huacán Archaeological-Botanical Project has enormously enlarged our understanding of the beginnings of farming and its relation to the crucial transitions from mobile bands to villages and towns [*Science* **143**, 531 (1964)]. Fortunately, readers will find in the nearly 1000 titles cited at the end of the volume a few references to the most recent literature on this and other topics. It is perhaps unavoidable that publication lags so far behind the appearance of new data, particularly publication of a multivolumed survey; it would have been helpful if the date of submission for each chapter had been indicated.

A surprising omission in the volume is any prefatory explanation of its origin, aims, and scope. At least as early as 1955 the Committee on Latin America of the National Research Council's Division of Anthropology and Psychology discussed plans for the handbook, and by 1957 had concluded detailed studies of the problems involved. It appeared impossible for the Smithsonian Institution to sponsor the project, as it had the South American handbook, and despite extensive discussion by committee members with Mexican colleagues, bilingual publication was not feasible. The entire program illustrates well an important traditional role of the National Academy of Sciences–National Research Council—that of providing an environment in which significant and far-reaching programs have their inception and initial precarious growth, until means are found for transferring their ultimate realization to others. By its very nature this role is sometimes obscure, but as in the present instance, it is nonetheless of tremendous ultimate importance to scholarly pursuits. Unfortunately, the names of the continuing NAS–NRC Committee, which forms the Advisory Board to the Editor, are entirely omitted. The group of scholars who conceived, planned, and brought to fruition this handbook deserve our thanks, and the National Science Foundation's crucial role should not go overlooked—two substantial grants that made possible the planning and preparation and another towards publication costs.

The aim of this ambitious handbook is to provide a summary and interpretation of the Indian cultures of Mexico and Central America from the earliest human occupation to the present. Because this volume provides mainly introductory and background material, the full scope of the series will only become apparent in future volumes. They will present for the first time in accessible, systematic form all the basic data on the anthropology of Mesoamerica, with interpretations by leading experts. Robert Wauchope, the general editor, and Margaret A. L. Harrison, the associate editor, have earned the gratitude of scholars and laymen alike for their skill and perseverance in successfully carrying through this enormous and exacting task. The University of Texas Press has produced a handsome format, with splendidly reproduced drawings and photographs; typographical errors are remarkably few. The price, at $15 a volume, is reasonable, and a prepublication subscription is offered at $120 for the 11-volume set. There can be little doubt that, like the *Handbook of South American Indians*, this monumental synthesis will provide a sound basis for new generalizations and will stimulate additional research to fill the gaps in knowledge and understanding that will become apparent.

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Methods Used to Date Fossil Man

The publication of **Frameworks for Dating Fossil Man** (Aldine, Chicago, 1964. 365 pp., $8.75), by Kenneth P. Oakley, is a most significant milestone for the study of early man; it provides for the first time in one volume an authoritative and concise account of many of the dating methods used today and of the main cultural successions in the Old World up to the end of Mesolithic times. It does more than this, however, although this is not its main purpose, in that it provides beautifully concise summaries of the ecological background essential to any understanding of early hominid behavior.

Oakley was trained as a geologist and as an archeologist, and his book shows how important, indeed one might say essential, it is that knowledge of these two subjects should be combined in a prehistorian. The study of paleoanthropology is at present more closely linked to the earth sciences than it is to anthropology, because the methods of the archeologist are those of the sci-

The greatly increased interest in the life of early man that has been a feature of postwar anthropological studies follows, in part, from the discovery of a number of very important fossil hominid remains and, in part, from the application of immeasurably more precise techniques for dating these remains and the associated finds. All this is the outcome of an expanded teaching program in universities, with the consequent increase in the number of trained paleoanthropologists now actively engaged in field research, and of the growing awareness on the part of prehistorians and natural scientists concerned with the interpretation of paleoenvironments that team studies provide potentially the most satisfactory way of reaching the correct answer. Both look to the physicist, the chemist, and the geologist to provide a chronological framework in terms of years to supplement the various methods of relative dating. The resulting new methods and techniques and the new "co-operative" approach have rendered very much out of date the few textbooks, written before or just after World War II, that attempted to provide a comprehensive view of Quaternary man and his surroundings.

entist, although the interpretative reconstruction of behavior belongs in the field of anthropology.

The book is divided into two parts, the first, and shorter, being devoted to stratigraphical dating and the second to describing the succession of cultural stages and events in Europe, Africa, and Asia. The text is very clearly written and a pleasure to read; it is supplemented liberally by text figures, tables, charts, and illustrations of tools. The excellent dating terminology which Oakley himself developed at the Wenner-Gren Foundation symposium (New York, 1952) is explained in an introduction and used throughout the book.

Part 1 includes much information on the methods of relative dating which are in general or limited use today, and the chapter on the Pluvial-Interpluvial hypothesis is an excellent summary of current theories to explain glacial phenomena and the "pluvial" climates in the lower latitudes. Other chapters give more detailed accounts of certain well-known and important stratigraphic successions, and three chapters are devoted to post-Glacial stratigraphy, varve analysis, climatology, and forest development. The text is supplemented by 117 notes that are particularly useful in explaining the changes that have been made in terminology and the importance of using local names for regional stratigraphic units.

Prehistorians will find the first part particularly valuable, though it is to be regretted that no account is given of the main absolute methods of dating. The book makes extensive use of the results of these, but it would have been valuable to have included some account of the radiocarbon, potassium-argon, and protoactinium-thorium methods, for example.

Part 2 concerns Paleolithic and Mesolithic archeology, and the author sets out to show that, prior to the development of food production and settled village life leading to disparate cultural evolution, there was little or no time lag in the general dissemination of the essential inventions and techniques which led to increased economic and social efficiency. It is, therefore, considered that cultural remains may be regarded as zone fossils just as fauna and pollens are so considered. Within very broad limits this is true, but they must be kept sufficiently broad, as between the Lower, Middle, and Upper Paleolithic, for example. Also, in view of the present state of our knowledge, it is to be debated whether, except with respect to a very few regionally restricted tools, one would be justified in narrowing the limits to use artifacts as precisely as, for example, fauna for determining the relative age of a particular deposit. It is to be doubted whether subdivisions of the Acheulian culture in the Somme, Olduvai, or Vaal River localities have anything more than local significance. Oakley is aware of this and points to the importance of having an assemblage of artifacts, as of fauna, for assessing its relative age. The precise quantitative methods of analyzing assemblages now being used, although providing a much closer approximation of age, also show the degree to which variability is present in industries at least as early as the beginning of the Middle Pleistocene. The investigation of earlier Pleistocene living places, of assemblages in primary context to recover distribution patterns, now being carried out by a small group of investigators, demonstrates that typology is a very uncertain criterion from which to assess the age of a tool *unless* the specimen is properly tied into the rest of the assemblage. Tools that typologically would be classified as Mesolithic are now being found to occur in Lower Pleistocene assemblages, and for long the reverse has been known to be true. It would, therefore, have been of value if some of the examples of the quantitative analyses that have been done on European Mousterian and Upper Paleolithic or on African Earlier and Middle Stone Age industries could have been included. When considered in conjunction with the distribution pattern at the living sites, these show the increasing complexity and variability of culture through time.

The main cultural traditions in the three continents are all concisely covered, and much of what is discussed is here correlated for the first time, particularly in the chapter on Asia. The so-called "parallel evolving" tool traditions of northern Europe and the Far East are seen as expressions of activity differences and ecological adaptation and, in my opinion, quite correctly, doubt is cast on the earlier hypothesis that they were the product of two genetically distinct hominid populations.

The section on Africa gives an up-to-date account of Leakey's discoveries at the Olduvai Gorge, but reference should be made to Hay's stratigraphic work that gives new climatic interpretations for the nature of the sediments and amends the position within Bed II of some of the site localities—for example, sites BKII and SHKII are now seen to be at the top of Bed II, not at the bottom as originally stated. The significance also of the blade-tool and other interrelated traditions in Africa would have been more apparent if North and sub-Saharan Africa had been considered as a whole. There are 138 explanatory notes to this section.

An appendix of 14 tables provides a list, with very few omissions, of the human fossils, indicating associated culture and absolute age where this is known. It may be regretted that a specific section on hominid evolution is not included in the text, because this would have served to emphasize more clearly the inseparable nature of biological and cultural evolution.

There are a few printer's errors, among which may be mentioned the use of *E. joliensis* for *E. iolensis* and of Anfantian for Anfatian on page 99. There are also some omissions in reference to recent work—for example, Bordes's suggested derivation of the Lower Perigordian from the French Mousterian or Movius's work at the Abri Pataud and Mason's studies of the Earlier and Middle Stone Ages in South Africa or Robinson's on the status of the *H. erectus* (*Telanthropus*) fossil. But these by no means detract from the importance of the book; indeed, in view of present-day publication delays and the speed with which new evidence is becoming available in Quaternary studies, such omissions are often inevitable. There is a valuable bibliography to each part.

Frameworks for Dating Fossil Man is a textbook of major importance which brings together for the first time the results obtained from the relative and absolute dating techniques in use today, results that Oakley himself not infrequently played a leading part in obtaining. The book presents this evidence with a clarity that makes it indispensable to all concerned with the research and teaching of paleoanthropology.

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