1-1-1957

River Basin Surveys Papers, No. 9: Archeological Investigations in the Heart Butte Reservoir Area, North Dakota

Paul L. Cooper

Smithsonian Institution

Bureau of American Ethnology

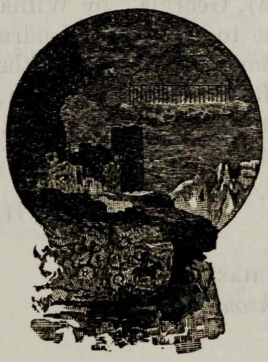
SMITHSONIAN INSTITUTION
BUREAU OF AMERICAN ETHNOLOGY
BULLETIN 169

RIVER BASIN SURVEYS PAPERS

FRANK H. H. ROBERTS, JR., *Editor*

Inter-Agency Archeological Salvage Program

NUMBERS 9–14



UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1958

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C. - Price $3.25

LETTER OF TRANSMITTAL

SMITHSONIAN INSTITUTION,
BUREAU OF AMERICAN ETHNOLOGY,
Washington, D. C., March 29, 1957.

SIR: I have the honor to submit the accompanying manuscripts, entitled "Archeological Investigations in the Heart Butte Reservoir area, North Dakota," by Paul L. Cooper; "Archeological Investigations at the Tuttle Creek Dam, Kansas," by Robert B. Cumming, Jr.; "The Spain Site (39LM301), a Winter Village in Fort Randall Reservoir, South Dakota," by Carlyle S. Smith and Roger T. Grange, Jr.; "The Wilbanks Site (9CK–5), Georgia," by William H. Sears; "Historic Sites in and Adjacent to the Jim Woodruff Reservoir, Florida-Georgia," by Mark F. Boyd; "Six Sites near the Chattahootchee River, in the Jim Woodruff Reservoir area, Florida," by Ripley P. Bullen, and to recommend that they be published as a bulletin of the Bureau of American Ethnology.

Very respectfully yours,

FRANK H. H. ROBERTS, Jr.,
Acting Director.

DR. LEONARD CARMICHAEL,
Secretary, Smithsonian Institution.

EXPLANATION OF THE INTER-AGENCY ARCHEOLOGICAL SALVAGE PROGRAM

The Inter-Agency Archeological Salvage Program is a cooperative plan of the Smithsonian Institution; the National Park Service and the Bureau of Reclamation, Department of the Interior; and the Corps of Engineers, Department of the Army. It was formulated, through a series of interbureau agreements, for the purpose of recovering archeological and paleontological remains which would otherwise be lost as a result of the numerous projects for flood control, irrigation, hydroelectric power, and navigation improvements in the river basins of the United States. Various State and local agencies have assisted in the work. To carry out its part of the joint undertaking, the Smithsonian Institution organized the River Basin Surveys as a unit of the Bureau of American Ethnology. The National Park Service has served as liaison between the various agencies and has provided the Smithsonian Institution with all of the necessary information pertaining to the location of proposed dams and other construction and their priorities. It has also had responsibility for budgeting costs of the program, funds for which are provided in the annual Department of the Interior appropriations. The operations of the River Basin Surveys, Smithsonian Institution, have been supported by funds transferred to it from the National Park Service. Through agreements with the National Park Service, money has also been made available to State and local agencies to supplement their own resources and aid them in their contributions to the program.

FRANK H. H. ROBERTS, Jr.,
Director, River Basin Surveys.

PUBLISHER'S NOTE

A separate edition is published of each paper in the series entitled "River Basin Surveys Papers." Copies of Papers 1–14 are available at the Bureau of American Ethnology, Smithsonian Institution, and can be had free upon request.

RIVER BASIN SURVEYS PAPERS PUBLISHED PREVIOUSLY

No. 1. Prehistory and the Missouri Valley Development Program: Summary Report on the Missouri River Basin Archeological Survey in 1948, by Waldo R. Wedel. Bull. 154, pp. xv–xviii, 1–59, pls. 1–12, fig. 1. 1953.

No. 2. Prehistory and the Missouri Valley Development Program: Summary Report on the Missouri River Basin Archeological Survey in 1949, by Waldo R. Wedel. Bull. 154, pp. 61–101, pls. 13–15. 1953.

No. 3. The Woodruff Ossuary, a Prehistoric Burial Site in Phillips County, Kansas, by Marvin F. Kivett. Bull. 154, pp. 103–141, pls. 16–28, figs. 2–3. 1953.

No. 4. The Addicks Dam Site:

I. An Archeological Survey of the Addicks Dam Basin, Southeast Texas, by Joe Ben Wheat. Bull. 154, pp. 143–252, pls. 29–47, figs. 4–23. 1953.

II. Indian Skeletal Remains from the Doering and Kobs Sites, Addick Reservoir, Texas, by Marshall T. Newman. Bull. 154, pp. 253–266, figs. 24–28. 1953.

No. 5. The Hodges Site:

I. Two Rock Shelters near Tucumcari, New Mexico, by Herbert W. Dick. Bull. 154, pp. 267–284, pls. 48–54, figs. 29–30. 1953.

II. Geology of the Hodges Site, Quay County, New Mexico, by Sheldon Judson. Bull. 154, pp. 285–302, figs. 31–35. 1953.

No. 6. The Rembert Mounds, Elbert County, Georgia, by Joseph R. Caldwell. Bull. 154, pp. 303–320, pls. 55–56, figs. 36–40. 1953.

No. 7. Archeological Investigations in the Oahe Dam area, South Dakota, 1950–51, by Donald J. Lehmer. Bull. 158, 190 pp., 22 pls., 56 figs., 6 maps. 1954.

No. 8. Excavations in the McNary Reservoir Basin near Umatilla, Oregon, by Douglas Osborne. With appendixes by Marshall T. Newman, Arthur Woodward, W. J. Kroll, and B. H. McLeod. Bull. 166, 250 pp., 40 pls., 6 figs., 19 maps. 1957.

CONTENTS

	PAGE
Foreword, by Frank H. H. Roberts, Jr	VII
No. 9 Archeological investigations in the Heart Butte Reservoir area, North Dakota, by Paul L. Cooper	1
No. 10. Archeological investigations at the Tuttle Creek Dam, Kansas, by Robert B. Cumming, Jr	41
No. 11. The Spain site (39LM301), a winter village in Fort Randall Reservoir, South Dakota, by Carlyle S. Smith and Roger T. Grange, Jr	79
No. 12. The Wilbanks site (9CK–5), Georgia, by William H. Sears	129
No. 13. Historic sites in and adjacent to the Jim Woodruff Reservoir, Florida-Georgia, by Mark F. Boyd	195
No. 14. Six sites near the Chattahoochee River in the Jim Woodruff Reservoir area, Florida, by Ripley P. Bullen	315
Appendix. List of reports, articles, and notes relating to the salvage program published in other series	359
Index	371

FOREWORD

The six reports which form the contents of this volume of the River Basin Surveys Papers are based on the results of field investigations carried on as a part of the Inter-Agency Archeological Salvage Program. Three of the articles are concerned with projects in the Missouri Basin and three with studies made in the Georgia-Florida area. Three reservoirs were involved in the Missouri Basin and two in Georgia-Florida. The work at two Missouri Basin reservoirs was done by field parties under the direction of members of the staff of the Missouri Basin Project of the River Basin Surveys, Smithsonian Institution, with funds transferred from the National Park Service. The third party was from the University of Kansas and was operating under a Memorandum of Agreement with the National Park Service whereby some moneys were made available to assist the university in its investigations. One of the projects in Georgia was a cooperative contribution on the part of the University of Georgia which bore the entire cost of the operations. The other two investigations in the Southeast were carried on under Memoranda of Agreement between the National Park Service and the Florida Historical Society and between the Service and the Florida State Museum, University of Florida, with financial assistance from the Service. In each case where a Memorandum of Agreement was concerned, the report submitted was in partial fulfillment of the agreement and received the approval of the Regional Director for the region in which the investigations were made.

The archeological investigations in the Heart Butte Reservoir area in North Dakota were under the direction of Paul L. Cooper and were carried on during the summer field season of 1948. Owing to insufficient funds, it was not possible for Mr. Cooper to accomplish as much as should have been done in that reservoir basin. However, the information and materials which he obtained there do constitute a contribution to the archeological knowledge of the area. The dam has long since been completed and the basin flooded.

The investigations at the Tuttle Creek Dam in Kansas were under the supervision of Robert B. Cumming, Jr., a member of the Missouri Basin Project staff. The particular excavations which Mr. Cumming made were truly of a salvage nature, because the sites tested were on the dam axis and construction work was then under way. Lack of funds and sufficient time prevented more extensive investigations, but the results obtained were better than expected. The Tuttle Creek area

is receiving further attention, and before the dam is completed and the basin is flooded good information should be obtained from the numerous sites located in that area.

The excavations at the Spain site in the Fort Randall Reservoir area in South Dakota were supervised by Dr. Carlyle S. Smith of the University of Kansas, assisted by Roger T. Grange, Jr., who at that time was associated with the Chicago Natural History Museum. The work was carried on during the summer field season of 1953 and most of the members of the party were college students. Dr. Smith and Mr. Grange completed their report in July 1954 and submitted it to the Regional Director of Region Two of the National Park Service at Omaha, Nebr. After its subsequent acceptance and approval the manuscript of the report was submitted to the River Basin Surveys of the Smithsonian Institution for publication. In view of the delay in sending the report to the printer, it was returned to Dr. Smith in the autumn of 1956 so that he might make certain revisions and bring his conclusions up to date. He returned the revised manuscript to the River Basin Surveys in December 1956. The report on the Spain site provides new and useful information on certain archeological aspects in that portion of the Missouri Basin. The Fort Randall Dam was closed in the summer of 1953 and the site is now under water.

When it appeared that funds for archeological excavations in the Allatoona Reservoir area in Georgia might not be forthcoming in time to salvage information from sites in the construction area for the dam, the University of Georgia provided for some digging at one of the more important locations and a party under the direction of Dr. William H. Sears, then associated with the Department of Anthropology at the university, conducted excavations there in 1949. That site is now beneath some 90 feet of water. Subsequently funds were appropriated and transferred from the National Park Service to the Smithsonian Institution and an extensive series of excavations in the Allatoona Reservoir area got under way. Two parties from the River Basin Surveys excavated 11 additional sites and tested 19 others. Originally it was contemplated to include Dr. Sears' report in the major publication on the Allatoona Reservoir. Because of the size of the main report and the attendant delay in arranging for its printing, it was deemed best to make Dr. Sears' results available at this time rather than to hold them indefinitely. The cooperation of the University of Georgia was indeed helpful at a critical period in the Allatoona basin investigations, and the results obtained add a useful chapter to the Allatoona story as a whole.

The study by Dr. Mark F. Boyd of the historic sites in the Jim Woodruff Reservoir area in Florida and Georgia is the first report based mainly on historical records and evidence to be issued in the River Basin Surveys Papers. Reports of investigations at historic

sites in other areas will be issued in later bulletins. While not as much mention has been made of the historic aspects of the salvage program as of those pertaining more to the aboriginal remains, they nevertheless are an important part of the overall investigations and a number of studies of that nature are being carried forward in various reservoir basin areas. Dr. Boyd's project was sponsored by the Florida Historical Society under a Memorandum of Agreement with Region One of the National Park Service. In commenting upon the report by Dr. Boyd when it was forwarded to the Region One office, the President of the Florida Historical Society stated that in the opinion of the society the report was an important contribution to the preservation of the history of that area. The report was accepted and approved by the Regional Director and was subsequently released to the River Basin Surveys for publication in the present volume.

The archeological investigations pertaining to aboriginal sites made along the Chattahoochee River in the Florida portion of the Jim Woodruff Reservoir area were under the direction of Ripley P. Bullen of the Florida State Museum and were carried on under a Memorandum of Agreement between the National Park Service and the University of Florida. The field work was done in June 1953. The report was completed and submitted to the Region One office of the National Park Service and was accepted and approved by the Regional Director in December of that year. Early in 1954 the manuscript was released to the River Basin Surveys. New information developing in the interim between its receipt and scheduling for publication made certain additions and revisions advisable and it was returned to Mr. Bullen who resubmitted the new draft in October 1956. Plans were to include both Mr. Bullen's and Dr. Boyd's reports in a general publication on the Jim Woodruff Reservoir area which would include the reports on archeological investigations in Indian sites in the Georgia portion of the basin. One series of excavations there was carried on by the National Park Service and another by a member of the staff of the River Basin Surveys. Since there has been some delay in completing those reports, it has been deemed advisable to issue the papers by Dr. Boyd and Mr. Bullen in the present volume.

FRANK H. H. ROBERTS. JR.,
Director, River Basin Surveys.

SMITHSONIAN INSTITUTION
Bureau of American Ethnology
Bulletin 169

River Basin Surveys Papers, No. 9

Archeological Investigations in the Heart Butte Reservoir Area, North Dakota

By PAUL L. COOPER

CONTENTS

	PAGE
Foreword	5
Introduction	9
The Koehler site (32GT1)	12
Excavations	12
Artifacts	20
Pottery	20
Work in stone	26
Work in bone and antler	29
Faunal remains	31
Conclusion	32
Literature cited	34
Appendix. Sites in the Heart Butte Reservoir area	37

ILLUSTRATIONS

PLATES

	FOLLOWING PAGE
1. Views of Koehler site (32GT1)	40
2. Koehler site (32GT1) during excavation	40
3. Koehler site (32GT1). *a*, Profile on W15 line, N50 to approximately N62, with zones marked. *b*, Typical profile of N45 line, W70.3 to W75.2, with zones marked. *c*, Profile on W15 line, N85 to N92, showing deposit of mussel shells, Feature 29, and beneath it, shallow pit, Feature 43. *d*, Pottery fragments, Feature 28, in situ. *e*, Pottery fragments, Feature 30, in situ	40
4. Koehler site (32GT1). *a*, Typical profile on N47.5 line. *b*, Profile of fireplace, Feature 35, on W15 line. *c*, Profile of fireplace, Feature 7, on N175 line	40
5. Koehler site (32GT1). *a*, Top of cultural deposit in excavation unit 1, square N170W50, showing nature of cultural debris. *b*, Discarded unidentifiable bones recovered from Feature 19. *c*, Top of deposit of mussel shells, Feature 29	40
6. Pottery rim sherds from the Koehler site (32GT1)	40
7. Pottery sherds from the Koehler site (32GT1)	40
8. Stone artifacts from the Koehler site (32GT1)	40
9. Chipped stone artifacts from the Koehler site (32GT1)	40
10. Large blades and "choppers" from the Koehler site (32GT1)	40
11. Bone and antler artifacts from the Koehler site (32GT1)	40
12. *a*, Site 32GT5, rock shelter (arrow), to southeast. *b*, Site 32GT5, rock shelter, to northeast. *c*, Artifacts from Koehler site (32GT1) and rock shelter, site 32GT5	40

TEXT FIGURES

	PAGE
1. Plan of excavation units 1 to 4 (X1–X4), Koehler site (32GT1), showing locations of fireplaces and other features	14
2. Characteristic profiles in Koehler site (32GT1)	17

MAPS

1. Map of Heart Butte Reservoir showing locations of archeological sites	9
2. Contour map of Koehler site (32GT1) showing locations of excavations	12

ARCHEOLOGICAL INVESTIGATIONS IN THE HEART BUTTE RESERVOIR AREA, NORTH DAKOTA [1]

By Paul L. Cooper

FOREWORD

The investigations upon which this report is based were carried out as a part of the inter-agency salvage program in the Missouri Basin and reflect the cooperation of a number of agencies and individuals. The work was instigated by the plan of the Bureau of Reclamation to construct the Heart Butte Dam, a unit of the comprehensive water-resources development program under the Pick-Sloan plan. The dam, now completed, is on the Heart River south of Glen Ullin, N. Dak., and is designed to create a reservoir of almost 11,000 acres at its maximum elevation of 2,118.2 feet above mean sea level. In August of 1946, J. Joseph Bauxar and the writer, archeologists with the Smithsonian Institution River Basin Surveys, spent 2 days in reconnaissance of a small part of the area that would be flooded if the proposed Heart Butte Dam was constructed. Only a few sites were recorded, but one of these, the Koehler site, was deemed sufficiently important to require intensive investigation. Rather exhaustive excavation of this site and additional survey of the reservoir were recommended in an appraisal report.[2] In 1947, under an agreement with the Smithsonian Institution, the University of North Dakota Field Session in Archaeology, cosponsored by the State Historical Society of North Dakota, devoted a week, June 25 to July 1, to the Heart Butte Reservoir area. The party of 8, supervised by Dr. Gordon W. Hewes, excavated 8 test pits, each 5 feet square, in the Koehler site and found a few previously unrecorded sites in the vicinity. The limited tests in the Koehler site confirmed the earlier judgment that full-scale excavation would be worth while. In 1948, with the dam already under construction, limited funds were available for further investigations there by the Smithsonian Institution. These funds were far less than the amount recommended as necessary for an adequate sampling of the archeological remains that were to be destroyed, and permitted only 7 weeks in the field with a party of from 2 to 4

[1] Manuscript submitted July 1954.

[2] Preliminary appraisal of the archeological and paleontological resources of Heart Butte Reservoir, Grant County, N. Dak., June 1947, prepared by River Basin Surveys, Smithsonian Institution, for Missouri Basin Recreation Surveys, Region Two, National Park Service.

individuals. Approximately 12 man-days were devoted to reconnaissance, 2 man-days to the investigation of a rock shelter near the dam site, and the remainder of the time to work in the Koehler site. The little more than 100 man-days spent in excavation, recording, mapping, and refilling trenches at this site represent about 20 percent of the original estimate of the time that would be required for investigation on a desirable scale.

The writer arrived in the Heart Butte area June 12, 1948, and was assisted in reconnaissance until June 19 by the late Thad. Hecker, of the State Historical Society of North Dakota. Robert L. Hall and Warren L. Wittry, then students at the University of Wisconsin, reported on June 22 and worked for the remainder of the time spent in the area. Vernon Gerving of Glen Ullin, employed from July 6 to July 30, completed the roster of paid workers. The writer's wife, Dorothy Thurlow Cooper, was with the party after July 1 and assisted in the field. Most of the time after June 22 was devoted to the Koehler site, but between July 20 and the termination of the Heart Butte operations on July 31 the investigations in the rock shelter were accomplished and some reconnaissance was carried out.

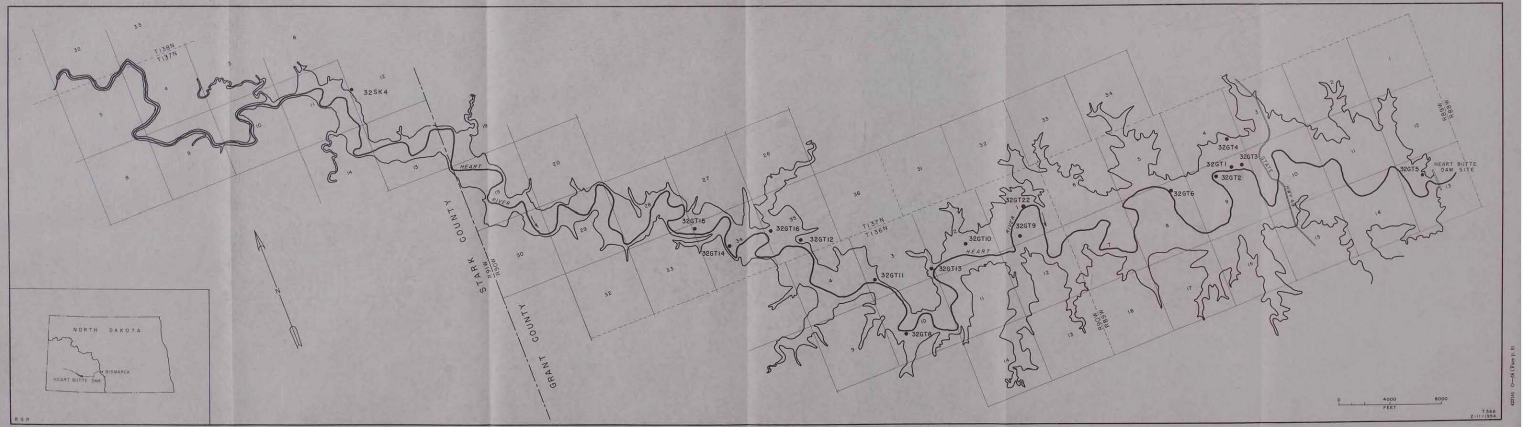
In addition to the workers in the field, all of whose services were eminently satisfactory, a number of individuals, as well as several agencies, have been of assistance in various ways. Funds to carry on the investigations were transferred to the River Basin Surveys by the National Park Service. Personnel in the Bismarck and Glen Ullin offices of the Bureau of Reclamation freely provided information and maps. Camping space and other facilities were made available at the Government camp in Glen Ullin. W. W. Brenner, construction engineer, and B. L. Mendenhall, field engineer, both of the Heart Butte project office, were especially helpful. Landowners in the area of investigation and various residents of Glen Ullin were uniformly cooperative and rendered assistance of various kinds. We are especially indebted to August Koehler, owner of the site to which we have given his name, for permission to excavate on his property and for other courtesies, and to W. F. Salzer, a resident of the reservoir area, who guided us to sites and presented the River Basin Surveys with specimens which he had collected in the vicinity. Dr. Hewes supplied us with information relative to his investigations and made helpful suggestions based on his experience in the Koehler site. The State Historical Society of North Dakota, through its superintendent, Russell Reid, not only made the services of Mr. Hecker available for several days, but also has loaned the Surveys the specimens collected and records made by Dr. Hewes in 1947. Material assistance was provided by Alan Woolworth of the Historical Society staff.

Identifications of the unworked bones from the Koehler site were made by Dr. Theodore E. White, paleontologist with the River Basin

Surveys, and of the mollusks by Dr. J. P. E. Morrison, of the United States National Museum. Dr. Charles M. Riley, Department of Geology, University of Nebraska, assisted in the identification of the stone material, and Dr. C. Bertrand Schultz, director of the University of Nebraska State Museum, identified the worked bone. Members of the laboratory staff of the River Basin Surveys headquarters in Lincoln were instrumental in the production of this report in diverse ways. Raymond S. Price prepared the final copies of the map, ground plan, and profiles, and Nathaniel L. Dewell photographed the artifacts.

422141—58——2

HEART BUTTE
DAM SITE
32GT5
HWY 23
8000
4000
0
FEET



MAP 1.—Map of Heart Butte Reservoir showing locations of archeological sites.

INTRODUCTION

The Heart River rises in Billings County, N. Dak., only a few miles from the northward-flowing Little Missouri River, and follows a tortuous course to its confluence with the Missouri at Mandan, approximately 120 miles due east. Its total length lies within the Missouri Plateau section of the Great Plains Province (Fenneman, 1931, pp. 71–79), which is characterized by rolling uplands relieved by isolated mountains, buttes, and sections of badlands and by terraced valleys of streams that, with their tributaries, have dissected the general surface. The area which is now covered by the Heart Butte Reservoir and is the subject of this report lies about 50 miles by air from the mouth of the Heart River, considerably less than the channel distance between the two points. The outcropping bedrock here belongs to the Paleocene Fort Union formation, which consists of a basal zone of fine sand overlain by zones of shale, clay, and sand. Lignite deposits of considerable extent occur in this formation and there are small mines nearby which produce this material for local use. A conspicuous feature of exposures in road cuts and elsewhere is the frequent presence of brick-red deposits of various thicknesses, apparently the result of the heat generated by natural burning of the lignite beds. Silicified wood (probably similar or identical to so-called "Knife River flint") is reported to be associated with almost all of the Fort Union beds in the immediate vicinity, though not in great quantity (Tisdale, 1941, p. 14). At several localities there are limited zones in the basal sand which are cemented and much more resistant than the surrounding materials. These concretions, typically elliptical in shape and frequently of considerable size, are responsible for shallow rock shelters where they outcrop on the slopes (see pl. 12, *a*, *b*). There are a few scattered patches of extensively weathered glacial till and occasional erratics in the area (Tisdale, 1941, p. 6).

In the reservoir area, the Heart River, a perennial stream, meanders in a relatively wide, flat-floored valley lying approximately 200 feet below the rolling, treeless uplands into which it is incised (map 1; pl. 1, *a*). The stream, which is easily forded by car in places except during times of flood, has an average fall of approximately 0.6 foot per mile (Leonard, 1912, p. 29). All the tributaries in the area are relatively short and are intermittent. The shallow river channel is cut into alluvium, but where it swings against the main valley walls there are sheer bluffs composed of bedrock, ordinarily the basal sand of the Fort

Union formation. The predominant vegetation, even today, is grass, and trees occur only in a sparse fringe along the course of the Heart River, in the valleys of the tributaries, and occasionally in favored spots on the main valley floor and the lower slopes. The commonest trees are ash, elm, and boxelder; there are some cottonwoods along the river and chokecherries are locally abundant.

Lying within the Saskatchewan biotic province (Dice, 1943, pp. 24–26), the region has a predominant vegetation of mixed short and mid-height grasses which undoubtedly once supported abundant herds of grazing animals. While very early descriptions of the faunal resources of the immediate vicinity are apparently lacking, the chroniclers of various early 19th-century expeditions along the Missouri River (e. g., the Lewis and Clark and the Atkinson-O'Fallon Expeditions) recorded observation of vast herds of bison and numerous other mammals such as elk, deer, bears (including grizzly bears), and wolves.

The climate of the region is characterized by long, cold winters, hot summers, rather scanty rainfall, and a mean growing season of approximately 120 days. During the period of record at Carson, N. Dak., some 20 miles southeast of the reservoir area, the mean annual precipitation has been 15.68 inches, and the maximum and minimum temperatures have been 116° and −43° F. respectively. Average temperatures are 10.7° for January and 70.5° for July. At Dickinson, which is more than 100 miles northwest of Carson but has a very similar climate, the extremes in growing season during the 40 years of record have been 62 and 164 days. There are favorable factors in the climate of the region that tend to counterbalance the brevity of the growing season and the scantiness of precipitation. These are, on the one hand, the long hours of daylight during the summer months and, on the other, a relatively low rate of evaporation and the fact that a large proportion of the annual precipitation occurs during the growing season (approximately 70 percent during the months of April through September). The prevailing winds at all seasons of the year are from the northwest. On the average, the climate here does not compare unfavorably with that of stations along the Missouri River, where native horticulture is known to have been practiced, but, at least in recent times, there have been occasional years when the frost-free season was exceedingly brief. The Heart Butte vicinity would seem to have little to offer in the way of a location for an aboriginal group seeking a place to settle and raise crops, but it would provide eminently suitable camping locations for groups engaged in the hunt.

Reported archeological investigations antedating those described here are lacking for the immediate area and are rare for the region west of the Missouri River in the Dakotas. This is not surprising, in view of the spectacular nature of the remains to the east and the relatively

minor attention that has been given the archeological situation in the northern Plains generally. Previous to the current salvage program, under which the areas for investigation are dictated by the plans of the dam construction agencies, most of the limited archeological research has been understandably directed toward the more intensively occupied banks of the Missouri River and of the streams in the eastern parts of North and South Dakota. Since the confluence of the Heart River with the Missouri is not more than approximately 50 miles from the Heart Butte vicinity, it is reasonable to suppose that at least some of the remains here might relate to sites in the immediate valley of the Missouri. Much of the reported work in the latter area has consisted of surface surveys (Will, 1924; Will and Hecker, 1944), but excavations have been accomplished in a few sites, notably in the contact-period Slant (or Old Fort Abraham Lincoln) and Double Ditch (or Burgois) sites near the mouth of the Heart River (Will and Spinden, 1906; Strong, 1940, pp. 360–365). These two sites have been attributed to the Mandan by the investigators. West of the Missouri River in areas immediately adjacent to North Dakota, two sites showing relationships to complexes on the Missouri River have been investigated and reported. These are the Hagen site, on the Yellowstone River near Glendive, Mont. (Mulloy, 1942), and Ludlow Cave, near the headwaters of the Grand River and about 20 miles from the Little Missouri River in the extreme northwestern corner of South Dakota (Over, 1936; Strong, 1940, p. 384). The excavations in the former revealed a circular house site and yielded an artifact complex similar in many respects to Mandan and Hidatsa material culture. This similarity and the location of the village led Mulloy to suggest that the Hagen site might be attributable to the Crow, who were in the Yellowstone area in historic times and are believed to have been originally a part of the Hidatsa group (Mulloy, 1942, pp. 100–103). Ludlow Cave is reported to have yielded numerous projectile points, several sherds, and other artifacts in deposits underlying a superficial layer containing glass beads and projectile points and other objects of metal (Over, 1936). Strong has stated, on the basis of an examination of the specimens, that the pottery rather closely resembles ceramics of "a generalized Mandan-Hidatsa type" and that "perhaps the closest resemblance is to the Old Fort Abraham Lincoln Mandan" (Strong, 1940, p. 384).

Returning to the Heart Butte Reservoir area, the combined investigations of the River Basin Surveys in 1946 and 1948 and of the North Dakota University–Historical Society party in 1947, which included inspection of almost all of the area to be flooded, resulted in the location within or immediately adjacent to the reservoir of 16 sites that either certainly or probably represented aboriginal activity. These sites, most of which appeared to be lightly occupied camps, are

listed and briefly characterized in the Appendix. Most of them are now covered by the reservoir waters.

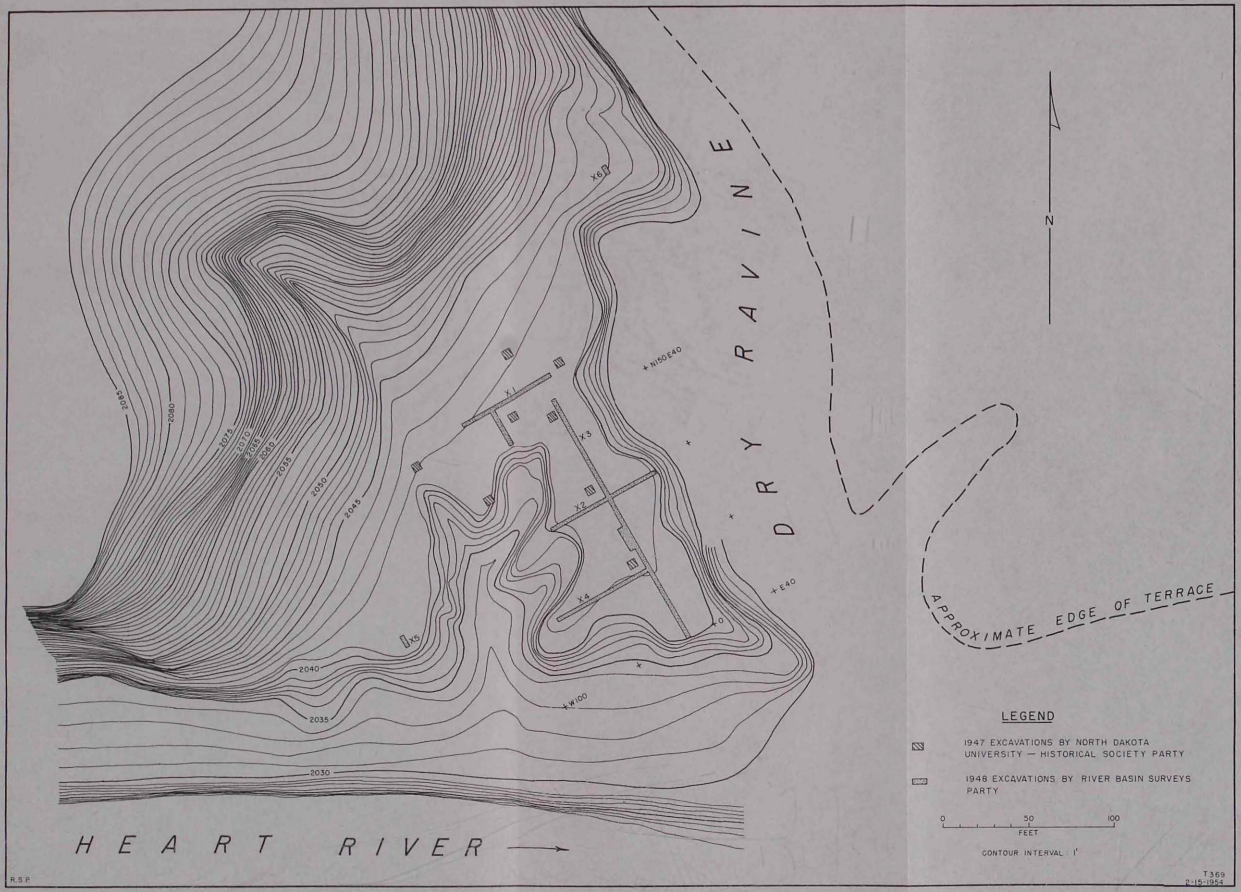
The site designations used in this report are in accordance with the standard system of the River Basin Surveys in the Missouri Basin. The first number indicates the State, and represents the numerical position of the State in an alphabetical list of the United States; the two letters following the numbers are symbols for the county; and the final number designates the specific site within the county. Thus, for example, 32GT1 is the first site numbered by the River Basin Surveys in Grant County, N. Dak., and 32SK4 is the fourth site numbered in Stark County, N. Dak.

THE KOEHLER SITE (32GT1)

EXCAVATIONS

The Koehler site, now covered by the reservoir, lay on the north bank of the Heart River near the line between the NE¼ and NW¼ of the NE¼ of sec. 9 T136N R89W. The river in this vicinity meandered from one side to the other of a relatively wide, flat-floored valley, and the site was at the outside of a bend which closely approached the northern valley wall (see map 1). It occupied a small terrace remnant, roughly triangular in shape, although somewhat altered by the encroachment of a short, shallow ravine. The remnant was bounded on the northwest by bluffs, on the south by a narrow strip of lower terrain bordering the channel of the Heart River, and on the northeast by a shallow dry ravine (pl. 1 and map 2). A camp at that spot would have been well sheltered from the prevailing northwesterly winds by the bluffs, which rise 40 to 60 feet above the terrace surface. The bordering ravine was heavily timbered, and there were a few trees on the terrace at the foot of the slopes from the uplands and in the small ravine that cuts into the terrace. Trees along the course of the river in the vicinity of the site were few and of small size. The predominating varieties were ash, elm, and boxelder, but there were a number of chokecherry shrubs in the two ravines adjoining the site. During the period covered by the investigations, there was a heavy cover of grass on the site, as elsewhere throughout the reservoir area where cultivation was not practiced, but the owner of the land stated that during the drouth of the 1930's the surface was bare of vegetation except for scanty patches of sunflowers and miscellaneous weeds.

The surface of the terrace on which the site lay, approximately 18 feet above the river, was basically almost level; there were considerable areas, however, where the surface was irregular, quite obviously as the result of recent disturbance. This situation was explained by Mr. Koehler, the owner of the site, who reported that about 1940 his nephew had dug a number of pits in search of artifacts and that several



MAP 2.—Contour map of Koehler site (32GT1) showing locations of excavations.

422141 O—58 (Face p. 12)

deep furrows had been plowed across the site to turn up these materials. In 1946, when the site was first observed by River Basin Surveys personnel, virtually no cultural material was observable on the surface except in places which had been thus disturbed.

During its week in the Heart Butte area in 1947, the Hewes party established a grid system and excavated 8 test pits, each 5 feet square, at scattered points over the site (see map 2, for locations). These pits were carried to depths ranging from 8 to 86 inches. Hewes reported finding a cultural deposit of some thickness containing pottery and other artifacts, as well as charcoal-blackened soil, animal bones, and mussel shells (Hewes, 1949 a, pp. 21–22). No cache pits, post molds, or floor lines were observed, but it was thought concentrations of charcoal might mark the locations of fireplaces.

Before the River Basin Surveys excavations were initiated in 1948, Dr. Hewes provided us with a ground plan showing his grid system and the locations of his test pits. Since several of his reference points (including the zero stake) were identifiable on the site, the established grid system was adopted for recording horizontal locations in most of the new excavations. Exceptions were 2 isolated trenches, excavation units 5 and 6 (X5 and X6), whose locations were plotted directly on the topographic map of the site made in the field (map 2). The zero point was at the southeast corner of the site. One base-line extended from this point along the northeast edge of the terrace in a direction 30 degrees west of magnetic north, and the other was a perpendicular through the same point. The former was arbitrarily designated the north-south zero line, the latter, the east-west zero line. In the following description of the excavations, references to directions are in relation to these baselines rather than to actual compass directions. Distances "north," "east," or "west" of the zero point were recorded as the number of feet, together with the symbol "N," "E," or "W." Thus, a point designated "N170W40" was 170 feet from the arbitrary east-west zero line and 40 feet "west" of the arbitrary north-south zero line (see map 2 and fig. 1). The units within the grid system were 5-foot squares, which were identified by the positions of their southeast corners. Thus, for example, the southeast corner of square N170W40 was 170 feet north and 40 feet west of the zero point. The surface at the zero stake served as the vertical datum point and measurements in relation to this elevation were made by level readings with a telescopic alidade or by tape from points established by this method.

Because the time and manpower available for the investigation of the site were strictly limited, only relatively small-scale excavations could be undertaken. They consisted of trenches, usually 2.5 feet wide, through various parts of the area of occupation. Ordinarily, the trenches were not expanded to uncover the entire extent of such features as fireplaces and concentrated refuse deposits when they ex-

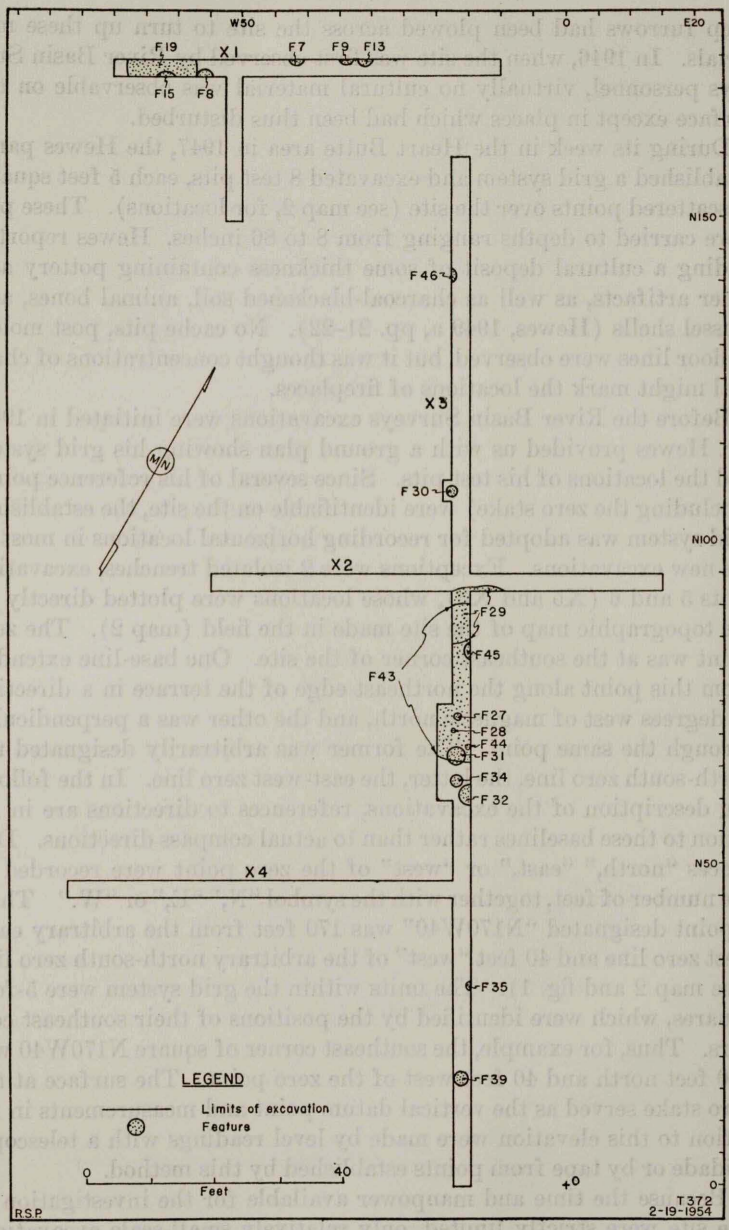


FIGURE 1.—Plan of excavation units 1 to 4 (X1–X4), Koehler site (32T1), showing locations of fireplaces and other features.

tended beyond the trench walls, since as extensive a sampling of the site as possible was deemed essential. For convenience in recording, trenches or segments of trenches were assigned excavation unit numbers and are designated on the site map (map 2) as X1 through X6. Since all records were categorized under feature numbers—e. g., Feature 2 was the description of the superficial appearance of the site, Feature 3, the description of the horizontal and vertical control system, etc.—only a minority of such feature numbers refer to cultural phenomena encountered in the excavations.

All trenches were excavated well into the undisturbed soil which underlay the cultural deposits. Except as specifically noted, all were 2.5 feet wide. Excavation unit 1, at the north end of the main segment of the level terrace and at the foot of the slope to the upland, consisted of a trench (N172.5–175, W10–70) 60 feet long lying perpendicular to the axis of the terrace finger and of an intersecting trench (W50–52.5, N150–172.5) 22.5 feet long. Excavation unit 3 extended nearly the full length of the terrace finger and was intersected by excavation unit 2 (N92.5–95, 15E–55W), a trench 70 feet long, and excavation unit 4 (N45–47.5, W17.5–77.5), a trench 60 feet long. Excavation unit 3 was 160 feet long (0–N160) and was 2.5 feet wide (W15–17.5) except from N60 to N75, where it was 5 feet wide (W15–20). Excavation units 5 and 6 were on small detached segments of the terrace (see map 2, for locations) and were 7 and 5.5 feet long, respectively.

Excavation was in horizontal layers varying usually from 0.2 to 0.5 foot in thickness, depending upon the individual situation. The proveniences of specimens were recorded by square and excavation level except that exact horizontal and vertical measurements were taken of the locations when it seemed such data might have significance. As the excavations were carried downward, an attempt was made to define the horizontal and vertical limits of all features of cultural significance. A profile of one wall of each of the trenches was sketched on graph paper, based on vertical measurements in reference to the site datum. Such drawings were made of the W15 line from 0 to N92 and N95 to N160, the N45 line from W17.5 to W77.5, the N95 line from E15 to W55, the N175 line from W10 to W70, the W50 line from N150 to N172.5, the west wall of excavation unit 5, and the east wall of excavation unit 6. All pottery sherds, regardless of size, all artifactual material, and all identifiable faunal remains were collected, as were considerable samples of unworked stone and of unidentifiable bone refuse.

A generally similar stratigraphy was found to prevail over all portions of the site tested, except in excavation unit 6, which was at a higher elevation, and in areas which had been recently disturbed. The following description applies to all excavations but excavation unit 6.

Six zones were identifiable in all other trenches and were usually present at almost every point on the profiles. Recent disturbance, however, had been so extensive in the area of excavation unit 2 that the classic profile was only fragmentarily represented on the N95 line, and various of the zones on the W15 line, especially between N80 and N123, had been destroyed. Other local absences of the upper zones on the W15 and N45 lines were also apparently attributable to the deep plowing which had been done on the site. The six zones were as follows, top to bottom (see fig. 2 and pls. 3, *a*, *b*, 4, *a*, for characteristic profiles).

Zone A, a very thin dark layer, was the latest humus zone. It almost never exceeded 0.15 foot in thickness, averaging closer to 0.1 foot, and was often not discernible on the profile. It was unusually well represented on the part of the N45 line shown in plate 3, *b*. This zone was culturally sterile.

Zone B was a layer of light-tan material, predominantly a very fine sand over most of the site, but having a clayey component in excavation unit 1, near the foot of the adjoining bluffs. This zone varied in thickness from 0.1 to 0.8 foot, the thicker deposits lying generally near the slopes to the upland. Over much of the site, the average thickness was about 0.3 foot. No cultural material was found in this layer.

Zone C was a dark layer, probably an old humus zone, containing occasional lenses, usually very small, of light-colored silty material. It appeared to have a considerable organic content. It ranged in thickness from 0.15 to 0.5 foot, being thicker in excavation unit 1 (where it has apparently been augmented by slope wash), and averaged approximately 0.2 foot thick in most of the site. Cultural material, mainly small bone fragments and flecks of charcoal, occurred sparsely within this zone, but there were no fireplaces nor any concentrations of refuse.

Zone D was a layer of predominantly light-colored silty material containing, from top to bottom, thin, discontinuous lenses of darker earth; small lenses of burned earth and ashes; and other evidences of occupation such as flecks of charcoal, fragments of stone and bone, and artifacts. A number of fireplaces and dense deposits of bones and mussel shells were also uncovered in this zone. The thickness of the layer varied from 0.25 to 0.8 foot and averaged about 0.5 foot in most of the site.

Zone E resembled zones A and C in consisting of dark, heavily organic material; it was probably an old humus zone. It was not discernible in restricted areas of the site where it may have been destroyed by the activities of the aboriginal occupants. This was true in at least one instance, in excavation unit 3, where an extensive, shallow pit, apparently excavated from the base of zone D, had removed

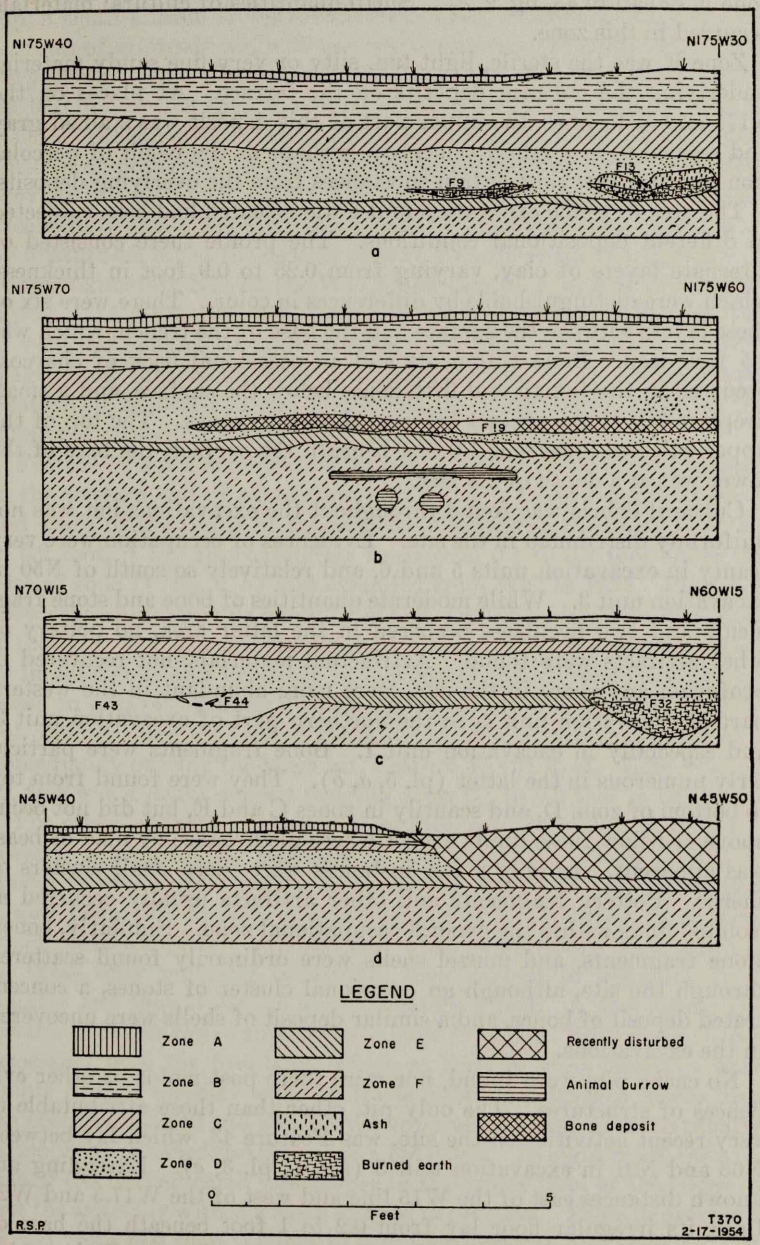


FIGURE 2.—Characteristic profiles in Koehler site (32GT1). *a*, *b*, N175 line in excavation unit 1. *c*, W15 line in excavation unit 3. *d*, N45 line in excavation unit 4.

zone E (Feature 43, fig. 2, *c*). Small quantities of cultural materials occurred in this zone.

Zone F was the sterile, light tan, silty or very fine sandy material underlying the cultural deposits on the terrace. At places on the N175 and W15 lines, the upper part of this deposit was stained gray and seemed to be slightly cemented, perhaps as the result of percolation of water carrying certain substances from the overlying deposits.

The area in which excavation unit 6 was situated had been subjected to different depositional conditions. The profile there consisted of alternate layers of clay, varying from 0.25 to 0.9 foot in thickness, which were distinguishable by differences in color. There were six of these layers between the surface and the base of the trench, which was 3.5 feet deep. Bone fragments and an occasional fleck of charcoal occurred in the fourth and fifth zones below the surface, and a small fireplace lay at the contact between these two zones. The top of the upper cultural layer was 1.6 feet beneath the surface, the base of the lower was at a depth of 2.8 feet.

Cultural debris was found throughout the excavations but was not uniformly distributed in the site. Evidences of occupation were very scanty in excavation units 5 and 6, and relatively so south of N50 in excavation unit 3. While moderate quantities of bone and stone fragments and two fireplaces occurred in the latter area, no pottery or other artifacts were found. Artifactual materials, not recovered in profusion anywhere in the site, were more abundant in the western part of excavation unit 4, in the northern part of excavation unit 3, and especially in excavation unit 1. Bone fragments were particularly numerous in the latter (pl. 5, *a*, *b*). They were found from top to bottom of zone D, and scantily in zones C and E, but did not occur above or below these limits except where disturbance by man or beast was apparent. In only a few instances were there small clusters of sherds. Pottery fragments and other artifacts usually occurred as isolated finds within the general occupational zone. Similarly, bones, stone fragments, and mussel shells were ordinarily found scattered through the site, although an occasional cluster of stones, a concentrated deposit of bones, and a similar deposit of shells were uncovered in the excavations.

No cache pits were found, nor were there post molds or other evidences of structures. The only pit, other than those attributable to very recent activities on the site, was Feature 43, which lay between N66 and N91 in excavation unit 3 (fig. 1; pl. 3, *c*). Extending unknown distances east of the W15 line and west of the W17.5 and W20 lines, its irregular floor lay from 0.2 to 1 foot beneath the base of zone D. The fill was a relatively homogeneous brown silt in which there were no fireplaces and no lenses of ashes or burned earth but which contained occasional bone and stone fragments and, near the

top, a small cluster of heat-fractured stones, Feature 27 (fig. 1), and a group of approximately 50 pottery fragments (Feature 44), mostly very small, from a single vessel (figs. 1; 2, *c*). The excavation of this pit had obliterated zone E, so that it was directly overlain by zone D.

Other conspicuous concentrations of debris consisted of two small clusters of potsherds in addition to the deposits of bones and shells previously mentioned. Two rim sherds and 43 body sherds, some exceedingly small, apparently all part of the same vessel represented by Feature 44, lay at the base of zone D, just above the pit, Feature 43, at approximately N71 on the W17.5 line (see pl. 3, *d*, and Feature 28, fig. 1). At N107–109, W17–18.5, and 0.2 foot above the base of zone D were the remains of approximately one-third of a vessel, so badly fragmented that restoration is impossible (pl. 3, *e*). This group, Feature 30, included 11 rim sherds and 325 body sherds, many of the latter not exceeding a centimeter in greatest dimension.

Feature 19 was a dense deposit of bones, mostly of bison, encountered in the western end of excavation unit 1 (fig. 1) and extending north and south of the limits of the trench. Varying in thickness from 0.1 to 0.2 foot, it lay approximately horizontal 0.1 to 0.2 foot above the base of zone D (fig. 2, *b*) and extended from W57 to W68. Plate 5, *b* shows the unidentifiable bones from this deposit which were discarded in the field. A deposit of mussel shells (Feature 29), similar to Feature 19 in thickness, and probably in horizontal extent, was partially exposed in excavation units 2 and 3 (pl. 5, *c*). It also lay horizontally, but directly upon the base of the cultural zone, except that much of it immediately overlay the large pit, Feature 43 (pl. 3, *c*). Like Feature 19, this was a dense deposit ranging from 0.1 to 0.2 foot in thickness.

The other features in the site were fireplaces, of which 13 were uncovered completely or partially in the trenches. These tended to cluster in two areas, near the slopes to the upland, in excavation unit 1, and from N60 to N85 in excavation unit 3. Judging from those which were completely exposed and what observations were possible on those only partially excavated, they ranged in diameter from slightly less than 2 feet to approximately 3 feet. A size nearer the lower end of this range appears to be most frequent. Stones were never associated with the fireplaces, which at least in some instances were simply limited circular areas on the occupational surface where fires had been maintained and which were apparent as lenses of earth usually surmounted by ashes and burned to a red color. In eight cases, the surface of the burned earth was deeper in the center than at the edges so that the ashes lay within a basin-shaped depression. These depressions varied from less than 0.1 foot to 0.25 foot in depth and some at least may have been created incidentally as the ashes were removed by the users. Ashes usually, but not invariably, lay upon the surface of the fireplaces; sometimes there were traces only but in other instances the

deposits were as much as 0.25 foot thick. The depths to which the color of the underlying earth had been affected by heat varied considerably as well, suggesting differences in the duration of the fires which had burned on the hearths. The range in maximum thickness of the burned earth lenses was from 0.05 foot in the case of Feature 33, a small fireplace in excavation unit 6, to 0.5 foot for Feature 32 at the base of zone D at N60.8W15 (fig. 2, *c*). The fire-reddened earth beneath the majority of the fireplaces, of which Feature 7 (pl. 4, *c*) and Feature 13 (fig. 2, *a*) were typical, was 0.2 to 0.25 of a foot thick. In the main part of the site, where the classic profile prevailed, fireplaces were found from top to bottom of zone D, although the majority (8 of a total of 12) were in the lower half of this deposit and 4 lay on or nearly on its base. One (Feature 35) was at the upper limits of zone D in the southern part of the site.

ARTIFACTS

As indicated above, artifactual materials were recovered in rather limited quantities. Furthermore, the range of forms is not great, and numerous types almost invariably present in adequate samples from sites on the Missouri River in the northern Plains are absent from the collections. Examples of such artifacts are the ubiquitous scapula hoes and shaft straighteners. No metal or other White trade items were found, nor have the collectors reported finding such materials.

In the following sections, the specimens collected by the North Dakota University-Historical Society party have not been included in the artifact counts, but are mentioned when they provide information lacking in the River Basin Surveys collections. Hewes has described the few rim sherds found in his excavations (1949 b).

POTTERY

The pottery collected from the site by the River Basin Surveys party consists of 1,383 fragments, which range in size from less than 1 cm. to 8.5 cm. in maximum dimension. More than 75 percent of these are less than 3 cm. long, and a very small number lie near the upper end of the size range. Sixty-two sherds are from the rim of the vessel and include the lip—some of them consist of little more than this feature—and 23 additional sherds are from various decorated parts of the rim area, but do not extend to the lip. Several of the sherds adjoining the vessel mouth have been fitted together to reduce the number of such fragments from 62 to 39, believed to represent 28 vessels. Three groups of sherds, found in as many clusters in the site, are apparently attributable to two vessels (Feature 30 and Features 28 and 44, respectively), although they have proved capable of little restoration. These groups constitute the only information

available as to certain attributes of the pottery, such as size and overall form, and the combination of attributes which go to make up a pottery container. Feature 30 consists of 11 rim sherds and 325 body sherds, many of which are exceedingly small. The rim sherds and several body sherds have been combined into 3 larger rim and neck fragments, and 16 body sherds permitted restoration of a part of the lower body of the vessel. Features 28 and 44 comprise 10 rim sherds, which partial restoration has reduced to three larger pieces, and 101 body sherds.

The tempering material included in the pottery, judging from examination of the edges of the fragments in the collection and of several crushed sherds, is invariably composed of angular rock fragments, apparently crushed granite. The particles are relatively fine, averaging considerably less than 1 mm. in diameter; the finest are less than 0.25 mm. in diameter, and only a rare example exceeds 1 mm. Only moderately abundant, the tempering fragments are rather uniformly distributed through the paste in most sherds, although occasionally some clumping is observable. The paste, as revealed by the broken edges of the sherds, is most often fine-grained and compact, but occasionally has a rather gritty appearance as though fine silty material were included with the clay. The gritty pottery tends to break rather cleanly, while the broken edges of the sherds with finer paste are most often irregular and sometimes fairly contorted. Some of the latter have a slightly laminated appearance and there is an occasional split sherd. Surfaces vary from very smooth to gritty, but the preponderant surface, both interior and exterior, can be described as moderately smooth. Occasional sherds, usually but not exclusively from the neck area, are glassy to the touch, and have a high light reflectance. This effect has been achieved by a usually horizontal smoothing, apparently with a very smooth, hard-surfaced object. There appears to be relatively little variation in hardness; of the samples tested, over 95 percent fall between celestite (3.5) and fluorite (4), the remainder are between 3 (calcite) and 3.5.

Surface color is usually gray, although there is a gradation to a dull buff, at least sometimes on the same vessel. The two surfaces of a sherd are generally similar in color except for alterations, such as smoke blackening and the accumulation of carbonized material, incidental to use. The core is almost always entirely or predominantly gray, usually of a very dark tone approaching black but occasionally fairly light. The cross sections of sherds with buff surfaces, however, sometimes reveal thin strata of a similar color adjacent to the surfaces.

Of the body sherds, 68 percent have alternating grooves and ridges on their exterior surfaces, presumably created by the application of a grooved or thong-wrapped paddle (pl. 12, *c*, *2*, *6*, *9*), a treatment which has frequently been called simple stamping by archeologists in the Plains area. Seven percent bear incised decoration, and the

remainder are plain. A large proportion of the plain sherds are probably from the neck area or from the rim, although a very small number are quite obviously from the lower portion of the vessel. The lack of grooves and ridges on a few sherds does not necessarily indicate that the paddle was not always used, since these features were barely discernible on many sherds from vessels which had been unusually well smoothed subsequent to the paddling. A few sherds from the lower edge of the decorated area indicate that sometimes, at least, paddle marks extend this high on the vessel, but they are never discernible within the decorated zone. They are not present on the neck and rim of Feature 30, but traces of vertical grooves and ridges can be seen on the outer rim of Features 28 and 44, despite considerable smoothing. Such vestiges are not visible on any other identifiable neck or rim fragments. Although on a large proportion of the sherds there is evidence of various degrees of smoothing subsequent to paddling, such evidence is lacking on some. The grooves, which appear to lie vertically on the vessel, with some crossing in the basal area, vary considerably in width, but most are from 3 to 4 mm. wide and are separated by ridges 1.5 to 2 mm. wide. The extremes in width are approximately 1.5 mm. and 7 mm., but only rare examples lie near these extremes. The remnants of vertical striations, usually nearly obliterated by subsequent horizontal smoothing, are observable on some sherds from the neck area. Interior surfaces are smooth and relatively even, lacking tool marks, except that in the area from the lip to the point of maximum constriction there are sometimes polished elongated horizontal facets resulting from the final smoothing of this area.

The specimens in the collection cast little light on the method of manufacturing the pottery. There is, however, no evidence to suggest coiling, and it is probable that the paddle marks on the exterior surfaces were incidental to at least some of the later phases of the fabricating process.

The collection provides little evidence relative to the general form or the size of the vessels represented, but some clues are available. There are, for example, no sherds indicating bowl forms, angular necks or shoulders, except for a single very small sherd which may be from a miniature vessel (pl. 7, *9*), or bases which are pointed or flattened. A partially restorable vessel, Feature 30 (pl. 7, *3*), had originally, judging from the portions present, a mouth diameter of approximately 205 mm. and a neck diameter of approximately 180 mm.; its maximum diameter and height are unknown. A partially restorable segment which appears to belong to the lower part of the body suggests a rounded base. The rim rises in a wide curve from an apparently rounded shoulder area and flares outward from the

point of maximum constriction. The exterior surface of the rim has been thickened, by the addition of a fillet, for a distance of 9 mm. below the lip. The thickness varies from place to place on the vessel. The upper rim averages 8 mm., sherds from the neck average 5 mm., and those from the lower part of the body range from 3 to 6 mm. The thinnest sherds, 2.5 mm. thick, are from the decorated shoulder area. An even more scantily represented vessel (Features 28 and 44) appears to have been similar in form and not greatly different in size. A mouth diameter of approximately 240 mm. and a neck diameter in the neighborhood of 215 mm. are indicated. The rim is thickened as on Feature 30 (pl. 7, *1*). Other, smaller, rim sherds suggest that most of the vessels represented may be close to these in size, although one unthickened flaring rim indicates a mouth diameter probably not exceeding 150 mm. (pl. 7, *6*).

The commonest rim form (31 sherds representing 17 vessels) is characterized basically by a slight to pronounced convexity of the outer surface of the upper rim as viewed in vertical section, and a corresponding concavity of the inner surface (pl. 6). The exterior and interior walls are usually parallel and describe a smooth curve, but in one instance there is a sharp break on the outer rim 43 mm. below the lip and a somewhat less pronounced angle on the inner surface (pl. 6, *13*). This latter specimen is also unusual in the series in its thickness and in the height of the decorated rim area. On 8 sherds (4 vessels) the concave-convex part of the rim is surmounted by a flare to a lip which is rounded, thinned, or thickened (pl. 6, *8*, *9*, *14*), but otherwise the surfaces curve directly to a lip which may be flattened, rounded, thickened, or thinned (pl. 6, *1–7*). Thinning of the lips of the last category was usually accomplished by beveling the inner rim margin (pl. 6, *1*, *4–7*). None of the sherds in our collection includes the total height of the concave-convex portion of the rim, but a single specimen collected by the Hewes party extends to the point at which the curve to the shoulder area begins. This sherd, which has been thickened on the interior adjacent to the lip, measures 32 mm. from lip to point of maximum constriction (pl. 6, *11*).

Thirty-one sherds (9 vessels) flare to a rounded, thickened, or thinned lip except that 25 (5 vessels) have been thickened on the exterior surface adjacent to the lip. On all but one of the latter the thickening is elliptical in cross section and varies from 5 to 10 mm. in width (pl. 7, *1–4*, *7*). Note variation on single vessel fragment in plate 7, *1;* the exception, apparently created by folding the plastic clay outward, breaks sharply at the base of the thickening, 15 mm. below the lip, to give the upper rim a roughly triangular cross section (pl. 7, *10*).

422141—58——3

Decoration occurs on the lip, inner rim, outer rim, and shoulder area and is, with rare exceptions, in two techniques, incising and impressing with single twisted cords. Except for one sherd in the collection made by the Hewes party and described below, incising is restricted to the body—probably to the shoulder area only—and cord impressing is apparently found only on the rim. Incising is invariably fine, 1 to 2 mm. wide and usually so shallow as to defy measurement except at the beginning of a stroke, where it may approach 1 mm. in depth. A single body sherd in our collection combines punctations with incisions (pl. 7, *9*), and there are two punctations on a cord-impressed rim sherd in the Hewes collection (pl. 6, *15*). The sherds in our collection are too small to permit any comprehensive determination of the designs. It is evident, however, that they consist of groups of parallel lines and that these groups are combined in various ways. A few sherds reveal a distinctive interrupted-line arrangement which appears to be similar to an incised design at the Double Ditch site (Will and Spinden, 1906, pl. 38, *h*). There is no way of determining what proportion of the vessels from the site bore body decoration or how such decoration is correlated with other characteristics of the pottery. It should be stated, however, for what it may be worth, that approximately 30 percent of the body sherds from Feature 30 bear incised lines in contrast to a figure of approximately 7 percent for the remainder of the body sherds from the site. It seems certain, judging from the sherds comprising Features 28 and 44, that body decoration was not always present. If it could be assumed—which it cannot—that the various zones of the complete original vessel were proportionately represented by the sherds of Feature 30 and that other conditions were such as to produce a fragmentation representative of that for pottery in the site in general, a tentative conclusion might be drawn that approximately 1 of 4 vessels bore body incising. While the assumptions necessary to reach this conclusion are highly questionable, it may not be unreasonable to guess that a minority of the vessels which contributed to the sherd collection had been incised.

The cords used to impress designs on the rims invariably had a left-hand twist, but they varied in diameter and in the tightness of the twist. Plate 6, *17*, is illustrative of the finest, most tightly twisted cord used on the pottery from the site; plate 6, *5*, of the largest cord. The range in width of the cord impressions is approximately 1.5 mm. to 3 mm. Rims with exterior thickening invariably have the resulting band decorated with closely spaced oblique lines, extending from the upper left to lower right or vice versa (pl. 7, *1–4*, *7*, *10*). In addition, the lip of rim sherds of Feature 30 bears a series of notches, perhaps made by impressing with the fingertip, averaging approximately 10 mm. long and 4 mm. apart (pl. 7, *3*), and the lower border of the

collar of another specimen is notched at intervals by the removal of clay with the fingernail (pl. 7, *10*). A rim sherd in the Hewes collection has a series of deeply incised lines lying obliquely from upper right to lower left across the thickened portion (pl. 7, *4*). The exterior surfaces of concave-convex upper rims are decorated, except for 2 entirely plain specimens, with cord impressions often (10 sherds, 5 vessels) as a series of horizontal lines extending to the lip (pl. 6, *1–4*). In one instance the horizontal series is interrupted by a series of diagonal, or perhaps curvilinear, lines (pl. 6, *1*). The three sherds representing this vessel also have a band of decoration 9 mm. wide adjacent to the lip on the inside of the rim. This band is composed of closely spaced cord-impressed lines lying obliquely from upper right to lower left. Three other fragments, all small and not extending to the vessel mouth, reveal a similar interruption of horizontal lines by diagonal, or curvilinear, lines, and there is a similar specimen in the Hewes collection (pl. 6, *11*). When the upper part of the rim flares outward above the concave-convex section, the cord-impressed lines do not extend onto the flaring portion (pl. 6, *8*, *9*, *14*). Other designs on rims of this form are oblique lines, probably between a pair of horizontal lines (pl. 6, *5*, *7*, *16*, *18*) and groups of opposed diagonal lines (pl. 6, *6*). On the single rim sherd which has a sharp break in the rim curve (pl. 6, *13*), three diagonal lines break a series of horizontal lines. This sherd, although similar in paste, color, and tempering, differs from other rim sherds in the site and resembles pottery reported by Hewes from a site (32SI4) on the Missouri River near Fort Yates, N. Dak. (Hewes, 1949 b, pl. 6, *q*). Of the 5 sherds (3 vessels) from unmodified flaring rims, 1 certainly and 2 others (1 vessel) probably are decorated only on the lip, which in each instance is thickened to the exterior, is flattened, and slopes outwardly. Both bear closely spaced cord-impressed lines lying obliquely from upper left to lower right (pl. 7, *5*). The remaining 2 sherds (1 vessel) are decorated on the lip and both surfaces of the rim with closely spaced, exceptionally fine cord-impressed lines. A band of horizontal lines occupies the space on the outer rim surface below a point 8 mm. from the lip, and above this is a series of oblique lines slanting from upper right to lower left (pl. 7, *6*). A series of lines arranged as horizontal chevrons lies across the lip and on the upper margin of the inner rim surface.

The group of sherds which appear, on the basis of the decorative technique present, to be from the rim area, add nothing to the foregoing descriptions except that on a single sherd one and part of a second elliptical punctate lie adjacent to, and probably below, the vestiges of a cord-impressed line.

The ceramics from the Koehler site, quantitatively limited as they are, appear to fall entirely within the range described for sites which

have been attributed to the Mandan of the 18th century (Will and Spinden, 1906; Will and Hecker, 1944; Strong, 1940). Not only do the descriptions of the general characteristics of Mandan ceramics of this period apply to our pottery, but many of our sherds appear to be almost identical to specimens illustrated in the cited reports (Strong, 1940, pl. 5; Will and Hecker, 1944, pl. 15; Will and Spinden, 1906, pls. 37–41, figs. 14–16) and most of them can be virtually duplicated in the limited surface collections from the Slant and Double Ditch sites in the possession of the River Basin Surveys, especially from the latter. The lack in the scanty Koehler site collection of the more elaborate forms and of such features as check-stamped surfaces, handles, and cord-wrapped stick decoration has little significance, since these are reported to be rare in the large collections from the Missouri River sites. The major difference between our sample from the Double Ditch site and the Koehler site materials is in the thickness of the sherds; the average for the latter is appreciably smaller than that for the specimens collected from the surface of the former. There seems to be no reason for comparing our pottery with that reported by Mulloy (1942) from the Hagen site, since the resemblances are of a much lesser order.

WORK IN STONE

Fragments of stone of various kinds—quartzite, cherts, chalcedonies, and various igneous forms—were abundant in the site, but artifacts were not numerous and the range of forms represented is relatively limited. Ground stone artifacts are rare and there are only 2 or 3 unshaped cobbles which appear to have been used as hammerstones. There are a few small fragments of pumice, none of which shows any evidence of use. Chipped artifacts were made from what appear to be four varieties of chalcedony (including a considerable quantity of so-called Knife River flint), a gray chert, a gray silty chert, a fine-grained quartzite, and—rarely—jasper. Chert and chalcedony were most often utilized for the smaller artifacts, while the larger ones were predominantly made from quartzite and the silty chert.

There are 10 complete or fragmentary projectile points in the collection, 9 of which are small, light, and triangular and have straight or very slightly concave bases. All are illustrated in plate 8, *1–10*. Of the 9, all but 1 have a single pair of side notches. They are delicately chipped on both surfaces to produce a thin biconvex cross section, invariably falling between 3 and 4 mm. in thickness. The sides are sometimes slightly convex. The 4 complete or nearly complete specimens have actual or estimated lengths and widths as follows: 28.5 mm. and 14 mm. (pl. 8, *1*), 24 mm. and 14 mm. (pl. 8, *3*), 25 mm. and 14.5 mm. (pl. 8, *2*), and 28 mm. and 13 mm. (pl. 8, *4*).

Plate 8, *10*, shows the single small unnotched point, which has a maximum width of 14 mm. The points represented by the smaller fragments probably did not greatly exceed the size range of the complete specimens; the largest (pl. 8, *5*) is 18.5 mm. wide and is, in its incomplete condition, 29 mm. long. The specimen shown in plate 8, *2*, has been reworked to its present form by chipping from one face; while the specimen has probably been broken, all edges including the concave one, have been chipped. The points are made from a homogeneous chert (pl. 8, *10*), silty chert (pl. 8, *2*, *4*), "Knife River flint" chalcedony (pl. 8, *3*, *6–8*), and a light yellowish chalcedony (pl. 8, *1*, *5*). A single basal fragment, 20 mm. wide and 23 mm. long, with straight base and parallel sides, apparently is part of a larger projectile point (pl. 8, *9*). Of chalcedony, it has a thin (3.5 mm.) biconvex cross section. Three fragments in the Hewes collection are apparently from both notched and unnotched triangular points.

Twelve complete and fragmentary end scrapers were found in the excavations. All complete or nearly complete specimens and a specimen from the Hewes collection are illustrated in plate 8, *12–23*. All are basically triangular in form and are relatively small; the complete specimens vary in width from 20 mm. to 26.5 mm. and in length from 23 mm. to 33 mm. The ventral surfaces are unworked and represent the original unmodified flake surface, except in two instances where a small amount of chipping was probably necessary to remove some irregularity. The dorsal surface has usually been shaped by overall chipping, although this is not true of the specimen shown in plate 8, *23*. The working edge is steeply inclined except in one instance (pl. 8, *20*). One specimen has a graverlike point at one end of the steep scraping edge (pl. 8, *14*). All but two of the end scrapers are made of "Knife River flint" chalcedony. Of the two exceptions, one is of a compact gray chert, the other, of dark red jasper. The only end scraper in the Hewes collection is like those described above, but is larger; it is 45 mm. long and 30 mm. in greatest width (pl. 8, *12*). A single specimen, somewhat similar to the end scrapers in general form, although larger, has a concave, gougelike working edge (pl. 8, *24*). Of "Knife River flint," it is 40 mm. long and 33.5 mm. wide. One or two coarse flakes have been removed from the ventral surface, but otherwise it resembles the end scrapers in being worked only on the dorsal surface.

The site produced a rather wide variety of blades, varying considerably in size and form. One group of bifacially flaked specimens, while varying in form and size, can be set apart on the basis of relative length and width and the invariable presence of retouching on the edges. Ends may be pointed, rounded, or straight, and sides are straight, or moderately convex, but all are alike in being relatively long and narrow. The complete range is illustrated in plate 9, *1–11*.

Four of the 13 complete and fragmentary specimens are of "Knife River flint," 4 of other chalcedony, 4 of silty chert, and 1 is of fine-grained quartzite. The smallest complete specimen (pl. 9, *11*) is 46 mm. long and 15 mm. in maximum width, the largest (pl. 9, *2*) is 109 mm. long and 28 mm. wide. The specimens are 3 to 4 mm. thick. Some of them resemble rather closely specimens from the Double Ditch site, described and illustrated by Will and Spinden (1906, pl. 34). A fine-grained quartzite fragment is long, narrow, and relatively thick (pl. 8, *29*). It may have been intended to serve as a drill, although its point seems rather blunt to have so functioned. It is carefully worked on both faces and is 7 mm. thick and 15 mm. wide.

All but 2 of 11 rather large blades are incomplete; they are made of fine-grained quartzite or silty chert with one exception, which is of "Knife River flint." They have convex sides and pointed (pl. 10, *1, 3, 6*), straight (pl. 10, *5, 8*), or rounded (pl. 10, *2, 4, 7, 9*) ends. They are shaped by percussion flaking on both surfaces, and secondary chipping is sometimes present, sometimes absent on the edges. On some specimens, only parts of the edges have been retouched. Two complete specimens are 59 mm. long and 40 mm. wide and 127 mm. long and 50 mm. wide (pl. 10, *7*), respectively. Specimens of this class vary in thickness from 8 mm. to 13 mm. Like the long, narrow blades previously described, these objects seem to bear a close resemblance to specimens reported and illustrated from the Double Ditch site (Will and Spinden, 1906, p. 164 and pl. 33). A few larger and heavier blades made from the same materials may have been used either as scrapers or as choppers. The only complete specimen (pl. 10, *13*), 112 mm. long, 68 mm. wide, and 23 mm. thick, is the most carefully made of this group of artifacts. On the others, only enough percussion flaking has been done to create an ordinarily rather blunt edge and sometimes to reduce a fragment to convenient size (pl. 10, *11, 12, 14–16*).

Other chipped-stone objects consist of irregular flakes, large and small, with one or more retouched edges. The end of one very small, thin flake of chalcedony has been chipped on one surface to create a very fine point (pl. 8, *11*). It is difficult to visualize a function for this specimen, since it is much too thin and fragile for use as a graver. The smaller retouched flakes are usually chalcedony, while the larger, heavier retouched fragments are most often quartzite and silty chert (pl. 9, *12–14*).

Objects of stone other than those which have been altered by chipping are very rare. A thin subtriangular object smoothly ground into shape from Amazon stone, a green variety of microline, has been perforated, presumably for suspension (pl. 8, *28*). Above the biconical perforation, which is approximately 1 mm. in diameter, and at the apex of the triangle, can be seen the remains of a similar hole

which had apparently been drilled too close to the edge of the stone. This object, supposedly a pendant, is 16 mm. long, 12 mm. wide, and 3 mm. thick. Three thin fragments of a brick-red stone with laminated structure, tentatively identified as volcanic ash, are probably split from a single tabular piece which was rectangular in outline. Most of the original surfaces have scaled away, but a small remnant near a rounded corner of one of the pieces bears a short segment of an incised line (pl. 8, *26*). Another thin tabular fragment of similar material with a rounded edge bears the remnants of 3 or 4 lines which seem to radiate to the edge of the object from a common point (pl. 8, *25*). This piece also appears to have been split from a thicker stone. Although they are so fragmentary that no definite statement is possible, these objects seem to me to be reminiscent of incised rectangular and tabular stones reported by Will and Spinden from the Double Ditch site (1906, pp. 165–166 and fig. 4). Of similar material is an asymmetrical but basically disk-shaped bead with a conical central perforation (pl. 8, *30*). It has an average diameter of approximately 17 mm., an average thickness of 7 mm., and a perforation 4–7 mm. in diameter. A fragment of fine-grained red stone is probably part of a circular bead. It is crudely shaped and is broken through a conical perforation (pl. 8, *27*). The diameter of the bead was 13 mm., the thickness 8.5 mm. Finally, as far as tools or other objects of stone are concerned, there are two unshaped cobbles of igneous rock each with one end somewhat battered, suggesting their use as hammerstones.

As in the case of the pottery, it appears that the artifacts of stone from the Koehler site fall within the range of the materials from the Double Ditch site. Although the descriptions of projectile points, for example, from the latter site are too general to permit a satisfactory comparison, there seems to be no doubt that there are at least some nearly identical artifacts. The similarities in some of the larger chipped blades have already been noted. I suspect, also, that there is a close correspondence in the materials utilized. For example, Will and Spinden mention the use of a "gray chert or fine grained argillite" for the larger blades (1906, p. 164), and I am of the opinion they are referring to material identical to that which is described here as a silty chert; stone of this kind is in our surface collection from the Double Ditch site. I do not remember having seen material of this sort, at least in quantity, in sites of other cultural affiliations, and its use may prove to be culturally diagnostic.

WORK IN BONE AND ANTLER

Objects of worked bone and antler recovered in the excavations are few in number and represent a very limited range of artifacts. A single well-made awl, 108 mm. long, is made from a section of long

bone, probably the metapodial of a deer or antelope (pl. 11, *8*). The butt has been modified by grinding, but traces of those features characterizing the articular surfaces of the end of the bone can still be recognized. The implement is relatively uniform in width to within 24 mm. of the sharp point, which is formed by a sharp taper of the two edges and the interior surface. Four spatulate objects, all but one fragmentary, may be classed together. Three are made from the lateral surface of a large rib, one is probably from the thickened border of a large scapula. The three fragments retain on the inner surface a layer of rough cancellous bone which shows no evidence of smoothing. The edges are roughly shaped, and only the ends appear to have been used. On 1 specimen, the end is rounded, and on 2 it is bluntly pointed (pl. 11, *1*, *3*, *6*). These ends bear 1 or 2 wear facets. The fourth specimen has been worked overall and has one end thinned and rounded. The other end, also rounded but considerably more tapered, bears a wear facet but has also been somewhat nicked as though the tool might have been used in chipping. This specimen is 120 mm. long and 19 mm. wide (pl. 11, *2*). These specimens appear to be similar to bone objects from the Double Ditch site illustrated by Will and Spinden (1906, pl. 35, *n*, *o*), and as far as general form and the nature of the working ends are concerned, to objects from the vicinity of Mobridge, S. Dak., described by Wedel (1955, pp. 123–126). Wedel points out the resemblance of his specimens to an object described and figured by Orchard (1916, p. 9, pl. 5), identified as a quill-flattener and attributed to the Sioux.

There are two objects which may have been used primarily for chipping stone, judging by the nicked condition of their blunt points. One is an otherwise unmodified tip which has apparently been broken rather than cut from an antler (pl. 11, *11*), the other appears to be made from the thickened border of a large scapula. The distal half of this specimen has been worked overall to remove all traces of cancellous bone and to create a symmetrical taper to a rounded point (pl. 11, *12*). The antler specimen is 95 mm. long and about 18 mm. in diameter at the butt, the bone specimen is 223 mm. long and varies from 10 mm. to 35 mm. wide, near the tip and at the base, respectively.

A small highly polished section of bird bone is presumably a bead. Marks of cutting are visible at both ends, and there are several short transverse scored lines irregularly spaced at various points on the specimen, which is 14 mm. long and 6 mm. in diameter (pl. 11, *4*). A fragment of a small mammal rib is unmodified except for a slight polish and half of a biconical perforation at one of the broken ends (pl. 11, *5*). The specimen is 43 mm. long and 2.5 mm. wide. Its function is uncertain, but it is suggestive of specimens from the Double Ditch site (Will and Spinden, 1906, p. 172 and pl. 36, *x*). A split section of bird bone, rounded at one end and broken at the other, is also

of uncertain function (pl. 11, *9*). It is 5 mm. wide and, in its present condition, 68 mm. long. All edges but the broken one are well polished. The remaining specimen in the River Basin Surveys collection is the distal end of a bison metapodial, which has been cut from the shaft and is presumably a byproduct of preparation of the shaft for manufacture of an artifact.

The collection made by the Hewes party includes three objects of bone showing more or less modification. There are 2 fleshers, 1 broken near the working end, made of bison metatarsals by cutting diagonally through the shaft from the anterior to the posterior surface and producing a rounding chisellike edge where the cut meets the posterior surface. In each instance, a few narrow notches have been cut into the edge and the wear produced by use is on the cut side of the edge. The butt consists of the unmodified proximal end of the bone. The illustrated specimen (pl. 11, *10*) is 158 mm. long, and the other is almost identical in size. A fragment of rib of a large mammal, roughly broken at both ends, has a series of 10 short transverse scored lines near one end, but is otherwise unmodified (pl. 11, *7*). There is no evidence of wear or polish anywhere on the specimen.

TABLE 1.—*Artifacts from the Koehler site*[1]

Artifact	River Basin Surveys collection	North Dakota University-Historical Society collection	Illustrations
Pottery:			
Rim sherds (including lip)	62	10	Pls. 6, *1–15*; 7, *1–8*, *10*.
Rim sherds (not including lip)	23	2	Pl. 6, *16–19*.
Body sherds	1,288	215	Pls. 7, *9*; 12, *c*, *2–6*, *9*.
Stone artifacts:			
Projectile points	10	3	Pl. 8, *1–10*.
End scrapers	12	1	Pl. 8, *12–23*.
"Gouge"	1	0	Pl. 8, *24*.
Drill (?)	1	0	Pl. 8, *29*.
Long, narrow blades	13	0	Pl. 9, *1–11*.
Large blades	11	2	Pl. 10, *1–10*.
"Choppers"	10	1	Pl. 10, *11–16*.
Graverlike object	1	0	Pl. 8, *11*.
Circular bead	1	0	Pl. 8, *27*.
Disk bead	1	0	Pl. 8, *30*.
Incised tablets	[2] 2	0	Pl. 8, *25*, *26*.
Amazon stone pendant	1	0	Pl. 8, *28*.
Hammerstones	2	1	
Bone artifacts:			
Awl	1	0	Pl. 11, *8*.
Chipping tools	2	0	Pl. 11, *11*, *12*.
Fleshers	0	2	Pl. 11, *10*.
Spatulate objects	4	0	Pl. 11, *1–3*, *6*.
Scored rib	0	1	Pl. 11, *7*.
Tubular bead	1	0	Pl. 11, *4*.
Perforated rib	1	0	Pl. 11, *5*.
Split bird-bone object	1	0	Pl. 11, *9*.

[1] Quantities include complete and fragmentary specimens.
[2] 4 fragments.

FAUNAL REMAINS

Bones were the most abundant remains in the site. A large proportion were exceedingly fragmentary and, not being identifiable, were

not all collected. The bones in general were in such small fragments (pl. 5, *b*) that it seems certain they were deliberately crushed, probably to be boiled for the manufacture of bone grease (Leechman, 1951). An occasional bone was scorched. All bones which seemed to present any opportunity for identification (virtually all of these except vertebrae, tarsals, carpals, and phalanges were also fragmentary) were collected, but they probably constitute less than half the bulk of the total uncovered in the excavations. Of the 959 bones identified by Dr. Theodore E. White, 731 are of bison (*Bison bison*), and 217 are of the domestic dog (*Canis familiaris*). Other forms represented are beaver (*Castor canadensis*), by 9 bones; prairie dog (*Cynomys ludovicianus*), 1 bone; and a microtine rodent, 1 bone. It will be noted that a number of mammals ordinarily utilized by the Indians—deer, antelope, and elk, for example—are missing from this list; furthermore, bird and fish remains are entirely absent, except for the two artifacts made from bird bone previously noted. Horse bones are likewise absent. Approximately one-third of the dog bones and 22 percent of the bison bones are from immature individuals. It is not possible to arrive at a sound estimate of the numbers of individuals represented by the bison and dog bones, but, on the basis of the number of the most abundant element present (divided by 2), it can be said that there are at least 11 bison and at least 3 dogs. Probably considerably more individuals than these are represented.

Molluscan remains were scattered throughout the site, but by far the largest number were found in a single deposit, Feature 29. As identified by Dr. J. P. E. Morrison, they include six species of fresh-water mussels, most of which are represented by only a few specimens. Of the 750 identified shells, 698 belong to the species *Lampsilis siliquoidea* (Barnes); others are *Lasmigona complanata* (Barnes), 43 specimens; *Lampsilis ventricosa occidens* (Lea), 5 specimens; *Amblema costata* (Rafinesque); and *Quadrula quadrula* and *Anodonta grandis plana* (Lea), 1 specimen each. Seventeen fossil snail shells whose origin is the Fort Union formation are probably accidental inclusions in the cultural deposits; the species are *Ceriphasia nebrascensis* (Meek and Hayden) and *Compeloma multistriata* (Meek and Hayden).

CONCLUSION

The investigations in the Heart Butte Reservoir area, limited as they have been, provide some information relative to the aboriginal utilization of an area which until now has been entirely unknown archeologically. The number of sites revealed by the fairly intensive reconnaissance of a restricted segment of the Heart River valley indicates that the area west of the Missouri River in North Dakota was not avoided by aboriginal peoples, but much additional investigation will be necessary before even a sketchy knowledge of the prehistory of the

area is acquired. The excavations in the Koehler site, although on a regrettably small scale, constitute a first step in the acquisition of such knowledge.

The evidence revealed by the excavations in the Koehler site suggests occupation by small groups, probably over a period of some years. There is no evidence, however, of any cultural change from bottom to top of the cultural deposit, so no considerable time span is indicated. No evidence of structures of any kind was uncovered, nor was there any evidence of storage pits, which facts lead to the conclusion that the mode of life was unlike that represented by the more or less permanent earth-lodge villages on the Missouri River to the east. The absence of remains of corn or other cultivated plants and of such agricultural tools as scapula hoes, while not conclusive, in view of the generally scanty specimen yield, suggests the probability that the inhabitants were not engaged in agriculture during their occupancy of the site. On the other hand, the relative abundance of bones and of mussel shells indicates a heavy reliance upon hunting and gathering for food. If the bones found in the site can be considered conclusive, the bison herds were exploited almost to the exclusion of other game animals; no deer or elk bones have been identified in the collections. The extremely fragmentary condition of the bones, probably indicative of the extraction of bone grease, would seem to imply that the site was not simply an overnight stopping place for groups on the move, but that it served as a headquarters during the hunt.

The artifact inventory, while leaving much to be desired from the standpoint of quantity and range of forms, seems to point unmistakably to a close relationship with certain sites which have been investigated on the Missouri River near the mouth of the Heart River. Specifically, resemblances to artifacts from the Double Ditch site, for which comparative data are available, seem very close. Many artifacts reported for the Double Ditch site are lacking in the Koehler site, as is to be expected in view of our small sample, but, on the other hand, it appears that all of the pottery and other artifacts from the Koehler site can be duplicated in the large collection from the Double Ditch site. The lack of metal and other White contact materials in our excavations is compatible with such a relationship, for the only items of trade goods reported from the excavations in the Missouri River site are two pieces of copper (Will and Spinden, 1906, p. 168).

It is suggested, in view of its location, its general character, and its apparent cultural relationships, that the Koehler site was a recurrently occupied hunting camp of a people closely related culturally to the occupants of the Double Ditch site. These occupants were presumably Mandan, since the Slant Village, virtually identical culturally (Strong, 1940, p. 363), was identified with this tribe by one of Lewis and Clarke's informants. While the absence of materials of Caucasian

origin cannot be considered proof of a precontact date for the site, there is no doubt that a date prior to the acquisition of large quantities of such materials is indicated. This negative evidence, together with the positive evidence of a close cultural relationship to the Double Ditch site, points to occupancy in the 18th century, and perhaps in the first half of that century.

It appears probable that most of the other sites recorded in the reservoir area (see Appendix) can be similarly identified, although the collections are too scanty to permit more than tentative identifications. In each instance where pottery was recovered, it resembled that from the Koehler site. Whether the sites which yielded only flint materials represent different complexes or are simply workshop areas cannot be stated on the basis of present information. At the moment, evidence of any appreciable time depth in the area is lacking, but further investigation may alter this situation. At any rate, there seems no doubt that the western tributaries of the Missouri River constitute a fruitful field for future archeological research.

LITERATURE CITED

DICE, LEE R.
1943. The biotic provinces of North America. University of Michigan.

FENNEMAN, NEVIN M.
1931. Physiography of Western United States. New York and London.

HEWES, GORDON W.
1949 a. The 1947 summer field session in archeology, University of North Dakota. Notebook No. 1, Lab. Anthrop., Univ. Nebraska, pp. 21–24.
1949 b. Pottery from the sites excavated by the 1947 North Dakota field session. Notebook No. 1, Lab. Anthrop., Univ. Nebraska, pp. 58–67.

LEECHMAN, DOUGLAS.
1951. Bone grease. Amer. Antiq., vol. 16, No. 4, pp. 355–356.

LEONARD, A. G.
1912. Geology of south-central North Dakota. State Geol. Surv. North Dakota, Sixth Biennial Rep., pp. 21–99.

MULLOY, WILLIAM.
1942. The Hagen site. Univ. Montana Publ. Soc. Sci., No. 1.

ORCHARD, WILLIAM C.
1916. The technique of porcupine-quill decoration among the North American Indians. Contr. Mus. Amer. Ind., Heye Foundation, vol. 4, No. 1.

OVER, W. H.
1936. The archaeology of Ludlow Cave and its significance. Amer. Antiq. vol. 2, No. 2, pp. 126–129.

STRONG, WM. DUNCAN.
1940. From history to prehistory in the northern Great Plains. Smithsonian Misc. Coll., vol. 100, pp. 353–394.

TISDALE, ERNEST E.
1941. The geology of the Heart Butte quadrangle. North Dakota Geol. Surv., Bull. 13.

WEDEL, WALDO R.
1955. Archeological materials from the vicinity of Mobridge, South Dakota. Bur. Amer. Ethnol. Bull. 157, Anthrop. Pap. No. 45, pp. 69–188.

WILL, GEORGE F.
1924. Archaeology of the Missouri Valley. Anthrop. Pap. Amer. Mus. Nat. Hist., vol. 22, part 6.

WILL, GEORGE F., and HECKER, THAD C.
1944. The upper Missouri River Valley aboriginal culture in North Dakota. North Dakota Hist. Quart., vol. 11, Nos. 1 and 2.

WILL, GEORGE F., and SPINDEN, HERBERT J.
1906. The Mandans, a study of their culture, archaeology, and language. Pap. Peabody Mus. Amer. Archaeol. and Ethnol., Harvard Univ., vol. 3, No. 4.

APPENDIX

SITES IN THE HEART BUTTE RESERVOIR AREA

Following is a list and brief description of sites found in the Heart Butte Reservoir area by the River Basin Surveys in 1946 and 1948 and by the University of North Dakota-State Historical Society party in 1947. Except for site 32GT1, where fairly large-scale excavation was accomplished, and site 32GT5, where minor testing was done, none of these sites was excavated, even on a small scale.

Site 32GT1 (the Koehler site), a camp site of a pottery-using group in the NE¼ sec. 9 TI36N R89W, was probably the most intensively occupied site in the reservoir area. Both the River Basin Surveys and the North Dakota University-Historical Society party undertook excavations here. The description of this site comprises the body of the present report. The site is flooded by the reservoir.

Site 32GT2, on a low terrace on the right side of the Heart River in the NE¼ NW¼ sec. 9 T136N R89W, yielded bone fragments at the time of the reconnaissance. The landowner reported pottery and flint artifacts had been found here in the past. Situated just across the river from the Koehler site, it may relate to the same occupation. It lies within the pool area and has been flooded.

Site 32GT3, on the left side of the river in the NE¼ NE¼ sec. 9 T136N R89W, was on the same terrace as the Koehler site, but across a shallow ravine. Fragments of bone only were observed by the reconnaissance party and Hewes reports that the same material was found in garbage pits dug by his party. It may be an extension of the Koehler site and has also been flooded.

Site 32GT4 consists of 5 groups of stones, 1 of which constitutes approximately half a circle and 3 of which are groups of stones somewhat resembling it but being rather irregularly arranged. The fifth has been disturbed by excavations of the landowner, who assumed it marked a grave but who reports having found no bones or other evidence. The site is in the SE¼ sec. 4 T136N R89W and is within the area flooded by the reservoir.

Site 32GT5, in the NW¼ sec. 13 T136N R89W, is a small, shallow rock shelter formed by the erosion of very soft sandstone underlying more firmly cemented materials. Numerous fallen slabs lying on the slope below the shelter and elsewhere in the vicinity (pl. 12, *a*, *b*) suggest a lack of stability in the situation which would preclude the possibility of occupation over a long period of time. The present floor

is composed of an exceedingly fine sand. The shelter faces to the northwest, toward the prevailing winds, and on windy days would be untenantable; sand whipped up by such a wind made work almost impossible during a half day spent here by the River Basin Surveys party. Evidence of casual occupation was found by the Hewes party in 1947, when a few sherds from a single pottery vessel, points, and many spalls and chips are reported to have been found (Hewes, 1949 a, p. 22). The pottery, which is apparently in the same tradition as that at the Koehler site, has been described by Hewes (1949 b, p. 61). It has a grooved and ridged body and a concave-convex upper rim decorated with a band of diagonal cord impressions (pl. 12, *c*, *1*, *7*). A point in the collection on loan from the State Historical Society of North Dakota (pl. 12, *c*, *8*) is small and triangular and has a slightly concave base and a pair of side notches. The sides are serrated. The spalls and flakes are of "Knife River flint."

During a very brief examination of the site in 1948, the basal fragment of a small, probably triangular, point with a concave base and a number of flakes and spalls of "Knife River flint" were found on the surface. In addition, a small sherd from the lip of a vessel and a few additional fragments of "Knife River flint" were collected just beneath the surface in a 5- by 10-foot test trench at the outer edge of the shelter. Otherwise the trench yielded no certain evidence of occupation, although there were occasional flecks of charcoal mixed with the otherwise sterile fine sand. The sherd is too small for satisfactory identification, but could very well be from a vessel like a number represented by the sherds from the Koehler site. Immediately above the dam, the site is believed to have been destroyed by flooding.

Site 32GT6 is a deposit of bison bones, exposed in the eroding bank of the Heart River in the NE¼ sec. 8 T136N R89W. At the time it was observed in 1948, the deposit was 0.1 to 0.75 feet thick, but it was reported that, previous to recent cutting by the river, it was as much as 3 feet thick. The top of the layer of bones was at a depth of about 10 feet beneath the surface. A fragment of a projectile point, perhaps corner notched, was found at the edge of the river below the deposit, but it may not have originated in the bone deposit. Presumably a bison kill, this site would undoubtedly have repaid investigation had resources been available. Lying on the immediate bank of the river, it was flooded soon after water storage began.

Site 32GT8, in the SW¼ sec. 10 T136N R90W, is apparently a small camp site which occupies a terrace finger on the south side of the Heart River. Four small pottery sherds, collected from the terrace slope below the site, are decorated with cord-impressed lines and resemble pottery from the Koehler site. The site is within the area of flooding.

Site 32GT9 is a single boulder circle reported to lie in the SE¼ SW¼ sec. 1 T136N R90W, on the south side of the Heart River. No artifacts were found on the site, which has been covered by the reservoir waters.

Site 32GT10 is an occupational area, apparently a small camp site, on a terrace on the north side of the Heart River in the NW¼ SE¼ sec. 2 T136N R90W and within the reservoir pool area. The cultural evidence on the surface consisted of a single cord-impressed rim sherd, similar to those found in the excavations at the Koehler site, two retouched flakes, and nine unworked fragments of stone. The stone is "Knife River flint" and gray chert.

Site 32GT11, in the NW¼ SW¼ sec. 3 T136N R90W, is an occupational site buried beneath slope wash on a terrace which is being cut by the Heart River. The occupational layer, in which basin-shaped fireplaces and deposits of bison bones and mussel shells were observed, lies an average of 3.5 feet beneath the present surface. Two pottery sherds, one plain and one simple stamped (bearing parallel grooves and ridges), a triangular chert end scraper, a broken blade of "Knife River flint," and cores, spalls, and flakes, mostly of "Knife River flint," and an unfinished bone awl were collected. The site has been flooded.

Site 32GT12 is on high land on the north side of the Heart River in the SE¼ SW¼ sec. 35 T137N R90W. Numerous flakes and a few cores, all of "Knife River flint," were collected from the surface of the site, which may be a quarry, since the materials are reported to be exposed in shallow depressions. The site is apparently not subject to flooding.

Site 32GT13, in the SE¼ SE¼ sec. 3 T136N R90W, is a camp site lying on a terrace about 15 feet above the Heart River and on the north side of that stream. Four small simple-stamped sherds and fragments of "Knife River flint" were found on the surface of the terrace, which lies well below the reservoir level.

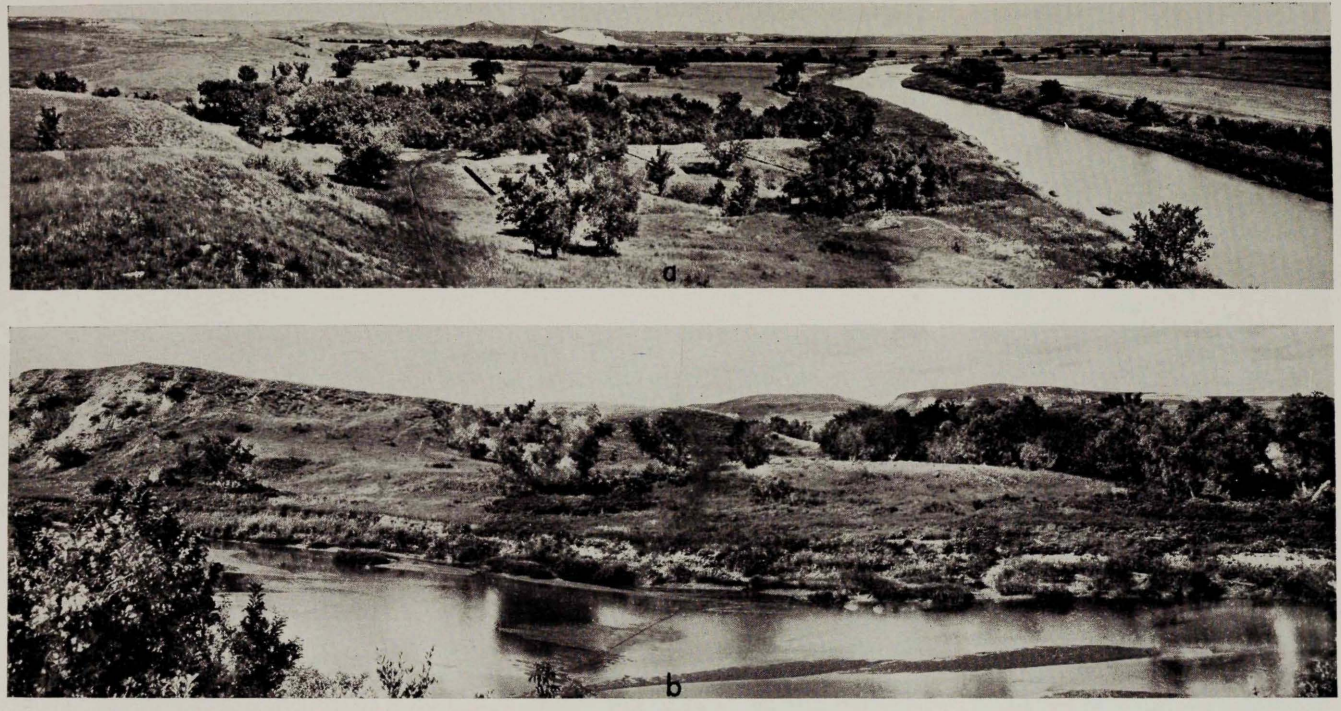
Site 32GT14 is a camp site on a fairly low terrace on the north side of the Heart River, in the NE¼ SW¼ sec. 34 T137N R90W. Ten small sherds, one bearing decoration with single cord impressions and others with simple-stamped surfaces, and a number of chalcedony fragments, mostly "Knife River flint," were collected from the surface, which is now covered by the reservoir.

Site 32GT15 occupies the crest of a knoll on the north side of the Heart River in the NW¼ NW¼ sec. 34 T137N R90W and within the flooded area. Fragments of bone and of flint and other stone were observed on the surface and a single end scraper of "Knife River flint" was collected.

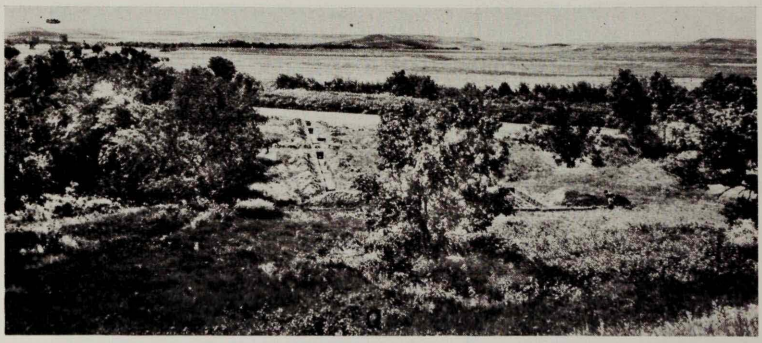
Site 32GT16 is a small area on the north side of the Heart River which yielded a number of flakes and cores of "Knife River flint." Three depressions, which may represent quarry pits, are reported. The site is in the W½ W½ sec. 35 T137N R90W within the flooded area.

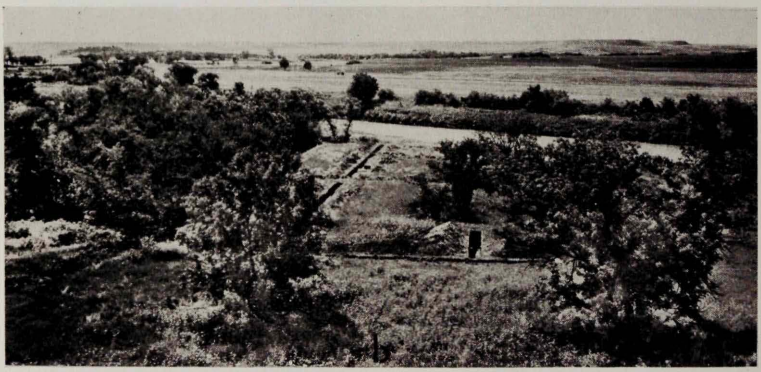
Site 32GT22, not observed by the River Basin Surveys party, is reported by Hewes (1949 a, p. 22) to be a quarry yielding chalcedony spalls and a few tools in the SW¼ NE¼ sec. 1 T136N R90W. It occupies a knoll on the north side of the Heart River and will apparently be flooded.

Site 32SK4 is a pottery-bearing camp site on a low terrace on the north side of the Heart River in the NW¼ SW¼ and SW¼ NW¼ sec. 12 T137N R91W. Approximately 60 small sherds, 2 end scrapers, and a quantity of chips were collected from the surface. The sherds, most of which are simple stamped, resemble the pottery from the Koehler site. This site probably lies slightly above the reservoir pool and, accordingly, will be available for future investigation.

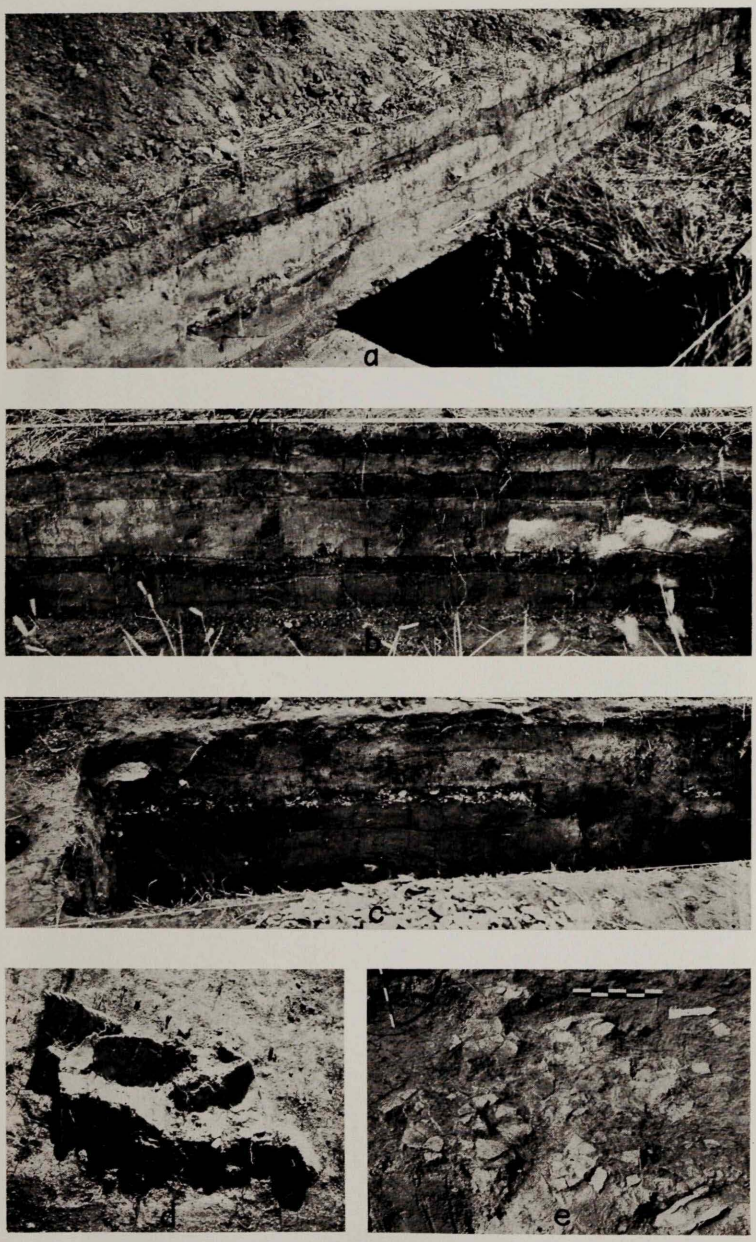


Views of Koehler site (32GT1). *a*, To east (downstream) from adjacent hill. *b*, To north from across Heart River.

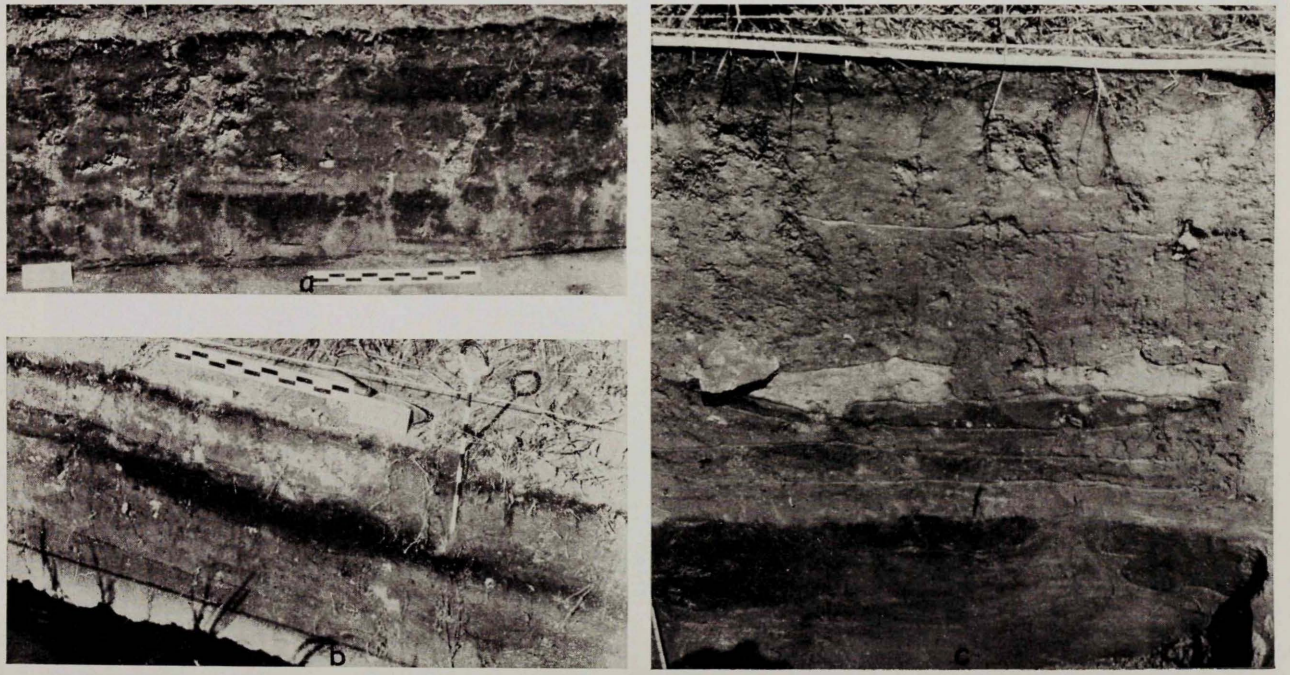




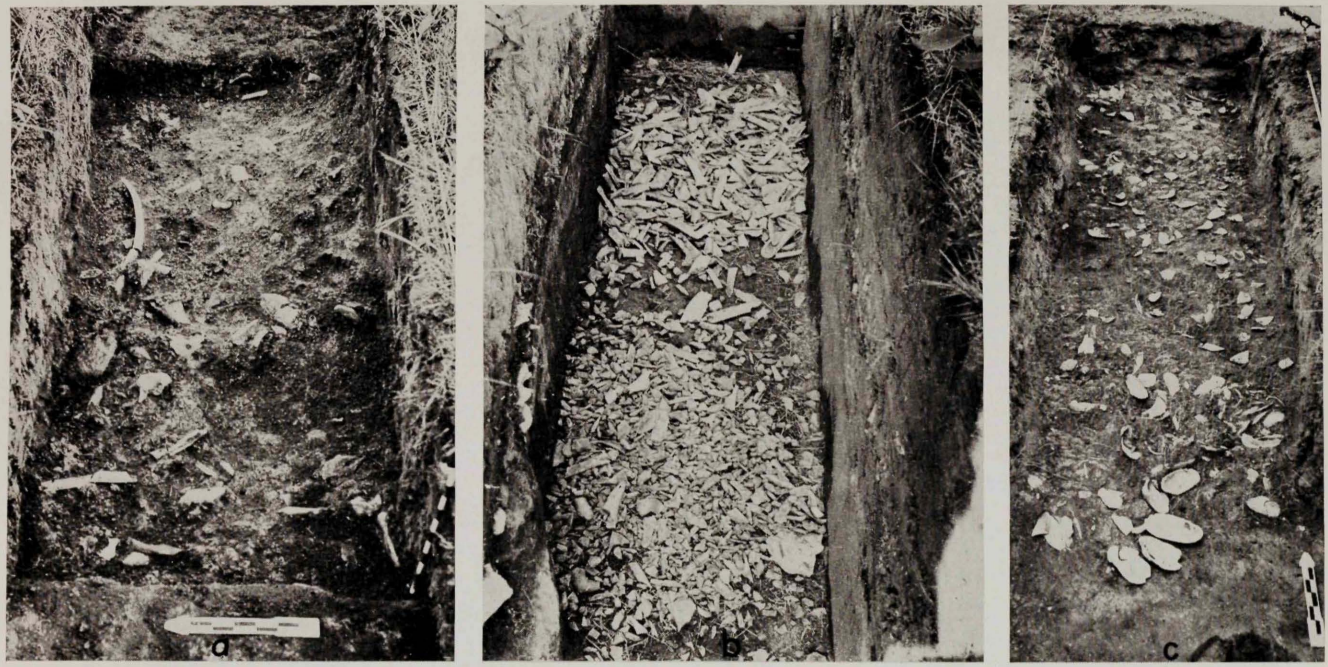
Koehler site (32GT1) during excavation. *a*, *b*, Excavation trenches. Heart River in background. *c*, Excavation unit 1 in early stage, toward site west. Excavation floor nearest camera is at top of cultural deposit.



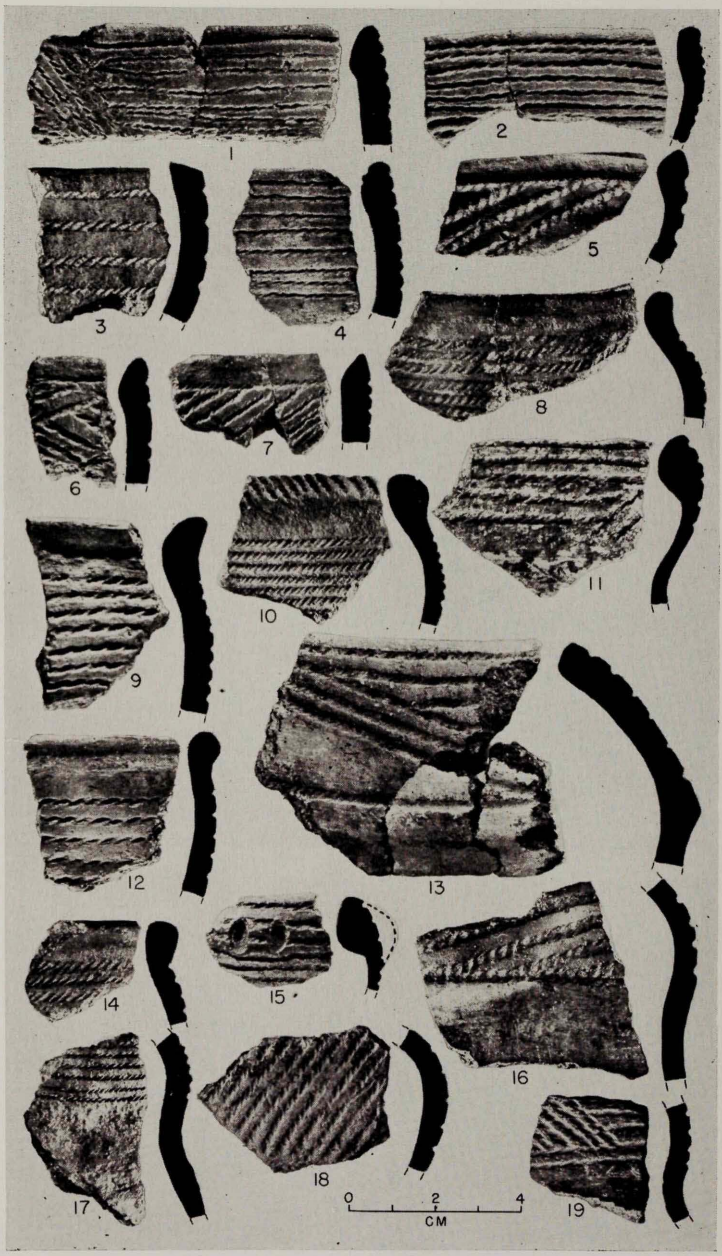
Koehler site (32GT1). *a*, Profile on W15 line, N50 to approximately N62, with zones marked. Top to bottom, zones B–F. Fireplace, Feature 32 at left. *b*, Typical profile of N45 line, W70.3 to W75.2, with zones marked. Top to bottom, zones A–F. *c*, Profile on W15 line, N85 to N92, showing deposit of mussel shells, Feature 29, and beneath it, shallow pit, Feature 43. Recent pit at right. *d*, Pottery fragments, Feature 28, in situ. *e*, Pottery fragments, Feature 30, in situ.



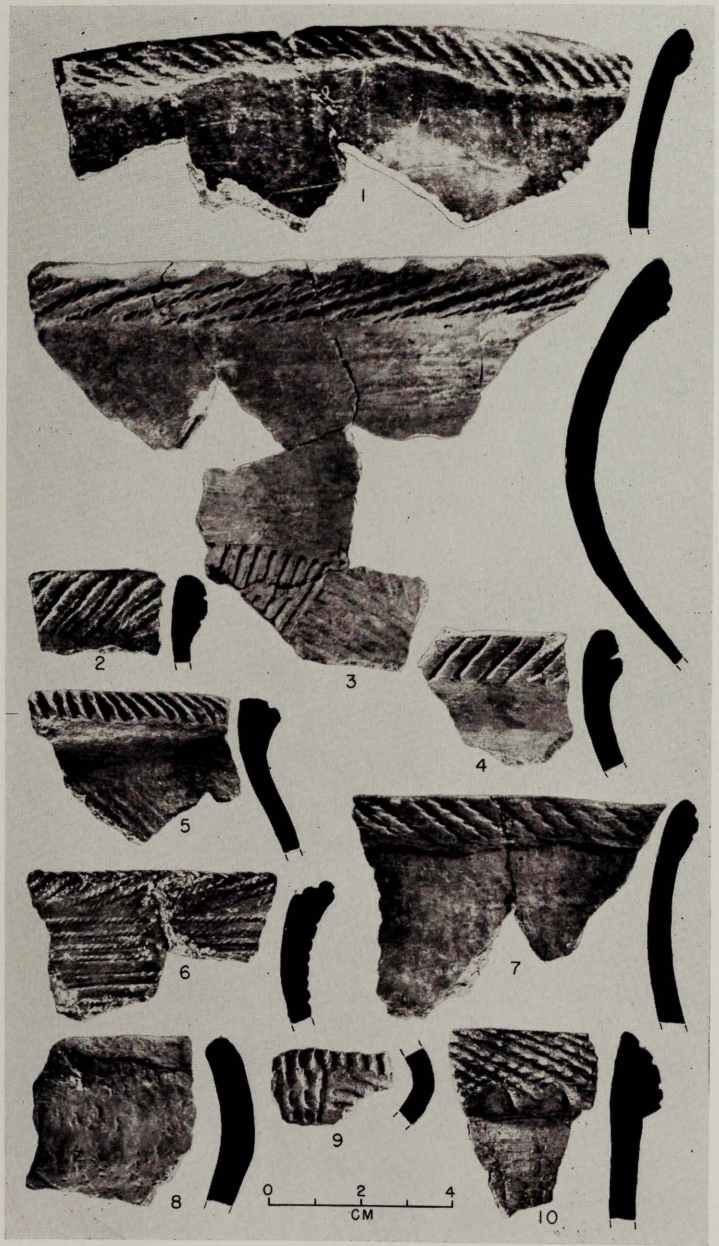
Koehler site (32GT1). *a*, Typical profile on N47.5 line. Top to bottom, zones A–F. *b*, Profile of fireplace, Feature 35. on W15 line. *c*, Profile of fireplace, Feature 7, on N175 line.



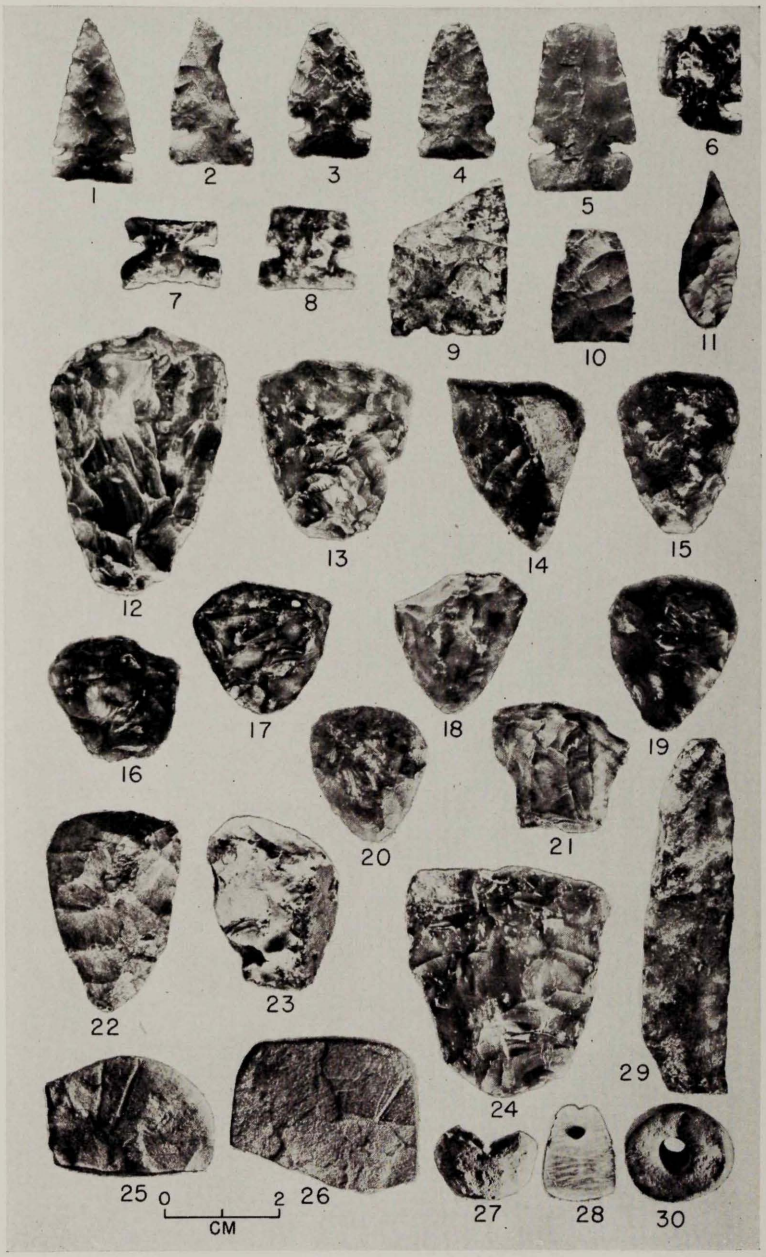
Koehler site (32GT1). *a*, Top of cultural deposit in excavation unit 1, square N170W50, showing nature of cultural debris. *b*, Discarded unidentifiable bones recovered from Feature 19. *c*, Top of deposit of mussel shells, Feature 29.



Pottery rim sherds from the Koehler site (32GT1). Interiors of profiles to left.

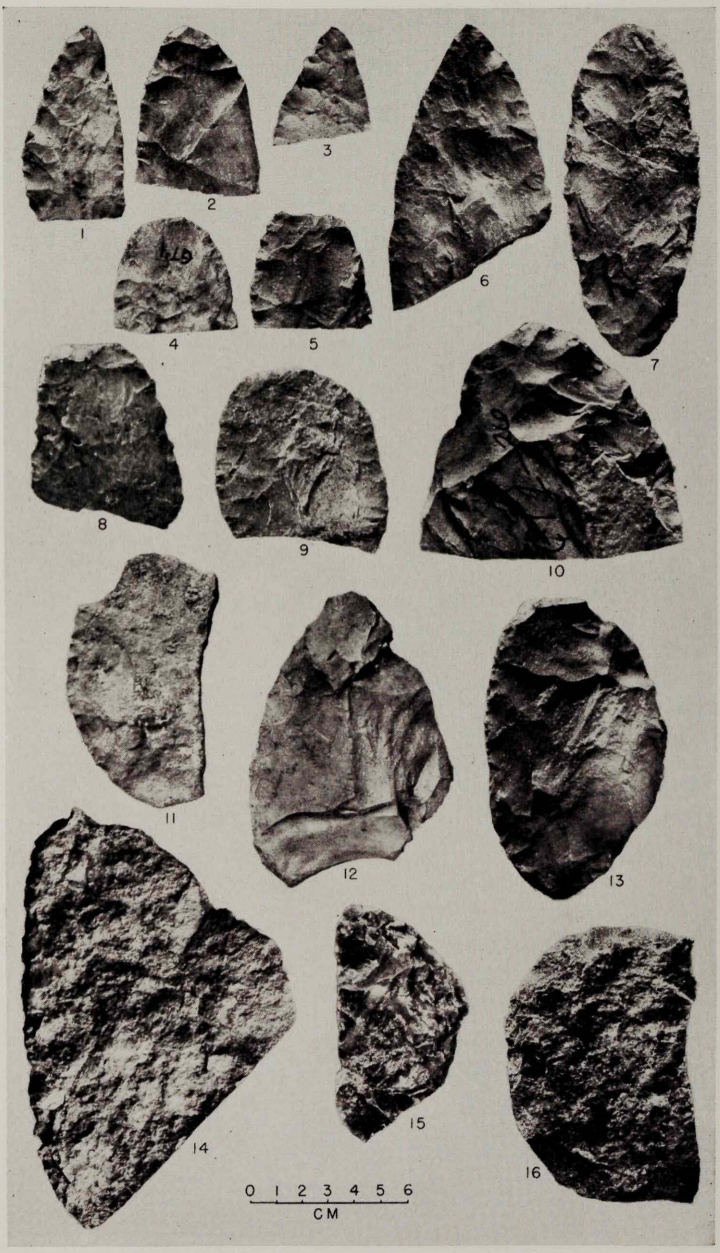


Pottery sherds from the Koehler site (32GT1). All are rims except 9, which is from the shoulder area. Interiors of profiles to left.



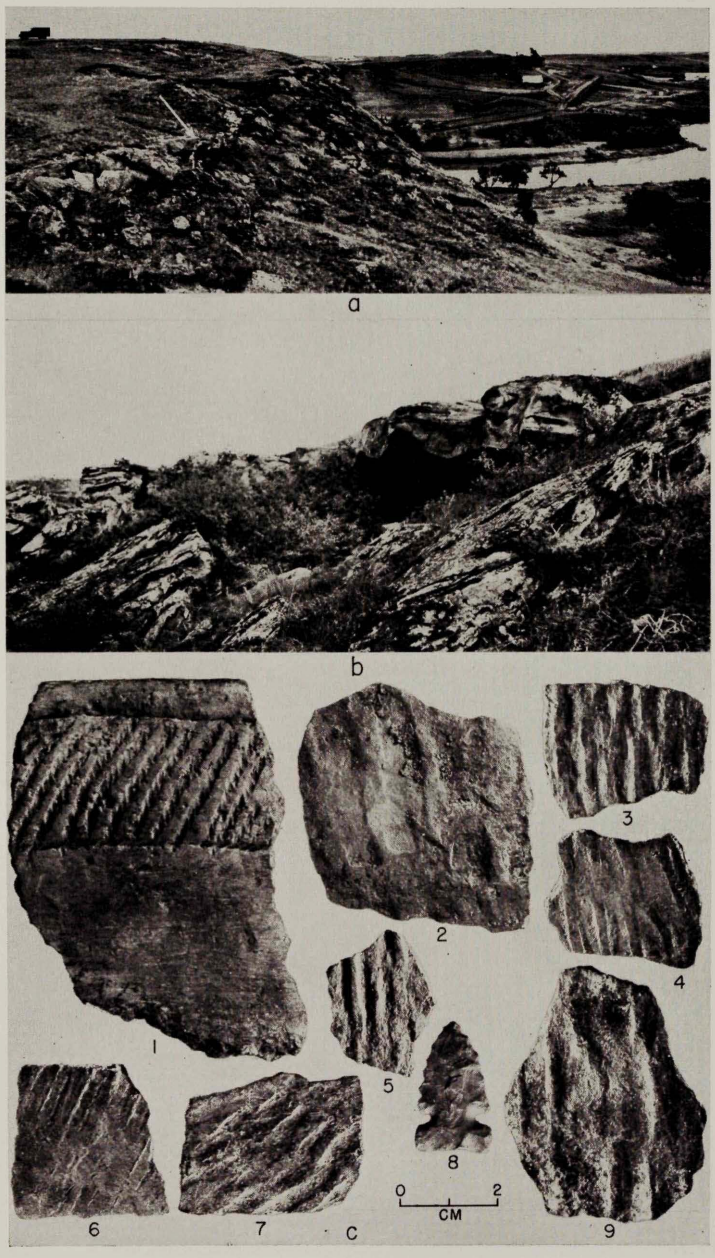
Stone artifacts from the Koehler site (32GT1).

Chipped stone artifacts from the Koehler site (32GT1). *1–11*, blades; *12–14* retouched flakes.



Large blades and "choppers" from the Koehler site (32GT1).

Bone and antler artifacts from the Koehler site (32GT1).



a, Site 32GT5, rock shelter (arrow), to southeast. *b*, Site 32GT5, rock shelter, to northeast. *c*, Artifacts from Koehler site (32GT1) and rock shelter, site 32GT5. *2–6, 9*, body sherds from Koehler site; *1, 7, 8*, from site 32GT5.