salient basal angles; and bowls with a sharp, relatively high basal angle and convex, sharply incurving sides. The favored form of decoration in both complexes is zoned hatching, with the hachured areas showing overpainting with red pigment after firing. The two complexes share a number of design motifs and the same general emphasis on design layouts built up from a series of bands of uniform width. That these two complexes are closely related appears highly probable, and the fact that Kotosh Waira-jirca shows a number of ceramic influences from some other source, such as neckless ollas and pattern burnishing, which are completely absent in Early Tutishcainyo, suggests a lowland to highland movement rather than the reverse. In its extensive use of double-spout and bridge bottles; concave-sided, round-bottomed, composite silhouette bowls; and zoned, post-fired painting, Kotosh Waira-jirca also aligns itself with the early ceramics of the southern coast of Peru, the ceramics that form the foundation for the long stylistic continuum through the Paracas style and on into Nasca style.

The earliest indications of influence from Mesoamerica occur in the Kotosh Kotosh period around 1000 B.C. The exact significance of the ear of corn depicted on one of the Kotosh Kotosh bottles has already been hotly debated by Coe and Lanning [M. D. Coe, *Amer. Antiq.* **27**, 579 (1962) and **29**, 101 (1963); E. P. Lanning, *ibid.* **29**, 99 (1963)]. Whether or not the design is specifically La Venta in style, the fact that corn is illustrated is positive proof of cultural stimulation from Mesoamerica. A couple of figurines from the Kotosh Kotosh level (Plate 99d) show stylistic characteristics aligning them with certain early Coastal figurines, such as the one from Haldas, and certain peculiarities of all of these figurines are suggestive of Mesoamerican derivation. The appearance of strong Mesoamerican influence in northern and central Peru between 1200 and 1000 B.C. is hard to deny, but such influence appears about 1000 years too late to explain the appearance of elaborate religious structures and sizable sedentary communities within the Central Andes.

One of the two controversies mentioned at the beginning of this review seems to be definitively settled by the data presented in *Andes 2*. If the Kotosh site were the only one in the Central Andes indicating the appearance of massive ceremonial structures, and large sedentary communities well back into the second or even into the late part of the third millennium B.C., then one might question the evidence more closely and doubt the relevant carbon-14 date. However, much recent work on the central and southern coast of Peru and around the Titicaca Basin, which has been less well publicized and less adequately published, backs up the Kotosh data in these respects [J. H. Rowe, *Ñawta Pacha* **1**, 1 (1963); T. C. Patterson and P. Lanning, *ibid.* **2**, 113 (1964)].

With respect to the second controversy, the direction of the flow of early cultural influences between the highlands of the Central Andes and the tropical lowlands of the Amazon Basin, the data of Kotosh are less emphatic, but they at least suggest that Sauer was basically closer to the truth than were his critics. The earliest ceramics at Kotosh clearly have their closest affinities with ceramics from within the tropical forest region of the Amazon Basin, and I have already cited some evidence that would suggest the temporal priority of Early Tutishcainyo over Kotosh Waira-jirca. Sauer described a hypothetical environment in which Tropical Forest root-crop agriculturalists could have modified their agricultural patterns to the point where they could have progressed further into the colder altiplano: "Some of the tropical tubers, sweet potato and racacha in particular, do well in temperate altitudes, to six thousand feet, or more. My postulated tropical planters, therefore, should have had no difficulty in settling valleys that reached well up into the Andes. For the next stage in the farming colonizations of the Andes, that of the cool temperate zone, new crops had to be found" [Carl O. Sauer, *Agricultural Origins and Dispersals* (1952), p. 50]. It is interesting to note that the location of Kotosh in the Huánuco Basin, part way up the eastern slope of the Andes and at an elevation of about 6000 feet, fits Sauer's hypothetical description perfectly.

DONALD W. LATHRAP
Department of Anthropology, University of Illinois, Urbana

Handbook of Middle American Indians

As anthropological knowledge increases, the need also increases for summaries and handbooks such as those long enjoyed by the older disciplines. But the growth of knowledge also makes the task greater and the result more bulky, as evidenced by this 11-volume series—**Handbook of Middle American Indians** (University of Texas Press, Austin), edited by Robert Wauchope—which will be published during the next five years. Its predecessors were the *Handbook of American Indians North of Mexico* (2 vols., 1907) and the *Handbook of South American Indians,* (7 vols. 1946 to 1959). Anthropologists, scholars in other fields, librarians, and the general public will all be well served by this encyclopedic survey. The ten forthcoming volumes will be devoted to archeology, language, physical anthropology, ethnology, social anthropology, and ethnohistory. Like volume 1, *Natural Environment and Early Culture* (1964, 578 pp., $15), edited by Robert C. West, each will contain about 15 articles on specific aspects of these themes, usually defined geographically, chronologically, or topically. To judge from this first volume the completed handbook will be a

major scholarly contribution and an indispensable reference work.

The Indian cultures of Mexico and Central America have been the subject of investigation from the time of their first discovery and subsequent destruction by Europeans. But only during the last few decades have systematic studies by anthropologists provided a clear view of cultural origins, growth, and flowering. The extreme geographic diversity of Middle America was matched by its cultural differentiation into scores of distinct units ranging from simple bands or tribes to sophisticated city-states with all the basic attributes of civilization. In spite of the rapidity with which the indigenous cultures were destroyed by the diseases, soldiers, and priests of Spain, a vast fragmentary record exists, including eyewitness accounts, native documents of both pre- and postconquest origin, and histories (many based on now-missing sources). This record supplements and clarifies the archeological data, which are still meager for the first dozen millennia but provide almost a surfeit of detail for some localities and topics in the last two millennia. The purpose of this handbook, and a long-felt, widely acknowledged need, is to summarize in broad terms the basic data, to point out the threads of cultural continuity that can make meaningful such a seeming patchwork of native peoples, to characterize the several pre-Columbian civilizations of the area, and to describe the remnant tribes and indigenous aspects of the modern scene.

As has often been pointed out, the social sciences must depend to a considerable degree on whatever data they can secure on the varieties and sequences of human behavior under all kinds of conditions, as a basis for testing their hypotheses and gaining new understandings, because controlled observation and testing are often impossible. Our accumulating knowledge of the peoples of the world, both past and present, provides an important source on which to draw, and such areas as Middle America are becoming known in enough depth and detail to permit research on a wide range of complex social-historical-ecological problems. By its very richness, however, this growing mass of data is unusable without a guide like this handbook, and without advice to the unwary about the reliability of various segments of the data. All the "facts" that anthropologists have to work with are not equally "true" (or even useful), and the appraisals and summaries in these volumes should be invaluable to the growing body of scholars who are using Middle American data in their studies. The rapidity with which data are accumulating and permitting new and sounder formulations of the culture history of the area is dramatically illustrated by contrasting such recent works as *Sons of the Shaking Earth* (by E. R. Wolf, 1959) and *Mexico: Ancient Peoples and Places* (by M. D. Coe, 1962) with the sections on the same area in Toynbee's *A Study of History* (1934); many simplistic or totally erroneous notions of three decades ago can now be discarded, as a more meaningful picture of American indigenous cultures is constructed.

About three-fourths of this first volume of the *Handbook of Middle American Indians* consists of ten chapters on natural environment: geohistory and paleogeography (Manuel Maldonado-Koerdell), surface configuration and geology (Robert C. West), hydrogeography (Jorge L. Tamayo), "The American Mediterranean" (Albert Collier), oceanography and marine life of the Pacific Coast (Carl L. Hubbs and Gunnar I. Roden), weather and climate (Jorge A. Vivó Escoto), natural vegetation (Philip L. Wagner), soils (Rayfred L. Stevens), fauna (L. C. Stuart), and natural regions (Robert C. West). Admirable as these compilations may be, some of them have too little relevance to the anthropological data that are the *raison d'être* of this handbook. For example, there are 30 pages of geological data, beginning with the Precambrian; 15 pages on the oceanography of the Baja California region, quite peripheral to Middle American coasts that receive much less detailed treatment; and 47 pages on fauna, with ethnozoology specifically omitted from consideration. In contrast, the discussions of soils, hydrography, and natural regions are oriented toward an understanding of relationships between man and the natural environment, a concern that is receiving growing scrutiny from anthropologists. How much more useful it is to have soil types discussed in terms of their potentialities for aboriginal cultivation than to have marsupials, bats, or edentates cataloged as to number of genera and species, with little or no mention of their roles in the human occupation of the region. The chapter on natural regions deserves special praise, as it offers compactly and clearly the geographic data that are most significant to an understanding of the region's human use. Its author, Robert C. West, professor of geography at Louisiana State University, also deserves credit as editor of the volume for a great deal of the success achieved in the other chapters.

Although the summaries of the natural environment contain data that will be found useful by students of man, and the references will be helpful for penetrating the specialized literature in these fields, it is the last chapters of this volume that will probably be read with most care by anthropologists: "The primitive hunters" (Luís Aveleyra Arroyo de Anda), "The food-gathering and incipient agriculture stage of prehistoric Middle America" (Richard S. MacNeish), "Origins of agriculture in Middle America" (Paul C. Mangelsdorf, MacNeish, and Gordon R. Willey), and "The patterns of farming life and civilization" (Willey, Gordon F. Ekholm, and René F. Millon).

This last chapter which might well serve as an introduction to all the archeological portions of these volumes, sketches the distribution and development of the distinctive prehistoric cultures of Middle America and discusses problems of terminology and dating. It is a cautious summary, however, providing few new ideas or interpretations (for example, the chronological charts provided are based on *both* of the major correlations of the Maya with Gregorian calendars, although radiocarbon dates that are cited almost certainly eliminate the Spinden correlation from serious consideration).

Through no fault of their authors, the other three mentioned chapters suffer from the lapse of time between writing and publication—the chapters were written in 1959 and 1960—because our knowledge of the areas treated has advanced rapidly in the past few years. Attempts are made, through footnotes, addenda, and a few revisions, to insert new data and interpretations, but the results are nevertheless out-of-date in many significant details. Particularly, MacNeish's Te-

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.

RICHARD B. WOODBURY
Office of Anthropology, Smithsonian Institution

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.

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.

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-