

ECOLOGICAL INTERPRETATION OF DATA ON ARCHAEOLOGICAL SITES: THE MODOC ROCK SHELTER

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INTRODUCTION

At the eastern edge of the Mississippi flood plain about two miles southeast of Prairie du Rocher, Randolph County, Illinois, is the Modoc Rock Shelter. It is one of the oldest and longest occupied Indian sites now known in North America. Radiocarbon determinations have indicated that it was occupied as early as 8000 B.C. and inhabited until after 2000 B.C., a time span of over 6000 years (Fowler, Winters and Parmalee, 1956; Deuel, 1957; and Fowler, 1959). During most of its history, the Modoc Rock Shelter was occupied by peoples of the Archaic Stage of cultural development (Willey and Phillips, 1959). Later occupations of the Modoc Rock Shelter were sporadic, and some evidence indicates the site was occasionally utilized by Indians as late as 1200 A.D.

The basic contours of an overhanging bluff were probably formed by the torrential waters from the Valdres substage of the Wisconsin glaciation (M.M. Leighton, pers. comm.). This substage reached its maximum around 9000 B. C. (Rubin, 1955: 453). The Modoc Rock Shelter was probably first occupied soon after the flood waters receded, for the first evidence of such occupation was found on bed rock. During the course of human occupation the site built up, through natural and human agencies, to a depth of more than 27 feet above this rock.

The Illinois State Museum conducted archaeological excavations at the Modoc Rock Shelter during the summers of 1952, 1953 (with cooperation of Department of Anthropology, University Chicago), 1955 and 1956. Thousands of artifacts of human manufacture, chert chips, mollusks, animal bones, human burials, and other indications of human habitation were recovered.

ECOLOGICAL INTERPRETATION OF ANIMAL REMAINS

The large quantity of bone and shell recovered at the Modoc Rock Shelter Site has proved to be of especial significance to both the zoologist and the archaeologist. For the zoologist, the variety of species represented and the number of remains provide an index to the prehistoric distribution and possible abundance of the animals inhabiting or migrating through this area. To the archaeologist, these faunal materials supply food habits data of these Archaic people. The presence of exotic species in the midden deposits suggest trade routes and/or barter, while the occurrence of species typical of a particular habitat indicates the locality hunted by the Indian.

More than 92,000 pieces of bone were removed from these midden deposits; nearly 8,000 bone remains were identifiable to genus or species. Approximately 17,000 shells of fresh-water mussels and terrestrial

and aquatic gastropods were identified. With but few exceptions, all of the species of mussels and animals identified from the midden debris still occur in that general region of southwestern Illinois.

Mollusks

Fresh-water mussels were common at this site and apparently formed an important source of food for the Indian; they would have been easily obtainable and available throughout most of the year. Approximately 2,900 shells of mussels, representing 36 species, were identified, and the majority of these were typical large-river forms and had probably been collected in the Mississippi River. However, the presence of certain species characteristic of shallow, mud-bottomed ponds and sloughs (e.g. *Uniomorus tetralasmus*) suggests that the Indians hunted the shallow backwaters and sloughs as well as the main river for mussels (Parmalee, 1956).

None of the numerous sites previously excavated in Illinois produced the quantity and variety of species of snails recovered at the Modoc Rock Shelter. Although the vast expanse of time involved during the periods of human occupancy would allow for the probable accumulation of such quantities of terrestrial gastropods, the abundance of certain aquatic species (more than 4,400 specimens of *Campeloma* spp.) also points to the use of snails as a source of food. Matteson (1953) concluded that terrestrial gastropods in the midden heap of a Hopewellian site in Pike County, Illinois, "... were not an item of diet of the Indians.... They became a part of the kitchen midden while seeking

food." Probably some of the specimens recovered at the Modoc Rock Shelter occurred there naturally, but the high concentration of aquatic as well as terrestrial forms indicates that snails were eaten.

Of the more than 14,000 identified gastropod shells recovered at the Modoc Rock Shelter less than two dozen bore evidence of having been worked or altered in any way. Four shells of *Campeloma* and 17 small specimens of *Anculosa praerosa* had been drilled or otherwise modified for use as beads. The latter species is of interest since it apparently occurs only in the lower Wabash and Ohio rivers in Illinois. These 17 specimens were possibly acquired through barter or during wanderings to the southeast. This paucity of worked shell artifacts compared with the huge quantity of mollusk remains suggests that their primary use was for food; in most instances it appears that the various species were collected in direct proportion to their abundance and availability.

Vertebrates

Judging from the variety of fishes, turtles, birds and mammals represented in the midden deposits, the Indian utilized extensively the local vertebrate fauna. In the instance of the whitetail deer, as well as many other species, it is obvious that the animal was intentionally killed for food and/or other purposes. However, the remains of small mammals such as chipmunks and mice which could have inhabited the site area raise the question as to whether or not these forms were eaten by the Indians.

Fishes.—A minimum of ten species of fishes was represented in the

midden debris; bones of the fresh-water drum, catfish (*Ictalurus* spp.), gar, bowfin, and catostomids (buffalofish and suckers) were the most numerous. Most of the remains were of small specimens and more than 50% of all those identified were of "rough" fish—gar, suckers and

bowfin; the smaller bullheads accounted for approximately 25% of the total. These fishes are known to inhabit commonly the shallower, quiet backwaters and sloughs; therefore, it appears that the Indians obtained most of their fishes from such habitats.

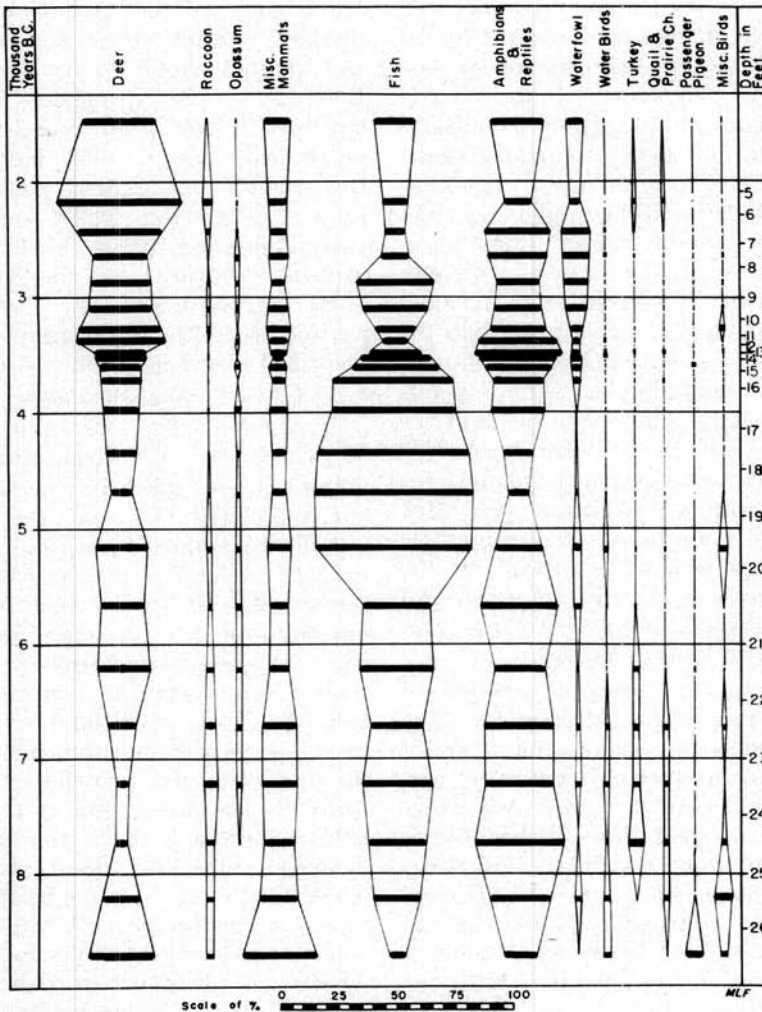


FIG. 1.—Distribution of vertebrate remains by depth, Modoc Rock Shelter, Randolph County, Illinois. Length of bar represents proportion of category to total number of vertebrate remains from that depth.

Reptiles.—More than 800 snake vertebrae were found scattered throughout the occupation levels; no specimens were found associated with any of the human burials, and it is a matter of speculation as to whether snakes were eaten by these Archaic people or whether they died naturally at the site.

Turtles were apparently collected in large numbers as indicated by the nearly 2,000 shell fragments and sections. Remains of the locally abundant pond terrapin, *Pseudemys scripta*, and painted turtle, *Chrysemys picta*, were the most numerous. Correlated with the predominance of bullhead and "rough" fish bones, remains of turtles (species especially common in backwater areas) strengthen the hypothesis that the Indians hunted and collected this type of game in the overflow ponds and sloughs. Only eight bones of the soft-shelled turtle were recovered; *Trionyx* more typically inhabits the faster waters of the main river. Box turtles were taken in considerable numbers and, as evidenced by the numerous sections of scrapped and worked shell, the carapace was often used as a dish or utensil.

Birds.—At least 56 species of birds were identified from the more than 900 avian remains found, and it is apparent that this group of vertebrates provided an important source of food. The Modoc Site is situated along the Mississippi River which is one of the major waterfowl flyways; approximately 65% of the identified bird bones were those of ducks, geese and swans. With the occurrence of other aquatic and semiaquatic species such as the pied-billed grebe, American coot, sandhill

crane, rails, bitterns, and shorebirds, it is apparent that the Mississippi River and especially the associated backwaters were hunted extensively for avian game.

Although the data indicate that much of the game was taken in river and marsh habitats, remains of species associated with dry upland areas, such as the greater prairie chicken, bobwhite, eastern cottontail and spotted skunk (Parmalee and Hoffmeister, 1957), suggest limited hunting in the prairie and semi-brush areas away from the river. Bones of the extinct passenger pigeon (Parmalee, 1958) were of special interest; these birds were probably captured on the wooded bluffs during migration. In comparison with the total number of identified bird bones, the percentage (7) of turkey bones was small.

Mammals.—The whitetail deer was singly the most important vertebrate species taken by the Indian (approximately 70% of the total identified mammal bones) and it apparently served as the meat staple. Several smaller species such as the muskrat, raccoon, squirrel (*Sciurus* spp.), opossum, and eastern cottontail were taken in considerable quantities and constituted some of the more important supplements of the diet. The first two species were definitely associated with an aquatic habitat, although the squirrels and opossum could have been taken in the wooded uplands or the floodplain forests along the river. A rather extensive use of the opossum by these Archaic people is noteworthy, since remains of this primitive mammal are rare in sites of more recent periods in Illinois.

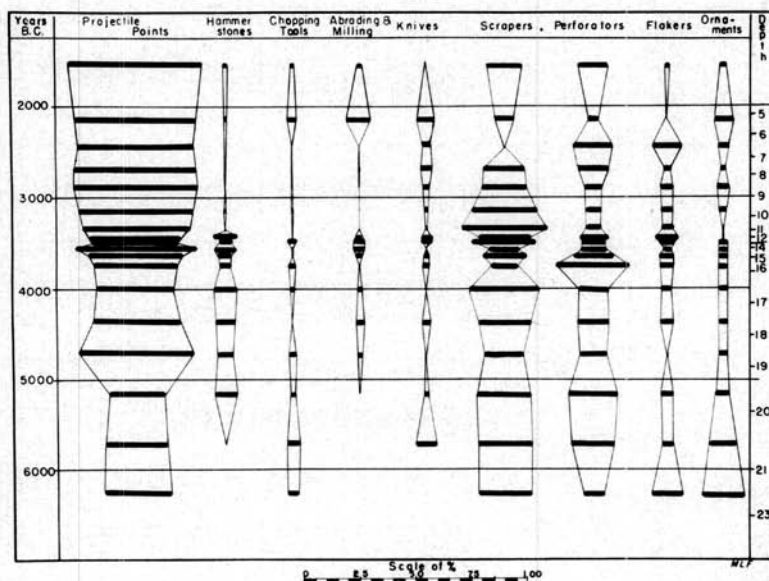


FIG. 2.—Distribution of artifacts by use categories and depth found, Modoc Rock Shelter, Randolph County, Illinois. Length of bar represents proportion of category to total number of artifacts found at that depth.

The presence of such species as chipmunk, mice (*Peromyscus*, *Microtus*), plains pocket gopher and other small animals often considered as undesirable for food and which could have lived naturally in the area of the site raises the question as to whether or not these forms were eaten by the Indians.

Bone Artifacts

Animals were taken primarily for food although in many instances bones of one or more species served in a secondary capacity as ornaments, tools or utensils. Several artifacts manufactured from deer antlers (tines, flakers) and limb bones (e.g. awls fashioned from the ulna) were not uncommon while bone splinter awls occurred throughout most occupation levels. The tarsometatarsus of the turkey was also

used to make awls. One of the most unique finds was a cache of approximately 160 goose (*Branta canadensis* and *Chen* spp.) radii and six tarsometatarsals of the sandhill crane associated with a human burial. Some of the radii had been made into awls but the majority were not altered. This find probably was a cache of raw materials for making awls, placed as a grave offering.

Ecological Conditions

The data indicate that ecological conditions were much the same throughout the history of the site. The well-represented species of animals were present in most levels of the site. One notable exception to this was the presence of the terrestrial gastropod, *Allogona profunda*, only in the lowest strata; presently this species occurs only in the north-

TABLE 1.—Vertebrate Remains from Modoc Rock Shelter:
Mammals, Fishes, Amphibians and Reptiles.

Depth, feet	Mammals					Fishes	Amphibians, reptiles
	Deer, Elk	Raccoon	Opossum	Others	Unident.		
Above 5.....	115	7	1	47	3102	65	86
5-6.....	72	6	1	10	1381	15	16
6-7.....	100	6	1	17	1918	22	80
7-8.....	207	11	14	67	5885	193	236
8-9.....	503	45	66	138	2872	770	425
9-10.....	399	35	19	122	9328	388	292
10-11.....	342	18	10	95	7246	166	220
11-12.....	140	6	2	27	3342	41	125
12-13.....	95	3	5	31	2968	100	164
13-14.....	249	14	9	53	7051	338	370
14-15.....	139	5	3	57	4862	301	220
15-16.....	115	4	14	37	3854	332	144
16-17.....	96	7	1	43	4555	317	138
17-18.....	99	9	.....	50	4087	485	106
18-19.....	68	10	10	37	3345	494	63
19-20.....	57	8	5	27	2603	179	54
20-21.....	67	6	6	28	2517	104	117
21-22.....	60	10	5	23	1915	99	59
22-23.....	34	12	9	25	1548	58	77
23-24.....	7	7	3	17	664	37	35
24-25.....	8	7	2	21	1101	36	60
25-26.....	12	3	.....	13	336	16	20
26-27.....	6	1	.....	7	134	2	1
27-28.....	2	.....	.....	2	24	.....	3

ern half of Illinois and is associated with a cool, damp, wooded habitat. This may correlate with the geological data which indicate that the site was first occupied soon after the Valdres Substage of the Wisconsin glaciation reached its maximum.

Although remains of a few species suggest the utilization of upland prairie and semi-bushy regions by the Indian, the majority of the animals were apparently taken in the forested flood plain and backwater habitats of the Mississippi River. At the present time, therefore, interpretation of the faunal data leads to the conclusion that the local habitat remained relatively unchanged with the exception of earlier periods which were apparently somewhat cooler and damper.

CORRELATION OF ARTIFACTS WITH ANIMAL TYPES

To study any possible changes in the use of fauna through time, the vertebrate remains were divided into broad categories as well as species. The proportion of each of these categories (Tables 1 and 2) to the total number of vertebrate remains was calculated for each one-foot level of the site. These proportions were plotted on a graph (Fig. 1) with the levels spaced on a time axis as indicated by the radiocarbon assessments.

In the periods of the earliest occupation of the site (8000-6000 B.C.), the inhabitants made use of practically all animals available to them for food. For example, the category of miscellaneous mammals was more strongly represented in that period than in any later periods. Birds, with the exception of water-

fowl, were more common in the midden debris of the lower levels than in the upper strata.

In the middle periods of the site's occupancy (6000-3000 B.C.) fishes dominated the remains, thus indicating that they were used more extensively for food than previously. A separate analysis of the mollusks by one-foot levels indicated that this was also the period when aquatic snails and clams were most extensively utilized at the Modoc Rock Shelter.

In the later period of the Archaic habitation (3000-2000 B.C.), all categories decreased except deer and waterfowl; remains of these animals became much more plentiful. This suggests that the Modoc hunters had become more selective in hunting and that, perhaps, the Modoc Rock Shelter became a hunting camp occupied only in the fall of the year when deer and waterfowl would have been most abundant.

A similar analysis was undertaken of the artifacts found at the different levels. These artifacts were broken down into use categories to indicate the different activities of the people. The analysis of these categories (Table 3) was carried out in the same way as described above for the vertebrate remains. The proportions of each of these tool categories for the various levels are shown in Figure 2. There are no data from before 6500 B.C. since, for this type of analysis, too few artifacts were found in the lower levels.

Projectile points, suggesting hunting activities, increased through time, and between 3000-2000 B. C. they accounted for more than 50%

TABLE 3.—Analysis of Modoc Assemblage by Use Categories.

Depth, feet	Projectile pts.	Hammer stones	Chopping tools	Milling, abraders	Knives	Scrapers	Perforators	Flakes	Ornaments	Totals
Above 5.....	40	.....	1	1	.....	11	9	2	3	67
5-6.....	14	1	1	3	2	2	1	.....	2	26
6-7.....	20	.....	.....	.....	2	4	7	5	1	39
7-8.....	80	1	1	1	6	28	21	5	3	146
8-9.....	135	3	1	1	8	50	19	16	13	246
9-10.....	124	7	4	1	6	69	16	131	8	240
10-11.....	118	3	2	1	2	103	19	11	2	261
11-12.....	31	9	1	.....	3	17	9	8	1	78
12-13.....	39	5	3	2	4	30	10	6	4	103
13-14.....	64	12	1	6	1	16	12	3	3	119
14-15.....	35	4	1	4	2	16	15	4	3	84
15-16.....	30	4	2	2	2	5	26	5	2	78
16-17.....	38	13	4	.....	.....	34	14	4	4	114
17-18.....	38	8	.....	2	4	22	14	5	4	97
18-19.....	37	5	2	2	1	13	9	1	3	73
19-20.....	12	5	1	1	1	12	11	3	3	49
20-21.....	12	.....	2	.....	4	10	8	2	5	43
21-22.....	6	.....	1	.....	.....	5	2	3	4	21

of the tools. Domestic tools, indicating various manufacturing and living activities such as hammerstones, chopping tools, perforators and scrapers, were most common in the period between 6000 and 3000 B.C. but negligible from 3000 to 2000 B.C. Knives or cutting tools, although well represented between 6000 and 5000 B.C., had their strongest consistent representation between 3000 and 2000 B.C., the same as projectile points. Ornaments were most common around 6000 B.C. and decreased proportionally thereafter.

The analysis of the artifacts indicates that the Modoc Rock Shelter was a general habitation site between 6000 and 3000 B.C. and that many different hunting and domestic activities were carried on there. After 3000 B.C., projectile points and knives, *i.e.* hunting tools, became more important and other activities were negligibly represented. These data correlate with the analysis of the faunal data which points to the probability that in the earlier periods, the Modoc inhabitants hunted and gathered a great variety of wild food. In the middle period they utilized more extensively freshwater mussels, snails, and fish which were locally available. In the late period they tended to specialize in the hunting of deer and waterfowl.

In terms of the process of adaptation to the local environment, the human habitation of Modoc Rock Shelter can be divided into three sequent phases based upon the data on the fauna and artifacts presented above: *Phase I*) The Initial Occupation (8000-6000 B.C.). The site was first occupied by people who

utilized all food resources available; *Phase II*) The Period of Localized Adaptation (6000-3000 B.C.). In this phase the Modoc inhabitants learned to supplement more extensively their staple deer meat diet with other food sources available in the immediate area. These were fish, clams, and snails in the tributaries, backwaters and sloughs of the Mississippi River; *Phase III*) The Period of Specialized Adaptation (3000-2000 B.C.). In this phase the Modoc inhabitants became specialists in hunting deer and waterfowl and probably occupied the site primarily as a hunting camp. Previously it had been a general habitation area. They probably carried on other activities in different specialized camps and at different seasons of the year. Exemplary of such other specialized camps would be the Ferry Site in Hardin County, Illinois (Fowler, 1957), where the tools indicated that it was a nut collecting, manufacturing, and ceremonial site. Another type of site was the large shell middens in Kentucky (Webb, 1946) which indicates that the collection of mussels (probably in the summer when rivers were at low level) was the basis of subsistence.

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