

## ANTHROPOLOGY

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### Post-Glacial Ecology and Prehistoric Settlement Patterns in the Central States Area

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It is only within the span of the last decade, with its break-throughs of nuclear biology, especially the development of refined methods of dating of archeological remains by the radiocarbon method, and the accumulation of such dates for various prehistoric manifestations, that the nature of the ecological relationship of the American Indian to his environment in the eastern United States is beginning to emerge. Earlier attempts to elucidate ecological relationships, such as that by Wissler in 1926 (12) properly pointed out the permissive nature of the environment—rather than determinative nature, as far as man is concerned—were seriously hampered by the lack of a chronological framework for the cultures as well as the lack of information on continuities and possible replacements of populations.

Man is unique among animals in that, by virtue of his culture, he is the least dependent on his environment and with the passage of time he has been able to modify or control it to an increasing extent. This fact makes it exceedingly difficult to point out specific causal relationships and to examine relationships which, ecologically speaking, cover rather limited spans of time. It is therefore at this time only possible to sketch these relationships in the broadest outline in the hope that it will provide a framework the details of which can be filled in with the accumulation of specific data.

The physiographic province under consideration covers most of the central part of the United States—and if we follow Fenneman (4) especially the Great Lakes section and the Central Lowlands east of the Mississippi. The latter comprises local lowlands and uplands and constitutes an area that is being dissected in true plateau fashion. The elevation of the province ranges from 1500 feet on the western edge to 300 feet on the shores of Lake Ontario. To the west it is bordered by the Great Plains which cover 532,000 square miles in ten states, an area that is characterized by its flat-lying rocks. Glaciation dominates most of the landscape.

The province boundary is marked by a visible contrast of topography along its borders. The topographic distinctions in this area depend not so much on underlying rocks as they do on the glaciations. The ice is known to have advanced at least a half dozen times followed by a retreat. Each successive glaciation covered some territory not reached by its successors.

The major glaciations are generally classified as the: Nebraskan (bottom), Kansan, Illinoian, Iowan, and the Wisconsin. The present drift cover falls into three main divisions: Kansan, Illinoian, and the more recent sheets.

The northeastern part of the Central Lowlands is characterized by lakes which are very abundant although they are not evenly distributed. Swamps represented intermediate stages between lakes and dry land, and flat plains bordered the Great Lakes. Much of the area is covered with marginal moraines, outwash plains, and rolling ground moraines—all evidences of recent glaciation. The lowlands, south of the Great Lakes section with its drift areas, reflects the features due to underlying rocks to a much greater extent. The dominant structural features here are the northern part of the Cincinnati anticline which brings Ordovician rocks to the surface, and the southern Illinois syncline, which bed the Carboniferous coal measures. Deeply dissected areas and minor uplands have repeatedly served as refuge areas for Archaic populations.

It soon becomes obvious to anyone who carries on archeological excavations in a number of cultural horizons of a particular area, and studies them in their ecological setting, that the prehistoric remains exhibit considerable differences in settlement patterns as one goes back into time. It can be equally well demonstrated that there was an increase in dependence on the natural resources of the immediate localities inhabited as one proceeds into the past. The dependence is, of course, greatest in the most ancient hunting and gathering groups or those that retained such an economy until historic times mainly because of local abundance of game and fish. With food production, an increase in population, and the expansion of trade, dependence on immediate surroundings becomes less direct, and the nature of population pressure changes.

With the retreat of the last glaciers in the Middle West eleven to thirteen thousand years ago, we note the first shift in economy. The Paleo-Indian hunters gradually shifted from dependence on Pleistocene big game, especially various species of now extinct bison, to hunting smaller game such as deer that spread into the area accompanying a change from prairie to woodland conditions. Concomitant with this change from a Paleo-Indian to an Archaic level we also find a greater dependence, at least seasonally, on the molluscs found in the larger streams.

The Archaic Pattern was followed by a Woodland Pattern with increasing forestation and the development of regional cultural traditions. The Middle Woodland period was characterized by considerable interaction of traditions and the rise of secondary culture centers. Toward its end, corn is introduced to supplement the mixed diet of the hunting and gathering economy, and the emergence of the Mississippi Pattern.

The Mississippi Pattern which developed in the middle Mississippi area represented a marked change in the way of life—a food-producing tradition supporting town dwellers. The proto-historic period, finally, saw a reemergence of the Woodland Pattern and the fusion of Mississippi

and Woodland traditions in several localities, a process that was only stopped by the advent of the Whites and the subsequent displacement of the Indians.

### The Paleo-Indian

Given an immediate post-glacial period of 12,000 to 15,000 years, we can thus observe considerable climatic changes accompanying drastic shifts in ecology. With the ecological changes we can trace evolutionary cultural changes that allow certain groups to occupy particular ecological niches.

As Mason has recently demonstrated (7) on the basis of the distribution of Folsom spear-points and other lithic remains attributed to the Paleo-Indian, the earliest hunters occupied the Great Lakes region soon after the retreat of the last glacier. Radiocarbon dates from Wisconsin indicate that this took place around 13,000 B.C. An earlier occupation of the continent by the Paleo-Indian is well substantiated by many radiocarbon dates, which indicate that man was contemporary with a Pleistocene mammalian fauna which includes the horse, camelops, the ground sloth, the mastodon, and a number of species of now extinct bison.

Areas vacated by retreating glaciers pass through a regular sequence of climatic and ecological zones during the course of several thousand years as the temperature rises. At first tundra conditions prevail. Gradually grasses begin to cover the flat, barren, lake-studded land. Arctic forms of mammals prevail. During the Sangamon Interglacial Period even musk oxen roamed as far south as central Illinois. (8) As northern Indiana became swampy around 10,000 years ago, herds of mastodons seasonally wandered north for forage. Their remains are frequently encountered in ancient peat bogs, one of which has recently yielded a human skull of an early mastodon hunter. These mastodons were hunted in the West from Wyoming to the Valley of Mexico. One find in particular from Wyoming has been described as a hunting camp where one of these animals has been killed. Undoubtedly the Paleo-Indian followed the mastodons into the Great Lakes area. Mason recently suggested that the early hunters, who made the fluted points which are part of the Paleoeastern culture, entered the Lower Peninsula of Michigan about 11,500 years ago from Indiana and Illinois, following closely on the retreating margins of the Cary ice. From the scattered remains a slowly changing hunting culture is indicated. Mason emphasizes the fact that the fluted points are definitely not a trait of the eastern Archaic cultures, but part of the Paleoeastern complex that ceased to exist by the time that recognizable Archaic manifestations had developed. His distribution maps of fluted spear points clearly demonstrate that they are limited to the southern half of the Lower Peninsula, the northernmost finds having been made in a tier of counties west from Saginaw Bay across the state. This strongly suggests that the Paleo-Indian occupation of the lower part of the state was contemporaneous with the glacial cover of the northern half of the peninsula.

### The Archaic Period

Sometime around 8000 B.C. with changing ecological conditions and forestation of formerly glaciated areas an Eastern Archaic culture began to differentiate. During the Terminal Glacial retreat between 6000 and 3000 B.C. the climate changed from a damp cool to a warm dry climate (10). Pines achieved dominance during the first part of the period, and were followed by an expansion of great grasslands, which spread eastward across the area as far as New York state. After 2000 B.C. the climate became cooler again and conditions had become much as they are today. The mastodons had left the region and deer and elk replaced the barren-ground caribou. The period of a seven thousand year duration reflects various adjustments to a mixed hunting and gathering economy within a woodland ecological setting.

In many parts of the world populations, now living in larger aggregations, seasonally supplemented their diet of small game and wild seeds with shellfish. Large shellheaps found along the shallows of the majority of larger streams throughout the Middle West and the South attest to the extensive use of clams for food. The fact that the people of this period often seem to have been malnourished and undersized and their cultures of low vigor has led Jensen (6) to suggest that grave thiamin deficiencies from the destruction of thiamin by thiaminase of shellfish may be the reason. The enzyme in these foods is destroyed by cooking, which is known to have been practiced at that time because of the presence of hearths with fire-cracked rocks used in "stone-boiling."

By studying the remains found on Archaic sites it can be inferred that the people certainly lived in family groups or bands up to about fifty individuals leading a migratory way of life in pursuit of game.

Winter (2) describes this seasonal shift from one riparian camp site to another as follows: "As the seasons changed they moved from camp to camp, taking advantage of various natural resources, both plant and animal, or seeking shelter in inclement weather. Thus, were we able to follow a typical band throughout the year, we might find them during the fall in a camp near a grove of nut trees. After their departure from this camp, the ground would be left littered with the pebble grinding stones, pestles, grinding slabs, and nutting stones which had been used in preparing the harvest of nuts and other ripe seeds for consumption and storage. The winter would perhaps be spent in a rock shelter, where campfires placed towards the front of the shelter would warm the interior both directly and by heat reflected from the rock above. There would be innumerable fragments of burned sandstone or other rock scattered around the hearths, since throughout the year stone boiling was a standard procedure for cooking food. That is, stones were heated in the hearths and dropped in the skin or bark food containers. Part of their food would be supplied from the fall harvest which had been stored in pits in the floor of the shelter. Deer and other game would have formed another part of their diet, since hunting was very likely a year-round activity. As always, there was need for chipping dart and spear points and making other stone tools. Perhaps time was also spent in making the beautiful tools of ground stone which

have been found on so many Archaic sites in Illinois. With the coming of spring, open campsites would again be reoccupied for the gathering of edible plants and roots. In the following months, the camp would move from time to time as game was depleted in the area and as new food sources become available in other areas. With the fall, we should again find our band at its site near the nut groves, completing its seasonal round." (pp. 9-10.)

It was towards the end of the early Archaic period, perhaps around 6000 B.C., that inhabitants of the area learned to utilize their woodland environment. This corresponds to Caldwell's (3) first economic level. In a recent paper he demonstrates that there have been three dominant trends in the prehistory of Eastern United States which lead to three stages or economic levels: (1) the establishment of primary forest efficiency, (2) the dominance of regional differentiation and stylistic change in artifacts, and (3) increasing connections with Nuclear Middle American civilization. The first two transformations, which had been completed at the time of European contact, depend to a greater or lesser degree on ecological conditions prevalent at the times the particular cultures existed. All evidence points to a very slow cultural development during the Archaic period, and emphasizes the fact that a culture must have advanced to a certain level before proper utilization of particular ecological resources can take place. Despite a greater concentration of population and living in villages, the Archaic people had to await the advent of pottery, food production (corn, beans, and squash) and a more complex socio-religious organization that served as a cohesive factor, before undergoing a radical change in the way of life typical of the more advanced Neolithic agricultural town dwellers. In northeastern North America the innovations were adopted in the Terminal Archaic after 1000 B.C., which allowed the Archaic groups to become gradually identified with the Woodland culture.

### The Middle Woodland Period

As mentioned in the preceding section, the onset of the Woodland period was gradual, varied with the locality, and lasted as the Early Woodland period over a span of two thousand years, that is, from 2500 to 500 B.C. Archaeologically the Woodland sites can be recognized by the presence of pottery, generally sherds of conoidal vessels with cord-marked or stamp-decorated surfaces. Evidently at least two ceramic traditions developed, the northern remaining relatively unchanged, while the southern or Mississippi tradition became quite distinct. The ultimate origin of the Early Woodland pottery has not been ascertained, for some hold that it is a local development, while others have attempted to trace it to northeastern Siberia.

The Middle Woodland Period is distinguished by an elaborate assemblage of traits of the Indians of the widespread Hopewell culture, which flourished in two centers between 300 B.C. and 500 A.D. The center in the Illinois River Valley yields radiocarbon dates that are somewhat earlier than those from the center that was located in southern Ohio (2, p. 21).

Struever (11) especially has been greatly interested in the ecological relationships of the Middle Woodland peoples. Whereas the Early Woodland (Black Sand Focus) people of the Illinois Valley, who are directly ancestral to the Hopewell group in that area, invariably occupy river bottom sites which were located right on the river bank, often on sand bars, the Middle Woodland peoples generally occupied higher ground, which has been characterized as bluff-base occupation. This suggests canoe nomadism for the former, and a sedentary occupation for the latter. The Middle Woodland Hopewellian groups are well-known for their erection of earthworks and burial mounds. So far no evidence for the cultivation of maize has been discovered in Hopewellian sites in Illinois, though the fact that one finds a concentration of population in large villages around the ceremonial earthworks and burial mounds strongly suggests food production. Struever believes that even the Classic Hopewellians still maintained a hunting and seed-gathering economy. As proof he discovered remains of large quantities of pigweed (*Chenopodium*) seeds in cache pits. Nuts, berries, roots also made up an appreciable percentage of the diet. Chief dependence was still on the Virginia deer and a number of smaller mammalian species. Rabbit bones are noteworthy because of their absence—a fact that may have some connection with a mythological role the rabbit plays in trickster tales of the Algonquian tribes. We thus have a hunting-oriented culture which nevertheless congregated in fairly large population assemblages for socio-religious reasons, which was only possible in favorable, rather restricted environments. Struever points out that it was in the riverine alluvium, along the mud-flats bordering sloughs and river banks that presented just such density and diversity of natural food products, and Caldwell (3) holds that it must have been under just such conditions that the earliest cultivation was practiced. Subsistence thus restricted the concentration of people to the broad river valleys along which we indeed find the greatest population expansion of the Hopewellian period. There is little doubt that horticulture, that is food production, and the actual introduction of the maize plant was from the south.

An elaborate mound burial complex in which the ruling families were buried in specially prepared mound tombs while ordinary people were buried or cremated (Ohio), indicating a socio-religious cohesive factor; artifacts and materials demonstrating extensive trade and far-ranging contacts; and the increase in cultural complexity and elaborateness of ceremonialism and settlement pattern in a series of ecological zones—all raise interesting questions regarding the relationship between subsistence patterns and particular ecological niches.

According to McGregor (2, p. 24) the Classic or Late Middle Woodland people had maize and practiced limited agriculture. Be that as it may, in general the Middle Woodland peoples represent a cultural peak in the prehistory of the area, and a way of life that led to the development of extensive permanent settlements.

### The Middle Mississippi Tradition

It is now the consensus of archaeologists that the Middle Mississippi cultural tradition is an outgrowth of the Woodland Pattern with its

regional traditions. The interactions of a number of these regional developments, near the mouth of the Missouri and in the Tennessee-Cumberland area, led to the emergence of a culture that was primarily agricultural but centered around towns. These towns, which served as religious centers, furnished the necessary cohesion. The earliest developments probably date back as far as A.D. 500 with good-sized villages by 900, and the climax of well developed religious centers between 1200 and 1450. An analogous development of politico-religious centers and daughter colonies occurred in the South.

Practically all of the towns with their temple mounds, chief's mounds, and town squares were established in areas with like climatic conditions, such as found in northern Mississippi and western Tennessee. They were in areas with a warm humid climate and a long growing season, with winter temperatures that rarely fall much below freezing. The palisaded towns were found along the main river courses where cane, pecans, and cypress grew. Intense cultivation of the soil was carried on by the farmers in the river bottoms surrounding the towns. Although there were no definite streets, the square wattle-and-daub houses with their grass-thatched gabled roofs were oriented with their corners to the four cardinal points. Grass-lined storage pits for corn dotted the whole site within the stockade.

Subsistence was based on growing maize, beans, and squash, supplemented by game (deer), fowl, and fish. Camp refuse from such sites yield reliable information about food habits and species of animals utilized for food, as well as approximate proportions of plant food to game and fish (1, 8, 9). It has been estimated that the larger centers may have had between 1000 and 2000 inhabitants and a population that may have increased in times of festivities or times of danger when the farmers of the surrounding countryside would flock to the towns. Such a concentration of a sedentary population probably led to an exhaustion of local resources, for we find that most of the towns seem to have a rather brief occupational history. Most of the settlements were contemporaneous, for there was wide trade, and such uniformity in settlement pattern that Indians from a thousand miles away would know what to expect in the settlements.

### The Historic Period

The mode of life and ecological relationships of the historic tribes corresponded roughly to three ecological and culture areas. In the north-eastern Woodlands and eastern Canada the tribes belonged mainly to the great Algonquian linguistic family. Tribes such as the Menomini, Potawatomi, Ottawa, Chippewa, Miami, Illinois, Shawnee, and Delaware were the descendants of the Boreal Archaic and Early Woodland peoples, native to the area for at least five thousand years. They were adapted to a hunting economy in a northern forest environment. Food production was secondary and the growing of maize directly dependent on the length of the growing season. The densest populations were found in the river valleys and lake regions, in locations where forage was most plentiful for deer. Transportation was by birch-bark canoes, and settle-

ments, consisting of an aggregation of bark or mat-covered wigwams, were invariably located immediately on the banks of streams.

Similarly, in the South, the tribes had been indigenous to the area for seven thousand or more years, again derived from an Archaic (Southern) population. The linguistic homogeneity—most of the tribes spoke languages of the Muskogean linguistic family—is attested by the continuous block of related languages, revealing very little of the shatter pattern characteristic of marginal populations. Tribes such as the Chickasaw, Choctaw, Creek, Seminole, and the Iroquoian-speaking Cherokee are typical. Their culture was largely of the Mississippi Pattern, largely food producing, and, as previously described, centered in towns. Since the Indians never had draught animals and the plow to cut the hard soil, settlement was largely limited to the fertile river-bottoms where the soil was tilled with digging sticks and flint hoes. It has been estimated that maize, beans, and squash formed about seventy percent of the diet. It was supplemented by game (mainly Virginia deer), fowl, and fish. Transportation in contrast to that of the north-eastern Woodlands was by dug-out canoes. The towns, as described for the Middle Mississippi period above, were palisaded and located along the main river courses.

The third major culture area that impinges on the Middle Western region is the Plains area, where subsistence was based chiefly on the hunting of the bison. Linguistically, the Indians of the area were largely Siouan-speaking. The expansion of the Southern Village Indians, who grew maize, occurred mainly between A.D. 1100 and 1300. The movement from the St. Louis area was largely directed up the Missouri, Mississippi, and Illinois rivers. Tribes like the Wichita, Caddo, Pawnee, and Arikara were Caddoan-speakers and still formed linguistic islands along the Missouri in historic times, after being engulfed by the Siouan tribes that spread from southwestern Minnesota and the eastern Dakotas to the southwest across the Plains. The Teton, Brulé, Ogalala, Yankton, Kansa, Osage, Iowa, Missouri and Winnebago are the best known. Subsistence, in the contact period, was almost entirely based on hunting of the bison. But there is good evidence (5) that the large herds of *Bison bison* are a rather recent development, perhaps since 3000 B.C. The Siouan expansion into the Plains dates largely after 1300, and is closely related to the advent of the horse (1540-1740), which gave these tribes greater mobility. Some bison ranged over northern Illinois and northern Indiana and were hunted by the Sauk and Fox and the Winnebago Indians, who introduced Plains area customs into this section of the region under consideration. Archaeologists have been able to trace this historic eastward movement by the presence of Oneota (Iowa) pottery and skeletal remains which definitely points to Siouan influences. It must, however, be kept in mind that this only represents a historic movement, rather than a long range adaptation to ecological conditions.

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