

A COMPARATIVE STUDY OF TWO UNIONID POPULATIONS OF THE LOWER ROCK RIVER

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INTRODUCTION

During the summer of 1960, Dr. John C. McGregor and his staff excavated a large Indian village which had existed about 1800 A.D. at a site on the south bank of the Rock River, south of Rock Island, Illinois. The Indians were of the Sauk tribe and, at one time, were led by Chief Black Hawk. Many artifacts, including cooking utensils, weapons, and jewelry were uncovered. During the process of excavation, a large number of valves of fresh-water mussels were collected from refuse piles. Presumably, the soft parts had long ago been consumed by the Indians as food, after the mussels had been gathered from the nearby river.

While digging on the eastern edge of the village site, McGregor uncovered a huge pile of mussel shells which were more disintegrated than those previously found. Further examination of the immediate area revealed artifacts which proved that the site had been previously occupied by a far more ancient Indian village. Apparently, many previous floods of the Rock River had caused the deposition of silt over the earlier village; the one existing at 1800 A.D. had been built on soil which had completely covered the earlier one. As no other streams flow within several miles of the site, the ancient shells seemingly must have been discarded from living mussels which were originally gathered from the nearby Rock River.

The objectives of this paper are (1) to identify those shells which were collected from the great midden formed by the ancient village, (2) to collect at random living mussels from the Rock River adjacent to the site, and identify them, and (3) to compare the two populations; as a result of the comparison, describe any changed physical features of the river from the time of the former occupation to the present, as shown by habitat-demands of the mussels.

At the time when I visited the site, August, 1959, the level of the river was low enough so that the maximum depth from bank to bank was approximately three feet. In obtaining a present-day collection to compare with that secured from the midden, several hours were spent collecting living mussels from the river.

ACKNOWLEDGEMENTS

The author is indebted to Dr. John C. McGregor, Professor of Anthropology, University of Illinois, for carefully removing the large collection of shells from this site; also, for allowing the author to obtain further samples of shells. Financial aid for both travel and assistance in the preparation and identification of shells was given by the Research Board of the University of Illinois.

DESCRIPTION OF THE SITE

In order to eliminate confusion on the part of the reader, no further

mention will be made pertaining to the shells discarded by the Indians of 1800 A.D.; these shells will be analyzed after further collections are made.

According to artifacts found both in the midden and in the surrounding area, the Indians who built and occupied the village were of the Archaic culture and lived from 6,000 to 8,000 years ago (Fig. 1). The large midden is about 300 feet from the present south bank of the river. There is evidence that the village has been flooded on many occasions as shown by the thick layer of silt which covers the area. A small ditch, running south to north, passes the west edge of the site; as was usual, the village probably used it as a source of water for cooking and drinking.

The site is located in Rock Island County, on the south side of the Rock River (T17NR1WS18). It lies roughly 400 feet from the present bank of the river and is about 20 feet above normal water level. At a point directly below the village, the river presently is divided by a small island, Carr Island, which lies nearer the north side.

There is evidence which supports the idea that, in the past, the entire river flowed north of this island. Mill Creek, a stream of considerable size, enters the south branch of the river from a southerly direction. Opposite its mouth on the north, Carr Island is completely separated from an island down-river, Vandruuff Island, by a deep ditch, which is filled with water other than during extreme drouth. This ditch could easily have been a continuation of Mill Creek at a time when the

present north channel probably represented the entire river. If the south channel were unformed at the time when the Indians of Archaic culture occupied the site, the distance to the original river at that time was considerably farther. The mussels now occupying the larger south channel probably have invaded it since the site was occupied.

A short description of the river at the level where the living mussels were removed is necessary. At the site of the village, the river is impounded by the remnants of a very low dam which is located several hundred feet down-river on the south branch only. An area of river bottom several feet wide and extending from bank to bank was examined about 300 feet below the dam, which has a fall of about 2 feet. The substratum varies from a few inches of silt over gravel to pure sand, but is usually sand-gravel. Although several hundred feet wide at this point, the river is exceedingly shallow, having a maximum depth of three feet. Large boulders, often three feet in diameter, are scattered from shore to shore in this section of the river. In general, the substratum, tilt of river bottom, current, and depth of water form a large area of deep riffles.

RESULTS

The midden of archaic origin was comparatively large and roughly pyramidal in form. It had been completely covered with silt as a result of many successive floods. It was composed almost entirely of valves of fresh-water mussels; occasionally, both valves of the original shell were intact with the cavity

filled with silt. Single artifacts such as an ornament or small piece of discarded flint were present. Very little silt was noticed in the midden other than that which occupied original cavities.

The valves were badly decomposed due to the action of carbonic acid and slight amounts of humic acids usually present in silt. Extreme care was taken by the anthropologists in obtaining the valves in clean, intact condition. The author very quickly gained respect for their techniques after destroying many valves before salvaging a bushel of useable specimens.

The decomposition was evident by either slaking of the nacre into a powder or by entire layers of one or more year's growth splitting off as intact pieces. At no time was the membranous covering of the shell, the periostracum, preserved.

The valves were identified in the laboratory. Although the periostracum of each valve was lacking, umbonal markings were often evident; their features are an important factor in identifying shells to species. Usually, a combination of shell characteristics were required for a valve's identification; the general size and shape of the valve, features typical of a certain area of it, and the nature of lateral and pseudocardinal teeth were used most frequently. Shell traits often used in identification of recently alive shells such as color of nacre and periostracum were absent.

Fragments of valves were identified if they had retained diagnostic characteristics, otherwise they were discarded. The umbonal area of a badly decomposed shell usually persists after the disc has disappeared.

The collection of shells from the ancient midden contained 34 different forms (Table 1). The number which represents each species was determined by counting individual valves. This method was compulsory because most of the ancient shells had separated into two valves. Therefore, in reference to Table 1, one must multiply the numbers of present-day forms by two whenever a numerical comparison is to be made with the archaic collection. The reason for this is evident; each living shell is composed of two valves. An approximate ratio of 6:1 exists between the numbers of valves of the archaic collection and those of the modern one, respectively. A search of the river bottom by the author, working alone for a period of three hours, produced 549 living mussels, representing 21 species and subspecies.

DISCUSSION

The valves of thin-shelled forms (*Anodonta*, *Strophitus*, etc.) are first to be totally decomposed as they lie in a midden. Consequently, one cannot be accurate in determining the presence of these species in a river at the date when the midden was formed. Parmalee (1956) found five valves of *Anodonta* sp. in the remains of an archaic midden at the Modoc Rock Shelter site in southern Illinois; Matteson (1959) discovered three valves of *Strophitus rugosus* at the Chrisman site (Archaic) near Meredosia, Illinois. Thorough examination of shell material as gathered by both McGregor's crew and the author at the Rock Island site revealed no thin-shelled forms other than 52 valves of *Strophitus rugosus*

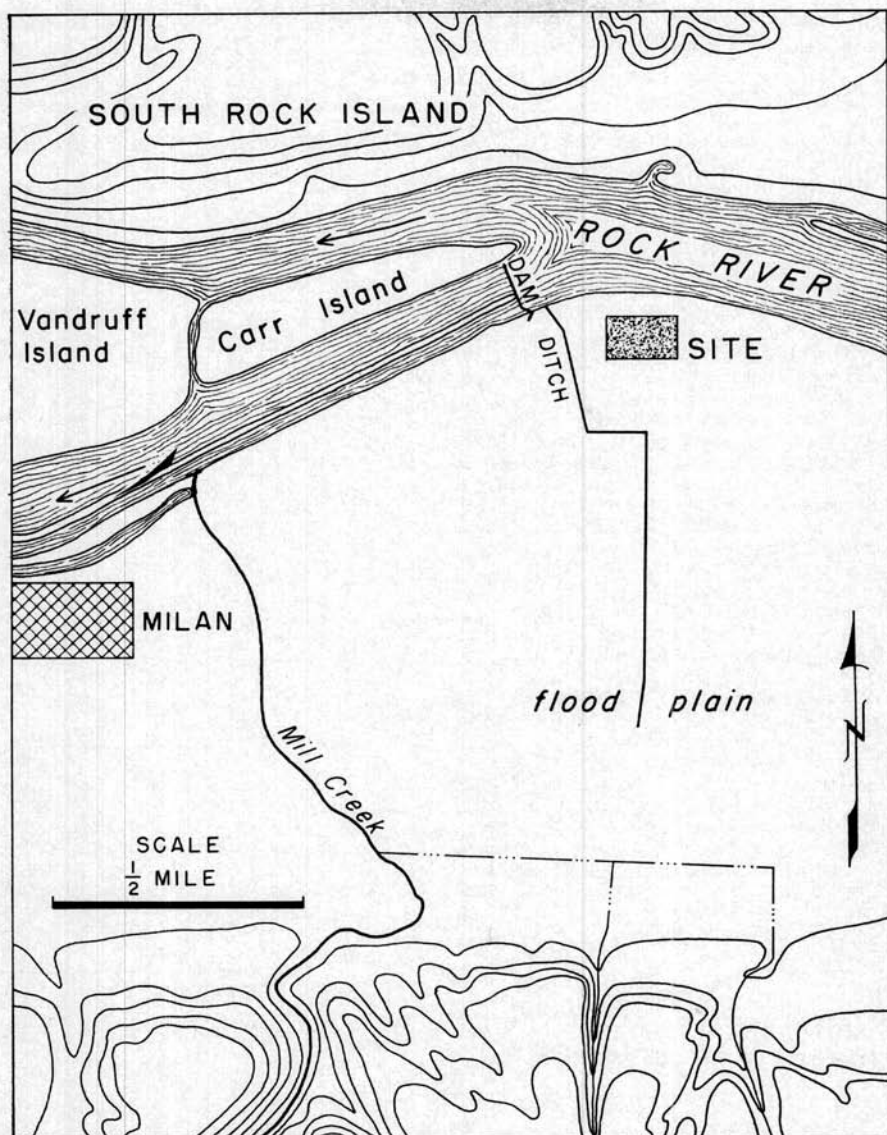


Fig. 1.—Map of the Rock River south of Rock Island, Illinois. The midden of archaic origin is located at the eastern edge of the village site.

TABLE 1.—Comparison of Archaic and Modern Collections of Unionids from Rock River at Rock Island.

	Archaic 6,000-8,000 years ago	Modern 1959 A.D.
<i>Actinonaias carinata</i> (Barnes), 1823.....	*1788	—
<i>Alasmidonta marginata</i> (Say), 1819.....	4	—
<i>Amblema costata</i> Rafinesque, 1820.....	112	—
<i>Amblema peruviana</i> (Lamarck), 1819.....	1136	131‡ (1572)
<i>Anodonta grandis</i> Say, 1829.....	—	3 (36)
<i>Anodonta imbecillis</i> Say, 1829.....	—	1 (12)
<i>Arcidens confragosus</i> (Say), 1830.....	—	1 (12)
<i>Cyclonaias tuberculata</i> (Rafinesque), 1820.....	172	—
<i>Dysnomia triquetra</i> (Rafinesque), 1820.....	3	—
<i>Elliptio crassidens</i> (Lamarck), 1819.....	126	—
<i>Elliptio dilatatus</i> (Rafinesque), 1820.....	770	—
<i>Fusconaia ebenus</i> (Lea), 1831.....	9	—
<i>Fusconaia flava</i> (Rafinesque), 1820.....	1	—
<i>Fusconaia undata</i> (Barnes), 1823.....	347	—
<i>Fusconaia undata trigona</i> (Lea), 1831.....	230	42 (504)
<i>Lampsilis siliquoidea</i> (Barnes), 1823.....	361	—
<i>Lampsilis ventricosa</i> (Barnes), 1823.....	194	9 (108)
<i>Lasmigona complanata</i> (Barnes), 1823.....	8	5 (60)
<i>Lasmigona costata</i> (Rafinesque), 1820.....	23	—
<i>Leptodea fragilis</i> (Rafinesque), 1820.....	2	28 (336)
<i>Ligumia recta</i> (Lamarck), 1819.....	191	1 (12)
<i>Megalonaias gigantea</i> (Barnes), 1823.....	6	—
<i>Micromya iris</i> (Lea), 1830.....	1	—
<i>Obliquaria reflexa</i> Rafinesque, 1820.....	34	37 (444)
<i>Obovaria olivaria</i> (Rafinesque), 1820.....	35	15 (180)
<i>Plagiola lineolata</i> (Rafinesque), 1820.....	9	—
<i>Plethobasus cyphus</i> (Rafinesque), 1820.....	244	—
<i>Pleurobema coccineum</i> (Conrad), 1836.....	132	—
<i>Proptera alata</i> (Say), 1817.....	22	15 (180)
<i>Proptera laevissima</i> (Lea), 1830.....	5	1 (12)
<i>Quadrula metanevra</i> (Rafinesque), 1820.....	104	2 (24)
<i>Quadrula nodulata</i> (Rafinesque), 1820.....	19	25 (300)
<i>Quadrula pustulosa</i> (Lea), 1831.....	414	132 (1584)
<i>Quadrula quadrula</i> (Rafinesque), 1820.....	4	65 (780)
<i>Strophitus rugosus</i> (Swainson), 1822.....	52	7 (84)
<i>Tritogonia verrucosa</i> (Rafinesque), 1820.....	2	6 (72)
<i>Truncilla donaciformes</i> (Lea), 1828.....	—	19 (228)
<i>Truncilla truncata</i> Rafinesque, 1820.....	30	4 (48)
	6590	549 (6588)

* Denotes number of single valves.

‡ Number of living shells multiplied by two, and then multiplied by six for comparison with valves of archaic collection.

(Table 1). The presence of *Anodonta* sp. usually denotes mud substratum in a river. Both *Anodonta* and *Strophitus* are present in the modern collection.

The composition of the archaic collection (Table 1) signifies that the riffle-like condition of today also existed at the time when the midden was formed. The large numbers of *A. carinata*, *A. costata*, *C. tuberculata*, *E. dilatatus*, *L. recta*, and *P. coccineum* support this observation. Some species, among them *A. peruviana*, *F. ebenus*, *F. undata*, *M. gigantea*, and *Q. nodulata*, are usually identified as forms living in large deep rivers. As the Mississippi River lies approximately six miles down-stream, fish carrying glochidia of these forms doubtless were and are able to ascend the Rock River as far as this midden site. The author has collected all of these forms in several rivers of the state, often many miles from their confluence with a major river. Some of the forms represented in the archaic collection such as *Q. meta-nevra*, *Q. pustolosa*, *Q. quadrula*, *L. siliquoidea*, and *L. ventricosa* are tolerant to many lotic environments, with the exception of silt and very slow-moving water.

Evidently, there were at least small areas of soft substratum over which the current flowed slowly at the time when the archaic village flourished, since *L. fragilis* and *P. laevissima* are present in that collection. These forms, especially the latter, are definitely associated with soft mud.

A number of impressive differences in texture of population are evident in the modern collection.

Although the area studied is definitely a deep-riffle habitat, many of the mussels present in the archaic collection, and which should be present now, are very noticeably reduced in number or are completely absent. In areas where the water velocity is diminished, silt has accumulated; the deepest observed layer was two inches, over sand-gravel. The water was relatively clear and no signs of either industrial or domestic pollutants were present. Heavy collecting by local people for various reasons has probably lowered the general population, but even this procedure would not account for the complete absence of several species which usually are found in a deep-riffles environment.

The most plausible reason for the reduction in numbers of several species may be that continuous erosion of the river bottom has resulted in both a reduction of current due to a leveling of the bottom and the elimination of deeper areas which were once within reach of the Indians. Several forms, including *E. dilatatus* and *L. recta* are usually more plentiful where current is more rapid than it presently is. The complete absence of *E. dilatatus*, *L. siliquoidea*, *A. carinata*, *A. costata*, *C. tuberculata*, *F. undata*, *P. cyphus*, and *P. coccineum* is difficult to explain; all should be found in this present-day habitat. The last six species may have been removed from deeper areas which might have existed formerly. They prefer areas of less agitated water, although occasionally they are found in riffles. *L. siliquoidea* occupies a variety of situations. *E. crassidens* has only been recorded in Illinois from In-

dian middens. It is evident that some species present in small numbers in the archaic collection might also have been found in the present fauna had collecting time been prolonged.

The increased numbers of *T. verucosa*, *P. alata*, *L. fragilis*, *L. complanata*, and *A. grandis* offer evidence that larger areas of river bottom are now subjected to silting than formerly. All of these species are usually found on a firm substratum which has been covered by varying amounts of sediment brought about by a decrease in water velocity. Other mussels whose comparative numbers have increased in the present collection, such as *O. reflexa* and three species of *Quadrula* are able to occupy several habitats; although found in riffles, they prefer waters of less current.

The Indians at this site may have favored certain species of mussels as food. This possibility may explain the comparatively large numbers of certain shells in the archaic collection. The complete absence of *T. donaciformes* from the archaic collection may be further evidence of deliberate selection on the part of the Indians. This species is the smallest one in size in either collection and perhaps it was not gathered extensively by the Indians for food.

LITERATURE CITED

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