

## ARCHEOLOGY AND SOCIAL CHANGE

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Just a year ago the retiring president, Dr. Emerson, read before this academy a thought provoking paper on the biological basis of social cooperation, wherein he stressed the crucial social problems then confronting humanity, suggesting certain biological and ecological principles which it was felt may bear on the interrelations of human society. The same appalling problems still confront us, with little change. Such being the case it may be profitable to continue this general discussion, somewhat in the nature of a running symposium, by bringing to the attention of this group the contributions of another field, that of archeology.

Man has undoubtedly been a subject of consuming interest to man since the beginning of human history, and there is little doubt that the human species has been subjected to a more searching examination than any other animal species. Every individual must necessarily spend a lifetime in the study of other people; yet with all this research and accumulated knowledge, society is repeatedly confronted with crises of various sorts, of which the present is beyond any question the most filled with promise of dire consequence. Many of us have heard

the implied, or specific charge, that social science has failed miserably to keep stride with the development of the physical sciences.

Even if it be admitted that such a charge is true, and it probably is, it is somewhat unjust at a time when the physical sciences have enjoyed a war time stimulation far beyond their normal status, even in the present age. However, if a social atomic bomb is to be exploded in time to neutralize the effects of the physical atomic bomb, social thought must be revised as radically and put into effect as forcefully as thinking and action in the physical sciences. But society is resistant to social change, and if the necessary immediate readjustment is to be effected every effort must be made now to determine how such evolutionary processes function.

This paper does not attempt to answer all the social problems which are so urgently crying for solution; it rather points up the possible contributions of one small field to a better understanding of the mechanics of change. To do so, not only must the biological sciences be called upon for assistance, but all the physical and social sciences must be mobilized as well.

## ARCHEOLOGICAL AIMS AND METHODS

It has long been my conviction that the fundamentals of a complex society are generally obscured by the proliferation of incidentals, for it is so easy for an abundance of fascinating trees to obscure the broad outlines of the forest. Also, if we are ever to understand the operation of complex society, and all society is more or less complex, we must first study the more simple society and resolve it to understandable fundamentals. This principle has been subscribed to by a long and illustrious list of anthropologists, and is today reflected in the work of Redfield on the mechanics of social change the Maya are now undergoing, and by Kluckhohn in his long range Navaho studies at Ramah, New Mexico.

However, such studies are limited to a comparatively short span of observable time, and if we are to have the desirable depth of perspective of the evolution of simple society, so as to understand the mechanics of broad social change, we must of necessity employ history. Unfortunately it is a well known fact that simple society almost universally has no written history, and it is therefore necessary to turn to archeology to supply the missing pages in the record of the story of man.

Kluckhohn has expressed a critical attitude toward archeology when in 1940 he said:<sup>1</sup> "Do researches which require large funds for their support require no social justification other than that of quenching

certain thirsts for knowledge on the part of a relatively small number of citizens? If archeologists and ethnologists have hardly begun to ask themselves the tough-minded query—so what?, evidence is not lacking that this question has occurred to research foundations and other sources of financial support. Personally, I suspect that unless archeologists treat their work quite firmly as part of a general attempt to understand social behavior they will, before many generations, find themselves classed with Aldous Huxley's figure who devoted his life to writing a history of the three-pronged fork."

Just what is the case of archeology, and where does it stand among the sciences of the study of man today?

If we are willing at the outset to admit that the immediate aim of archeology is the re-creation of history from prehistoric data, and are willing to let universal laws become evident as a result of the study of these historical sequences, we may now proceed to a more careful examination of how history may be wrung from prehistory. The activities of man are apparent in two broad categories. 1. The material remains which result from his efforts at production or creation. These are known as material traits, and in our own society are rather fully represented by salable articles. 2. The mental attitudes, or non-material traits, which consist of such elusive qualities as the folkways, mores, laws, rules and regulations which control human relations.

It is obvious that the source data of true archeology, lacking all writ-

<sup>1</sup> Kluckhohn, Clyde, "The Conceptual Structure in Middle American Studies," From, "The Maya and their Neighbors," D. Appleton-Century Company, Inc., 35 W. 32nd St., N. Y. 1, New York, 1940, Page 43. (Permission to quote given in letter of May 12, 1947.)

ten history, is confined wholly to material traits, and because they are perishable many data are limited to the more resistant of even these traits. The preservation of any material through centuries depends on many factors, and at best only a small portion of any group survives. Thus, at the outset, the archeologist is limited to laboring with only a part of the tools available to other branches of social study. However, as will be demonstrated later, it is sometimes possible, through analogy with living groups, to suggest certain non-material traits.

One of the most vexing problems confronting every archeologist is the ordering of his data into relative and absolute temporal sequences. By comparison the equally necessary technique of arranging traits into typological sequences is a very simple matter. The most common and most satisfactory method of establishing relative chronology is by a study of stratigraphy, although other disciplines, such as geology and paleontology, chemistry in soil analysis, and even artifact sequences may also be of aid. In the Southwest, tree-ring dating revolutionized archeological research, and is in fact of such importance that I would like to take a few minutes to discuss it in some detail.

Dr. A. E. Douglass, a southwestern astronomer, in 1905 began study of tree growth, as reflected in their ring sizes, in an effort to correlate sun spot cycles with growth. With comparatively little effort, once suitable material was made available, he was able to demonstrate that rings grown in certain years were more or less consistently small, or large.

However, he was unable to extend this record back for more than four or five hundred years.

Additional material, this time from prehistoric and ruined southwestern dwellings, was next secured. An examination of numbers of these specimens indicated that they also carried consistent ring growth patterns, which could be cross-dated to form floating chronologies. The ensuing search for specimens which would bridge the gaps and so produce one long chronology is a saga of exceptionally fascinating interest.

Suffice it for our present purpose only to report that a continuous tree-ring sequence is now available for the Southwest from A. D. 11 to the present. This span covers all major periods of well represented culture stages of the prehistoric inhabitants of this area, and has made it possible to speak of events in past time in terms of years in our own calendar. The most immediate and obvious result of this dating was that almost every previous estimate of archeological dates had to be revised downwards, or shortened, in some cases radically. Here then, is evidence that culture changes more rapidly than might be expected.

Many of you will be interested to learn that the Tree Ring Laboratory at the University of Chicago has, within the past few months, released dates on Kincaid, an archeological site in southern Illinois, which fall within the 16th century A.D.<sup>2</sup> Archeologists are already busily engaged in interpreting these dates in terms of other sites from which

<sup>2</sup> Paper read by Robert E. Bell at the December 1946 Meeting of the American Anthropological Association, and affiliated societies, Chicago, Illinois.

trade material came to Kincaid, and in estimating expanded dating. For example, it has been suggested that the Middle Mississippi occupation at Kincaid probably began about A. D. 1450 and lasted to about A. D. 1630. Through the identification of trade objects the famous Cahokia Mounds may be dated as of a somewhat similar span. Thus with additional tree ring research it may be safely predicted that other both earlier and later sites and cultures will soon be dated, and so may be assigned to an absolute chronology.

Before turning to a serious examination of one archeological area, two other important methods should be briefly characterized. Extensive surface survey, occasionally supplemented by small-scale excavation testing, has proved one of the most effective and productive of archeological techniques. It depends on type descriptions of various artifacts and artifact typologies, and on relative or absolute chronology. Systematic survey, and the thorough digestion of its products, will add one more most important and fundamental field of knowledge to the study; that of geographic distribution. This prepares the background for the presentation and ordering of the available data.

If any mass of raw data is to be evaluated and interpreted, it must be arranged according to some pre-determined systematic pattern. Any attempt to arrange archeological material in preparation for interpretation involves what might be considered four dimensions. Traits, which are physical representations of past events, must be ordered first in some scheme which places them

in a two-dimensional geographic plane, and in a third crossing temporal sequence. I have elsewhere suggested a simple physical method by which this ordering may be accomplished.<sup>3</sup> If several cabinets containing a series of drawers are employed, each cabinet representing a particular geographic area and each drawer a pre-determined time period, artifacts may be placed in their appropriate case and drawer. By simply pulling out all drawers of one level, and then successive levels, it is possible to demonstrate where and when a given artifact occurred, where it spread, and when it disappeared. But this is not in itself the creation of history from prehistory, for a fourth dimension must be added.

A simple definition of history has already been suggested; it now is imperative that history be further defined. One of the tenets of anthropology is that any social structure, like any physical structure, is more than a simple sum of its constituent parts. Certainly, therefore, history must be more than the simple ordering of determined traits, or events, in their proper temporal and spacial niches. It must be the interpretation of the interrelationship of these events in terms of social patterns and principles. It is the determination of the why and how, in so far as possible, of the interrelationship of events that adds zest to archeological, and in fact all anthropological studies, and will in the end result in an understanding of the dynamics of culture, or culture change, growth, and modification.

<sup>3</sup> McGregor, John C., "Southwestern Archaeology." John Wiley & Sons, Inc., New York, 1941, Page 55.

This is the fourth dimension just referred to.

These, briefly and somewhat schematically stated, are the aims and methods of archeology. Almost nothing has been said about techniques, for they have little bearing on the discussion to follow.

What has been, and is now being accomplished, by these means?

#### PREHISTORIC HISTORY OF THE SOUTHWEST

Of all the areas of the world where archeological research has been undertaken, probably our own American Southwest is the most significant. This statement is based on several facts not generally appreciated. Systematic and intensive archeological research has been energetically prosecuted there for more than six decades. The arid physical environment, combined with a physiography which has provided many natural caves and shelters attractive to man as habitations, has made possible the preservation of articles which otherwise would have deteriorated. The arid environment has also tied man closer to the soil than in many other areas in the world, and has called forth ingenuity in the adaptation of life to a variety of physical and ecological environments. Thus a number of somewhat diversified evolutionary lines are represented.

Of more importance is the fact that here is found a social evolution which spans all stages, without break, from an exceedingly simple semisedentary-seminomadic way of life, to the highly compact, wholly sedentary stage represented today by the living Pueblo groups. As

descendents of their prehistoric ancestors in the same area, these latter people supply much of the information, which through analogy, makes possible interpretation and comprehension of events indicated by artifacts in prehistoric horizons. There is also the unique contribution of tree-ring dating, already mentioned which has made possible the specific dating of all major stages in the unfolding of Southwestern cultures.

It is these reasons, plus the fact that I am most familiar with the achievements of this area, that prompt me to turn to this field as a source of material to illustrate this discussion. As a logical beginning the following simple summary of Southwestern history is offered.<sup>4</sup>

The earliest known evidence of man in the Southwest consists of stone artifacts which through various geological and paleontological processes have been correlated with now extinct mammals, and dated as on the order of some fifteen thousand years old. The famous Folsom Culture is probably the best known of these early finds. Unfortunately this and other related finds of somewhat comparable age lack any human remains, and they consist of such an impoverished trait complex that little is known concerning them, beyond a few tools, and the fact that the people appear to have been purely nomadic hunters.

The first more completely represented culture is the Cochise, known from southeastern Arizona. Stone work was expanded by these people to include what is probably the earliest use of grinding stones by

<sup>4</sup> In a paper such as this, questions still somewhat controversial must be treated as though settled.

any group in America, perhaps in the world, for they have been dated by Antevs as of about ten thousand years old. These people lived in the pluvial, or immediately postglacial period, and their remains are commonly found as camps on the borders of long since dry lakes. Two human skeletons, probably assignable to this period, have been found, but have not as yet been studied and reported.

None of these early cultures is sufficiently rich to make possible much in the way of interpretation, but by the time of Christ other people living in the southern portion of Arizona and New Mexico were well established, and are more fully represented and known. These have been designated as the Mogollones, and at this early period they had pottery, had built more or less permanent homes, practiced an economy divided between hunting, gathering, and a simple agriculture, and were individuals of some consequence.

At about this same time another related group invaded the desert country of southern Arizona to establish a long dynasty of rich cultural development. These people are known as the Hohokam. They were sedentary individuals with permanent homes, pottery, a more or less specialized stone industry, and were faced with the necessity of adaptation to a decidedly inhospitable environment. Because of the exceeding aridity of this region they settled along the permanent streams and in the foothills of the isolated mountain ranges where water was assured.

Slightly later, probably in the

third or fourth century A. D., the Basket Makers settled in the northern portion of Arizona and southern Utah. They were seminomadic, practiced only simple agriculture, and relied for subsistence on gathering and hunting. Because of their way of life they constructed no permanent homes in the early portion of their reign, and lacking pottery they turned their interests and energies to the production of containers and objects of soft materials, such as fibers, in which they excelled for their time.

With these three groups accounted for we have the basis of what has commonly been accepted as the three roots, or fundamental cultures, of the Southwest. From them, as the centuries gradually unrolled, and perhaps stimulated by occasional outside influence, all of the later cultures sprang. Perhaps these three roots should even be reduced to two by combining Mogollon and Hohokam as two stems under one root, the Cochise.

By A. D. 700, the three same groups were still represented in the Southwest, although a fourth, the Patayan, may have become further differentiated, or introduced into the area along the Colorado River. Little is known about it. Mogollon was thoroughly entrenched, and although it had achieved comparatively little evolutionary progress within itself, it was exerting considerable influence on other groups, especially to the north and northwest. As they moved northward they came into contact, sometimes violently, sometimes apparently peacefully, with the resident Basket Makers, and to them contributed the bow

and arrow, at least the rudiments of pottery making techniques, and the principles of house construction. At this time the Hohokam were busily engaged in building the extensive system of canals that was to characterize their existence and make possible an expansive agriculture in the most arid portion of the Southwest. They had also established contacts with Mexico, as is testified to by shared trade, and such mutual traits as ball courts.

Three hundred years later, or by A. D. 1000, the picture had changed more or less radically. The Hohokam people had about reached their peak. They have been mentioned first because Hohokam represents an even continuation of preceding developments.

In the north the result of the Basket Maker - Mogollon contact seems to have been the development of what is known as Pueblo Culture, most spectacularly in the four corners area, where large multiroomed pueblos had been evolved, the pattern of economy firmly established as one of a highly sedentary agricultural nature, and pottery had developed to an equally rigid pattern.

On the other hand the Mogollones had suffered reverses. Apparently having shot their bolt northward to the Basket Makers they began to wane as a distinct entity, and with the southward expansion of Pueblo influence more and more took on a Pueblo cast. The general economy was also shifting from a hunting to a more sedentary type.

During the fourteenth century many radical changes took place in the Southwest, probably the most striking of which is directly trace-

able to the great drought, a period of about twenty years at the end of the century, which tree rings have demonstrated was a time of very little rainfall. This occasioned a mass movement of Pueblo people southward and eastward, where they pressed on others, forcing them still farther south and east. At this time Pueblo Culture had reached a high level of development, and as it moved south and eastward it was modified by every local group with which it came in contact, but on the whole retained its major works of art and general culture with little change.

What remained of Mogollon was quite overshadowed by the march of Pueblo Culture. The descendants of the Mogollones were being forced into the southwestern corner of New Mexico, where they were to have one last florescence as Mimbres.

Far to the south the Hohokam were also feeling the pressure of Pueblo contact, and the most remarkable observation which may be made about them at this time is that they apparently existed peacefully, but quite independently, side by side with Pueblo culture and people. The Hohokam had definitely passed their peak, and were making no more contributions to Southwestern development, while they clung tenaciously to most of the features of their own way of life.

What became of these several groups is a matter of consuming interest to archeologists today. The remnants of the Mogollones moved first into southwestern New Mexico, and there is some evidence that they eventually migrated on into north-

ern Mexico, but what then became of them is unknown. Many of the Pueblo people remained in the north, and are represented today by their descendants in Arizona and New Mexico, but those who moved far south to mingle with the Hohokam simply seem to have disappeared. Perhaps they once more moved north when conditions there again became advantageous. Most fascinating problem is the final disposition of the Hohokam, for their ultimate fate is shrouded in the deepest mystery of all. Perhaps they moved west to the Colorado River, there to become members of the Yuman speaking groups, or remained in the Gila and Salt River valleys to be absorbed into the Pima and later arrivals into this area.

Three hundred years later, or by A. D. 1600, about the present pattern of occupation of the major Indian groups in the Southwest was at least roughly formed. The Pueblo Indians were firmly entrenched in approximately their present homes in northern Arizona and New Mexico, and there is much evidence to lead us to believe the nomadic Apache and Navaho bands had arrived, and were rapidly becoming established. Since from this time on written records supply the necessary data for historical reconstruction, this summary outline of history can be terminated at this point.

However, major outlines rest on the meticulous demonstration of innumerable bits of history. It is therefore proposed, in the remainder of this paper, to examine a few of these small historical fragments, to see how they have been arrived at, and of what they consist.

#### PHYSIOGRAPHIC PROVINCES

Some years ago it was my privilege to be briefly associated with J. W. Hoover, geographer of Tempe State College. At that time he was greatly interested in establishing Southwestern geographic provinces, and I was immediately struck by the fact that in most cases these provinces seemed to coincide with the areas of prehistoric culture as then understood. Continued research has more clearly confirmed this association.

The Southwest may be readily divided into major physical areas, with the northern and central portion composed of a high flat plateau, dissected into broad valleys by only a few streams, and with many box canyons. This is bordered on all sides, except the extreme north, by a continuous area of dissected mountain country, or on the east by mountain ranges. South and west of this band is the typical arid desert, again with only a few major streams in broad valleys, and to the east the high plains. The three roots, previously described, are assignable in broad measure to these separate regions. The Hohokam had their entire development, in fact complete existence, in the desert area. The Mogollones, except for early sporadic and late migratory movements while under pressure, were dwellers of the mountain region. The Basket Maker, and later the Pueblo development, was almost entirely confined to the plateau area, with the exception of the rather brief southward expansion already discussed.

These broad provinces are of course divisible into many regions, each with characteristic peculiari-

ties, and each with its own distinctive variant of the broader culture pattern. However, for the moment, it would be most profitable to limit our discussion to a consideration of the effect of environment on the broader groups. Probably the most clearly marked effect of environment on culture is found in the desert area and on the history of the Hohokam. With their invasion of this uninviting environment they at once committed themselves to a culture adaptation to an unusual situation. The main streams, the Gila and Salt rivers, predetermined the major pattern of their settlements, and as soon as population concentrations reached any dimensions, demanded the use of irrigation in the prosecution of agriculture. With thinly scattered populations flood-water irrigation sufficed, but as permanent populations increased irrigation was developed, until ditches supplied water to a total acreage approaching that under cultivation at the beginning of this century in the same area.

The development of such engineering projects thoroughly tied the people to the soil, rooting them in one location, so long as this method of agriculture was locally effective. As a result the development of Hohokam culture followed a long and regular path, with its inception at about the beginning of the Christian era, and reaching a peak sometime about the eleventh or twelfth centuries A. D. A gradual decline then set in, and by probably A.D. 1450 they had reached the point of extinction, or had been absorbed by other groups. This gradual development to a high level and

then decline might be considered characteristic of a firmly entrenched and smugly satisfied group.

Opposed to this is the Mogollon, which was limited to the mountain section, and was, because of the opportunities offered on every side, more preoccupied with hunting as a means of subsistence than any of the later groups. This apparent restlessness and fluidity, early led these people northward to contact and influence the Basket Makers, and later made them easy prey to the solid advance of the Pueblo people and culture. With a lack of abundant natural resources to supply large concentrations of population, and their persistent adherence to an outmoded way of life, their eventual assimilation, or dispersion, was a foregone conclusion.

On the other hand the early conversion of the Basket Makers to a new mode of existence, prodded by the necessity stimulus of the encroachments of Mogollon, with the resultant population concentrations and the development of a permanent agriculture and elaborate social structure, assured their perpetuation. Here, as is always the case, the transition period, though obviously difficult, was one of great stimulation. A new sedentary way of life was substituted for an old seminomadic form, and as soon as the new pattern had been set, with for the first time security and abundance of leisure, advance was very rapid. Population increase, and social and technical stability, then led naturally to geographic expansion, with continual additional stimulus. It was, therefore, not until the arrival of overwhelming ag-

gressive foreign European elements that Pueblo culture was forced to retreat, consolidate, isolate, and in at least some characteristics stagnate.

#### CROSS-DATING SITES

Much more, and in many cases in great detail, could be said on this line, and shortly one or two other examples of social processes will be considered more microscopically, but just now it becomes necessary to examine another technique. Continued reference has been made to dates, yet it is a matter of general knowledge that tree ring dates in the Southwest are largely confined to the Plateau area, and there to the more datable kinds of conifers. Also, the earliest date so far secured in association with human culture stages is an early Basket Maker beam, found in Dupont Cave in Nevada, and dated as A. D. 217. How then may dates be assigned to the Hohokam stages, particularly in their earlier portions at about the beginning of the Christian era?

The most intensive work of dating, and correlation of dates with culture stages, has been that done by the Museum of Northern Arizona in the general vicinity of Flagstaff. Here it is demonstrated that the average rate of human cultural evolution resulted in distinguishable differences about every two hundred years. Once datings had been established for local groups it was then possible, by an involved process which I have referred to as "seriation," and through the establishment of cross finds, to date sites and cultures where no tree ring dates were available. For this cross-dating it was early recognized that pottery was of the utmost aid, in that

once made it was practically indestructible, was on the whole abundant, was subject to continual fad changes, and might be easily collected, stored, and studied. It is by these means—cross-dating through trade pottery, and projection of dates according to what appears to be an established pattern rate of development—that dates have been assigned with some evidential basis to early periods, and also to sites without the tree ring area.

#### CULTURE EVOLUTION CYCLES

However, one of the most obvious results of this study of Southwestern archeology is that the development and change of human culture is not unilateral, and over long periods is not uniformly continuous. Rather, the history of one culture is that it tends comparatively to fluctuate with various periods of rise and regression, though in every case to gradually rise to a peak, and then more or less gradually decline. The problem now is to attempt to determine, in a few selected cases, why such a pattern forms.

Perhaps one of the most common causes of decline is the failure of individuals, and society, to readjust to changing environmental conditions. Halseth, and others, working on the problem of Hohokam decline have suggested it is associated with the difficulties which developed in their irrigation projects. He has suggested specifically that continued spreading of water over the land waterlogged it. The evaporation of quantities of water from the soil, in the arid atmosphere, led to the deposition of a layer of lime, known locally as caliche, anywhere from a foot to two or three feet below the

surface. When this had formed a seal beneath the soil, water could no longer penetrate beyond this seal but rapidly evaporated, thus rendering the lands useless to further agriculture. This is a problem still confronting irrigation farmers in this same area. Such an explanation in conjunction with theories of invasion, which are based on convincing evidence, and perhaps several cycles of continued stream erosion as a result of serious droughts, which made necessary the repeated removal upstream of canal inlets, may be the answer of the tip of balance from progression to regression.

#### CULTURE CONTACTS

One of the most important factors contributing to the evolution of culture is contacts. This may be demonstrated in any one of a number of cases in Southwestern prehistory, is demonstrable in history throughout the world, and is in operation on a grand scale today. The effect of Basket Maker and Mogollon contact has already been pointed out and discussed. Another example, also taken from the work of the Museum of Northern Arizona, demonstrates how a natural phenomenon may cause a social upheaval.

Some years ago it was learned that sometime in the eleventh century A. D., a volcano, something like Paricutin in Mexico, erupted and covered the surface of the ground for many square miles with a layer of volcanic ash. This ash, like that at Pompeii, covered old dwellings, but soon after it had been distributed through wind action to a more even and thinner cover people began to move back into the area. Shortly

the movement became almost a land rush, in which elements of all the major roots were represented; Hohokam from the south and west, Mogollon from the south and east, and Pueblo from the North. Unfortunately it was directly in the center of this horrible mixture that this museum first began serious work, and it can be imagined what a scramble of confusing problems had to be resolved before any semblance of order could be established in our data. However, it was from this amazing congenial mixture of population that almost immediately a culture of unusually rich character sprang.

An incidental practical result, of immediate application to modern practices, came from one phase of this study. In an effort to determine why the cinder covered area was so attractive to humans a study of tree growth in the cinder field was undertaken, and compared to that outside it. It was learned that the fine dark cinders formed a mulch above the clay soil, acting to conserve moisture and at the same time absorb heat; that tree species sharply dipped down into the cinder areas, in some cases a thousand feet from their normal environments; and that a cinder depth of some eight or ten inches was the optimum condition for growth. This information was passed on to the local agricultural adviser, and you can hardly imagine my surprise the next summer when I came upon luxuriant corn fields growing at seven thousand feet from extensive cinder flats, where the farmer had only to plant and reap his harvest, since cultivation was not only impractical but unnecessary.

## CULTURE ISOLATION

In general the evidence from the Southwest is that at no time, and among no people, was there any extended or extensive isolation. Several excellent recent studies of prehistoric trade have shown that contacts were far flung. Many contacts were continuous over long periods. Not only was trade extensive, but physical contact, often resulting in physical and social mixtures were common. There is evidence of mutual influence between Mexico and the Hohokam. Early contacts, even the exchange of such artifacts as pots, between the Hohokam and Mogollon has been demonstrated by detailed mineralogical studies. The Mogollon and Basket Maker contact has been repeatedly stressed, as has the later Pueblo contact with Mogollon. It should also be noted that extensive studies have been made and several papers written on the important influence exerted on the Pueblo development by Hohokam, and on the later Pueblo contact with and influence on Hohokam. The important lesson to be learned here is that cultural enrichment has always resulted to one or both of the participating groups.

Another exceedingly important point affecting the development and change of culture is the need of available leisure time. When a group is continually confronted with the necessity of procuring a bare existence, cultural advance requires great individual effort. It was not until the Basket Makers became converted to a sedentary agricultural existence that they made any radically marked development, then it suddenly blossomed. Mogollon was

probably limited, certainly retarded, because of persistently clinging to a hunting economy.

Economic, social, and war pressure from without a group is undoubtedly another factor strongly influencing social development. It has the effect of consolidation from within to combat the pressure from without. However, it may induce stagnation, as apparently happened when pressure of nomadic tribes historically induced the Pueblos to consolidate into a few defensible large villages. Or, under other circumstances, it may be responsible for a marked broadening of horizons, such as was the case of the Basket Makers, but this seems to be dependent upon tribal intermixture.

Just what influence on cultural change vigorous individual leadership may have is still a matter of debate. Archeology can contribute little or nothing to the question of whether the man is the result of the times or can develop the times. History and ethnology combine in two illustrations to shed some slight light on this question. Archeological research at Sikyatki, an ancient and ruined Hopi Pueblo, was followed with much interest by the first mesa Indians. One of these was a pottery maker, Nampeyo, and she was so struck with the designs of the ancient pots that she, almost alone, by copying them, inaugurated a revolution in the pottery of these people. A similar result was observed when Indians visiting the Museum of Northern Arizona were fascinated by still older pottery designs, and again introduced a revival of style among their people. But this question is dependent upon an-

other, that of the acceptance or rejection of proffered traits.

#### TRAIT ACCEPTANCE

There is much archeological and ethnological evidence that any superior trait will be readily accepted if in so doing it does not thereby disrupt other associated and integrated traits and traditions. The steel axe was readily accepted as a substitute for the stone axe, the steel knife and the copper or iron pot for the stone knife and pottery vessel, but the Christian religion was either flatly rejected or only superficially accepted. Religion has its roots deep in the total culture of the people, with ramifications in every phase of activity. Archeology, like history, gives every evidence of the reluctance of religions to change. As example the writer found an individual buried in a small pueblo just west of Flagstaff, accompanied by sufficient obviously ceremonial paraphernalia that the ceremony represented could be identified by modern Hopi Indians. He was interred sometime early in the twelfth century, so here is evidence of a religious ceremony which persisted for more than eight hundred years with little or no change. We may therefore speak with some conviction of stable and unstable institutions and practices.

#### REVOLUTIONS, CRISES, BARRIERS, FRONTIERS

Not long ago Gordon Childe wrote a book entitled "What Happened in History,"<sup>5</sup> and in it suggested that the main stream of cultural history followed a pattern which might be characterized in four stages. Of

more interest at the moment is his concept that these developmental stages are separated by revolutions; the first and second by what he calls the Neolithic or food-producing revolution, the second and third by the urban revolution, and the third and fourth by the industrial revolution.

This concept of revolution is closely allied, though on a grander scale, to what Colton has called a crisis.<sup>6</sup> To understand what he means by a crisis it is necessary to explain what he has in mind when he refers to frontiers and barriers. When foci, which are minute temporal, areal, and cultural divisions of roots, are plotted on maps for given periods, frontiers become evident. In north central Arizona in the vicinity of Flagstaff he has worked out in great detail at least seven such frontiers. All have different qualities, some being relatively stable over a period of years, while others are fluid, with one group advancing at the expense of another.

After having examined the character of all these frontiers Colton concludes that any geographical condition which makes an area unfavorable for human occupation may become a frontier, although it may be that no natural barriers are present. One such non-barrier frontier remained almost static for nearly 600 years. He visualizes a frontier as a semi-membrane, against which traits, ideas, and even people are beating like molecules in a liquid. People diffuse slowly through frontiers on trading or other excursions, whereas, as has been sug-

<sup>5</sup> Childe, Gordon, "What Happened in History." Penguin Books, Inc., New York, 1946.

<sup>6</sup> Colton, Harold S., "The Sinagua. A Summary of the Archaeology of the Region of Flagstaff, Arizona." Bull. 22, Museum of Northern Arizona, Flagstaff, Arizona, 1946. pp. 300-301.

gested, certain traits easily diffuse through these zones.

A crisis is then described as the breaking of this membrane, when both people and ideas freely flow across the frontier. Archeologically this is the most obvious type of crisis, but there surely must be many other less obvious types. Population shifts are probably only the outward evidence of the internal cause, or the true crisis. A suggestion of what a few of these causes may have been might be undertaken at this point.

If all of the tree-ring dates from the Southwest are plotted, it becomes evident that certain periods saw more construction of new dwellings, or repair of old ones, than others. Based upon what must be admitted as far from an ideal quantity of tree ring evidence it would appear that about A.D. 700, slightly past 900, about 1100 or 1130, and near 1300 are the most apparent disruptive periods. When this information is tested against the results of archeological survey, a much more complete pattern of population shifting becomes evident.

Unfortunately there is too little information available to enlarge upon his problem before about A. D. 1100, which incidentally appears to have been one of the most crucial dates of American history, but from that time on to the present it is fairly full. Considering only the area most intensively studied, that in the north central portion of Arizona, it may be seen that at about 1130 the Tsegi and Chaco canyons were abandoned, while the Wupatki, Kayenta, Hopi country, Winona and adjacent areas, were occupied.

At about A. D. 1250 the Tsegi Canyon and Mesa Verde areas were re-occupied, while Wupatki, Citadel, and parts of the Hopi Country were abandoned. At about A. D. 1300 the entire San Juan, Little Colorado, and San Francisco peaks areas were abandoned, and the Hopi Country, the upper Little Colorado and the Verde Valley were intensively occupied. By A. D. 1400, or thereabouts, all of the Pueblo people had been gathered into the Hopi and Zuni villages from the Verde Valley, the Winslow area, and from the Hopi Butte country north to the Jeddito Valley.

#### CRISES CAUSES

Just what the motivating causes of all these movements were it is impossible to determine at present, but some suggestions may be made. Some time ago A. E. Douglass personally outlined to me what he called the human cycle of site occupation. It was not new with him, but I have never been able to trace it to its proper source. This theory consists of the knowledge that new occupants in a virgin area will invariably choose a spot of precarious natural balance. This is usually at the edge of a forest, to supply construction and fuel, and an open or grassland area, to make possible agriculture. Occupation of the site, with the attendant stripping off of the cover, disturbs this balance, with the result that erosion sets in, the water table lowers, occupation becomes impossible, and the people move. When nature has once more re-created a balance the same region may, and often is, once more occupied.

There is much actual evidence, in cutting and filling of wash beds in canyons, that this is exactly what happened in the very areas which have just been characterized. Certainly such a cycle is demonstrated in the Tsegi Canyon system, the Chaco Canyon, and in parts of the Little Colorado Valley. However, humans are loath to make any change, and will usually resist it to the last possible moment. What is the actual trigger event that casts the last die is more difficult of determination. It may be a drought, or continued droughts, such as is known to have taken place in the late fourteenth century. It may be a cinder fall, such as that described for the Flagstaff area, which inaugurated widespread movements of people. Or it may be even so simple a matter as the interpretation of a dream on the part of one individual in a position of great influence.

So many more ideas of such fascinating possibility have sprung from the recent study of Southwestern archeology that I should like to be able to continue with a discussion of them, but this is impossible now. By way of conclusion it might be profitable to briefly review the several points covered, and to summarize them. For convenience they are listed in order as discussed.

#### SUMMARY

1. Social development, when sufficient data are available, is found to have made strides more rapid than is generally otherwise believed to have been true, at least once a certain minimum level is attained.

2. Culture units tend to be confined to certain physiographic or environmental areas.

3. In turn physiographic and ecological environments by their nature tend to restrict or to encourage the advance of culture.

4. The evolution of culture is not lineal but fluctuating, although on the whole gradually rising to a peak, after which, in all specific cases, decline sets in.

5. Cultural decline is commonly traceable to the failure of individuals and society to readjust to changing environmental conditions.

6. Cultural evolution is greatly stimulated by contacts; the closer the contact, on the whole, the more rapid the advance, and cultural enrichment often results to both participating groups.

7. Pressure from without a group may advance cultural evolution within the group, by consolidation and pointing up purpose, but conversely it may so force a group in upon itself as to retard it.

8. Leisure time is a necessary adjunct of cultural development.

9. Cultural isolation has not existed to any extent in the past, and exists almost not at all today.

10. Vigorous individual leadership in pioneering advances may in some rare cases have influenced social development.

11. New ideas and objects, even concepts, offered a group will be readily accepted only if they are superior, or promise reward, and if they may be accepted without upsetting social integration.

12. Frontiers may or may not be determined by physical barriers.

13. Some frontiers remain stable for long periods, while others are constantly shifting.

14. Traits, ideas, and even people may slowly diffuse across frontiers, usually to the mutual benefit and stimulus of the parties involved.

15. When a natural or artificial barrier breaks down, a crisis develops at that frontier.

16. Crises may be the result of causes other than the breaking down of barriers and shifting of frontiers, for the "human occupation cycle" may also give rise to a local crisis, as may drought, or any other natural or social disruptive agency.

All of this is very well, and I believe it has given some sort of answer to the question of "so what?" raised by Kluckhohn, and quoted early in this paper, but we as individuals are concerned with the problems of the present, as well as a long time prospect of the future. Considering

what is likely to result from the recent war in the immediate future there is some cause for optimism. Not only will physical science and technology advance, and be applied to problems of the convenience and productiveness of our daily lives, but the mass displacement of people throughout the world is sure to have a stimulating and advantageous effect on the development of culture. Displaced persons of superior quality will be drawn to the United States, because of our high standard of living and abundant opportunities. This will result in a great stimulus, which should mean, if the lessons of history and archeology are any indication, that we will soon lead the world in culture, as well as physical production, and in all other fields.