

Book Reviews

Laboratory Methods and Techniques in Archeology

Science in Archaeology. Don Brothwell and Eric Higgs, Eds. Thames and Hudson, London; Basic Books, New York, 1963. 595 pp. Illus. \$17.50.

The title for this volume is well chosen, for *Science in Archaeology* deals with the contributions made to archeology by scientists from other disciplines, mainly those in the natural sciences. Only a few of the contributors are themselves archeologists; most have their primary affiliations, titles, and degrees in other fields. Archeology is among the most fortunate of investigative studies in attracting the attention and research contribution of so many scholars. This is particularly noteworthy because the research time so generously spent by biologists, geologists, chemists, and others can be motivated only by true intellectual curiosity about man's past—there are no tangible rewards for the scholar who chooses to apply some of his research time and skills to archeological problems. It is, however, important in appreciating the contribution of this volume to recognize that it is indeed science *in* archeology. It is not the science *of* archeology, which is something quite different in scope, nor does it deal with the critical question of the intellectual relationship between science and archeology. These matters are discussed below, and it is sufficient here to point to them as an indication of who is likely to read this volume. The book should have a much wider audience than archeologists alone, for anyone in the diverse sciences represented may enjoy reading about his colleague's efforts as they are applied to archeology, and anyone who shares the archeologist's curiosity about unraveling the mysteries of past humanity will be interested in the intricate, ingenious, and sometimes brilliant ways in which specific problems have been attacked and solved.

As for the union-card archeologists themselves, one may ask whether they will be better archeologists after perusing this volume. The answer is yes and no. Certainly they will be better informed in a discipline that requires tremendous breadth of knowledge. In some practical ways, also, they will be better archeologists, primarily as a result of picking up explicit and implicit pointers about better techniques for collecting and preserving specimens. On the other hand, this is not a "how to" book, and the reader will not be able to perform most of the analyses presented by the authors; he will be just as dependent on the intellectual assistance of colleagues in other disciplines as he was before. In fact, several contributors explicitly caution that the archeologist is not competent to analyze the materials discussed and that he should not attempt to do so without expert assistance.

Since 1945 there has been a great burst of publication dealing with the methods and techniques of archeology. If we disregard readers and anthologies, an approximate count shows one such book by a Belgian, one by a Mexican, two each by Frenchmen and Germans, four or five by Americans, and at least ten by British authors. It is not surprising, therefore, that the present volume is primarily a British effort, although 19 of the 54 essays were contributed by authors from other parts of the world. The essays deal largely with the analysis of particular materials or classes of specimens encountered in archeological sites: soil, pollen, wood, coprolites, bones (bird, fish, and human), shells, skin, fibers, stone, metal, ceramics, and glass. There is an introductory section (eight essays) that deals with the important and always interesting problems of determining the age of finds, two articles on prospecting, and an extensive group (12 essays) that is

concerned with the analysis of human remains.

With the exception of the two essays on prospecting, the volume is essentially a treatise on laboratory methodologies, since nearly all the studies reported must be done in the laboratory. There is little on the technique of scientific excavation, although several of the authors stress the fact that specimens which are to be analyzed must be collected under carefully controlled conditions, hopefully by an archeologist who is aware of the value of the many kinds of specimens described.

This book will not teach anyone how to dig, and little is said about what the archeologist is up to intellectually. Archeology is here treated as the accumulation of facts about ancient specimens, a true enough but a relatively low level approach which may make readers wonder why anyone should seek a specialized degree in archeology (or, indeed, what the archeologist does besides pester his colleagues in the natural sciences for technical analyses of this or that find). It is impossible to appreciate the merits and shortcomings of this volume without understanding that archeology is both a natural and a social science, and that all these facts about animal bones, obsidian chips, and mummy hair are meaningful to archeology only in their relevance to the immense panorama of human history and the development of culture. It has been said that archeology is a discipline that uses the methods of the natural scientist to attain conclusions that can be classified as social science (or as the humanities). A book that stresses one side of the coin, no matter how well, cannot therefore provide real understanding of what archeologists do, or of what they think about.

The professional archeologist has as his close colleagues some natural scientists and some social scientists, and as the man in the middle he is aware, sometimes painfully, of the communications problems between the two. The natural scientists often like archeology but are indifferent or even hostile to the social science part of it. The social scientists commonly feel that an archeologist could be a pretty good social scientist, if he didn't spend so much of his time fooling around with material specimens that have to be measured and tabulated. The more hostile social scientists are fond of classifying archeologists as mere technicians and their discipline as a body of techniques,

lacking entirely in theory or any broad intellectual goals.

All of this is not criticism of *Science in Archaeology* which makes no pretense (except on the dust-jacket and that can be ignored) of being a complete treatise on methods and techniques. Concentrated as it is on the laboratory approach, the book is far from complete, even with respect to the natural science part of archeology, although its summary articles include excellent up-to-date statements about most of the problems of current interest. One can, however, more clearly appreciate the accomplishments of the authors through understanding the place of their essays within the framework of scholarship in archeology.

It is not particularly useful to comment on which of the 54 articles are the best. The individual reader will find that his interest varies widely from article to article, depending on his background and specific interests. Some of the articles are well done, but their content will be familiar and hence perhaps less exciting than material of greater novelty. Some of the more interesting articles are those by E. H. Willis on radiocarbon dating (a most informative compact summary of the current problems), Charles Reed on osteoarcheology (the analysis of faunal remains), and Nils-Gustaf Gejvall on cremations (the determination of age and sex from small fragments of cremated human bone). Other readers will find their own interests most drawn to different parts of this extensive and varied series of essays.

It is a truism that large collections of essays are uneven in scope and quality, and in works like this one the variability is inevitably intensified because the contributors are from different countries and different disciplines. A few of these articles are brief pontifications without bibliographies. Others, while not lengthy in pages, are crammed with information and have such exhaustive bibliographies that some of the more obscure and inconsequential articles (namely my own) are cited. Many of the articles cite only "local" literature, mainly European. Some articles cite no archeological writing and are confined to specialized literature dealing with a particular type of analysis. Other articles make the analysis more explicitly relevant to archeological conclusions.

Despite the inevitable shortcomings of collected essays, however, the vol-

ume profits greatly from the built-in advantages of this kind of treatment—primarily the assemblage between two covers of many kinds of compact summary articles. Although much of the material is available elsewhere, to uncover what is presented here would require broad reading in many technical journals. The selection of essays is good and the editorial grouping is sensible, so there is a coherent pattern for the book as a whole. As a result of the broad coverage, every reader will find something of interest in and will learn quite a bit from *Science in Archaeology*.

CLEMENT W. MEIGHAN
*Department of Anthropology,
University of California, Los Angeles*

Crystalline Polymers

Polymer Single Crystals. Philip H. Geil. Interscience (Wiley), New York, 1963. xii + 560 pp. Illus. \$16.

In 1957 Keller showed that the single crystals produced by precipitating polyethylene from dilute solution were formed by repeated folding back on themselves of the long polymer molecules, a process that results in thin, platelike, single crystals whose large upper and lower surfaces consist of chain folds. This discovery initiated a revolution in polymer crystal physics, which, when expanded to include the case of other polymers and crystallization from the melt, forms the basis of Geil's timely book. Geil treats the experimental aspects with admirable clarity and without serious omissions. Theoretical aspects of chain folding and related phenomena are discussed, but they do not constitute his central theme.

The chapters on the experimental aspects of single crystals from bulk and dilute solution, and on hedrites and spherulites formed in the bulk phase, are excellent. Convincing experimental evidence of chain folding is given in detail. The chapters on the annealing of polymers and on the relationship of morphology and properties are perhaps somewhat less satisfying because both the experimental and the theoretical background of these aspects are more confused or less complete, than those of other parts of the topic. Certainly Geil's presentation and organization of the facts in these areas, as they are now known, will not be easily surpassed until new evidence comes to

light. The chapter on orientation effects is particularly worthy of praise.

Most of the theoretical side of chain folding is discussed in one chapter, and in the discussion of the experimental aspects no persistent attempt is made to weave theory and experiment together, although the expert reader can often sense what Geil thinks about the origin of various phenomena. Doubtless his reluctance to assume a firm stance with respect to the theoretical interpretation is partially justified by the fact that two very different and somewhat complex theories of chain folding have been proposed. At the time the book was written there was no clearly decisive test of which, if either, theory was correct. Geil gives a sound and fair presentation of both theories.

My evaluation of this book can be summarized in a prediction: In a relatively short time, well-worn copies of Geil's book will be found in the laboratories of practically every worker interested in the physical properties of crystalline polymers, regardless of whether his main interest is fundamental research or technological application.

JOHN D. HOFFMAN
*Polymers Division,
National Bureau of Standards*

Russian-English Dictionary

Russian-English Physics Dictionary. Irving Emin and others. Wiley, New York, 1963. xxx + 564 pp. \$14.

This Russian-English dictionary of physics is a welcome addition to our technical literature, for it fills a great need in that it facilitates our access to a highly important segment of the world's scientific literature. Indeed, the Emin dictionary is too much of a good thing. An adequate physics dictionary need not be burdened with geology, mineralogy, and meteorology. We do need good polytechnical dictionaries, but the Emin dictionary does not claim to be one. Why then burden a physics dictionary with пулемет [machine gun], партийный [party] разве [perhaps; unless; really], извините (меня) [I beg your pardon], шпион [spy], and many others. Although the English rendition of Russian technical terms is generally good, there are mistakes. Thus, чад is never smoke but fumes, and обзоливать is not calcine but ash