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## Ash Hollow Cave: A Study of Stratigraphic Sequence in the Central Great Plains

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*Frank A. Lundy.*

# Ash Hollow Cave

★ ★ ★ ★ ★

J O H N   L .   C H A M P E



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## UNIVERSITY OF NEBRASKA STUDIES

October 1946

N E W   S E R I E S   N O .   1

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# University of Nebraska Studies

October 1946

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## ASH HOLLOW CAVE

A STUDY OF STRATIGRAPHIC SEQUENCE IN THE  
CENTRAL GREAT PLAINS

★ ★ ★

JOHN L. CHAMPE

NEW SERIES NO. 1

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PUBLISHED BY THE UNIVERSITY AT LINCOLN, NEBRASKA



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## FOREWORD

This study, in its first form, was submitted to the Faculty of Philosophy of Columbia University in partial fulfillment of the requirements for the degree of Doctor of Philosophy, and was successfully defended on October 25, 1945. It has since been revised and supplemented with the results of field work carried on in 1946, and with a more complete dendrochronological analysis by Harry E. Weakly.

This report could not have been written without the cooperation of scientists in several fields. This will explain the emphasis which this study places on teamwork between specialists. In a cooperative enterprise of this kind, credit for any accomplishments may be shared, although the author must assume full responsibility for the form which any statement may take.

The work of Harry E. Weakly has already been mentioned. Weakly gave much patient study to the fragmentary charcoal returned from Ash Hollow Cave. His first reports supplied a welcome check on the stratigraphic inferences. His more recent work, reported here in Appendix I, supplies the basis for a Central Plains chronology.

The task of identifying the faunal remains from Ash Hollow Cave was accepted by Dr. C. Bertrand Schultz. In addition to this work, he joined with Prof. T. M. Stout in a study of certain eastern Nebraska terraces. A preliminary account of this research is included with the report of new investigations at Sterns Creek.

The basic data for the report of the archeology of Ash Hollow Cave were recovered by a field party of the Nebraska State Historical Society Archeological Survey, under the personal supervision of its Director, A. T. Hill. The complete results of this work were most generously placed at my disposal by Mr. Hill. These well-kept records, particularly the sound observations by George Metcalf, were essential to the analysis of Ash Hollow Cave archeology.

The actual excavation of Ash Hollow Cave was carried out by George Metcalf and Moss Fletcher, with the assistance of Gordon McKenzie and of Carlyle Smith, Columbia University. Drs. Waldo R. Wedel and Philip Drucker, now of the Smithsonian Institution, supplied professional assistance and advice during the excavations. Flavia Waters Champe and the author were present for part of the work.

It is impossible to recognize the welcome help of each friend by individual mention. The generosity of the several landowners who have permitted excavations on their property can be acknowledged when the site reports are published. Good reasons can be adduced for the mention of a considerable number of my colleagues in anthropology and on the faculty of this University, and it has been possible, in several instances, to include acknowledgment in the text.

I cannot fail, however, to acknowledge the constructive advice and sound criticism of Paul Cooper, Mildred Mott Wedel, Dr. W. R. Wedel and Dr. Ralph Linton. The wise counsel of Dr. Gene Weltfish, especially while the original report was being written, was invaluable to me. Dr. W. Duncan Strong initiated me into Plains archeology and, later, guided me in the broader field of anthropology. Almost every page of this study bears witness to that association.

JOHN L. CHAMPE.

October 25, 1946.

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**ASH HOLLOW CAVE  
A STUDY OF STRATIGRAPHIC SEQUENCE IN  
THE CENTRAL GREAT PLAINS**

## INTRODUCTION

The Great Plains has been an important laboratory for anthropological research since the latter part of the nineteenth century. Much of the early work was ethnological in character, a consequence, perhaps, of the late preservation of tribal life in the area. These early studies, however, cover a wide range and include subjects as diverse as tribal ethnographies, special studies in ethnobotany, and distributional analyses of Sun Dance traits.

Although many of the earlier studies stressed historical sequences, a definite swing away from this position soon developed. By the middle of the nineteen-twenties, in fact, investigators became so preoccupied with distributional concepts that readily available sequential data were entirely overlooked. Recent studies, and particularly those in the Central Plains, indicate a return of the interest in problems of sequence and an increasing appreciation of the importance of time perspectives. This renewed emphasis on history is closely associated with the rise of scientific archeology, which has as its first purpose the achievement of time perspective by means of an objectively derived sequence of cultures. This correlation is probably no coincidence. The utility of valid archeological inference as a corrective to ethnological theory was underlined by Strong<sup>1</sup> in his brief, but pungent essay, *Anthropological Theory and Archeological Fact*. Strong<sup>2</sup> considers the inferential picture of the Great Plains before the advent of the horse and contrasts it with the more objective data revealed by archeology. He concludes that

. . . in the Great Plains . . . the application of archeological techniques seems destined to overturn one of the most strongly held ethnographic concepts in the area. It is already apparent that, critically applied, the combined ethnological and archeological approach has possibilities that have as yet hardly been touched on.

The purpose of this study is to achieve further time perspectives for the Central Great Plains by means of archeology. The material to be discussed will be presented under four headings.

<sup>1</sup> Strong, 1936.

<sup>2</sup> Strong, 1936, pp. 363-364.

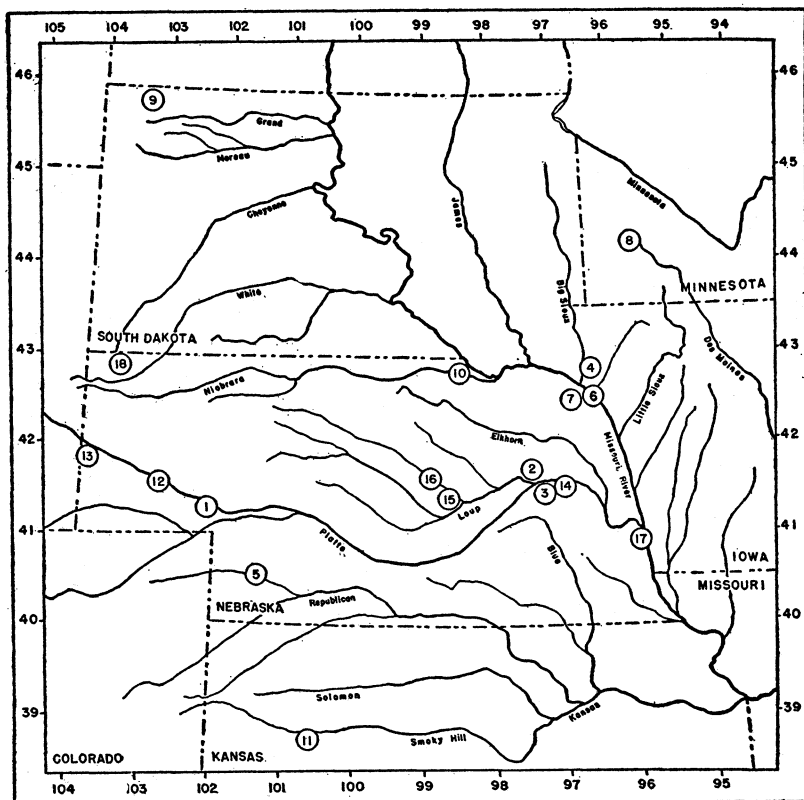


FIG. 1. MAP OF THE CENTRAL PLAINS, SHOWING THE  
ARCHEOLOGICAL SITES DISCUSSED.

- |                  |                  |                  |
|------------------|------------------|------------------|
| 1. Ash Hollow    | 7. 25DK3         | 13. Signal Butte |
| 2. Bakenhus      | 8. Great Oasis   | 14. Skull Creek  |
| 3. Bellwood      | 9. Ludlow Cave   | 15. Sondergaard  |
| 4. Broken Kettle | 10. Lynch        | 16. 25VY1        |
| 5. 25CH1         | 11. Pottorff     | 17. Sterns Creek |
| 6. 25DK2         | 12. Rock Shelter | 18. White River  |

Excavations in Ash Hollow Cave (Fig. 1, site 1) provide the basic data for this study and the first heading includes a detailed statement of the archeology of this cave. The Ash Hollow evidence is fundamental in character because the stratification within the floor deposits is thoroughly documented and the inferences of cultural succession for this site are adequately supported. In addition to

satisfactory stratigraphy, independent evidence from dendrochronological studies of charcoal contained within the stratified deposits is available as a check on the inferences of cultural sequence.

Although the evidence from Ash Hollow Cave provides a frame of reference for this study, important data have been reported heretofore from Signal Butte and other stratified sites in the Central Plains (Fig. 1, sites 11, 13, 15). The material from these sites, relevant to an analysis of cultural sequence in the Central Plains, will be summarized under the second heading.

A review of the evidence for culture sequence in the White River terraces (Fig. 1, site 18) is included under the third heading. At this time, only preliminary reports of the archeological findings have been published. I have supplemented the published material with personal observations made on two brief visits to the site.

The fourth heading comprises the evidence for succession of cultures in certain eastern Nebraska terraces (Fig. 1, sites 2, 7, 14, 17). The Walker Gilmore site, investigated and discussed by Sterns<sup>3</sup> and by Strong,<sup>4</sup> is typical of this group. New data can now be added to the record of the Walker Gilmore site for comparison with the reports of several other sites where similar problems appear. The greater part of this latter material has not been reported before.

There are several other multi-component<sup>5</sup> sites in the Central Plains from which some evidence of culture sequence has been reported. Although the data now available do not seem directly relevant to the present problem, these sites have been discussed briefly, for the sake of completeness, and included as Appendix III.

In general, the evidence for culture sequence summarized under the second, third and fourth headings is less fully documented than that from Ash Hollow Cave. By comparing this material, however, and referring it to the Ash Hollow sequence, it becomes possible to derive a sequence for the greater part of the Central Plains that is basically stratigraphic in character.

This newly derived sequence and its implications have a number of interesting applications. First of all, a testing of previous hypo-

<sup>3</sup> Sterns, 1915; 1915a.

<sup>4</sup> Strong, 1933b; 1935.

<sup>5</sup> The term "component" will be used here in its original meaning, i.e., "the manifestation of a given culture at a single site" (McKern, 1934, quoted from Bell, ed., 1936, p. 8). The term "multi-component," then, may be applied to the general case of sites which have more than one component, but without reference to the problem of cultural succession.

theses of culture sequence in the Central Plains is made possible. Further, new steps are added to the existing Central Plains sequence and certain new formulations of the older data are presented. Attainment of these new perspectives permits a reconsideration of the archeology of the Central Plains and its relationship to that of adjoining areas. Finally and in addition to these purely anthropological considerations, this material is relevant to recent studies in allied fields. Brief mention, therefore, will be made of the relationship of this study to recent publications in ecology, geology, and plant geography.



THE EAST WALL OF ASH HOLLOW NEAR THE CAVE





VIEW OF ASH HOLLOW FROM THE CAVE

# THE ARCHEOLOGY OF ASH HOLLOW CAVE

## ASH HOLLOW

Ash Hollow is a well-known name to students of western history. A few miles west of present-day Ogallala, Nebraska, the Old Oregon Trail divided and the north branch turned northwest out of the South Platte valley to cross the high table-land between that river and the North Platte. West-bound wagon trains found that the best route from this high land to the North Platte bottoms, some 400 feet below, lay through the short steep-walled canyon known as Ash Hollow (Pls. 1 and 2; fig. 2).

An excellent and early description of the Hollow may be found in the diary of Edwin Bryant<sup>1</sup> who travelled the Oregon Trail almost one hundred years ago. Under the date of June 19, 1846, he wrote:

. . . We descended into the valley of the north fork of the Platte through a pass known as "Ash Hollow." This name is derived from a few scattering ash trees in the dry ravine, through which we wound our way to the river bottom. There is but one steep or difficult place for wagons in the pass. I saw wild currants and gooseberries near the mouth of Ash Hollow. There is here, also, a spring of clear cold water. . . .

We found near the mouth of "Ash Hollow," a small log-cabin, which had been erected last winter by some trappers, returning to the "settlements," who, on account of snows, had been compelled to remain here until spring. This rude structure has, by the emigrants, been turned into a sort of general post-office. Numerous advertisements in manuscript are posted on its walls outside; descriptive of lost cattle, horses, etc. etc.; and inside, in a recess, there was a large number of letters deposited, addressed to persons in almost every quarter of the globe, with requests that those who passed would convey them to the nearest post-office in the states. The place had something of the air of a cross-roads settlement; and we lingered around some time, reading the advertisements and overlooking the letters.

Bryant's description shows clearly that as early as 1846 the Hollow had become a landmark on the trail. Earlier references emphasize the same point. Robert Stuart,<sup>2</sup> in 1813, passed along the north

<sup>1</sup> Bryant, 1936, p. 97.

<sup>2</sup> Stuart, 1935, pp. 210, 225.

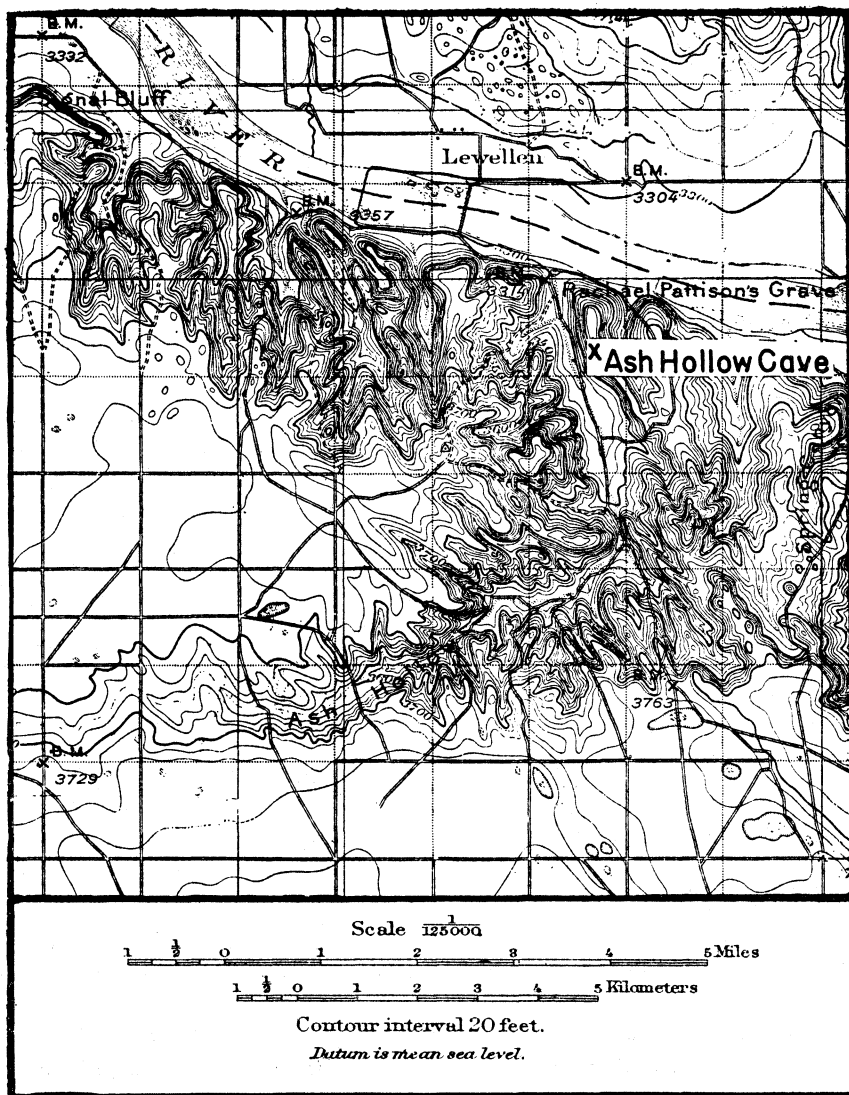


FIG. 2. MAP OF ASH HOLLOW.

bank of the North Platte River on his trip east from Oregon. In his diary for March 24, 1813, he mentions the small creek on the opposite, or south, bank but names it Cedar Creek from the numbers of that tree on the nearby bluffs.

Visitors to the Hollow, however, must have been more impressed by the ash trees within the Hollow than by the cedars on the bluffs. Nearly thirty years after Stuart, Frémont<sup>3</sup> mentions the Hollow by the French form of its present name. In his report for July 4, 1942, he describes the division of his party in order that a detachment under his own command might continue west along the South Platte, and continues:

The party I left in charge of Clement Lambert, with orders to cross to the North Fork; and at some convenient place, near to the *Coulee des Frenes*, make a cache of everything not absolutely necessary to the further progress of our expedition.

On his return from the mountains, Frémont camped at the mouth of Ash Creek on September 8, 1842. He makes no special mention of the Hollow on this visit, except to give the latitude, which he determined as 41° 18' 19".<sup>4</sup>

Throughout the busy days of the Oregon Trail and the early Indian troubles, Ash Hollow continues to be an important landmark.<sup>5</sup> The "steep and difficult place" which Bryant mentions becomes the Windlass Hill of pioneer yarns and more recently of the movies. The graves of Rachael Patterson<sup>6</sup> and other Forty-niners are now a part of Ash Hollow cemetery and the site of Fort Grattan can still be distinguished about one-half mile east of the cemetery. This short-lived post was established by General Harney after the battle of Blue Water, sometimes referred to as the battle of Ash Hollow but actually fought about nine miles north and west of the Hollow itself.

<sup>3</sup> Frémont, 1845, p. 23.

<sup>4</sup> Frémont, 1845, p. 642.

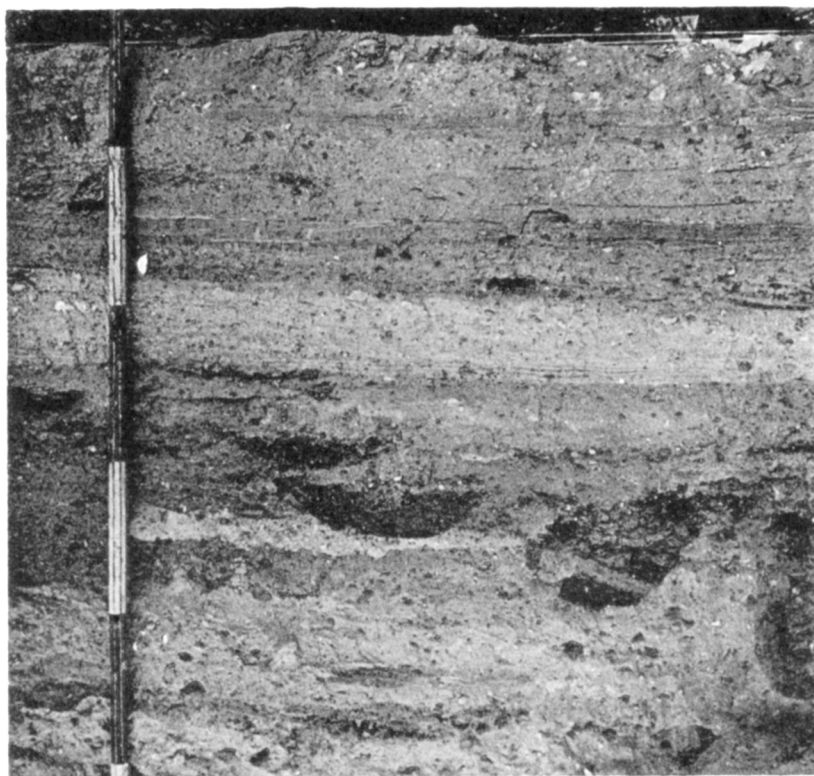
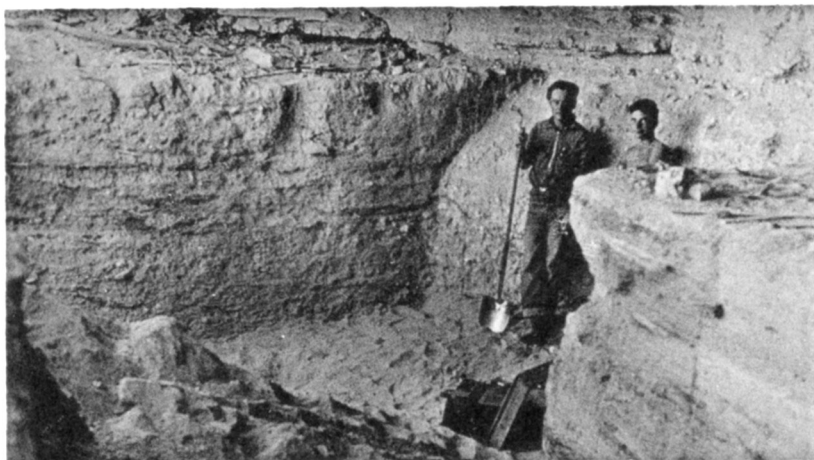
<sup>5</sup> Dr. W. D. Strong called my attention to the following note from Spier, 1935, p. 31. "Old Ignace (a well-known Iroquois) was killed at Ash Hollow on the South Platte (sic) in the summer of 1837 while conducting the third embassy to St. Louis."

<sup>6</sup> Marked on Chappell Quadrangle, U.S.G.S. (Fig.2). The original stone is barely readable now but a more recent marble slab is inscribed as follows: "In Memory of Rachael Patterson who died and was buried here in 1849. Aged 18 Yrs."



*Top*, THE FRONT OF THE CAVE

*Bottom*, THE FLOOR OF THE CAVE BEFORE EXCAVATION



*Top*, THE INTERIOR OF THE CAVE DURING EXCAVATION  
*Bottom*, STRATIFICATION IN THE WEST FACE OF COLUMN 5NR3

The history of Ash Hollow, however interesting, is not the subject of this study. Yet it is a matter of some importance that the Hollow can be shown to have been an important landmark and rendezvous throughout the period of early white exploration and settlement. There are many other canyons along the North Platte valley but none of them seems to have achieved the historical prominence accorded Ash Hollow. We need not be surprised, then, at evidence that the Indian as well as the pioneer found Ash Hollow an exceptionally attractive camp site or that his visits were probably continued over many hundreds of years.

The mouth of Ash Hollow is almost exactly on the north line of Section 3, Township 15 North, Range 42 West, and is three miles south-east of the town of Lewellen, Garden County, in western Nebraska (Fig. 1, site 1; fig. 2). This location is very nearly  $41^{\circ} 18' 30''$  North Latitude and  $102^{\circ} 7' 0''$  West Longitude.<sup>7</sup> It can be approximated easily by projecting the eastern boundary line of the State of Colorado northward until it intersects the North Platte River.

At its mouth the Hollow is little more than a quarter of a mile wide. Within the Hollow the walls stand steeply to a height of one hundred to one hundred and fifty feet above the valley floor. A small stream has cut away the talus from the east wall near the entrance and created a high, almost vertical cliff. This exposure has been selected as the type section for the lower portion of the Ash Hollow formation, Ogallala series.<sup>8</sup> At this point and elsewhere along the canyon wall, a hard stratum of massive white calcareous sandstone, the basal ledge of the Ash Hollow formation, overlies a pebble conglomerate from 16–22 feet thick.<sup>9</sup> This conglomerate, in turn, lies above some 60 feet of the Whitney member of the Brule formation.

Erosion and undercutting of the relatively soft pebble conglomerate from beneath the harder sandstone has created many shallow recesses along the canyon walls, usually just above the upper margin of the talus. Collapse of the overhanging slab frequently occurs before the recess attains any great depth but, under favorable conditions, a thoroughly habitable shelter can result from this erosion.

<sup>7</sup> Wolfanger, Goke, Weakly, Strieter, 1924, map.

<sup>8</sup> Lueninghoener, 1934.

<sup>9</sup> T. M. Stout, Department of Geology, University of Nebraska, personal communication.



A thorough survey of the entire Hollow and of the other canyons nearby has not yet been possible. Preliminary reconnaissance near the Cave, however, revealed several possible occupation sites and is believed that adequate search and test-pitting will demonstrate new locations. There are a large number of fallen slabs scattered along the top of the talus. Since these represent collapsed roof-slabs, careful excavation beneath them may be the means of discovering occupation sites older than Ash Hollow Cave. The fact that several Yuma points have been reported from the area should add special interest to such a search.

There is some reason to believe that the present Ash Hollow Cave does not include all of the original shelter. A very large slab lies buried in the top of the talus immediately to the north and a little in front of the present Cave. Test pits dug near this slab gave some indications of the presence of deposits underneath the rock much like the floor deposits within the Cave. This suggests, of course, that the slab is the collapsed roof of a similar, and possibly, older shelter than Ash Hollow Cave, but confirmation of this suggestion must wait upon the removal of the great rock.

### ASH HOLLOW CAVE

About a quarter of a mile within the Hollow, the talus at the foot of the eastern wall extends nearly seventy-five feet above the valley floor (Pl. 1). Here a deep recess has been eroded into the stratum of pebble conglomerate which lies just above the talus. Overflow water from the hill above found its path to the valley at this point and must have contributed to the erosion and to the collapse of a large slab which once formed the outer part of the roof. When this slab broke away from the ledge, it must have dropped almost vertically to the top of the talus and there remained, blocking the deeper part of the recess behind it. In this way, a reasonably well enclosed cave was formed, with entrances on the north and south but with the fallen slab almost closing the front of the cave on the west (Pl. 3, top).

The cave is very well hidden. An observer on the valley floor, even directly opposite and within hailing distance, can hardly distinguish the narrow opening to the cave from other shallow recesses nearby. The cave mouth, however, commands an excellent view of the lower part of the Hollow and of the Platte river bottoms just outside (Pl. 2). Springs feeding the small stream at the foot of the

talus may be found immediately below the cave. This combination of a well-protected rock shelter commanding the entrance to the Hollow, with plenty of water near at hand, provides an unusually attractive camp site. It appears unlikely, however, that the cave would be particularly well adapted to continuous habitation. Only a small group could be accommodated, and the front of the shelter is too open to the weather for year-round comfort. A storm-bound hunting party, however, could live in relative comfort for a few days or the cave could serve as a headquarters and occasional storm shelter during a whole season of hunting. The evidence from the floor deposits, as will appear later, lends weight to this theory of semi-permanent habitation rather than all-year-round occupation.

The recess behind the fallen slab is 68 feet by 18 feet and approximates in shape, after excavation, one-half of an ellipsoid cut by a vertical plane along the longest, and horizontal, axis (Fig. 3). Before excavation began, the floor deposits filled the lower half of this space so that the ceiling of the cave curved upward and outward from the juncture of the floor and the back wall to a point about six feet above the floor near the center of the outer edge. The floor deposits seem to have been derived from disintegration of roof and wall material; it may be inferred, then, that the outer margin of the original roof was much lower and, perhaps, very nearly in contact with the top of the fallen slab. The indications are that, when the cave was formed, the original floor lay lower and was better protected from the weather than at present since a gap of nearly five feet now exists between the top of the fallen slab and the present ceiling and the floor line is now about five feet higher. All in all, it appears that the cave has been a livable shelter for a long time, and this general impression is confirmed by the abundant evidence of human habitation contained within the deposits which formed the cave floor.

#### METHOD OF EXCAVATION

The archeological significance of the site was first discovered by local collectors. In 1939, the cave was brought to the attention of A. T. Hill, Director of the Nebraska State Historical Society Archeological Survey. Unfortunately, when Mr. Hill first inspected the site, he found that earlier and unknown investigators had dug a large hole to a depth of some 36 inches very nearly in the middle of the cave floor (Pl. 3 bottom; fig. 3).

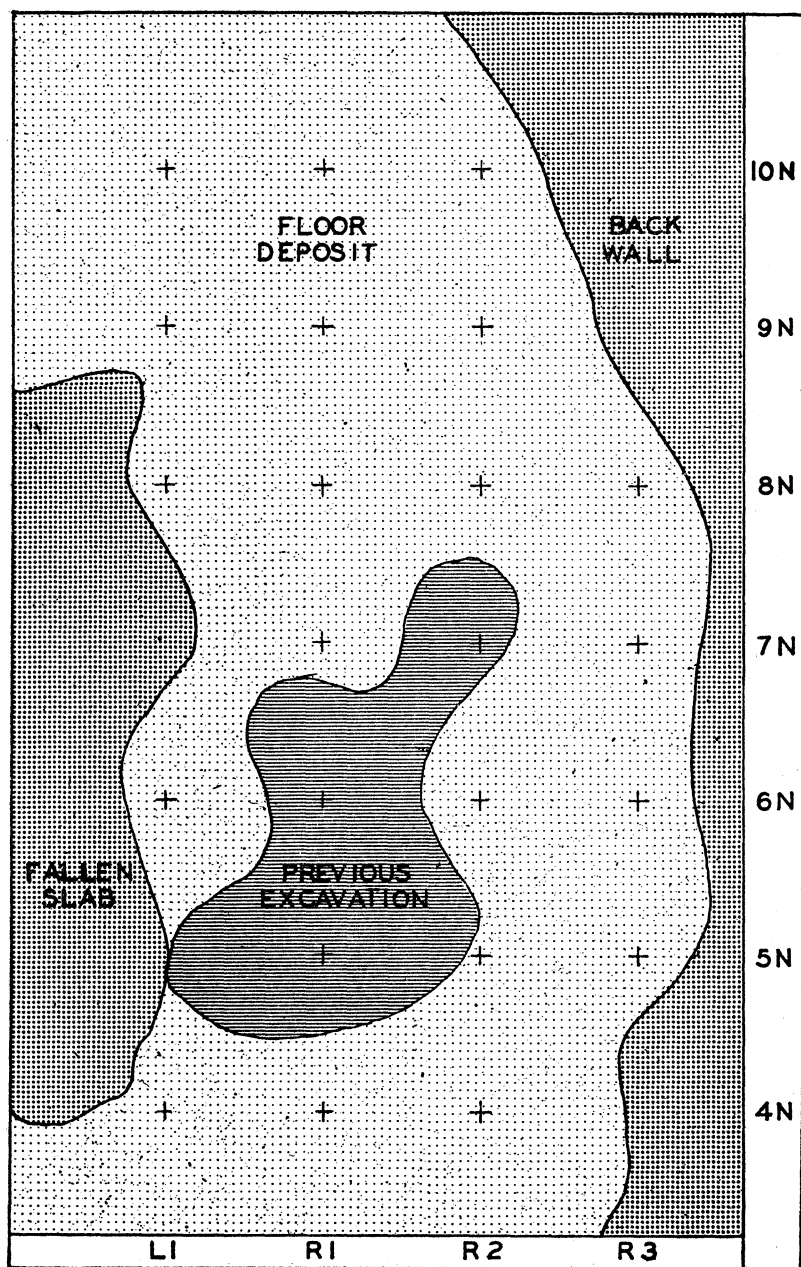


FIG. 3. FLOOR PLAN, ASH HOLLOW CAVE.

When actual excavation of the site began, the first step was to clear away from the surface the loose dirt derived from the early amateur digging. This material was screened and the artifacts were segregated from those recovered by later excavations. The true surface of the floor deposit was approximated, the sides of the amateur "pothole" were squared and the floor of the hole cleared to undisturbed deposit.

A bench mark was cut into the south end of the fallen slab. This served as a datum point for imposition of a grid system on the floor area and acted as a reference point for both vertical and horizontal measurements. A chalk line was drawn on the east side of the datum point, approximately under the front or western edge of the roof. This line, oriented to the Magnetic North, was called the R1 line. Another line drawn parallel to R1 but five feet to the right or east was called R2, and like parallels each at five foot distances became R3 and R4 (Fig. 3). The first parallel to the west, or left, and at five feet from R1 became L1 and the second line so drawn was L2.

East-west lines, also five feet apart, were numbered from south to north; line 1N was taken at the point where R1 intersected the south wall, line 4N crossed the datum point. Stakes were placed at the intersection of these lines and were designated by combining the symbols for the intersecting lines, as in 5NR3 or 8NL1. The squares formed between the intersecting lines were identified, by convention, by the designation of the south-east stake of the square. For example, the square included between stakes 7NR2, 7NR3, 8NR2, and 8NR3 was described as square 7NR3, which is the number of the southeast stake.

Strata were easily distinguished in the vertical faces of the previous excavation. Attempts to follow the apparent surfaces horizontally were not satisfactory and it became necessary, therefore, to excavate by block and column. The floor deposit lying directly beneath each square is considered a column. The unit of excavation in each column was a block, three inches deep, beginning with the level of the datum point and covering the entire square. Each of these blocks was identified in the records by the name of the column, followed by the measurements of the upper and lower levels of the block taken from datum. In every case the upper level is named first, for example, block 5NR3 3-6 indicates the block in column 5NR3 whose top level is three inches below datum and whose lower level is 6 inches below datum. A few blocks excavated actually lay

above datum. These are numbered in the same way, for example, 6NR2 9-6; in this case, since the larger number comes first, the block is above datum.

The earth within each block was loosened with trowels and passed through a fine screen. Items recovered were sacked separately for each block, and the sack or other container was marked with the block designation. The containers were then packed and taken directly to the laboratory in Lincoln where the artifacts were cleaned, identified, catalogued and the individual items marked with the site symbol and catalog number.

Each workman maintained a log of the excavations in which he participated. These logs were kept by block and column, and since two men often worked together on the same column duplicate records covering the same blocks are available in many cases. Profiles of the standing faces were drawn wherever possible and, in several instances, profiles of the same faces were drawn independently by different observers. A complete series of photographs was taken, and serve as a valuable check on the accuracy of the profiles and as a verification of the observations recorded in the excavation logs.

Detailed auditing of observations was made possible by the several lines of evidence just summarized. This audit resulted in the demonstration of a few minor errors in the records and also permitted a satisfactory adjustment of them. Instances were noted where measurements were taken from actual surface instead of datum; blocks were incorrectly identified in other cases, and datum was incorrectly shown on several profiles. Adjustments were submitted to Mr. Hill and to George Metcalf for approval; those to which no objection could be found were accepted and a list placed on file with original excavation records. Finally, no adjustments were required which would affect the observed sequence within any one column. Those corrections which were made facilitate the reconciliation of notes and profiles, and the comparison of one column with another. This report is based upon the corrected data.

An horizontal floor plan is shown (Fig. 3) on which the grid of five foot squares is imposed. The fallen slab is indicated in outline and the present margin of the roof is shown by a long irregular line ending in the lower left-hand corner. The pothole resulting from amateur excavations can be seen near the center of the floor plan. Particular attention is directed to the six squares which were in-

vaded. The hole is some thirty-six inches deep, and it is evident that valuable data from these columns have been destroyed.

All of the area between the 4N and 10N lines, from the face of the fallen slab to the back wall, was completely excavated as were several columns which lay to the left of the R1 line and north of the large rock. Shallow excavations in two squares south of the 4N line demonstrated a ledge of rubble with relatively little cultural detritus. At the extreme north end of the cave, the floor deposits included many very large boulders which broke up the continuity of the strata observable elsewhere in the cave (Pl. 5, bottom).

Finally, that portion of the deposit abutting directly on the fallen slab seems to have been cut away for a few inches and refilled with camp refuse which may represent periods other than that of the undisturbed material lying next to it. The fact that water from the hill above poured directly over the roof and onto the slab has been mentioned. Probably a part of that water found its way down the inside of the fallen slab and cut away the floor deposits nearest the slab. This break in the strata nearest the fallen slab is clearly shown in the profile for 5NR1 and is commented on by the field observer.<sup>10</sup> The artifacts which were recovered from the columns next to the rock were not segregated as to location in the undisturbed strata or in the refilled portion. The volume of the disturbed material is relatively small, however, and no significant error was introduced.

Consideration of these difficulties indicates that the area between the 4N and 9N lines provides the most satisfactory evidence of occupation. Here the floor deposits are from five to six feet in depth and are composed of very fine sand containing much finely comminuted lime. Large rocks were found in many blocks but rock falls were probably cleared away from the central part of the cave during periods of occupation. A full-length profile, from 4N to 10N, is available and cross profiles drawn on the 4N, 8N, 9N and 10N lines are on file. A short profile, drawn about midway between 5N and 6N in square 5NR1, confirms the placement of strata on the west side of the pothole. All profiles have been carefully checked at points of intersection and have been compared in detail with the excavation logs and photographs. No error believed significant was demonstrated.

<sup>10</sup>Drucker, 1939, Field notes, Mss.

## STRATIGRAPHY

### THE FLOOR DEPOSITS

The fine sand which composes the greater part of the floor deposit is derived from the disintegration of the soft pebble conglomerate forming the ceiling and walls. The dry sand is very nearly white but, when damp, the color becomes a buff or light tan. Against this light background, even the smallest amount of charcoal is clearly visible, and this may account for reports of fine charcoal from almost every block excavated. Small amounts of humus were observed near the north end of the cave but the total amount of such material seems insignificant. Dusty appearing laminae within the deposit indicate sorting of the floor deposits by the wind and suggest the possibility of accretions from outside the cave through wind action augmented by small amounts of earth tracked in by animals or man. Soil samples were taken from each block in column 5NR3, and from other locations throughout the site. This sample material however, confirms the observations made during excavation, which were that additions from outside the cave were relatively small in quantity.

Modification of this matrix of light-colored sand by inclusion of charcoal and ashes of wood fires within the cave is apparent. During an occupation period, fine charcoal and ash would be trampled into the light-colored sand around the hearth. An over-night camp fire, then, might be represented by a thin lens only a few feet larger than the fireplace itself. A long occupation, or a series of camps at frequent intervals, would result in the trampling of charcoal into the floor to a considerable depth and, perhaps, as far as the walls and ends of the cave.

In vertical profile, the floor deposits show clearly the situation just discussed (Figs. 4 and 5). The matrix of light sand is held within the walls and ends of the cave and above the relatively tight conglomerate which seems to represent the original floor. Within this matrix a series of charcoal-darkened lenses can be outlined, usually thicker near the center of the cave and tending to become thin or even to pinch out before they reach the walls. In most cases the lenses are separated by relatively clean matrix, but the color of the different lenses varies enough for ready identification, where lenses are in contact. The difference in color between the lenses seems to be due to mixtures of varying proportions of charcoal,



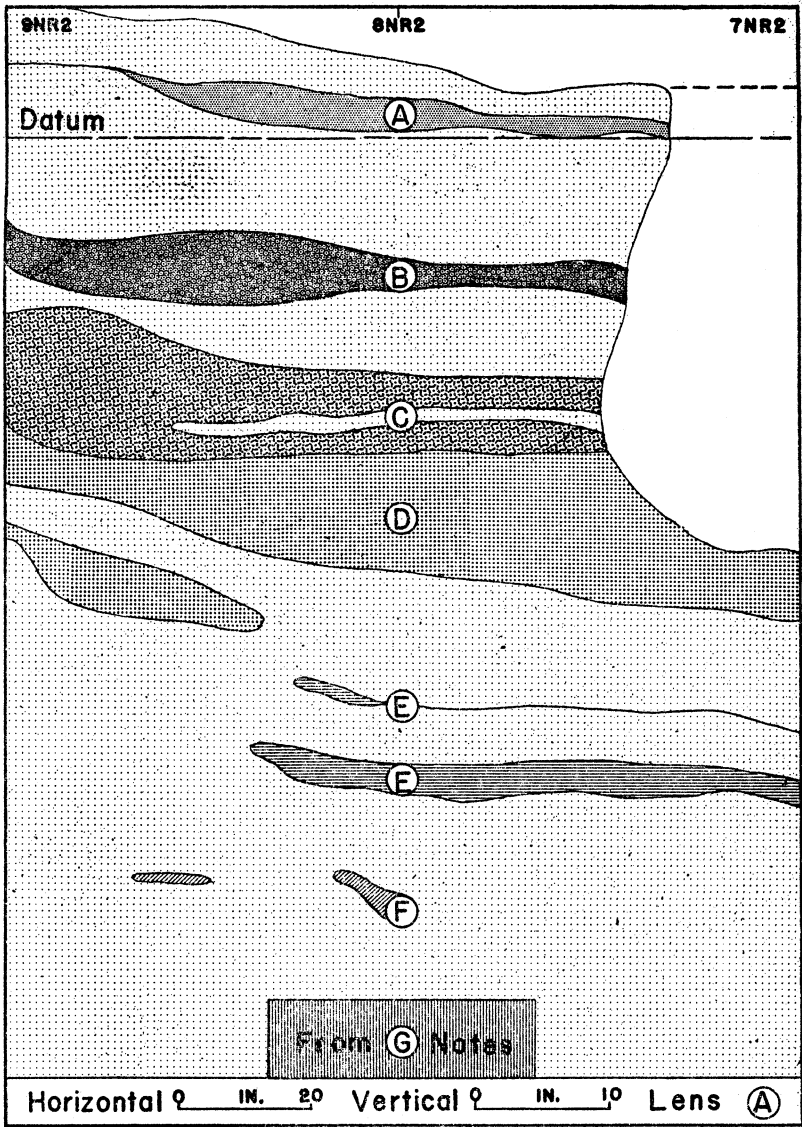


FIG. 4. VERTICAL SECTION FROM 9NR2 TO 7NR2.

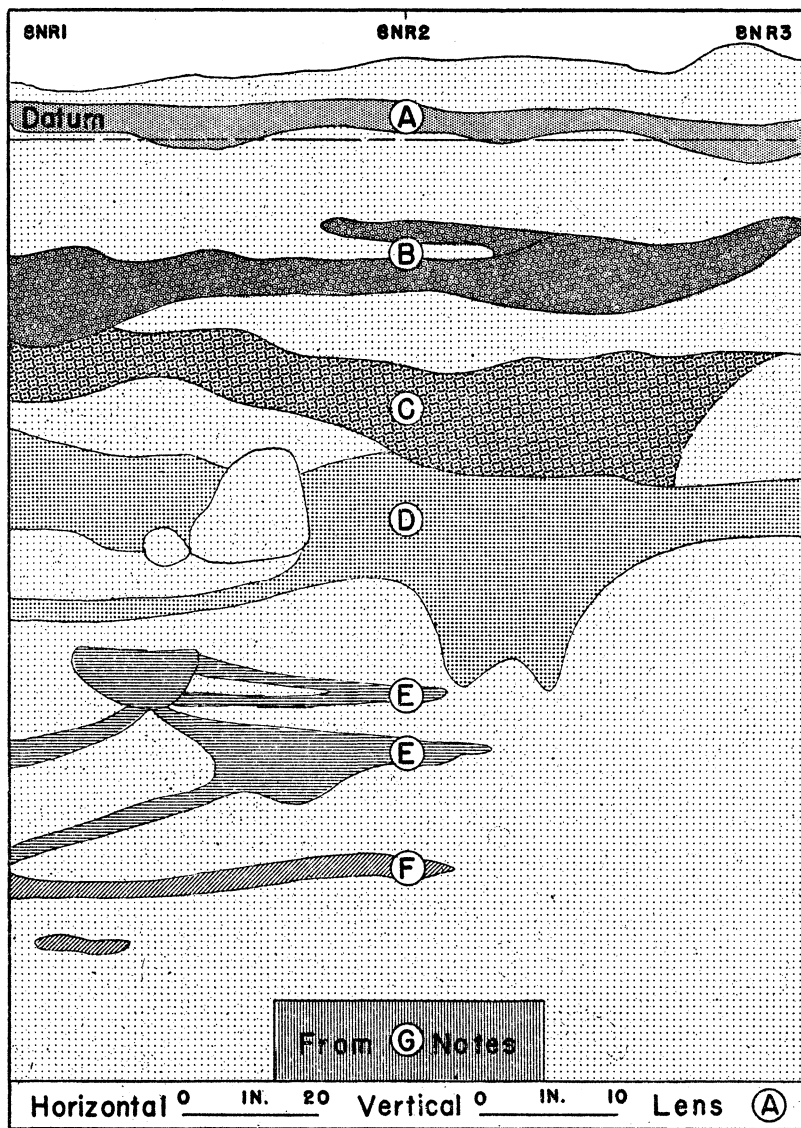


FIG. 5. VERTICAL SECTION FROM 8NR1 TO 8NR3.

white wood ash, and the buff sand. Lenses which contain basin-shaped fireplaces show much more white ash, while an extremely dark layer may represent a people who built camp fires on the surface and so, with less complete combustion, produced more charcoal and a darker occupation lens.

The lenses which can be identified in the profiles probably represent occupations of some duration, but it should not be assumed that these occupations necessarily were continuous during the period indicated by a lens, or that only one group of people was represented in the occupation. Indications that the cave was better adapted to temporary rather than permanent habitation have already been introduced and this suggests that alternating occupation by different peoples is highly probable. Identification of different components, in such cases, would depend on the presence of diagnostic artifacts, and evidence of this kind was reported from the cave.

The presence of these well-marked lenses, however, does not exclude the possibility of less easily distinguished occupations between the major lenses. Small amounts of charcoal are reported from nearly every block. The greater part of this distribution may be attributed to rodents and other burrowing animals. Some of the charcoal deposits, however, must be the result of very short occupations for which the only evidence is a few flint chips, some fragmentary bone or occasional bits of charcoal.

The fact that the floor deposits are contained within the matrix, often without reaching to the walls, affords excellent evidence that the original order of deposition of the lenses is undisturbed. The fine sand of the floor deposit is compact enough to stand in a vertical face while damp but any movement of this material would immediately break up the continuity of the lenses as shown in vertical profile. It was possible, however, to identify and to draw profile maps of the lenses over much of the cave. These profile maps are confirmed, in turn, by photographs and by the excavation logs, hence disturbance of the order of deposition can be ruled out and the lower of any two strata may be considered the older.

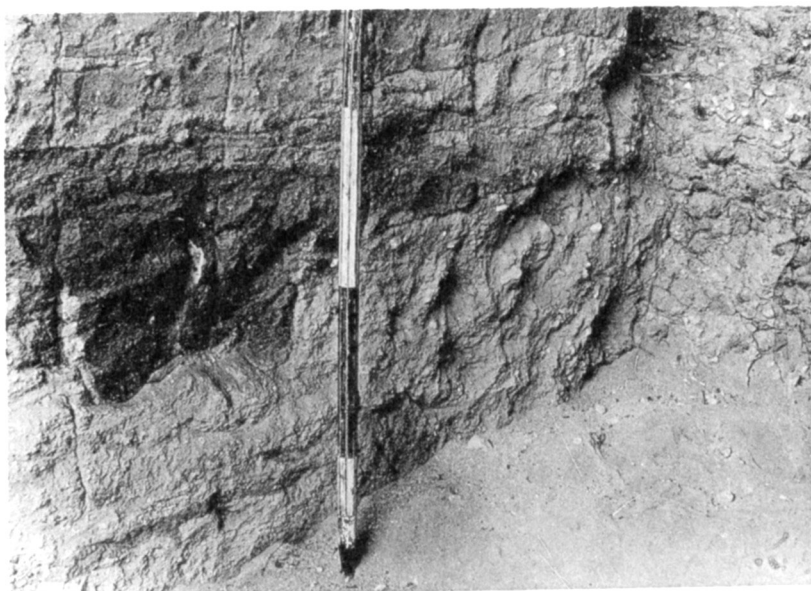
The general nature of the lenses and the order of their succession can be demonstrated conveniently by the intersecting profiles at 8NR2 (Figs. 4 and 5). All of the important lenses are clearly shown at this point and the intervening matrix has not been trampled out so much as it has been near the center of occupation. The thickness of the lenses and of the intervening matrix varies throughout the cave, but the depths at 8NR2 represent a fair sample.

The true surface of much of the cave floor is not known since it had been covered by the "back dirt" from the pothole and could only be approximated in clearing this dirt away. Other agencies have added to the unreliability of the topmost material. The cave overlooked a busy spot on the Oregon Trail; soldiers were stationed at near-by Fort Grattan for a short time, and picnic parties have entered the cave for many years. Near 8NR2, however, a layer of clean sand about three inches thick is shown on the profiles and reported in the notes. This relatively clean stratum, which shows little disturbance since deposition, is immediately above a darker layer described as Lens A.

#### LENS A

At 8NR2 (Figs. 4 and 5), Lens A is shown as a stratum of dark sand two inches thick lying just above datum. The lens may be traced across the profiles from 9NR2 to a point south of 5NR2. It is well represented in rows R3 and R2, but it is much thinner in row R1. On the west face of column 6NR3 the lens extends down to a point about 6 inches below datum, where a fire pit is shown. The sand is much darkened with charcoal, and abundant cultural detritus is included. Some fifty potsherds, of Dismal River type,<sup>11</sup> identify the major occupation. Scrap metal, glass and a few artifacts are reported from the matrix above Lens A, and from the upper part of the lens itself. Much of this material is evidently late, and a few items may be the remains of some Indian group, quite probably the Dismal River people, since metal has been found in their sites elsewhere. Disturbance of the upper levels, however, makes any such assignment dubious, and for that reason, all material of European manufacture has been considered in a special group. Immediately underlying Lens A, at 8NR2, is some six inches of relatively clean matrix. A few of the Dismal River sherds attributed to Lens A were found in the upper inch or two of this material. A number of these sherds could be fitted to those actually included in Lens A and, for that reason, the entire lot has been attributed to that lens. At six inches below datum a fireplace is shown on the profiles with an inch of matrix between it and Lens B at nine inches below datum. The excavation logs, however, make no mention of such a feature and it may be disregarded so far as identification of lenses is concerned.

<sup>11</sup> Hill and Metcalf, 1941, pp. 179-185, 206, 210.



*Top*, LENS D SHOWN IN THE SOUTH FACE OF COLUMN 8NR3

*Bottom*, LARGE ROCKS AT THE NORTH END OF THE CAVE



a



b



c



d



e



f

DISMAL RIVER TYPE POTTERY FROM ASH HOLLOW CAVE

### LENS B

Lens B is about two inches thick at 8NR2 (Figs. 4 and 5) not including the firebed mentioned above. The lens is well represented throughout the cave, more often from four to five inches in thickness, and very nearly level. A number of basin-shaped fireplaces with white ash filling are described and a substantial yield of artifacts is recorded. Typical Upper Republican sherds were found in the lens, as well as a new type of pottery whose possible affiliations will be discussed later.

The matrix below Lens B at 8NR2 is about seven inches in thickness but it does not appear near the north end of the cave where lenses B and C are in contact. In the profiles for the west face of 6NR3, a fireplace is shown in the matrix and slightly above Lens C. This is described in the logs as a typical basin firepit filled with white ash with well-burned red-brown earth beneath. It is probable that this feature should be associated with the lens below and that the upper margin of Lens C, as shown, is too low at this point.

### LENS C

The upper margin of Lens C, under stake 8NR2 (Figs. 4 and 5), is 17 inches below datum and the lens itself is about seven inches thick. The north-south profile shows a thin stratum of clear matrix near the middle of this lens, but this is not recognized in the east-west profile nor is it specified in the log, although there is a suggestion of a lighter seam within the lens. The description for the north sections is "darker sand, some charcoal," but Lens C appears in column 5NR3 as a definitely light colored stratum, probably resulting from a heavy admixture of the white ash from the basin fireplaces (Pl. 4, bottom). A considerable quantity of charcoal and camp detritus is contained within the lens. The most abundant sherd type is Upper Republican, but other and very different ceramic types are present. A few typical Woodland sherds are regarded as migrants from Lens D which is in contact and just below Lens C.

### LENS D

Lens D is immediately beneath Lens C and in contact with C over much of the floor area. The upper margin of Lens D is 25 inches below datum under stake 8NR2 (Figs. 4 and 5) where it is nearly eight inches thick. Large amounts of charcoal make the lens readily identifiable throughout the deposit. It extends from the 4N to the

10N line and from the back wall to the fallen slab, and out of the entrance-way north of the slab. Pottery and other artifacts are abundant, with Woodland sherds in the majority. New pottery types, however, indicate occupations other than Woodland. This lens apparently includes the most intensive occupation of the several lenses. Certain features merit special attention. The lower margin of the lens is very irregular probably due to the digging of pits, as shown in Plate 5, bottom. This is in marked contrast to the other lenses which lack evidence of pitting. The lens itself may be divided into an upper and lower level by a relatively clean lens associated with a rock fall which appears some thirty inches below datum in the west profile of 6NR3. There seems to be some tendency for the pottery to be more abundant in the upper portion. The abundance of charcoal and the lack of the well-defined basin fireplaces found in lenses B and C, seem noteworthy. Hearths are described for the lens but they lack the shallow basin filled with white ash and the red burned earth below. These observations suggest that the Woodland fireplaces are surface hearths rather than the basin firepits typical of the Upper Republican. This agrees with the findings and cultural identifications made at other sites and also accounts for the difference in the lithic character of the two lenses.

Below Lens D the character of the matrix changes. More rubble is reported from nearly every column and the occupation zones are less well defined although there is abundant evidence of habitation on several levels. Artifacts become relatively rare and pottery is absent, except for one sherd which the finder attributes to rodent burrows noted in the same block. Careful comparison of the excavation logs, the profiles, and the artifact records indicates that the various occupation levels may be grouped into three well-defined zones, each one separated from the others by a layer of relatively clean matrix. At 8NR2, the matrix is clean, from 33 inches below datum to 46 inches below, except for a thin brown line near the 42-inch level, shown in the profiles but not important in the logs. This line probably represents the final occupation of Lens E.

#### LENS E

The profiles show a four-inch layer of charcoal-bearing sand at 46 inches below datum under 8NR2 (Figs. 4 and 5). The descriptions in the logs report a well-marked deposit with much charcoal continuing nearly to the 52 inch level over much of the area near 8NR2.



The deposit is clearly shown near this level over the greater part of the cave with greatest intensity of occupation near 6NR3.

Beneath Lens E, at 8NR2, the profiles show clean matrix to 57 inches below datum but the notes indicate that the matrix is only two or three inches in thickness.

#### LENS F

This lens lay along the bottom of the excavations at the time the profiles were drawn, and for that reason is not well shown on them (Figs. 4 and 5). The notes clearly indicate that the zone just below 57 inches below datum contains charcoal, occasional hearths, and a few artifacts. This lens varies in thickness from two to six inches and, in most columns, represents the level just above the tight conglomerate floor. Five columns, however, show material at a deeper level but in these columns there is a definite layer of matrix under Lens F. A heavy mixture of charcoal is noted in one or two spots in Lens F but the lens is thin in most places.

#### LENS G

Five columns near the front and central part of the cave include fireplaces and charcoal underlying clean matrix at depths of from 70 to 75 inches below datum (Figs. 4 and 5). Test pits were driven from two to three feet below the floor in all columns dug so it can be assumed that occupation at this level is confined to the places noted. As much as three inches of charcoal-impregnated sand is reported but, in general, the occupation of this lens seems temporary.

The presence of two points readily identified as Yuma encouraged a careful search for some deep-lying stratum representing a very early horizon. The two points came from levels much higher in the cave and were associated with known pottery types, but the suggestion of an early horizon, from which these points might have originated, was very strong. A member of the party succeeded in working his way under the fallen slab at the front of the cave, but no evidence of a possible Yuma horizon is reported from this effort or from any other tests.

A very large slab, however, lies just to the north of the large rock which blocked up the rock shelter. This second slab may be a part of the roof of an earlier shelter than Ash Hollow Cave, and investigation of the deposits under this slab should be one of the first steps in the search for a Yuma horizon in Ash Hollow.

## DENDROCHRONOLOGY

The excavation techniques described made possible the recovery of considerable amounts of charcoal from the floor deposits. In general, the individual bits of charcoal were small, but items as large as a walnut or larger were saved. In most instances all of the charcoal saved from one block was catalogued under a lot number, which might represent one or several specimens.

In February, 1944, all of the charcoal, 148 lots in all, was turned over to Harry E. Weakly<sup>12</sup> for study. Weakly<sup>13</sup> has reported a sequence developed from non-archeological wood specimens from Lincoln County, Nebraska, which extends from the present to 1480 A.D. and with a little less reliability, to 1420 A.D. This sequence has been recognized by Wedel<sup>14</sup> and has been found useful by Hill and Metcalf.<sup>15</sup> These authors have accepted a date of 1706, which Weakly assigned to charcoal from Ch-1, the type site of the Dismal River Aspect.

A second sequence, not yet published, has been built up by Weakly from wood collected near Redington, Morrill County, Nebraska, which is in the North Platte Valley some two hundred miles west of Lincoln County. Ash Hollow is very nearly midway between these stations, and also in the North Platte Valley, hence especially well located for comparison with both the Redington and North Platte sequences.

When the charcoal was turned over to the tree-ring analyst, it was agreed that the dendrochronological and the stratigraphic studies would be carried on in complete independence of each other until it had been determined that the tree-ring analysis would yield significant results. Each lot of charcoal, whether one or more pieces, carried the block and column designation given it in the field. These were left uncorrected by the laboratory audit previously mentioned. No further information was supplied by the archeologist. The cave was known to be stratified but the actual lenses, as now identified, and their relative positions within the floor deposits, were known only to the writer.

<sup>12</sup> When this study was begun, Harry E. Weakly was Junior Agronomist, University of Nebraska Experiment Substation, North Platte, Nebraska. He has since been appointed Superintendent of the Experiment Station at Newell, South Dakota.

<sup>13</sup> Weakly, 1940, pp. 18-19; 1943, pp. 816-819.

<sup>14</sup> Wedel, 1941, pp. 21, 25.

<sup>15</sup> Hill and Metcalf, 1941, p. 205.

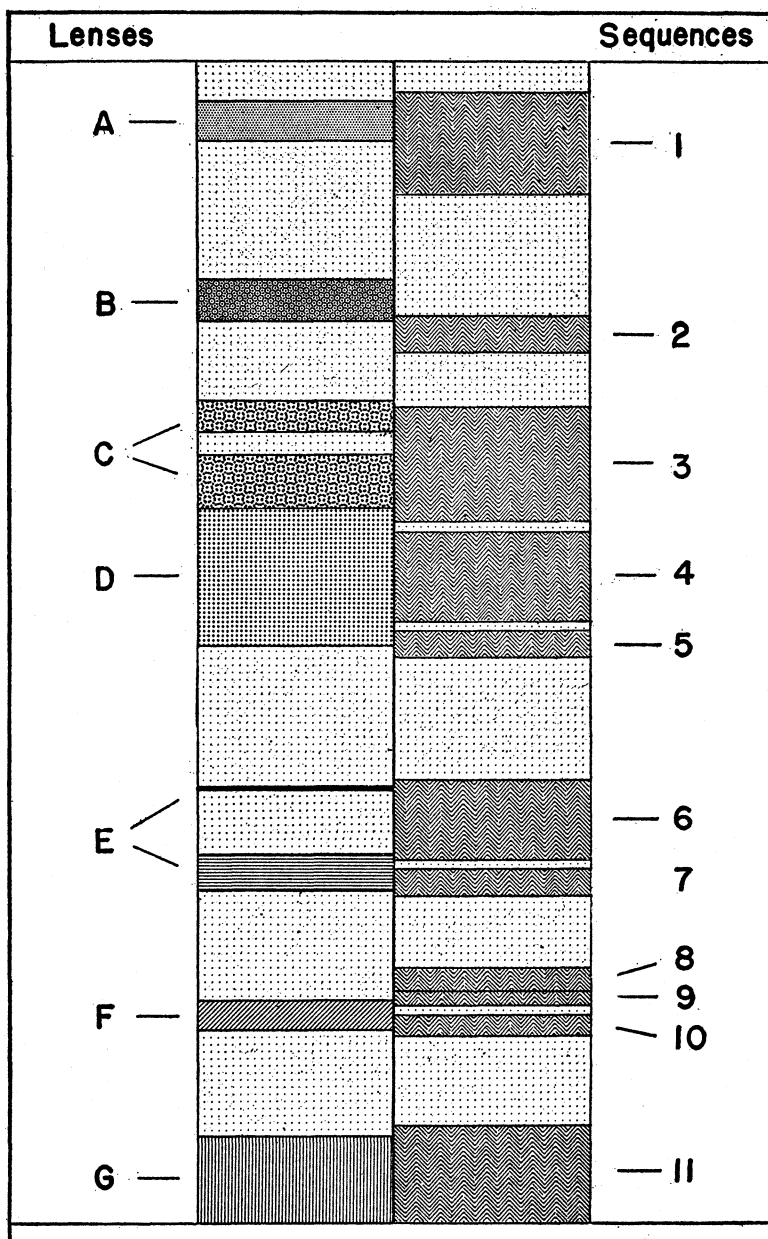


FIG. 6. COMPARATIVE SECTION FOR LENSES AND SEQUENCES.

Study of the charcoal was only possible when the analyst's regular duties permitted, which was, for the most part, during the winter months of 1944-45 and of 1945-46. A preliminary report of specimens from 46 of the 148 lots was made by letters from Weakly to the writer, dated March 22 and April 5, 1945. Careful comparison of the charts of the usable material from these lots led Weakly to postulate eleven tentative sequences separated by ten gaps of unknown duration. A specimen from the sequence made up of material nearest the surface was dated at 1676, plus a few years allowance for outer rings burned away. These data were reworked by the archeologist, the corrected locations and lens assignments for each lot determined, and the depths were plotted against the actual section under 8NR2, used as an ideal section (Fig. 6). Close correlation between lens and sequence is apparent, although in several cases, more than one sequence corresponds to a single lens. Since these data were independently derived, the correlation of the tree-ring and the stratigraphic sequences provides a strong confirmation of the accuracy of both archeological and dendrochronological observations and inferences.

The terminal date of 1676 and the total number of rings in each of the eleven "floating" sequences postulated in this first report, provided a basis for preliminary estimates of the age of the lenses. Allowances for ten gaps, on purely arbitrary grounds, made these estimates highly speculative for the lower levels. It seemed clear, however, that more work on the charcoal might be expected to do much to close these gaps and to make the dating more certain.

Work on the charcoal during the winter of 1945-46 has made possible the use of data from 93 lots, which now seems to include the greater part of the usable material from the cave. These new data, and the stratigraphic information made available to the analyst, brought about the reduction of the eleven original sequences to seven with excellent correspondence, after 1420 A.D., with the Redington sequence.

Sequence I corresponds to Lens A, and is dated from 1587 to 1684, plus an allowance of some 20 years for missing rings. A gap between Sequence I and the combined sequences II and III is bridged by the Redington material, while the two sequences together extend from 1517 to 1210 A.D. The Ash Hollow sequences then seem to extend published dates for the area to a date more than two hundred years earlier, but, for the present, no overlap with the earlier sequences is possible.

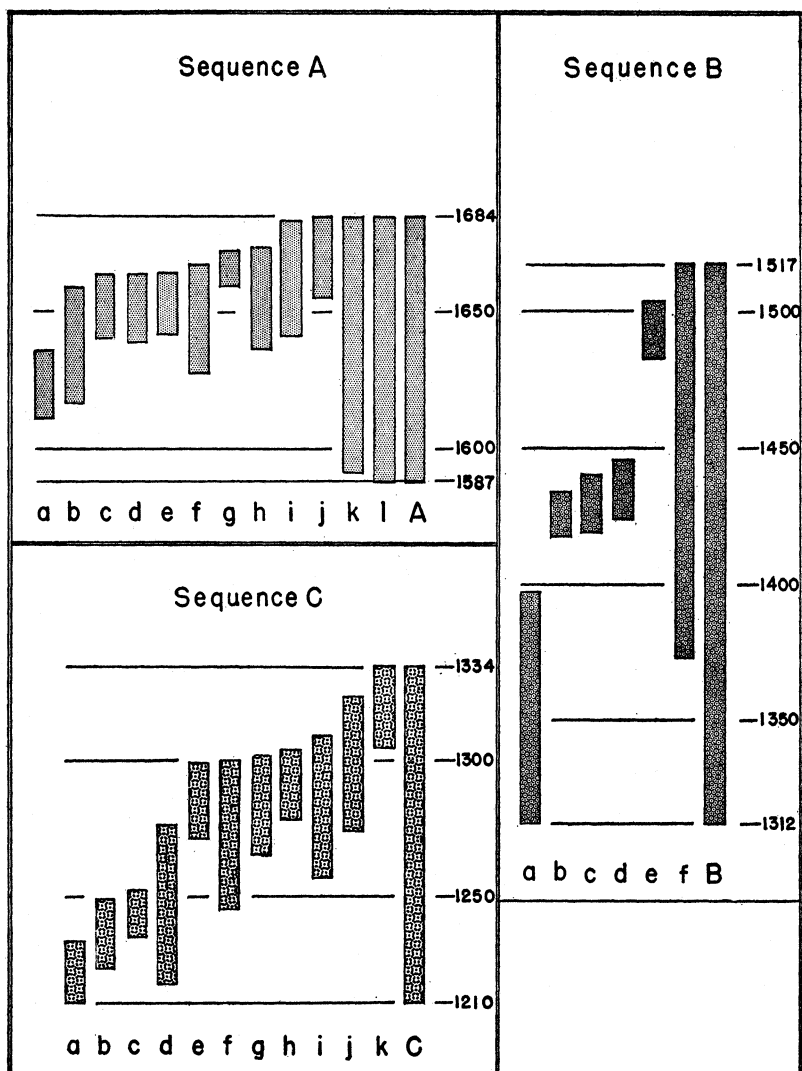


FIG. 7. THE TREE-RING SEQUENCES FOR LENSES A, B, AND C.

Sequences IV and V are now combined into Sequence D, associated with Lens D and now 154 years in length. Sequences VI and VII have been united as Sequence E, of 246 years; sequences VIII, IX, and X become Sequence F, 102 years long, while Sequence XI, now 86 years, becomes Sequence G but remains relatively unchanged.

Each of these newer sequences will be presented in a chart showing the items which make up each sequence,<sup>16</sup> and the implications of these data will be discussed briefly. The preliminary nature of this material can hardly be over-emphasized but the importance of even a tentative dating of the lenses, and of the cultural complexes identified, may justify this first statement in connection with the present study. A full report of the dendrochronology of this material is planned for the near future, together with other tree-ring data for the western Central Plains. Changes in the detail of the present sequences are to be expected, but neither the tree-ring analyst nor the archeologist now expects significant changes in the dating of the Ash Hollow charcoal.

#### SEQUENCE A

Sequence A is made up of twelve items from nine blocks. Three items come from blocks containing matrix over Lens A; eight items derive from six blocks within Lens A, and the last lot comes from a column in which Lens A is not definitely represented. Dismal River sherds lay just below nine of these items, two charcoal specimens were directly associated with Dismal River pottery and the one remaining is the doubtful occurrence already mentioned.

Consideration of the bar chart (Fig. 7, Sequence A) shows that two items, from widely separated blocks, include almost all of the lens sequence. These items are supported, in the later half of the sequence, by the other ten specimens. Except for one item, all of the terminal dates fall after 1658 and four of them come at the very end of the sequence. If a few years are allowed for missing rings on the outside of these specimens, the most probable dates of occupation would seem to be from 1675 to 1705.

This sequence stands alone so far as the Ash Hollow data is concerned, but fortunately it can be cross-matched with Weakly's Redington sequence. This matching permits the dates already given and also bridges the gap between Sequence A and Sequence B, from the lens just below.

<sup>16</sup> See also Weakly, Appendix I to this paper.

### SEQUENCE B

Sequence B (Fig. 7) is made up of six items from six blocks and covers 205 years. It is made possible by the very satisfactory overlap of two large items, which are supported, to some extent, by four shorter pieces. Cross-matching with the Redington sequence is satisfactory, adding some further support and extending the Redington data backward to 1312.

Direct pottery associations are not clear; a Dismal River sherd is reported from one block and a typical Upper Republican rim occurred in another.

### SEQUENCE C

Sequence C (Fig. 7) covers the time period from 1210 to 1334 A.D. and so overlaps 22 years on Sequence B. Although this is not a long overlap, the matching is described as of a very high order and entirely convincing to the analyst.

Eleven items are included in the sequence, and these vary from 22 to 68 years in length. No single specimen spans the entire time period but there are three to six items for any particular year in the sequence, except for a few years at the beginning and end.

Direct associations with Upper Republican pottery occur in five of the eight blocks represented. Two lots are from blocks just above pottery of this kind, and one association with type X ware is noted from a block laid down late in the occupation. The evidence is too meager for more than a suggestion of the occupation date, but the terminal dates show that it must have been after 1255. Since seven of the eleven specimens terminate after 1298, an estimate of 1300 A.D. for the occupation seems conservative.

### SEQUENCE D

Sequence D (Fig. 8) covers 154 years and includes 26 items from 15 blocks. It was impossible to match any of this material with the preceding sequence although the time gap so indicated need not have been very long.

Pottery associations are noted for six of the 15 blocks, all of these are Woodland with two exceptions. An Upper Republican sherd is reported from a block which intersects both Lens C and D, and one block contains eight sherds identified as type Y. Eleven of the blocks were within Lens D, one block included both C and D, two contained matrix below Lens D, and one lay in matrix nearly twelve

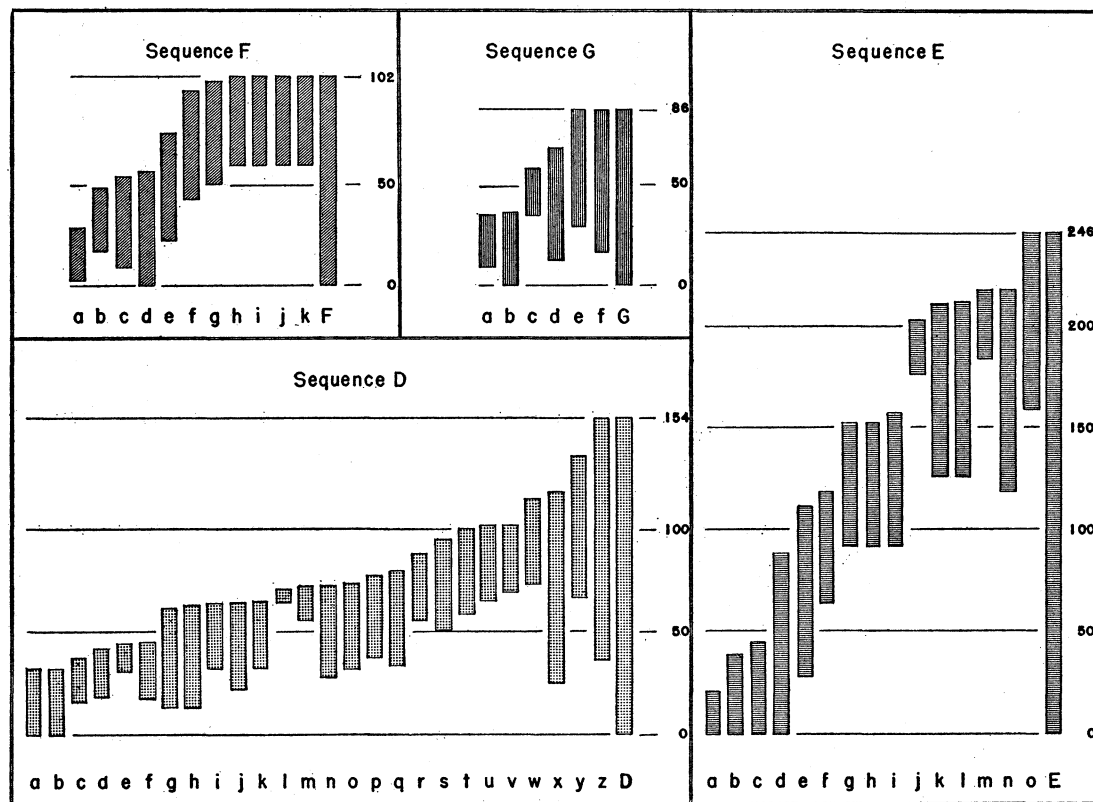


FIG. 8. THE TREE-RING SEQUENCES FOR LENSES D, E, F, G.



inches below the bottom of Lens D. This last occurrence may be the result of pitting of the type shown in the west face of column 5NR3 (Pl. 4, bottom).

The analyst notes that there is evidence of drouth in the ring patterns near the close of Sequence D. This fact may explain the complete break which is apparent between Sequence D and the long sequence from 1210 to the present. It is also of some importance to theories which involve the possible relationships between the Woodland and Upper Republican manifestations in the Central Plains.

### SEQUENCE E

Sequence E (Fig. 8) includes 15 items from ten blocks, extending 246 years. No pottery associations occur in these blocks. The individual specimens are of good length and cross-match well so that the sequence seems well supported except for a few years near the fifty-year mark covered by only two specimens.

Five of the ten blocks are from Lens E, four include matrix with Lens E and one specimen is from the matrix several inches above Lens E. This lens, however, is some twelve inches below the bottom of Lens D over much of the cave, so this one migrant item does not seem significant.

Several very early occupations are indicated, followed by one in or just after year 225 in this sequence.

### SEQUENCE F

Sequence F (Fig. 8) includes 102 years and is made up from eleven specimens from five blocks. There were no pottery associations. The sequence itself seems well supported and there are some suggestions of two occupations, one near year 60 and the other at the end of the occupation of the lens. Stratigraphically, this lens is well separated from either Lens E above or Lens G below, but there is no ready means of estimating the time intervals which correspond to the strata differences.

Five of the six blocks were within Lens F and one block included matrix above the Lens F stratum.

### SEQUENCE G

This last short sequence of 86 years (Fig. 8) is derived from three blocks just above the tight conglomerate forming the original floor of the cave. Six items are reported with satisfactory cross-dating for

the entire sequence. Two or perhaps three occupations are indicated for the lens, probably occurring after year 40.

Some comment is needed regarding the wood from which this charcoal is derived, and also of the kinds and amount of variation which might be anticipated.

Much of the charcoal actually used in the sequences is cedar or juniper with occasional items of pine. Juniper has been found unreliable for cross-dating elsewhere<sup>17</sup> but Weakly<sup>18</sup> finds it entirely workable on the Central Plains. He thinks this may be attributed to a different rainfall pattern resulting in very few double rings.

The use of branches as well as stems for cross-dating has been fully discussed by Glock<sup>19</sup> who gave this matter special attention in his study of the Ponderosa Pine.

As a matter of curiosity the rings from three sections of the best branches and those from one section of root were measured and plotted. (Fig. 33). Agreements are fairly good if the nature of the materials is considered. Agreement between root and branches goes so far that practically every crest in one graph is represented in the others. A comparison between figures 33 and 25 shows a fairly good agreement, especially so if the graphs were smoothed. The major features are almost identical, and smoothing eliminates minor details which furnish the discrepancies, not only between the root and the branches but also between these and the stem.

The matter of branches touches the archaeological phases of tree-ring work in two ways. First, the presence of branches in material being dated may explain the occurrence of ring sequences partly out of harmony with the chief record. Therefore it would be well to be able to distinguish branches if possible. Branches are likely to be eccentric, that is, to show a degree of hyponastic development. Second, the more a given amount of tree-ring material contains portions of a single tree, the more localized the possible inferences. Branches or roots add little or nothing to an ecologic record if the stem is available.

The possibility that charcoal from a single lens might show very considerable variation in age has been suggested. On speculative grounds, it would not be surprising to find specimens of wood many years apart in age recorded from a single lens. Such a situation could come about, for example, if wood-gatherers should collect long-dead branches from the ground and include them in the same lot of fire-wood with recently dead twigs pulled from living trees. Great variation in age might be anticipated if the supply of fallen trees considerably exceeded the demands of fire-builders, and the

<sup>17</sup> Glock, 1937, p. 1.

<sup>18</sup> Weakly, 1946, Appendix I.

<sup>19</sup> Glock, 1937, pp. 56-57.

conditions for preservation of down timber permitted great age-differences to develop.

The situation at Ash Hollow, however, argues against such an occurrence. Timber is nowhere abundant within the Hollow and is very scanty, at the present time, within a half-mile of the Cave. It is also apparent that very few fallen branches would remain on the floor of the Hollow near the Cave. At this point, almost the entire width of the canyon floor is an old wash, with banks of sand and gravel that indicate floods of considerable extent and moderate frequency. It seems very unlikely that fallen timber would remain near the Cave for more than a few years at the most.

Perhaps the best evidence relevant to this discussion is provided by the actual records of the charcoal from the lenses themselves. No unaccountably large variations are reported, although almost all of the usable wood has been considered and placed, except for three or four unassigned specimens. It may be assumed, then, that mixing of the type suggested must have been most unusual at Ash Hollow, and that no significant error has been introduced by this means.

## SUMMARY OF STRATIGRAPHY AND DENDROCHRONOLOGY

The first stratigraphic and dendrochronological studies were carried on independently so that they could be used for mutual confirmation if significant results were obtained. Seven lenses were identified by the archeologist and lettered successively from the top down, beginning with A and ending with G. Independent work on the charcoal from the cave resulted in the identification of eleven tree-ring sequences separated by ten gaps. These sequences were numbered from top to bottom, beginning with I and ending with XI.

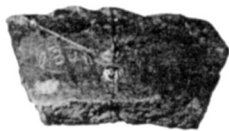
These sequences and the blocks from which the material was derived were carefully compared with the lenses and other stratigraphic data by the archeologist, resulting in the excellent correlation between the two lines of evidence shown graphically in Figure 6. This correspondence was taken as confirmation that both sets of inferences were acceptable, and thereafter work on the tree-ring data was carried on with benefit of the stratigraphic data.

At present, the greater part of the cave charcoal has been examined and it has been found possible to reduce the original sequences to seven. The most recent of these sequences now extends

from 1210 A.D. to the present, after cross-matching with non-archeological wood from Redington and Lincoln County, Nebraska. This sequence includes all of the usable wood in lenses A, B, and C. A minimum suggested date for the Lens C occupation is 1300 A.D. or perhaps a few years earlier. Wood from Lens B covers the period from 1312 to 1517 but the major period of occupation would seem to be from 1450 to 1517. Lens A is datable by comparison with existing sequences, and it appears that the period of occupation is probably from 1675 to 1705 at the earliest.

Lens D is represented by Sequence D, of 154 years. Since there is no matching between Sequences C and D, the occupation of Lens D must have terminated before 1210 A.D. The terminal dates of the 26 specimens in this sequence grade evenly from the year 34 to the end of the sequence, and this may indicate a long time of occupation. An allowance of fifty years for the gap between sequences C and D would seem to be a reasonable one. These fifty years added to the 154 years in the sequence would permit a suggested date of *circa* 1000 A.D. for the beginning of Sequence D, and it is probable that the actual occupation is nearly as long. This estimate for the Woodland occupation seems conservative, but it is interesting to find that this new estimate is almost identical with earlier placements for the Woodland occupation of the Central Plains.

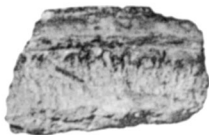
A date for the lower margin of Lens D of 1000 A.D. permits a rough estimate of the age of the three lower lenses, based largely on the relative depths of deposition. Such a procedure is clearly speculative but it seems to be the best inference which can be drawn from available data. The total number of rings from the cave charcoal is 992, and the center of distribution is about the center of Lens D. This point is also near the mid-point of the total floor deposit, which suggests a rough correlation between the depth of deposit and the elapsed time after the earlier part of Lens D. On this basis, the first occupation, indicated by Lens and Sequence G, could be placed not long after 1 A.D., and might be estimated as from 1-100 A.D. The occupation indicated by Lens and Sequence F could then be assigned to the period of 300-400 A.D. and Lens and Sequence E could be placed between 600-850 A.D. Obviously, the exact dates are chosen arbitrarily but the relationship between them is consistent with present scanty data. The four floating sequences seem well established and it is to be hoped that further research in other caves and deposits will supply wood to fill in some of the existing gaps.



a



b



c



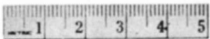
d



e



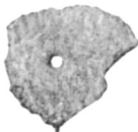
f



g



h



i

UPPER REPUBLICAN TYPE POTTERY FROM ASH HOLLOW CAVE



WOODLAND TYPE POTTERY FROM ASH HOLLOW CAVE

## ARTIFACTS AND OTHER REMAINS

The preceding sections have been devoted to an analysis of the evidence for cultural stratification and it has been found possible to identify seven lenses superimposed within the floor deposit. This identification is supported by the dendrochronological study of charcoal recovered during the excavation of the floor. Some anticipatory comment about the artifact content has been unavoidable. The following section, however, will be devoted to a description of artifacts and other remains under the standard headings, Ceramics, Work in Stone, Work in Bone, and Faunal Remains. The material will be described by types, and distribution charts (Figs. 9, 10, 12, 13) are included to show the disposition of the items throughout the lenses. Two categories have been added to the seven lenses. One is a category C/D, to take care of material from blocks which intersected both lenses making impossible the segregation of the artifacts recovered. The second category is called Lens Unassigned and is identified by the symbol X. Here have been placed surface materials, artifacts found in clearing the old excavations and all other items for which a lens assignment seemed dubious. The charts, then, record all of the identified material returned from the cave, but assignment to lenses has not been forced.

### CERAMICS

TYPE	A	B	C	C/D	D	E	F	G	X	Totals
Dismal River	69	2	1						3	75
Upper Republican	1	16	54	2	8				97	178
Woodland			12	7	18	1				38
R					1					1
S			1							1
T			4		4				2	10
X			3	1	14				1	19
Y			1		12					13
Z	1	1	1						5	8
Totals	71	19	77	10	57	1			108	343

FIG. 9. DISTRIBUTION OF POTTERY TYPES.

Potsherds were moderately abundant in the upper four lenses (Fig. 9). No sherds were found below the lower border of lens D with the exception of one Woodland sherd whose position the finder explained by rodent activity. No restorable pots were found but

three small sherds, from small "toy pots," are reported from lenses C, C/D and D. Several good-sized fragments have been built up by fitting together sherds from various parts of the site and this fitting has been helpful in verifying associations between blocks.

In all, 343 sherds were considered identifiable. Three wares, well known elsewhere on the Plains were observed. Seventy-five sherds, classed as Dismal River, were found comparable to material from the type site of this complex, Ch-1.<sup>20</sup> One hundred seventy-eight sherds of Upper Republican pottery were found, and 38 sherds of a Woodland type of pottery comparable to that reported from site Vy-1 in Valley County, Nebraska.<sup>21</sup>

The remaining 52 sherds have been described under six headings, identified by letters near the end of the alphabet. These seem to be new wares for the Central Plains although two of the types are represented by only one sherd each. The dangers of setting up new types on such scanty evidence are perfectly clear. On the other hand, the differences between these sherds and known Plains pottery types are clear and each kind of pottery merits separate description and discussion (Pls. 6, 7, 8, 9).

### WORK IN STONE

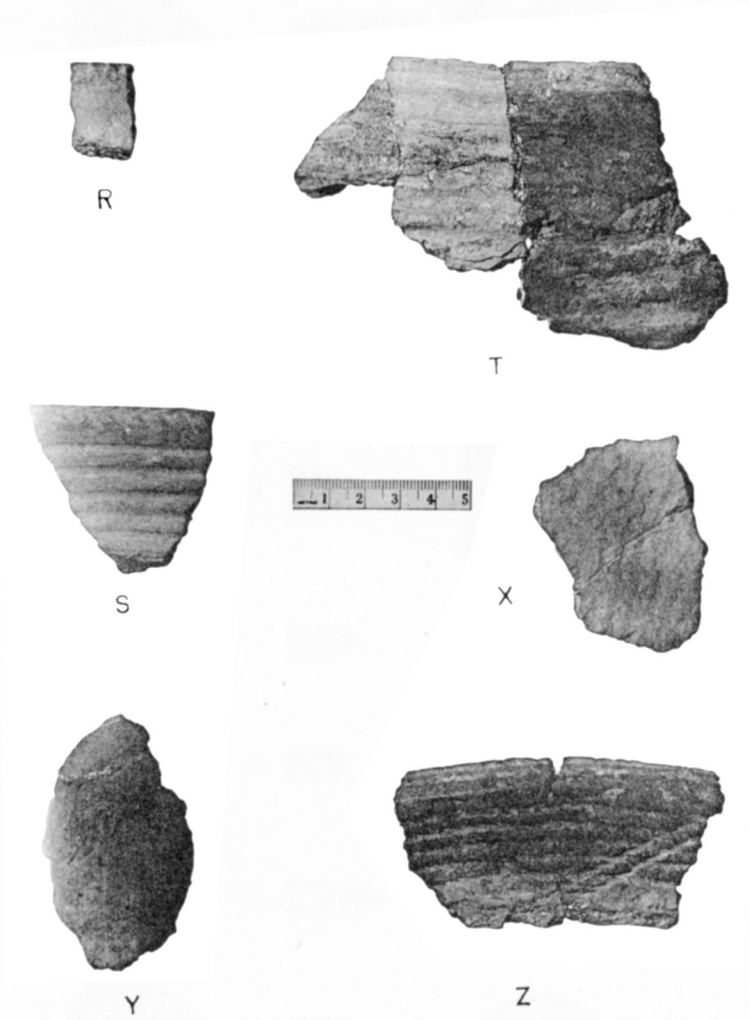
The inventory of work in stone includes 475 items. One hundred and sixty-four of these artifacts have been analyzed as points, although this group includes nine large, leaf-shaped knives. A second group is made up of 97 endscrapers, and the third group includes 44 knives and identifiable parts of knives. The remaining material comprises a large number of flakes slightly modified for use as knives or scrapers and, in addition to these modified flakes, a few fragmentary items whose original shape could not be determined. A distribution chart (Fig. 10) shows the number and type of these artifacts reported from each of the lenses.

The materials from which the stone items are chipped include several kinds of jasper, chalcedony, agate, flint and chert, and less abundantly, sugar quartzite. The last named resembles the quartzite from the Spanish Diggings, which are about two hundred miles west of Ash Hollow. The crypto-crystalline quartzes mentioned are found throughout the Platte gravels and near the Spanish Diggings.

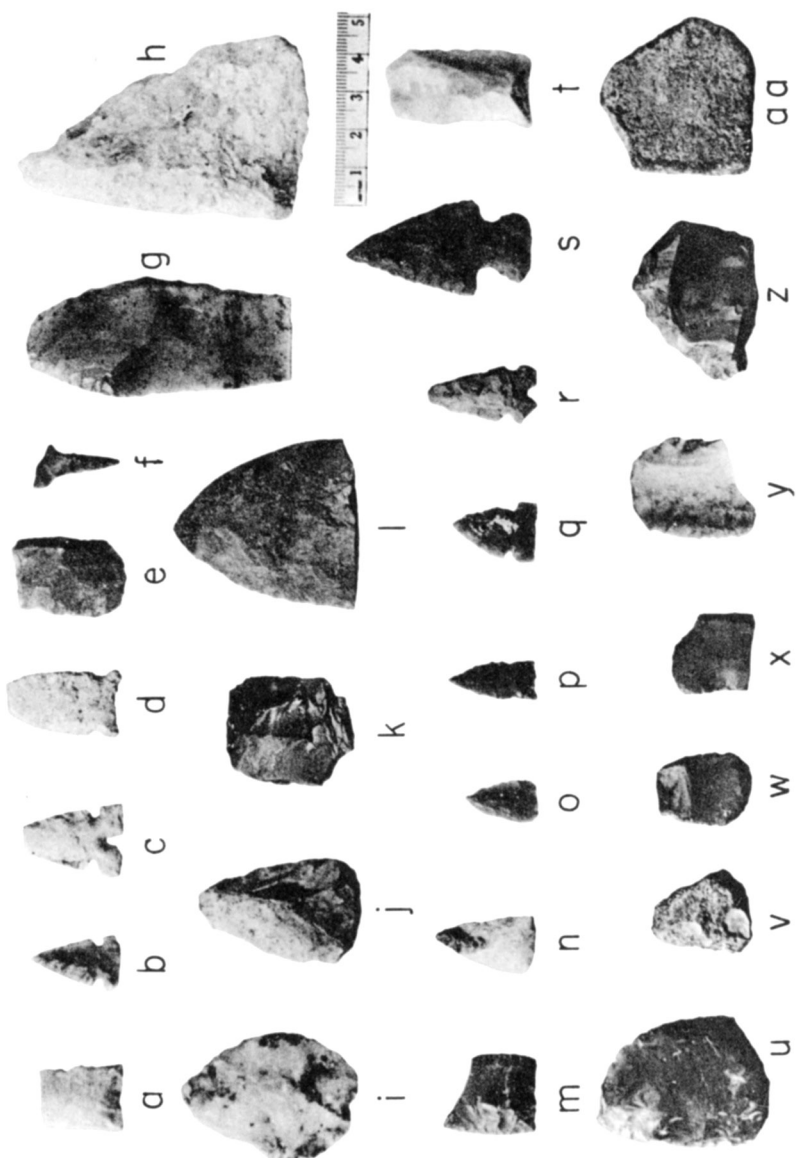
<sup>20</sup> Hill and Metcalf, 1941.

<sup>21</sup> Hill and Kivett, 1940.





UNUSUAL POTTERY TYPES FROM ASH HOLLOW CAVE



WORKED STONE FROM LENSES A AND B, ASH HOLLOW CAVE

This ready availability probably accounts for the relatively large number of artifacts chipped from chalcedony. Hill and Metcalf<sup>22</sup> report obsidian from the Cave, but none of this material was included with the stone turned over for this study.

CHIPPED STONE											
TYPE		A	B	C	C/D	D	E	F	G	X	Totals
Points	NAb1	1				1	4			2	8
	NAb2						1				1
	NBa	5	12	28	6	12	1			10	74
	NBa1	2	3	13	7	7				6	38
	NBa2	1	3	2	2	2	1			2	13
	NBa3			2		2					4
	NBa4		1								1
	NBb1		1							1	2
	ND		1								1
	SBa			1	2	1					4
	SCa1		1	2							3
	SCa2			4		2				1	7
	S										
	SCb1					1					1
SCb2				1	3			1	1	6	
SCb3					1					1	
Totals		9	22	52	19	35	3		1	23	164
Endscrapers		4	7	30	13	18	3	3		18	96
Knives		4	7	8	9	4				13	45
Gravers		1								1	2
Drills		2		1			2			1	6
Modified flakes		10	13	75	9	21	5			29	162
Totals		21	27	114	31	43	10	3		61	311
OTHER WORK IN STONE											
Bead				1							1
Abraders			1	1			1			1	4
Grinding Slabs				1		1				1	3
Paint				1			1				2
Totals			1	4		1	2			2	10

FIG. 10. DISTRIBUTION OF WORK IN STONE.

<sup>22</sup> Hill and Metcalf, 1941, p. 209.

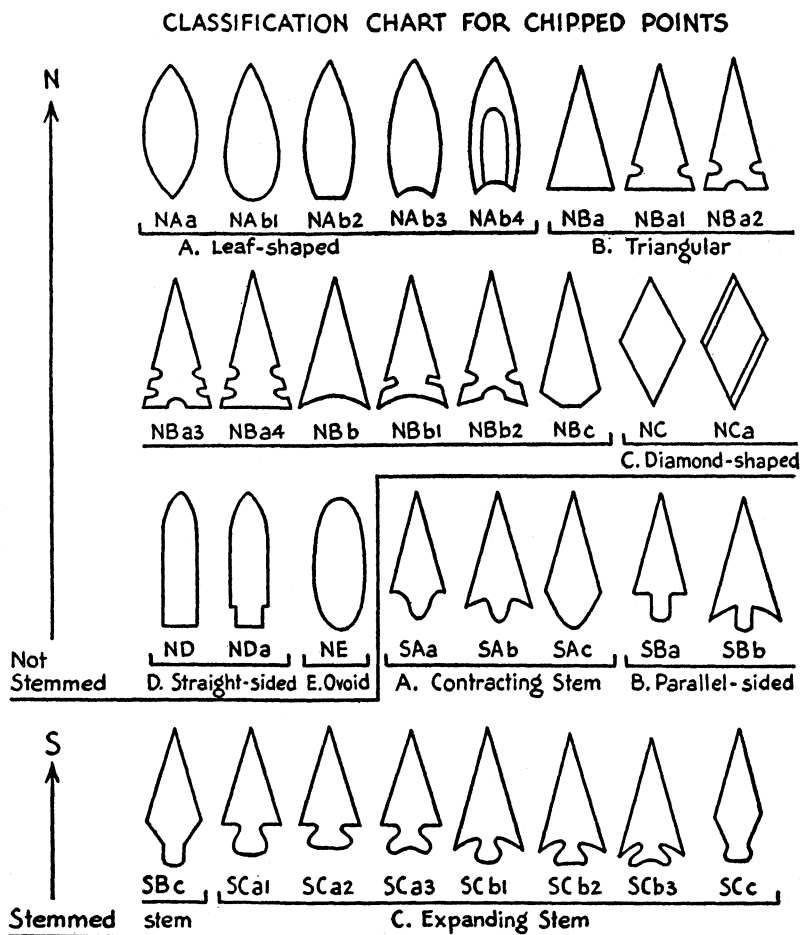


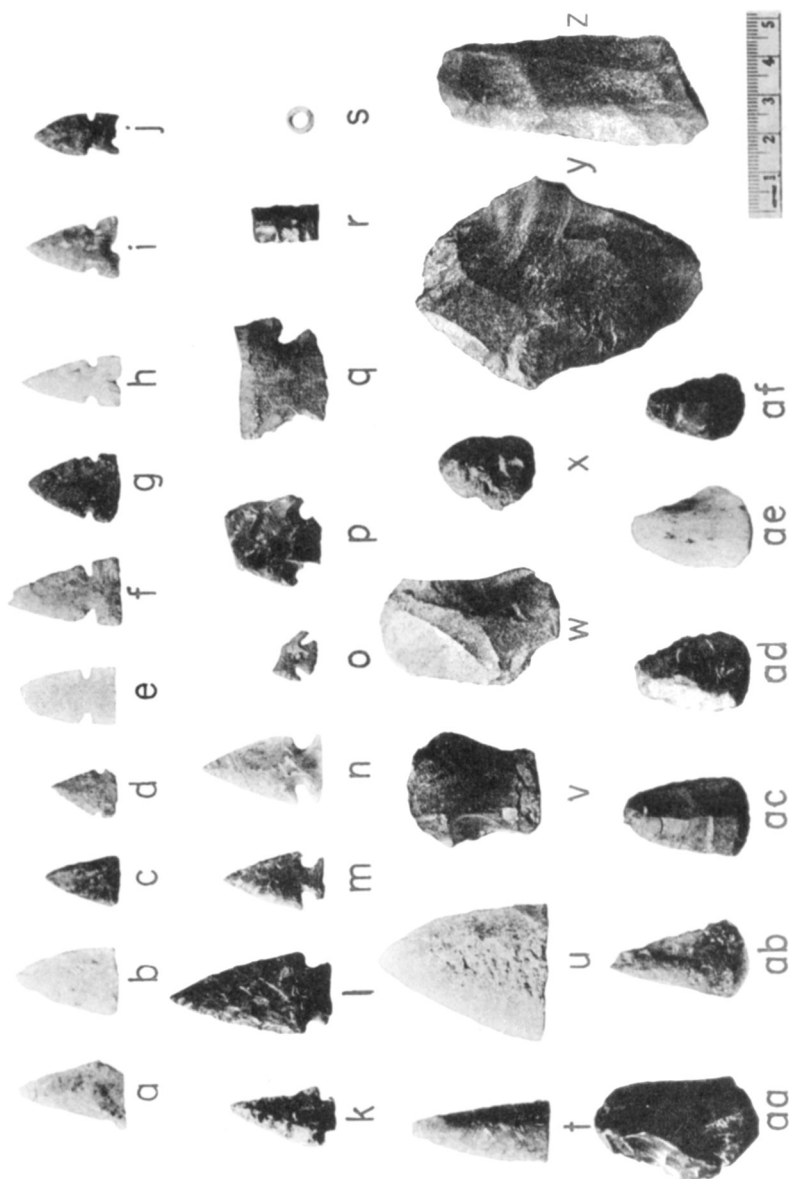
FIG. 11. CLASSIFICATION CHART FOR CHIPPED POINTS.  
(AFTER STRONG.)

#### CHIPPED POINTS

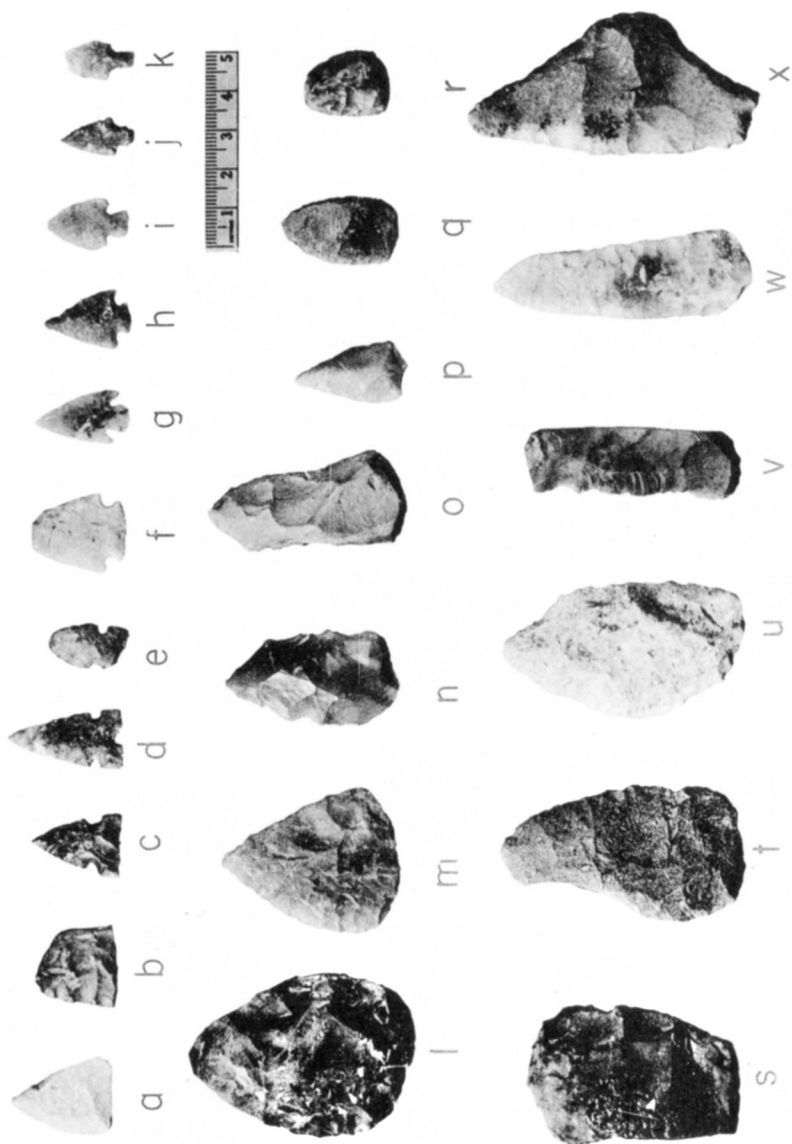
The point classification (Fig. 11) which Strong first applied to Plains material in 1935<sup>23</sup> was used for points and knives for which the original shape could be determined. Fifteen types are recognized, which is comparable to Signal Butte, where Strong found fourteen types of points.<sup>24</sup>

<sup>23</sup> Strong, 1935, p. 89; illustration reproduced by permission of the Smithsonian Institution; Wedel, 1943, pp. 51-52.

<sup>24</sup> Strong, 1935, p. 90.



WORKED STONE FROM LENS C, ASH HOLLOW CAVE



WORKED STONE FROM LENS D, ASH HOLLOW CAVE

Most abundant are points of the NBa series, that is, triangular not-stemmed points with or without side notching. These points appear in all lenses but Lens G and they are greatly in the majority in lenses B, C, and D. Stemmed points of the SB and SC series are found in the same horizons with one representative in Lens G. A slightly larger percentage of stemmed points appears in Lens D but the relative number of stemmed points is much larger than would be expected from Strong's<sup>25</sup> chart covering his early investigations in Nebraska.

In general, the points are of types commonly found in sites on the Central Plains, except for two specimens which deserve separate mention. The first item (Pl. 13, m) is a beautifully made chalcedony point found in the 12-15 block in column 5NR1, and attributed to Lens B. This point is ND in outline but it is shorter than the points usually so classified. It measures 22 x 35 mm., with a slightly concave base, and a little basal thinning. The chipping is in ribbon flakes, 3-4 mm. wide, placed slightly oblique to the longer axis of the point. It falls well within the range of variation of Yuma points and except for its stratigraphic location would be so classified without question.

A second example, (Pl. 13, n) also identifiable as Yuma, came from material which caved from the southwest corner of column 9NR3. This caved material came from 23 inches below datum to 54 inches below datum, which includes lenses D and E and the intervening matrix. The artifact is of brown jasper, with excellent ribbon flaking perpendicular to the long axis. It resembles the central portion of a long Yuma point with the point and base missing. The flake scars on the point seem worn as though the point had lain on the surface and been subjected to sand-blasting by wind action.

The stratigraphic placement of these items in Ash Hollow indicates an antiquity of not more than a thousand years rather than the several millennia usually estimated for Yuma points. No other items from the site, however, have the characteristic ribbon-flaking although much of the chipping is extremely well done. Other finds of Yuma points have been reported from Garden County and the surrounding area, so it seems reasonable to attribute the presence of these items in late horizons to the activities of aboriginal collectors of unusual arrow-points.

<sup>25</sup> Strong, 1935, p. 90.

Finally, the relatively large number of broken points should be mentioned. More than half of the total number were damaged, and it is noteworthy that the base is the part most often found. All of the blocks were screened and all of the material recovered was brought to the laboratory for examination. This lack of selection may account for the appearance of more than the usual number of broken specimens. An alternative reason may be that the occupants of the cave were accustomed to exchange damaged points for new ones while in the cave and the points recovered are the broken parts discarded in this exchange. The rather large amount of small flint flakes supports this theory, since these flakes would be the residue from the making of new points for replacements.

#### ENDSCRAPERS

Endscrapers are well represented in all lenses except Lens G (Pls. 10, 11, 12, 13). The scrapers are small to medium in size. They range from 20 to 50 mm. in length, with those from 25 to 40 mm. long most abundant. They are characterized by a plane or slightly curved undersurface and a dorsal keel varying from low to medium in height. Large high-keeled specimens are absent. The later specimens seem to be made from flatter flakes with little or no keel and to be somewhat smaller in all dimensions. The scrapers from Lens C (Pl. 11) give the impression of first-class workmanship, while those from Lens D (Pl. 12) are not so well made and seem much more variable in design. The endscrapers are, in general, the kind found on all Plains sites and no unusual types were observed.

#### KNIVES

Much of the material included in this category appears to be fragments of well-chipped knives. The broken points of such knives are common and an oval or diamond shape seems most likely for the complete implement (Pls. 10, 11, 12, and 13). No explanation seems obvious for the considerable number of knife points and other fragments although only a few undamaged specimens are reported.

The fragments show well-done bi-face chipping to a straight edge and evidence excellent workmanship. The items reported are rather evenly divided among lenses A to D inclusive but none were found in the three lower horizons. A large knife, with alternately beveled edges but nearly oval in outline, was found in Lens B. It appears to be a crude "Harahey" type. A long slender flake of chalcedony, beautifully chipped as a knife, was found in Lens D. A good example



of the alternately beveled diamond-shaped form, called the "Harahey" knife (Pl. 13) is included in the material to which no level is assigned. Two semi-lunar flakes (Pl. 13, s), reminiscent of "ulus" or a kitchen chopper blade are included in this same material. The stone from which these items are made is the familiar chalcedony dike material, and it may be that the semi-lunar shape resulted from sharpening one side only of a fragment of this material. As in the case of the endscrapers, all items found are of well-known types and nothing unusual is to be reported.

#### DRILLS

Expanding base drills are represented by six specimens (Pl. 10, s, f; 13, f, g; fig. 10). They are well made but in no respects unusual.

#### GRAVERS

Two specimens are classified as gravers. One is made of a fragment of agatized wood on which a small point has been chipped. The second item is a small flake with one end retouched into a rather sharp point.

#### BEAD

A small disk bead 12 mm. in diameter and 4 mm. thick is an unusual specimen (Pl. 11, s). The bore is 4 mm. in diameter and the workmanship of the specimen is excellent. It was recovered from Lenc C, and in appearance is much like the shell beads reported from the Marshall ossuary by Strong.<sup>26</sup> It is almost identical with a stone bead figured by Cooper.<sup>27</sup>

#### ABRADERS

Four items are classed as abraders. They are objects of fine grit with evidence that they have been used as rubbers, but they have no distinctive form (Pl. 13, h).

#### GRINDING SLABS

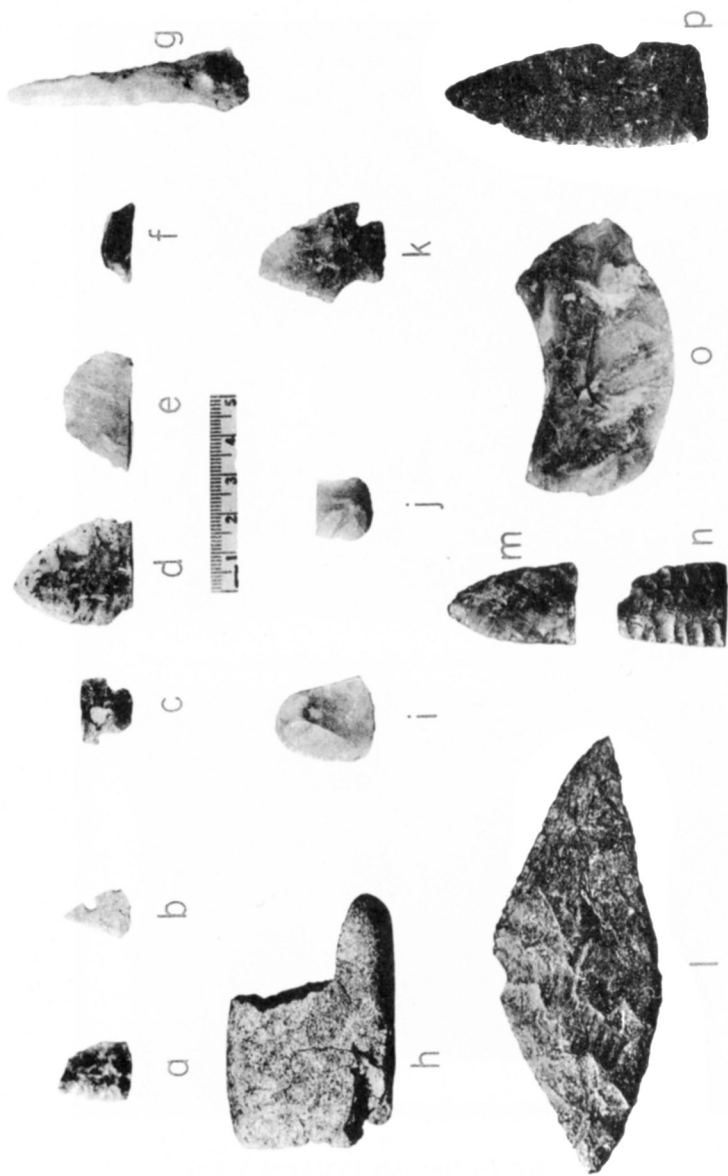
Three slabs with plane surfaces showing considerable use are called grinding slabs. They are stones which might serve as grinders during a short residence and then be discarded.

#### PAINT

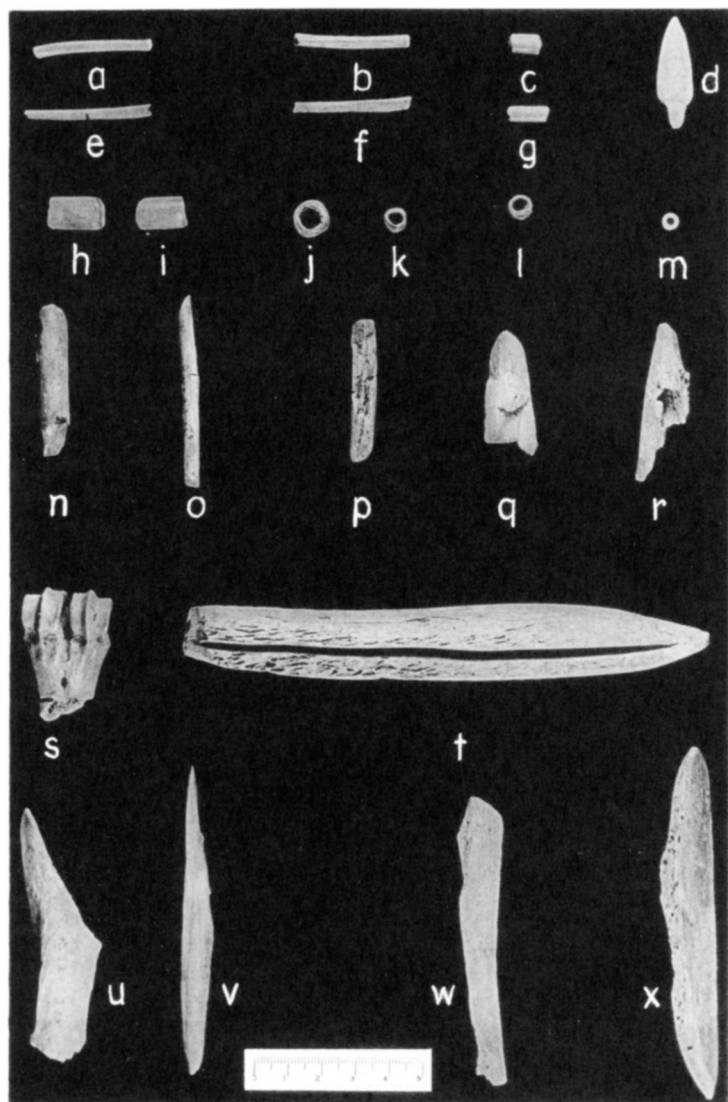
Lump hematite was reported from lenses C and D.

<sup>26</sup> Strong, 1935, Plate 11, 2c.

<sup>27</sup> Cooper, 1936, p. 144, plate XXXIV, no. 4.



WORKED STONE FROM LENSES E, F AND G AND UNUSUAL STONE  
ARTIFACTS FROM ASH HOLLOW CAVE



WORKED BONE FROM ASH HOLLOW CAVE

## WORK IN BONE

TYPE	A	B	C	C/D	D	E	F	G	X	Totals
Arrow point	1									1
Beads, short	3	2	4		5				1	15
Beads, long						4			1	5
Flakers	2		1		2				2	7
Awls			4	2		1	1			8
Pick, Ulna	1									1
Miscellaneous		3	2		2		2		1	10
Totals	7	5	11	2	9	5	3		5	47

FIG. 12. DISTRIBUTION OF WORK IN BONE.

Worked bone was found in all of the lenses (Pl. 14; fig. 12) but was nowhere abundant. Beads proved to be the most common artifact, but awls, perforators and flaker tips were represented. Larger items, especially bison scapula hoes, were absent.

## BEADS

Twenty beads were found, as well as a longer section of hollow bone, probably some kind of bird, which may have served as source of material for manufacture of beads. The beads themselves may be sorted into two groups. The first of these (Pl. 14, n, m), is made up of short sections of hollow bone, in which the length of the bead varies from one to three times the diameter. The second group (Pl. 14, a, b, e, f), includes several specimens of smaller diameter, where the length is nearly ten times as great. One specimen, from Lens C, however, is only three mm. long by five mm. wide and can be classed as a disk, rather than tubular bead. In general, the short beads are found in the ceramic lenses, and the four beads reported from Lens E are all of the long type.

## POINT

One bone point, of a new type, was reported from Lens A (Pl. 14, d). The point is thin and flat, and may have been made from a rib since the cancellous bone can be seen on one side. The point is 41 mm. long, 11 mm. wide and 2.5 mm. thick. It is entirely unlike any other point so far reported from the Central Plains.

#### AWLS AND PERFORATORS

Five well-made awls or fragments were found in Lens C and these items, with one awl shaft fragment from Lens E, include most of the really well-made artifacts of this kind from the cave. Crudely made awls or perforators (Pl. 14, u-x), however, are reported from all of the lenses except A and G. These crude implements give the impression of somewhat temporary use, and may represent makeshift tools used under emergency conditions.

#### FLAKERS

Three tips of tine, probably deer, and one fragment of bison bone shaped much like a flaker tip are reported. Two items each were found in lenses A and C.

#### PICK

An ulna, identified as bison, showing some evidence of wear at the tip is classified as an ulna pick. It came from Lens A.

#### MISCELLANEOUS

Several items of bison rib or other flat bones were classified as worked but these bits of bone give few clues to their use. The distal end of a deer metapodial shows a deep cut one and five-eighths inches from the end, in preparation for the breaking away of the shaft for making awls (Pl. 14, s). This item is from 8NL1 and may be attributed to Lens C, which also included the best of the awls. A broad flat piece of bison rib from Lens F is probably a crude tool since the edges appear to be rounded as though from use but the function of the implement is not clear.

#### FAUNAL REMAINS

In contrast to the relatively limited inventory of worked bone, the unworked bone remains were abundant. Some selection of material was made at the time of excavation. Only specimens believed identifiable were brought in and, in the higher levels, duplicates of common types were discarded. It is evident that a specimen count will be of little service, but type distributions appear useful and these will be introduced later.

The bone itself was extremely fragmentary and this made the task of identification doubly difficult.<sup>28</sup> Identifications were made to the smallest division which could safely be recognized.

<sup>28</sup> All identifications of faunal remains were made by Dr. C. B. Schultz, University of Nebraska, Lincoln, Nebraska.

LENS	A	B	C	C/D	D	E	F	G	X	Totals
Amphibian		1								1
Antelope		3	23	3	5		1		15	50
Artiodactyl		2	2	1	5	1			1	12
Beaver			1			2				3
Bird	4	1	12	3	7		1		40	68
Bison	2	10	18	4	27			1	43	105
Carnivore									4	4
Canis, sp. undet	6				1				2	9
Cat			1	1	2					4
Cottontail			2		1				5	8
Deer		5	2	1	6	2	3		23	42
Fish			3	2	4				9	18
Jackrabbit						1				1
Meadow mouse						1				1
Mollusca			2		7			1	1	11
Pocket gopher			1		8				2	11
Prairie dog					5	1			1	7
Rodents	2	1	2	4	6	3	2		3	23
Skunk		1							1	2
Turtle	7	22	96	15	98	6	1		63	308
Wapiti									2	2
Wood rat		1			1					2
Totals	21	41	165	34	183	17	8	2	215	692

FIG. 13. DISTRIBUTION OF FAUNAL REMAINS.

## FAUNAL REMAINS IDENTIFIED.

Class Amphibia, order undet.

Class Aves, order undet.

Class Mammalia

Order Artiodactyla, family undet.

*Antilocapra americana* (Ord)

prong horn

*Bison bison* (Linnaeus)

bison

*Cervus*, sp. undet.

wapiti or elk

*Odocoileus*, referred.

deer

Order Carnivora

*Canis*, sp. undet.

wolf or dog

*Felis*, sp. undet.

cat

*Mephitis*, sp. undet.

skunk

Order Lagomorpha		
<i>Lepus</i> , sp. undet.		jack rabbit
<i>Sylvilagus</i> , sp. undet.		cottontail
<i>Sylvilagus floridanus</i> (Allen)		cottontail
Order Rodentia, family undet.		
<i>Castor canadensis</i> (Kuhl)		beaver
<i>Cynomys ludovicianus</i> (Ord)		prairie dog
<i>Geomys bursarius lutescens</i> (Merriam)		pocket gopher
<i>Microtus pennsylvanicus</i> (Ord)		meadow mouse
<i>Neotoma</i> , sp. undet.		wood rat
Class Pisces, order undet.		fish
Class Reptilia		
<i>Terrapene ornata</i> (Agassiz) referred		sand turtle
<i>Terrapene</i> , sp. undet.		box turtle

Many of these animals are only identified at one to four or five locations and no particular significance can be attached to the distribution. This applies to the carnivores, the rabbits and the rodents, although rodentia, sp. undet., are abundant in all levels. It is interesting that only one occurrence of wapiti is reported although deer, antelope and bison remains are abundant.

Fish bones appear in six blocks, all from lenses C and D.

Prairie dog and pocket gopher remains were reported from 15 blocks, all assigned to Lens D except one block which is from the matrix just below D.

Deer appears 28 times in all horizons but antelope is confined to Lens C except for one occurrence in Lens E and one near E. This distribution of antelope remains is much like that for bison which appears 49 times in all but only once below Lens D or the matrix immediately below it. This one occurrence below Lens D is in Lens G, column 8NR1. There is much unidentifiable bone from the cave so this apparent lack of bison and antelope should not be over-emphasized. It is striking, however, that the time period represented by Lens E, F, and G, appears in the artifact inventories as a time of poverty compared to the abundant remains of the later ceramic periods.

The 92 occurrences of the two kinds of turtle must be mentioned. All horizons except Lens G are represented, but the greater number of occurrences are in Lens D and later. This great number of oc-

currences and the fact that the remains found were fragmentary suggest that turtle made a welcome addition to the diet of the various dwellers of the Cave.

Fragmentary shell is reported from a number of blocks. The shell seems to be bits of ordinary river mussels but none of it was large enough for specific identification. Shell beads are mentioned but not described in the catalogue and were not turned over for laboratory study.

*Homo sapiens* is represented by two premolars. One came from 8NL1, 9-12 and the other from 8NR1, 12-15. No special significance is attached to the occurrences.

### OTHER ARTIFACTS

Before beginning actual excavation of the floor, it was necessary to remove a large amount of back-dirt resulting from amateur excavations and in this operation the true surface of the floor deposit could only be approximated. The potsherds, chipped stone and other definitely aboriginal specimens recovered in the course of these preliminary operations have been included in the general class X, that is, Level unassigned.

Brief mention, however, must be made of a small amount of goods of European make, some of which is probably trade material and probably owes its presence in the cave to Indian ownership. A part of this material came from the matrix overlying Lens A and the rest from blocks which include Lens A.

A number of pieces of light sheet iron, which are probably from recent tin cans and one awl, square based and  $3\frac{3}{4}$  inches long, came from the matrix. Other metallic objects found in this matrix are a 22 cal. cartridge case, marked "H," and two lead bullets. One of the bullets is about 32 cal. and shows rifling marks, the other is almost spherical and of about 44 cal. Pottery is represented by a crockery marble of recent type, and glass items include several fragments of slightly iridescent bottle glass and one blue trade bead.

Material from blocks intersecting Lens A includes more of the light sheet iron, a short coil of iron wire, 1/16 to 5/64 inches in diameter, and a T-shaped iron object. A recent 22 cal. cartridge marked U and a pointed object were made of bronze or brass. The last item may be a partially completed arrow point. Four linked rings of lead about  $\frac{3}{4}$  inch in diameter are probably lead rings cast by the Indians from lead bullets. Glass items include fragmentary



bottle glass with some iridescence and a small white button. A square object of blue-gray flint is probably a gun-flint.

The lead rings, the pointed brass items, the bead and the gun-flint all suggest some Indian occupancy after the close of the Lens A habitation of *circa* 1700. The 44 cal. ball may represent some early white man and the small cartridge cases can be attributed to later hunters or picnickers. It is clear that the cave has been visited by many persons, presumably by Indians as well as whites, during the last two hundred years. The archeological data, however, are not sufficient for accurate identifications.

### IDENTIFICATION OF COMPONENTS

Stratigraphic and dendrochronological evidence has been introduced to show that Ash Hollow Cave has been occupied at seven different periods. The types of artifacts found and their occurrences have also been discussed. Comparison of these data permits a discussion of the artifact inventory for each lens and the identification of the components manifested.

It is not rewarding to make a comparison of total inventories from the Ash Hollow lenses with lists from type sites reported elsewhere. The Ash Hollow remains seem to be the refuse of temporary hunting parties and material of this kind can hardly be compared statistically with the more elaborate inventory from a permanent village site. This point is demonstrated in the discussion of the Dismal River component of Lens A by Hill and Metcalf, and in their comparison of the Ash Hollow component with those found at some nine other sites.<sup>29</sup> The following identification of components, then, will be made by means of items, largely ceramic, which are believed to be culture-indicative and diagnostic. Lens inventories will be checked against known trait lists, when possible, and the presence of new or unexpected traits will be discussed as possible indicators of the presence of new peoples or of modifications of known culture complexes.

#### LENS A

A total of 71 sherds was included in Lens A; 69 of these sherds were identified as Dismal River (Pl. 6; fig. 9), one, Upper Republican and one type Z. The Dismal River pottery was analyzed by

<sup>29</sup> Hill and Metcalf, 1941, pp. 206-213.

Hill and Metcalf<sup>30</sup> in their report of Ch-1 and other Dismal River sites. In this report, they set up 24 traits for the pottery found at Ch-1 and note that 75 per cent of these traits appear at Gd-2—Ash Hollow Cave. The traits which do not appear at Ash Hollow are largely those associated with the form and body type of complete pots. These could not be determined for the Cave since no restorable pots were found. Comparison on the basis of determinable traits, however, makes the likeness between Ash Hollow and Ch-1 considerably greater than that already quoted. The thorough knowledge which Hill and Metcalf have of both sites places the identification beyond question without resort to statistical comparison.

The chipped stone work (Fig. 10) is comparable to that at Ch-1, except for the item classed as a graver (Pl. 10, a-1). No item of this kind is reported from the other Dismal River sites.

Worked bone (Fig. 12) from Ash Hollow and Ch-1 was not compared by Hill and Metcalf. Tine flakers and ulna picks are present in Ash Hollow and at Ch-1, but the flat bone point and short tubular beads found at the Cave are not reported from the other Dismal River sites.

Faunal remains (Fig. 13) are comparable. Box turtle and *Canis*, species undetermined at Ash Hollow, are to be found at Ch-1 and Ash Hollow Cave.

Charcoal from both sites was analyzed by H. E. Weakly. Charcoal from the type site, Ch-1, was given a date of 1706, which compares well with the dates 1587–1684 plus a probable twenty years, which were assigned independently to Sequence A from Lens A.

The present analysis then agrees with Hill and Metcalf,<sup>31</sup> who say:

Material from the Ch 1, Dn 1, and Ft 1 sites is nearly or quite identical, even down to the types of stone used, and these stations are apparently all components of a single focus. The Dismal River level from Gd 2 (Ash Hollow. JLC) probably falls into this focus, also.

### LENS B

The ceramic inventory for Lens B (Fig. 9) includes 19 sherds. Sixteen of these sherds are Upper Republican, two are Dismal River and one is type Z (Pl. 9, z). Points are largely of the NBa series (Pl. 10, m-aa; fig. 10) but one SCal is included, as is the Yuma (ND) already discussed. Endscrapers are small and well-made and one Dakota sandstone abrader was reported.

<sup>30</sup> Hill and Metcalf, 1941, p. 206.

<sup>31</sup> Hill and Metcalf, 1941, p. 211.

Work in bone (Fig. 12) includes two short tubular beads and three items of undetermined function. Ten varieties of faunal remains (Fig. 13) are reported. These compare well with the list for Lens C.

Save for the Yuma point and the type Z sherd, the total inventory falls within the range of the Upper Republican aspect. The type Z sherd (Pl. 9, z) merits further discussion. The lens assignment of type Z pottery is not absolutely certain but careful study of the notes and profiles indicates an assignment to Lens B. It is entirely possible that the type Z sherds are an Upper Republican variant. The use of single cord impressions as design elements has been described from Sweetwater where the trait is an important diagnostic of the Sweetwater focus, Upper Republican aspect.<sup>32</sup> The Sweetwater pottery, however, displays cord designs only on the "Braced" rims, with one or two exceptions, while type Z ware uses a band of parallel cord impressions around the upper part of a somewhat flaring rim. This band of parallel lines is crossed at an angle of 30° by paired cord impressions. I do not recall this design on Upper Republican pottery, but it can be found on ceramics from the Redbird site in northeastern Nebraska and on pottery closely associated with remains believed to be Omaha, at Wynot and Homer, Nebraska.<sup>33</sup>

These suggestions seem important: first, that type Z is a late Upper Republican variant, and second, that the distinctive design shows influence from the Missouri River region in northeastern Nebraska. Strong<sup>34</sup> has suggested the possibility of an Upper Republican horizon along the Missouri in southern South Dakota out of which the Pawnee and Arikara may have developed. The return of an Upper Republican people to western Nebraska after contact with the Missouri River peoples might well be reflected in the adoption of the cord-impressed designs and the occasional use of the type Z design, now known only from the Missouri River area in northeastern Nebraska. By themselves, these suggestions are highly speculative but it is interesting to note how well they fit the slowly developing picture of population shifts so essential to an understanding of the dynamics of Central Plains anthropology.

<sup>32</sup> Champe, 1936, pp. 275-278.

<sup>33</sup> Wilford, 1945, p. 35, fig. 3a; pp. 32, 35-36, shows a similar decorative motif on Great Oasis pottery from southwestern Minnesota.

<sup>34</sup> Strong, 1940, p. 382.

Sequence B from Lens B spans the period from 1312 to 1517, but the best indications are that occupation took place after 1450 and continued until 1517 or shortly thereafter.

### LENS C

The inventory for Lens C, particularly of the pottery types (Fig. 9) seems much mixed, with strong suggestions of occupation by several groups of unrelated peoples. The most abundant kind of potsherd is identified as Upper Republican (Pl. 7) but the Woodland pattern is also represented, and the single type sherd of Ash Hollow S ware (Pl. 9, s) comes from this lens. Sherds of Dismal River ware, and of types X, Y, and Z appear to be migrants, and type T (Pl. 9, T) is equally divided between lenses C and D.

The chipped stone inventory (Pl. 11; fig. 10) includes 51 points, of which 34 are of the NBa series usually associated with Upper Republican. One SBa and six SCa series suggest, like the pottery variants, at least one occupation other than Upper Republican. The remaining stone work includes well-made small endscrapers, a drill, knife parts and a large number of flakes modified for temporary use. An annular stone bead (Pl. 11, s) is an unusual item but a similar bead from northeastern Nebraska is reported by Cooper.<sup>35</sup> An abrader, a grinding slab and hematite complete the inventory of work in stone.

Worked bone (Fig. 12) includes four of the short tubular beads, a flaker tip, four awls and two unidentified bits of worked bone. The beads are the only item of this group not reported from all Upper Republican sites.

Faunal remains (Fig. 13) include thirteen varieties, with good amounts of antelope, bison and box turtle, which must have been an important part of the diet. Fish bones are present as well as a few bones each of beaver, deer, cat, cottontail and several rodents.

The total inventory is characteristic of the Upper Republican aspect with the addition of several stemmed points and at least two new and distinctive ceramic types. The points may have been associated with the Woodland pottery which also appears more frequently than might be expected. The suggestions from the artifact inventory, then, are:

1. The major occupation for the zone is Upper Republican.

<sup>35</sup> Cooper, 1936, p. 144, Pl. XXXIV, no. 4.

2. There have been brief secondary occupations, by Woodland groups and by the people who made the type T ware. These two occupations were early in the formation of the lens and may have preceded the Upper Republican occupation by a short time.
3. The type S sherd suggests an occupation by still another unidentified people or it may be considered another aboriginal "collector's item" like the Yuma point. In either event it implies an as yet unrecognized culture complex in the area at a time equivalent to the Upper Republican aspect elsewhere.

For the present study, the temporal placement of the Upper Republican aspect seems the important fact to be established. The occurrence of distinctive new ceramics at this strategic location near the eastern edge of the High Plains, however, emphasizes the need for a thorough survey and report of the region just east of the Rockies in Colorado, Wyoming, and Nebraska.

Sequence C from Lens C covers a period of 1210 to 1334 A.D. The best indications appear to be that the major occupation took place at about 1300 A.D. It has been customary to allow four hundred to six hundred years antiquity for the Upper Republican and Nebraska aspects so this new estimate, based on an actual tree-ring count, checks very well with the earlier opinions.

#### LENS D

A preliminary consideration of the Woodland pottery and other material from this lens has already been published by Hill and Kivett<sup>36</sup> who concluded that "the material from the third level at the Ash Hollow cave appears to be some variant of the Woodland culture." This report is not easily compared with Hill and Kivett's because blocks including both C and D have been eliminated here. The identification of the major component is the same but indications of occupations other than Woodland are apparent.

Ceramic remains (Fig. 9) include eight sherds of Upper Republican but these sherds are referred to Lens C where they appear in quantity. Eighteen sherds are large cord-roughened sherds of a Woodland ware very much like that described from VI-1 (Pl. 8) tentatively identified as the Valley focus, of an unnamed aspect, Lake Michigan phase, Woodland pattern.<sup>37</sup> A single rim sherd has been described as type R (Pl. 9, R) although it is reminiscent of the

<sup>36</sup> Hill and Kivett, 1940, pp. 190, 224-226.

<sup>37</sup> Hill and Kivett, 1940, pp. 191, 227.

heavier and thicker typical Woodland ware. Four sherds of type T (Pl. 9, T) appear in Lens D as well as in Lens C. This ware can be accounted for by postulating a short occupation between the major occupation of lenses C and D, and by supposing that it was not intense enough to alter the inventory of either lens except for the presence of the easily recognized pottery.

Pottery types X and Y (Pl. 9, X, Y) represented by 14 and 12 sherds respectively, are assigned to Lens D although a few sherds of each type are reported from higher lenses. Hill and Kivett<sup>38</sup> included them in their count of Woodland sherds but the criteria for discussing them separately here may be found in Appendix II.

The point types from Lens D also suggest an occupancy other than Woodland. Eight stemmed points (Fig. 10) are present but 23 out of 36 points are classifiable in the NBa series. The Woodland inventory from Vy-1 includes 7 out of 13 stemmed points. The suggestion at Ash Hollow is that a second occupation more like the Upper Republican in type is represented by this preponderance of Nba points and, perhaps, by the type Y pottery.

Other work in chipped stone (Pl. 12, 1-x) includes 18 endscrapers which as a group seem cruder and more variable in form than those from the higher lenses. They range from 20 mm. to 50 mm. in length but are not so well made as those from Lens C. Four parts of knives and 21 modified flakes show no unusual characteristics.

A slab of light gray sandstone has one side planed smooth as though for a grinding slab of some kind. The slab, however, is not much worn and is otherwise unshaped.

Work in bone includes five short tubular beads (Fig. 12), two tip of tine flakers and two unidentified items of flat bone. Tubular beads are reported from Vy-1<sup>39</sup> but there they range from 17 to 80 mm. in length and from 3 mm. to 10 mm. in diameter. At Ludlow Cave, however, the thirty-six inch level, according to Over,<sup>40</sup> produced beads of this same type associated with pottery which Strong<sup>41</sup> later identified as of a generalized Mandan-Hidatsa type. Present data do not permit identification of the Ash Hollow material as identical with the lower level at Ludlow cave, but the occurrence of

<sup>38</sup> Hill and Kivett, 1940, p. 224.

<sup>39</sup> Hill and Kivett, 1940, p. 165.

<sup>40</sup> Over, 1936, p. 127, Pl. 11, fig. 1, b.

<sup>41</sup> Strong, 1940, p. 384.

these beads with type Y pottery at a depth comparable to that of the Ludlow material offers additional support for a non-Woodland component as well as a Woodland component in Lens D. And, as Over concluded,<sup>42</sup> such a component, if present, would seem to indicate some western group coming east into the Plains since similar material of this kind is not reported from the well-worked areas east of Ash Hollow.

Fifteen kinds of faunal remains are listed (Fig. 13). Bison is important but antelope seems less so than in Lens C. Box turtle remains in favor while shells and fish bones indicate use of the Platte River fauna. Thirteen items of prairie dog and pocket gopher may indicate their use as food since only three other gopher or prairie dog bones are reported from the cave.

An estimated dating from 1000 to 1150 A.D. was arrived at by including an arbitrary allowance of fifty years for the unknown gap between lenses C and D. Since these lenses are in contact in many places this is probably a reasonable estimate and it compares very well with earlier estimates made without reference to the tree-ring count.

The entire picture for Lens D and for the period which it represents is not a simple one. The major occupation is a Woodland complex closely related to the Valley focus but a second ceramic type suggests a Woodland occupation related to the type of manifestation found at Eagle Creek in northeastern Nebraska. Type Y pottery and short bone beads may be construed as indications of a third occupation probably of western origin and hitherto unknown east of Ash Hollow. The type T ware, found also in Lens C, is probably another occupation of no great intensity between the major occupations of lenses C and D.

#### LENS E

Chipped stone implements (Pl. 13, a-g; fig. 10) from this horizon include one specimen each of types NAb2, NBa and SBa. Three broken endscrapers are well made but of ordinary type. An expanding base drill and the base of a second are reported. A small fine-grained flat stone is classified as an abrader. A few modified flakes and a pebble of hematite complete the stone inventory.

Work in bone (Fig. 12) consists of four long slender tubular beads and an awl. Faunal remains (Fig. 13) are limited to representatives

<sup>42</sup> Over, 1936, p. 129.

of the smaller animals such as beaver, jackrabbit and rodents, except for one artiodactyl and two deer bones, and several bones of the box turtle. Bison and antelope are not reported.

A single Woodland sherd from Lens E was considered intrusive by the finder.

Tree-ring Sequence F, of 246 years, is associated with the lens. An impression of several rather brief occupations is given rather than one long intensive series. The suggestion that game was not too plentiful, especially such larger animals as bison and antelope, matches well with the picture of intermittent occupation inferred from the artifacts and tree-rings.

Age estimates already made suggest a possible date of 600–850 A.D. This does not compare well with any known horizon elsewhere on the Plains and the artifact inventory is too scanty for identification of more than the local component.

#### LENS F

The short inventory of artifacts from this lens includes two well-made endscrapers and a third from a flake neatly modified. A small amount of red pigment is reported (Pl. 13, i-j; fig. 10).

An awl and two unidentified items of worked bone (Fig. 12) were returned from this lens. The faunal remains (Fig. 13) include antelope, deer, bird, rodents and turtle bone.

A date of 300–400 A.D. has been suggested for Lens F on the same basis as the estimate for Lens E. As in Lens E, the impression is that of one or more short occupations. Sequence F, which is correlated with Lens F, seems to bear this out.

The small number of artifacts makes it impossible to identify other than the local component.

#### LENS G

Lens G includes evidences of occupation at the very bottom of five columns and so can only represent a short occupation or occupations occurring not long after the front of the Cave was blocked by the fallen slab. The artifact list is scanty. An SCb2 point (Pl. 13, k), chipped from thin chalcedony, is the only specimen of worked stone. No worked bone was found. A bit of shell, too small for identification, and a fragment of bison bone complete the list of faunal remains.

A review of the notes adds little to the artifact record. A thin stratum of charcoal is reported from all five blocks, with a fire-bed



in column 5NR1. As in lenses E and F, the artifacts are too few for identification of more than the local component. A tentative dating of 0-100 A.D. is indicated.

### SUMMARY OF ASH HOLLOW CAVE

The rock shelter known as Ash Hollow Cave is located high in the east wall of Ash Hollow near its mouth. Ash Hollow, a landmark of the Oregon Trail, is in southeastern Garden County, Nebraska, at a point almost directly across the North Platte river from the town of Lewellen, Nebraska.

The cave was formed by the fall of a large section of the overhanging roof of a small rock shelter, which had been eroded into the canyon wall. This fallen slab partially blocked the recess behind it and so made an especially desirable temporary habitation. Evidence that the cave was occupied on many occasions was found in the deposits which formed the floor.

The floor deposits were built up of fine sand derived from the disintegration of the conglomerate forming the roof and walls. This fine light-colored sand was readily modified in color by inclusions of ashes, charcoal and camp refuse during periods of occupation, and this modification caused well-defined lenses across the face of vertical sections of the deposit. The unconsolidated nature of this sand matrix gives assurance that no major disturbance has taken place since the floor deposits were laid down, since any small movement would have obliterated these lenses.

The top of the floor deposit was approximated in clearing away the loose earth which amateurs had dug and piled beside their excavation. At 8NR2 (Fig. 4; fig. 5), three inches of clear matrix lay below this assumed floor level just overlying Lens A, which was a stratum of dark charcoal-impregnated sand about three inches thick. About six inches of matrix lay below Lens A, followed by a darker zone, two inches thick at this point but four or five inches thick elsewhere. This was Lens B. Seven inches of matrix lay just above Lens C, a much darker stratum, some seven inches thick here. Lens D was immediately in contact with Lens C over much but not all of the cave. It was eight inches in thickness at 8NR2 but there was a great variation in this particular lens throughout the deposit. Pits were clearly shown in some profiles, notably the west face of 5NR3, and the variable lower margin of Lens D may be due largely to this fact. Nearly thirteen inches of matrix lies just over the four inch

stratum of Lens E. A thin brown line is noted about three inches above the upper margin of Lens E but this line could not be placed definitely as an occupation zone although it may be a late manifestation of Lens E. Some three or four inches of matrix lay between Lens E and Lens F, which is about two inches thick at this point but as much as six inches thick elsewhere. Lens F lay just above the rubble floor over much of the cave but, in five columns, Lens G lay still lower, separated by a definite layer of matrix from Lens F.

A series of tree-ring sequences form an interesting check on the archeological inferences which in turn tend to confirm the sequences themselves. H. E. Weakly, working independently, combined charcoal from 46 of the 148 lots into eleven sequences and these in turn were found by the archeologist to correlate very well with the stratigraphic lenses. Further work by the analyst, with the benefit of the stratigraphic data, resulted in the identification of sequences to correspond with each of the lenses. The three later sequences, A, B, and C, were matched with existing sequences to form a chronology extending from 1210 A.D. to the present.

A terminal date of 1704 was estimated by Weakly for the end of Lens A, by an allowance of twenty additional years for burned outside rings in addition to the date of 1684 actually read. The material from this lens has been identified as Dismal River on the basis of the pottery and the artifact inventory. The date of 1684-1704 corresponds well to a date of 1706, also assigned by Weakly to material sent him by Hill and Metcalf from the type site of the Dismal River aspect, Ch-1.<sup>43</sup>

An analysis of artifact types showed that, in general, artifacts were of the kinds usually found in the Central Plains except for samples of pottery which may prove to be new types. Two points, identified as Yumas, were considered intrusive in the levels where they were found. All faunal remains were those of animals now known within the area. The fact that bison and antelope were absent from the earlier strata, except for one fragment at the very bottom, may be important if future work shows that this apparent scarcity of bison holds true for large parts of the Plains at a time just preceding the ceramic period.

Known ceramic types proved to be the best criteria for identification of components. The total artifact inventory, however, was con-

<sup>43</sup> Hill and Metcalf, 1941, p. 205.

sidered in each case and special attention was given to the relative percentages of types of points.

Lens A was attributed to the Dismal River aspect, and the general likeness to the Stinking Water focus was observed. Since the Ash Hollow component seems to be the result of temporary camps rather than permanent village life, direct comparison of inventories is not practicable. Assignment of focus was, therefore, left to later studies. Presence of common ceramic types was noted in this study as well as by Hill and Metcalf in 1941. The dating of charcoal from the lens by Weakly added further support to the identification.

Lens B was assigned to the Upper Republican aspect after consideration of the total artifact inventory. The presence of a type Z sherd led to a discussion of the possibilities of an Upper Republican horizon in South Dakota and northeastern Nebraska from which Pawnee and Arikara might have developed. Ware of type Z kind, or of Sweetwater Upper Republican, may be interpreted as showing, in the use of cord-impressed designs, the results of contact with such Missouri River tribes as the Mandan. Type Z ware at Ash Hollow, then, need not imply a new and hitherto unknown people in the area. A Yuma point from Lens B was thought intrusive. An occupation date of 1450–1517 A.D. was suggested for Lens B, on the basis of the charcoal in Sequence B.

Lens C has probably been occupied by more than one group. Much of the pottery and other artifacts can be attributed to the Upper Republican aspect, quite probably to such a focus as Lost Creek. The presence of both type T and Woodland wares suggests the possibility of an early overlap in occupation between lenses C and D. The single example of a type S sherd is not sufficient to identify a hitherto unknown people, but the presence of such a group is implied. Lens C can be dated tentatively between 1250 and 1350 A.D.

The major occupation of Lens D seems to be a Woodland type much like the Valley focus at Vy-1. Pottery type X has been discussed as a probable Woodland variant similar to material from Eagle Creek but pottery type Y seems closer to Upper Republican ware. This suggestion of a non-Woodland occupation is reenforced by the relatively large number of NBa points in the artifact inventory as compared to other Woodland sites. X or Y wares may represent a developmental stage between Woodland and Upper Republican but the presence of typical Woodland in lens C and of

good Upper Republican ware in Lens D makes this a very remote possibility. Type T pottery appears in Lens D as it did in Lens C. A short occupation by the people who made this unique ware is suggested, probably at a time between the major occupations of lenses C and D. Tentative dates for this lens, based on the tree-ring sequences, are from 1000 to 1150 A.D.

The cultural horizons for lenses E, F and G are well established stratigraphically and are confirmed by the tree-ring sequences but the artifact inventories are too meager to permit identification of more than the local components. It should be noted, however, that the three lists grouped together present definite likenesses to the inventory for Signal Butte II. NBa, SB, and Sc points, expanding base drills, endscrapers and modified flakes are reported from both sites. The work in bone includes rather crudely made awls and tubular beads. These likenesses fall short of identity between inventories but it seems important that the lists contain much the same artifact types in both cases. As will appear later, this limited inventory also seems characteristic of the hearths reported from the non-ceramic horizons in the White River terraces.

Time factors must be considered as well as artifact inventories. Suggested datings have been put forward of 600–850 A.D. for Lens E, 300–400 A.D. for Lens F, and 0–100 A.D. for Lens G. These dates were postulated on the assumption that the lower half of the cave deposits were built up in approximately the same length of time estimated for the filling of the upper half. This assumption is purely arbitrary but even if this estimate were doubled the datings for the non-ceramic horizons would be far short of the current estimate of 5000 years for Signal Butte, level II.<sup>44</sup>

Assignment of any one of the three lenses, E, F, and G, or of all of them, to Signal Butte II, which is not too well defined itself, is not warranted by the evidence now in hand. The three components can be recognized as present at Ash Hollow Cave, and as distinct on stratigraphic and dendrochronological grounds, leaving the matter of identification open to future research. The general likenesses to Signal Butte II and to the White River material, as well as the apparent absence of bison at Ash Hollow during the time period represented by lenses E, F, and G and the enclosing matrix, will be taken up again in this paper.

<sup>44</sup> Strong, 1935, p. 239.

## OTHER STRATIFIED SITES IN THE CENTRAL GREAT PLAINS

Three Central Plains sites, for which preliminary reports have already been published, have much in common with Ash Hollow Cave. All three are located in the western part of the Central Plains, all have been reported as stratified, and all have an Upper Republican component.

These sites can be located conveniently from Ash Hollow as a central point. Signal Butte is almost one hundred miles west northwest of Ash Hollow; the Sondergaard site is nearly one hundred and seventy-five miles east of Ash Hollow, in central Nebraska, and the Pottorff<sup>1</sup> site is in Lane County, Kansas, some two hundred and fifty miles south southeast of Ash Hollow. Lines connecting the three sites just located would form a triangle nearly three hundred miles on a side and would enclose almost all of the single-component Upper Republican sites now known.

### SIGNAL BUTTE

One of the most important sites in the Plains area was the stratified deposit surmounting the picturesque mesa known as Signal Butte. The butte is located about twenty-one miles west of Scottsbluff, Nebraska, almost on the Wyoming-Nebraska line. Excavation of the site was directed by Strong<sup>2</sup> in 1932<sup>3</sup> and a preliminary report was published in 1933.<sup>4</sup> The more complete report from which this statement is summarized appeared in 1935.<sup>5</sup>

Signal Butte was capped by a deposit of fine windborne material averaging about eight feet in thickness. Within this deposit, five distinct strata were identified; the first, third and fifth, counting upward from the lowest, contained cultural debris. The second and fourth were composed of sterile windborne material, readily distinguished from the culture-bearing strata, and separating them completely except at the extreme outer edges. Each level will be described briefly beginning with the lowest.

<sup>1</sup> The name Pottorff was suggested by Dr. W. R. Wedel, July 28, 1945.

<sup>2</sup> Strong, 1935, p. 224. The statement in the text gives the direction of the site as "southeast" from Scottsbluff, evidently a typographical error since the accompanying map (Fig. 1, site 27) shows the site correctly.

<sup>3</sup> Strong, 1932, pp. 69-72.

<sup>4</sup> Strong, 1933a.

<sup>5</sup> Strong, 1935, pp. 224-239, 269-270.

## SIGNAL BUTTE I

Level I, the lowest of the cultural strata, was some twelve inches thick, composed of a black humus containing abundant cultural detritus. Broken animal bones were plentiful. None of them has been identified as of other than recent species despite the fact that some were partially mineralized. Shallow storage pits were numerous, as were small round fire pits, but no evidence of postholes or of houses was observed. Pottery was entirely absent but several types of ground stone artifacts were found. Ground stone objects included grinders, shaft polishers, grooved mauls, and one axe with ground notches. The chipped stone inventory provides determinants for the culture. As Strong<sup>6</sup> states,

The most characteristic and abundant of the latter types (projectile points) is a medium-sized (average length 4 cm.) lanceolate or leaf-shaped projectile point with a concave base (NAb3). The base is often thinned down by the removal of flakes from each face.

No true Folsom points were found but the resemblance of the point just described, except for the lack of the longitudinal groove, is most noteworthy. The entire inventory impresses Strong<sup>7</sup> as

... so abundant and distinctive that it seems safe to designate it as a major culture, or aspect, under the name Signal Butte I.

## SIGNAL BUTTE II

A second culture-bearing level was separated from Signal Butte I by some eighteen inches of sterile soil. It is described as a thin dark horizon, about six inches thick, which contained a few artifacts, some fireplaces, bone and rocks. The artifact complex was definite in type although limited in extent. Stemmed points were most abundant and those with barbs and straight bases were accepted as most characteristic. Pottery was absent but some ground stone objects were noted. The cultural representation, however, was not entirely satisfactory, leading Strong<sup>8</sup> to conclude that

... on Signal Butte, however, this horizon is so limited that it must be found elsewhere in more abundance before it can be described as a major culture (or aspect).

<sup>6</sup> Strong, 1935, p. 233.

<sup>7</sup> Strong, 1935, p. 269.

<sup>8</sup> Strong, 1935, p. 269.

### SIGNAL BUTTE III

The first two cultural strata and the intervening sterile layers lay almost horizontally above the cap rock. Level III, however, was arched above level II, separated by nearly two feet of the aeolian deposit near the center and nearly in contact at the outer edges. Level III was some eighteen inches in thickness although it was not very clearly defined. A small amount of glass beads and a few objects of trade copper were found just at the grass roots. The remainder of the deposit contained a substantial and representative collection of artifacts associated elsewhere in Nebraska with late prehistoric and proto-historic horizons. Pottery was well represented. Eleven hundred and fifty-five sherds were preserved. Eight hundred and seven were identified as Upper Republican and the remainder, 348, were classified as Dismal River, type b.

Occupation by at least two different groups was suggested by the fact<sup>9</sup> that

. . . there is no blending, or obvious relationship between the two ceramic types, nor was there any evidence of superimposition of either.

### SOIL ZONES

The presence of old soil zones on Signal Butte should be mentioned for comparison with those to be discussed in the White River terraces. Strong<sup>10</sup> has described a thick black soil horizon which corresponds to occupation level I. This old soil zone is covered by wind-blown earth attributed to a dry period. A second soil horizon, very thin and faint, is found in occupation level II. Level III is little darker than the aeolian deposit which separates it from level II and no soil horizon, other than the present one, is described.

Strong's tentative correlation of these soil horizons with Sear's chronology<sup>11</sup> indicates an age of some 5000 years for level II and 7,000–10,000 years for level I.

### POTTORFF

During the field season of 1939, Dr. W. R. Wedel excavated a small terrace site located on Salt Creek, north of Healy, in Lane County, Kansas. Two cultural strata were identified in stratigraphic

<sup>9</sup> Strong, 1935, p. 230.

<sup>10</sup> Strong, 1935, p. 237.

<sup>11</sup> Strong, 1935, p. 239.

relationship and the possibility of a third horizon is noted.

Wedel<sup>12</sup> reports Upper Republican artifacts and pottery to a depth of six inches. Two small pit houses from this horizon had the four center posts usual in the Upper Republican aspect. These house pits cut through a sterile stratum and into a second deposit attributed to some "plains Woodland manifestation." A third stratum, below two feet of sterile material, is suggested in Plate 5.<sup>13</sup> The investigator concludes<sup>14</sup>

. . . this sequence parallels that in Western Nebraska and adds materially to the geographic range of the cultures involved.

### SONDERGAARD

The Sondergaard site is located on a terrace of Davis Creek, in the northwestern part of Howard County, in central Nebraska. The Archeological Survey party of the Nebraska State Historical Society investigated the site in October 1939. A preliminary report was made in 1941 by Hill and Kivett<sup>15</sup> from which this account is summarized.<sup>16</sup>

. . . the Woodland horizon, which extended from a depth of 4 to 14 inches, consisted of flint chips, stones, burnt earth, charcoal, animal bones and pottery sherds, and appeared to be the remains of a definite occupational level. . . .

Pottery from the Woodland horizon (Plate XIX-1), which generally underlay the Upper Republican material, consisted of 272 sherds. Sixteen of these were rim sherds, while 256 were body sherds. . . .

The material from the Upper Republican horizon consisted of 22 pottery sherds. Two of these were rim sherds while the remainder were body sherds. . . .

In general the Upper Republican sherds (which were at a higher level than the Woodland remains) appeared to be only washed and scattered materials and did not represent an occupational level. . . .

In conclusion, the Sondergaard site evidently represents materials of two distinct types. The deeper materials appear to be the remains of a Woodland occupational level. The pottery is very closely related to the pottery from the Vy-1 site in Valley County. . . .

Overlying the Woodland materials were a few scattered sherds of pottery and flint chips which are quite different from the Woodland materials below. On the basis of these few pottery sherds the less deeply buried material can be tentatively classified as ware of the Upper Republican aspect.

<sup>12</sup> Wedel, 1940b, pp. 83-88; 1941, p. 19, pl. 5.

<sup>13</sup> Wedel, 1941, pl. 5.

<sup>14</sup> Wedel, 1940b, p. 88.

<sup>15</sup> Hill and Kivett, 1940, pp. 215-219.

<sup>16</sup> Hill and Kivett, 1940, pp. 215-216.



## SUMMARY OF STRATIFIED SITES

Components of the Upper Republican aspect appear at all four stratified sites but the Dismal River and Upper Republican components found together in Signal Butte III are clearly separated at Ash Hollow. The relative position of Upper Republican and Woodland at Ash Hollow are confirmed, and extended far to the east and south, by the reports from Sondergaard and Pottorff respectively. The separation of the Upper Republican deposits into two components appears only at Ash Hollow. While this division seems clear at the Cave, it must be accepted tentatively pending confirmation of the two components and especially the association of the Z type ware.

The earlier non-ceramic components present a more complex situation. Stratum C at Pottorff contained only fragmentary bone and broken stone and cultural identification was not made. The fact that it lies some two feet below the Woodland stratum is an unreliable test of relative antiquity since this is not much greater than the distance between the Woodland and Upper Republican components at the same site. Since these latter two components are in contact in Ash Hollow Cave, it would be possible to infer that stratum C was not much older than the Woodland, no older perhaps than Lens E at Ash Hollow Cave. This suggestion is the best that can be made at present, since there is no evidence of relative deposition rates, either before or after the Woodland occupation.

The three lower lenses, E, F and G, at Ash Hollow Cave were discussed in the report of that site. The occurrence of these three components seems well established but an identification in terms of components known elsewhere is not now possible. Certain general likenesses have been pointed out between the components at Ash Hollow Cave and the materials reported from the middle stratum at Signal Butte and described as Signal Butte II.

An estimate of some two thousand years of occupation can be justified for Ash Hollow Cave, but this figure is still two or three thousand less than the current estimates for Signal Butte II. If the components at Ash Hollow and at Signal Butte were practically identical, some compromise of these estimates might be justified. Assertion of such an identity of components, however, is not supported by present evidence. It seems better, for the present at least, to regard Signal Butte II, and Signal Butte I, as well, as substantially earlier than Ash Hollow Lens G.

## WHITE RIVER TERRACES

An important series of sites is located in the terraces of the upper White River, north of Crawford, in extreme northwestern Nebraska. Barbour<sup>1</sup> notes that he observed hearths weathering out of formations in this area as long ago as 1891. Sheldon<sup>2</sup> also reported fireplaces from the Bad Lands near the middle White River. His report of pottery in association with these hearths indicates a more recent date than that for the Sioux County hearths where no pottery associations are reported.

In 1928 the occurrence of artifacts in the White River terraces was called to the attention of the Nebraska State Museum but it was not until 1935 that actual association of artifacts and fossil bones was reported by a Museum field party. The following year, 1936, four geologists joined in a report<sup>3</sup> of the results of their reconnaissance of the White River valley. Their report is primarily concerned with problems of varve sediments found at several points in the White River valley but they also report a series of observations under the sub-heading of Human Occupancy. They find that

. . . a great many Yuma points have been picked up in Sand Creek Valley by Nebraska Museum parties as well as local collectors in the past few years. Artifacts were found *in situ* in 1935 in the pre-varve soil zones, notably Soil B, Fig. 3. Several typical Yuma artifacts were found in a nearby locality in a soil zone which seems to correspond to Soil B. Fossil mammals and bird bones were discovered in these same soil zones. In many places, the bones were in a broken and burned condition. Also approximately 150 fire pits were found within the area (Fig. 8). The fire pits, which were filled with much charcoal and burned stones, had been dug to 1½ to 2 feet below the original habitation surface. Their rims appear to be at the level of the lower member of the twin soil zone A of Fig. 3.

In summary they suggest that

. . . varved sediments may have been deposited by such an ice-dammed lake, since the White River was dammed at its eastern end by ice of the late Wisconsin glacial invasion. . . . Furthermore, the relationship of the soil zones, containing hearth pits and artifacts, suggest that the latter are older than the varves and hence are of Pleistocene age.

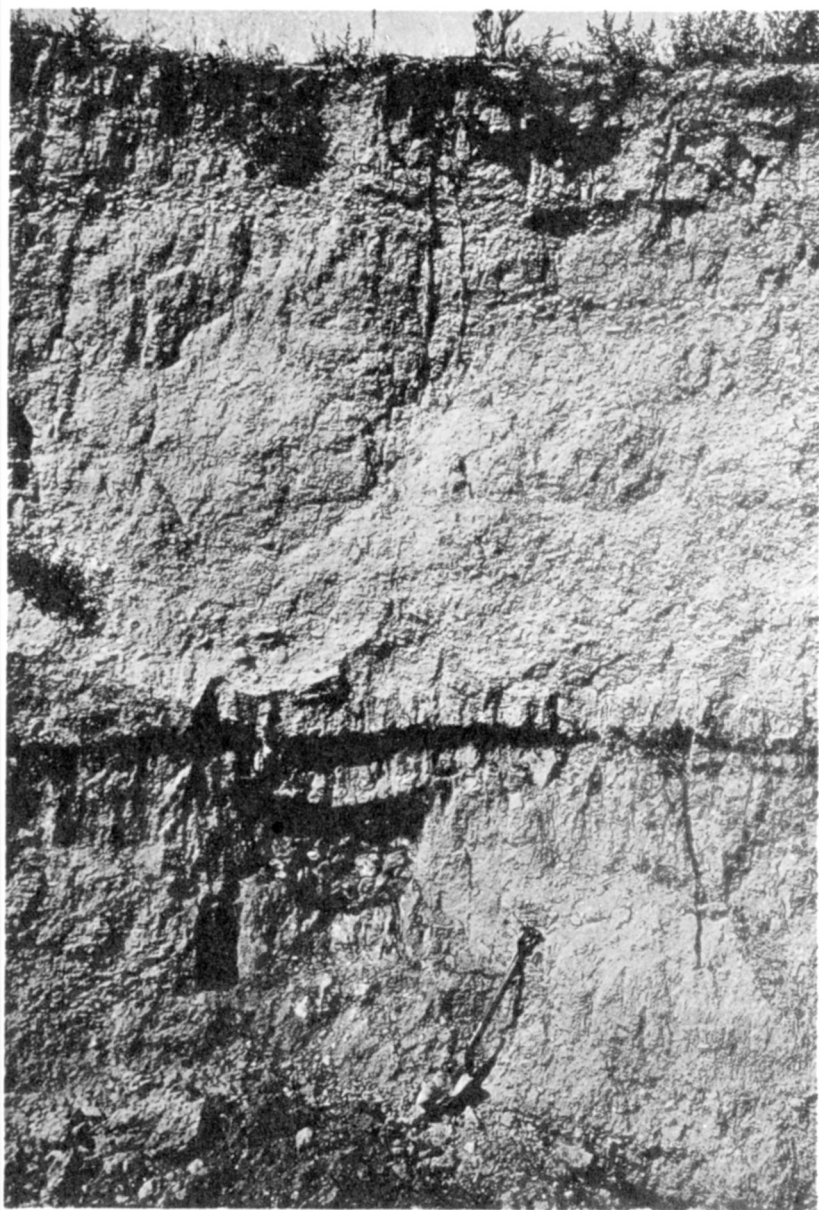
<sup>1</sup> Barbour and Schultz, 1936, p. 444.

<sup>2</sup> Sheldon, 1905, pp. 44-48.

<sup>3</sup> MacClintock, Barbour, Schultz and Lugn, 1936, pp. 346-360.



WHITE RIVER TERRACES, HEARTH LOCATIONS IN T 1



WHITE RIVER TERRACES, THE "GOOD HEARTH" IN T 1

Still more recent opinion regarding the archeological manifestations as well as the terrace sequences may be found in a semi-popular article by Schultz,<sup>4</sup> entitled "The First Americans," and in comments by Schultz and Stout<sup>5</sup> with reference to the correlation of the Platte and White River terraces. Schultz summarizes the complicated story of the building of a "higher terrace" which contains Yuma and Folsom artifacts associated with extinct animal forms and of a "lower terrace" containing five soil zones, each with hearths, topped by a ceramic horizon.<sup>6</sup> This "higher terrace" seems to be the equivalent of T<sup>2</sup> of the Platte River and the "lower terrace" the equivalent of T<sup>1</sup>.<sup>7</sup> Schultz and Stout express the opinion that

... the terraces recognized in the Lincoln County loess-canyon area are correlated tentatively with the terrace up the North Platte River from Lisco to Scottsbluff (See Text Fig. 2). The Scottsbluff Bison Quarry without question occurs within the T<sup>2</sup> terrace, in sediments correlated with the Bignell formation. Mammoth remains found east of Scottsbluff (Text Fig. 2) also occur in this terrace.

In the drainage of the White and Cheyenne rivers in Sioux and Dawes counties, Nebraska, there are terraces which appear to correspond to the T<sup>2</sup>, T<sup>1</sup>, T<sup>0</sup> of the Platte River valley. The faunas of the T<sup>2</sup> terraces of both areas are the same, with *Bison antiquus taylori* occurring most frequently. Yuma and Folsom artifacts also occur in this terrace (Locality 22, Text Fig. 1). The late Pleistocene extinction of many of the important large mammals appears to have occurred during the time of the basal fill of T<sup>2</sup>.

In the summer of 1941, I accompanied Dr. Schultz on two trips to the terrace sites. My own observations confirm the occurrence of typical Woodland pottery, much like that from Lens D at Ash Hollow, just below the grass roots at the top of a terrace identified by Schultz as T<sup>1</sup>, or the "lower terrace" (Pl. 22, f). A few sherds of a second ware, which may be a variant of the Upper Republican pottery, appeared at much the same level, so far as we could tell by our brief reconnaissance. (Pl. 22, c). The location at which a part of this pottery was found has been figured by Schultz<sup>8</sup> elsewhere and is shown again here (Pl. 15).<sup>9</sup> In this picture, the uppermost figure is near the level of the highest of five distinguishable soil zones.<sup>10</sup> The right-hand figure indicates a fire pit in the lowest of the five zones.

<sup>4</sup> Schultz, 1938, pp. 346-356, 378.

<sup>5</sup> Schultz and Stout, 1945, pp. 231-244.

<sup>6</sup> Schultz, 1938, pp. 350-353.

<sup>7</sup> Schultz and Stout, 1945, pp. 243-244.

<sup>8</sup> Schultz, 1938, p. 353; Barbour and Schultz, 1937, pl. XV.

<sup>9</sup> The photograph was taken by Dr. C. B. Schultz and is reproduced here by his courtesy.

<sup>10</sup> Schultz, 1938, p. 352.

The lower left-hand figure indicates a layer of gravel at the base of T<sup>1</sup>, which may be derived from reworking T<sup>2</sup>. A Yuma point was reported near this lower fireplace<sup>11</sup> adherent to these gravels but not *in situ* and the opinion that these basal gravels are equivalent to T<sup>2</sup> is reflected in the ideal section of these terraces figured by Schultz.<sup>12</sup> Not far from this location a fire pit, called the "good hearth" in the field notes, was observed in what appears to be the middle level of the five zones in T<sup>1</sup> (Pl. 16) and a large number of similar fire pits are observable at various depths in other terraces, identified by the geologists as T<sup>1</sup>.

Small collections of artifacts from these fire pits were returned to the Museum by their field parties.<sup>13</sup> The short inventory of a few points, many of them stemmed, bone awls, endscrapers, and modified flakes is much like the lower three lenses in Ash Hollow Cave and, therefore, reminiscent of Signal Butte II. Actual identification must wait on further work in the terraces and a precise statement from the field as to the soil zones in which the material is found.

The tentative sequences which Schultz has set up are based almost entirely on surface reconnaissance by field parties whose first interests were the geological and palaeontological problems presented. An intensive study by archeologists as well as palaeontologists and geologists is clearly needed for a definitive statement regarding the site. Until that study is possible, and has been made, provisional acceptance of the sequences set up by Schultz<sup>14</sup> seems justifiable.

A second possibility of correlation between Signal Butte I and II, and the White River terraces should not be overlooked. The Signal Butte horizons are associated with soil zones which are presumably in the upper part of T<sup>2</sup> or in T<sup>1</sup>. The Scottsbluff Bison Quarry, which lies just below Signal Butte, is definitely placed in T<sup>2</sup>.<sup>15</sup> I am informed that there is a well-developed terrace system on Spring and Kiowa creeks in the Signal Butte locality and that there is definite possibility of correlating the soil zones on the Butte with soils represented in the terraces.<sup>16</sup> Since the extinction date of *Bison taylori* and other early forms seems to fall between Signal Butte I and the Folsom-Yuma period, this correlation would offer some interesting data in addition to its purely archeological interest.

<sup>11</sup> Schultz, 1941, personal communication.

<sup>12</sup> Schultz, 1938, p. 352.

<sup>13</sup> Schultz, 1938, p. 353.

<sup>14</sup> Schultz, 1938, p. 352.

<sup>15</sup> Schultz and Stout, 1945, p. 244.

<sup>16</sup> Schultz and Stout, 1945, personal communication.

## MULTI-COMPONENT SITES IN EASTERN NEBRASKA TERRACES

The important Walker Gilmore site on Sterns Creek in eastern Nebraska is one of the two stratified sites which Strong<sup>1</sup> considered basic to his original sequence in 1935. The data already published will be reviewed and supplemented by more recent information. More or less complete data from three other areas which have much in common with the Walker Gilmore site are also available for comparative purposes.

At all of these sites, pottery identified as Woodland is reported deeply buried within recent terraces developed along small creeks in eastern Nebraska. On the surface of each site and presumably in stratigraphic relationship to the lower lying material is evidence of a Nebraska or Upper Republican component. The exact relationship of the components at each site poses a problem that will probably require a thorough cooperative investigation by competent physiographers as well as by archeologists.

### WALKER GILMORE

The well-known Walker Gilmore site, on Sterns Creek in eastern Nebraska (Fig. 1), was described by Strong<sup>2</sup> as

... one of the most important as well as intrinsically interesting sites in Nebraska, and it may be added, in the Plains region generally. It is one of the very few stratified sites so far reported from the Plains or Upper Mississippi region. . . .

The site was first reported by Dr. F. H. Sterns<sup>3</sup> in 1915 and his more detailed findings were incorporated in his doctoral dissertation at Harvard.<sup>4</sup> Fifteen years later, these investigations were continued by Dr. W. D. Strong and his assistants at the University of Nebraska in the course of some ten reconnaissance trips to the site. Only minor excavations were attempted by Strong, and he considers his work as supplementary to the pioneer work by Sterns. In general,

<sup>1</sup> Strong, 1935, pp. 271-272.

<sup>2</sup> Strong, 1935, pp. 175-198.

<sup>3</sup> Sterns, 1915, pp. 121-127; 1915a, Mss.

<sup>4</sup> Dr. Sterns has graciously permitted a microfilm copy of his personal copy of this dissertation to be placed with the Walker Gilmore file in the Laboratory of Anthropology, University of Nebraska, Lincoln, Nebraska.

Sterns' conclusions have been accepted by Strong and the other writers who have discussed the site.<sup>5</sup>

The real problem of the site, however, has remained unsolved. This problem includes the description of the terrace complex through which Sterns Creek cuts its channel, and the analysis and exposition of the several archeological manifestations associated with these terraces. This problem and the method of attack was clearly set out by Strong<sup>6</sup> in his latest published statement regarding the Walker Gilmore site:

. . . First of all, the place calls for an extended period of cooperative research on the part of both anthropologists and geographers. . . . The entire site should be mapped and each exposure given a number. . . . Meanwhile the course of the older stream as indicated by gravel and clay deposits could be mapped in by the geographers. Also the extent and relationship of the different types of soil would be diagrammed. The combined results of such a survey would be an accurate series of maps showing the old dwelling places in relation to the former stream, to the various soil deposits, and to the present gully of Sterns Creek.

The foregoing statement also makes evident the fact that if it is possible to quibble over the nature of proof for cultural stratification at this important site, then the responsibility for that situation is very largely my own. There have been many difficulties but they should have been surmounted, and the necessary procedure was clearly indicated by Strong. Such a re-examination of the site, however, is now under way, and it is possible at this time to make a report of work in progress supplementing and, in some respects, modifying the earlier inferences.<sup>7</sup>

The Walker Gilmore site comprises the gully of Sterns Creek and the terraces and cultivated field just north of the creek about one-half mile from the point where Sterns Creek enters the Missouri. The legal description of the site is the N. E.  $\frac{1}{4}$  of the N. E.  $\frac{1}{4}$ , Section 28, Township 11, Range 14, which places it in eastern Cass

<sup>5</sup> Wedel, 1940; Hill and Kivett, 1940, p. 204.

<sup>6</sup> Strong, 1935, p. 197.

<sup>7</sup> The present statement must anticipate a full report of this research by the several investigators themselves. Present plans call for a report of the terrace complex by the geologists who have conducted the field work, Professors C. B. Schultz and T. M. Stout of the University of Nebraska and Professor G. M. Luenighoener of Midland College. Mr. A. T. Hill of the Nebraska State Historical Society and Marvin F. Kivett of the Laboratory of Anthropology of the University of Nebraska will report the Nebraska Component and the writer will discuss the Sterns Creek Woodland component.



County, Nebraska, about fifteen miles south of the mouth of the Platte.

At this site, thin ash lenses, ranging from ten to more than 100 feet in length, are exposed in the vertical walls of Sterns Creek at depths of 10 to 16 feet below the surface of the fill. Sterns originally reported 17 such exposures, as did Strong who suggests, however, that the two series are not identical. My own observations indicate that as many as 25 exposures may be identified and that this number will probably include both of the earlier series. An accurate map of the entire site, showing elevations by one-foot contour lines, has been completed,<sup>8</sup> and the location and description of each exposure individually is in progress (Fig. 14).

The archeological component manifested in these lenses was described by Strong<sup>9</sup> as the Sterns Creek Culture, which he suggested was a Woodland complex "apparently related to the 'Algonkian' and Lake Michigan cultures of Iowa and Wisconsin."<sup>10</sup> Hill and Kivett,<sup>11</sup> however, in their recent analysis of Woodland manifestations in the Central Plains, concluded that

. . . on the basis of present information, Vy-1, with the cord-wrapped paddle applied in the final shaping of the outer surface of the pots, seems more closely related to the Lake Michigan phase than does the Sterns Creek pottery.

Temporal equivalence between the Sterns Creek material, the Vy-1 complex, and the Hopewellian material from the Renner site near Kansas City, is suggested in the report by Hill and Kivett<sup>12</sup> of the Leahy site near Peru, Nebraska. The area in which the Sterns Creek complex may be found is suggested by sample sherds from Mills County, Iowa in the collections of the University of Nebraska and of Columbia University and in the report by Wedel<sup>13</sup> that "closely similar sherds of this ware have recently been sent to the writer from Holt County, Mo." Thorough exploration of both banks of the Missouri between Omaha and Kansas City may be expected to disclose other sites of this kind and to provide the data

<sup>8</sup> This excellent map is the work of three graduate students in the Department of Geology, University of Nebraska, Joe Johnson, John H. Rathbone, and Willard Bunker, all recently returned to the University after serving with distinction as captains in the Army of the United States.

<sup>9</sup> Strong, 1935, pp. 177-198; 1933b, p. 281.

<sup>10</sup> Strong, 1935, p. 295.

<sup>11</sup> Hill and Kivett, 1940, p. 204.

<sup>12</sup> Hill and Kivett, 1940, pp. 196-199.

<sup>13</sup> Wedel, 1940, p. 305.

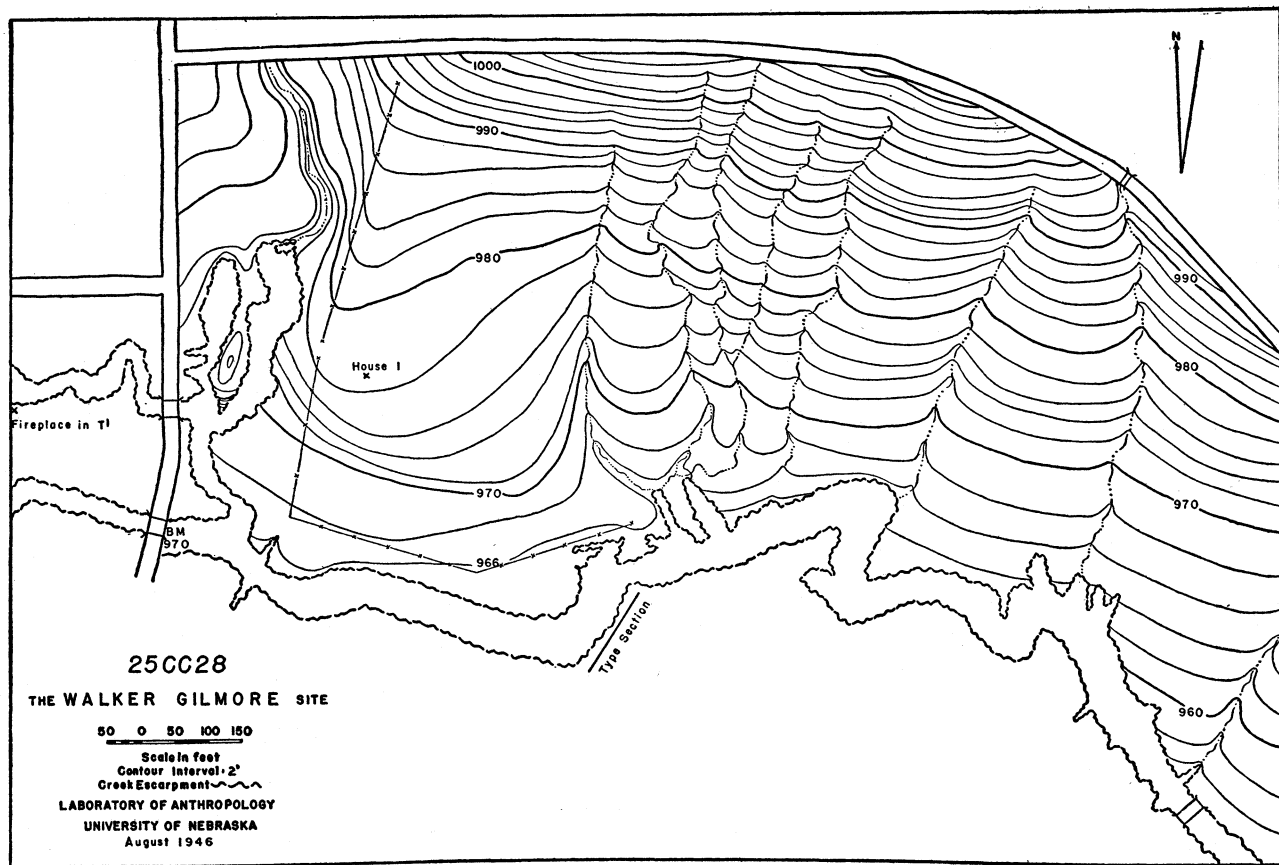
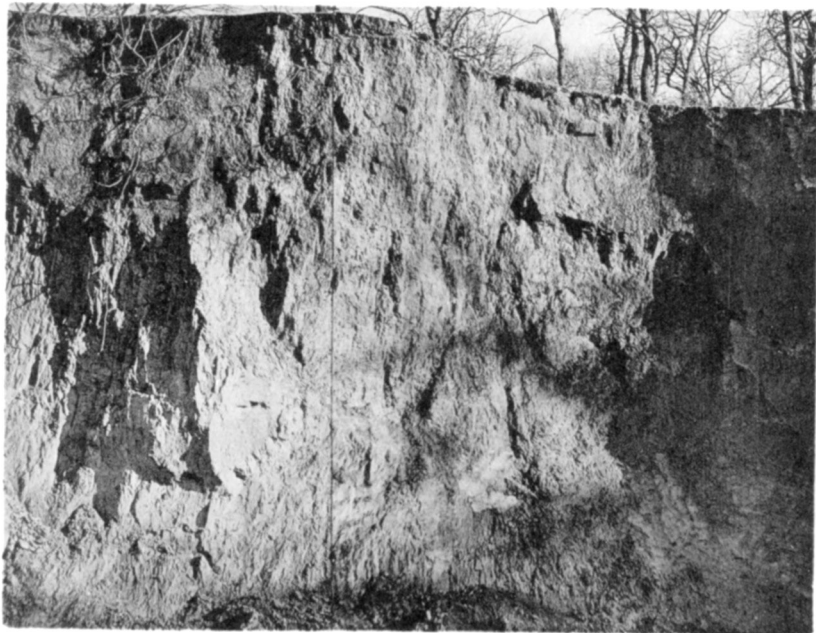


FIG. 14. MAP OF 25CC28, THE WALKER GILMORE SITE.



*Top*, EXCAVATION OF HOUSE 1 AT THE WALKER GILMORE SITE

*Bottom*, HOUSE 1, WALKER GILMORE SITE, NEBRASKA COMPONENT



*Top*, THE TERRACE COMPLEX AT THE WALKER GILMORE SITE  
*Bottom*, ASH BEDS IN THE STERNS CREEK WALL, WALKER GILMORE SITE

needed for a definitive statement of the complex. Pending such an investigation, the best estimate of the Sterns Creek ceramics and the culture complex for which they stand, seems to be that they represent a variant type of Woodland, roughly equivalent in time to the Vy-1 material or, it may be, a little older.

This review of the Sterns Creek component adds little that is new to the earlier statements. Consideration of the terrace complex, however, with respect to the archeological manifestations will require some modification of earlier opinion.<sup>14</sup> Sterns'<sup>15</sup> excellent description of the gully itself will make a good beginning for this reconsideration.

The stream formerly had a winding southeasterly course across the alluvial terrace; but the owners of the property diverted the creek a few years ago by digging a drainage ditch almost due eastward. The great shortening of its course thus produced has caused it to cut the gully which it now occupies. This gully averages about 30 feet in width and 20 feet in depth, and has almost vertical walls.

In places its sides and bed are composed of a yellow loess-like clay similar to that which forms the neighboring river bluffs, while in other places it cuts through deposits of blue "gumbo" clay, such as is common in the creek beds of the region, or through creek gravels, or through secondary loess such as could occur only as wash from the hills. The distribution of these various materials in the gully and for some distance in its banks (as determined by boring with a long auger) makes it clear that the present stream is cutting across the course of an older stream whose channel was wider than that of the present creek. The banks of the older stream valley had a much gentler slope than those of the present gully, and its course was not the same as that of the present stream. Where the latter cuts the old channel, the gully walls consist of "gumbo" clay, gravel or secondary loess. Where it does not cut the old valley, the walls are the original clay.

This differentiation of two or more fills within the gully walls agrees with present findings, but it is noteworthy that neither Sterns nor Strong discuss the variation in the surface topography which is correlated with these terrace fills. Both authors speak of "the flats around the gully"<sup>16</sup> without commenting on the differences in elevations which exist. The difference in height of the surfaces of the two major terrace-fills can be determined readily from the map

<sup>14</sup> The following discussion of the terrace complex is based on information supplied by Professors Stout and Schultz after their preliminary surveys were completed.

<sup>15</sup> Sterns, 1915, pp. 122-123.

<sup>16</sup> Sterns, 1915, p. 123; Strong, 1935, p. 177.

of the site (Fig. 14). House 1 is shown on the upper level with a moderately sharp drop just to the south. The lower terrace is marked by a broad and relatively level surface which extends from the scarp above the creek to the foot of this rise in front of House 1. In the type section of the gully wall (Pl. 18, top) the upper level is shown on the left and the lower level is at the right, tending to lap up against the face of the higher terrace at the point of contact. Well-developed ash lenses containing Sterns Creek material begin a few feet to the right of the picture and extend more than one hundred feet along the creek in both walls. The material composing this terrace-fill is a gray silt, laid down in many fine laminae. Some of these bands can be traced over much of the site wherever this fill is exposed, thus serving as a datum plane for correlation of the discontinuous ash lenses of the Sterns Creek component. This terrace-fill, in which all of the Sterns Creek lenses are found, is the most recent fill at the site, and may be tentatively identified as  $T^0$ , the flood-plain fill, or its equivalent.<sup>17</sup>

The next higher terrace-fill, tentatively identified as  $T^1$ , is readily distinguished from  $T^0$  in color and structure as well as in elevation. It is composed of bright yellow re-worked loess showing some stratification but lacking the very fine lamination which is characteristic of the lower part of  $T^0$ . Clearly defined contacts between the two terrace-fills can be distinguished at many places in the site. Such a contact is actually very well defined in the type section (Pl. 18, top) although the photograph does not show it very well. Contact between  $T^0$  and  $T^1$  slopes down and to the right from the break in the upper level near the upper center of the picture to a point just below the center of the right-hand margin of the photograph. In the lower right-hand portion of the picture, the  $T^1$  meander core reveals a remnant which may represent a still older terrace-fill or even the loess bed rock. This remnant has been outlined by shovel marks in the picture.

For the present, it may be said that the identification of  $T^0$  and  $T^1$  seems reasonably certain, and that it seems very probable that further work will establish the relationship of these later fills to the earlier Pleistocene-Recent history of eastern Nebraska. Archeological evidence at the site is related to the terrace sequence in several ways. First, all Sterns Creek ash lenses are contained in  $T^0$ , from ten to 16

<sup>17</sup> Schultz and Stout, 1945.

feet below the present surface and below an obvious band of light-colored silt traceable throughout the site. Second, the cultivated field north of the gully, the so-called "flat," in which the material identified as Nebraska Culture is found, is the upper surface of T<sup>1</sup>. Third, charcoal occurs five feet below the surface of T<sup>0</sup> but clearly above the light-colored silt band which overlies the ash lenses. Finally, Weldon Frankforter, Associate Curator of the Museum, University of Nebraska, located a small fireplace thirteen feet eight inches below the surface of T<sup>1</sup> in what is clearly the yellow T<sup>1</sup> fill. It is very nearly level with an old soil zone within T<sup>1</sup> a short distance down stream in the same outcrop. No artifacts or other evidence which might permit cultural identification were recovered from this location.

The Sterns Creek component has already been discussed, but some comment on recent work on the Nebraska component is essential to an analysis of the site. Strong<sup>18</sup> in 1935, identified this manifestation as a component of the Nebraska Culture and summarized the available evidence for the location of the Nebraska Culture village in the following statement:

On the flats around the gully Sterns found numerous potsherds and a few flint implements. We will describe this pottery later, but for the present it will suffice to say that in the main it resembles the ceramic remains from the rectangular earth lodges (i.e., the Nebraska Culture). As the flat has been plowed since 1857, at present no visible traces of house pits remain, but there was a remarkable concentration of pottery on the flat compared to its scarcity in the gully of Sterns Creek itself and its total absence on the surrounding ridges. These observations made by Sterns were corroborated by our own work here in 1930 and 1931. Hence he argues with reason that the rectangular-earth-lodge people dwelt on the flat itself and not on the ridges above. Since there is thus no evidence that the present surface cultural debris was washed down from the higher ground we can safely assume that the present surface of the flat on both sides of Sterns creek represents the living level of the prehistoric rectangular-house people.

The correctness of these inferences by Sterns and Strong has now been confirmed by actual excavation. Test pitting in the north field during several reconnaissance and mapping trips to the site demonstrated the presence of potsherds and village debris below the plow line to a depth of twenty inches or more over much of the area. A cache pit was located and excavated and found to contain abundant sherds of Nebraska type pottery and a few unmistakable sherds of

<sup>18</sup> Strong, 1935, p. 197.

Sterns Creek pottery as well. In March, 1946, a party of students from the Laboratory of Anthropology at the University of Nebraska engaged in extensive testing of the area under the direction of Mr. A. T. Hill and myself. Careful observation of the tests by Marvin Kivett, my research assistant, led to the location and subsequent complete excavation of a typical Nebraska Culture earth lodge floor (Pl. 17, fig. 14) located in the north field, not far from the point marked A on Strong's map of the site.<sup>19</sup> The detail of these excavations will be included in a subsequent report; for the present, it suffices to say that the location of a typical Nebraska Culture village, in the north field, as predicted by Sterns and Strong, is fully confirmed.

It has already been indicated, however, that in one respect the present observations differ from those by Sterns and Strong. Both writers speak of the location "on the flats around the gully" but do not differentiate between the surfaces of T<sup>1</sup> and T<sup>0</sup>. Careful examination of the remains with special reference to this problem shows that all of the Nebraska Culture material is derived from the upper surface of T<sup>1</sup>, and that the house pit and cache pits are excavated into the upper surface of this terrace. Deep borings through the bottom of a cache pit below the house floor demonstrated thirteen feet of yellow loess typical of T<sup>1</sup>.

The precise location of both the Nebraska and the Sterns Creek component has been stressed since these data are crucial to the question of cultural stratification. It now appears that the major manifestations of the two components are not directly super-imposed as had been implied in earlier statements but rather, that the Nebraska culture village lies on the upper surface of T<sup>1</sup>, the older terrace, and the Sterns Creek component is contained within the younger terrace, T<sup>0</sup>. The case for stratification, however, is not lost. Strong as well as Sterns mention the presence of occasional charcoal in the gully walls about four feet below the surface, and my own observations confirm this occurrence. The vertical walls of a lateral gully now working back into the north field east of House I, show an excellent sloping contact between T<sup>1</sup> and T<sup>0</sup>. Five feet below the surface of T<sup>0</sup> and just at the point of contact is a small bed of charcoal. The position of this deposit suggests a mid-den developed between the earth lodges in the north field and

<sup>19</sup> Strong, 1935, p. 176.



Sterns Creek, although proof of this theory will require actual excavation. No artifacts have been found at this level by recent parties nor are any reported by Sterns or Strong from the charcoal of much the same level which they report. Sterns' original field notes,<sup>20</sup> however, contain the following statement, which if not sufficient to prove cultural stratification *per se*, at the very least indicates that direct proof may be had by further excavation. Sterns says:

Where the creek gully breaks through the old river gully, there begins an artificial cut, which extends to the river, passing through river alluviums the whole distance. Near the head of the cut, at a depth of four feet, were traces of charcoal and rocks with a few fragments of pottery similar to the firepits of Rock Bluffs.

The current opinion of the Sterns Creek archeology, then, may be summarized briefly. Sterns Creek, at the Walker Gilmore site, cuts through at least two terrace-fills which are believed to be equivalent to T<sup>0</sup> and T<sup>1</sup> which have been identified on the Platte River and elsewhere in the Central Plains. A series of ash lenses, the manifestation of the Sterns Creek Woodland component, is contained within T<sup>0</sup> which is the more recent of the terrace-fills. The Nebraska Culture component is located on or excavated into the upper surface of T<sup>1</sup>, the terrace next older than T<sup>0</sup>. A seam of charcoal reported by all observers independently, four to five feet below the present surface of T<sup>0</sup>, may represent midden material from the Nebraska Culture village located on T<sup>1</sup> when the surface of T<sup>0</sup> was four or five feet lower than at present. Sterns' report of Nebraska Culture sherds in this location make this hypothesis seem highly probable at the least. The newly-found fireplace deep within T<sup>1</sup> adds a third but as yet unidentified component in stratigraphic relationship to the Nebraska material on the surface of T<sup>1</sup>.

This summary of work in progress may seem overlong. The importance of this small site in Central Plains archeology may serve as justification, if it be needed. Strong made full use of the culture sequence in his *Introduction to Nebraska Archeology*, and, more recently, Carter<sup>21</sup> finds the Sterns Creek data of importance to his thesis. Roberts' comments<sup>22</sup> regarding the Sterns Creeks material, in his analysis of Carter's interpretations, may well serve as a final

<sup>20</sup> Sterns, 1914, Mss., p. 162.

<sup>21</sup> Carter, 1945.

<sup>22</sup> Roberts, 1946, p. 267.

note pending the completion of the re-examination of the Walker Gilmore site. Roberts says:

The Sterns Creek culture, as far as known, is restricted in range and somewhat anomalous in that its chief distinguishing feature is the pottery. That it could be identified solely from its other artifacts is questionable. Furthermore, until sampling comparable to that done in other sites of the general area has established that the lack of corn and beans is actually a negative trait, its use as evidence for a pre-Central American agricultural level seems a bit forced. Before they can take their proper place in the archeological picture some of the Sterns Creek sites must be worked downward, level by level, and not dug into, a little here and a little there, along the gully bank.

### BAKENHUS

During the field season of 1936, and again in 1941, the Nebraska State Historical Society Archeological Survey explored a series of sites along Loseke Creek, a small tributary of Shell Creek, which is, in turn, an affluent of the Platte River in east-central Nebraska. A brief report of the site was made by Hill and Kivett from which this account is summarized.<sup>23</sup>

Pottery identified as Upper Republican was found in close association with Woodland remains. An earth lodge of Upper Republican type, including the usual artifact inventory for the complex, was located on the present surface of a rather extensive terrace on the eastern bank of the creek. About four hundred yards downstream, where the stream is now cutting the front of a fill apparently equivalent to that bearing the earth lodge, abundant pottery of Woodland type was found in a distribution which indicated redeposition during the time the terrace was being built up. Other Woodland remains were found beneath the surface of a small terrace a short distance upstream; Hill and Kivett suggest the possibility that this is the source of the redeposited material. Definitive statement must wait for a physiographic analysis of the terraces; current opinion is, however, that the Woodland material will prove older than the Upper Republican at this site.

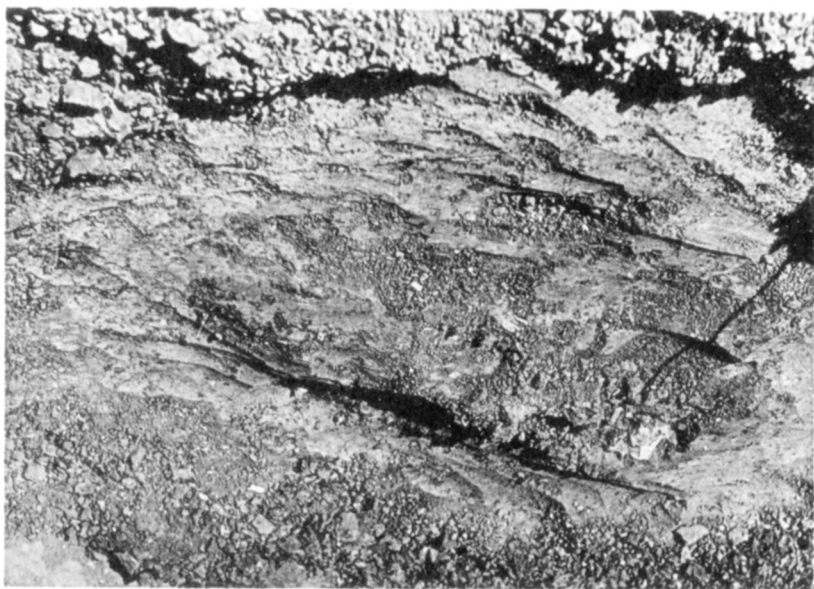
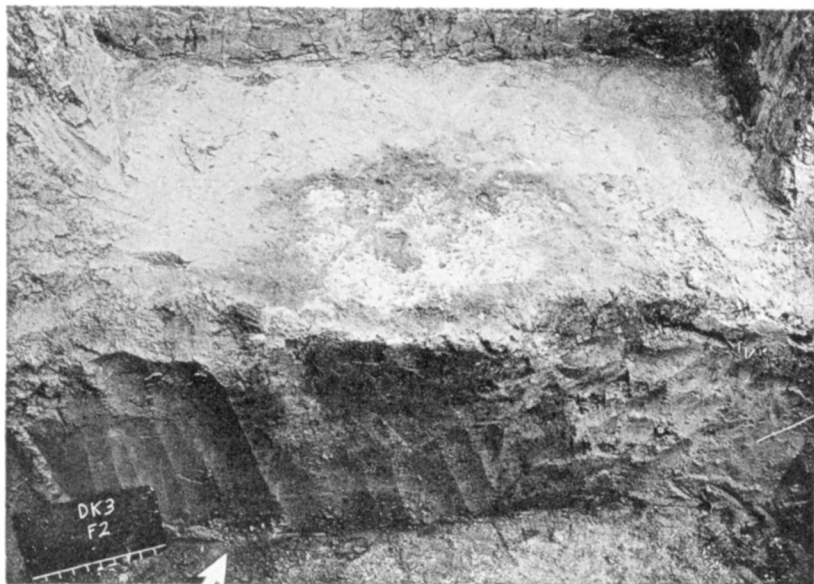
### DK-3

Survey sheets in the files of the Laboratory of Anthropology, University of Nebraska, show that in 1939 Dr. E. H. Bell and Stanley Bartos, his field assistant, located remains, including pottery of

<sup>23</sup> Hill and Kivett, 1940, pp. 211-215.



FIREPLACE IN THE WALL OF FIDDLER CREEK,  
DAKOTA COUNTY, NEBRASKA



*Top*, CLOSE-UP OF FIREPLACE SHOWN IN PLATE 19

*Bottom*, BURNED EARTH, BONE, AND ARTIFACTS IN THE FLOOR OF  
FIDDLER CREEK

Woodland type, from ten to fifteen feet below the surface of a terrace near the headwaters of Fiddler Creek, a small tributary of Omaha Creek. The site is located about six miles west and a little south of Homer, Dakota County, in northeastern Nebraska.

In 1940, Dr. F. H. Sterns accompanied me in a preliminary reconnaissance and in August, 1941, a field party, supervised by Robert Cumming of Columbia University, made a thorough examination of the site. Actual excavations, in 1941, were limited to shaving down the walls of the gully through which the creek flows and to the location and examination of a number of fireplaces and other evidences of human occupancy within the gully walls. Since continuing observations were necessary, three permanent datum points were installed and a three-dimensional grid system was imposed on the site to facilitate periodic re-examinations. The following report is summarized from the excellent field notes and maps filed by Cumming.<sup>24</sup>

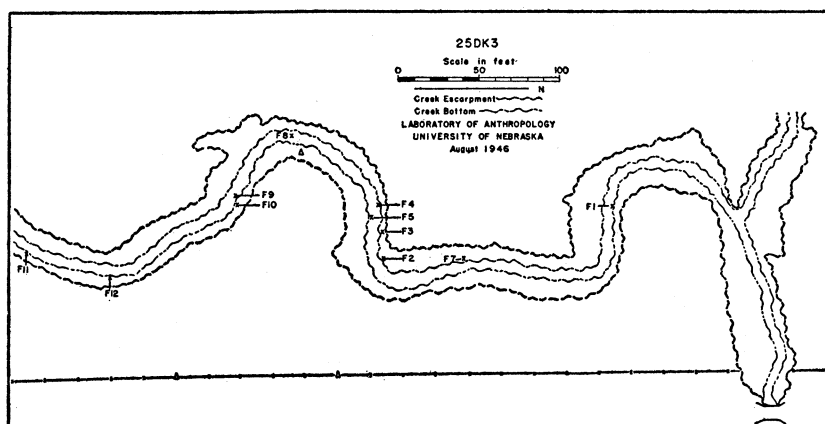


FIG. 15. MAP OF 25DK3.

Site Dk-3 is located in the N  $\frac{1}{2}$  of NE  $\frac{1}{4}$  Section 23, 2 27N, R 7 E in Dakota County, Nebraska. At this point near the headwaters of Fiddler Creek, a recent gully, now 10 to 12 feet deep, has been cut into an unbroken pasture which was a marsh not so long ago. Local people report that the little stream, now intermittent, has developed in the last thirty years, perhaps from a spring which formerly existed near its head.

<sup>24</sup> Cumming, 1941. Mss. field notes, DK-3, on file at the Laboratory of Anthropology, University of Nebraska, Lincoln, Nebraska.

Ten to twelve feet below the present surface of the pasture, Cumming found a number of fireplaces, containing white ash and red burned earth beneath (Pls. 19, 20). Associated with these fireplaces were small amounts of stone, burned bone and occasional potsherds of a Woodland type (Pl. 22, e). My own observations confirm Cumming's opinion that the fireplaces, with abundant white ash, are *in situ* and that the material is not re-deposited.

The cross sections and soil profiles of the gully wall indicate several strata, apparently water-laid, and varying in type from point to point along the walls. The site has not been examined by geologists and a definitive statement is not possible on present data.

Twelve "features" were described by the archeologist.<sup>25</sup> Four of these (Fig. 15, F. 2, 3, 4, 7) were fireplaces (Pls. 19, 20) with much red burned earth and white ash. Four others (Fig. 15, F. 5, 8, 11, 12) were probably temporary camp fires with ash and charcoal but no burned earth. Sherds of Woodland pottery (Pl. 22, e) are reported in association with the four fireplaces and two of the temporary hearths. Moderate amounts of bone were recovered, and nearly all of this material is deer.<sup>26</sup>

All of the sherds found *in situ* in the fireplace level were identified as Woodland. Occasional sherds of Nebraska Culture pottery are found in the gully bottom and these have apparently been washed from their original place of deposition elsewhere. The sherd collection of Mr. Viggo Petersen, who lives nearby, includes a good representation of both types of pottery. He recalls that part of the Nebraska type ware was found on a small bench on the right bank of Fiddler Creek, just above the site. Careful search by the field party, on this terrace and elsewhere, failed to locate the source of the Nebraska Culture pottery.

The general picture again is that of a component identified as a Woodland variant on a level 10 feet below the present surface of a recent fill with a second component presumably located on a higher level. War conditions have prevented observations since 1941, but search for the exact location of the Nebraska component will be undertaken with the resumption of field work.

<sup>25</sup> The term "feature" is used in a special sense. Any situation which the archeologist considers worthy of separate description is identified by the non-classificatory term "feature." It may be a fireplace, an aggregate of artifacts or even a soil profile.

<sup>26</sup> Personal communication, Weldon Frankforter, University of Nebraska, June 10, 1945.

## SKULL CREEK SITES

Skull Creek is a small tributary of the Platte River, in northeastern Butler County, in central Nebraska (Pl. 21; fig. 16). A terrace on the right bank of the creek just north of the point at which it cuts its way through the bluffs bordering the Platte Valley on the south, is the site of an historic Pawnee village. This village site and the extensive burials along the nearby bluffs, Bu-1, were investigated by Strong and Wedel, in 1932, and by Hill and the writer in 1939. Neither of these excavations has been reported formally except for brief statements by Wedel<sup>27</sup> in connection with his identification of the site as a Grand Pawnee village.

About two miles upstream, on the west bank of Skull Creek, a very high terrace was the site of a second village and burial ground, Bu-4, explored by A. T. Hill and myself in 1939. The final report has not been published but the complex can safely be assigned to the Pawnee, of an earlier type than Bu-1.

Directly across Skull Creek from the upper village is a low alluvial plain where occasional finds of Pawnee type potsherds have been made. Evidence of a village located on this surface is lacking although the possibility cannot be ruled out on present evidence.

Rising out of this alluvial plain are a number of low ridges which appear to be erosion remnants or outliers from the bluffs. Small amounts of Nebraska or Upper Republican type pottery were found on these ridges but no sherds of this kind were reported from the surface of the plain itself. Time did not permit excavation on these ridges but a group of local enthusiasts dug a large pit through the remains of an earth lodge located on a similar low ridge about one mile upstream. I inspected the pit and could identify the well-burned basin type fire-pit and the general floor level as well as what may have been a post hole.<sup>28</sup> Pottery from the excavation was of the type found on the low ridges. About a half mile upstream from this earth lodge site, pottery recognizable as Woodland was found about fifteen feet below the surface of a terrace-fill which appears to be a continuation of the alluvial plain mentioned. The land owner, Mr. John Kopecky, found the pottery and other material (Pl. 21) while cutting a ditch for the purpose of shortening Skull creek.

<sup>27</sup> Wedel, 1936, pp. 29-31, 55, 75, 93.

<sup>28</sup> Champe, Field notes, 1939, Mss.

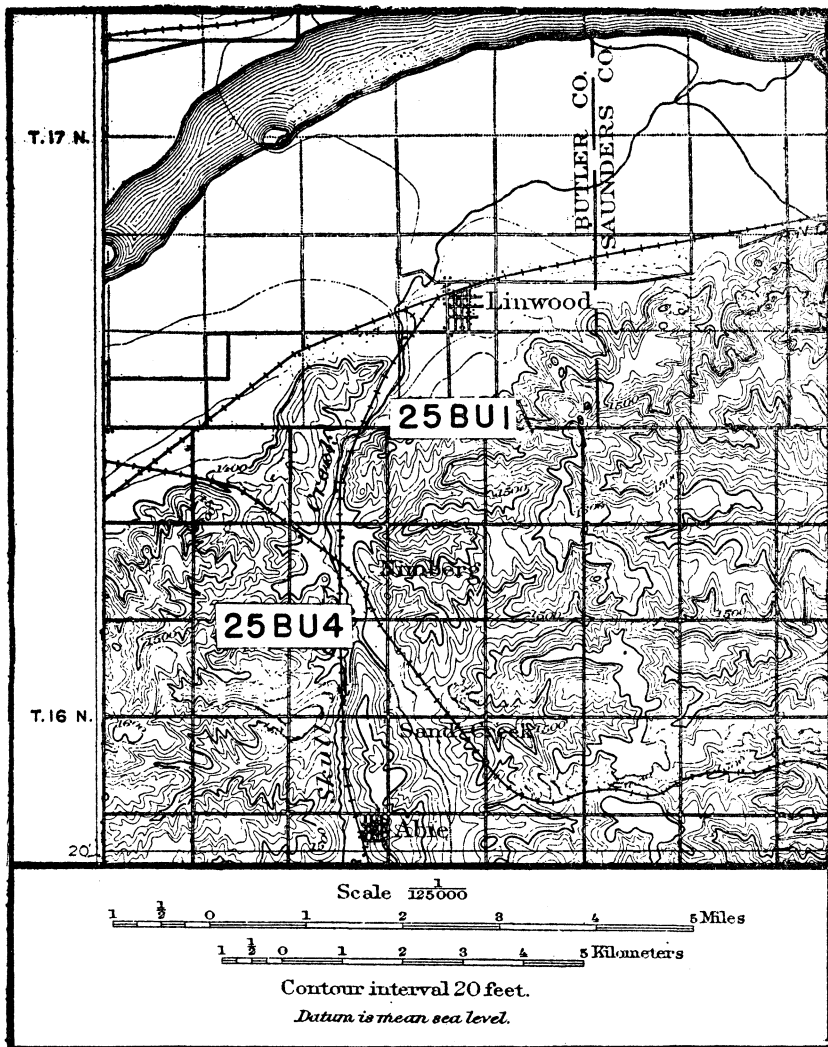
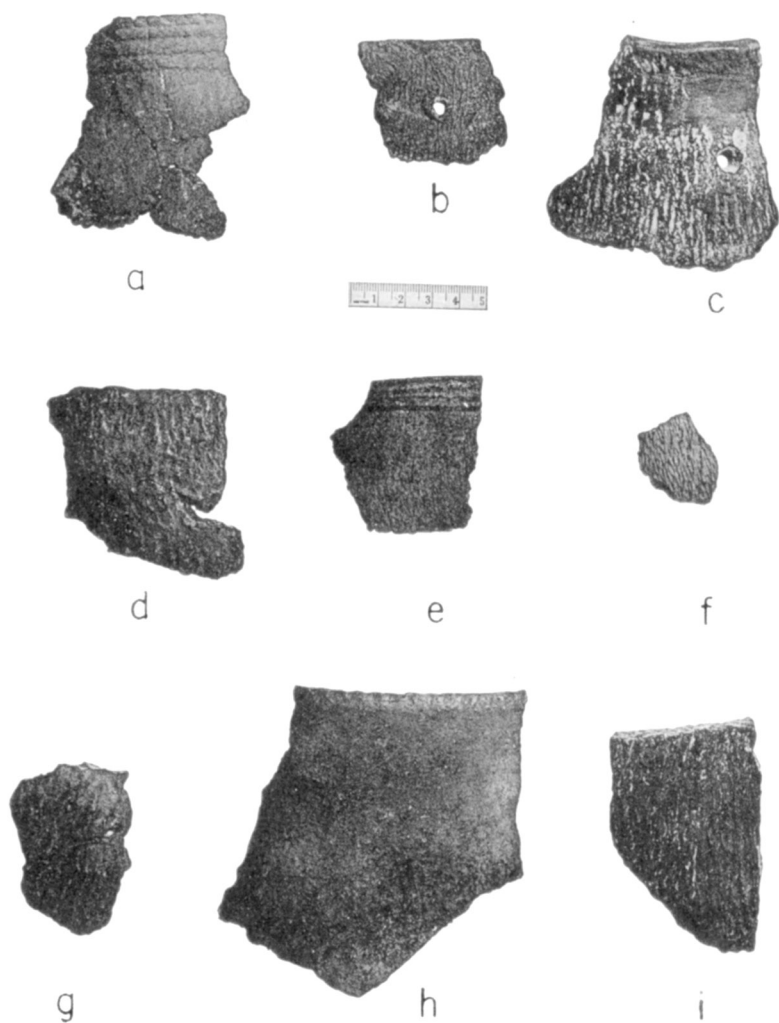


FIG. 16. MAP OF SKULL CREEK SITES.





ARTIFACTS FROM THE SKULL CREEK SITES,  
BUTLER COUNTY, NEBRASKA



WOODLAND POTTERY TYPES FROM THE CENTRAL PLAINS

Inspection of the place at which the pottery was found showed some charcoal and other camp refuse but no pottery could be found. The fact that the lens, if that is what it was, lay just below the level of the small creek made thorough investigation impossible.

None of these sites has been worked, except the Pawnee villages, Bu-1 and Bu-4, and present interpretations rest on reconnaissance by Hill and myself during the progress of the excavations downstream in the summer of 1939 and on two or three short trips since that time. The low terrace mentioned appears to me to be equivalent at the various points mentioned but no competent physiographer has considered the situation. If such equivalence is assumed, then the Pawnee material is located stratigraphically above the Woodland. The earth lodge and Upper Republican pottery, however, are found on the surface of the little ridges above the terrace surface. As at Sterns Creek, the exact relationship of these outliers to the terraces must be worked out but thorough excavation just at the contact between the terrace-fill and the ridges appears most likely to demonstrate any cultural stratification which may exist.

The likenesses between the sites just described are striking but there are a number of differences which need examination. In all cases, the deeply buried component is described as Woodland, largely on ceramic criteria. I am in full agreement with these identifications, but the fact that there are at least four pottery types should not go unnoticed. The most common kind of Woodland pottery is that found at Valley 1, the type site of the Valley focus, at Ash Hollow Cave, and the White River terraces, among sites discussed here (Pls. 8 and 22, f, 1). The Sterns Creek type (Pl. 22, h) is less widely known at present but will probably be reported from more sites along the Missouri River as times goes on. The Dk-3 variant (Pl. 22, e) is reported so far only from the one site and the Eagle Creek sherds (Pl. 22, a, d) are very nearly duplicated from Ash Hollow Cave (Pl. 22, g). It seems probable that there are time differences which can be determined between these several Woodland ceramic types although positive evidence is not yet available. Only a few hints can be gathered. The depth of the Lens D at Ash Hollow suggests an occupation of hundreds of years in all, with some indications that the Vy-1 type of Woodland pottery came in fairly late. A few grains of corn have been found in association with this same

kind of pottery<sup>29</sup> but the details of the find have not been reported. It seems entirely possible that the Sterns Creek or the Dk-3 type of Woodland may be older than the more widespread Vy-1 type but, for the present at least, positive proof seems lacking.

The upper or more recent components at these sites are identified as Nebraska, plus Upper Republican traits, at the Walker Gilmore site and as Upper Republican at Bakenhus. The components at the other sites were tentatively called Nebraska on the basis of a few sherds in private collections. The general chronological equivalence of the Upper Republican and Nebraska aspects was noted by Strong<sup>30</sup> in his identification of the aspects and subsequent research tends to strengthen that opinion. It is significant, despite any technical difficulties over the exact stratigraphic relationship of the two components, that in every case a component identified as Woodland is buried within a terrace-fill and a component identified as Nebraska or Upper Republican is to be found on or near the surface. The additional evidence that no report exists of the upper level type pottery being found in the lower horizon makes the precedence of the Woodland in time seem assured.

The few sherds of Pawnee type pottery found on the surface of the Skull Creek terraces provide the only tie with horizons later than the Nebraska or Upper Republican. Since the large site across Skull Creek from these finds can be assigned to the Lower Loup focus, the recency of the pottery can be attested on other than stratigraphic grounds.

The need for a thorough study of all of these terraces, by geologists cooperating with archeologists, seems most obvious. A definitive statement of stratigraphy and cultural sequence, as Strong has pointed out, depends on the careful investigation and analysis of the terrace complexes at each site. The benefits, it may be noted, need not be too one-sided in favor of archeology. If we follow Schultz and Stout<sup>31</sup> in assuming the general equivalence of the terraces throughout the Platte River area, rough estimates of the dates of the later terrace-building become possible. For example, T<sup>1</sup> would have been built and the creek channels again scoured out by Woodland times, that is, before 1000 A.D. The building of T<sup>0</sup> took place largely after Woodland times and must have been com-

<sup>29</sup> Hill, 1941, p. 7.

<sup>30</sup> Strong, 1935, pp. 274-275; Wedel, 1943, p. 215.

<sup>31</sup> Schultz and Stout, 1945, p. 244.

pleted during or shortly after the Nebraska or Upper Republican occupation, that is, between *circa* 1300 A.D. and 1600 A.D. more or less.

These speculations have a striking parallel in the conclusions drawn by Hack<sup>32</sup> in his study of the terraces in Tsegi Canyon in Arizona. In this canyon, Hack finds evidence of a terrace building cycle, after 2000 B.C. and complete around 900 A.D., followed by an erosion, the Tsegi-Naha, about 1300 A.D. and a second terrace building episode between 1300 and 1700 A.D.

Tsegi Canyon in north central Arizona is a long way from the Central Plains but the close parallel in dates between these Tsegi terraces and T<sup>0</sup> and T<sup>1</sup> in the Central Plains, respectively, should repay further investigation.

There are a number of other sites in the general Central Plains area which offer more or less convincing evidence of cultural succession. These have been listed in Appendix III with a short statement as to the type of evidence found at each site. It may be said here that there is no suggestion from any of these sites which contradicts the sequences set up here on stratigraphic or other grounds. Much of the data from these remaining sites are now unreported, and the list is included here in the interest of completeness.

<sup>32</sup> Hack, 1945, pp. 151-158. I am indebted to Prof. T. M. Stout for calling this report to my attention.

# STRATIGRAPHY AND TIME PERSPECTIVES IN THE CENTRAL PLAINS

## SUMMARY AND CONCLUSIONS

The data which have been introduced demonstrate that the succession of cultures found at Ash Hollow Cave, together with the Signal Butte sequence, provides the core of a stratigraphic sequence for the Central Plains; first, because the data are abundant and second, because the stratigraphy is adequate and is confirmed by independent dendrochronological studies of the charcoal from the Ash Hollow deposits. Two other stratified sites, Pottorff and Sondergaard, confirm this stratigraphy in part and operate to extend the area for which the stratigraphic sequence holds good.

Less complete evidence for cultural sequence is available from the T<sup>1</sup> and T<sup>2</sup> terraces on the upper White River and from later eastern Nebraska terraces, which may be equivalent to the T<sup>0</sup> terraces of western Nebraska. Woodland components, present at all of these terrace sites, permit the association of the terrace data with the sequences from the stratified sites although full correlation of components is not yet possible.

The stratigraphic sequence from Ash Hollow may be used to clear up situations previously indeterminate and to add new steps within the previously existing sequence. At Ash Hollow, the clear separation of Lens A, which is the Dismal River component, from lenses B and C, which include components of the Upper Republican aspect, clarifies the mixture of these same cultural complexes in Signal Butte III (Fig. 17). A Woodland component is found in Lens D at Ash Hollow but no such manifestation is reported from Signal Butte. Woodland components, however, do appear below Upper Republican horizons at the Pottorff and Sondergaard stratified sites and, as has been noted, they form a linkage with all of the terrace sites. Below Lens D at Ash Hollow, which is the lowest ceramic horizon, three successive non-ceramic components are identified in lenses E, F, and G. These non-ceramic components, on the basis of tree-ring counts by H. E. Weakly, are believed to be substantially younger than Signal Butte II although they resemble it in some particulars. A combination of the sequences from Ash Hollow and Signal Butte yields a sequence which includes three major

ceramic and five non-ceramic horizons. There are also strong suggestions of the presence, at Ash Hollow, of new components in lenses C and D, which are not yet identified elsewhere.

The terrace sequences from the White River can be correlated with the stratigraphic sequence by the common presence of a Woodland component. The five soil zones which underlie this Woodland material in terrace T<sup>1</sup> of the White River cannot be compared directly with the non-ceramic lenses at Ash Hollow or levels I and II at Signal Butte. There are resemblances in the artifact inventories from the three localities but a reliable identification and correlation of components from these sites will require more data from the White River terraces. Only recent faunal remains are reported from T<sup>1</sup>, Signal Butte, and Ash Hollow, and for that reason the T<sup>1</sup> soil zones are set in parallel with the non-ceramic lenses at Signal Butte and Ash Hollow but without attempt at cross identification of components.

The older terrace, T<sup>2</sup>, at White River is reported to contain Yuma points and bones of extinct animals. Schultz and Stout<sup>1</sup> also specify as T<sup>2</sup> the terrace just below Signal Butte, in which the Scottsbluff Bison Quarry<sup>2</sup> is located. This quarry, which also yields extinct animal remains and Yuma points, offers additional evidence for the placement of Yuma as older than Signal Butte I.

A non-ceramic stratum C is reported by Wedel<sup>3</sup> at the Pottorff site below the Woodland stratum, which is overlaid, in turn, by an Upper Republican zone. The placement on the chart (Fig. 17) of the C component at the Pottorff site as a possible equivalent of Ash Hollow Lens E is entirely arbitrary.

The eastern Nebraska terrace sites may be linked to the stratigraphic sequence by the Woodland components included within the terraces. At the Bakenhus site, re-deposited Woodland sherds are found within a recent terrace above Loseke Creek and Upper Republican remains are reported nearby on what seems to be the surface of the same terrace. At Skull Creek, the Woodland component reported from within the terrace is of much the same type but the remains from the small ridges near the surface of the terrace are tentatively classified as Nebraska Culture. At the Walker Gilmore site, the lower level component is Sterns Creek type Woodland and the more recent component is Nebraska Culture. The Dk-3 ter-

<sup>1</sup> Schultz and Stout, 1945, p. 244.

<sup>2</sup> Barbour and Schultz, 1932, 1936; Schultz and Eiseley, 1935, 1936; Schultz, 1932.

<sup>3</sup> Wedel, 1941, pl. 5.

TIME DIVISIONS			STRATIFIED SITES				SITES IN TERRACES				
			Ash Hollow	Signal Butte	Pottorff	Sondergaard	White River	Walker Gilmore	Bakenhus	Dk-3	Skull Creek
HISTORIC			SURFACE								
CERAMIC	Late	1700 A.D.	A DISMAL RIVER	SIGNAL BUTTE 3 DISMAL RIVER a							
	Middle	1500 A.D.	B UPPER REPUBLICAN C	UPPER REPUBLICAN	UPPER REPUBLICAN	UPPER REPUBLICAN		NEBRASKA	UPPER REPUBLICAN	NEBRASKA	NEBRASKA
	Early	1300 A.D.	WOODLAND D		WOODLAND	WOODLAND	WOODLAND	WOODLAND	WOODLAND	WOODLAND	WOODLAND
LITHIC	Inter- mediate	1000 A.D.	E		STRATUM C		TERRACE T1	A Tentative Stratigraphic Sequence  and comparison of Central Plains sites			
		600 A.D.	F								
		300 A.D.	G								
		1 A.D.									
	Early			SIGNAL BUTTE 2							
		3000 B.C.		SIGNAL BUTTE 1							
		8000 B.C.					TERRACE T2 YUMA				

FIG. 17. A TENTATIVE STRATIGRAPHIC SEQUENCE AND COMPARISON  
OF CENTRAL PLAINS SITES.



ances include a third type of Woodland pottery with some evidence of a Nebraska component on the surface although the exact location of this horizon has not been determined.

In general, the evidence for stratigraphy and cultural succession from the eastern terraces, like that from the White River terraces, is less complete and satisfactory than the data from the four stratified sites in western Nebraska and Kansas. It is significant, however, as Wedel<sup>4</sup> has pointed out, that the older and lower-lying component in these eastern terraces is always identified as Woodland despite some variation in ceramic type.

Estimated dates for the lenses at Ash Hollow Cave are made possible by Weakly's preliminary tree-ring sequences from the cave charcoal. An estimated date of 1684–1704 for the occupation of Lens A is a satisfactory date for the Dismal River component. The terminal occupation of Lens B, perhaps a late Upper Republican manifestation, may be dated tentatively from *circa* 1450–1517 A.D. Lens C, in which the major component resembles the Lost Creek type Upper Republican, must have begun about 1300 A.D. or, perhaps, shortly before. The distinctive ceramic types S and T from this lens argue the presence on the western Plains of other than Upper Republican groups at this same time.

Lens D is given an estimated date of from 1000–1150 A.D. after allowing some fifty years arbitrarily for the gap between lenses D and C. The major component of Lens D is a Woodland type very much like Valley focus, but three other components are suggested by ceramic types T, X, and Y, as well as by the artifact inventory.

Estimates for the non-ceramic lenses may be made by assuming that the deposit below Lens D, nearly one-half of the total thickness, was laid down in approximately the same time that has elapsed since the beginning of Lens D. On this speculative basis, the following dates are suggested: Lens E, 600–850 A.D.; Lens F, 300–400 A.D.; Lens G, 0–100 A.D. The area for which the stratigraphic sequence holds good is limited to the western part of the Central Plains for the earlier non-ceramic horizons. No data are now available for the eastern part of the area until Woodland times. The ceramic components, however, are well represented throughout the entire Central Plains although there is some variation in ceramic types. The location of three or more varieties of Woodland pottery beneath

<sup>4</sup> Wedel, 1943, p. 216.

eastern Nebraska terraces sets a minimum date for the Woodland pattern, but it does not preclude Sterns Creek or Dk-3 pottery from being somewhat older than the Valley focus.

The general contemporaneity of the Nebraska and Upper Republican aspects has been conceded<sup>5</sup> but the consistent occurrence of these complexes on or near the surface of the eastern terraces adds confirmation of their equivalence in time.

Consideration of the sequences from stratified and other multi-component sites in the Central Plains (Fig. 17) indicates no inconsistencies which need reconciliation although complete correlation of all non-ceramic components is not yet possible. Comparison of this stratigraphic sequence (Fig. 17) with the earlier formulations by Strong<sup>6</sup> and Wedel<sup>7</sup> indicates full agreement.<sup>8</sup>

The stratigraphic data, then, from Ash Hollow Cave, supported by independent dendrochronology, permit sequential arrangement of all known culture complexes in the Central Plains, prior to *circa* 1500 A.D. This stratigraphic culture sequence tests and confirms earlier cultural sequences and will permit the formulation of a generalized chronology for the area.

## TIME PERSPECTIVES

The preceding section has been devoted to an evaluation of the stratigraphic data and to the arrangement of site and regional sequences for much of the Central Plains. We can now proceed to draw from these data further inferences for chronology and history.

Three main periods of occupation of the Central Plains may be recognized at once, and those periods may be identified, beginning with the oldest, as Lithic, Ceramic, and Historic. Too much importance need not be attached to these names; it is not intended to suggest that periods are exclusively Lithic or Ceramic. The intent is rather to characterize the period by that trait or complex of traits which seems most important to the archeologist seeking a general classification.

<sup>5</sup> Strong, 1935, p. 274; Wedel, 1940, p. 343; 1943, p. 217.

<sup>6</sup> Strong, 1933b, p. 274; 1935, p. 272.

<sup>7</sup> Wedel, 1935, p. 253; 1940, p. 343; 1943, p. 217.

<sup>8</sup> Strong (1935, p. 274) placed the Dismal River as early proto-historic. Wedel (1940, p. 343) shows the component as late prehistoric on his chart but by footnote (Wedel, 1940, p. 323) accepts a proto-historic dating. Wedel (1943, p. 217) continues the later dating which agrees with Strong's placement, and with the findings here.

The Lithic period includes all of the time prior to *circa* 1000 A.D. This is the time of the Early Hunting Peoples described by Wedel<sup>9</sup> and of the several new complexes of much the same time first described in this study. The known artifact inventory is almost entirely chipped stone, so justifying the name Lithic; bone tools are rare and pottery is entirely lacking. The inferential picture is essentially that of an early hunting and gathering economy.

The Ceramic period extends from about 1000 A.D., the close of the Lithic, to approximately 1700 A.D. During this period the Central Plains was occupied by peoples who made pottery and had acquired the simpler techniques of horticulture. Each of these occupations seems much more intense than any of those of the Lithic period. Stone tools remain abundant, but large amounts of pottery provide ready index artifacts and make the term Ceramic an appropriate description.

The latest period, the Historic, is based on somewhat different criteria. White exploration of the Plains begins with Coronado but there is relatively little documented history until 1700 A.D. Thereafter, evidence of white contact is plentiful so that 1700 becomes a very useful date on which to end the Ceramic and begin the Historic period for the Plains. The making of pottery did not end on that date, but there is good evidence that its use and that of stone tools declined very rapidly after white man's goods became abundant.

### THE LITHIC PERIOD

Linkages between Signal Butte I and the earlier Folsom complex have been noted elsewhere.<sup>10</sup> A substantial part of the artifact inventory, especially the simpler tools, is common to both complexes. The true Folsom point is not found at Signal Butte<sup>11</sup> but the typical Signal Butte I point has marked likenesses to the Folsom point and is reported from the Lindenmeier site as well.<sup>12</sup> Both cultural complexes are interpreted as the remains of groups who emphasized the hunting of large animals, especially bison. The Lindenmeier bison are identified as extinct forms while only recent types have been reported from Signal Butte. Emphasis on big game hunting,

<sup>9</sup> Wedel, 1940.

<sup>10</sup> Strong, 1935, pp. 279-280; Wedel, 1940, p. 301, Roberts, 1940, p. 72.

<sup>11</sup> One Yuma point is reported, however, by Strong, 1935, p. 281. See also Renaud, 1934, p. 39.

<sup>12</sup> Strong, 1935, p. 279; pl. 25, fig. 1, o.

however, is much the same at both sites. The total Yuma artifact inventory has not been determined although it is usually assumed to be very nearly like that of the Folsom culture except for the distinctive points. For this oldest period on the Central Plains, then, the name Early Lithic is suggested to include the Folsom, Yuma, and Signal Butte I horizons as now known.

The next later period on the Plains, continuing from Signal Butte II, some 5000 years ago, to the beginning of the ceramic horizons at approximately 1000 A.D., now appears to be a time of occupations characterized by an extremely simple artifact inventory and with suggestions that large game was not too abundant on the Plains. This period, which is described here as Intermediate Lithic, includes Signal Butte II, lenses E, F, and G from Ash Hollow, stratum C from Pottorff and, presumably, one or more of the soil zones from the White River terraces, subject to later identifications. These evidences of early occupation are confined to the short-grass country of the western Central Plains since, at the present time, we have no information about pre-ceramic periods in the area east of the 100th meridian.

### THE CERAMIC PERIOD

Beginning at about 1000 A.D., by present estimates, the entire Central Plains seems to have been occupied by the peoples whose artifact inventory and cultural pattern falls within the Woodland pattern<sup>13</sup> although final grouping into aspects and foci has not yet been made. The number of sites now known, the full artifact inventories, and the depth of occupation at Ash Hollow give the impression of a much more intense occupation of the Central Plains than that of the preceding Intermediate Lithic period. Since this period is the earliest time that pottery is to be found, the name Early Ceramic is suggested. Pottery types T, X, and Y, at Ash Hollow Cave, suggest occupations other than the Woodland manifestations. Since these new pottery types are unknown farther east, they are referred to as yet unidentified components to be expected west of Ash Hollow.

Separated from the Early Ceramic period by the terrace-building episode in eastern Nebraska, the Middle Ceramic period is characterized by still more intense occupation of the Central Plains by

<sup>13</sup> Hill and Kivett, 1940, pp. 184-188.

the well-described Upper Republican and Nebraska cultures. At Ash Hollow Cave, where the Upper Republican occupation seemed to follow the Woodland very closely, the best estimated dating for this period is *circa* 1300–1500 A.D. This Middle Ceramic period is characterized by the very large number of earth-lodge villages, whose artifact inventories are surprisingly uniform, and with strong indications of greater emphasis on horticulture, especially corn growing, than on hunting. At Ash Hollow Cave, lenses B and C suggest two such occupations of the western part of the Central Plains, separated by a clear break in occupation and with suggestions of a population movement toward the upper Missouri River and a later return to the western Plains. Such a migration would fit in well with ideas advanced by Strong<sup>14</sup> on the basis of the data from the Arzberger site and other material from South Dakota.

Following the Middle Ceramic, a short period which may be designated as Late Ceramic, can be identified dating from *circa* 1500 to 1700 A.D. It includes the Dismal River component at Ash Hollow Cave and the single component sites, such as Ch-1, of the same aspect. The Lower Loup focus, also called proto-historic Pawnee, must be included although it has not been found in stratigraphic placement. The evidence, however, from Bellwood and Bu-4 on Skull Creek, may demonstrate cultural succession when the full reports on these sites are available. The Oneota aspect, at the Leary site in southeast Nebraska and elsewhere in the Central Plains, also falls into this time period on the basis of present reports.

The characteristics of this period have been discussed by Wedel<sup>15</sup> in some detail. Important traits include emphasis on horticulture, especially the growing of maize, beans and squash, residence in large villages of earth lodges, the use of elaborate and distinctive types of pottery, and the earliest use of the horse among the Central Plains Indians. Wedel<sup>16</sup> regards the 100th meridian as the eastern margin of the High Plains and the western limit of the Central Plains, but the Ash Hollow evidence, and that from Ch-1,<sup>17</sup> indicates that Central Plains manifestations of this period extended at least as far west as the 102nd meridian in Nebraska.

<sup>14</sup> Strong, 1940, p. 382.

<sup>15</sup> Wedel, 1940, pp. 324–339.

<sup>16</sup> Wedel, 1940, p. 292.

<sup>17</sup> Hill and Metcalf, 1941.

## THE HISTORIC PERIOD

The year 1700 A.D. is an arbitrary selection of a division point between the Late Ceramic and Historic periods in the Central Plains. Early documentation for the Central Plains is limited almost entirely to the map attributed to Marquette, the series of maps by Franquelin, *circa* 1685–1708, and a very few references in early French and Spanish accounts. After the establishment of trading posts in southern Minnesota by Le Sueur *circa* 1700, and a few years later by Bourgmont in central Missouri, the names of the Historic Central Plains tribes and the areas they occupied are well established although, ethnologically, the surviving data leave much to be desired.

The true Central Plains of the Historic period seem to be divided into rather well-defined areas held by tribes living in large, often fortified villages, emphasizing the growing of corn, beans and squash, but maintaining large summer and winter hunts in the western Central Plains and the High Plains just east of the mountains. The Pawnee, living in central Nebraska, have been called the tribe *par excellence* of this time and area although their neighbors in the Central Plains show very much the same pattern of culture.

Few reliable data exist for the western Plains beyond Ash Hollow until after 1800, by which time the “typical” semi-nomadic Plains culture, associated with the horse, was well established. There are good indications, however, that Kroeber<sup>18</sup> is right in his opinion that

. . . it is scarcely contendable that the western plains were wholly uninhabited before the horse was available. Agricultural groups from east and west probably strayed in now and then and tried to farm. Small groups could make a living by combining bison and river bottom hunting with berry and root gathering. . . .

The new types of pottery from Ash Hollow also suggest that a careful survey of the area will disclose evidence of semi-sedentary occupation at times corresponding to Early and Middle Ceramic periods farther east. Renaud<sup>19</sup> has reported a large number of pottery sites from the Plains just east of the Rocky Mountains. In his opinion,<sup>20</sup>

<sup>18</sup> Kroeber, 1939, pp. 76–79; quoted in Wedel, 1941, p. 11.

<sup>19</sup> Renaud, 1931, pp. 83–94; 1932a, pp. 39–45; 1932b, pp. 58–63; 1933, pp. 23–26; 1934, pp. 51–54.

<sup>20</sup> Renaud, 1934, p. 54.

. . . it seems that the pottery of Colorado, Wyoming, W. Nebraska and similarly located districts, represents the western peripheric extension of a ceramic center, probably richer in quantity and quality of pottery and in variety of decoration, likely to be found further east and in lower valleys.

These facts and opinions are good indications that the Central Plains Ceramic periods will be represented well west of Ash Hollow and out into the High Plains. It is possible that non-ceramic manifestations from the west into the Central Plains may be demonstrated later. The category of Late Lithic has been reserved for such groups, when and if they are identified.

### COMPARISONS

The Central Plains chronology seems consistent with all of the data now available for the area and has some flexibility for placement of new manifestation, when that becomes necessary. Comparison of this chronology with similar formulations is the next step, but correlation of the Central Plains chronology with peripheral areas is not easily done at present except for later periods in the Northern Plains and by means of the Hopewellian and Middle Mississippi data from Platte County in northwestern Missouri.<sup>21</sup> For such periods on the Central Plains as the Intermediate Lithic the feeling of isolation and lack of contact with neighboring areas can hardly be avoided. Perhaps this is the result of less intensive investigation and of publication lags in reporting work actually done. It probably does not represent any real insulation from the well-studied areas to the east and south.

The Woodland pattern, however, offers good ties to the east. The implications of this situation have already been discussed by Wedel<sup>22</sup> in his report of the Renner site, an Hopewellian manifestation on the Missouri River near Kansas City. When the widespread Woodland manifestations from Iowa and southern Minnesota have been described in full, the relationship of the several Plains components to the Lake Michigan and other Middle Western phases will surely become much clearer.

Will and Hecker<sup>23</sup> have suggested a three-part chronology for the Mandan-Hidatsa area on the Missouri River in North Dakota. They have considered the evidence for cultural succession from strati-

<sup>21</sup> Wedel, 1943.

<sup>22</sup> Wedel, 1943, pp. 193-208, 214-223.

<sup>23</sup> Will and Hecker, 1944, pp. 46-64.

fied lodge floors and other instances of super-imposition, and from changing types of earth lodges. Pottery types, however, provide the major criteria, as appears from their statement:<sup>24</sup>

The Archaic Mandan period covers the ceramics of the early sites upon which the Mandan cultural development is based. The Middle Mandan period covers the ceramics of those sites which show that the Mandan ceramics had achieved definite individuality. The Later Heart River period was that in which Mandan ceramics had reached its peak before decadence due to white contact.

In their opinion the area has been occupied for 400 years or more by

... a people whose earliest cultural traits show resemblances to both the Woodland and Nebraska cultures and who were with little doubt the same people who came to be known as the Mandans.

Some evidence as to the length of the period of occupation in the area is given. With the acquisition this year of two cross-sections of very old oak trees from the Missouri River bluffs in the area, there seems to be good hope that an actual chronology may be worked out from the various bits and pieces of oak posts that have come to light in the various sites. These two trees show ages of between 400 and 500 years.

Illustrations<sup>25</sup> of the pottery types which they attribute to the Archaic cultural period include a number of sherds with considerable likeness to Nebraska and Upper Republican wares, which may well indicate mutual influences between the peoples in the Central Plains in the Middle Ceramic period and the residents of the Northern Plains at the same time.

Although Middle Mandan period is that of the greatest extension of the Mandan nation, superficially, there are fewer trait likenesses to Central Plains horizons. This period correlates roughly with the Late Ceramic period in time and it is interesting to note that Will and Hecker<sup>26</sup> find an increase in the use of cord-impressed designs over incised motifs for pottery decoration.

The Later Heart River period is dated from 1650-1764 A.D. and corresponds to the last of the Late Ceramic period and the beginning of the Historic period on the Central Plains. The authors<sup>27</sup> characterize this as the time of concentration in large villages and the beginnings of circular earth lodges. This seems directly com-

<sup>24</sup> Will and Hecker, 1944, p. 54.

<sup>25</sup> Will and Hecker, 1944, pl. 13.

<sup>26</sup> Will and Hecker, 1944, pp. 59-60.

<sup>27</sup> Will and Hecker, 1944, p. 63.



parable to like manifestations in the Lower Loup Focus at approximately the same time. Full correlation of these horizons and the Central Plains periods appears entirely possible, subject to further research in the intervening areas, and the successful completion of tree-ring studies proposed in both areas.<sup>28</sup>

Chronological comparisons of the same kind, but on a broader scale, might be made by setting the Central Plains sequence in parallel with established chronologies elsewhere, for example, with those set up by Strong<sup>29</sup> in his *Cross Sections of New World Prehistory*. Desirable as this may be, there are very real difficulties in such comparisons at this time. One example must suffice. Ford and Willey,<sup>30</sup> following a profile from Marksville in the Southeast to central Nebraska, indicate a dating of 1300–1400 A.D. for Woodland and 1500 A.D. for Upper Republican. On the other hand, Hall<sup>31</sup> compares the traits from his Rosa phase, found in the Gobernador in northwest New Mexico, with its Anasazi affiliate, the La Plata Phase, and factors out nine diagnostics present in Rosa and lacking in La Plata. Of these non-Southwest traits, he says:<sup>32</sup>

The stockade around a large simple pit house and full surface complex, the earth storage pits, and the scored pottery are highly suggestive of what are believed to be a later Plains horizon, but our evidence is insufficient to warrant any positive assumption that they represent a direct Pueblo-Plains contact.

Hall<sup>33</sup> dates the Rosa Phase at 700–900 A.D., but the Plains traits he selects are reminiscent of Upper Republican and even of Late Ceramic horizons in the Plains. It is interesting that Hall<sup>34</sup> finds little in common between the Rosa material and the Mogollon Culture for which Great Plains relationships, much like those for the Rosa Phase, are also claimed.<sup>35</sup> Another chronological difficulty with these formulations is created by the suggestion of a possible Woodland infiltration in the Largo-Gallina Phase *circa* 950–1100 A.D.<sup>36</sup> These dates for the Woodland compare well with those set up in this study but are much at variance with the interpretations

<sup>28</sup> Will and Hecker, 1944, p. 118.

<sup>29</sup> Strong, 1943.

<sup>30</sup> Ford and Willey, 1941, p. 329, fig. 3.

<sup>31</sup> Hall, 1944, p. 66.

<sup>32</sup> Hall, 1944, pp. 66–67.

<sup>33</sup> Hall, 1944, pp. 6, 7, 61, 62.

<sup>34</sup> Hall, 1944, pp. 65–66.

<sup>35</sup> Haury, 1936a, 1936b, 1938.

<sup>36</sup> Hall, 1944, pp. 61, 66.

by Ford and Willey.<sup>37</sup> The placement of the Upper Republican, however, is quite different in all three statements and this makes direct comparison of the three sequences seem futile at present.

Resolution of these differences, however, is a problem that must be faced since each of these interpretations appears to flow logically from the premises chosen. A reliable tree-ring sequence for the western Central Plains seems to offer the greatest promise for correlation of the Plains-Southwest relationships and would also resolve the differences between the Central Plains chronology set up here and Ford and Willey's dates as well. The probability of working out such a set of tree-ring dates, at least for the Upper Republican, would seem to be much enhanced by the acceptance of the Ash Hollow stratigraphy and sequence. A second possibility of cross-dating Plains and Southwestern phenomena may lie in the apparent correlation between the terraces in Tsegi Canyon,<sup>38</sup> in northern Arizona, and the Platte River terraces in Nebraska. Each set of terraces can be related to archeological horizons, and, if correlation across the Continental Divide be possible, valuable temporal equivalences may become possible across wide areas.

The correlation of terraces, and of the archeological horizons included within them, has been emphasized throughout this study although terrace problems are actually incidental to the assertion of the stratigraphic sequence. The value of mutual assistance between archeologists and geologists, both interested in terraces and their contents must be evident. Since the terraces indicate climatic change, data of importance to students of climatic cycles and ecology may also be adduced through these correlations.

The gathering of data relevant to ecological problems in the Great Plains was begun nearly sixty years ago by Bessey and his students at the University of Nebraska<sup>39</sup> and has been continued by Clements, Chaney, Elias, and others. Wedel<sup>40</sup> has ably summarized these studies of the ecology of the Central Plains with particular attention to the role which archeology can play in assembling the basic data. His conclusion may be quoted with full approval,<sup>41</sup> when he says:

<sup>37</sup> Ford and Willey, 1941.

<sup>38</sup> Hack, 1945, pp. 151-158.

<sup>39</sup> Clements and Chaney, 1937, p. 43, Clements, 1936, pp. 193-210.

<sup>40</sup> Wedel, 1941.

<sup>41</sup> Wedel, 1941, p. 28.

Nevertheless, it begins to look as though alternate settlement and abandonment was true of primitive man's occupation of the western plains just as it has characterized the subsequent white man's tenure where large-scale government aid was not forthcoming during periods of adverse climatic conditions.

Wedel's thesis of many discontinuous occupations is fully supported by the findings of this study. It has become possible to define ten separate periods of occupation for the western Central Plains, between the Yuma-Folsom period, more than ten thousand years ago and the historic Indians, of whom some are still resident in the area. The causes of these migrations in and out of the Central Plains are still inferential. There is much, however, to support the hypothesis that recurring droughts of sufficient intensity might move large grazing game out of the area, even though small gardens could still be raised in favorable locations by horticultural peoples. Studies of the Ash Hollow charcoal by Weakly indicate that drought rings may terminate several of the sequences he has set up for Ash Hollow Cave.<sup>42</sup> The estimated dates for the ceramic periods make the assumed gaps between them compare well with the dates for known dates of major droughts in the Southwest. This correlation is, of course, highly speculative but Wedel<sup>43</sup> has adduced evidence of drought, following the Lost Creek Upper Republican time, from the hard aeolian deposits formed across the house pits and the surrounding earth as well.

The problem of drought as a prime mover of populations in the Central Plains is most intriguing to archeologists and their researches also bring forward data of the utmost importance to the people resident in that area today. Those persons who have known the dry years in the Nineties as well as those of the Thirties will be grateful for any reliable data relevant to climatic cycles. This is not the first purpose of archeology but it is, in itself, a justification of the research. The archeologist will not solve this problem alone but he can supply invaluable data and assistance to the geologist and ecologist who will draw the final conclusions.

A recent study of plant geography<sup>44</sup> draws conclusions to which the present formulations are directly relevant. Carter<sup>45</sup> has postulated a series of influences on the agriculture of the Southwest, the

<sup>42</sup> Weakly, letter to the writer, dated March 22, 1945.

<sup>43</sup> Wedel, 1941, p. 18.

<sup>44</sup> Carter, 1945.

<sup>45</sup> Carter, 1945, p. 123, Fig. 27.

first arising in the Plains before 300 A.D., a second at about 700 A.D., and two at about 900 A.D. His case is well argued but the notion of the Plains as an agricultural focus between 300 and 900 A.D., rests heavily on his interpretation of the evidence from Sterns Creek and on his own estimates of the time required for the origination and stabilization of varieties of corn and squashes. The area for which we now have evidence of an Intermediate Lithic period, that is, the short grass portion of the Central Plains, lies squarely across the path of all of these corridors of influence. It does not offer much support for Carter's thesis, then, to find that on present time estimates this key area was occupied only occasionally and by hunter peoples until 1000 A.D. and that the earliest date for squash in eastern Nebraska is not likely to be much earlier. Present evidence is too thin, and datings are too uncertain, to make these inferences a disproof of Carter's theories but the present picture of the Central Plains before 1000 A.D. is hardly that of a place of origin for important aspects of Southwestern agriculture.

## OBSERVATIONS

The first purpose of archeology, as Vaillant<sup>46</sup> indicates, is the recovery of "social history through the study of surviving remains of human handiwork in ages past." This study is proposed as one step toward such a history of the Central Plains. In these preliminaries, however, it is apparent that the archeologist will not go far toward this goal without the help of colleagues in related sciences. The present study, for example, has leaned heavily on the work of geologists, botanists, and others, not alone for the solution of specific problems, but for basic concepts as well. The contributions which archeology, in return, may make to these related fields have also been stressed until scientific cooperation might well be regarded as the *leitmotif* of this study.

The status of this question of cooperation, however, has changed profoundly while this study has been in progress. The need for teamwork is no longer a matter for academic discussion, but it has become immediate and urgent. Legislation authorizing development programs for nearly every major river in the United States has been passed or early passage may be anticipated. Work in the Missouri Valley, the first of these new programs, has begun.

<sup>46</sup> Vaillant, 1941, p. 3.

Recent releases by committees concerned with American archeology<sup>47</sup> point out that eighty per cent of archeological data may be found in that two per cent of the land area which comprises the river valleys. The construction of the projected dams, the flooding of the great reservoirs which they create, and the building and operating of immense irrigation and power developments will irretrievably destroy a very large body of basic archeological data. These remains are a national asset, not only to the archeologist or his scientific colleagues, but also to the people who live beside the dams today. A substantial part of these data may still be salvaged by prompt action and effective teamwork between the scientists concerned and between local and national institutions. The Missouri Valley development has become the proving ground for a genuine cooperative effort between archeology and the other sciences whose field data are endangered. This teamwork has been shown to be wholly practical, and, in the area with which this study is primarily concerned, it has become a prime necessity; let it begin at once.

<sup>47</sup> Strong, Johnson, Webb, 1945, p. 44.

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## APPENDIX I

### A PRELIMINARY REPORT ON THE ASH HOLLOW CHARCOAL

BY

HARRY E. WEAKLY

The charcoal recovered from the excavations at Ash Hollow Cave was turned over to me in February, 1944. This charcoal was identified by 148 lot numbers, each lot containing one or more individual items, and each lot also bore the designation of the block and column from which the material was recovered. No information regarding the number or placement of strata within the floor deposits was furnished to me.

In the course of a preliminary study during the winter of 1944-45, charts were made up for the usable charcoal from 46 of the 148 lots. These charts were matched into eleven sequences separated by ten gaps of unknown length. A date of 1676, however, plus a few years allowance for burned rings was suggested for the sequence which lay highest in the Cave. These findings were reported to the archeologist by letters dated March 22 and April 4, 1945.

An independent check of these sequences against the lenses identified by the archeologist showed an entirely satisfactory correlation, and afforded confirmation of the correct identification of the sequences themselves. After this check was finished, the number and placement of the lenses within the floor deposit was furnished to me for my guidance in working with the remaining charcoal.

It is now possible to report the results of further study of this charcoal during the winter of 1945-46. Material from 93 of the 148 lots has been found usable, but this, in my opinion, will include all or nearly all of the usable charcoal from the Cave. A few items may be added by a recheck of the lots but no major changes in the sequences should be anticipated.

The following report includes all of the items on which I have relied in setting up the sequences. There are a few additional small items from each lens which can be matched into the sequences. This secondary material consists largely of items with only a few diagnostic rings and, since they add little strength to the sequences shown, they will not be reported here. The stratigraphic charts were of great value in assigning places to certain apparently unconnected specimens. As it now stands, all but three or four items have been worked into the sequences and these items seem to lie near the end of the sequence in question.

It is now possible, with the aid of the stratigraphic data, to reduce the original eleven sequences to seven which correspond to the seven lenses identified by the archeologist. The three later sequences, corresponding to lenses A, B, and C, have also been matched with the published sequence from Lincoln County, Nebraska and with the non-archeological sequence from Redington, Nebraska. This matching forms a continuous sequence from the earliest date from Lens C, 1210 A.D., to the present date. Before 1210, there are four relatively dated sequences, whose order in time can be determined by the stratigraphy, but which are separated by gaps of unknown length. The data supporting each of these sequences will be reported by the lens with which they are associated, together with certain comments which may be helpful in determining the archeological significance.

### SEQUENCE A

SPECIMEN NO.	LOCATION	NO. OF YEARS	DATES	(FIG. 7)
250	5NR1 3-6	94	1590-1684	k
493	7NR3 6-3	13	1658-1671	g
499	7NR3 3-0	40	1627-1667	f
714a	8NR3 3-0	30	1654-1684	j
714b	8NR3 3-0	37	1636-1673	h
714c	8NR3 3-0	20	1616-1636	a
721	8NR3 6-3	23	1640-1663	c
796	8NR3 3-6	97	1587-1684	l
1033	6NR2 3-0	25	1638-1663	d
1151a	6NR4 6-0	32	1627-1659	b
1151b	6NR4 6-0	42	1640-1682	i
1440	9NR1 6-3	23	1641-1664	e

This sequence represents some small rearrangement of the original Sequence I. As it now stands, the sequence covers 97 years, from 1587 to 1684. This terminal date is short an unknown number of years since there were no outside rings remaining. My estimate of the missing rings would be that the shortage would not exceed 20 years, which would give an estimated outside date of 1704 for the end of occupation of Lens A.

## SEQUENCE B

SPECIMEN NO.	LOCATION	NO. OF YEARS	DATES	(FIG. 7)
176	4NR3 15-18	17	1417-1434	b
937	8NR2 9-12	136	1361-1517	f
1162	4NR2 15-18	21	1482-1503	e
1249	4NR1 18-21	23	1423-1446	d
1382	9NR2 6- 9	86	1312-1398	a
1479	5NR3 6- 9	22	1418-1440	c

This chronology covers 205 years, beginning with a center date and ending with a bark date. It can be matched with the existing sequence from Redington, Nebraska, to extend it backward to 1312 A.D.

## SEQUENCE C

SPECIMEN NO.	LOCATION	NO. OF YEARS	DATES	(FIG. 7)
152	7NR2 18-21	29	1270-1299	e
177	4NR3 15-18	26	1277-1303	h
830a	8NR3 21-24	22	1210-1232	a
830b	8NR3 21-24	23	1229-1252	c
830c	8NR3 21-24	26	1223-1249	b
830d	8NR3 21-24	30	1304-1334	k
975	8NR2 21-24	51	1225-1276	d
980	8NR2 24-27	56	1244-1300	f
1088	6NR3 18-21	37	1265-1302	g
1342	7NR2 21-24	68	1256-1314	i
1725	6NR4 below 22"	50	1273-1323	j

The overlap of Sequence C on Sequence B is only 22 years, but the matching is of a very high order. It may be worth noting that there is some indication of two periods of occupation in this sequence.

## SEQUENCE D

SPECIMEN NO.	LOCATION	NO. OF YEARS	DATES	(FIG. 8)
20	5NR2 30-33	40	38-78	p
27a	5NR2 36-39	45	18-63	h
27b	5NR2 36-39	45	28-73	n
34a	6NR2 42-45	37	65-102	u
34b	6NR2 42-45	45	51-96	s
160a	7NR2 24-27	33	0-33	b
160b	7NR2 24-27	33	0-33	a
229a	7NR2 30-33	24	18-42	d
229b	7NR2 30-33	27	18-46	f
229c	7NR2 30-33	22	16-38	c
319	5NR1 30-33	33	56-89	r
324a	5NR1 33-36	32	70-102	v
324b	5NR1 33-36	42	59-101	t
330	5NR1 36-39	42	32-74	o
568	7NR3 27-30	49	13-62	g
834	8NR3 24-27	43	22-65	j
855a	8NR3 36-39	33	33-66	k
855b	8NR3 36-39	32	32-64	i
855c	8NR3 36-39	23	31-45	e
855d	8NR3 36-39	42	73-115	w
1358a	7NR2 30-36	17	56-73	m
1358b	7NR2 30-36	6	65-71	l
1417a	9NR2 30-33	70	67-137	y
1417b	9NR2 30-33	47	34-81	q
1581	5NR3 24-27	94	25-119	x
1603	5NR3 30-33	118	36-154	z

This sequence extends for 154 years but no overlap on Sequence C can be determined. The number of usable specimens seems surprising but there is some duplication in such lots as 229 and 855. The occupation of this lens appears to have ended in a drouth period which may account for the failure to join with Sequence C.

## SEQUENCE E

SPECIMEN NO.	LOCATION	NO. OF YEARS	DATES	(FIG. 8)
46	5NR2 42-45	45	0-45	c
235c	7NR2 48-51	55	64-119	f
862a	8NR3 42-45	85	126-211	k
862b	8NR3 42-45	86	126-212	l
1016	8NR2 48-51	99	119-218	n
1127a	6NR3 42-45	26	176-202	j
1127b	6NR3 42-45	82	164-246	o
1135	6NR3 45-48	34	184-218	m
1139a	6NR3 48-51	39	0-39	b
1139b	6NR3 48-51	21	0-21	a
1142a	6NR3 51-54	60	92-152	h
1142b	6NR3 51-54	60	92-152	g
1142c	6NR3 51-54	66	92-158	i
1235	6NR2 36-39	84	28-112	e
1362	7NR2 45-48	89	0-89	d

This sequence covers 246 years, beginning with a center date and ending with what appears to be a bark or outside ring. The gap between this sequence and Sequence D is probably large.

## SEQUENCE F

SPECIMEN NO.	LOCATION	NO. OF YEARS	DATES	(FIG. 8)
238a	7NR2 54-57	44	58-102	k
238b	7NR2 54-57	44	58-102	j
238c	7NR2 54-57	44	58-102	i
238d	7NR2 54-57	44	58-102	h
239a	7NR2 57-60	55	0-55	d
239b	7NR2 57-60	45	8-53	c
239c	7NR2 57-60	32	16-48	b
478	5NR1 63-66	26	2-28	a
1023	8NR2 54-57	53	42-95	f
1146a	6NR3 57-60	51	50-101	g
1146b	6NR3 57-60	53	21-74	e

The sequence for Lens F covers 102 years, with some indications of fairly intense occupation near the end of the period. There are good outside rings present to establish the terminal date but no center dates were present as a beginning.



## SEQUENCE G

SPECIMEN NO.	LOCATION	NO. OF YEARS	DATES	(FIG. 8)
248a	7NR2 63-66	58	28-86	e
248b	7NR2 63-66	26	34-58	c
248c	7NR2 63-66	71	15-86	f
249a	7NR2 69-72	35	0-35	b
249b	7NR2 69-72	56	12-68	d
486	5NR1 69-72	26	8-34	a

This chronology covers 86 years only and shows no overlap with Sequence F.

Some comments on the wood itself are desirable. The greater part of the usable material was cedar or juniper, with occasional items which seem to be one of the pines. There has been some difficulty in the use of juniper in other areas but it seems entirely satisfactory for the Plains. This may be due to the rainfall pattern of the area in question, which is not likely to produce double rings and so to confuse the ring count.<sup>1</sup>

Much of the charcoal appears to be smaller branches and occasional stems gathered for firewood. Although branch wood is somewhat more variable than stems it is entirely workable so far as the ring pattern exhibited is concerned. It is also of interest that each lens shows a consistent pattern so far as age of the wood is concerned, that is to say it does not appear that casual wood-gatherers would be likely to pick up a branch or two of very old wood along with the recently dead branches which could be pulled from living trees. Perhaps the few unassigned specimens represent such an occurrence or they may be older charcoal dug up by later residents from the cave floor itself. Since, except for the three or four pieces mentioned, all usable material has been considered, it does not appear that any significant error has been introduced here.

In conclusion then, it appears that charcoal from 93 lots is usable, and that charts of this material may be matched into a sequence extending from 1210 A.D. to the present and that four relatively dated sequences, earlier than the first mentioned, can be set up. These last sequences can be set in sequential arrangement by means of the stratigraphic data. A full statement of the dendrochronology is being prepared, but no major changes in this preliminary arrangement now are in prospect.

<sup>1</sup> Weakly, 1943, p. 817.

## APPENDIX II

### POTTERY TYPE DESCRIPTIONS

#### DISMAL RIVER

(Pl. 6, a-A)

<i>Temper</i>	Moderate amount of medium sized sand.
<i>Texture</i>	Granular.
<i>Hardness</i>	5.
<i>Color</i>	Buff to gray, mottled with blue gray.
<i>Surface finish</i>	Smooth.
<i>Decoration</i>	Some sherds may have a design painted in dull brown or black. (Pl. 6, b-e.)
<i>Rim</i>	Simple flaring rim, some thickening.
<i>Lip</i>	Rounded and decorated.
<i>Body</i>	Probably globular, with vertical flattening.
<i>Thickness</i>	Rim sherds, 8 mm.; body sherds, 5-8 mm.
<i>General comments</i>	The first description of Dismal River ware may be found in Strong <sup>1</sup> while the specific identification of the pottery here considered was first made by Hill and Metcalf. <sup>2</sup>

#### UPPER REPUBLICAN

(Pl. 7, a-l)

<i>Temper</i>	Moderate amount of medium sized sand.
<i>Texture</i>	Flaky.
<i>Hardness</i>	3.5 to 4.
<i>Color</i>	Light to dark gray with warm brown tones.
<i>Surface finish</i>	Random paddled cord on outer surface, followed by rubbing or scraping.
<i>Decoration</i>	On rim only except as above.
<i>Rim</i>	Two rim types: the typical "braced" rim associated with Upper Republican, and a simple direct rim with impressed diagonals.

<sup>1</sup> Strong, 1933 a, p. 71, fig. 72, a; p. 216, pl. 22, d, f-n.

<sup>2</sup> Hill and Metcalf, 1941, pp. 179-185, 206, 210.

<i>Lip</i>	Rounded, when plain; otherwise decorated by diagonal incised lines with some flattening of the rim for their imposition.
<i>Thickness</i>	6-7 mm.
<i>General comments</i>	This ware resembles closely the Upper Republican pottery first described by Strong <sup>3</sup> and later defined as Lost Creek focus. <sup>4</sup> See also Cooper <sup>5</sup> and Champe <sup>6</sup> .
<b>WOODLAND</b>	
(Pl. 8, 22, i)	
<i>Temper</i>	Moderate amounts of fine sand. Occasional flakes of shell are probably accidental inclusions.
<i>Texture</i>	Granular.
<i>Hardness</i>	3.5-4.
<i>Color</i>	Gray with warm brown tones.
<i>Surface finish</i>	Cord impressions laid on neatly, vertically from rim to bottom. The twist of the cords is not clearly shown.
<i>Decoration</i>	Applied on inner lip. A band, $\frac{1}{2}$ to $\frac{3}{4}$ inch wide, of neatly made cord impressions applied at an angle of $45^{\circ}$ to vertical.
<i>Rim</i>	Direct, vertical, no neck line.
<i>Lip</i>	Inner lip thickened for imposition of decoration.
<i>Body</i>	Undetermined but the camber of the sherds is similar to that of sherds from tall, pointed-bottom pots.
<i>Thickness</i>	10°13 mm.

<sup>3</sup> Strong, 1935, pp. 69-124, 245-250, 275-278.

<sup>4</sup> Wedel, 1935, pp. 133-209; 1940, pp. 310-315.

<sup>5</sup> Cooper, 1936, pp. 11-145.

<sup>6</sup> Champe, 1936, pp. 249-299.

<sup>7</sup> Strong, 1935, p. 215.

*General comments* This type of pottery was first described for Nebraska by Strong<sup>7</sup> as Dismal River, type a, but has since been described in detail by Hill and Kivett<sup>8</sup> who have identified the Ash Hollow material as Woodland, much like the pottery from their Valley focus (Vy-1).

#### ASH HOLLOW R

(Pl. 9, r)

*Temper* Moderate amount of coarse sand.  
*Texture* Rather flaky.  
*Hardness* 5.  
*Color* Outer surface, medium gray with brown tones; inner surface, bluish gray.  
*Surface finish* Rather smooth.  
*Decoration* Small notches on lip.  
*Rim* Direct, vertical.  
*Lip* Accurately flattened with a slight bevel to the outside. Some thickening near the outer margin of the lip.  
*Thickness* 8-9 mm.

*General comments* One small rimsherd only reported from site. Found in column 8NR1, block 24-27, and attributed to Lens D. The impression is Woodland-like but it is unlike any ware so far reported from the Central Plains.

#### ASH HOLLOW S

(Pl. 9, s)

*Temper* Sparse, with large grains of sand.  
*Texture* Fine even paste, rather flaky.  
*Hardness* 4.  
*Color* Gray brown, grading to blue gray near lip.  
*Surface finish* Outer surface, smoothed and slightly polished; inner surface striated as if brushed parallel to the lip.  
*Decoration* Five trailed lines parallel to lip on outer surface. The lines are about 2.5 mm. wide and 1 mm. deep. On the lip and outer margin of lip,

<sup>8</sup> Hill and Kivett, 1940, pp. 224-227.

	a design of stamped chevrons with the points to the left and on the outer margin of the lip.
<i>Rim</i>	Straight, nearly vertical, slight camber to the outside.
<i>Lip</i>	Slightly thickened on outer margin. Flat, smooth and beveled 10°–15° to outside. See decoration.
<i>Thickness</i>	8–9 mm.
<i>General comments</i>	One rim sherd only, from 7NR3, 21–24, attributed to Lens C. I am unaware of any other sherd of this ware in Central Plains collections.

## ASH HOLLOW T

(Pl. 9; fig. 2, d)

<i>Temper</i>	Moderate amount of large granular sand.
<i>Texture</i>	Flaky, with a thin outer layer that shows some tendency to chip or flake away.
<i>Hardness</i>	5 to 5.5.
<i>Color</i>	Outer surface, brown to black, probably smoked in use; inner surface, blue black.
<i>Surface finish</i>	Horizontally grooved or corrugated but without evidence of coiling. The surface consists of flat scraped lands with rounded grooves between. Lands, 5 mm. wide, grooves 5 mm. wide by 1 mm. deep.
<i>Body</i>	Body sherds only. Appears globular with some vertical flattening.
<i>Thickness</i>	6–8 mm.
<i>General comments</i>	This ware seems to be unique on the Plains. Pottery showing some corrugations is reported from Ch-1, the type site of the Dismal River, and from 66 Mountain near the Wyoming-Nebraska line but it is probably not type T.

## ASH HOLLOW X

(Pls. 9, x; 22, g)

<i>Temper</i>	Small amount of coarse water-worn sand.
<i>Texture</i>	Granular.

<i>Hardness</i>	About 4.5.
<i>Color</i>	Gray brown to dark gray.
<i>Surface finish</i>	Roughened as though by coarse cord but the cord impressions cannot be identified.
<i>Thickness</i>	6-10 mm.
<i>Rim</i>	None associated.
<i>Body</i>	Body sherds only. Shape undetermined.
<i>General comments</i>	22 sherds were reported from 11 blocks in Lens D, two of which contained Woodland pottery. X type ware has some likeness to Upper Republican pottery but the thickness and surface treatment is unlike Upper Republican ware. Sherds from Eagle Creek (Ht-1), Holt County, Nebraska (Pl. 22, a, d), are very much like this ware. The rim shown, and other pottery from Ht-1, has been discussed as Woodland <sup>9</sup> and it is quite probable that Ash Hollow X may be a Woodland variant.

## ASH HOLLOW Y

(Pl. 9, 4)

<i>Temper</i>	Moderate amount of coarse sand.
<i>Texture</i>	Rather granular.
<i>Hardness</i>	5.
<i>Color</i>	Red brown to black, carbonized.
<i>Surface finish</i>	Smoothed and scraped out in small shallow depressions.
<i>Thickness</i>	6-8 mm.
<i>Body</i>	Undetermined. Body sherds only.
<i>General comments</i>	20 body sherds reported from nine different blocks in Lower Lens C and upper Lens D with two Woodland and two Upper Republican sherd associations.

<sup>9</sup> Hill and Kivett, 1940, p. 240, pl. XXVIII.

## ASH HOLLOW Z

(Pl. 9, 2)

<i>Temper</i>	Occasional large water-worn sand grains.
<i>Texture</i>	Granular and compact.
<i>Hardness</i>	4.
<i>Color</i>	Reddish brown to smoked black.
<i>Surface finish</i>	Smoothed and lightly scraped.
<i>Decoration</i>	Cord impressed, made up of 5 or 6 impressions of single cords about 5 mm. apart and parallel to the rim. These lines are crossed by paired single cord impressions, at 30° with the horizontal, alternately right and left.
<i>Rim</i>	Direct, straight and turned slightly outward.
<i>Lip</i>	Outer lip thickened for imposition of design, slightly rounded; inner lip slightly concave.
<i>Body</i>	Undetermined.
<i>Thickness</i>	7-10 mm.
<i>General comments</i>	The paste is much like Upper Republican but the cord impressed designs are referred to northeastern Nebraska rather than to the Sweetwater type of Upper Republican. Z ware is assigned to Lens B on basis of material from 8NLI. Wilford <sup>10</sup> shows a Great Oasis sherd with this design incised on the outer rim, from the type site in Murray County, Minnesota (Fig. 1).

<sup>10</sup> Wilford, 1945, p. 35 fig. 3a.; p. 32.

### APPENDIX III

#### OTHER MULTI-COMPONENT SITES

Several more Central Plains sites are known, in addition to those discussed in the preceding study, which afford some evidence of cultural succession. A short summary of the information now available is offered for each site but definitive statements are not now possible. For the present, the evidence from each site must be considered for what it may be worth in support or denial of the cultural sequences suggested for the Central Plains.

#### DK-2

Dk-2, known also as the Ryan site, is located about one mile south and east of Homer, Dakota County, Nebraska. In September 1939, a field party of the Nebraska Archeological Survey, directed by Dr. Earl H. Bell, investigated three low elevations above the surface of the high ridge overlooking the Missouri River bottoms. The field party, with Stanley Bartos, Jr. as archeologist in charge, excavated an area 140 feet long and from 30 to 50 feet wide, in which they found the remains of more than fifty individuals. Two groups were readily distinguished, by skeletal criteria, by burial type, and by associated artifacts. The distribution of the remains, however, did not coincide too closely with the three mounds originally observed indicating that these mounds were probably erosion remnants.

Bartos<sup>1</sup> reports a series of burials, many of them bundles, at depths of 24 to 30 inches below the surface. His measurements of the skulls give a mean cephalic index of 74.8 and he identifies the associated pottery as Woodland.

A second type of burial was in pits, sometimes as deep as 72 inches and well defined in the moist yellow clay beneath the humus line. The skulls from these deep burials have, according to Bartos, a mean cephalic index of 87.6 and the associated artifacts include abundant metal and trade goods of recent types.

Identification of this second series as Omaha is supported by the location and partial excavation of the "Large Village" of the Omaha, in 1940 and 1941, on the Missouri bottom below Dk-2.<sup>2</sup> The skeletal types and burials at Dk-2 appear comparable to those recovered in

<sup>1</sup> Bartos, 1939.

<sup>2</sup> Champe, 1940; Champe, Cooper, Cumming, 1941.



1940 by the excavation of a cemetery, Dk-10, attributed to the Omaha.<sup>3</sup>

At Dk-2, considerable potting, presumably by amateurs, tended to blur the lines of the pits in the upper levels but Bartos satisfied himself that the Omaha type burials had been dug through the shallower Woodland burials. Although this reverses the usual order of stratification, in which the lowest stratum is the oldest,<sup>4</sup> the field archeologist found other evidence adequate for a determination of the order of deposition. Present opinion, then, is that two cultures are represented. The older, but shallower, burials are Woodland; the deeper, but more recent, graves are Omaha.

### ROCK SHELTERS

Much of the material discussed by Bell and Cape<sup>5</sup> in the *Rock Shelters of Western Nebraska* is the result of the work of the junior author between 1930 and 1936. The artifacts from site 14, a rock shelter excavated by the University of Nebraska Archeological Survey under the direction of Dr. E. H. Bell, are included in the summary.<sup>6</sup>

These rock shelters, like Ash Hollow Cave, are located in the rough canyon country which borders the North Platte River on the south for nearly 150 miles eastward from the Wyoming border. The rock shelters described by these authors<sup>7</sup>

. . . vary from small shelters 12 feet in width and nearly equal in depth, to 30 or 40 feet wide and 15 or 20 feet deep. The depth of the shelter under the projecting ledge is usually much less than the width. At present they are partly filled with erosional deposits, but excavation shows them to have had an average height of from 5 to 10 feet. . . .

In the more intensively inhabited sites the detritus of occupation ranges from 6 to 15 inches in thickness. In those having the thickest deposits there is some evidence of stratification, which would seem to indicate that the sites were not occupied over a long continued period of time, but rather an intermittent or seasonal occupation, and apparently by people of the same culture. In one site (No. 50) three habitation levels were found, separated by 6 to 10 inches of clear soil.

<sup>3</sup> Champe, 1940.

<sup>4</sup> Grabau, 1924, p. 1121.

<sup>5</sup> Bell and Cape, 1936, pp. 357-399.

<sup>6</sup> All artifacts and supporting data remain in Mr. Cape's possession, except the material from Site 14.

<sup>7</sup> Bell and Cape, 1936, p. 363.

Seven shelters are described: one, No. 50, has three habitation levels; three, Nos. 21, 45, and 58, have two, while Nos. 2, 22, and 18 seem to represent single occupations.

All artifacts are described in bulk except for a few drills, sandstone implements, and bone and antler tools for which site identifications are given. Pottery is reported as occurring in a "large proportion of the shelters."<sup>8</sup>

The authors conclude:<sup>9</sup>

The little work on the rock shelters of western Nebraska does not permit us to draw more than a few very tentative conclusions. It does seem, however, that we have a very definite complex of recurring traits which indicate that the shelters were inhabited intermittently by the same prehistoric people. These people seem to have been related culturally to those who lived in semi-subterranean houses along the Platte and Republican rivers farther to the east. In fact, they may have been hunting parties of those people.

### BELLWOOD

The site of a Pawnee village, probably inhabited about 1800,<sup>10</sup> was excavated in 1936, by a Nebraska State Historical Society field party. The village is located on the right bank of the Platte almost due north of David City, Butler County, Nebraska, and about 10 miles west of the Pawnee village on Skull Creek. Unpublished field notes indicate that the eastern part of the site was probably the village of *circa* 1800 while the western portion seems to be an older village whose artifact complex is related to the Lower Loup focus.

### LYNCH

University of Nebraska field parties, in 1936, cut two long trenches through the southern part of the Lynch site in Boyd County, northern Nebraska. No stratification was reported but Wedel<sup>11</sup> has discussed the several ceramic types from the site. Early estimates of considerable antiquity gained some prominence but are not highly regarded at this time.

### BROKEN KETTLE

Just across the Missouri from northeastern Nebraska, the Iowa Archeological Survey trenched the Broken Kettle Mound, about

<sup>8</sup> Bell and Cape, 1936, p. 383.

<sup>9</sup> Bell and Cape, 1936, p. 385.

<sup>10</sup> Stuart, 1935.

<sup>11</sup> Wedel, 1940, p. 317; 1941, pp. 16-20, 24; Van Royen, 1937, p. 638.

15 miles north of Sioux City, Iowa. Sherds resembling the Nebraska Culture of eastern Nebraska are included in a sample collection in the Laboratory of Anthropology, University of Nebraska, together with other ceramic types entirely unknown in Nebraska archeology, but resembling Middle Mississippi ceramics from Cahokia Mound. In 1940, I visited the site, while the excavations were in progress, in company with Dr. W. R. Wedel and Mr. A. T. Hill, but, unfortunately, the archeologist in charge of the work was not available. Good evidence of stratification was apparent in the deep trench which was open to our inspection but a statement of the cultural succession has not yet been made by the Iowa Archeological Survey.

Of the several sites just discussed, the Broken Kettle Mound seems most likely to supply new insights into problems of cultural succession in Plains archeology. Sample sherds from the site suggest the possibility of stratigraphic placement of material of Nebraska aspect type, with other material not heretofore reported for the Plains. Lynch and Bellwood seem to have no more than minor importance to stratigraphic studies at present and the Dk-2 data merely offer stratigraphic confirmation of a sequence between Woodland and historic Omaha. For the present study, then, in addition to these small confirmations, the importance of these miscellaneous multi-component sites seems to lie in the fact that they offer no contradictions to the sequences presented.

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