lates by means of women." The image denotes marriage and alliance, which depend on circulation of women, but it also connotes deeper meanings which unite biology, politics, and the social order. Fox states in his introduction:

> This "flow of life" is synonymous with the transmission of a woman's blood, the vital fluid that, united with semen, produces the human person. Implicit in this conception . . . is the idea of a return or reunion of life: the "life" that a brother and a sister share can be restored only by marriage of their children or the descendants of their children; in other words, the life, or blood, that a sister takes with her when she marries may be returned to her brother's group through her daughters.

At an organizational level, then, the alliance system is based on the principle that when a woman marries out of her natal group her child marries back into it; at a symbolic level, such a pattern is embodied in such notions as circulating blood and reunion of life. In native conception such "levels" constitute a unity.

The second section focuses on the symbols themselves. Here is rich material concerning the symbolism of livestock, art, the house, ritual. The kind of images treated is illustrated by the title of the essay by Friedberg: "Boiled woman and broiled man." The section concludes with Traube's poetical and rather moving analysis of the meaning of black and white as symbols of the life cycle among the Mambai of Timor.

Fox's introduction and concluding essay ("Models and metaphors . . ."), supplemented by a useful piece by de Josselin de Jong on the methodology of comparison and generalization, ably draws out themes at once distinctive of Eastern Indonesia and carrying wider implication: for instance, the significance of parallelism in ritual language. Fox's conclusion, which is not without theoretical importance, is that the commonalities and order of Eastern Indonesian societies are to be found not in organizational patterns abstracted sociologically but in the system of symbols expressed by the natives: "metaphors for living which are encoded primarily in a pervasive dyadic form."

Well written, carefully constructed, adducing rich ethnographic data to develop an important theoretical theme, the volume is recommended to the reader who wishes to become acquainted in a concrete way with a certain type of comparative and structuralist analysis distinctive of contemporary social anthropology.

JAMES L. PEACOCK
Department of Anthropology, University of North Carolina, Chapel Hill 27514

The Formation of Sediments

Early Diagenesis. A Theoretical Approach. ROBERT A. BERNER. Princeton University Press, Princeton, N.J., 1980. xii, 244 pp., illus. Cloth, $25; paper, $9.50. Princeton Series in Geochemistry.

"Diagenesis" refers to the sum total of processes that produce changes—mineralogical, chemical, and physical—in sediments from the time of their deposition on. A final product of diagenesis is a sedimentary rock formed over some period of time from unconsolidated sediment deposited on land or in water. The book under review addresses itself only to sediments in water, including those of detrital (land-derived), chemical, and biological origins. It deals with an upper zone of sediments, generally several tens of centimeters thick, and the pore waters contained within it. The focus is primarily on the chemical changes taking place in pore waters, as caused by a variety of inorganic chemical and biological processes operating within the solids-plus-solution system of the young sediment. As the title suggests, the book does not deal with the broader and more advanced stages of diagenesis, the products of which are observable as the older sedimentary rocks on the continents and ocean floor.

The author's involvement in early diagenesis goes back nearly 20 years, to his days as a graduate student. His treatment of the subject is generally clear, and the material is well organized, up to date, and sufficiently illustrated by means of graphs and occasional sketches. Within the constraints of the available data on the chemical composition of pore waters, the coverage of pore-water diagenesis is exhaustive. Parallel evidence of early diagenesis in solid phases of sediments is limited owing to the difficulties of obtaining such data. Among the more prominent topics dealt with in the general and theoretical chapters of the book are diffusional and advective transport in pore waters of sediments, the chemical thermodynamics and kinetics of dissolution and precipitation of minerals, and redistribution and mixing of sediments by burrowing organisms (bioturbation). Applications of the theory are given in illustrative discussions of pore waters of lake, marine coastal, and oceanic pelagic sediments. The chemistry and mineralogy of early diagenesis are well covered by cases representing the behavior of carbonates, iron sulfides, organic materials, nitrogen species, sulfate, silica, phosphate, and methane in modern sediments.

The book contains some jargon: "diagenetic equation," a term introduced by the author some years ago, stands for a well-known mass-balance equation with diffusional, advective, and chemical reaction terms; "biodiffusion coefficient" and "irrigation coefficient," even if descriptive of the processes to which they refer, make me wonder if they are needed. From a user's point of view, somewhat weaker points of the book are a paucity of tabulated numerical data and of examples of how numerical solutions to many of the equations are arrived at.

The subject matter, style, and method of presentation should make *Early Diagenesis* highly useful to persons concerned with various aspects of the environment at the sediment-water interface in lakes, coastal waters, and oceans.

A. LERMAN
Department of Geological Sciences, Northwestern University, Evanston, Illinois 60201

Regulatory Proteins

Regulatory Functions of Interferons. Papers from a conference, New York, Oct. 1979. JAN VILČEK, ION GRESSER, and THOMAS C. MERIGAN, Eds. New York Academy of Sciences, New York, 1980. xiv, 642 pp., illus. Cloth or paper, $124. *Annals of the New York Academy of Sciences*, vol. 350.

Although interferons have been the subject of far too much publicity recently, there can now be no doubt about their scientific importance. More and more workers in different disciplines are studying this family of biologically active proteins, and it is clear that their physiological role extends far beyond that of an antiviral defense mechanism. Much recent work has been concerned with the interactions between interferons and immune mechanisms and with their effects on cell growth, the cell membrane, surface antigen expression, and so forth—in other words, with the regulatory functions of interferons. This book contains the 58 papers (and abstracts of the 38 posters) presented at a symposium on the subject. The subject is broadly interpreted, and the field covered is enormous. I admire the stamina of those who participated in what must have been four long and hard but rewarding days. The reader browsing at leisure has an easier time.

The book has appeared with commendable speed. One can view it in two ways. From one point of view, it is an exceedingly useful reference source. It contains within its covers papers by

many of the leading workers in the field, with data and conclusions that are otherwise scattered in many journals. What a pity it is that, as in most volumes of this type, no subject index is provided. From another point of view, the book is a fascinating cross-section of the state of interferon research in mid-1979. Some of the puzzles that existed then have already been solved. How baffling they seemed at the time, and, with hindsight, how easy it is to reinterpret the data. Also, how rapid progress has been in some areas. Was it such a short time ago that all interferons were thought to be glycoproteins, that the very first partial amino acid sequences for any interferon were published?

Space will not allow the mention of more than a few papers that particularly interested me. The demonstration by De Maeyer and De Maeyer-Guignard that electrophoretically pure mouse interferon exerts multiple biological effects is a landmark. For the first time, some 22 years after interferons were discovered, one can be sure that interferon molecules rather than impurities were responsible for certain effects previously reported as obtained with cruder interferon preparatins. Conversely, the blocking effect of large doses of crude preparations on the production of interferon by stimulated mouse cells was not seen with the pure material. Of course other properties have now been studied, and pure human interferons prepared and similarly tested.

Gresser and his colleagues review work on the toxicity of interferons in newborn mice and rats and suggest that interferon plays a role in the glomerulonephritis that develops in mice infected at birth with lymphocytic choriomeningitis virus. Although Schellekens has since reported that interferons do not seem to have similar effects in newborn monkeys, these data point out the need for caution in administering interferon to infants. Indeed, Gresser *et al.* speculate that the embryotoxic effects of rubella virus could result from interferon induced in the embryo itself.

There are many papers dealing with interactions between interferons and immunological mechanisms. For example, six discuss the stimulation by interferons of the activity of natural killer cells: the possible role of this effect in the antitumor activity of interferons continues to excite considerable interest.

It seems that only a proportion of patients with cancer respond to injections of interferon. Epstein and her colleagues describe how they have adopted the technique of Hamburger and Salmon to test human ovarian cancer cells for their in vitro sensitivity to interferons. Perhaps such studies will in the future provide a logical basis for choosing which patients should be treated.

Both the interferon specialist and the general reader will find a great deal of interest in this book. It can be cordially recommended.

N. B. FINTER
Wellcome Research Laboratories, Beckenham, Kent BR3 3BS, England

Changes of Place

Animal Migration, Orientation, and Navigation. SIDNEY A. GAUTHREAUX, JR., Ed. Academic Press, New York, 1980. xii, 390 pp., illus. $39. Physiological Ecology.

Most of the recent volumes on animal migration and orientation emphasize the mechanisms of orientation. This book takes a much broader view. It starts with a consideration of which animals migrate and why (Dingle), goes on to examine how these patterns are influenced by both long-term and short-term climatic changes (Gauthreaux), how animals store the energy necessary for migration (Blem), and what environmental cues trigger migration and how (Meier and Fivizzani), and concludes with a chapter on the mechanisms of orientation (Able).

Each chapter considers a variety of animal groups; some plant biology has even sneaked into Gauthreaux's chapter on climatic influences—no doubt on the reasonable premise that where the plants are the animals are sure to follow. Indeed, one of the major themes running through the book is that while migration is a complex phenomenon in which every animal seems to behave differently its effect is to allow the animals to utilize changing environments, whether the changes are seasonal, daily, tidal, or longer-term. In a way this theme follows from the definitions of migration proposed: "a specialized behavior especially evolved for the displacement of the individual in space" (Dingle) or "any oriented, long-distance, seasonal movement of individuals" (Able). I think that both of these definitions are more useful than Baker's view (in *The Evolutionary Ecology of Animal Migration*) that any movement of a plant or animal is migration.

The breadth of this book's coverage makes it especially useful. It summarizes and reviews a veritable mountain of literature in sufficient detail to lead one to specialized reviews or to the original papers. It is a pity that the bibliographies do not include the titles of the papers cited. With nearly 60 pages of references, brevity is obviously desirable; yet the references are such a central feature of the book that the omission of the additional information is particularly unfortunate.

Every reader will have a favorite chapter. I particularly liked Dingle's "Ecology and evolution of migration." His emphasis on the diversity of migratory patterns and processes and his attempt to find a basis for understanding the variety is appealing. I especially like his comment that "no single factor theory of migration is ever likely to be adequate." The same comment could easily be made on the basis of Able's contribution on the mechanisms of orientation. Here also there seems to be a diversity of mechanisms: the sun in the day and the stars at night, magnetic fields, olfaction, and even the moon all seem to play a role. The search for a single, unitary mechanism has been abandoned in favor of a Chinese menu approach. The problem now is to understand which cues animals use under which conditions and what information they can derive from them. Able does a splendid job reviewing the recent developments in the field, although the turmoil and rate of progress in this area are such that his review is already somewhat out of date.

The chapters fit together to make a well-integrated whole, constituting a comprehensive account of animal migration that will be a required volume for anyone in the field and a useful introduction for everyone else.

CHARLES WALCOTT
Department of Neurobiology and Behavior, State University of New York, Stony Brook 11794

Women as Workers at Risk

Work and the Health of Women. VILMA R. HUNT with assistance from Kathleen Lucas-Wallace and Jeanne M. Manson. CRC Press, Boca Raton, Fla., 1980. viii, 236 pp. $64.95.

The impetus for this book, Hunt reports in the preface, dates from 1974, when the Women's Equity Action League passed a resolution calling for more attention to the occupational health of women workers. This volume is thus intended as a resource for policy-makers—"those who are responsible for providing answers and influencing the quality of our work environment." It is not