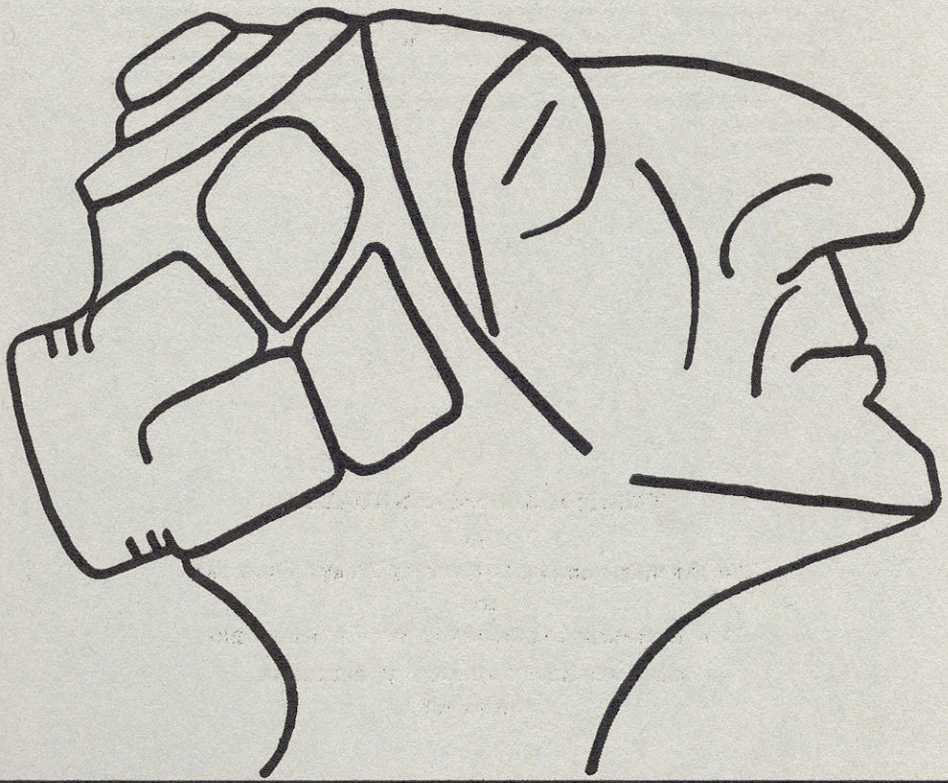
# SOUTHERN INDIAN STUDIES



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# CONCEPTIONS OF TIME IN EASTERN UNITED STATES ARCHAEOLOGY:

## PART I

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The eastern part of the United States, an area that includes all of the land east of the Rocky Mountains and west of the Atlantic Ocean, contains a great variety of cultural remains from many different cultural traditions. In over 100 years of archaeological research in the area, a great many cultural objects have been dug up, classified, and interpreted by professional and non-professional prehistorians. Yet the fact remains that, as a group, they do not agree on more than a very general chronology for the various cultural traditions in the area.

There are "schools" that believe the Hopewell culture had its origin in Ohio, and other "schools" that believe the origin of the Hopewell culture tradition was across the Ohio River in the state of Kentucky. In like manner, there are "schools" of archaeological thought that believe that the Mississippian cultural tradition moved north from Mexico, up the coastal area of Texas, and eventually up the Mississippi River, to flourish in and around the area that is now the city of St. Louis. There is also the "school" that believes that the Mississippian cultural tradition first arrived in the St. Louis area *via* an overland trip from the Southwest, and later spread south down the Mississippi River as well as eastward up the Ohio River.

It is noteworthy that each of these "schools" has amassed a considerable quantity of data to justify its point of view. Why have these differences occurred? The answer is simply that the prehistorians have not had a means to date the remains of human occupation found in the eastern part of the United States. They have had to rely upon relative chronology alone. The relative date-fixing methods used in the East have included stratigraphy, fluorine content of bones, and geological formations.

A concept of time is essential to the establishment of a cultural sequence in any area. The more accurate the determination of the time of any occupation of a site, the more accurate and scientific will be its interpretation. An accurate determination of time fixes its association with other cultural sequences through-

out the world. The order of the first, second, or third occupations of a site can be determined by stratigraphy, but a calendar date for these occupations can be only guessed at, or relatively determined. Thus "schools" spring up around different interpretations or "guess-dates" for the various cultural traditions in the world.

Prior to radiocarbon dates (which are absolute dates), there have been only a few areas in the world that could attach absolute dates to archaeological cultures. The written documents or calendric inscriptions of China, Egypt, and Iraq trace their cultural tradition back in time as far as 2,000 to 3,000 B. C. The southwestern area of the United States has had the benefit of the tree-ring method of establishing dates which has dated archaeological sites back to about 11 A. D.

The eastern part of the United States, as well as many other areas in the world, lacked a "key-piece" to fit its diverse cultural traditions into a scientific system. Many anthropologists hoped the "key-piece" had been found when W. F. Libby announced in 1946 that he had developed a new dating technique that could establish absolute time for any site in the world that contained organic material among its remains. Yet this new dating method, called radiocarbon, was viewed with considerable skepticism by some of the anthropologists, especially since the new technique claimed world-wide utility.

Frederick Johnson, one of the leading critics of the new dating method, organized a world-wide project to test the validity of Libby's hypothesis. The results of the project were described by Johnson as "surprisingly consistent, and our early qualms were unjustified. In general, series of dates having reliability which can be supported by archaeological or other investigations have been, with puzzling exceptions, substantiated by the radiocarbon method." He also adds that "the agreement between radiocarbon and other methods on dates which are not so well documented is quite erratic. However, on the whole the results are very satisfactory, and the 'failures' simply represent problems requiring attention."[1]

It is believed that a sufficient number of radiocarbon dates have been published to warrant an interpretation of their effect on the ordering of the cultural traditions in the eastern part of the United States. Therefore, it seems advisable to precede an interpretation of the effects of radiocarbon dates with a discussion of

1. *Johnson,* 1952, p. 97.

time as a concept in the science of prehistory; an historical review of timescales used in anthropology; a description of the methods used to obtain time-scales, including radiocarbon techniques; a list of significant radiocarbon dates; and finally, a discussion of the effect of radiocarbon dates on the interpretation of the cultural traditions of the eastern part of the United States.

# INTRODUCTION

The central core of all science is time. The more accurately a scientist can measure time, the more accurately he can predict a future event. As a rule, a scientist studies a process and describes the process he observes. A process proceeds on a time continuum, and the changes observed in a process are made meaningful by means of plotting them on a time-scale. Predictions are made in the comparative study of selected traits in a number of scientific disciplines, including anthropology. The predictions arrived at in comparative analysis of selected phenomena are based upon statistical frequency tables, and as such are relative to the selected "universe" in which they are associated. Comparative studies utilize synchronic time-scales and disregard the historical position of these phenomena in their original contextual setting. Time for the purposes of this paper is considered as historical time.

Most time-scales are based on the motions of the earth that are perceivable by man through the naked eye and through man-made instruments that refine perception. Time is measured in terms of the duration of the earth, and the earth is conceived as a material substance which has both a beginning and an end within the material universe. Events that happen are an aspect of the earth's duration as a material object. In addition, events that occur within the perceptual field of man are measurable on a fractional scale of the total time of the earth's duration.[1]

One of the most elementary and most frequently used time indicators is the year. This time period is the measurement of one revolution of the earth around the sun. It is further delimited as a measurement of duration by the day, hour, minute, and second. Other measurements of time, in terms of the yearly orbit of the earth, are: the sunspot period of 11.4 years; the procession of the equinoxes, a period of 21,000 years; the obliquity of the ecliptic, a 40,000 year period; and the eccentricity of the earth's orbit, a period of 92,000 years.[2]

The measurements of time involving the earth are, in reality, points along a continuum of a total system or process. As such, they are useful in delimiting the stages of its duration.

The science of man, anthropology, is concerned with the total duration of man's existence, both past and the future. The

1. *Tomb*, 1953, pp. 2-3.
2. *Zeuner*, 1950, p. 4.

concept of the present is conceived as a point between the past and future. While the present has reality, it does not exist long enough for any analytic purpose of anthropological investigation. The past time of man's existence is studied by anthropologists in a scientific manner in order that they may better understand social processes and activities. Archaeology is a branch of anthropology which studies the past existence of man and is commonly divided into two parts. The first subdivision studies man's past activities that are covered by historical calendars; the second subdivision studies man's existence prior to historical calendars. The former study is frequently called historical archaeology, and the latter, prehistoric archaeology. In terms of time, prehistoric archaeology is a study of ninety-nine per cent of the total duration of man's existence on the earth.

The prehistorian and the historical archaeologist have constantly sought ways to place the evidence they find of man's existence within a precise time-scale. This task of establishing a valid chronology for the various sites under investigation has always depended upon other allied sciences, such as chemistry, physics, geology, and paleo-botany. In fact, the archaeologist has had to wait until reliable systems of dating were established in other sciences before he could accurately date habitation sites a few hundred years older than the invention of writing. There was no doubt that many events—such as the domestication of plants and animals—occurred, but there was no way to measure time, or to determine when they happened.

The paramount place time holds in the study of man's existence in the past is attested to by the fact that whenever another science has developed a new means of dating the past, archaeologists have frequently tried to incorporate the new techniques in the study of prehistory. There are many examples of this, some of which have already been mentioned, such as astronomical dating, fluorine content dating, radiocarbon dating, and geochronological techniques of dating; but none of them has provided the archaeologist with as useful a technique as the radiocarbon method. This method not only gives time in absolute terms, but it is not confined to any particular region of the earth. In a larger sense the method of obtaining absolute dates by the radioactivity method, which involves determining the rate of disintegration of certain elements, provides both the archaeologist and geologist with an "atomic clock" that can measure immense periods of time, including periods prior to organic life on earth.

The archaeologists have had to revise their estimates of when events have happened as new methods of dating have been discovered. This is especially true today as radiocarbon techniques of dating prehistoric remains are becoming more widely used. In a general way, each new dating technique has enlarged the time period of man's existence, or pushed back the estimates of man's origin and subsequent human strivings to cope with his social and physical environment. There have been many shrewd guesses as to the time of origins,[3] as well as the time when man made such specific outstanding achievements as animal and plant domestication, but these dates will remain "guess-dates" until they are correlated with an historic calendar. The fact that many of these "guess-dates" were proven to correspond with absolute dates arrived at by radiocarbon methods has added immensely to the prestige of the science of man.

3. One of the Hindu sacred books, *Manusmitri,* discusses the age of the earth; it states that the length of time from a creation to a destruction of the world is 4.32 billion years. (See *Jacobi,* 1908, pp. 200-201.) According to Hindu religionists the earth is at the mid-point of the above time period, or, about 2 billion years old. The radioactive measurement of the age of the earth is 4.5 billion years. (See *Zuener,* 1952, p. 340.)

# METHODS OF RELATIVE DATING

In large measure the reconstruction of culture depends upon finding prehistoric ruins and placing them within a time perspective. This temporal sequence may be stated in terms of relative or absolute time. In either case a temporal sequence is developed from which an analysis and an interpretation of a culture or cultures is made by the archaeologist. A relative chronology estimates the age of a culture in terms of other cultures within a cultural-temporal sequence.

A relative chronology is most frequently established by means of stratigraphy. This chronology is determined by a study of the layers of deposition that have been gradually built up. Human occupation sites are frequently stratified. Broken pots, animal bones, and abandoned house sites are covered over by a new batch of refuse, thus forming layers—the oldest at the bottom being covered by successive younger layers as one goes toward the surface. Relative chronologies can be established by other methods which include fluorine content analysis, typological analysis, and the age-area analysis of cultural objects and traits.

## Age-Area Analysis

The most general and the least accurate of the time-fixing techniques used in archaeology is the age-area method. Otis T. Mason is credited with developing, in 1901, the conceptual framework for this method of determining the age of cultural phenomena. His system was later clarified and expanded by Clark Wissler[1] and A. L. Kroeber[2] into the cultural and natural areas of North America. The cultural and natural area concept is essentially the geographical distribution of a whole cultural system, as distinct from another cultural system. Within a cultural system, there is a geographical distribution of cultural traits and complexes among the various groups of people in the area. The distribution of the cultural traits is accomplished by contiguous affinities and relationships of the people. Franz Boaz emphasized the contiguous affinity aspect of diffusion of cultural manifestations from region to region in contradistinction to the "German School" concept of diffusion.[3] The "German School" emphasized

1. *Wissler*, 1938, pp. 219-260.
2. *Kroeber*, 1939, p. 6.
3. *Boas*, 1927, p. 6.

the role of migrating peoples who took their culture with them as they moved from area to area, whereas the "American School" conceptualized culture as being diffused outward from a center, passing from one group of people to another.[4]

The American Indians were found to have many material traits in common, and those Indian tribes that lived adjacent to each other had more material traits in common than did those who lived more distant from each other.[5] The credit for stating the temporal aspect of the geographical distribution of a material object from one sub-cultural area to another goes to N. C. Nelson. Nelson correlated geographical distribution of customs, mores and material objects within a time-space continuum and illustrated that cultural manifastations found with the wider spatial distribution were older than ones with less spatial distribution. Nelson implied that general area was the center from which cultural objects were distributed. Later, this concept of a cultural center was defined by Wissler in the following manner: "A culture-area is a region within the boundary of which is a group of tribes closely similar in culture, which tribes manifest the regional culture type in its purest form and lead in its development. This central group of tribes constitutes a culture center."[6] This culture center for a region or an area is the creative center in which the regional expression has reached a culmination of cultural productivity and richness. It is from this central district that material and non-material manifestations of culture diffuse to the outer areas; thus, the technique for manufacturing a projectile point with an antler will occur later in the other areas than it will at the culture center. In like fashion, similar cultural objects found in stratigraphic sequences in various sites within a region represent different time. The same type object, *e.g.*, a small triangular projectile point of the Mississippian cultural tradition, will be found in a lower strata near the culture center than it will in the other areas. In addition, the cultural objects found in the outer areas of a cultural region may represent an earlier cultural tradition.

In effect, a very general time-scale can be constructed for a cultural area by applying the age-area concept stated above. However, the weaknesses of the method are easily recognized. The most outstanding shortcoming is that the rate of diffusion is not

4. *Kroeber,* 1939, p. 5.
5. *Wissler,* 1914, pp. 447-505.
6. *Wissler,* 1929, p. 350.

uniform for various cultural traits and complexes, as many factors are involved in process of adoption of a new cultural equipment. The age-area hypothesis does not allow for items being diffused toward the culture center, or for the existence of trade goods moving more rapidly to outer areas than to areas near the center.

In summary, the age-area method of establishing a chronology is restricted to generalizations over large geographical areas. The chronology is built by assigning similar typological cultural objects within a time-scale relationship.

### TYPOLOGICAL METHOD

Another method of determining the relative age of certain habitation sites is by the analysis of cultural objects for degrees of similarity or dissimilarity and placing those objects with the greatest similarity within the same time period. The typological method above is described by Alex Krieger as one in which cultural objects, such as pottery, projectile points, sandals, etc., are of a recognizable type and defined by specific and cohesive combinations of features.[7] Krieger further defines the type as a whole and states that it "is understood to occupy a definable historical position, that is, its distribution is delimited in space, time, and association with other cultural materials."[8] In order to construct a chronology by the typological method, it is necessary to have a great many artifacts or cultural objects of the same general type. The consistency of the form, mode, and structure of objects is determined first. Sandals are separated from potsherds in the first step of classification. The next step is to determine the differences of style. If styles can be identified, the next step is the correlation of styles or types with different levels of occupation in a series of sites. Once a type is identified with a particular level of occupation, then its presence can be used to place other cultural objects within the same general time period. The typological method has been successfully employed in the southwestern part of the United States, where a series of sandals was used to help determine several cultural traditions.[9]

### FLUORINE CONTENT METHOD

A third method of obtaining relative time for prehistoric objects is the technique of measuring the fluorine content of

7. *Krieger,* 1944, pp. 271-288.
8. *Ibid.,* p. 277.
9. *Martin, Quimby, and Collier,* 1946, p. 108.

bones found in archaeological sites. The fact that many human bones have been found in association with animal bones of extinct types led to many controversies during the nineteenth and the first half of the twentieth centuries.[10] A series of discoveries has eventually led to the establishment of a relative chronology by measuring the flourine content in bones. The first of these discoveries was made by an Italian chemist named Morichini, who found traces of fluorine in the tooth of a fossil elephant.[11] Morichini's claim was investigated by several French scientists, including Gay-Lussac, who found no trace of fluorine in new ivory and tooth enamel.[12] The conclusion reached by Gay-Lussac was that the fluorine in the tooth of the fossil elephant analyzed by Morichini must have come from the fluoric acid in ground water. James Middletown, an English chemist, claimed in 1844 that fossil bones contain fluorine in proportion to their antiquity.[13]

The attempts at correlating the fluorine content of fossil bones with an historic calendar were revived after World War II by Kenneth Oakley, a British geologist and anthropologist attached to the British Museum. He proposed in 1947 that the fluorine content method might help sort bones of unknown age that came from the same site.[14] He stated that, while no absolute dates could be arrived at, the method could give relative dates with the aid of geologic time determinates.

The measurement of relative age of bones by the fluorine content method is essentially a chemical analysis. Ground water was found to contain various amounts of fluorides, and as the water seeped through sedimentary deposits the fluorine ions were readily absorbed by bones. Once the fluorine is absorbed by bony material, it is extremely resistant to removal by weathering or to other acids. The only acids that will disperse or dissolve the fluorine will also destroy the bone. The bones absorb the fluorine very slowly, thus the longer the bony parts of the animals are subject to fluorine-bearing ground water the more fluorine they will absorb up to a point of saturation. Oakley concluded that "animal or human bones which have been lying in a gravel bed

10. The most famous is the "Piltdown Man" which was later proved to be a hoax.
11. *Moore*, 1953, p. 334.
12. Later investigations disproved their findings. Fluorine is absorbed by bones and teeth during the lifetime of an animal, and more can be absorbed if it is exposed to fluorine-bearing ground water.
13. This view was presented in a paper read before the Geological Society of London in 1844. *Moore*, 1953, p. 335.
14. *Oakley*, 1949, pp. 44-49.

for 200,000 years are likely to have fixed considerably more fluorine than a human skeleton interred in the same grave, say 2,000 years ago."[15]

The refinement by Kenneth Oakley of the fluorine method has aided in determining the contemporaniety of fossil animal bones and human bones found at the same site. The fluorine content analysis of bones of an unknown age is a method of fixing the relative age or contemporaniety of human and animal bones, and while the chemical analysis of bones for the fluorine content is done with due regard to scientific procedure, the dates assigned the bones are inferred or "guess-dates."

## STRATIGRAPHY

The relative age of cultural manifestations in prehistoric sites can often be determined by stratigraphy. Stratigraphic chronology is determined by a study of the various layers of deposition. Artifacts found in these layers can be assigned relative dates according to the law of superposition. The principle underlying the law of superposition is simply that the bottom or lower layers in a sequence of deposits are older than the layers toward the surface of the ground. A great many people have assisted in the task of systematizing the knowledge of stratigraphy. In 1840 two Danish museum curators, C. J. Thomsen and J. J. A. Worsaae, developed a stratigraphic concept of culture. These two men postulated that stone implements preceded bronze implements, and that iron implements followed bronze; therefore, the stone tools would be found in the lowest layers of a prehistoric site, bronze in the next layer, and the iron on the top layer. The various layers were described as levels of culture and commonly referred to as evidences of a Stone Age, Bronze Age, and Iron Age.[16] Charles Lyell, in his book, *Principles of Geology,* published in 1867, related his studies of the earlier forms of life which had been fossilized in various layers of sedimentary deposits. Lyell formulated the theory of Uniformitarianism, which holds that the processes of building up and wearing down of land on the earth have remained essentially the same since the earth was created; thus deposits could be used as indicators of past time.[17]

Following Lyell's theory of Uniformitarianism, Baron Gerard de Geer in 1878 studnied the lamination present in certain clay

15. *Ibid.,* p. 44.
16. *Daniel,* 1950, p. 41.
17. *Ibid.,* p. 28.

deposits near Stockholm, Sweden, and eventually constructed a time-scale from these deposits that went back to early post-glacial time.[18] By 1910, the science of stratigraphy was considered essential to understanding time sequences in the study of early man, and the law of superposition was being applied to cultural sequences.

The law of superposition can often be extended to more than one site. This relative dating of a series of sites depends upon several factors. Sites with true stratigraphy[19] are rare, thus most frequently an archaeologist finds a site that has been occupied intermittently without the development of distinctive soil zones; or, in other words, which has several undifferentiated layers of cultural debris directly on top of one another. The artifacts from such a site can be divided into various levels according to the kind of cultural characteristics they possess at different locations. For example, the lowest level may not contain any pottery; the next level may have fiber-tempered pottery; and the third level may have grit-tempered pottery. Neighboring sites often contain similar cultural objects, but occasionally they may contain artifacts of different characteristics occuring above or below the levels found at the original site, thus extending the cultural sequence.

The cultural sequence or series of levels at a site represents an indefinite period of time, since there is no uniform rate of debris accumulation. It can, however place each period within a relative time-scale, e.g., the level with no pottery is found at the bottom and, therefore, has to be older than the levels with pottery that occur above it. In a similar fashion neighboring sites can be placed within this relative chronology as long as they have a level that ties in with the original sequence. It is necessary to recognize the limitations of building stratigraphic chronologies. This method is culture-bound, and it does not place the various sites of pre-historic occupation within an absolute time-scale.[20]

18. *Zuener*, 1950, p. 20.
19. A site with true stratigraphy has distinctive layers of soil containing the various cultural traditions.
20. *Nelson*, 1916, pp. 159-180; *Spier* and *Leslie*, 1931, pp. 275-282.

# METHODS OF ABSOLUTE DATING

## Tree Ring Dating

One of the first to use yearly growth rings of trees as an indicator of past time was De Witt Clinton in 1811. Clinton studied the earth works of Canadaigua, New York, and estimated the time of their construction by counting the rings of a tree growing on the site. Trees and other forest flora have been used by others in the past to estimate the age of various archaeological sites. President William Henry Harrison wrote in a treatise on the mounds of the Ohio Valley that "The process by which nature restores the forest to its original state, after once being cleared, is extremely slow."[1] He observed that "the sites of the ancient works on the Ohio present precisely the same appearance as the circumjacent forest."[2] Harrison concluded by asking, "Of what immense age, then, must be those works, covered, as has been supposed, with the second growth after the ancient forest state had been regained."[3] Other scholars have pondered over the same question of how long it would take a forest to regain its primeval character after once being destroyed. Several American anthropologists, including Squier, Davis, Cyrus Thomas, and Samuel Haven, used a tree-ring count to estimate the age of earth works found in the eastern part of the United States prior to 1900.

These earlier estimates of time by the counting of the annual rings of trees lacked a scientific footing until 1901, when A. E. Douglass worked out a method of correlating tree ring growth with an historical calendar.[4] Douglass was primarily interested in observing fluctuations in climate due to sun-spot activity. He eventually found an indicator in the annual ring growth of trees in the Southwest. This tree-ring analysis is called dendrochronology, and the method has developed a chronology back to 11 A.D.

Dendrochronology has been most successfully applied to the southwestern area of the United States. The analysis of tree-rings revealed that an annual growth-ring is observable, and that the ring of growth varies in width according to the age of the tree,

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1. *Harrison,* 1883, p. 31.
2. *Ibid.,*
3. *Ibid.,* p. 32.
4. *Zuener,* 1950, p. 404. Zuener states that Charles Babbage suggested in 1837 a method of distinguishing exceptional rings of a tree from ordinary ones, as well as a method of cross-dating which is quite similar to the one later adopted by A. E. Douglass. Babbage felt that his methods might possibly aid in developing a chronology of man.

as well as with the amount of moisture it receives during its growing season. An annual ring is formed by the cambium which separates the old wood from the bark.[5] As a growth season begins in spring, sets of large, thinly-walled cells are added to the wood, and as the growing season continues on to fall, the cells get progressively smaller until the growth process ceases. Each growing season repeats the process and a distinct demarcation is formed between the spring cells and the fall cells of a previous season.[6]

The width of rings in a tree varies, as mentioned above, with age. The older a tree becomes the narrower is each succeeding ring. The rings near the center of the tree will always be larger than those toward the outside. There is also a variation in the size of the rings of a tree due to varying amounts of moisture it receives each year. In years of drought the rings will be narrower than those formed in years of abundant rainfall. "A curve reproducing the variation in a series of rings observed in the cross-section of a tree, therefore, reproduces to some extent the variation of the local climate. It is on this fact that the applicability of tree-ring analysis to dating depends, since most trees of one area tend to exhibit similar variations in their ring-records."[7]

This growth characteristic of trees, that of annually adding a new layer of cells which can be distinguished from other annual rings of growth, enables a dendrochronologist to count backward in years. The inner rings of a tree can often be correlated with outer rings in an older tree in the same locality. The cross-comparative tree-ring method was successfully used by Douglass and his associates for the southwestern region of the United States. This region has very moderate amounts of rainfall each year. Many parts of the Southwest receive less than 10 inches of rain per year; therefore, minor fluctuations in rainfall are easily observed in the annual ring-growth of trees.[8] Climate fluctuations were Douglass's main interest, and the Southwest provided an ideal region for his study. The Southwest is also a very favorable region for studying prehistoric archaeology. Eventually, these

5. *Ibid.*, p. 6.
6. *Ibid.*, pp. 6-7.
7. *Ibid*, p. 7.
8. Waldo Glock suggests "A study of tree growth in relation to mean annual rainfall has suggested the following law: An increase of rainfall by a certain increment helps to produce a progressively greater amount of tree growth as the mean annual rainfall lies closer to zero. Optimum rainfall tends to produce maximum growth. After rainfall reaches the optimum any further increase produces little, if any added growth in trees, and may actually retard it." *Glock*, 1937, p. 93.

two disciplines were of assistance to each other. The old ruins provided timbers which filled in the gaps in time and the chronology developed by Douglass gave the archaeological investigators absolute dates for the old ruins.

Specimens for laboratory examination are usually a slice of the tree, cut as near to the root-buttresses as possible. At times a rectangular radial cut or a long thin core is extracted from a tree for laboratory analysis. The specimen is smoothed and a liquid is used occasionally to make the reading of the ring sequence easier. A method for plotting the sequences of rings on coordinate paper was found especially useful in field work, as exact measurements are not taken of each ring's width. This method, developed by Douglass, only counts the tree-rings of ordinary thickness, and the very thin rings are indicated by a vertical line. The thinner the ring is, as compared to its neighboring rings, the longer the vertical line is made. The rings of exceptional width are marked on the coordinate paper with a "B" or "BB", the additional letter B indicating a very wide ring in relation to its neighboring rings.[9] This method of describing the various widths of tree-rings has the advantage of being independent of the decreasing average thickness of the rings as the age of the tree increases.

Another method of plotting the annual growth of rings was developed by Ernest Antevs. Antevs' method plots each ring's width on a graph. The thickness of each ring is given in millimetres, and a broken curve is drawn.[10] A smoothed curve is drawn over the broken curve to indicate the general trend of fluctuations in the annual growth of rings over a period of years. This general trend of growth indicates, by inference, the amount of moistures available for a tree, thus reflecting climatic conditions and cycles. The graphs of individual trees of the same age will all have the same general fluctuations if they grew in the same locality.

The use of either method for dating purposes in the Southwest has been successful in correlating old timbers in various sites of archaeological interest. Douglass, starting with trees of recent time, worked back to prehistoric time. He found that many of the timbers supporting historic pueblo houses were quite old, as they had been used over and over again when a house was erected. The old beams provided links with prehistoric pueblos

9. *Zuener*, 1950, p. 8.
10. *Antevs*, 1938, p. 51.

that had been abandoned, but which contained ancient timbers that could be dated back to 11 A.D. in absolute time.

There were certain difficulties encountered by Dr. Douglass and his associates. He found that the beams used in building the "apartment houses" of the pueblos differed considerably from one another with regard to time. Therefore, a single tree date would not be reliable evidence for the exact age of the ruin or village. It was also necessary to make sure that the outer ring of the beam was the last one grown by the tree before it was chopped down; otherwise, an investigator had to allow for an unknown number of rings or years. However, if most of the beams of a house can be dated within a year or two of each other, there is little doubt about the time of erection of the house. The few beams that do not fall in with the majority of the other like-dated beams can be considered as being either replacements or beams that had been salvaged from other buildings.

## VARVE ANALYSIS

The idea of determining time by counting the clay and sand deposits at the various terminal points of glaciers occurred to Baron Gerhard de Greer of Stockholm in 1878.[11] He observed the regularity of the lamination present in clay deposits. De Greer studied the clay layers and soon found that the deposits varied in thickness, and that the variations were also present in neighboring deposits. In 1910, de Greer published a paper entitled *A Geochronology of the Last 12,000 Years,* in which he outlined his methods. He was soon followed by others, including Ernest Antevs, who studied the glacial deposits in eastern Canada.[12]

The counting of time by the clay-varve method is restricted to late glacial and postglacial periods,[13] yet the dates from varve analysis are extremely valuable. For example, they enable "us to say that the Magdalenian was flourishing somewhere between 13,000 and 20,000 years ago."[14] In addition, "it is no longer a matter of guesswork to say when man first made works of art on bones and on the walls of caves in the south of France and the north of Spain."[15] In North American, varve analysis was used by geologists in estimating the date of the Folsom culture site near

11. *Daniel,* 1950, p. 254.
12. *Antevs,* 1925.
13. Time-scales have been determined for other periods of the Ice Ages, but the attempts to link them with recent time have failed; thus, the dates are tentative.
14. *Daniel,* 1950, pp. 224-225.
15. *Ibid.*

Ft. Collins, Colorado, as falling between 10,000 and 25,000 years ago.

The history of varve analysis begins with de Greer's observations that the terminal moraines of glaciers kept the melted water from flowing rapidly to the sea. The melt-water held a great deal of sand in suspension, and as the heavier sand settled first, a graduation from coarse grains to very fine grains of sand was built up annually. According to de Greer's analysis of varves, the relative thickness or thinness varied according to the climate. He postulated that a warmer summer season would cause more ice to melt, thus releasing more water and sand, and causing a thicker layer of clay to be deposited on the bottom of the terminal moraine lakes. A thinner layer of clay deposit would indicate a cooler summer season.

Baron de Greer applied his theory to glaciers that were known to exist in historical time, and counted backward until he had constructed a chronology for 12,000 years. His chronology is restricted to the Baltic area in northern Europe, and his principles applied by Antevs in North American have resulted in a corresponding chronology for the post-glacial period that appears to be trustworthy.[16] The chronology by varve analysis for Europe is correlated with historical calendars, but the North American varve analysis has not yet been linked up with an historical calendar.

### POLLEN ANALYSIS

The pollen analysis method was developed by the Swedish scientist Lennart von Post, an endeavor for which he was awarded the Vega Medal by the Swedish Anthropological and Geographical Society in 1944.[17] The method of pollen analysis involves a count of the different varieties of pollen in layers of peat moss deposits. It is von Post's assumption that the number and variety of pollen in the various levels of peat moss are representative of the floral conditions of the area at the time of deposition. Von Post studied pollen from all parts of the world found in various levels of peat moss deposits and found that the varieties and number were very similar in the same geologically dated deposits. He found that the types could be correlated with postglacial climatic cycles, and that, within a temperature range, certain kinds of pollen increased to a climax and others diminished. Thus, he was

16. *Zuener*, 1950, p. 45.
17. *Nature*, 1944, p. 205.

able to construct a chronology by using a combination of interrelated techniques.

The pollen analyst studies a small quantity of peat moss after it has been treated with sodium or potassium hydroxide, which removes most of the organic matter but leaves the pollen. The count is made under a microscope and the various specimens are plotted on a frequency table. The results are indicative of the composition of the tree and floral vegetation, as discussed above. Artifacts in collections can often be identified with a particular stratigraphic level, if they have but a trace of peat moss on their surface.[18]

The major divisions of von Post's forest flora chronology are three in number. They are called Stages A, B, and C. Stage A is a warm period and heat-loving trees predominate. Stage B is a period of intense heat and drought, which decreased the number of heat loving trees of Stage A. Stage C is a period of a gradual decrease in temperature toward the kind of temperature and climate of today. These major divisions are further sub-divided and refined and cross-related with various zones of climate. The refined charts and graphs of pollen have proved very useful in Europe and in parts of North America, assisting archaeologists in dating prehistoric sites.[19]

## RADIOCARBON METHODS OF DATING

The newest method to determine absolute dates for archaeological sites is the radiocarbon technique. The method correlates the rate that certain elements lose their radioactivity with a calendar. The history of radiometric dating begins with the discovery of X-rays by Rontgen in 1895. Following Rontgen's discovery that an electrically charged vacuum tube emitted rays that penetrated opaque substances, it was observed that a heavy metal (uranium) would do the same thing. Soon other metals and elments were found that would perform in the same manner as X-rays and uranium. These spontaneously radioactive metals released rays of energy which caused the original substance to change its chemical and physical characteristics. A series of investigations by a great number of scientists revealed that the rate of decomposition could be ascertained and measured, and that the various radioactive metals had different rates of disintegration. It was found that a gram of radium loses half of its radio-

18. *Zuener*, 1950, p. 59.
19. *Cooper*, 1942.

active properties in 1590 years, and in another 1590 years the remaining half gram will lose one-half of its radioactive properties. Thus, a gram of radium will lose three fourths of its radioactive properties in 3,190 years. To simplify matters, radioactive metals and elements are commonly spoken of as having a "half-life" of so many years, *i.e.*, radium has a half-life of 1590 years.

A radioactive element begins to decay at a regular rate as soon as it is crystalized, unless new radioactive material is added to the original element. The decay of an element or metal involves a release of energy and a physical alteration of the metal's atomic weight. The process can be very simply illustrated by the change of uranium to lead. There are intervening metals, but the process begins with uranium and ends with lead. This knowledge allows a geologist to date many geologic formations if he can find traces of either uranium or lead.[20]

The same principles of radioactivity and half-life characteristics of certain elements apply to radioactive carbon; however, there are several important distinctions. The first is the production of radioactive carbon. The chain of events that eventually led to the radiocarbon dating techniques began in 1911, the year in which V. F. Hess discovered cosmic radiation. His discovery prompted a great many conjectures on the effect this cosmic radiation might have on the surface of the earth.[21] It was also thought that the cosmic radiation might affect the earth's atmosphere. With the discovery of the neutron in the atmosphere it was also observed that the neutron increased in number as the altitude increased up to about 40,000 feet. Conjecture was then centered around the role of cosmic radiation on the production of neutrons.[22] It was discovered that a radioactive neutron had a lifetime of only 12 minutes, and that it traveled at tremendous rates of speed. The cosmic radiated neutron smashes into other elements and combines with some of these elements in the atmosphere—the most common being nitrogen, or more specifically, with one of the two nitrogen isotopes, $N^{14}$.

Laboratory experiments by Libby, Arnold, and Anderson indicated that when the cosmic-ray neutron combines with isotope $N^{14}$, the result is radioactive carbon, or $C^{14}$.[23] This radioactive

20. There are several varieties of lead. Lead from uranium decay has atomic weights of 206, 207, or 208; lead occurring naturally has an atomic weight of 204.
21. *Libby*, 1955, p. 1.
22. *Ibid.*
23. *Ibid.*, p. 2.

carbon isotope will burn in a few minutes or hours to a radioactive carbon dioxide. This, in turn, will mix with other non-radioactive carbon dioxide readily, and therefore all atmospheric carbon dioxide is directly or indirectly made radioactive by cosmic radiation.[24] The plant life on the earth lives off of carbon dioxide, and since it is radioactive all plants are radioactive—as are all animals, since they eat plants to live or eat other animls that eat plants. In fact, all living matter is radioactive as a result, directly or indirectly, of cosmic radiation.

The second distinction between long range dating techniques useful to the geologists and radio-carbon dating techniques is that, while the geologist seeks natural radioactive elements uncontaminated by cosmic radiation, the prehistorian uses materials and elements that have been altered by cosmic radiation at some point in life.

Experiments by Anderson and Libby indicate that the amount of radioactive carbon dioxide has remained constant for the past 5,000 to 10,000 years.[25] They assumed that the cosmic radiation has remained at its present intensity, and that there exists, at present as well as in the past, a complete balance between the rate of disintegration of radiocarbon atoms and the rate of assimilation of new radiocarbon atoms for all plant life in the world. This state of equilibrium for plants ceases to exist when the plant dies, and only the disintegration process continues, at a half-life rate of 5568 + or — 30 years.

The organic materials found in various archaeological sites can be dated by measuring with a Geiger counter the amount of radioactivity remaining in the carbon isotopes contained in the dead organic material. The samples that give the most accurate count are those of cellulose and charcoal which have not been found in deposits with other organic materials containing carbon of an age different from that of the sample. Frequently small roots or rootlets, if not removed, can throw the radiocarbon count off several thousand years. The chamber in which the Geiger counter is placed has to be protected from cosmic radiation. The best protection was found to be steel walls about eight inches thick. In addition, the Geiger counter with the carbon sample is completely surrounded by other counters which absorb the cosmic

24. *Ibid.*, p. 5.
25. *Ibid.*, p. 73. Cited by E. C. Anderson, Ph.D. Thesis, University of Chicago; and E. C. Anderson and W. F. Libby, *Physics Review*, Vol. 84, p. 64 (1951).

radiation during the test.[26] These shielding devices reduce the error in the measurement of radiocarbon radiation to about 2 per cent in 48 hours,[27] the standard time for a given run.

The chronologies developed by the radiocarbon method have added immensely to our knowledge of when specific events occured. The method is unique in determining time, in that the dates may be determined by a single method and thus are directly comparable.[28]

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26. *Ibid.*, p. 66.
27. *Ibid.*, p. 67.
28. *Ibid.*, p. 142.

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# THE NATURE OF THE CHEROKEE SUPREME BEING

D. H. Corkran

It was once widely held that the Cherokees were sun worshipers, zootheists, and polytheists with a culture probably derived from Mexico,[1] and therefore incapable of relating themselves "to one great god, creator of heaven and earth and man, the founder of the moral and social order."[2] However, by penetrating the cloud of spirits, ghosts, fetishes, taboos, totems, little men, and quaint customs raised by Mooney, it is possible to perceive something which Lang and Fiske would recognize as a high god concept. Fire-spirit centered rather than sun centered, the Cherokee religious system apparently is not so much oriented from Mexican culture as it is from a religious complex common to a number of American Indian tribes well north of the Rio Grande, and it appears to have much in common with several Asiatic patterns.

Alexander Longe, writing of the Cherokees in 1725 after living fifteen years among them, states that: "They owne one Supreme Power that is above the firmament, and that power they say was he that made the heavens and the earth and all things that is therein and governs all according to his will and pleasure . . . and this great king as they call him has four messengers that he has placed in the four winds: East; West; North; and South."[3] Further on, Longe says that the great god has several messengers under him, "some to do good to the earth and some others to be messengers of his wrath."[4] Of the latter were thunder and lightning.[5] The four messengers of the winds "are obliged to keep strict watch over the winds . . . and every season they have the grate talks given them from the grate emperor what they shall do and act that season."[6]

The foregoing presents an idea akin to the medieval concept of an almighty God with ministering saints and angels to do his will. Other minor gods are suggested in a conflicting view of the creation also in the Longe manuscript: "The grate god that . . . lived in the heavens came down with the other gods I know not

1. *Schmidt*, 1932, p. 18.
2. *Ibid.*, pp. 17, 135.
3. *Longe*, p. 3, 11. 22-27.
4. *Ibid.*, p. 9, 11. 19-23.
5. *Ibid.*, p. 31, 11. 2-3.
6. *Ibid.*, p. 3, 1. 36.

how many."[7] It is not clear that these are the messengers mentioned previously; but there were enough of them to provide a populous pantheon should the central concept of one Supreme Being decay. "They combined together to make the earth"[8] . . . "The greatest of them" sent the crawfish below the waters to search for earth. The "greatest god" also made the sun and the moon.[9]

In the eighteenth century neither sun or moon appear as major objects of Cherokee devotion, even though tradition held them to be important representatives of the Supreme Being. Early nineteeth century materials do mention Cherokee worship of the sun as creator and yield old prayers to the sun;[10] but the same materials note that sun worship was rejected by the devotees of fire.[11] By that time the old way had been contaminated and was disintegrated as a major force. Adair, writing in 1775, says that the North American Indians "do not pay much regard to the sun."[12] Mooney says that the misconception of the importance of sun worship may have arisen when the translators of the Bible into Cherokee used a word assigned to the sun to designate God.[13]

A fire divinity concept would, of course, include the attributes of the sun; but fire would be much more important to a people who had experienced the limited daylight and long cold of northern regions, and who had lived for centuries through mountain winters. Such a people would find a sun god to have decided limitations. Fire and water, present both day and night, winter and summer, sustaining life with little of the sun's apparent help, would be superior objects of devotion.

It is the whiteness and brightness of the Great Being Above which causes outsiders to confuse him with the sun. He is referred to as "white" and "good",[14] and by nineteeth century informants as "The Great White Being Above."[15] In this respect he resembles the Algonkian Michebo or Great White Hare[16] and the white aspect of the Aztec Quetzacoatl.[17] His brightness suggest

7. *Ibid.*, p. 18, l. 10.
8. *Ibid.*, p. 18, ll. 11-13.
9. *Ibid.*, p. 18, ll. 15-16.
10. *The American Quarterly Register and Magazine*, 1849, p. 448.
11. *Ibid.*, p. 446.
12. *Adair*, 1775, p. 20.
13. *Mooney and Olbrechts*, 1932, p. 21.
14. *Stuart*, 1767.
15. *Butrick*, 1884, p. 12.
16. *Brinton*, 1896, p. 109.
17. *Vaillant*, 1944, pp. 174-175.

that of the Aryan daevos, "the bright ones,"[18] of Zeus, Jupiter, Juno and Diana, whose names stem from the root *di*, meaning "bright."[19] It was the brightness of the west coast Haidas' "Shining Heavens"; the Winnebago Hap, meaning "light, air, heavens, and life";[20] of Michebo, himself, the name being derived from a word meaning "dawn light . . . the spirit of light . . . the lord of the winds."[21] One recalls also the Genesis story in which, when God came down to perform the act of creation, he commanded, "Let there be light: and there was light."[22] So in the creation story of the Cherokees when the gods came to create, "light shone all over the waters." The Cherokee deity appears, therefore, to belong to that very old tradition in which the essence of the deity is light. As Adair stated it, the Cherokees worshipped "the celestial cherubim, fire, light, and spirit."[23]

As creator of the sun, moon, and stars, the Cherokee Great Being represents a principle much more powerful than either man or the sun. He is the giver of good things. Like Prometheus, loving the people of the earth, the Great Being gave them Fire, Bread, and the Rivers.[24] Like Zuetzacoatl, he is the giver of knowledge.[25] He is also the protector of the moral order; for according to Longe's informant, "sometimes the poeple of the earth are so wicked with disobeying their kings and seperiors . . . misbelieving the priests and not obeying the doctrines and good counseill that they give them" that "they cause the anger of that grate engage or Emperor and he sets all these four petty gods against the earth to destroy crops and bring a famine."[26]

The essence of the Cherokee religion of the "Great Being" is contained in Adair's statements that the Cherokee priests were "men resembling holy fire"[27] and by their prayers brought "success in war"[28] and "seasonable rains" by direct "reflection of the Divine Fire."[29] Here is a divinity of war and weather, of wrath and beneficence.

Like the storm gods of Eurasia—Zeus, Thor, Thunder, Per-

18. *Childe,* 1926, p. 44.
19. *Frazer,* 1951, p. 191.
20. *Radin,* 1914, p. 361.
21. *Ibid.*
22. *Genesis,* I:3.
23. *Longe,* p. 18, l. 10.
24. *Stuart,* 1770.
25. *Vaillant,* 1944, pp. 174-175.
26. *Longe,* p. 5, ll. 32-37.
27. *Adair,* 1775, p. 81.
28. *Ibid.*
29. *Ibid.*

kunas—the anger of the Divine Light speaks in thunder. "Worah —He is"[30] said the thunder to the Cherokees, as the lightning flashed in wrath.[31] So awful was the Divine Light in sending his fire to earth that the Cherokees, like the Greeks and Romans, tabooed an approach within fifty paces of a "thunder struck tree."[32]

As the lightning spoke of anger, so the rainbow— a sign of the Thunder God in Yuki lore[33]—spoke to the Cherokee of the beneficence of the Divine Light. Longe, excited by the Biblical parallels in the Cherokee story, asked a Cherokee priest if the end of the earth would not be in fire; but the old priest, knowing the beneficent nature of fire, said, "No, the rainbow shows you the contrary."[34]

Lightning also had its beneficence—as it must as an aspect of the "Divine Light"—a bringer of fire to forests or grasslands, it also came with the "seasonable rains" by which the crops were watered. In this aspect, as in the Hopi rain-serpent-lightning complex, for the Cherokee fire and water are closely connected.

Fundamental in Cherokee religious concepts, the divinity of fire and water points toward a probable unity of the two. Fire, a vital fluent thing released of vegetation, and water, welling up from the rocks, both appear to derive eternally from the essence of earth and are regarded as the givers and protectors of life. Water from the sky, rain, was a "reflection" of the Divine Fire. Because of this divinity the Cherokees prayed to the river of the "Long Man"[35] for long life, and for success in their enterprises; on the fourth day baptised the new born babe in it for long life;[36] sacrificed first fruits to it; and in death, regarded it as having relinquished its hold upon life.[37]

Addressed as "grandfather" or the Ancient Red and the Ancient White, fire received much the reverence that water did. To invoke its blessing the new born babe was waved over its flames.[38] For the deceased, whose life it had relinquished, the same prayer was said to the fire as to the water. Hunters sacrificed a portion of their kill to the fire;[39] and before the first meal of the day the woman sacrificed a portion of the food she was

30. *Ibid.*
31. *Longe,* p. 31, 11. 1-2.
32. *Longe,* p. 31, 1. 13.
33. *Schmidt,* 1932, p. 27.
34. *Longe,* p. 44, 11. 21-22.
35. *Mooney,* 1900, p. 1.
36. *Ibid.*
37. *Ibid.,* pp. 2-3.
38. *Mooney and Olbrechts,* 1932, p. 21.
39. *Ibid.*

preparing.[40] At the green corn feast some of the first fruits were offered the temple fire.[41] In early historic lore these sacrifices, especially that to the temple fire, had the character of offerings to the "Great Being Above." Writes Longe: "I asked the priest why he burned that piece of meat in the fire. He told me that it was to the great king above and that it was burnt in honor and obedience to him being supreme lord and emperor of all viseable and invisable."[42]

A number of evidences in the lore of southern and southeastern Asiatic peoples point toward an ancient unity of fire and water. Frazer points out a Cambodian Fire King and Water King, who may be identical.[43] The Vedic fire divinity, Agni,[44] referred to as "the essence of earth, squeezed from earth,"[45] is said to have been derived from three sources: air, water, and the friction of the sacred Arani sticks. Hindu priests discerned fire in the spray of the waterfall—perhaps in a rainbow in the mist, or in the mist itself—just as the Winnebago regarded the vapor of their steam baths as being spirit.[46] The presence of the rainbow in the waterfall mist would speak of the fire deity who produced the rainbow in the sky.

Serpent lore also points to the unity of fire and water. The ancient Persians, deriving their religion from India where the serpent is the water god, referred to the rainbow as a serpent.[47] The Mayans depicted their water god as a feathered serpent;[48] among the Aztecs the fire god is depicted as a feathered serpent;[49] wide spread among other tribes "is the water-spirit known as horned snake and the plumed serpent."[50] If fire and water were unified in a fire concept, then it is probable that the ceremonial bathing of the Hindu in the Ganges, and of the Cherokee in the Tennessee were anciently one form of purification by the fire spirit.

Of significance in this connection is the wearing of serpent-shaped arm bands by Cherokee headmen, who were also priests of fire. It is likely that the red and yellow possum's hair tail which

40. *Butrick*, 1884, p. 2.
41. *Longe*, p. 12, 11. 19-25.
42. *Ibid.*, p. 4, 11. 15-19.
43. *Frazier*, 1951, p. 124.
44. *Monier-Williams*, 1891, pp. 280-282.
45. *Crawley*, 1914, p. 30.
46. *Radin*, 1914, p. 349.
47. *Cook*, 1911, p. 678.
48. *Thompson*, 1927, p. 233.
49. *Vaillant*, 1944, pp. 174-175.
50. *Radin*, 1914, p. 356.

trailed from the headdress to the heels of the Cherokee Oolestooleeh or Fire King in the outdoor ceremonies of the green corn feast symbolizes the serpent, fire and water, or both.[51]

Color symbolism points also toward the content of the Divine Fire Concept. In the crown worn by the Oolestooleeh at the green corn ceremony were woven the sacred colors: red, blue, yellow, purple.[52] These were not the four winds or cardinal points colors which Longe gives as black, red, white and yellow,[53] but probably fire or rainbow colors. A number of items suggest an ancient unity of the fire and rainbow colors. Rabbinical tradition holds that the "red, blue, purple, and white fire" of the ancient Hebrews symbolically represented the being of God.[54] Somewhere along the way the Hebrews drew from these the colors red and white and raised them to particular significance: the red to mean the anger of God, the white, his love.[55] The California Yuki, regarded by Kroeber as among the most ancient residents of America, represented the rainbow symbol of the Thunderer by red and white.[56] The Cherokees spoke of the lightning in public as red, in private as white—the sacred or "awful" color.[57] Under this line of reasoning the colors red and white—the red of glowing fire, the white of quiescent fire—indicate a probable ancient unity of fire, lightning, and the rainbow in a concept of one "Divine Fire."

Like the Hopi, the Cherokee seem at one time to have associated fertility with fire and an attribute of the Divine Fire was the vitality and fertility of man. Hereditary Cherokee priests, members of "one Certing family that priesthood belong to,"[58] being men resembling the Divine Fire are the designated of the Great Being. Charles Hicks, a Cherokee headman, in 1826 said that these fire priests, once known as the Proud, had a fertility function or privilege which permitted them to come in the dark of night as messengers direct from heaven to take what they wanted from any Cherokee woman they chose.[59] Cherokee agricultural rites are associated with new fire rites rather than sun worship, and therefore probably contained fertility implications.

Finally the Divine Fire found expression in the Cherokee

51. *Longe*, p. 14, l. 12.
52. *Ibid.*, p. 14, ll. 9-11.
53. *Ibid.*, p. 4, ll. 15-19.
54. *The New Schaff-Herzog Encyclopedia of Religious Knowledge*, Vol. III, p. 163.
55. *Ibid.*
56. *Schmidt*, 1932, p. 43.
57. *Mooney and Olbrechts*, 1932, p. 21.
58. *Longe*, p. 3, l. 20.
59. *Payne Manuscript*, Vol. VII, pp. 5-7.

political system. Theirs was a theocratic government composed of two phalanxes of priests, the red or war priests, and the white or peace priests.[60] The red priests invoked the red phase of the Great Being and with his protection and anger made war upon the enemies of their nation. The white priests handled religious ceremonies of peace, rain-making, the civil functions of allotting lands, building homes, and making judgements in disputes.[61] These two brotherhoods composed the regional councils of the nation, that at Chotte among the Overhills possessing the Fire King, head of all the nation. Referred to as the Oolestooleeh, he sat in white skins, as a living representative of the Great Being Above. Thus the god-head, the one, was implicit in the Cherokee government. To disobey it was to provoke the divine wrath.

The Great Being Above, then, was a spirit, the Divine Light the vital principle of heat, light, fire, sun, the water, lightning, the rainbow, and of human plant and animal vitality. His antecedents were Asiatic; his parallels North American. The relatively minor position of the serpent idea in Cherokee religion, the unimportance of the sun, and the dominant role of "The Great White Being Above" or "Divine Fire" do not so much suggest descent from either the Mayan or the Aztec, as a simpler pattern from which the latter two may have sprung.

Chicago, Illinois

60. *Gilbert*, 1943, pp. 248, 321.
61. *Ibid.*, pp. 323-325.

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