

METHODS OF DETERMINING PREHISTORIC CHRONOLOGY

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"Chronology is the essential framework of prehistory in the same sense that it is of history. The difference is one of degree rather than of kind: history requires absolute chronology, prehistory only relative chronology."

—MacCurdy, "Human Origins."

In a specialized discussion such as this symposium on the Archaeology of Illinois, it is perhaps well to pause for a moment to consider the larger setting in which the contributions are implicitly imbedded. It is for this reason I feel that, although in no sense a specialist in the field covered by the morning's topic, I may still contribute a background against which the light thrown by the other papers may be all the brighter. That chronology is a basic aspect of archaeological research has been amply demonstrated by the preceding paper. For the question "When?" in prehistoric research is fully as important as the questions "What?" or "How?" and the immensity of the time-depth envisaged since the coming of man to this earth makes the first question a pregnant one. Dr. MacCurdy's comparison, quoted at the beginning of this paper, clearly states the case; let us consider the significance of an understanding of chronology for archaeological understanding; what, indeed, do we know of prehistoric sequences?

As the curtain of history rises slowly over the world, it is no unset stage indicative of rude beginnings that greets our eyes. Rather the sumptuousness and sophistication of the arrangements, and the number and variety of the actors, presuppose long periods of preparation, and indicate that what we are witnessing is but the latter phases of a drama which has long been in progress behind the dropped barrier. Yet it is not easy for us to understand that knowledge of the preparatory stages of what we witness may have as great a significance for our comprehension of the drama of history as close attention to the unwinding of that drama itself has given. It is only recently that the prehistoric development of man has claimed the attention of scholars, perhaps because the events

in which they live, and those of which they have exact knowledge, have so intrigued them that students did not wish to take the time to investigate the humbler beginnings.

Let us first inquire into the nature of the events which characterised prehistoric society. Were they fundamentally different from those which occur at the present, or which have occurred since the beginning of prehistoric times? As far as we know, the answer is a negative one, the essential difference being perhaps in the size and complexity of society then and now. It is the nature of our information concerning them that is different from that of cultures existing since the historic period. Our knowledge of prehistoric cultures is much more generalised, and concerns the fundamentals of social life to a much greater degree than any historian would find necessary to deal with. There is an entire lack of that specificalness of reference which the historian seeks as a matter of course.

What are the major difficulties which the prehistorian must face in making his record? Why must he be as vague as he is, and why must prehistory be so largely inferential? These impediments are four in number. First, there is the utter lack of written record, which restricts us to never more than hints concerning the intangibles of human activity. Then, such remains as are vouchsafed us are not found in their complete form, and what we must deal with are, therefore, fragments of the material cultures the people possessed. In the third place, we do not by any means have complete distributions, and this is most important. And finally, and most serious of all, is the absence of a time-table; of a chronological sequence universally applicable to which the data may be unfailingly referred.

Recognition of this lack came almost as soon as the study of prehistory itself, and as early as 1836 Thomsen set up his classification of prehistoric time as the ages of Stone, Bronze, and Iron. Obviously, such a rough chronology would not suffice, and many refinements were later introduced. There are three factors which must be considered in the making of a prehistoric time-series, all of which have been utilized. The geological formation of the land and the evidences of climatic change, the palaeontological character of the flora and fauna, and finally, the nature of the archaeological remains themselves, all contribute toward dating a given find. What is the relative importance of these three, and how are they used by the working archaeologists?

Geology is perhaps the science most closely related to that with which we are dealing—how closely, we have seen in the preceding discussion. Where the passage of the year marks a unit of time for the historian, that of a geological period may be said to be that of his colleague who is concerned with prehistoric dating. Investigating the early history of mankind, we find that man's existence does not begin until the very end of the Tertiary, or, better still, the beginning of the Quaternary. During this epoch, there was a series of four glaciations. During each of these four periods, the increasing coldness of the earth sent huge glaciers creeping from the north, covering all of northern Europe and America, and down the sides of the mountain ranges. These took great deposits of stone and earth with them. As the climate in each inter-glacial period became warmer, the glaciers in receding dropped their burdens, leaving clear indications which mark the points where the farthest reach of the glaciers was achieved. During the warm periods, also, large surface deposits of loess were laid down by the wind or water.

It is at this point, as Dr. Baker's contribution demonstrated, that the palaeontologist steps forward. During the warm epochs certain flora and fauna are to be found which are vastly different from the life that inhabited the continent during the cold ones. We therefore can utilize the animal types that were associated with given forms of early man in assisting us to date a given prehistoric phenomenon which we may find in association with them, and thus further establish our time-table. Indeed, in post-glacial periods in northern Europe, these indications are the best we have, marking small climatic changes with great fidelity. When enough of this type of association has been achieved, the typological forms of artifacts may themselves be standardized, and, if used with the greatest caution, may serve further to refine the table of time-duration achieved through the use of these other types of data.

Given a prehistoric site, then, how does the archaeologist go about dating his finds? Obviously, he must first attempt to ascertain its undisturbed character, and the geological period represented by the matrix in which it is found. If associated with his find there are the bones of animals other than man, the position is further strengthened by ascertaining what animals were contemporaneous with the makers of the artifacts, and whether they are those which the geological aspect of the site would cause to be expected in the given stratum. Finally, the nature of the artifacts themselves must be established, first by working out their

typology, and then by comparing them with the work of other prehistoric men who may be thought to have lived during the same period. If all these tests are satisfactory, the date of the find may be regarded as having been established. This is for finds made in the open. However, many remains have been found in caves, where geological data are not available. In these, careful stratification shows cultural changes through succeeding levels of debris to be excavated, and comparison with palaeontological specimens and other artifacts serve to establish the periods which are represented. It goes without saying that every remnant of the forgotten culture must be described as to the depth and location in the site as carefully as possible, and a wealth of technique to this end has been worked out and is the rule in archaeological research.

As a result of comparison, of untold effort in digging, and of much discussion, a consensus of opinion on the part of the scholars has thus worked out a reasonably satisfactory chronology for Europe. It must be remembered that the periods are relative in length; I give no numbers of years, as this is a matter of great doubt and much dispute. The rule of thumb is that the later the culture, the less time it occupied,—which merely says that one principle evolved by the archaeologists is that the more man has to build on, the faster he will build. At the beginning, so shadowed that its very existence is disputed, is the Eolithic period. Perhaps this came before the beginning of the Quarternary,—at best it is to be admitted in our chronology on sufferance. The Pre-Chellean and the Chellean epochs, however, which follow it, are undoubted, and these, with the Archeulean, make up the Lower Palaeolithic. Then comes the Mousterian, the time of *Homo neanderthalensis*, occupying the cold Middle Palaeolithic. The Upper Palaeolithic, wherein Man as we know him appears, comprises the Aurignacian, the Solutrean, and the Magdalenian cultures. Palaeolithic times are followed by the short and unsatisfactory Mesolithic, with the widely-spread and almost contemporaneous periods of the Azilian, Tardenoisian, and Maglemosian. After these, the Neolithic, where in the south we almost touch on historic times, but in the north are still in the dimness of later prehistory. The Neolithic—not only to be distinguished as the age of polished stone, as used to be believed, but the period when such important innovations as the use of domesticated animals, pottery, the plow, and others, came into being—is followed at varying periods by the Bronze, and this

by the Iron age. Always these new later impulses seem to work their way northward from the Mediterranean; while Egypt had its Iron age in full flower, Scandinavia was still in the Neolithic. But the sequences hold for any given locality, and the chronological periods described give us a time-progression on which we can base satisfactory conclusions as to the development of European man up to the dawn of history.

Thus in Europe prehistoric finds may be dated with certain sureness. What of the rest of the world? In Africa, for example, we are outside the glaciated belt. It is impossible to obtain closely correlated types of geological evidence which will date the archaeological finds as surely as is the case to the north. Certain sequences corresponding to those obtained in southern Europe have been established for northern Africa, notably thru the work of Dr. Collie and his colleagues of Beloit College, but where we must evaluate finds from the Congo, from Rhodesia, or from South Africa, we are at a loss. That two sets of flint chipping seem alike in their style, is no assurance that they belong to the same epoch, although the temptation to date them in this fashion becomes almost overwhelming in the absence of other controls. Associated faunal remains are not satisfactory, for we cannot be sure that the animals which lived in Europe at a given time had their counterparts in other continents contemporaneously with them. The same holds true for Asia. Nelson's finds in the Gobi desert look as though they are pre-Neolithic. But, as is the case in the Saharah, they are found on the surface where the action of the wind has exposed them, and as a result there is the greatest reluctance to express a given date for them.

This is not greatly different from the situation in which the American prehistorians find themselves, except that here the time element involved is perhaps not as long as in Europe. When did Man come to America? It is a question which has been much debated, but never satisfactorily answered. That man came during the Pleistocene,—that is, before the Neolithic period—has been vigorously denied, nor have the proponents been able to find certain answer to those who make their denials. It is true that recent finds in the Southwest, composed of finely-chipped arrows associated with the skeletons of an extinct variety of bison, have given new impetus to the controversy, but the finds merely make the point urged in the last paragraph, of the difficulties involved in utilizing only associated faunal evidence. For the Southwest is outside the glaciated region, and, since there are no time-tables of

a geological nature sufficiently precise, the palaeontologist can merely assure the pre-historian that the variety of buffalo found has been extinct a long time. But how long he cannot say with any certainty!

Such being the case, the American archaeologists have been compelled to start with the known and cautiously work their way back. In the Southwest, in Mexico, in Central America, and in Peru, the main centers of archaeological interest aside from the Mississippi and Ohio valleys, the aboriginal inhabitants had contacts with the invading Whites, who, too, left relics of their presence. The technique utilized in the Southwest and elsewhere, has been the result of work by Nelson, Kidder, Kroeber, Spier, and others. It has consisted of attempting to correlate stratigraphic results (usually obtained from potsherds, which are plentiful and reliable in the Southwest) with statistical tabulation of the data in each stratum, thus working toward the establishment of eras for the restricted localities within which each was working. More recently, all the work of these students, and that of later men, such as Schmidt, has gone into the attempt to establish relative chronology for the ruins of more extended portions of the regions in which they have all carried on research, with the result that today there are recognized certain well-defined time-series for the Pueblo and pre-Pueblo peoples. When the question as to the actual length of time involved in any one of these periods is broached, none of these students answer. And this is well,—it is a matter of relative length of deposit, of relative frequency of potsherd type, rather than years. How long does it take to form a refuse heap thirty feet deep? One may indeed hesitate before he replies. It is a direct function of the number of people present, of the extent to which they disposed of material, of the climatic conditions making for weathering or preservation,—of so many unknown quantities that the question cannot be answered.

At the same time, the ingenious work of Dr. A. E. Douglas of the University of Colorado Museum, in utilising tree-rings of the wooden beams in the Pre-Spanish pueblos, and correlating these with tree-stumps of known age by the configuration of the thickness of the rings caused by wet and dry years, may give us even an absolute chronology on which to build. In Mexico among the Maya of Yucatan, the problem is often neatly solved by the records of the people themselves, since they had devised one of the most accurate calendrical systems the world has ever known, deciphered by the intricate and painstaking work of Morley and

Spinden. As for a general chronology for the New World such as we have for Europe, it is a matter for the future. That it will eventually come no one doubts. The finding of Pueblo pottery in Kansas, of the Mexican plumed serpent motif on artifacts in Georgia, and Dr. Strong's work in Labrador all strongly point to comparisons which should go a long way toward a general time-scale. That such a correlation of prehistoric periods, perhaps even without the availability of geological and palaeontological data for close comparison, one made possible through the consideration of material excavated in intensive work from the southern Andes to the upper Mississippi, will be achieved, is certainly not too much to hope for. But, again, when it comes, it will be a relative, not an absolute matter, and the periods will be expressed in terms of their length as compared to one another, and not in absolute values of years.