history in Europe has been pollen analysis and related plant-macrofossil work. Although the methodology was devised in order to explain postglacial vegetational and climatic changes in Scandinavia, reviewed in volume 1 of *The Quaternary* (1965), it has been adapted to elucidate interglacial, interstadial, and even full-glacial conditions for the rest of the Quaternary through detailed analyses of buried organic sediments in controlled stratigraphic position. Particularly in the Netherlands and the British Isles have these studies been carried to perfection, so that several preglacial but post-Pliocene climatic fluctuations have been identified and confirmed at several sites. Because the vegetational sequences during the several interglacial intervals differed from one another in major features, a skeleton pollen diagram that shows the major trends can be used to establish the stratigraphic correlation of an unknown organic unit—thus serving the role of index fossils in pre-Quaternary stratigraphy.

The coverage in all of the four chapters in the book is comprehensive and broadly similar, for all treat the geologic, biogeographic, and archeologic aspects both topically and regionally—each even ends with a paragraph or two about economic applications. Archeology figures strongly throughout the treatment of France, which has relatively few Quaternary sediments. The chapter on Germany is condensed by Woldstedt from pertinent parts of his great three-volume treatise *Das Eiszeitalter,* and thus makes available in English a broad summary of much of his volume 2.

As a basic reference this book should be essential for all American Quaternary scientists who wish to understand the kind of record that glaciers and climate have left in another now-temperate region, or to obtain ideas they might use in their own investigations. Being condensed and highly documented, the book is more for reference than for light reading. But as a reference work it is well furnished with several hundred bibliographic titles for each chapter, a comprehensive subject index 40 pages long, and an author index. Illustrations and tables are generally good, but too many of them preserve the European tradition of burying in the caption the explanations for numbered map patterns, when the explanations could just as simply have been placed beside the map boxes themselves.

All the papers were written in 1962; in view of the pace and diversity of research in this field, some of the book must be considered out of date already. It is unfortunate that the publisher, when he commissioned the reviews, could not assure publication in less than five years. Although the editor makes apology for the delay, it must not go unmentioned in this review, which is otherwise intended to be highly favorable.

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Tracking Birds

Radar Ornithology. ERIC EASTWOOD. Methuen, London, 1967 (distributed in the U.S. by Barnes and Noble, New York). xii + 278 pp., illus. $12.

As director of research of the English Electric Group and chief scientist to the Marconi Company, Eric Eastwood had an unusual opportunity to use high-powered radar to study the movement of birds. He took advantage of this opportunity by making photographs of bird targets as they appeared on the radarscope as he was investigating ways of removing unwanted targets by developmental work on valves and other components of L-band radar.

About half of Eastwood's book is devoted to a discussion of radar and its techniques for monitoring bird passage. The remainder of the book reviews the findings of the author and others on bird movements.

An interesting history is given of the development of radar in Great Britain to meet the threat of the Luftwaffe. Although there are insufficient details for the radar engineer, there is an extremely readable account of the principles of radar and of the display and interpretation of radar targets. The author should convince any remaining skeptics once and for all that radar records the movements of birds in the airspace. Indeed, published reports by Eastwood and others indicate that a great deal of the unwanted "angel" display on radarscopes is made up of bird targets. Eastwood concludes that radar ornithology is becoming so advanced that a "signature analysis" of the radar echo can identify single bird targets. In fact, the wingbeat patterns of some birds have been identified as to species. Eastwood presents a thorough analysis of the ingenious ways in which several types of radar can be used to investigate the numbers and position of migrating birds in the airspace.

Most of the material on bird migration has been presented by Eastwood and other investigators in earlier papers, which are ably abstracted in the book. The treatment of bird movements is largely descriptive rather than analytical. The author uses many maps to demonstrate the passage of birds in relation to geography and weather. The influence of weather on bird migration is treated only superficially; no parameters are given which would provide a means of evaluating the degree of influence of various weather factors. A point of controversy raised by the author centers about the influence of wind on the flight path. Does the bird select a fixed heading from its point of departure, to be drifted from its goal by a wind with a beam component? Does the bird compensate for a beam wind, and so change its heading? Eastwood agrees with David Lack of Oxford that birds are drifted by the wind. This is at variance with the findings of radar ornithologists in the United States and of one of Lack's students in England. Eastwood analyzes his findings and those of others on the influence of radio waves on bird flight behavior. After careful study he concludes that "any interaction between alternating electro-magnetic fields and the bird's sensory organs can be second order only, if it exists at all" (p. 254).

This book is a valuable contribution to the ornithologist interested in radar and to the radar engineer interested in angel echoes.

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Sedimentology

Cyclic Sedimentation. P. MCL. D. DUFF, A. HALLAM, and E. K. WALTON. Elsevier, New York, 1967. xii + 280 pp., illus. $23.50. Developments in Sedimentology, No. 10.

In 11 chapters, chapters that draw upon more than 450 references, *Cyclic Sedimentation* attempts to organize, digest, and evaluate the ins and outs of the study of cyclic sedimentation since the early 1830's. After a brief and thoughtful introduction that touches upon terminology and methods of analysis, the subject is presented as follows:

cycles in continental (fluvial and lacustrine), transitional, and marine (epicontinental and geosynclinal) environments. Rhythm, cycle, and cyclothem are considered synonyms in this analysis, with the understanding that the last always refers to sedimentary deposits. The authors note that cycles have been recognized in units ranging in size from as small as silt and clay laminae to the order of geologic systems. To restrict the scope of their subject, geologic systems are excluded from consideration.

By and large, this book provides a very good source to find what is known —at least in what might be described as the Atlantic geologic community— about cycles in sediments, for surely all the important general papers are referred to in this book. In addition, many particular studies, the kind that are the hardest to find yet are often the very ones that are most useful, are described. Certainly the bringing together and organization of this literature is the most important contribution of Duff, Hallam, and Walton; the "why" of cycles, however, remains as difficult to assay as ever. In spite of this, the authors feel —and I agree—that "the search for and the discussion of cyclic sedimentation has an important role to play in understanding geological successions."

The book is attractively printed, appears to be largely free of errors, and has some good illustrations, mostly line drawings. But at $23.50 it is greatly overpriced.

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British Chemist

Humphry Davy. HAROLD HARTLEY. Nelson, London, 1966. viii + 160 pp., illus. 35s. British Men of Science.

"Brilliant fragments"—so the Swedish chemist J. J. Berzelius described the contributions to science of Humphry Davy, pioneer of electrochemistry, discoverer of the alkali and alkaline-earth metals, and inventor of the miners' safety lamp. If the fragments were brilliant, the man was even more so. The progress from a frugal provincial childhood to wealth, a baronetcy, and the presidency of the Royal Society; from obscure beginnings, through the friendship and encouragement of Wordsworth and Coleridge, to the company of cabinet ministers and royalty: this was no ordinary path even for the most gifted members of the lower middle class in Regency England. Small wonder, then, that Davy continues to attract the biographers (at least two further studies are in preparation to add to the three already published in the last 15 years!).

The particular contribution of Sir Harold Hartley's brief popular biography is to take Davy's science seriously: "readers," Sir Harold warns, "will find more chemistry than anecdotes in these pages." Indeed they will, and Davy's major experimental triumphs are fully and carefully described. That the description is set within the by-now-unfashionable reference-frame of "positive science" may disturb the purist, but not the sympathetic reader, who will enjoy the many perceptive asides that flow from Hartley's 70 years of reflection on Davy's colorful and complex character.

To criticize this present work for its failure to place Davy's experiments in intellectual context, and to suggest that Boscovichean atomism was the essential key to his science, would show both a lack of sympathy with the author's aim and an over-simple view of the currents of scientific thought in early 19th-century England. Yet, while savoring the enjoyable sketch the present work provides, one may certainly hope that the other biographers now at work will probe more deeply into Davy's own scientific motives and explore more thoroughly the particular intellectual and social milieu that enabled him to become the first of a now-familiar line of scientific entrepreneurs and self-made men.

In such an enquiry his early contacts with Gregory Watt, Thomas Beddoes, and the extraordinarily gifted Lunar Society group would repay close examination. So would his exploitation of the Hotwells Pneumatic Institution, and the publicity value of the newly discovered "mind expanding" properties of laughing gas. His meteoric rise to fame at the Royal Institution also invites careful study, as do his persistent attempts to discredit French chemistry in the midst of the Napoleonic wars. But these are controversial matters, and require much detailed research. In the interim, Sir Harold's book makes a welcome introduction to the fascination of Humphry Davy as man and scientist.

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Reptiles

Lizard Ecology. A symposium, Kansas City, Mo., June 1965. WILLIAM W. MILSTEAD, Ed. University of Missouri Press, Columbia, 1967. xii + 300 pp., illus. $7.50.

Interest in the ecology and the physiological ecology of small reptiles has been increasing rapidly during the past few years. This apparently is due in part to the relative stability which has finally been achieved in systematic herpetology and the discovery that small reptiles lend themselves particularly well to field and laboratory investigations. The volume under review clearly reflects this increasing interest.

The symposium was well attended, and highly acclaimed by those who did attend. The names of the 15 persons participating by invitation in this symposium read like a Who's Who of those active in this expanding field. The contributions are grouped in the three general areas where most current work in lizard ecology is now being done, Population Ecology, Social Behavior, and Physiological Ecology. Each section includes an introduction and three papers, followed by an edited version of the discussion that followed the formal presentations. The editing of the discussions has been most skillfully performed. The usual chaotic and ungrammatical flow of half-stated ideas and incomplete thoughts often delivered so effectively with gestures and facial expressions is not here. But the personalities of the speakers emerge clearly and they express themselves unreservedly on controversial ideas unsupported by adequate evidence. These discussions are particularly stimulating. Brief excursions are made into such subjects as "innate dispersers," refractory reproductive periods, blazoning of gravid females, value of behavioral characters in the systematics of genera, compulsive feeding, nest-site territorialism, head-bobbing and stereoscopic vision, oxygen transport, and the value of thermal models.

Unlike those in most symposia, many of the papers present first reports of original research. There is, however, considerable variation in this respect. The opening paper, by Donald W. Tinkle, summarizes a tremendous amount of research reported on here for the first time, covering a five-year study of various facets of the population dynamics of the side-blotched lizard *Uta stansburiana.* A number of other papers are similar in scope, among them the exhaustive account by