

# Book Reviews

## Goals of Archeology

**The Explanation of Culture Change. Models in Prehistory.** Proceedings of a meeting, Sheffield, England, Dec. 1971. COLIN RENFREW, Ed. Duckworth, London, and University of Pittsburgh Press, Pittsburgh, 1973. xvi, 788 pp., illus. \$29.95.

This is the third volume to result from meetings of the Research Seminar in Archaeology and Related Subjects. It follows *The Domestication and Exploitation of Plants and Animals* (P. J. Ucko and G. W. Dimbleby, Eds., Aldine, 1969) and *Man, Settlement and Urbanism* (P. J. Ucko, R. Tringham, and G. W. Dimbleby, Eds., Schenkman, 1972). Thus the Seminar has proceeded from a discussion of specific historical processes to the ultimate goal of archeological research, explanation of culture change in the abstract.

In making such a move, it is essential to state one's aims and to define the frame of reference within which they are to be realized. To the reader who examines only the first and the last papers in the new volume, it will appear that the Seminar has done just this. In the first paper, entitled "A paradigmatic view of prehistory," Gene Sterud applies Thomas S. Kuhn's theory of scientific revolution to the goals of archeological research. He theorizes that archeologists were in a "pre-paradigm" stage of development before 1859. Then they passed into a "first paradigm" stage, in which they attempted to reconstruct and explain the course of cultural development throughout the world, using the paleontologists' approach in the case of early prehistory and the historians' approach in the case of late prehistory. Now they are on the verge of entering a "new paradigm" stage, in which they will eschew both the natural-history and human-history approaches in favor of one that is "more explicitly scientific" (p. 15). By this Sterud means that the next generation of archeologists will no longer attempt to explain the patterns of change in specific cultures; instead, they will de-

rive hypotheses from a general theory of change and will test these hypotheses cross-culturally.

In a "Concluding address" at the end of the volume, Edmund Leach accepts this assessment and proceeds to evaluate the "new paradigm" of archeology. According to him, Lewis R. Binford (pp. 227-254) and his followers are deriving the new hypotheses from functionalism. Leach argues that this is an outmoded theory of culture change, which social anthropologists abandoned some time ago, and suggests that archeologists may eventually want to move on from functionalism to structuralism as the social anthropologists have done.

Had Leach based his comments on the second paper in the volume rather than the first, he would have reached a very different conclusion. In the second paper, entitled "Questions on theory in the explanation of cultural change in prehistory," Frank Hole implicitly assumes that prehistoric archeology is still in its "pre-paradigm" stage and has not yet settled upon a standard approach to the study of cultural change: "In my view, our theory on change is weak because we have not made necessary operational definitions of important concepts in terms of the properties of the phenomena under discussion and the goals we wish to achieve" (p. 19). He then proceeds to discuss the current range of thought about the concepts of explanation, prehistory, culture, change, and models. He notes many conflicting points of view and obviously thinks the time is not yet ripe to reconcile them or to organize them into a consistent paradigm in Kuhn's sense.

If Leach had based his concluding address on Hole's paper, he would have been unable to claim that archeologists are in the process of becoming functionalists. Hole does not believe that the ultimate goal of archeology should be the testing of hypotheses derived from a general theory such as functionalism. For him, it is more important to explain specific historical de-

velopments, as in the first two Seminar volumes. The way to do this is to postulate multiple hypotheses in explanation of each development, and to select the hypothesis or hypotheses that best fit the evidence for that development. Some of the hypotheses may be derived from functionalism, but all other sources should also be used, presumably including structuralism. Hole would not eliminate humanistic, as opposed to scientific, hypotheses. He doubts that we will ever be able to develop a cover theory from which all potential hypotheses for explaining culture change can be derived.

A concluding address based upon Hole's paper would have had to discuss separately the ultimate goal of archeology, the nature of culture change, and kinds of explanatory hypotheses, on the assumption that views about these issues are changing independently rather than as parts of a succession of paradigms. Indeed, the value of the book as a whole is that it illustrates the current range of opinions about these and other issues.

Most of the contributors to the volume seem to agree with Hole on the aim of explaining specific cultural developments in terms of multiple working hypotheses, as well they might, since the book is concerned with "prehistory." A minority follows Sterud and Leach in giving priority to "laws" derived from general theories of culture change; they prefer "scientific" to prehistoric explanation.

In formulating explanations of change, Binford and the other functionalist authors draw a dichotomy between culture and the natural environment. This enables them to explain the changes of culture in terms of its adaptation to the natural environment. Other contributors (most notably, J. J. Wood and R. G. Matson, pp. 673-683) view culture and the natural environment as parts of a single entity, to which humans must adapt. For them, change of culture is due not to factors in an external environment but to internal variation within a combined cultural and ecological environment.

In either case, systems theory is the favored way of approaching the study of culture change. Most of the authors who use this approach view cultural systems narrowly in terms of technology and subsistence, in accordance with the ecological emphasis that now prevails in prehistorical research. As Leach points out, they pay relatively little at-

tention to other cultural activities, especially science, art, and religion, which involve the study of information, style, and beliefs rather than motor behavior. Leo S. Klejn, the lone Russian contributor, is a notable exception; while he considers factors of production to be paramount, he notes that Marxian archeologists are now paying more attention to economics, politics, and ideology (pp. 691–710). Among the non-Marxists, there appears to be an increasing interest in demographic and social, as opposed to cultural, factors. William L. Rathje's paper on Mayan social structure (pp. 731–757) is a complex example.

In this computer age, most of the authors have found it convenient to proceed by examining the variability in artifacts and nonartifactual remains within particular assemblages. By so doing, they focus upon microchanges, which have taken place at particular points in time and space, as opposed to macrochanges, which take place through the dimensions of time and space. The greatest gap in the volume, especially when it is compared with the two previous Seminar volumes, is its failure to deal with macrochange, involving long-term patterns of development—this despite the fact that archeology is especially well suited to the study of long-term patterns since it covers the total range of prehistory and history. Evolution, conceived as the overall pattern of development in nature and man, is scarcely mentioned at all, except by authors like Warwick Bray (pp. 73–92) who draw analogies between paleontological and archeological studies of change.

IRVING ROUSE

*Department of Anthropology,  
Yale University,  
New Haven, Connecticut*

## Viruses and Chemotherapy

**Selective Inhibitors of Viral Functions.** WILLIAM A. CARTER, Ed. CRC Press (Chemical Rubber Co.), Cleveland, Ohio, 1973. x, 378 pp., illus. \$39.95.

The purpose of this book is to provide a ready source of references and a better basis for experimental design in investigating antiviral compounds. Another aim is to categorize knowledge on the mode of action of viral inhibitors at the molecular, cellular, and clinical levels. The result is a series of essays that proceed from general aspects of the

limitation of viral diseases to interferon induction and its biologic effects, then to specific groups of drugs that affect viral replication, concluding with inhibitors of some nucleic acid polymerases involved in viral transformation of cells and oncogenesis. An attempt to provide an overview of responses to viral infections fails owing to the largeness of the subject. The consideration given vaccines is not well integrated into the theme. Chapters on inhibitors of specific viral functions provide more than 2000 references and interpret them in a format that is enjoyable to read.

Research on interferon has established it as an integral part of the host defense response. Because of the large number of systems studied, some paradoxical results, and the unavailability of pure interferon, the authors must resort frequently to such phrases as "The mechanism is unknown, but the observations suggest . . ." The result, however, is a good view of the present status of knowledge about interferon and a calling of attention to the many gaps that remain to be filled. The discussion proceeds from the molecular biology of induction of viral replication to differentiation of specific effects, how interferon reduces infections, and the potential for medical application. Naturally the molecular end is hypertrophied by comparison with the clinical. A little disappointment is that the molecular biology presented primarily pertains to chemical inducers and the induced cell. The protected cell in the two-cell system is treated lightly although at least species specificity, viral polymerases, concentration-dependent binding, and varying virus sensitivity are involved. The biologic problems of toxicity, enhancement, hyporeactivity, and immunogenicity of inducers are identified, but few insights into mechanisms are provided. The most provocative challenge is to replace the Jacob-Monod model with one to explain interferon production by eukaryotic cells.

Optimism is expressed that useful chemotherapeutic agents can be evolved through knowledge of chemical inhibitors of viruses that compete for specific active sites in viral replication. Viruses of a single group possess common features subject to biochemical attack. Different mechanisms of inhibition are recognizable among the compounds considered. Amantadine exemplifies attack during entry of the virus into the cell, thiosemicarbozones selective chelation, nucleic acid analogs selective inhibition of DNA precursors,

guanidine and hydroxybenzimidazole reversible inhibition of RNA synthesis, and ansamycins selective binding and inhibition of RNA polymerases. Some presentations simply reiterate molecular dogma; some contain meager biochemical information; pharmacologic considerations are largely ignored. Time restrictions of the drug inhibitory effects, specificity, reversibility, helper activity, and mutational drug resistance exemplify the complexity of the problems facing clinical use.

Some important concepts noted are: formation of empty virions with cytotoxicity during drug blockage of infectious RNA virus, activation of latent virus genomes by drug treatment, and specific bivalent binding of drug to nucleic acid sites and polymerases. An "axiom" suggested by the last of these is that an inhibitor of an essential virus-directed polymerase can be lethal for the virus and therapeutically useful. The book fuels hope for the future of antiviral chemotherapy.

GEORGE GEE JACKSON

*Department of Medicine, University of Illinois College of Medicine, Chicago*

## Metalloproteins

**Iron-Sulfur Proteins.** WALTER LOVENBERG, Ed. Academic Press, New York, 1973–74. Two volumes. Vol. 1, Biological Properties. xiv, 388 pp., illus. \$33. Vol. 2, Molecular Properties. xiv, 344 pp., illus. \$29. Molecular Biology Series.

In slightly less than 20 years there has developed a vast core of knowledge on the iron-sulfur proteins. Impetus for research on these unusual proteins was provided in 1962 by the discovery of a low-molecular-weight protein from a nitrogen-fixing bacterium, *Clostridium pasteurianum*. This brown iron-containing protein was found to promote the phosphoroclastic reaction involved in nitrogen fixation and consequently was given the name ferredoxin. Interest in relating this protein to other, previously discovered factors that contained iron led to a flurry of research on the biochemistry of these proteins and the nature of the iron-sulfur complex.

It has now become clear that the iron-sulfur proteins are vital for many important biochemical reactions in nearly every organism from the very primitive anaerobe to the highly sophisticated mammal. Indeed, one begins to wonder if all organisms will not eventually be shown to utilize some