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A COMPARISON OF PAST AND PRESENT POPULATIONS OF FRESH-WATER MUSSELS IN SOUTHERN ILLINOIS

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Naiads or fresh-water mussels apparently constituted an important source of food for much of the Indian population occupying Illinois in prehistoric and early historic times. The shells were used as tools (hoes, cups, dippers, etc.) and for various body ornaments, beads and pendants, as well as temper material for pottery. The hard shells of these mollusks are extremely resistant to weathering and general deterioration; they are usually well preserved in nearly all soil types. Because of this resistant quality, shells removed from Indian camp sites, kitchen middens, and refuse pits serve as an index to the relative abundance and species composition of past populations of mollusks, as well as providing an insight to the general climatic and habitat conditions prevailing at that time.

Introduction

Table 1 is a composite list of the species of river mussels and their numbers which were encountered in eight Indian sites in southern Illinois. More emphasis will be placed on the Modoc Rock Shelter, Peter's Cave, Nigger Springs and the Rosiclare sites because of the larger numbers of shells examined from each and because of the more extensive collecting in the rivers at or near these sites. Naiads found in the remaining four sites, as well as others of particular interest, will be discussed only briefly.

In the summer of 1952, the Modoc Rock Shelter Site, located approximately two miles southeast of Prairie DuRocher, Randolph County, Illinois, was excavated by the Illinois State Museum. The following summer further excavation of this Archaic Site was undertaken jointly by the Illinois State Museum and the Department of Anthropology of the University of Chicago. A preliminary report of this site was prepared (Fowler, Winters and Parmalee, 1955). A large number of bone and shell remains was removed from this site, the majority of which were identified by the author. The Modoc Rock Shelter is of particular interest since radiocarbon tests (Libby, 1954) date the lower occupation levels (approximately 24-26 feet below the original surface) at about 9,000 years B.C. Mussel shells were not encountered below the 20-foot level (with the exception of four valves), and the greatest concentrations occurred throughout the levels that were 9 to 17 feet in depth, dating 3,000 to 3,600 years B.C.

The second major site considered is one that was probably occupied by a Middle Mississippian Culture between 1,200 and 1,500 A.D. It is the Nigger Springs Site, located approximately three miles southeast of Equality, Gallatin County, Illinois, and judged to have been about 30

acres in size. Peithman (1953) has described this site in some detail. It is of special interest since there is, located near the center of the site, a flowing saline spring. Formerly there were two such springs, but the second has since been filled in and the exact location is unknown. Peithman (1953:67) stated that "The Indians made use of the site in two ways: (1) procuring salt by evaporating the brine from the springs; and (2) manufacturing salt-pan pottery vessels used in the evaporating process".

In his examination of the Nigger Springs Site in November, 1952, Peithman (1953:67) excavated three test pits (each a five-foot square) "to determine the depth of the midden deposits and to check the potsherd stratigraphy of the site". The shell remains removed from these pits, plus those obtained from two additional surface collections made by the author in July and August, 1954, are combined and listed in Table 1.

The Orr or Rosiclare Site was occupied by a Middle Mississippi Culture during the period of approximately 1,400 to 1,600 A.D. It is one mile east of Rosiclare, Hardin County, Illinois, and constitutes roughly 25 acres of a north bluff overlooking the Ohio River. A total of 238 mussel valves were removed from a single test pit that measured approximately 5 by 5 by 3 feet. The large number of shells obtained from this kitchen midden indicates that river mussels provided an important source of food to these people.

The rock shelter referred to as the Peter's Cave Site is located approximately 11 miles northwest of Murphysboro, Jackson County, Illinois, now within one-half mile of Big Kinkaid Creek. Although material from the lower levels is apparently Archaic (a period ending about 2,000 B.C.?), the majority of remains are from a Late Woodland Culture, a time period range of about 800 to 1,200 A.D. The relatively large quantity of shell found at this site again points to the significance of river mussels in the diet of the aborigines of Illinois.

During the latter part of 1953 and in the summer and early fall of 1954, the author collected approximately 900 specimens of naiads from the Wabash, Ohio, and Mississippi rivers and some of their tributaries in southern Illinois. An attempt was made to make a collection of all species now present in the rivers at the points of closest proximity to the Indian camp sites. By comparing the shell remains taken from such sites with species inhabiting nearby bodies of water, it is possible to obtain some idea of the abundance and species composition of past and present mussel populations. With a knowledge of the present habitat requirements of the various species now living, the similarities and differences between past and present populations can be better understood. Early climatic changes have been instrumental in effecting changes in population composition. Pollution has more recently had a significant influence on the abundance and the species composition of naiad populations in Illinois waters (Baker, 1922).

Baker (1923, 1930, 1931, 1937, 1941, 1951-52) was instrumental in identifying, in adding to the general knowledge, and in pointing out the significance of mollusk remains

TABLE 1.—The Numbers and Species of Naiads Removed from Eight Indian Sites in Southern Illinois.

Species	Modoc Rock Shelter (Mississippi River)	Fountain Bluff (Mississippi River)	Peter's Cave (Big Kinkaid Creek)	Blairsville (Big Muddy River)	Nigger Springs (Saline River)	Rosiclare (Ohio River)	Hubele (Ohio River)	Wilson (Ohio River)	Totals
Amblema peruviana (Blue-point)	136	2	14	13	145	....	1	4	315
Quadrula spp.	53	....	....	4	2	....	....	....	59
Uniomerus tetralasmus	52	1	....	....	....	....	....	....	53
Quadrula nodulata (Warty-back)	50	....	....	....	....	1	....	2	53
Quadrula quadrula (Mapleleaf)	37	....	3	2	9	....	....	....	51
Obliquaria reflexa (Three-horned warty-back)	32	....	....	....	4	5	....	1	42
Lampsilis ventricosa (Pocketbook)	28	1	17	....	2	1	....	....	49
Amblema spp. (Three-ridge; Blue-point)	27	4	42	20	29	....	....	1	123
Lampsilis anodontoides (Yellow sandshell)	18	....	....	....	27	2	....	....	47
Obovaria olivaria (Hickory nut)	12	....	....	....	....	3	....	1	16
Amblema costata (Three-ridge)	16	7	180	43	....	....	....	....	246
Elliptio dilatatus (Spike; Lady finger)	13	....	....	4	30	48	5	9	109
Quadrula pustulosa (Pimple-back)	9	....	2	6	23	16	3	5	64
Tritogonia verrucosa (Buckhorn)	9	....	2	2	6	....	....	1	20
Truncilla truncata (Deer toe)	9	....	....	....	....	....	....	....	9
Lampsilis spp.	7	....	16	....	....	....	....	....	23
Sphaerium sp. (Fingernail clam)	6	....	....	....	....	....	....	....	6
Fusconaia ebenus (Niggerhead)	5	....	....	....	37	83	4	4	133
Anodonta spp. (Floater)	5	3	8	....	1	....	....	....	17
Proptera alata (Pink heel-splitter)	4	1	3	....	....	2	....	....	10
Lasmigona complinata (White heel-splitter)	3	....	....	....	1	....	....	....	4
Megalonaias gigantea (Washboard)	3	1	....	1	....	1	....	....	6
Fusconaia flava (Wabash pigtoe)	3	....	126	....	....	....	....	....	129
Ligumia recta (Black sandshell)	2	....	....	....	3	....	1	....	6
Proptera sp.	2	....	....	....	....	....	....	....	2
Lampsilis siliquoidea (Fat mucket)	1	....	88	....	13	1	....	....	103
Micromya iris (Rainbow-shell)	1	....	....	1	....	....	....	....	2
Anodontoides ferussacianus (Cylindrical paper shell)	1	....	....	....	....	....	....	....	1
Acridens confragosus (Rock pocketbook)	1	....	....	....	....	....	....	....	1
Lasmigona compressa	1	....	....	1	....	....	....	....	2
Plethobasus cyphyus (Bullhead)	1	....	....	....	6	4	....	....	11
Fusconaia undata (Pigtoe)	....	....	12	16	41	4	1	1	75
Pleurobema cordatum (Small niggerhead)	....	....	....	....	29	37	3	1	70
Elliptio spp.	....	....	....	....	8	....	....	1	9
Elliptio crassidens (Elephant's ear)	....	....	....	....	6	....	....	1	7
Cyclonaias tuberculata (Purple pimple-back)	....	....	....	....	5	12	....	2	19
Quadrula metanevra (Monkey-face)	....	....	....	....	3	2	....	1	6
Plagiola lineolata (Butterfly)	....	....	....	....	3	5	2	....	10
Obovaria retusa	....	....	....	....	2	4	1	....	7
Anodonta grandis (Floater)	....	....	1	1	....	....	....	....	2
Anodonta imbecillis (Paper pond shell)	....	....	4	....	....	....	....	....	4
Lampsilis fallaciosa (Slough sandshell)	....	2	2	....	....	....	....	....	4
Ligumia subrostrata	....	1	....	....	....	1	....	....	2
Quadrula cylindrica (Rabbitsfoot)	....	....	....	....	....	3	....	....	3
Actinonaias carinata (Mucket)	....	....	....	....	....	1	1	2	4
Totals	347	23	520	114	435	236	22	37	1934

found in sites occupied by prehistoric Illinois Indians. Most of the published accounts of materials removed from such sites are limited to a qualitative listing of species encountered. However, Matteson (1953), in listing the numbers as well as the species excavated from a Hopewellian site in Morgan County, Illinois, provided information concerning the relative abundance some 500 years B.C. of the local naiad population in that area.

The accounts of species of mollusks, with a comparison of present living fauna, concern primarily those species constituting a major percentage of the total number of remains found. Mussels encountered at the Nigger Springs Site, Gallatin County, were obtained by the Indians probably from the Saline River (which flows within approximately 200 yards of the site) and possibly, although unlikely, from the Ohio River about 8 miles to the east. Indians occupying the Modoc Rock Shelter Site in Randolph County collected their mussels from the Mississippi River and its backwaters, now approximately two miles to the west (the river flowed considerably closer to this site during its period of occupancy). Mussels found at Peter's Cave were likely obtained from the Big Kinkaid Creek, while those from the Rosiclare Site seemingly came from the Ohio River.

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Discussion of Species

Amblema peruviana. — This was the most numerous mussel encountered at the Nigger Springs and Modoc Rock Shelter sites, and it constituted a large percentage of the total number in both sites. Today it is one of the most abundant species found in large and medium-sized rivers in central and southern Illinois. Valves of *Amblema costata*, a mussel typical of small to medium-size streams and rivers, formed approximately 73% of the total number of shells removed from the Peter's Cave Site. Big Kinkaid Creek evidently supported a large population of mussels at the time Peter's Cave was occupied, although now this relatively small creek is almost devoid of naiads. The large number of valves of *Fusconaia flava* and *Lampsilis siliquoidea* found at this site, species typical of medium-sized rivers, testify to their former abundance.

Quadrula spp. — Species of this genus, particularly *Q. quadrula*, *Q. pustulosa* and *Q. nodulata*, were fairly well represented numerically at the Nigger Springs and Modoc Rock Shelter sites. These mussels may

be found in a variety of aquatic habitats, but they apparently become especially numerous in the medium and larger rivers. As evidenced from the remains at these two sites, the "Warty-backs" and "Pimple-backs" were abundant in prehistoric times. Although *Q. metanevra* is common in the Mississippi, Wabash, and Ohio rivers today, it is rare compared to the other mussels found in kitchen midden refuse from sites along these rivers.

Fusconaia spp.—Goodrich and van der Schalie (1944:307), in referring to *F. undata*, considered its range primarily in the larger portions of rivers, while *F. ebenus* ". . . is a species found only in streams of considerable size and is never associated with a creek or small river environment". The abundance of these two species at the Nigger Springs Site seems to indicate that either the Saline River was considerably deeper than at present or that pollution has eliminated these species. Only one valve of *F. undata* and no specimens of *F. ebenus* and the Small Niggerhead (*Pleurobema cordatum*), another abundant species at the Nigger Springs Site, were found in the Saline River and its tributaries. *F. ebenus* is an abundant mussel in the Ohio and Mississippi rivers and as indicated by the quantity of valves found in midden refuse from the Rosiclare Site, the Snyder Site (a recently excavated Hopewell Site in Calhoun County) and others (Matteson, 1953), this mussel was abundant and widely used by the Indians.

Elliptio dilatatus.—The Spike is a common species in the lower Ohio River and it was taken in considerable numbers by Indians camping along its shores. Baker (1941) found this mussel to be one of the most abundant in pits and mounds excavated along the Illinois and Mississippi rivers in the northern half of the state. It was comparatively uncommon at the Modoc Site and according to van der Schalie and van der Schalie (1950) it is presently limited only to the upper regions of the Mississippi River. Although *E. crassidens* was fairly numerous in the Starved Rock middens (upper Illinois River in northern Illinois; LaSalle Co.) and in other sites of a corresponding time period (Baker, 1941; *et al.*) and is a common species today in the lower Ohio River, it is rare in sites in southeastern Illinois.

Lampsilis spp. — *L. fallaciosa* is abundant and wide-spread in a variety of habitats in southern Illinois, while *L. anodontoides* is now restricted more to the larger rivers and in local populations. Baker (1941) found the latter species rare in midden material examined by him, although the Slough Sand Shell was fairly abundant, possibly because it was more easily obtainable in shallower water. Valves of both species were numerous at the Nigger Springs Site, although *L. fallaciosa* is the one now inhabiting the Saline River. It, like *Amblema peruviana* and *Quadrula quadrula*, appears more tolerant of silting and pollution, while other species of *Lampsilis*, *Quadrula* and *Fusconaia* are unable to survive in such conditions.

Remains of *Lampsilis ventricosa*, another species fairly common in most streams and rivers throughout southern Illinois today, were relatively few in the Modoc and Peter's

Cave sites and rare or absent in the other sites. Baker (1941:60) stated that "This large mussel was more or less abundant in all mounds and sites" (material based on 10 major sites from LaSalle County southward to Jackson County). As in the case of certain other species (*i.e., M. gigantea*) that are common today but rare or absent from midden refuse, the relatively few valves of the Pocketbook found in Indian sites in southern Illinois may possibly be explained as the result of then smaller populations, very local populations, or perhaps preference on the part of the Indian.

Uniomerus tetralasums. — The presence of numerous shells (primarily fragments, particularly the umbo) of this species at the Modoc Site is of special interest since it tends to indicate that the Indian hunted for naiads in the shallow backwaters and sloughs as well as in the main river. It is a species typical of shallow, mud-bottomed ponds and sloughs, and it is widely distributed in such habitats in southern Illinois, but usually in small numbers. Apparently it, as well as *Obliquaria reflexa* and *Obovaria olivaria*, has been previously unreported from Indian camp sites in Illinois.

General Discussion

Because it was possible to enumerate the species of mussels encountered in the Modoc Rock Shelter and other sites, a relative correlation could be made of species abundance and composition between populations occurring in prehistoric times and those now inhabiting the rivers flowing in close proximity to these sites. Two factors that would decidedly influence this correlation are that of preference by the Indians and availability to them of certain species. It is within reason to assume that, over a period of time, availability would be the most influencing factor determining which species were collected. However, with the occasional presence of fairly numerous remains of relatively small species such as *Truncilla truncata* and *Obliquaria reflexa*, and the absence or rarity of certain common, large and meaty species such as *Lampsilis anodontoides* and *Megalonaias gigantea*, there is an indication that the Indian may have preferred one species over another.

An additional factor to be considered is the influence of weathering (when the shells are exposed) and/or erosion in the breakdown and eventual destruction of the clam or mussel shell. Although many species possess a thick shell which is generally very resistant to erosion and other destroying elements, some are quite thin-shelled and easily broken. Remains of these thin-shelled species are quite rare or entirely absent in midden refuse from Illinois sites. Of particular interest in this respect are the "Floaters" (*Anodonta* spp.), a group of generally thin-shelled, quite common and widely distributed species. Specimens of this genus were poorly represented in the shell remains reported by Baker (1941) and were entirely absent in the midden material examined by Matteson (1953). However, several fragments (umbo and the edentulous hinge line, as well as entire valves) of *Anodonta grandis* and *A. imbecillis* were encountered in five of the eight sites

considered here. The presence of these thin-shelled species would indicate their use by the Indian, although they may have been rejected in preference to certain other species.

Proptera alata was found "sparingly" at several sites by Baker (1941), and only a few fragments were encountered in the midden remains from four southern Illinois sites. Today it is an abundant species locally in the Mississippi and several of the smaller rivers of southern Illinois. Based on the comparative number of remains found, this naiad was possibly rejected in most cases as a food by the Indian. *Lasmigona complinata* is another very common, fairly thick-shelled mussel inhabiting lakes, streams and rivers throughout much of Illinois. Either this species was uncommon in prehistoric times or it was also rejected as food by the Indian, since remains of the White Heel-splitter are quite rare in kitchen midden refuse. It was identified from a site in Tazewell County (Fowler, 1952), and a single fragment was found in a Fulton County site (Baker, 1941). A single fragment was encountered at the Nigger Springs Site and three at the Modoc Rock Shelter (the fragments consisted of only the beak with the typical 4-5 heavy, looped bar sculpture).

The naiads listed from the Clear Lake Site in Tazewell and Mason counties (Fowler, 1952) include apparently the only record of *Leptodea fragilis*, the Fragile Paper Shell, from kitchen midden refuse in Illinois sites. Both it and the Purple Paper Shell (*L. laevissima*) are quite common in Illinois waters today, and again the question arises as to whether a particular mussel was simply rejected by the Indian. Quite possibly some of the generally thin-shelled species such as *Anodonta* spp., *Leptodea fragilis* and *L. laevissima, Lasmigona complinata,* and *Proptera alata* have increased in numbers and have become more widely distributed due perhaps to changes in water depth and bottom composition favorable to them.

The occurrence of *Obovaria retusa* in the Nigger Springs Site (two small valves), Rosiclare (four valves), Hubele (one valve), and in a Hopewellian mound in Hardin County (one moderately large valve) excavated by the Illinois State Museum in the summer of 1954 apparently represents the first records of this species in Illinois sites. It inhabits large rivers and is known from the Wabash and Ohio rivers in Illinois, although it is now uncommon to rare. The absence of *Megalonaias gigantea* from Nigger Springs and other sites is somewhat surprising and rather difficult to explain. Only three specimens were encountered from the Modoc Rock Shelter, and but one each in the Fountain Bluff, Blairsville and Rosiclare sites. This species is a common mussel and Baker (1944:57) stated that it "was extensively used by the prehistoric Indians of Illinois".

Summary

Shell remains from the mounds and camp sites of early Indian cultures in Illinois have made it possible to approximate the species composition and proportionate abundance of early populations of mussels in the Mississippi, Saline and other rivers in southern Illinois. As

was pointed out earlier in this paper, the presence of certain species and absence of others in kitchen midden refuse of sites in Illinois would tend to indicate that the Indian may have preferred certain species over others. However, availability was in all probability the major factor in a selection of the different species for food. Thus, by tabulating the numbers of each species present, it may be possible to obtain a relatively accurate estimate of the relative abundance of each as well as the species composition.

Exceptions to this generalization are to be expected, possibly in the case of *Lasmigona complinata*, for example. The presence of such forms as the Fingernail clam (*Sphaerium* spp.) and other species that are found rarely and only occasionally may possibly be explained on the basis of being "taken incidentally with other species" or bartered. The absence of a particular species from a site does not necessarily mean it was not inhabiting the stream or river at the time the site was occupied. Comparisons with shell remains from other sites aid in establishing the presence or absence of a given species in an area or river system during a corresponding time period. A good example of this is *Megalonaias gigantea*, a species commonly found today and remains of which were numerous in other sites, although no specimens were encountered in the test pits and surface collections made at the Nigger Springs Site. Possibly it was rejected by the Indians or perhaps it was uncommon to rare in the Saline River at that time. A total of only six valves was found in the midden materials from these eight sites.

It is logical to assume that the Saline River furnished most of the naiads used by the Indians occupying the Nigger Springs Site, although possibly (but not probably) some may have been transported from the Wabash or Ohio rivers. Pollution, probably coupled with silting and a lowered water level, has drastically affected the naiad complex of today, as compared with prehistoric times. This may be illustrated by reduced numbers or complete absence of such species as *Elliptio dilatatus*, *E. crassidens*, *Fusconaia ebenus*, *F. undata*, *Cyclonaias tuberculata*, *Plagiola lineolata*, and *Pleurobema cordatum* from the Saline River system today.

It becomes evident that the smaller streams and rivers such as Big Kinkaid Creek and the Saline River, which were apparently more completely and drastically affected by changes brought about by an altered course, pollution, silting, etc., underwent a more radical change in their faunal composition than did the big rivers such as the Wabash, Ohio, and Mississippi. More detailed examinations and analyses of faunal remains from Indian sites in Illinois in the future will add materially to our knowledge of the various Indian cultures and the effect of a changing climate on the fauna. In addition, they will provide more exacting information on the distribution, abundance, and species composition of many groups of animals living in Illinois during prehistoric times.

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