(which may have been repeatedly remelted in association with metals from a variety of sources), helps the reader to understand why the earliest and principal sources of tin are still a matter of debate, although it is known that tin from Cornwall was available to the Aegean world by the 16th century B.C.

Muhly, as do other commentators, accepts Anthony M. Snodgrass's argument that in the 12th and 11th centuries B.C. political and economic factors combined to provide the incentive for the discovery and spread of iron technology in the Mediterranean. That is, the disruption of the long-distance trade in copper and tin, which was brought about by the collapse of the Mycenaean civilization and the general unrest in the Mediterranean world and which led to a critical shortage of bronze, provided the incentive to metalworkers to find a substitute for bronze. Iron, familiar as a by-product of bronze metallurgy and already used for more than a millennium for jewelry and ceremonial purposes, was available as an almost ubiquitous raw material.

Another theme that may be detected in the book is the variability of human invention seen in the different paths of metallurgical evolution. The essays in this collection demonstrate conclusively that metallurgical developments occurred in quite different stages in different parts of the world, and at different times. Several of the authors stress the importance of studying first the technological and cultural evolution of individual regions, rather than following simple models of universal evolution. Dennis Heskel and Carl Clifford Lamberg-Karlovsky, for example, offer Tepe Yahya, Iran, as a case study in refutation of such theories, including Colin Renfrew's evolutionary scheme of copper-to-bronze manufacture. Lechtman's essay on the Andes in pre-Columbian times, where iron technology was not developed at all, provides a more dramatic example of the importance of the regional approach.

Technical aspects of metallurgy constitute part of all papers, and are the principal component in some of them. One essay in the latter group is a lucid, concise discussion by Ronald F. Tylecote of metallurgical furnaces and processes. Neither Tylecote nor any of the other authors makes much, if any, allowance for a possible lack of technical knowledge among the readers; there is not even a technical glossary. Some archeologists, therefore, are likely to find parts of the book difficult reading. But the volume admirably repays the reader for any such difficulty with valuable, perceptive discussions and commentaries on some of the most significant technological and cultural changes of the human past.

The essays were written in honor of the distinguished scholar Cyril Stanley Smith, and they constitute, as their authors hoped, "a fitting tribute to a most uncommon man named Smith." The book belongs in every archeological and metallurgical library.

JAMES R. WISEMAN
Archaeological Studies Program,
Boston University,
Boston, Massachusetts 02215

Structuralist Ethnography

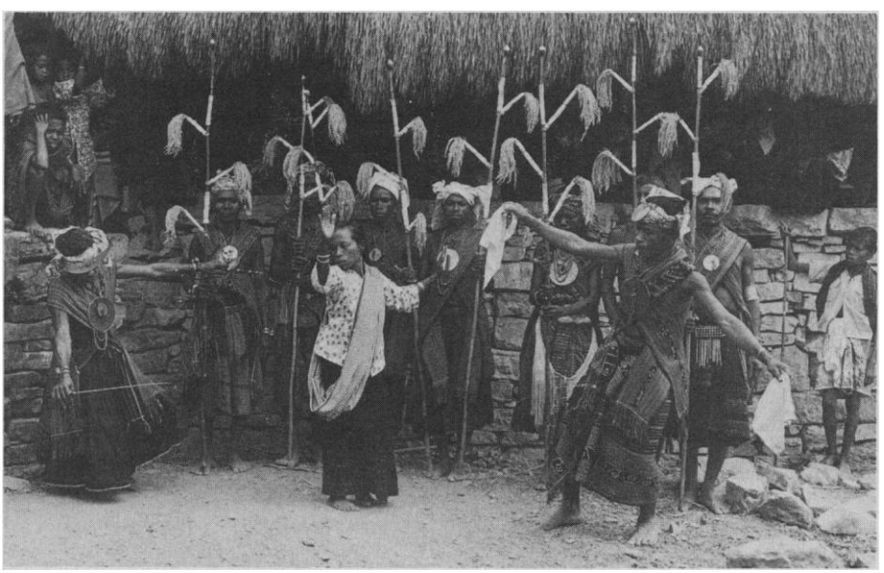
The Flow of Life. Essays on Eastern Indonesia. JAMES L. FOX, Ed. Harvard University Press, Cambridge, Mass., 1980. xii, 372 pp., illus. $30. Harvard Studies in Cultural Anthropology, 2.

The Flow of Life derives its inspiration from a pioneering study in comparative structuralism by the Dutch anthropologist F. A. E. van Wouden. Van Wouden's 1935 study of systems of marriage exchange and symbolic classification in Eastern Indonesia foreshadowed the structuralism of Claude Lévi-Strauss and others, notably Rodney Needham of Oxford. *The Flow of Life* collects essays by 15 anthropologists—English, American, Dutch, French, Australian, and Indonesian—who have done field research in Eastern Indonesia and bring this work to bear on the argument of van Wouden. In a fashion typical of much of the best social anthropology, they do not so much "test hypotheses" as explicate ordering principles, exploring their power and implication with reference to the ethnographic data. In this way, as P. E. de Josselin de Jong puts it, quoting Rivers, one illuminates "abstract problems by means of concrete facts."

The essays are divided into two sections, framed by the editor's introduction and conclusion. The first section treats social organization, the second symbolic structure—the two levels that van Wouden and, indeed, much of anthropological structuralism struggle to connect.

The first section is introduced by an essay by Needham, whose own fieldwork on the island of Sumba carried forward van Wouden's initial work and then stimulated some of the more recent researches on other islands of the region that constitute the bulk of the volume. Needham endeavors to lay bare the fundamental principles that account for variation in Sumbanese society: identity, duality, inequality, asymmetry, and complementarity. The result is a lucid and impressive comparative analysis that, while meticulously attending to the ethnographic variety, succeeds in revealing a suggestive order beneath that variety. Each subsequent essay focuses on findings from its author's recent fieldwork—on Flores, Roti, Timor, Seram, among the Kedang—that bear on principles like those elucidated by Needham, van Wouden, Lévi-Strauss, and other structuralists; topics include marriage alliance, state structure, moieties, and descent.

The volume's title derives from a phrase which Clamagirand describes for the Ema as "the flow of life which circu-



Dancing at a communal feast held by the Ema of Timor after the first harvest of dry rice. [From B. Clamagirand's paper in *The Flow of Life*]

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