaline Rocks

Carbonatite-Nephelinite Volcanism. An African Case History. MICHAEL JOHN LE BAS. Wiley-Interscience, New York, 1977. xiv, 348 pp., illus. $48.

This book aims at a contemporary statement of the "carbonatite problem" using an area in Kenya as a type locality. The area shows an association of intrusive and extrusive alkaline rocks and a rich variety of rock types, including melilite- and wollastonite-rich types, the melteigite-ijolite-urtite suite, nepheline syenite, and several varieties of carbonatites and associated fenites. The bulk of the book is of memoir style, commencing with a concise treatment of the Precambrian basement. The alkaline rocks are divided into ten complexes plus a problematic maar-type crater, each of which is treated in one or more chapters. Each chapter commences with a one-paragraph summary and a table of contents, so particular facts and descriptions can be found with exceptional ease. Petrography and field relations are given compendious treatment, and large amounts of material on mineral chemistry, whole rock chemistry, and age determinations are also included. Numerous line drawings illustrate the field relations, and photographs, all collected at the end of the book, are effectively used to demonstrate rock textures at field and microscopic scales. Casual readers may find the accumulation of detail overpowering, but the book fulfills an archival function characteristic of geological survey memoirs. It will be the definitive description of these rocks for years to come.

The book does not deliver a general treatment of carbonatite-nephelinite volcanism. The first chapter gives a confused and confusing account of occurrences of alkaline rocks that is notable for an apparently random selection of occurrences and references. The third chapter, entitled "The nomenclature of alkaline igneous rocks," refers only to the Kenyan rocks and, except for a simplified nomenclature for carbonatites, makes no new contribution to this difficult subject. Toward the end of the chapter, nomenclature is simply dropped and a description of the Precambrian rocks is commenced. The book concludes with two chapters on the magmatic and metasomatic processes involved in the petrogenesis of the carbonatite-nephelinite suite. These chapters are the least satisfying in the book, for they only recapitulate the (often conflicting) theoretical and experimental work on the subject. The significant conclusions of the book stem directly from the fieldwork, for example, the origin of melilite-rich rocks by metasomatism of pyroxenite, the distinction of sodium and potassium fenitization on the basis of magma type and temperature, and the spiral structure of some cone-sheet complexes.

Thirty years ago von Eckermann's classic memoir "The Alkaline District of Alno Island" (*Sver. Geol. Unders. Ser. C*, No. 36 [1948]) established the question of the origin of carbonatite as an important petrologic question. Le Bas's book shows that a contemporary discussion of this question cannot be contained within a discussion of a single area because of the enormous literature on the subject. (Over 300 references are cited, and the literature search is reasonably complete only to about 1972.) The exorbitant price of the volume will surely confine this solid memoir on west Kenyan alkaline rocks to larger geological libraries.

K. L. CURRIE
Geological Survey of Canada,
Ottawa, Ontario K1A 0E8, Canada

Plant Conservation

Extinction Is Forever. Threatened and Endangered Species of Plants in the Americas and Their Significance in Ecosystems Today and in the Future. Proceedings of a symposium, Bronx, N.Y., May 1976. GHILLEAN T. PRANCE and THOMAS S. ELIAS, Eds. New York Botanical Garden, Bronx, N.Y., 1977. vi, 438 pp., illus. Paper, $20.

This attractively printed volume is a stimulating if uneven collection of some 38 papers and a panel discussion presented at the New York Botanical Garden. The majority of the papers are focused on Latin America, a vast region inhabited by well over a third of the world's species of flowering plants. Perhaps an eighth of these have yet to be catalogued and given scientific names, and we know the uses of only a very few. More than a third of the forests of Latin America have been cut since 1800, and considering the rate of growth of human populations in the region the continued existence of the remainder beyond the next half-century is extremely doubtful.

Owing to our lack of knowledge, it is difficult to specify particular endangered species of plants in Latin America. Kubitzki makes an interesting case in this volume that in *Davilla* (Dilleniaceae) the species with the more primitive characteristics may be the rarest. The wide dispersal of individual plants in tropical forest means that many will be rediscovered hundreds of kilometers from their known localities. It is therefore inappropriate and largely impossible to focus conservation efforts in the tropics on individual species of plants. In this vast region whole ecosystems, the richest on earth in numbers of species of plants and animals, are being destroyed to satisfy the needs of a rapidly growing human population. Consequently, the focus