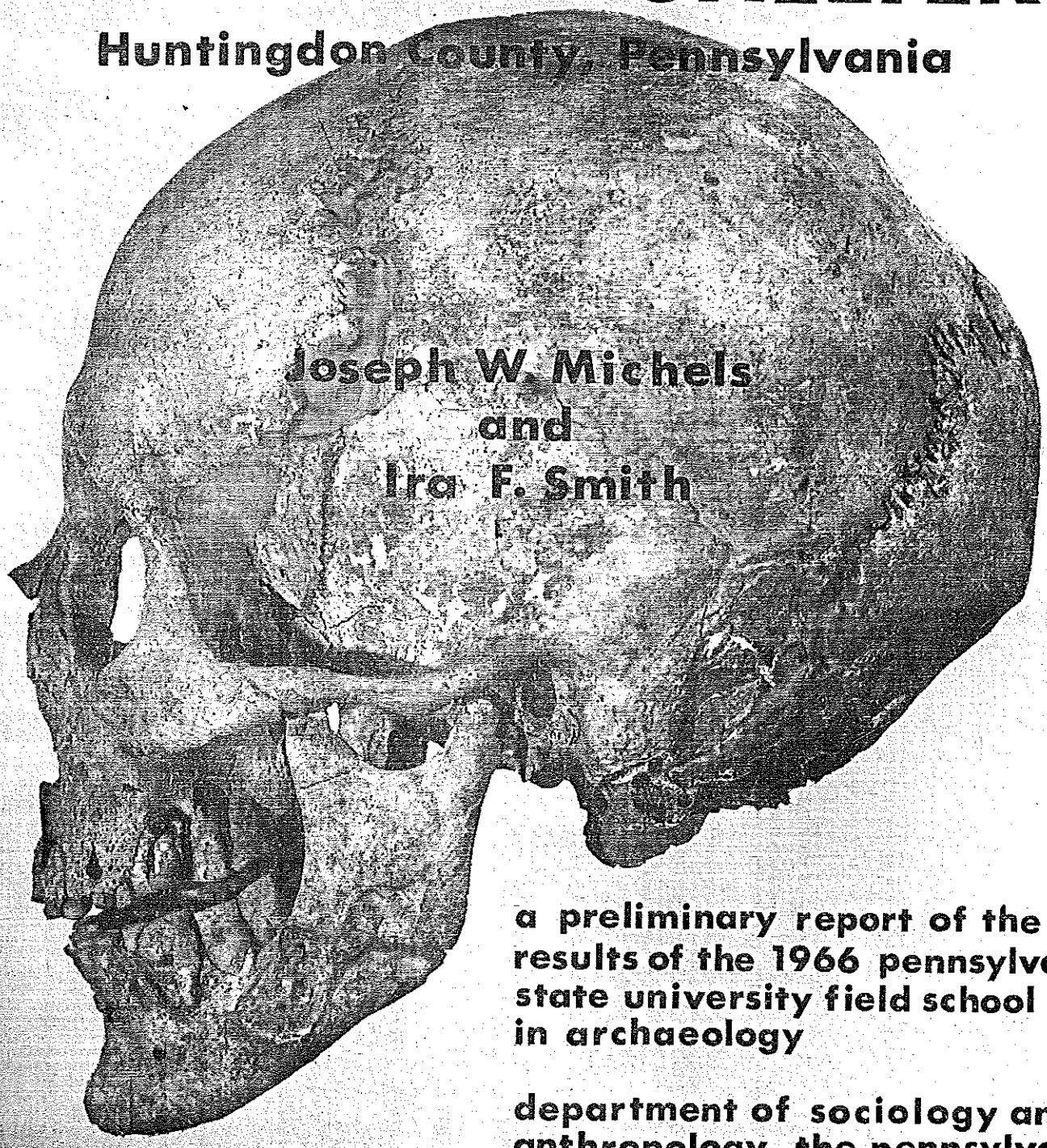
Archaeological Investigations of
SHEEP ROCK SHELTER
Huntingdon County, Pennsylvania



Joseph W. Michels
and
Ira F. Smith

a preliminary report of the results of the 1966 pennsylvania state university field school in archaeology

department of sociology and anthropology, the pennsylvania state university

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A PRELIMINARY REPORT

OF

ARCHAEOLOGICAL INVESTIGATIONS

AT THE

SHEEP ROCK SHELTER SITE

Huntingdon, Pennsylvania

Editors

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May 1967

DEDICATION

The editors sincerely dedicate this report to John G. Witthoft, previously State Anthropologist of Pennsylvania and presently Research Associate at the University of Pennsylvania, in recognition of his many contributions to the archaeology of Pennsylvania.

More specifically, our dedication is in recognition of the continuity of leadership he provided for the Sheep Rock project during the entire period of its activity, for his generous offer to turn over previously excavated materials for study, and for his unhesitating encouragement regarding all matters connected with our program.

TABLE OF CONTENTS

	Page
PARTICIPANTS OF THE 1966 PENNSYLVANIA STATE UNIVERSITY FIELD SCHOOL IN ARCHAEOLOGY	v
FOREWARD Joseph W. Michels	1
EXPEDITION OPERATIONS AND LOGISTICS D. Michael Steffy	13
THE ECOLOGY OF THE SHEEP ROCK SHELTER SITE Samuel E. Casselberry and Gene Paull	47
REPORT ON THE POLLEN ANALYSIS OF THE SAMPLES FROM THE SHEEP ROCK SHELTER SITE Anton J. Kovar	85
NOTES ON PLANTS FROM THE SHEEP ROCK SHELTER SITE Hugh C. Cutler and Leonard W. Blake	125
STRATIGRAPHIC PROFILES OF SHEEP ROCK SHELTER Cynthia D. Horn	169
AN ANALYSIS OF SOME FEATURE TYPES AND BURIALS FROM THE SHEEP ROCK SHELTER Ira F. Smith	207
AN ANALYSIS OF CORDAGE AND TEXTILE INDUSTRY OF SHEEP SHEEP ROCK SHELTER Donna L. Conway and Mary Moser	257
PERISHABLE MATERIALS OF SHEEP ROCK - WOOD, LEATHER, GRASS, FUR, AND FEATHERS Donald E. Hardenbergh, Jr.	303
ARTIFACTS OF BONE, ANTLER AND TURTLE SHELL FROM SHEEP ROCK SHELTER James S. Dutt	377
THE STEATITE VESSELS, CERAMICS, AND PIPES OF SHEEP ROCK John B. Huner, et al.	427
LITHIC ARTIFACTS FROM SHEEP ROCK SHELTER Carl A. Bebrich	553
SURVEY EXCAVATIONS IN THE RAYSTOWN DRAINAGE AREA Ira F. Smith	741

Page

A CULTURE HISTORY OF THE SHEEP SHELTER SITE
Joseph W. Michels. 801

INITIAL ANALYSIS OF CHARCOAL MATERIALS FROM THE SHEEP ROCK SHELTER
John H. Azer 825

PHOTOGRAPHIC RECORD OF SHEEP ROCK - A SUMMARY AND ANALYSIS
Isabelle S. Fries. 865

NOTES ON THE ARTIFACT CATALOGUE OF SHEEP ROCK
Philip Kilbride 911

BIBLIOGRAPHY
Lynn E. Dixon 927

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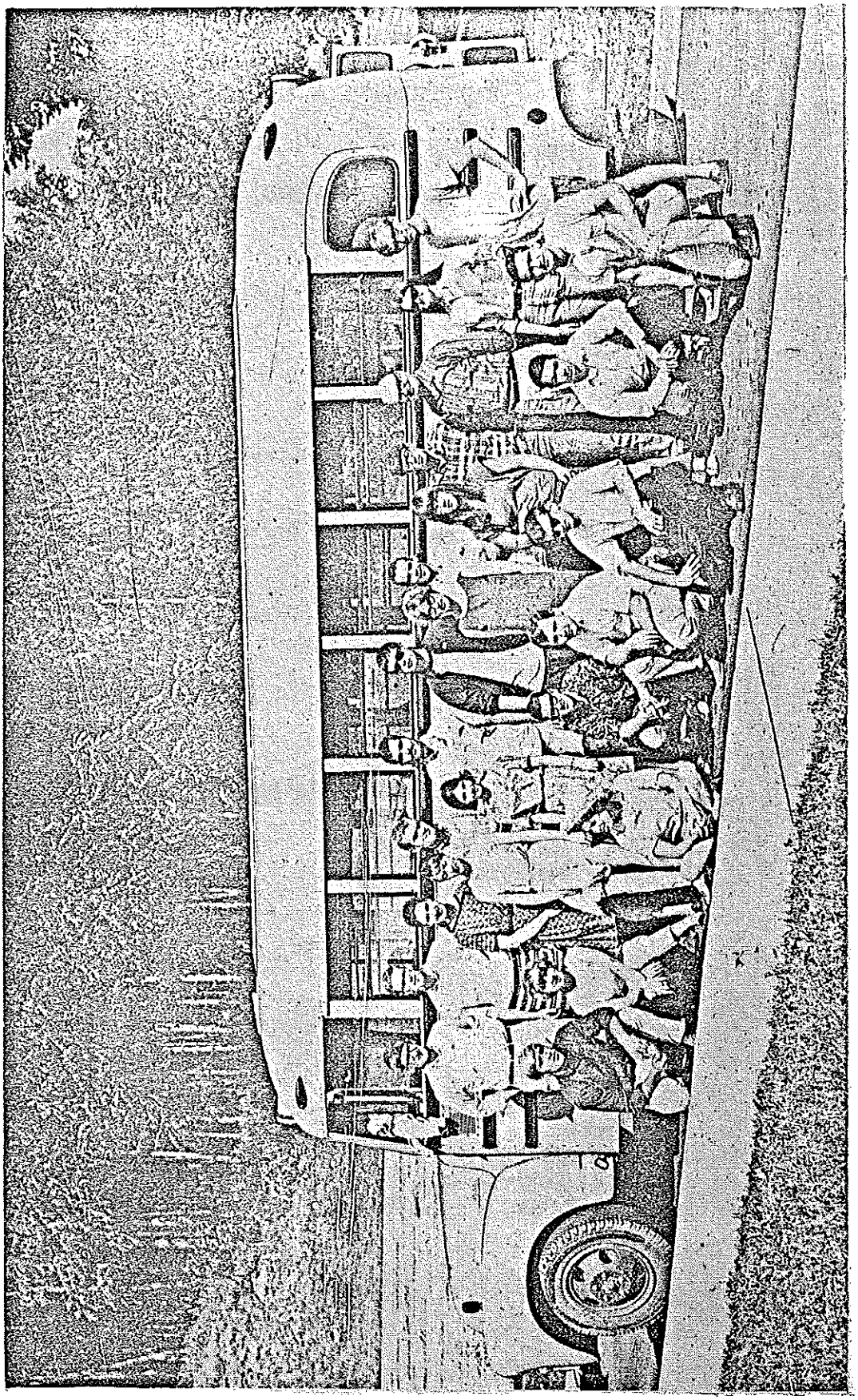


FOREWORD

by

Joseph W. Michels

FOREWORD

History of Archaeological Investigations at Sheep Rock

In 1962, Edgar J. Stackhouse and Melville W. Corl published an article entitled "The Discovery of the Sheep Rock Shelter" in Pennsylvania Archaeologist, bulletin of the Society for Pennsylvania Archaeology. Their introductory remarks chronicle the sequence of events leading from the discovery of the site to the time when excavations were placed under the direction of the Pennsylvania State Museum in cooperation with the Pennsylvania State University. Not only does their article bring to life the circumstances of discovery and initial exploration but it also reveals the incredibly important role of the amateur archaeologist in the ongoing business of prehistoric research. Stackhouse and Corl meant their remarks to be a "prologue" of the full report "eagerly awaited by all students of Pennsylvania archaeology." We believe that it is fitting to quote at length from their prologue as part of the introduction to this preliminary report on archaeological investigations at Sheep Rock.

> Sheep Rock Shelter (Site 36Hul) is a dry rock shelter located in Huntingdon County, Pennsylvania, in mountainland on a bend of the Raystown Branch of the Juniata River. The shelter is formed by overhanging rock and Chemung Shale of the late Devonian Epoch, on the east side of the Allegrippis Ridge of Tussey Mountain above the Raystown Dam (U.S. Geological Survey Topographic Maps, 15 Minute Series: Huntingdon Quandrangle). The protected area is approximately three hundred feet long by thirty feet deep, facing west so that it is sheltered from the prevailing winds, rain and snow. The overhang of the cliff is so gradual and high that, as the sun passes over the site, some parts of the shelter are in sunlight from sunrise until sunset. This makes the site highly desirable for human occupation.
>
> The sheltered area is dry and dusty. Its floor is about twenty-five feet above the present level of the impounded river, with a steep slope to the water, and is covered with fallen shale and sheep dung. Sheep were grazed on the ridges of Tussey Mountain after the timber was cut in the late 1800's, and found their way down the steep cliff to the protected area, where they sheltered for years, giving the place its local name of "Sheep Rock."
>
> The fact that the Sheep Rock had also been used as a refuge by the Indians was first discovered by John E. Miller of Westwood Park, Altoona, Pennsylvania, who at the time was a guest of John Folk of Altoona. While on a boat trip on the river, Mr. Miller remarked that

the mountainside should be an ideal location for a rock shelter. After explaining what he meant, he learned that there was just such a place nearby, often used by picnickers and Girl Scouts.

Bringing the boat to shore below the site, the two men climbed the steep rocks to the shelter. Miller dug a test hole near the back wall of the shelter and quickly found potsherds, animal bones, mussel shells, wood ash, and charcoal as well as a round stone hoe.

Realizing the importance of his find, Miller contacted his brother-in-law, Melville W. Corl, with whom he had hunted Indian artifacts for many years. They were unable to arrange for further trips to the site in 1957; however, on March 15, 1958, in a heavy snow storm and after a perilous climb down the ridge, Miller, Corl, and a nephew, Tommy Lukehart, found a way into the shelter on foot. They dug a second test hole near the center of the shelter, and again found sherds of pottery, charcoal, wood ashes, and animal bones.

An attempt was made in April to find a better way into the shelter on foot and to locate the owner of the land, but without success. The only practical way to reach the site is by boat from up or down the river. On this trip a third test hole was dug, this time striking a dry Susquehannock midden and uncovering corncobs, cornhusks, cornstalks, cordage, potsherds, and more animal bones.

Miller and Corl, knowing the rarity of such dry remains in the humid climate of Pennsylvania, and learning that the site was about to be "pothunted" by curio seekers, decided that a systematic excavation of the Sheep Rock Shelter should be started as soon as possible. John Miller, being unable to help, told Corl to go ahead with plans for the dig. Corl took samples of their finds to the Lancaster meeting of the Society for Pennsylvania Archaeology, where he showed them to John Witthoft, the State Anthropologist, and asked his advice as to how to start the dig.

The first step was to find the owner of the site and obtain his permission to excavate. After much inquiry, Eldo Frye of Lewistown, Pennsylvania, was identified as the probable owner, and an appointment was made for Corl to meet him at the Frye cottage on the Raystown Dam. Mr. Frye gave permission to excavate the site and to use his private road and boat launching facilities. A trip to the site was made in Mr. Frye's boat, only to find that the shelter was above his supposed property line marker.

Again the hunt was on for the real owner of the Sheep Rock. This time aid was sought from officials of the Pennsylvania Electric Company, owners of the Raystown Dam, who informed Corl that the land in question was owned by G. L. Norris of Aitch, Pennsylvania. Contacted by Corl, Mr. Norris willingly gave permission to dig the site, provided the excavation was carried out in a scientific manner. [Although none of those concerned knew it at the time the search for the owner of the Sheep Rock was not yet over. In 1961 Mr. Frye sold a tract of land to James Filson of Huntingdon, Pennsylvania. When the tract was surveyed, it was found that it included the Sheep Rock. site. Mr. Filson kindly gave permission for the dig to continue.]

With permission granted to excavate at the Sheep Rock, Corl enlisted the aid of E. J. Stackhouse, Raymond Zeak and Tommy Lukehart, all of Altoona and fellow members of the Society for Pennsylvania Archaeology. Plans were made to begin the dig in July, 1958. Screens were made, tools assembled, and on July 12 Stackhouse's boat was loaded on top of Corl's car and taken to Frye's landing, from which everything needed for an extensive dig was taken to the site.

As the distance from the Frye cottage to the site was too great for daily trips with the boat and small motor, the diggers scouted about for a way of getting closer to their work. An old logging road was found, down which Corl could drive the crew to within a mile of a spot on the river where an adequate boat landing and storage were found.

The systematic exploration of the Sheep Rock Shelter began on July 14, 1958, when Corl, Stackhouse and Lukehart took their remaining equipment to the site. They measured the site, cleared away the surface rubble and sheep manure, and laid out the grid of squares according to which the site would be excavated.

A small spring rises close to the back wall of the shelter at the deepest and most sheltered place. This was undoubtedly another of the factors that attracted the prehistoric occupants of the Sheep Rock site to the shelter. A datum point, from which measurements in the shelter would be made, was established on the back wall of the shelter at the point where this spring comes from the rock.

The areas to be excavated were located where they would provide a representative sample of the site, and at the same time allow the diggers to work out of the direct heat of the sun and the reflected heat from the face of the cliff.

Over the years, frost and natural erosion have caused many falls of rock and shale from the face of the cliff above the shelter. These were mixed with the midden deposits, making it difficult to dig by levels, but also providing a naturally stratified deposit which separated the different occupations found in the shelter. Insofar as was possible, all squares were excavated by 5-inch levels, from the surface uncovered after the fallen shale and sheep manure had been removed. The dig was begun on July 14 and continued on July 15, 17, 18 and 21 with E. J. Stackhouse, Melville Corl, Raymond Zeak and Tommy Lukehart taking part. Meanwhile, because of the evident importance of the materials being found, arrangements were made for John Witthoft to visit the excavation, to inspect the work and the materials collected. He arrived on July 21 and assisted with the excavation of Squares X-1 and X-2 on the following day.

The work of these few days had shown the extent of the dry midden, in which were preserved fragments of both cultivated and wild plants used by the Indians who inhabited the Sheep Rock Shelter. This is the first time such materials have been found in Pennsylvania in a dry preserved state, giving a very full picture of the natural resources of the region and the human uses made of them in early times. The first finds included corncobs; kernels of corn; green cornstalks that had been twisted and chewed to extract the sweet juices; beans; bean hulls; pumpkin and squash seeds, and portions of their shells; and sunflower seeds. Pieces of various barks, Indian Hemp stalks, and Indian Hemp fibers in all stages of spinning into cord, with many other interesting botanical fragments, illustrated phases of Indian life never revealed by the average site.

As has been explained, Corl was driving the excavation crew to the end of an abandoned logging road, from which they had a hike of about a mile through the woods to the boat landing, followed by a further trip by boat to the site. This transportation problem, with the time it involved, add to the difficulty of giving proper attention to the excavation and preservation of the enormous amount of perishable material that was showing up. The group consequently decided to turn the site over to the Pennsylvania State Museum, so that the wealth of unique material might be saved and the site protected from potholing and eventual destruction - the fate of so many important sites in the past (Stackhouse and Corl 1962:1-5).

In 1959, John Witthoft and W. Fred Kinsey III, at that time State Anthropologist and State Archaeologist respectively, took over responsibility for further excavation of Sheep Rock Shelter

on behalf of the Pennsylvania State Museum (presently the William Penn Memorial Museum). Enlisting the cooperation of the Pennsylvania State University, Fred Kinsey with a crew of four college students conducted further excavations at the site during the summer of 1959. John Witthoft took over supervision of field work at the site the following summer (1960) accompanied by five college students, most of whom were students at Penn State. He conducted field excavations during the summers of 1961 and 1962 as well, each time directing crews consisting of five Penn State University students. All four expeditions were financed by grants from the Pennsylvania State Historical and Museum Commission.

During those four seasons of excavation at Sheep Rock Shelter, an enormous quantity of archaeological and ecological specimens was recovered. Someone has estimated it as exceeding 80,000 items. Excavations reached a depth of over twenty feet in one area of the site, and knowledge of the basic stratigraphy and culture historical sequence began to emerge. Most of the extremely fragile and rare artifacts of perishable material were recovered during this period, and bear testimony to the remarkable skill and care with which Fred Kinsey and John Witthoft conducted their excavations. In the process they trained a number of college students in the science of field archaeology, several of whom have since entered archaeology as professionals. Among the students were David Hally (Dartmouth and Harvard), Michael Forth (Franklin and Marshall), Barry Kent (Pittsburgh, Michigan, and Penn State), and Ronald Thomas, Vincent Brown, Brenda Baer, Thomas Krajci, John McCullough, Ira Smith, Frank DiCecco, Michael Hanna, Andrew Keith, Gary Mootz - all of whom were students at Penn State.

During the years 1963 and 1964 no further work was conducted at the Sheep Rock Shelter site. Then, in 1965, Ira F. Smith (presently State Field Archaeologist with the William Penn Memorial Museum) conducted a site survey of that part of the Raystown Branch of the Juniata River to be flooded by the construction of a new dam scheduled for completion in 1971. In addition to discovering thirty-five additional sites, Smith returned to the Sheep Rock Shelter in the company of one assistant, Andrew Keith, and initiated further excavation of the site deposit. Support for both the site survey and the new excavations at Sheep Rock were provided by the National Park Service - the sponsoring institution was the Pennsylvania State University. This was the first year that the University had taken over the responsibility for supervising the excavation of Sheep Rock Shelter. Up until then, Penn State had actively cooperated in the investigations but supervision had remained in the hands of the Pennsylvania State Museum. Frederick Matson, Professor of Archaeology in the Department of Sociology and Anthropology, acted as Ira Smith's supervisor. Smith was then, as now, a graduate student in the department.

Ira Smith concentrated on the Archaic levels of the site deposit during that season, and was rewarded by the discovery of a human burial, two well-defined fire pits, and a number of important bone and stone artifacts of the late Archaic occupation. In addition to excavation tasks, Smith and his assistant began a general clean up of the site, which had begun to deteriorate during the two years of inactivity preceding the 1965 season.

I visited the site in the company of Ira Smith shortly after arriving at Penn State in the fall of 1965. I was interested in establishing a field school in archaeology locally within Pennsylvania, and Sheep Rock Shelter and the general Raystown vicinity became a prime candidate for selection as the site for the teaching program after this first visit. It had many advantages. The site had impressive research value, and there was an immense volume of midden deposit remaining to be excavated, even after six previous seasons of excavation. The teaching value of a deep and stratified site containing well-preserved perishable artifacts and features was obvious. In addition to Sheep Rock, however, there were thirty-five other sites discovered by Ira Smith, all within the vicinity of Sheep Rock, several of which warranted extensive excavation. These other sites were relatively shallow and generally displayed only limited periods of occupation. They demanded a different type of excavation strategy, and would give the students exposure to a second kind of excavation program.

Laboratory training could be enhanced by the fact that most of the specimens recovered during the previous six seasons at Sheep Rock were still in their level bags - unwashed and unanalyzed. The William Penn Memorial Museum agreed to give us permission to catalogue and analyze these materials in conjunction with a field school, and later we removed from the museum fifty-two large boxes filled with Sheep Rock level bags. Our students could therefore have the benefit of a full-time laboratory operation in conjunction with field work.

The final factor influencing my decision to locate our field school at Sheep Rock was the enthusiasm with which Juniata College received our request to use their facilities in connection with the program. Juniata College is located only seven miles from the Raystown Dam. It has fine dormitory and eating arrangements for both men and women, and a brand new air-conditioned science building in which we were provided very spacious laboratory facilities. By having Juniata College as our host, we could locate all of our operations in the neighborhood of the sites we were to excavate. Chapter One, "Expedition Operations and Logistics" describes in some detail the manner in which the field school was conducted during the summer of 1966.

INTRODUCTION TO THIS PRELIMINARY REPORT

One of the most frustrating aspects of archaeology is the almost inevitable long term delay between field work and the publication of a descriptive site report. This report represents our attempt to provide a solution to the problem. Every student in the field school was required to prepare a written report on some part of the artifact collection or on some topic related to the excavation or ecology of the site. These reports were handed in and graded at the end of the summer field school. Students were then invited to volunteer to rewrite their papers during the fall and winter as chapters in the Preliminary Report. In practically every case they did volunteer. Other students in the University who wanted some firsthand experience in the archaeology laboratory were brought in to assist those who were authoring chapters in the preliminary report. These latter spent many hours preparing line drawings of artifacts, tabulating and sorting items, and preparing graphs or tables. More than thirty-one students participated in the preparation of the report, eighteen as authors. This great effort on the part of students has enabled us to publish a descriptive site report less than nine months after completion of field work.

In addition to chapters written by students, the report contains the preliminary study of the plant remains by Hugh C. Cutler, Missouri Botanical Garden, and of the pollen samples by Anton J. Kovar, Department of Botany, Penn State. My chapter on the culture history of Sheep Rock is an attempt at sketching out the highlights of the site's prehistory as they emerge from the many separate studies contained in the report.

The final monograph will be published by the Pennsylvania State Historical and Museum Commission, and the manuscript is scheduled to be ready by June, 1968.

ACKNOWLEDGMENTS

My preceding remarks concerning the history of archaeological investigations and the preparation of this report clearly reveal the magnitude of common effort that went into making this a successful research and instructional program. But there are a number of persons whose efforts deserve special acknowledgment.

I am very much in debt to Dr. S. K. Stevens, Executive Director of the Pennsylvania State Historical and Museum

Commission, and the other members of the commission, for their continuing financial support of the work at Sheep Rock, and for the interest they have expressed in publishing the final report of these investigations. I am similarly indebted to Dr. John L. Cotter, Chief of Archaeological Research for the Northeast Region, National Park Service, for his continued financial support of our survey and salvage programs within the Raystown Dam Flood Basin, of which the Sheep Rock excavation forms a part.

Dr. Kenneth Roose, Dean of the College of Liberal Arts, and Dr. Donald Kent, Head of the Department of Sociology and Anthropology, deserve our warmest appreciation for their encouragement and financial support of the instructional program connected with the Sheep Rock investigations. Without their assistance the archaeology field school could not have been implemented.

Dr. Frederick Matson, then Associate Dean for Graduate Instruction and Research, College of Liberal Arts, and now Research Professor of Archaeology in the Department of Sociology and Anthropology, provided a continuity of leadership for the Sheep Rock project, between 1959 and 1966, for which we are very heavily indebted. It was only through his active participation and guidance that a person as new to the Pennsylvania scene as myself could possibly have hoped to initiate a program of such scope so soon after arriving.

A similar debt of gratitude goes to John Witthoft, then State Anthropologist, and now Research Associate at the University of Pennsylvania, for supplying a continuity of leadership in the Sheep Rock project during the entire period of its activity. His generous offer to turn over the previously excavated materials for study, and his unhesitating encouragement helped me greatly to decide to take on this project. I am also grateful to him for training Ira Smith who, as my field director, so competently handled the difficult business of supervising day-to-day activities of site excavation.

Mr. and Mrs. James Filson, Huntingdon, Pennsylvania, deserve great appreciation for the many ways they have aided in making this program a success. As property owners of the Sheep Rock Shelter site, they have continually welcomed our presence; taking a keen interest in the day-to-day developments connected with the excavation. They owned the anchorage from which we chartered water transportation to and from the site. Although our comings and goings between the site and the anchorage were far more frequent than we expected, and the number of official guests that needed to be transported exceeded our calculations, the Filsons unhesitatingly accommodated all of our needs, even at personal expense to themselves. Their hospitality and warmth captured the hearts of the students who showed their affection for the Filsons by presenting them with an engraved gift at the end of the summer.

In addition to the Sheep Rock Shelter site, we conducted excavations at three other sites, and the owners of these other sites similarly deserve our appreciation. Our thanks to Mr. George H. Grove and son for permitting us to excavate at site 36Hu9, to Mrs. Clair Corbin for permitting us to excavate at site 36Hu6, and to Mr. and Mrs. Robert H. Workman for permitting us to excavate at site 36Bd36. Without the cooperation of these above-mentioned families no program could have been implemented.

Our special thanks to Juniata College, Huntington, Pennsylvania, for acting as our host during the ten weeks of the field season. Special mention should be made of the great assistance provided by some of the staff at Juniata College. Harold Brumbaugh, Assistant to the President, and William B. Martin, then Director of Summer Conferences, deserve our gratitude for facilitating housing and food arrangements for our field school staff and students. Paul Heberling, Dean of Men, and Dr. Peter Trexler, Chairman of the Department of Geology, must be heartily thanked for their assistance in providing laboratory facilities and equipment, and for their untiring efforts at making all of us feel at home on their campus.

We are indebted to Edgar J. Stackhouse and Melville W. Corl for generously loaning us their private collection of artifacts and ecological specimens recovered by them during their early excavations at the Sheep Rock Shelter site. By loaning us their collection they enabled us to assemble for study almost one hundred percent of the specimens removed from the site during the nine years that have elapsed since its discovery.

Many persons connected with Penn State University administration contributed to the success of our program through their prompt and responsible handling of our many needs. I do, however, want to make a special note of the splendid job done for us by the University Purchasing Department. Equipping a thirty-man expedition in archaeology from scratch demanded the purchase of an immense number of different items and in a short period of time. The staff of University Purchasing worked very closely with us all the way through, giving us guidance, as well as insuring the completion of our orders. Also, I want to take this opportunity to thank Mr. Ardell W. Tyson, Assistant to the Registrar, who went out of his way to organize a special registration session for our students, since they could not be available for normal registration. We are indebted as well, to Mrs. Joyce Huner for preparing and administering a crash program in first-aid instruction for the members of the field school staff.

This report would not have been produced in such a short time and in so well-organized a form without the efforts of our Assistant Editor, Donna L. Conway. She

established the style guide, monitored the progress of the authors, and coordinated the activities of the many student volunteers. The task of keeping track of line drawings, half-tone plates, manuscripts, bibliographies, proofreading, and stencil correction also rested in her lap, and she handled them all with an indefatigably good spirit. The reader himself can judge the fine quality of her work.

Donna was aided by three volunteer assistants who shared with her the bulk of editorial labor: Lynn Dixon, Tony Gaalaas, and Pamela Smith. All three were involved in artifact illustration work, and their talent and care are clearly evident in so many of the figures scattered throughout the report. In addition to artifact illustration, Tony Gaalass did much of the proofreading. Similarly, Lynn Dixon took responsibility for preparing an integrated bibliography in addition to artifact illustration. All of the authors contributing to this report are very heavily indebted to these three volunteers, and we want to extend to them our warmest appreciation.

Appreciation is also extended to Jill Rhodes and Lorraine Willey for their help in the final proofreading of this report.

Last, but certainly not least, I want to thank Miss Kay Waite, our typist, for doing such a splendid job on the stencils and for exercising such patience and good humor in connection with the many corrections and revisions that seemed to intrude.

EXPEDITION OPERATIONS AND LOGISTICS

by

D. Michael Steffy

ABSTRACT

This chapter presents briefly the logistical and operational problems that faced the staff of the 1966 Pennsylvania State University Archaeological Expedition into the Raystown River Basin, and how they solved those problems. The basic needs and the logistical support for operation are considered first. Then the organization for that operation and the operation itself are presented. A total of 7,194 manhours of work were put in by the personnel as indicated by their individual field notes. This work was divided among three work areas: Sheep Rock excavation, survey site testing and laboratory processing of material. These work areas are considered individually as subdivisions under the topic headings of organization for operation and expedition operation.

TABLE OF CONTENTS

	Page
ABSTRACT	15
TABLE OF CONTENTS	17
LIST OF ILLUSTRATIONS	19
I. INTRODUCTION	21
II. MEETING THE BASIC NEEDS	21
Food and Shelter	21
Physical Facilities	22
Transportation	22
Equipment	23
III. ORGANIZATION FOR OPERATION	25
Organization of Personnel	25
Organization of the Laboratory	25
Organization at Sheep Rock	25
IV. EXPEDITION OPERATION	27
Personnel	27
Operation in the Field	27
Laboratory Operation	29
APPENDIX I: Expedition Inventory	31
APPENDIX II: Penn State Screen	43

LIST OF ILLUSTRATIONS

		Page
Figure 1.	Organization of Personnel	24
Figure 2.	Organization of Laboratory	26
Figure 3.	Organization at Sheep Rock	28
Figure 4.	Laboratory Organization Flow Chart	30

INTRODUCTION

Of the archaeological expeditions that are preserved in writing, the vast majority are remembered only by formal, scientific accounts of the material excavated and the culture described by the analysis of that material. Reporting culture is, of course, the purpose of these monographs, and so they are acceptable and normal. It is often helpful for later expedition organizers, however, to know something of the operational and logistical considerations that are connected with a given type of expedition. Such a chapter has been included in this report, then, to briefly explain the operation and logistics of the Pennsylvania State University Archaeological Expedition into the Raystown River Basin as an aid to future similar undertakings.

Operational and logistical considerations are affected greatly by expedition objectives, and this expedition was no exception. First, further excavation of Sheep Rock Shelter was to be undertaken. Second, cataloging and preliminary analysis was required of not only the artifactual material removed during the summer but also of a large quantity accumulated from previous seasons' work by other groups. Third, several sites defined in a survey project in the Raystown River Basin during the previous season were to be tested. Finally, the whole expedition was to serve the Pennsylvania State University as a field school experience in archaeology for interested students. These objectives largely determined the basic needs and logistical support necessary for expedition operation, the organization for that operation, and the operation itself.

MEETING THE BASIC NEEDS

The above stated objectives suggest the several basic needs that existed for the expedition. First and most basic of these was the need for food and shelter for the staff and students. The operation of the field school required classroom as well as laboratory and darkroom facilities at one centralized point. Transportation to survey sites and Sheep Rock was also a necessity for personnel and equipment. Sheep Rock's accessibility only by water compounded the transportation problem. Finally, a vast amount of field and laboratory equipment was required to support simultaneous field work at Sheep Rock and survey sites as well as accelerated laboratory operation.

Food and Shelter

The need for food and shelter was met through the cooperation

of Juniata College, located in Huntingdon, just 15 miles from the area of major field activity. Both the men and the women on the project were housed in specially assigned areas of the college residence halls. Meals were provided in the college dining facility, where expedition personnel were brought into close contact with the Juniata students attending the college's summer session. Juniata's food service department also provided bag lunches for groups of personnel who were in the field during the noon meal hour. Several galvanized thermoses of the 5- and 10- gallon size were purchased as part of the expedition inventory and filled daily by the food service to provide ice water, coffee, and fruit punch in the field. Paper cups were supplied with the bag lunches. Paper refuse and unconsumed food were collected and brought in from the field at the end of each day to minimize problems with scavaging animals.

Physical Facilities

The need for physical facilities was also met through Juniata College. Two adjoining and connected laboratories and a darkroom in the geology wing of their new, air-conditioned science complex were secured for laboratory work and as a base of expedition operations. The rooms were sufficiently large and well-lighted and contained ample sink and table-top space, the essentials for laboratory work in archaeology. The darkroom was located across the hall from the two laboratory rooms and was equipped, as were the laboratory rooms, with supplies and equipment from the expedition inventory. This equipment will be discussed later.

One of the physical facilities that was an absolute necessity was a field latrine. This was constructed by expedition personnel in a prefabricated form and was erected permanently at Sheep Rock. In its final form, it consisted of an open-bottomed box, equipped with seat, set over a large hole in the ground. To this was attached a frame supporting a plastic tarp for privacy. The latrine in operation was treated periodically with lime.

A final necessary physical facility was a place to store and secure equipment at Sheep Rock. The difficulty in transporting equipment by water dictated this need, and it was met by the purchase and erection of a prefabricated metal shed measuring approximately 5 feet wide, 3 feet deep, and 6 feet high. It held all the equipment left overnight at the site except the large screens and the wheelbarrows, the latter being secured by chaining them together.

Transportation

A large sixty-passenger school bus was obtained from the motor pool of the Pennsylvania State University, and it provided transportation for equipment and personnel on the expedition. In spite of its large size, it reached survey sites one would imagine

to be accessible only to smaller, four-wheel drive vehicles. All staff members were trained as qualified drivers and took turns performing this function.

Water transportation was contracted from Mr. James Filson, the owner of Sheep Rock and proprietor of a boat anchorage on the Raystown. A small Arkansas Traveler with a light out-board motor, which belonged to the Pennsylvania State Historical Commission, was positioned at the site for use in emergencies.

Equipment

A large amount of equipment is required for an archaeological undertaking of this type. There were over 210 single entries on the inventory for the Sheep Rock expedition. Expanded slightly over normal due to the operation of the field school in connection with the expedition, the equipment was inventoried under eight general categories: expendable supplies, surveying equipment, field equipment, laboratory equipment, photographic equipment, maps and drafting equipment, educational equipment and material, and general tools and equipment. A complete inventory is included in Appendix I, but some special items will be discussed here.

Each student was issued, upon deposit of $5, a personal dig kit which consisted of the following items: a 10-foot tape, a plumb bob, a ball of line, a snake bite kit, a line level, a tweezers, a compass, a razor blade, chalk, a pencil, a small note pad, and a hand trowel. Each student was expected to supplement this with his own 1 1/2-inch paint brush, small whisk broom, ice pick, grapefruit knife, plastic protractor, old toothbrush, 6-inch plastic ruler, grease pencils, and double-ended red and blue pencil. Students were also asked to supply 3-holed looseleaf notebooks with lined and graph (three units to an inch) paper for field notes.

One item which greatly improved operation in the laboratory was a 24- by 24-inch masonite laboratory tray painted with white, rubber-base paint. Fifty such trays permitted efficient handling of artifactual material because the contents of one bag could be carried through the whole lab process without removing them from their tray.

One of the more specialized pieces of equipment that an archaeological expedition may require is a screen. Generally, screens are built by the personnel on an expedition for a nominal amount of money and a minimal amount of labor. The resulting screens seldom last for a second season, if they survive one season without requiring major repairs. It is usually difficult to control screenings and backdirt on simply designed screens, which produces much frustration in the field. With the expense of a little more time and money, it is possible to build screens that provide maximum ease and efficiency in use and maximum durability for long life. The screens designed, built, and used on the Sheep Rock expedition contain the following features:

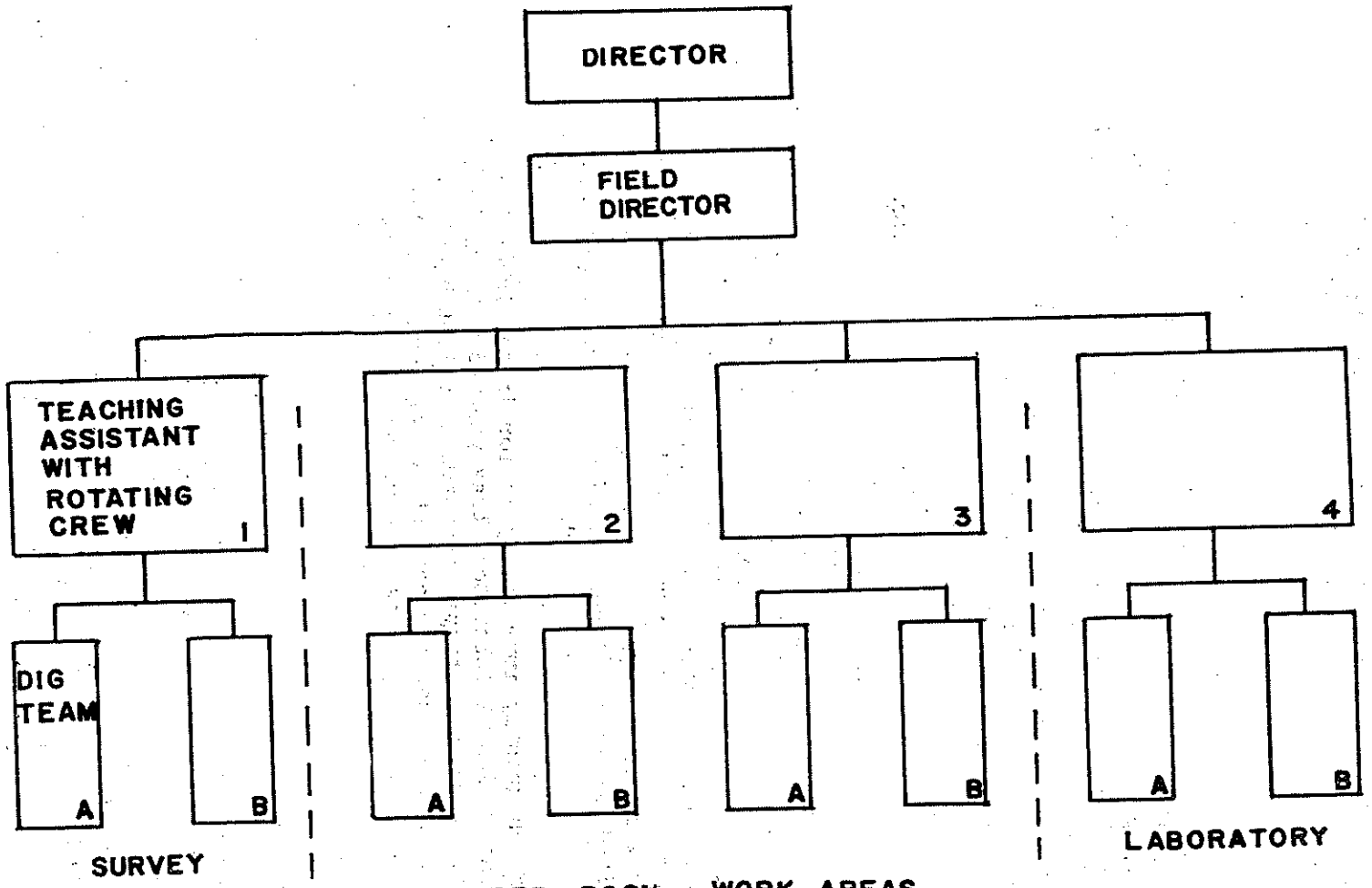

DIRECTOR
FIELD DIRECTOR
TEACHING ASSISTANT WITH ROTATING CREW
1
2
3
4
DIG TEAM
A
B
A
B
A
B
A
B
SURVEY
LABORATORY
SHEEP ROCK WORK AREAS
ORGANIZATION OF PERSONNEL

FIGURE 1.

1. A horizontally swinging screen box which permits control of the material being screened by shaking the screen box with it pulled up and toward the worker to keep the material on the screen and by shaking the screen box rather to the front to discharge the material off the open end.

2. A working area about waist high with access on three sides.

3. A sturdy construction utilizing the A-frame for a maximum amount of strength and a minimum amount of bracing.

4. Folding legs and a four-unit, two-brace, bolted construction permitting easy dismantling for transport and storage.

5. Easy change of screen size by changing the screen box, not the whole screen assembly.

The parts list and the design for the Penn State screen are given in Appendix II.

ORGANIZATION FOR OPERATION

Organization of Personnel

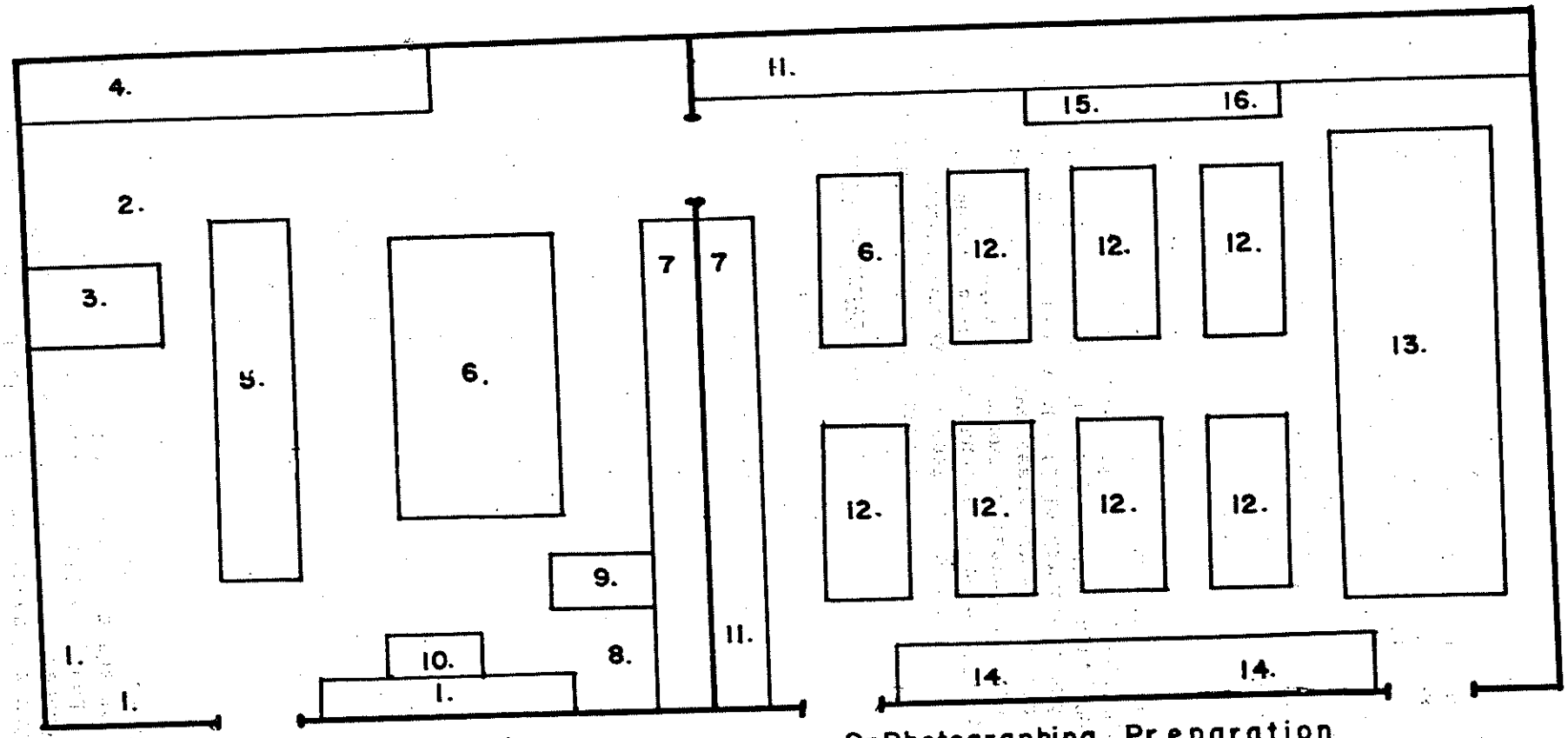
The expedition objectives required that three operations function simultaneously and that the personnel be organized to facilitate this. Eighteen students were divided into four field crews with a teaching assistant in charge of each crew. A crew was further divided into two teams for excavation work. These crews were coordinated by the field director, and the entire expedition was directed by the project director. Crews were assigned to laboratory work, survey site testing, and Sheep Rock excavation in a 1:1:2 ratio. Personnel organization is shown in Figure 1.

Organization of the Laboratory

The laboratory was organized for efficient cataloging, photographing, and drawing and mapping operations. This organization can best be demonstrated by Figure 2.

Organization at Sheep Rock

The limited space and stepped excavation at Sheep Rock coupled with the simultaneous operation of no less than four



1=Field Equipment Storage
2=Drawing and Mapping Area
3=Tracing Table
4=Maps and Drawing Supplies
5=Profile Chart Work Area
6=Material Preparation Area
7=Washing Area
8=Photographing Area
9=Photographing Preparation
10=Level Bags from Field
11=Lab Equipment and Supplies Storage
12=Material Drying and Sorting
13=Cataloguing Area
14=Artifact Storage
15=Lab Analysis Equipment
16=Field Catalogue

FIGURE 2. ORGANIZATION OF LABORATORY

excavation teams required careful organization at the site. The latrine was placed high on the hill well away from the site proper. The tool shed was located on the northwest side across from the entrance to the excavation. Screens were placed overlooking the river on various levels of the stepped excavation. Figure 3 shows this organization schematically.

EXPEDITION OPERATION

Personnel

The work week ran five days, Monday through Friday. The work crews at any one time were assigned so that one was in the laboratory, one at a survey site, and two at Sheep Rock. Every three days a rotation would take place, involving all except one of the crews at Sheep Rock.

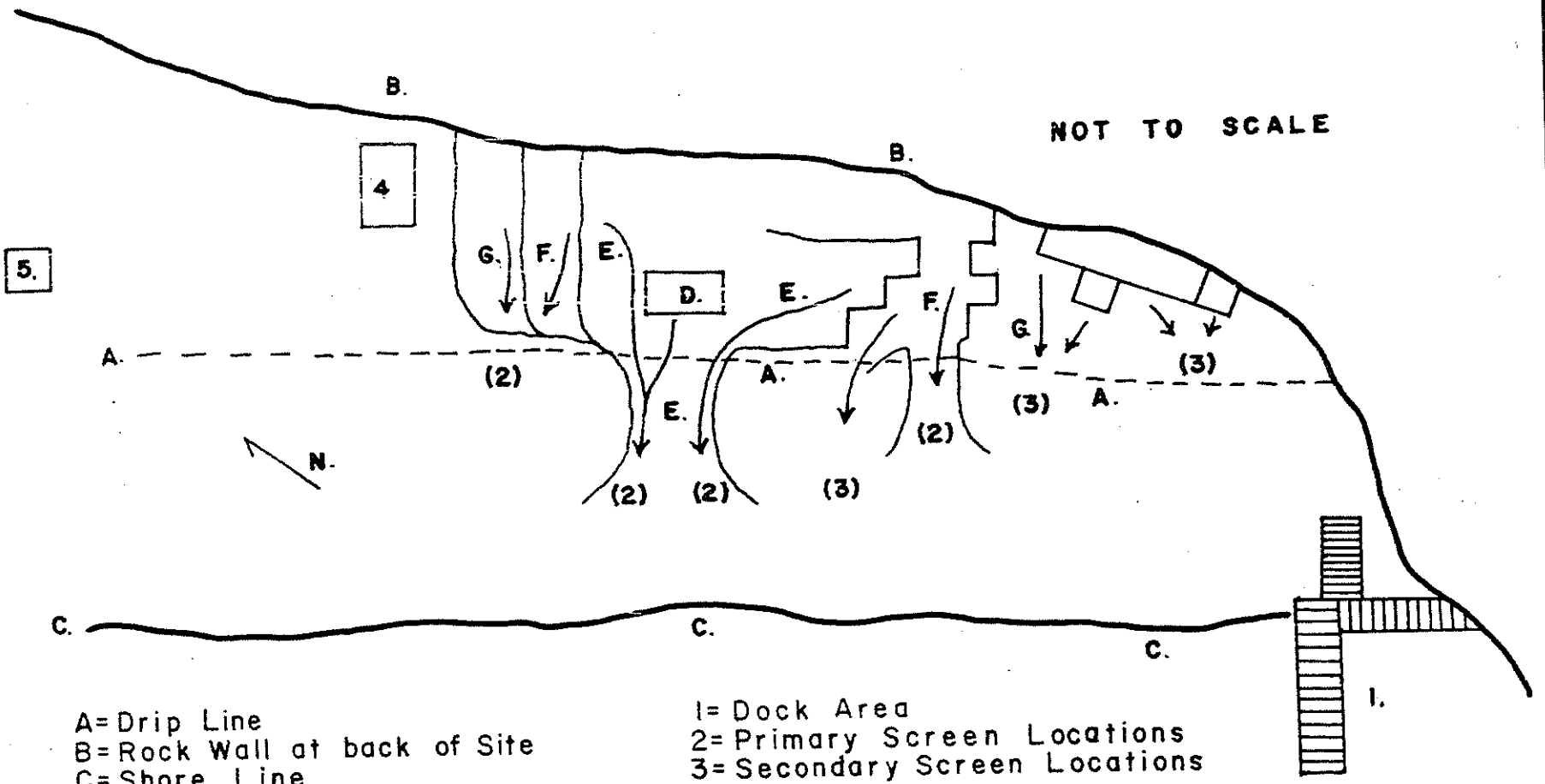
The system is easiest to understand when the assignments and rotation of one crew are considered. A crew may spend three days working in the laboratory, then rotate to a survey site for three days, then to Sheep Rock for six days, and then back to the laboratory for three days. As the summer progressed, projects concerning the analysis of artifactual material were assigned to students, and Monday was set aside to work on these. Friday was designated as a day to work on field notes and other written material so that the actual rotating schedule was in effect only on Tuesday, Wednesday, and Thursday.

As cataloging the backlog of material was essential for the publication of a preliminary report, it became necessary to close down the survey sites, followed by the Sheep Rock field operations, before the end of the ten-week program and to devote a large proportion of manpower to cataloging and photographing material. A summary of manhour distribution reflects the varying attention directed to the following objectives:

	Manhours	Per Cent
Laboratory processing and analysis	3,283	46%
Excavation of Sheep Rock	2,820	39%
Test excavations of survey sites	1,091	15%

Operation in the Field

A typical day in the field would proceed as follows. The students loaded their equipment, including lunches and beverages in large coolers, into the bus, and the group departed from Juniata College by about 7:30 a.m. At the Raystown River, the two crews going to Sheep Rock transferred their equipment onto the motor boats for the ten-minute trip up the river. The bus



A= Drip Line
B= Rock Wall at back of Site
C= Shore Line
D= Deepest Pit
E= Level 3
F= Level 2
G= Level 1

1= Dock Area
2= Primary Screen Locations
3= Secondary Screen Locations
4= Tool Shed
5= Latrine
↖ Access to Screen by Wheelbarrow

FIGURE 3. ORGANIZATION AT SHEEP ROCK

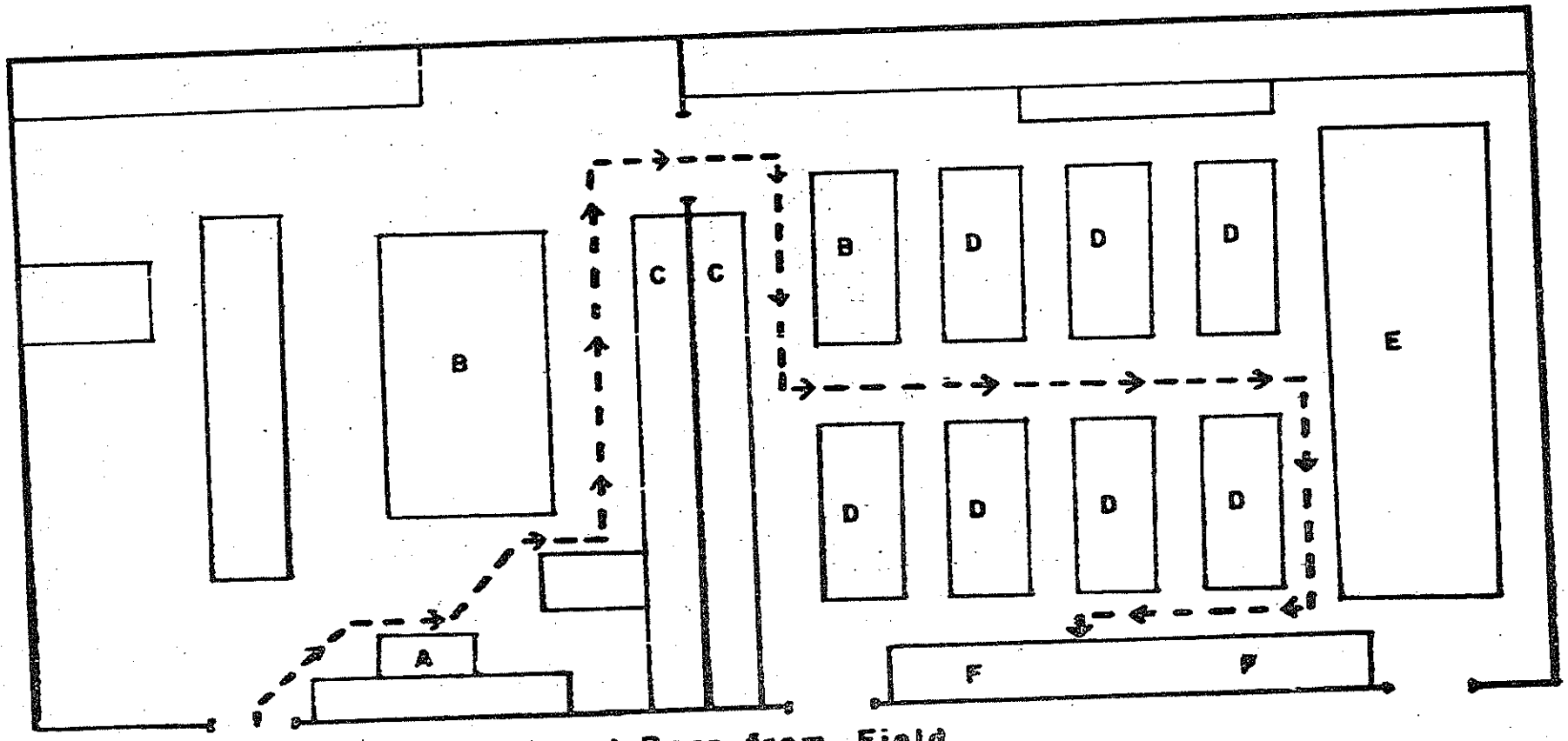
with the survey crew then left for the survey site. There it remained until about 3:30 p.m., when the survey crew loaded up and started back to pick up the two Sheep Rock crews.

Meanwhile, upriver at Sheep Rock, 5-foot squares were being dug using natural stratigraphy. Each crew was divided into two teams, and each team was assigned to a square until its completion, even though a team might be absent for six days due to rotation of crews. At 3:30 p.m. the site was closed down for the day and the group swam until 4:00 p.m. when boat transportation arrived. At the launch the group met the bus, which arrived back at Juniata well before 5:00 p.m., giving them time to clean up before the evening meal. Filled level bags were brought into the laboratory every evening along with the photographic equipment and exposed plates. Weekends were considered free, but most students and staff used them to put in extra laboratory time.

Laboratory Operation

The laboratory process began when level bags were opened and the contents placed in lab trays. After being washed at the sinks, the material was dried, sorted, labeled, and cataloged. Dry vegetable material, of which there was a large quantity, was stored in plastic bags. The final field catalogue contained over 7000 entries of artifactual and non-artifactual material. The laboratory process is outlined in Figure 4. Shallow cardboard laboratory boxes were useful for artifact storage and handling during analysis.

The work day in the laboratory ran from 7:30 a.m. until about 4:45 p.m. with work stopping at 4:30 to clean up. One hour was allotted for lunch in the Juniata dining hall.



A=Level Bags from Field
B=Level Bags Emptied on Lab Trays
C=Material Washed and Cleaned
D=Material Dried and Sorted
E=Material Numbered and Catalogued
F=Material Stored

FIGURE 4 LABORATORY ORGANIZATION AND FLOW CHART

Appendix I

EXPEDITION INVENTORY

INVENTORY FORM

Class I Expendable Supplies Page 1

No.	Item	Count Start	Count End
1.	Dektol paper developer, can to make 1 gal.	9	7
2.	Rapid Fixer, bottle to make 1 gal.	20	15
3.	Glacial acetic acid, 1 pint bottle	1	3/4
4.	Pakasol flattening solution, quart bottle	5	4
5.	D-76 film developer, can to make gal.	10	7
6.	D-76 film developer, replenisher can to make gal.	5	4
7.	DK-50 film developer, can to make gal.	2	2
8.	DK-50 film developer, replenisher can to make gal.	2	2
9.	Panatomic X 4" x 5" sheet film, 100 sheet boxes	7	3
10.	Photoflood bulbs	24	1
11.	4" x 5" polaroid film, boxes	5	5
12.	Kodak Azo Paper Double Wt. F-3, 8" x 10" sheets	100	95
13.	Kodak Kodabromide Paper Single Wt. F-3 8" x 10"	600	250
14.	Kodachrome II 20 exp. rolls daylight type	6	0
15.	Kodacrhome II 36 exp. rolls Type A	3	NI
16.	Kodak mailers for K II (20 exp.)	10	NI
17.	GE Spotlights	6	6
18.	Nails, box	NI	4
19.	Screws, box	NI	1
20.	Bolts, box	NI	1
21.	Washers, box	NI	1
22.	Staples, box	NI	1
23.	Level Bag Tags	NI	200
24.	Plaster Paris 10 lb.	1	1
25.	Plaster Paris 5 lb.	1	1
26.	Batteries, 45-volt	NI	2
27.	Cotton, rolls	NI	2
28.	Chalk, 1 gross boxes	3	3
29.	Hose Fittings	2	2
30.	String, balls	25	8
31.	Wax, cakes	3	3
32.	Ether, bottle	1	1
33.	3N HCl, bottle	1	1
34.	Latex Solution, bottle	1	1
35.	Vinyl Acetate, bottle	1	1
36.	Iso Alcohol, bottle	1	1
37.	Quick Spray Lacquer, can	1	1
38.	Solvent, can	1	1
39.	Baggies, box	NI	2
40.	Aluminum Foil, box	NI	1
41.	Vials	NI	40

INVENTORY FORM

Class I Expendable Supplies Page 2

No.	Item	Count Start	Count End
42.	Ink bottles	18	8
43.	Cutex	NI	4
44.	Duco Cement, tubes	6	5 part.
45.	Light Bulbs, replacement	16	16
46.	First Aid Material, in boxes	NI	3
47.	Leroy Lettering Ink	6	6
48.	Masking tape	6	2
49.	White Shoe Polish	NI	NI
50.	Scotch Tape	NI	NI
51.	Paper Clips	11	0
52.	Plastic Sheet	1	1
53.	Crystaline Guide Line Paper, 50 yd. roll	1	0
54.	Crystaline Guide Line Paper, Partial roll	1	1
55.	Razor Blades, box	3	0
56.	Wide Mouth Jars, dozen	6	0
57.	Rubber-coat Thinner, can	1	Part.
58.	Pencils	60	0
59.	Rubber Cement	2	0
60.	Linseed Oil, can	1	Part.
61.	Turpentine, can	1	0
62.	Paint, assorted	3	0
63.	Albanene Paper, 50 yd. roll	1	0
64.	3" x 5" Tablets, dozen	5	0

INVENTORY FORM

Class II Surveying Equipment Page 3

No.	Item	Count Start	Count End
1.	Compass, surveyor's	1	1
2.	Farm level "transit"	1	1
3.	Tripod for farm level	1	1
4.	Alidade	1	1
5.	Tripod for alidade	1	1
6.	Plumb bobs	8	6
7.	Line weights	2	2
8.	Stakes	200	50
9.	Steel tapes, 100'	3	3
10.	Stadia rods, with target	NI	3
11.	Hand levels	2	2
12.	Plane table, with tripod mount	1	1

INVENTORY FORM

Class III Field Equipment Page 4

No.	Item	Count Start	Count End
1.	Shovels, long handled	14	14
2.	Rakes	2	2
3.	Rope, 1", 100' coil	2	2
4.	Hoist, self locking	1	1
5.	Brooms	2	2
6.	Picks	2	2
7.	Pails	4	4
8.	Tapes, 10'	30	30
9.	Sledge hammer, long handled	2	2
10.	Axes	2	2
11.	Shears, "root cutters"	1	1
12.	Screens, 5 part unit with hardware	6	6
13.	Wheelbarrows	5	5
14.	Lantern, gas	1	1
15.	Hardhats	8	6
16.	Shed, tool, 34 part unit with hardware	1	1
17.	GI cans, with lids	2	2
18.	Cooler, galvanized, large	1	1
19.	Cooler, galvanized, small	5	5
20.	Tackle boxes, "dig kits"	30	30
21.	Trowels	30	4
22.	Tarps, plastic, large (10' by 12')	2	1
23.	Tarps, plastic, small (6' by 9')	3	3
24.	Levels, line	32	30
25.	Compass, field	9	9
26.	Tweezers	24	20
27.	Snake bite kits	6	5
28.	Tool boxes	2	2
29	Supply boxes	2	2
30.	Level bag boxes	2	2
31.	Latrine box	2	1
32.	Tackle Box dividers	NI	12
33.	Locks with chains	2	2
34.	Screen boxes "extra" with hardware	3	3
35.	Sprayers	2	1
36.	Cloth Level Bags	NI	NI

INVENTORY FORM

Class IV Laboratory Equipment Page 5

No.	Item	Count Start	Count End
1.	Cyclospot Illuminator	1	1
2.	Tensor High Intensity Lamp	1	1
3.	AO Spencer Series, 60 microscope with case	1	1
4.	B&L Zoomslope ST2100	1	1
5.	B&L Stereo Scope, 55m 15	1	1
6.	Rite Lite Illuminator	2	2
7.	Anchor Stereo Microscope	1	1
8.	Magnifying glasses	4	4
9.	Hand Vac. Cleaner	1	1
10.	Hand Vac. Cleaner attachments	1	1
11.	Sponges	10	8
12.	Brushes	10	10
13.	Sieve series, 6 piece unit	1	1
14.	Vernier calipers	7	7
15.	Ph test kit	1	1
16.	Wash bottle	NI	1
17.	Goniometer	2	1
18.	Stamp pad	1	1
19.	Numbering stamp	1	1
20.	2' by 2' lab trays	50	49
21.	Alkaline Rechargeable Battery	1	1
22.	Battery adapter	1	1
23.	Bulb syringes	2	2
24.	Vibragraver	1	1
25.	Mineralight Model UVS-12	1	1
26.	Pen point holders	12	11
27.	Nibs	50	10
28.	Tongs	1	1

INVENTORY FORM

Class V Photographic Equipment Page 6

No.	Item	Count Start	Count End
1.	Calumet 4 x 5 view camera	1	1
2.	Case for view camera	1	1
3.	Black viewing cloth	1	1
4.	Black daylight loading bag	1	1
5.	4 x 5 film packs	12	12
6.	Lens cap for 4 x 5	1	0
7.	Shutter release cord	1	0
8.	Instruction book for 4 x 5	1	1
9.	Weston V light meter 2 pieces	1	1
10.	Case for above meter	1	1
11.	Incident light attachment for above meter	1	1
12.	Pentax 35 mm SLR	1	1
13.	Case for Pentax	1	1
14.	Lens cap for Pentax	1	1
15.	Flip lock tripod	1	1
16.	Case for tripod (now damaged)	1	1
17.	Honeywell Strobe Unit	1	1
18.	AC adapting cord for above	1	1
19.	Polaroid 4 x 5 adaptor unit	1	1
20.	Print dryer 24" x 20"	4	4
21.	Ferreotype tin 24" x 20"	1	1
22.	Cover for dryer	1	1
23.	Gra-lab Darkroom Timer		
24.	Developing Trays		
	11" x 14"	3	3
	5" x 7"	3	3
25.	Collapsible plastic bottles, 1 gal.	2	1
	2 gal. size	1	1
26.	Kodak plastic measuring beakers		
	1 liter size	1	1
	250 cc size	1	1
27.	Film and paper tongs	1	1
28.	Chemical stirring rod	4	4
29.	Dark room thermometer	1	1
30.	Omega D-2V enlarger	1	1
31.	Small glass funnel	1	1
32.	Omega 11" x 14" adjustable enlarging easel	1	1
33.	Film squeegee	1	1
34.	Clothespins for hanging film to dry	36	36
35.	Safe light with four different filters	1	1
36.	"Gator Grip" reflector holder (1 is faulty)	4	4
37.	Anscomatic adjustable daylight loading tank	1	1
38.	Easy loading reels for Anscomatic tank	3	3
39.	Thermometer for Anscomatic tank	1	1
40.	Stainless steel developing tanks	3	3
41.	4" x 5" adjustable film holders (sheet film)	12	12

INVENTORY FORM

Class V Photographic Equipment Page 7

No.	Item	Count Start	Count End
42.	Daylight loading tanks for sheet film	2	2
43.	Film guides for above tanks (set)	3	3
44.	Sockets for photofloods	4	4

INVENTORY FORM

Class VI Maps and Drafting Equipment Page 8

No.	Item	Count Start	Count End
1.	Triangles 30, 60, 90	3	3
2.	Drafting kit	1	1
3.	Rapidograph pens 0, 1, 2, 3	4	4
4.	Ruling pen	1	1
5.	T Squares	2	2
6.	Leroy Set	1	1
7.	Leroy pen	1	1
8.	Drafting pencil	1	1
9.	Protractors	2	3
10.	Drafting board, small	2	1
11.	Air photographs, assorted	NI	NI
12.	Survey maps, assorted	NI	NI

INVENTORY FORM

Class VII Educational Equipment & Material Page 9

No.	Item	Count Start	Count End
1.	Pencil sharpener (left at site)	1	0
2.	Stapler	1	1
3.	3 hole punch	1	1
4.	Movie projector with speaker	1	1
5.	Movie screen	1	1
6.	Ring binders	8	NI
7.	Mimeo stencils, boxes	4	4
8.	Carbon paper, boxes	1	1

INVENTORY FORM

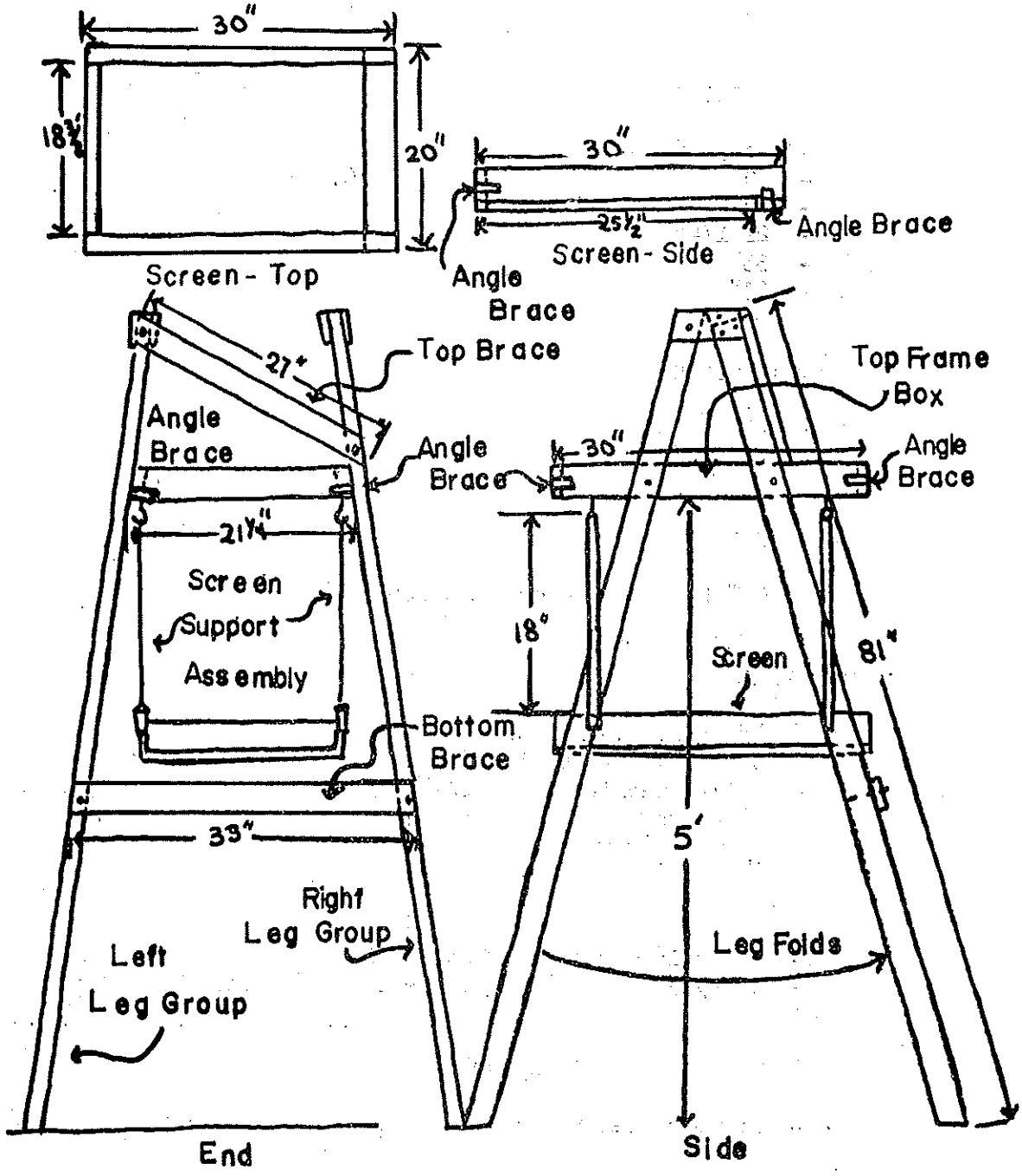
Class VIII General Tools & Equipment Page 10

No.	Item	Count Start	Count End
1.	Small paint brushes	5	5
2.	Hammers	4	4
3.	Power Drill	1	1
4.	Files, Metal	3	3
5.	Screw driver	1	1
6.	Drills, assorted	2	2
7.	Level 2'	1	1
8.	Saws, key hole	3	3
9.	Garden hose 25'	1	0
10.	Clip boards	3	1
11.	Saws, cross cut	2	2
12.	Wire cutters	1	1
13.	Sledge hammer, small	1	1
14.	Wrenches, box	4	4
15.	Wrenches, adjustable	2	2
16.	Blankets	2	2
17.	Dust brush	1	1

Appendix II

PENN STATE SCREEN

BLUEPRINT FOR SCREEN



DRAWING NOT TO SCALE

Penn State
Archaeology Field School
Screens - Parts List

2 by 4 STOCK

4 - 81"
2 - 30"

1 by 4 STOCK

1 - 18 3/8"
2 - 30"
1 - 20"
2 - 21 1/4"
1 - 33"
1 - 27"

1 by 1 STOCK

1 - 20"
2 - 25 1/2"

3/4" PLYWOOD

4 - 10" by 4 1/2" - cut to shape

HARDWARE

12 - 4" machine bolts 5/16"
4 - 5" machine bolts 5/16"
8 - 1 1/2" machine bolts 1/4"
4 - 4" hooks

WASHERS

4 - 1" by 18" by 1/4" flat steel 1/4" holes 1/2" from each end
8 - 1" by 3" by 1/4" flat steel 1/4" holes 1/2" from each end

1/4" WIRE SCREEN 22" by 30"

8 - Angle braces and screws

Screen dismantles into 6 parts for transport

1. Right leg group
2. Left leg group
3. Top frame box
4. Screen and screen support assembly
5. Top brace
6. Bottom brace

THE ECOLOGY OF THE SHEEP ROCK SHELTER SITE

by

Samuel Casselberry

and

Gene Paull

ABSTRACT

The Raystown area of Huntingdon County, where the Sheep Rock Shelter is located, appears to have provided a satisfactory ecological niche for both Archaic hunters and gatherers and Woodland horticulturalists. Ecological evidence suggests that a small population of Archaic hunters and gatherers could permanently occupy the general vicinity of the Sheep Rock Shelter. An adequate food supply seems to have been available during all seasons.

ACKNOWLEDGMENTS

I would like to thank Dr. Joseph Michels for his helpful suggestions offered during the writing of this paper. I am also indebted to Dr. Anton Kovar, Dr. Vincent Shepps, Dr. Hugh Cutler, and Ira F. Smith III for the use of their unpublished reports. A special note of thanks goes to the junior author, Gene Paull, presently serving in Micronesia for the Peace Corps, for his work on the soil conditions of the Raystown Valley.

TABLE OF CONTENTS

	Page
ABSTRACT	49
ACKNOWLEDGMENTS	51
TABLE OF CONTENTS	53
LIST OF ILLUSTRATIONS	55
LIST OF TABLES	57
I. INTRODUCTION	59
II. PHYSIOGRAPHY	59
III. THE SITE	61
IV. NATIVE VEGETATION	64
V. CLIMATE	64
VI. FAUNA	67
VII. VEGETABLE FOOD REMAINS	69
VIII. SOILS AND AGRICULTURE	71
IX. CONCLUSION	79
APPENDIX I: Preliminary Report on Mollusc Shell Study	81

LIST OF ILLUSTRATIONS

		Page
Figure 1.	Map of South-Central Pennsylvania.	60
Figure 2.	Aerial Photograph of Raystown Branch of Juniata River.	62
Figure 3.	Site Map of the Sheep Rock Shelter Site. . .	63
Figure 4a.	Looking West From the Top of Sheep Rock. . .	70
Figure 4b.	Looking Northeast Toward Sheep Rock	70

LIST OF TABLES

		Page
Table 1.	Climatic Data for Huntingdon	66
Table 2.	Soils and Corn Yields	72
Table 3.	Soils and Survey Site Distribution	76
Table 4.	Soil Types in Relation to Culture Period of Survey Sites.	77
Table 5.	Distribution of Soil Type in Relation to Culture Period.	78

INTRODUCTION

This paper is an attempt to reconstruct the total environment of the Sheep Rock Shelter area as it was when the site was inhabited. The central theme of this chapter is that the Raystown River Valley was rich enough to support a small population on more than a seasonal basis.

Realizing that "it is through food that prehistoric peoples are most intimately linked with their habitats..." (Clark 1965:117), this paper emphasizes the food resources available to the inhabitants of Sheep Rock. They are discussed in the following order: land animals, aquatic resources, wild vegetable foods and cultivated plants as they are related to soil condition.

Unfortunately, there was not enough time to analyze the remains stratigraphically; nevertheless, it is hoped that the present paper will aid in the understanding of man's interaction with his environment in the Raystown Valley.

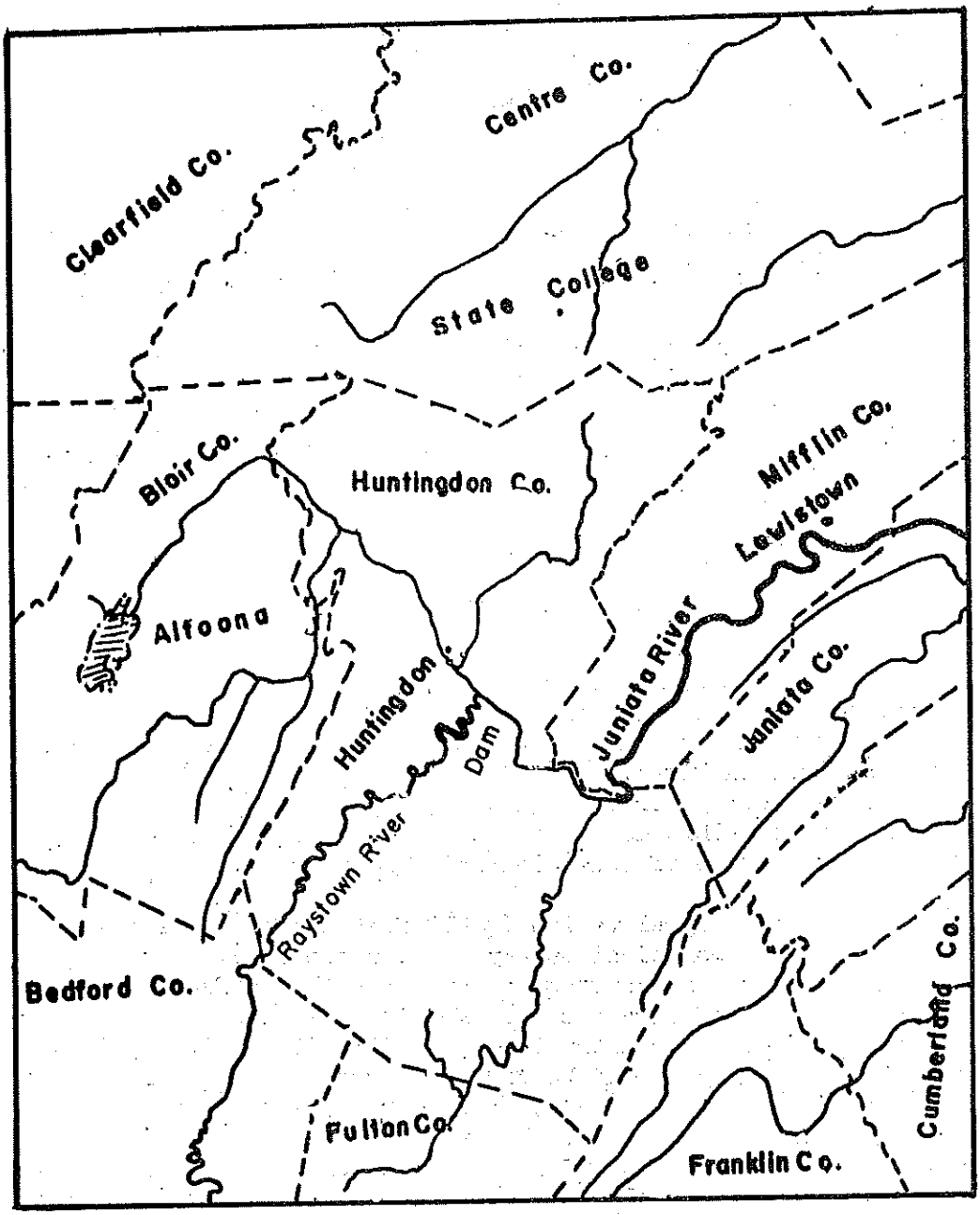
PHYSIOGRAPHY

Man has greatly altered the lower part of the Raystown Branch of the Juniata River. Today there is a dam constructed on the Raystown River about four miles south of where it flows into the Juniata River. This dam has created a lake about ten miles long, four hundred yards wide, and ten to fifty feet deep in the center. This dam is shown in Figure 1, which places it in the perspective of South-Central Pennsylvania.

The spillway elevation is 662 feet above mean sea level (United States Geological Survey 1963:Huntingdon). Thus, the areas of the present Raystown River where the surface elevation is more than 662 feet above mean sea level will be unaffected directly by the dam construction and will give a good indication of river description before the stream was altered. At 36Hu9 the river is a rapidly moving stream with a depth of 10 to 12 inches in the center. The river bed is composed of large water-worn conglomerates with shale beds exposed along the watercourse. Where the shale beds are exposed there are pools with a depth of three to five feet, but where the river bed is largely rocky, rapids are common.

The Raystown Branch of the Juniata River is extremely winding. The air distance from the point where the river enters Huntingdon County to where it flows into the Juniata River is twenty-one miles (White 1885:5). However, the actual distance

Figure I



SOUTH-CENTRAL PENNSYLVANIA

along the Raystown River is nearly fifty miles (White 1885:5). The reason for this is that the river flows along an exposed belt of a soft Catskill formation meandering along this weak rock, and being rebounded by the ridges of the Upper Chemung shales on the left, and the Pocono sandstone of Terrace Mountain on the right (White 1885:5). See the aerial photograph of the Raystown Branch of the Juniata River (Fig. 2).

The Raystown River and its bordering ridges are part of the Ridge and Valley province of the Appalachian Highlands (Gifford 1951:7). This area is in general characterized by long, narrow, parallel, even-crested ridges with lowlands in between (Gifford 1951:7). The ridges are formed by the more resistant rocks while the valleys are the least resistant formations (Lobeck 1956:108). The folding of the sedimentary beds produces the linearity of the features. Valley floor elevations in Huntingdon County range from 600 to 1400 feet above sea level while ridge tops are from 1500 to 2300 feet above sea level. Terrace Mountain has a maximum height of about 1800 feet above sea level while the Raystown River has an elevation ranging from 600 feet where it flows into the Juniata River to 700 feet where it enters Huntingdon County (United States Geological Survey 1963:Entriken and Mt. Union).

THE SITE

Sheep Rock is located in a valley (Fig. 1a) formed by the action of the Raystown Branch of the Juniata River on Devonian Catskill and Chemung formations (44759mN - 749500mE: U.S.G.S. Topographic Map, 7 1/2 minute series: Huntingdon Quadrangle, 1953). The site lies on the north bank of the river and is about seven miles up-river from the present dam (Smith 1966:2). The valley walls rise about 250 to 300 feet above the Raystown River. Sheep Rock is cut out of a section of Chemung shale which is tilted about 25 degrees from the horizontal (Fig. 1b) towards the southeast (Shepps n.d.). The southeast portion of the site presently extends into the Raystown River. The site is approximately 30 feet above the river and has a maximum width or depth of about 30 feet, measured from the back of the rock shelter out to the drip line. The length of the site, during the most recent occupation level, is about 110 to 130 feet (Fig. 3). Since the west portion of the site is a rather steep gradient, the accumulation of refuse constantly increased the size of the living floor by leveling off the slope. The overhanging rocks which protect the site have a height of about 70 feet (Guilday and Parmalee 1965:34), and a maximum overhang of about 30 feet. This overhang appears to have been formed by the water action cutting away at the Chemung shale. This process was undoubtedly accelerated during the Ice Age. At present the site is

Figure 2

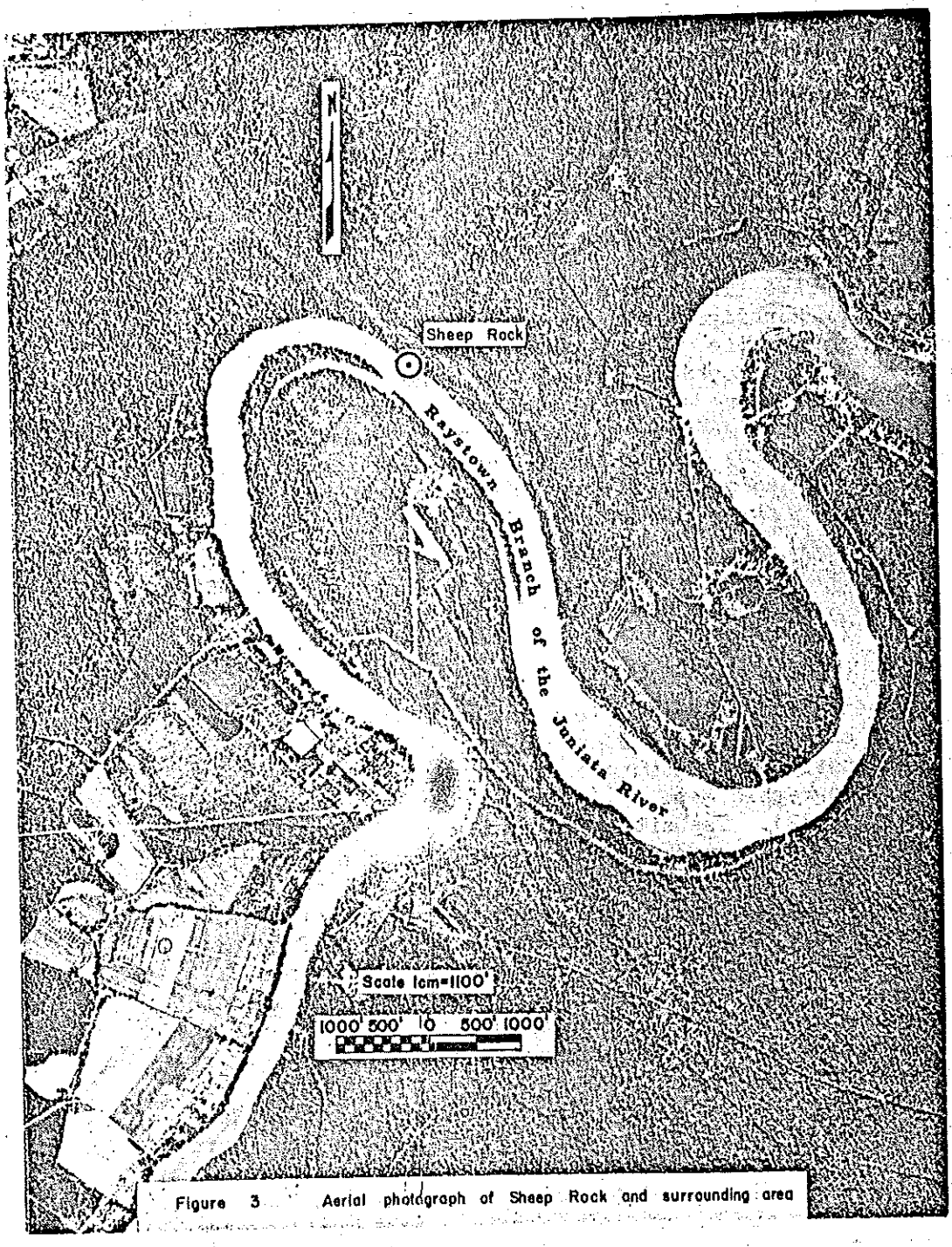


Figure 3 Aerial photograph of Sheep Rock and surrounding area

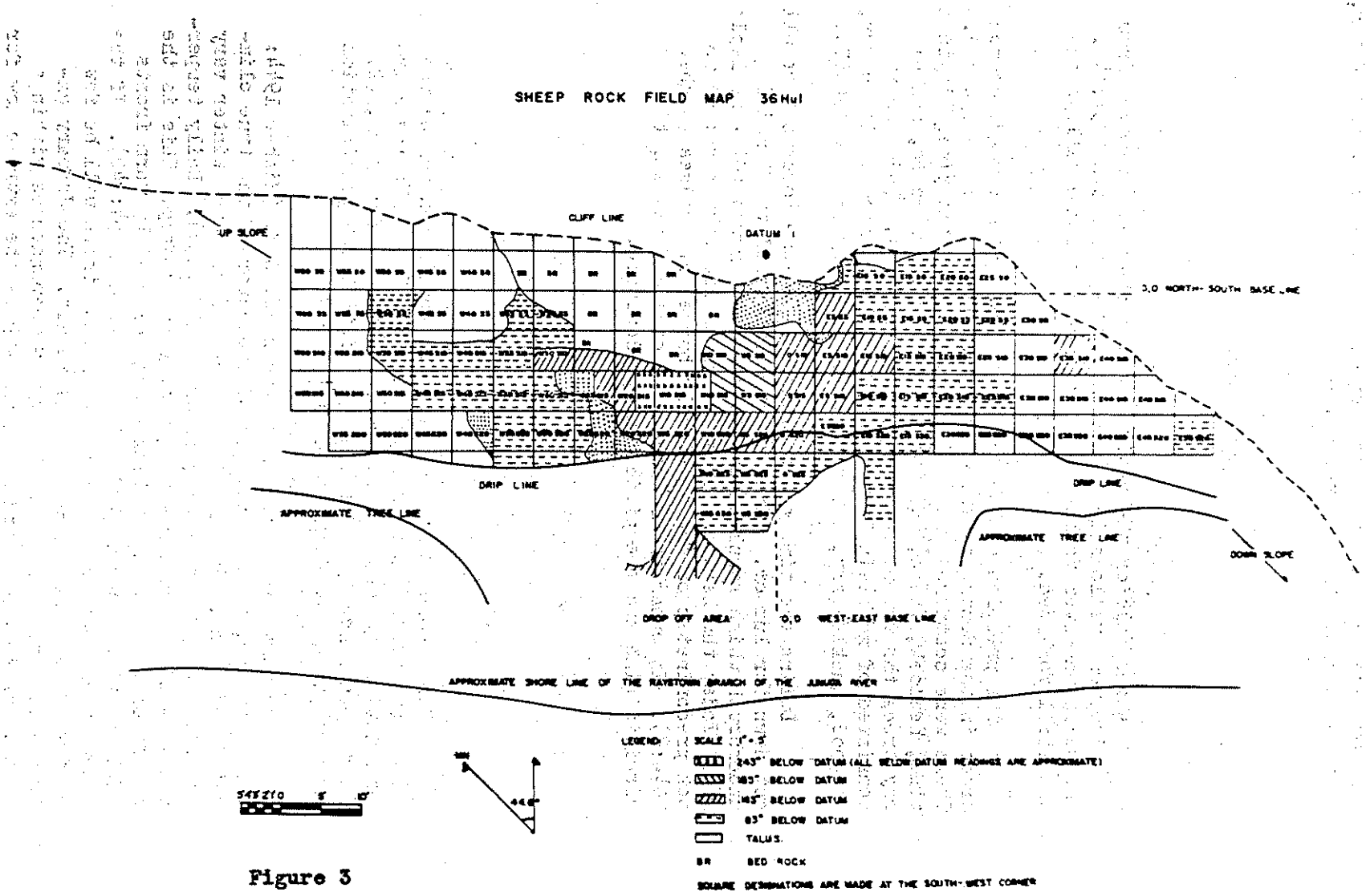

SHEEP ROCK FIELD MAP 36Hul
UP SLOPE
CLIFF LINE
DATUM
0,0 NORTH- SOUTH BASE LINE
DRIP LINE
DRIP LINE
APPROXIMATE TREE LINE
APPROXIMATE TREE LINE
DOWN SLOPE
DROP OFF AREA
0,0 WEST-EAST BASE LINE
APPROXIMATE SHORE LINE OF THE RAYSTOWN BRANCH OF THE JUNIATA RIVER
LEGEND: SCALE 1" = 5'
243" BELOW DATUM (ALL BELOW DATUM READINGS ARE APPROXIMATE)
183" BELOW DATUM
143" BELOW DATUM
83" BELOW DATUM
TALUS.
BR BED ROCK
SQUARE DESIGNATIONS ARE MADE AT THE SOUTH-WEST CORNER
44.6°

Figure 3

elevated about 30 feet above the river; this is the result of further river action, cutting even deeper into the valley floor, plus the accumulation of refuse.

NATIVE VEGETATION

Almost all of the native forests have been removed from the limestone valleys in Huntingdon County (Gifford 1951:14). The Raystown River Valley is one of the few large valleys that are still forested.

The precolonial land cover was oak and hardwood, common trees in the Southern Hardwoods forest region (Higbee 1944:7). There were scattered white pine, red pine, pitch pine, Virginia pine, hemlock, beech, walnut, elm, cherry, red maple, and hickory trees throughout the area (Higbee 1944:7). Undergrowth consisted of mountain laurel, azalea, rhododendron, blackberry, dogwood, huckleberry, blueberry, and dewberry (Higbee 1944:7).

During the time period 1830 to 1900 the forests were all cut down for lumber. Fires frequently burned the remaining underbrush which resulted in a new second growth (Gifford 1951: 14). Today the hardwood chestnut trees are very rare; scrub oak predominates on the previously burned off ridges (Higbee 1944:8). In other areas which were once deforested, the Virginia pine and the pitch pine predominate.

CLIMATE

Huntingdon County is characterized in general by the humid continental, warm summer climate. The following characteristics distinguish this region: (1) cold winters, (2) long, warm summers, and (3) evenly distributed precipitation throughout the year (Trewartha 1954:327).

January in Huntingdon averages 28.90 F. (Higbee 1944: 14). However, this is not a good indicator of the true climatic conditions. The monthly averages during the winter vary greatly from year to year (Trewartha 1954:339). Daily temperatures within a winter month, too, vary greatly. This is the result of cold waves and blizzards, followed by warm fronts which melt the accumulated snow (Trewartha 1954:340). If the storm tracks during a winter move north, there will be few cold waves and a mild season will result. The January extremes illustrate the variability of temperatures within a month: 72 is the record high, and -29 is the extreme low for the month (Higbee 1944:14).

Local variations in the winter climate are pronounced in the Ridge and Valley regions. Because of a decrease of temperature and an increase of wind velocity with altitude, the ridges are marked by an extremely hostile winter season (Gifford 1951: 13). Ice storms are common in the higher elevations (Gifford 1951:13). In the immediate vicinity of the Raystown River and other bodies of water, temperatures would be more moderate. The above facts tend to favor the hypothesis that if prehistoric Indians inhabited this area during the winter, they probably lived close to the river shores.

Summers are much more uniform (Trewartha 1954:339). They are characteristically long, warm, and humid (Trewartha 1954:339). Occasionally there are intrusions of polar air masses which drop the nighttime temperatures into the low 50's. Heat waves are very common; it is not uncommon to have a week with daytime temperatures in the mid 90's (Higbee 1944:14).

The bulk of the precipitation that occurs does so in the form of intense local thundershowers (Trewartha 1954:341). Huntingdon averages about four inches of rain for each of the summer months (Higbee 1944:14). The Raystown River Valley and its bordering ridges, Terrace Mountain and Allegrippis Ridge, exhibit an influence on local thundershowers. According to local residents, it serves as a storm track for local thundershowers and increases their intensity. This agrees with Trewartha's list of causes for microclimates.

Several factors of the climate have a strong influence on agriculture: violent storms, frosts, and droughts. Violent thunderstorms which occur in the presence of intense cold fronts can destroy recently-planted crops. Frosts have occurred in all months except July and August, but the usual growing season is from May 15 to September 15. Periodic droughts can occur in the summer when there is a shift in the semipermanent air masses which cause the storms for this region (Trewartha 1954:342).

When compared to many geographic regions of the United States, Central Pennsylvania has very minor hazards to agriculture with which a prehistoric Indian must deal. The humid continental climate is ideal for corn and hay, and these two crops are, indeed, the most prominent of the modern agricultural produce in this region (Trewartha 1954:339 and Higbee 1944:19). Table 1 presents a sixty-year record of the United States Weather Bureau, 1880-1940, for Huntingdon, Pennsylvania (Higbee 1944:14).

There is little evidence of any major climatic change occurring between the first Indian occupation of the site and the present. However, from his comprehensive pollen analysis Dr. Anton Kovar (1966:7) has hypothesized that there has been a minor drying and warming trend. Other specialists, Guilday and Parmalee (1965:35), also agree with the viewpoint that

Table 1

CLIMATIC DATA FOR HUNTINGDON FOR
THE PERIOD 1880 TO 1940

Month	Average Temp. (°F)	Extreme High (°F)	Extreme Low (°F)	Average Prec. (in.)	Average Snowfall (in.)
January	28.9	72	-29	3.20	10.8
February	29.5	73	-23	2.69	10.3
March	38.7	85	- 7	3.46	7.1
April	49.3	95	6	3.49	1.8
May	60.3	98	22	3.75	0.0
June	68.5	100	29	4.12	0.0
July	72.4	104	33	4.06	0.0
August	70.7	105	36	3.88	0.0
September	64.6	99	27	3.09	0.0
October	52.7	92	16	3.07	0.1
November	41.7	79	0	2.23	1.0
December	31.8	69	-15	2.92	6.8

there have been "no major ecological changes in the area during the time span represented by the deposit." With this in mind, a few comments will be made concerning the present climatic condition of the area. The major climatic features of this area are cold winters, long, warm summers and evenly distributed precipitation throughout the year (Trewartha 1954: 327). It has been further pointed out that there is marked variation in winter climates between that of the ridges and the valleys. Due to increased altitude on the ridges, the temperature is lower and the wind velocity is greater, thus producing a very undesirable cold winter on the ridges. On the other hand, in the valleys the temperature tends to be more moderate and the wind velocity is decreased considerably (Trewartha 1954:339-341).

The most impressive characteristic of Sheep Rock is the large overhang of rock which affords protection from the elements such as wind, rain and snow. However, just as important to the early inhabitants of the rock shelter is the river which flows directly in front of the site. The river as a valuable source of fish and shellfish will be discussed later, but it should be pointed out here that it also was very important as a source of fresh water. Several other factors which will be discussed in greater detail later are the abundance of game and wild vegetable resources in the immediate area. Also, the presence of tillable land which was of importance to the later inhabitants of the rock shelter will be discussed below. According to Meighan, et al. (1958:2), the exposure or lack of exposure of the morning sun upon an encampment was important in determining the desirability of a site. It is reported that "the overhang of the cliff is so gradual and high that, as the sun passes over the site, some parts of the shelter are in sunlight from sunrise until sunset" (Stackhouse and Corl 1962:1). Sheep Rock also affords an unobstructued view of the surrounding country which would have been invaluable for its defensive qualities if the need arose.

FAUNAL REMAINS

The animal population of the Sheep Rock area is typical of the central Ridge and Valley provence (Guilday and Parmalee 1965:35). The land animals which appear to be of the greatest importance as far as the diet of the Indian was concerned are the white-tailed deer, elk, raccoon, beaver, woodchuck and muskrat. Birds of some importance were the Canadian goose, ruffled grouse and possibly the passenger pigeon. Five kinds of turtles, as well as fish and shellfish, were taken from the Raystown River. Suckers, bullheads, eels, striped bass, shad, walleye and fallfish were

all eaten by the inhabitants of Sheep Rock. For a more complete list of the faunal remains excavated from Sheep Rock, see Guilday and Parmalee (1965).

The early inhabitants of Sheep Rock could have used the shelter for more than a winter abode, at which time it afforded excellent protection from the winter conditions. Gifford and Whitebread report that the forest of the steep hillsides along the Susquehanna and its tributaries of the south-central portion of Pennsylvania are very variable in composition. They also state that these regions have a very great variety of shrubs and herbaceous plants. Therefore, this region provides "excellent range, near water, for game and furbearers" (Gifford and Whitebread 1951:9).

Since the white-tailed deer was probably the most important food resource for the early population of Sheep Rock, it is necessary to show that the deer was a continual inhabitant of the Ridge and Valley section. One way to do this is to determine the deer's normal diet which will delimit the areas in which he may live. Roslund points out that during the spring and summer months the deer feeds mainly on herbaceous plants and leaves and new twigs of woody species. During the fall and winter the deer feeds on acorns, beechnuts, aspen, rhododendron, laurel, hemlock, blackgum and other woody twigs. He states that the habitat preferred by the white-tailed deer consists of forest and brush (Roslund 1951:18). "Woody browse plants" are a necessity for this deer (Grimm and Roberts 1950:33). Thus, the usual habitat of the white-tailed deer is deciduous or coniferous-deciduous forests; although, the deer might under unusual circumstances continually inhabit the meadow and grassland zones. Therefore, since the Sheep Rock area is one of forest and brush and supports the growth of plants which constitute the diet of this deer, it may be seen that this region provides a most suitable ecological niche for the white-tailed deer throughout the year.

The major supplementary land animal food resources consisted of beaver, muskrat, woodchuck, white rabbit and raccoon. The beaver is reported to have been plentiful in the higher mountain headwaters of the Susquehanna (Rhoads 1903:67), and to have favored streams, usually small creeks (Gifford and Whitebread 1951:38). There are many such small creeks flowing into the Raystown Branch of the Juniata River which were well suited for beaver. The muskrat is reported to be present in considerable numbers whenever there is enough water in which they can float (Rhoads 1903:105). Further refinement of the beavers habitat is given by Grimm and Roberts (1951:77): "Slow-flowing streams, with an abundance of herbaceous vegetation along their banks, constitute the principle muskrat habitat..." For the raccoon the "optimum habitat appears to be stream valleys, but in feeding it often ranges along the ridges..." (Grimm and Roberts 1951:50). Woodchucks are reported to be abundant in

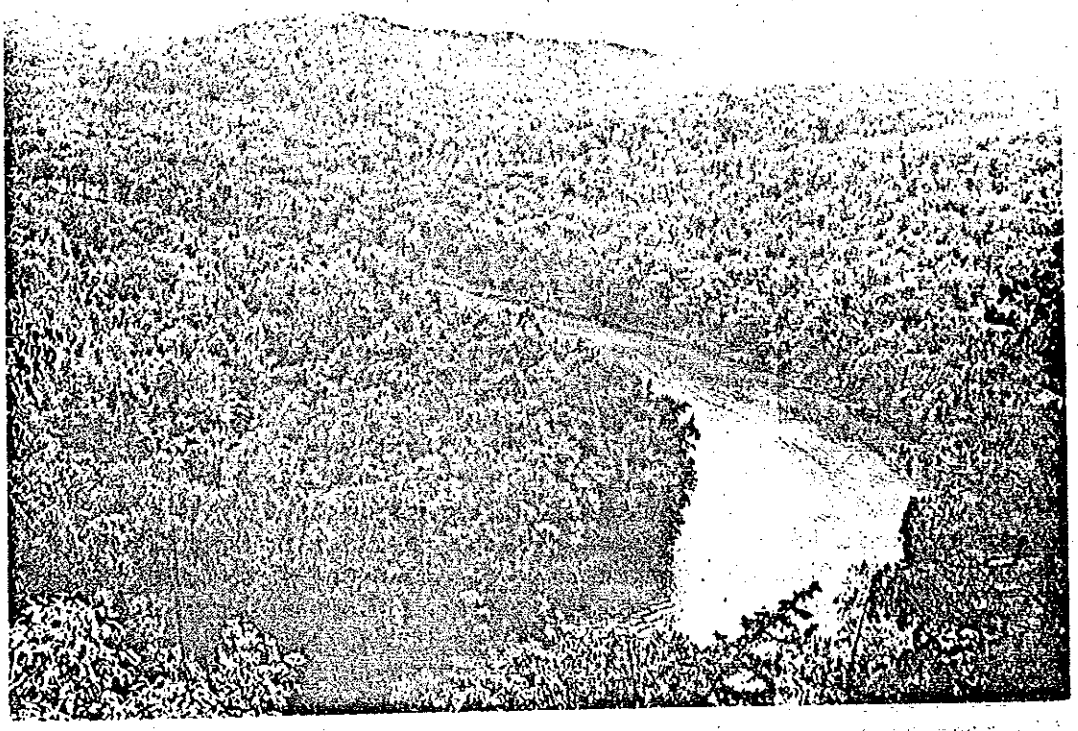
forested lands (Rhoads 1903:66). Finally the white rabbit, as opposed to the cottontail, prefers a wooded retreat instead of the more open lands frequented by the smaller rabbits (Rhoads 1903:118). After deforestation the cottontail replaced the white rabbit in the slightly altered environmental niche. From the above it appears that the area around Sheep Rock (Fig. 4a,b) had abundant deer and supplementary small game to support a small population on a yearlong basis. This suggests that the inhabitants of the rock shelter were free to inhabit the site at whatever season they wished.

Although the rate of flow decreases in rivers like the Raystown as compared to mountain streams, they still maintain a fair rate of flow. Evidence for this is derived from the shad and walleye remains excavated from the site. Both of these fish require rivers which maintain a moderate rate of flow. However, it appears that there were sectors of the Raystown River that were more suited for fish which preferred a slow muddy habitat. Both the bullhead (Pennsylvania Fish Commission n.d.:9) and the bass (Pennsylvania Fish Commission n.d.:5) prefer slow-moving streams. All the fish whose remains were excavated from Sheep Rock could have been present in local waters. The shellfish are also of a local type (Guilday and Parmalee 1965:47). Taking into consideration the large number of shellfish identified (Guilday and Parmalee 1965:40), as well as the Indians' familiarity with aquatic resources, there is no reason to exclude shellfish from the diet of the inhabitants of Sheep Rock even during the early periods of occupation. A possible method used to obtain fish during an early period of occupation is described by Harrington from Northeastern ethnographic data. "Bushes of dense growth were cut and tied together, forming a rude seine of considerable length, composed of matted leaves and twigs, which could be pushed and pulled through the shallow water in such a way that the fish were surrounded and dragged to the shore" (Harrington 1913:222).

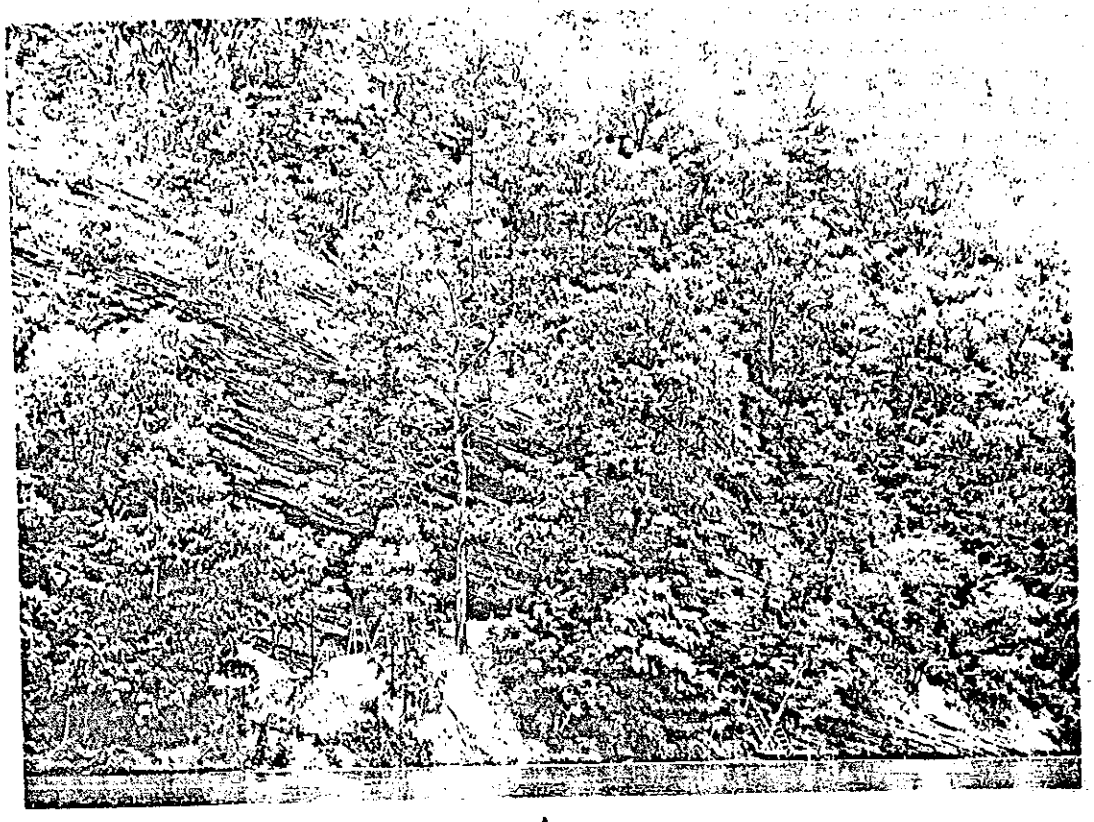
FLORAL REMAINS

The following is a list of the primary cultivated and wild plant foods excavated from the rock shelter. Maize, beans, squash and sunflower are the domesticated plants found at the site. The wild vegetable plants are wild plum, hickory nut, black walnut, acorn, hackberry, butternut, hazlenut, chestnut and cherries (Cutler n.d.). In an attempt to show that these mast-producing trees were not only present but were abundant, we can seek some information from the flying squirrel population. Guilday and Parmalee (1965:41) stated that the flying squirrel was "the commonest single species in the deposit." Also it is reported that for a large flying squirrel population, it is essential to have a forest capable of a large mast production (Gifford and

Figure 4



a



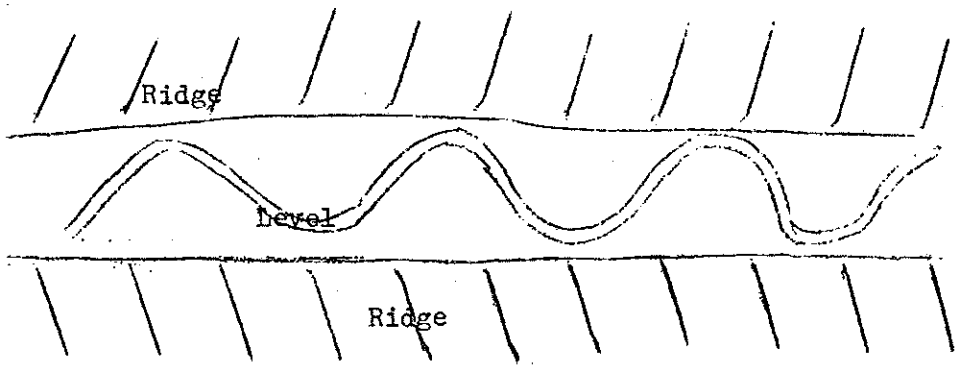
b

Whitebread 1951:56-57; Roslund 1951:44; Grimm and Roberts 1950: 66-67). It appears from the above information that there was at least enough wild vegetable food available to help sustain a small human population if diet was supplemented by a good supply of meat and fish from land and river.

SOILS AND AGRICULTURE

Soils are important indicators for determining where and how prehistoric man farmed in Pennsylvania. The object here will be to describe the soils near the Raystown River, and to evaluate their applicability to native agriculture. Table 2 presents the various soil types, their average corn yields per acre, and comments on their agricultural potentiality.

The Raystown Dam has altered the prehistoric soil distribution for the lower ten miles of the river. What has happened is that what was once alluvial soil is now under water. However, the meander pattern of the river has not changed. This is important because an examination of the Huntingdon, Casseville, and Entriken quadrangles will yield a generalized pattern in the relation of meanders and ridges. The meanders border on ridges, but the land in between is usually level (see diagram below).



Four major soil groups occur near the Raystown River. They occur in a general belt pattern and consist of the following: (1) flood plain soils nearest the river, (2) river terrace soils slightly back from the river, (3) shale hills, and (4) mountain soils.

Flood Plain Soils

Flood plain soils occupy the lowlands immediately bordering the Raystown River (Higbee 1944:26). Of the very greatest

Table 2

SOILS AND CORN YIELDS

Soil	Yield Per Acre	Comment
Moshannon silt loam	50-70 bushels	Very good for agriculture, not subject to serious erosion
Moshannon silt loam, high bottom phase	35-60 bushels	Very good for agriculture, slightly less productive than Moshannon silt loam
Moshannon sandy loam	35-50 bushels	Good for crops, minor limitations in drainage, flooding
Casseville silt loam	20-35 bushels	Fair productivity, present obstacles to prehistoric Indians
Calvin silt loam	20-35 bushels	Fair productivity, present obstacles to prehistoric Indians
Philo silt loam	35-50 bushels	Fertile, but land is too narrow to be under extensive cultivation
Calvin cobbly silt loam	20-30 bushels	Low productivity, needs much work for cultivation
Calvin shaly silt loam	15-30 bushels	Low productivity, needs much work for cultivation
Philo sandy loam	30-50 bushels	Fairly good yields, but needs much work for return. Overall low for cultivation
Philo silty clay loam	Scanty	Poor for agriculture, used for pasture
Calvin shale loam	None	Poor for agriculture, used for pasture
Mountain soils	None	No agriculture, forested land

significance in regard to prehistoric agriculture, is the fact that these are the only soils in Huntingdon County that do not have to be fertilized to provide an adequate crop yield (Higbee 1944:26).

The alluvial soils are deposited in very narrow bands along the river because most of the sediment flowing in the Raystown River is deposited far downstream (Higbee 1944:76). These deposits are very transitional, and are altered every time there is a flood (Higbee 1944:77). This explains why no fertilizer is needed.

Two series of alluvial soils are in association with the Raystown River, and one series in connection with the small streams that flow into the Raystown. The Moshannon and Senecaville Series, both derived from red acid shales and sandstones, border the Raystown River.

Moshannon Series. Moshannon silt loam occurs just below the Raystown Dam, and in the southern part of Huntingdon County. The soil, being very porous and permeable, is well drained. Today the land is generally under cultivation, and it is the most productive of the alluvial soils in the vicinity of the Raystown River. Corn is the major crop; the average yields are in the 50-70 bushels per acre range.

Moshannon silt loam, high bottom phase (Mnb), occupies the low terraces just above the flood level (Higbee 1944:82). This soil, therefore, has been in place much longer than the regular Moshannon silt loam, and as a result is leached more, and is slightly more acid. Today, 90% of this land is cultivated, and corn yields 40-70 bushels per acre. However, it occupies a much smaller area than the Moshannon silt loam.

Very common along the Raystown River is the Moshannon sandy loam (My). It is subject to yearly flooding which is probably why only 40% of this land is farmed today. Most of this land is under a cover of weeds, willows, and other trees (Higbee 1944:82).

Senecaville Series. Senecaville silty clay loam (Ss) occupies a very small proportion of the land bordering the Raystown River. It is composed of dull, brownish-gray, silty, clay loam. It is not too important for present agriculture, and in other parts of Huntingdon County it is used for forage.

Philo Series. The Philo loam series does not border the Raystown River, but it occupies the stream banks of several of the Raystown tributaries. In general, they are poorly drained, and this limits their use for agriculture (Higbee 1944:85).

Philo silty clay loam (Pc) is a soil which today is used mainly for pasture. During wet weather this soil is waterlogged, but in dry times it becomes very hard and dessicated (Higbee 1944:85). With proper draining, it can be used for corn.

Philo silt loam (Ph) is under very little cultivation; most of it is used for pasture. It is relatively fertile, but most of the land strips are too narrow for extensive modern cultivation (Higbee 1944:87).

The final Philo soil discussed, the sandy loam (Pm), also is not under extensive cultivation. It is located on the banks of the small streams. When it is cultivated, corn is the major crop.

River Terrace Soils

River terrace soils are much older in geological time than the alluvial deposits (Higbee 1944:70). Most of these date back to the time when this area was periglacial (Higbee 1944:70). Today, because of raised elevations, they are not subject to flooding.

The Casseville silt loam (Cl) has been leached for a long period of time, and its fertility is low (Higbee 1944: 72). There is a marked absence of organic materials, and fertilizers are needed to make it productive. Prehistoric Indians probably did not farm this land because of its low potentiality. It is fairly extensive along the Raystown River.

Soils of the Shale Hills

Soils derived from the shale hills are very extensive along the Raystown River area. Most of this land supports a forest cover today. The soils in general have a low moisture-holding capacity. Organic material, too, is low. A final obstacle to cultivation is erosion.

Calvin Silt Loam. The Calvin Series predominates along the Raystown River. Where the slopes are gentle, it may be used for agriculture. Calvin silt loam (Cs) occurs where the gradient is gentle. In contrast to most of the shale hill soils, the Calvin silt loam has a good moisture-holding capacity. Today this soil must be fertilized, but yields corn in amounts ranging from 30 to 50 bushels per acre (Higbee 1944: 54). This is the best soil of the Calvin Series, and occurs in the Trough Creek Valley.

Calvin Cobbly Silt Loam. Calvin cobbly silt loam (Ca) is basically the same as Calvin silt loam except that the former has large river cobbles deposited in its midst. These would further hinder prehistoric agriculturalists, although probably native agriculture could still be practiced.

Mountain Soils

The mountain soils will be discussed as a group, and not individually, as their potential for agriculture is low. The types that occur in the Raystown vicinity are as follows: Lehew-Dekalb stony loams (LD), Rough stony Dekalb (RsD), Rough broken Calvin (RbC), and Rough stony Lehew (RsL). Generally they all support a well-developed forest growth. These soils have been greatly leached, and are strongly acid. The kind of soil that develops in a particular place is strongly dependent upon bedrocks; these are not residual soils, but have been formed in place.

Now that the basic descriptions of soil types have been given, the task will be to determine which soils the prehistoric Indians farmed. Three criteria will be taken into foremost consideration: (1) modern corn yields of the soil type and general applicability of agriculture, (2) correlation of survey sites with soil types, and (3) relative date of the survey sites.

The correlation of soil types with site locations (Table 3) shows thirteen sites (42% of the total number of sites) in the Moshannon sandy loam, and nine sites (29% of the total) in the Philo silt loam soil. The Moshannon series is very good for native agriculture, and this soil is located throughout the Raystown River area. The Philo silt loam greatly restricts the size of the farm, but it is relatively fertile.

Table 4 shows soil types in relation to culture periods of the survey sites. Table 5, which illustrates the distribution of soil types in relation to culture periods, contradicts to some degree the fact that the Philo silt loam was used for agriculture. There are nine Philo silt loam sites, but only three show occupations during the periods of Indian agriculture - Early Woodland through Proto-Historic. Five were occupied during the Archaic.

The Moshannon sandy loam, likewise, has ten sites of the Archaic culture phase, but only two in the Late Woodland, and none in Early and Middle Woodland, and Proto-Historic. Indeed, Table 5 shows that in all of the soils, except the mountain types, there are many more sites from the Archaic than the later phases.

Since we have definite evidences of agriculture in this region during prehistoric times, there are two conclusions that can be made in line with the above evidence: (1) there was a marked decrease in population in the aboriginal population of South-Central Pennsylvania during the Late Woodland and later times with the remaining inhabitants farming the Moshannon soils; or (2) the population remained constant, but the farming sites were in the limestone valleys in near proximity to the Raystown River.

Table 3

SOILS AND SURVEY SITE DISTRIBUTION

Soil	Number of Sites	Sites
Moshannon silt loam	4	36-Hu-22, 36-Hu-23, 36-Hu-24, 36-Hu-25
Moshannon sandy loam	13	36-Hu-2, 36-Hu-3, 36-Hu-7, 36-Hu-8, 36-Hu-9, in association with Casseville, 36-Hu-10, 36-Hu-17, 36-Hu-18, 36-Hu-19, 36-Hu-26, 36-Hu-28, 36-Hu-29, 36-Hu-31
Moshannon silt loam, high bottom phase	0	36-Hu-6 near Moshannon silt loam, high bottom phase
Casseville silt loam	1	36-Hu-9 in association with Moshannon sandy loam
Calvin shale loam	3	36-Hu-1, 36-Hu-5 36-Hu-6 near Moshannon silt loam, high bottom phase
Philo silt loam	9	36-Hu-11, 36-Hu-12, 36-Hu-13, 36-Hu-14, 36-Hu-15, 36-Hu-16, 36-Hu-20, 36-Hu-21, 36-Hu-27
Mountain soils	2	36-Hu-4 above Moshannon sandy loam, 36-Hu-30

Above information from Soil Map, Huntingdon County, U.S. Department of Agriculture, 1934, and Survey Map Set for Penn State Archaeology Field School, 1966

Table 4

SOIL TYPES IN RELATION TO CULTURE PERIOD
OF SURVEY SITES

Soil Type	Site	Culture Period
Moshannon silt loam	36-Hu-22	Early Archaic to Transitional; Late Woodland to Post-1800
	36-Hu-23	Unknown
	36-Hu-24	Archaic
	36-Hu-25	Paleo-Indian; Late Archaic
Moshannon sandy loam	36-Hu-2	Middle and Late Archaic
	36-Hu-3	Susquehannock
	36-Hu-7	Middle Archaic - Late Archaic
	36-Hu-8	Archaic
	36-Hu-9	Early and Late Archaic; Late Woodland
	36-Hu-10	Not established
	36-Hu-17	Archaic
	36-Hu-18	Early Archaic - Late Archaic
	36-Hu-19	Early Archaic; 19th Century Earthenware
	36-Hu-26	Paleo-Indian; Late Archaic; Historic 19th Century
	36-Hu-28	Unknown
	36-Hu-29	Archaic; Late Woodland
	36-Hu-31	Archaic (?)
Casseville silt loam	36-Hu-9	Early and Late Archaic; Late Woodland
Calvin shale loam	36-Hu-1	Early Archaic; Proto-Historic
	36-Hu-5	Late Woodland
	36-Hu-6	Middle - Late Woodland
Philo silt loam	36-Hu-11	Archaic; 19th Century Historic
	36-Hu-12	Early Archaic to Late Woodland
	36-Hu-13	Early Archaic; Historic (1800-1840)
	36-Hu-14	Archaic (?)
	36-Hu-15	Unknown
	36-Hu-16	Quarry site, no date
	36-Hu-20	Unknown
	36-Hu-21	Unknown
	36-Hu-27	Late Archaic
Mountain soil	36-Hu-4	Early Woodland
	36-Hu-30	Early - Late Woodland

Sites dates from Raystown Reservoir Archaeological Salvage and Survey Program, Final Report Submitted to National Park Service, by Ira F. Smith III, April, 1966.

Culture Period	Moshannon Silt Loam	Moshannon Sandy Loam	Casseville Shale Loam	Calvin Shale Loam	Philo Silt Loam	Mountain Soils	Total No. of Sites
Historic, post-1800	(1) 25%	(2) 50%	0%	0%	(1) 25%	0%	4
Historic, 1600-1800	(1) 50%	(1) 50%	0%	0%	0%	0%	2
Proto-Historic	(1) 50%	0%	0%	(1) 50%	0%		2
Late Woodland	(1) 11%	(2) 22%	(1) 11%	(3) 33%	(1) 11%	(1) 12%	9
Early and Middle Woodland	0%	0%	0%	(2) 40%	(1) 20%	(2) 40%	5
Transitional	0%	0%	0%	(1) 50%	(1) 50%	0%	2
Archaic	(3) 14%	(10) 48%	(1) 5%	(2) 9%	(5) 24%	0%	21
Paleo-Indian	0%	(1)100%	0%	0%	0%	0%	1
Unknown	(1) 17%	(2) 33%	0%	0%	(3) 50%	0%	6
Other	0%	0%	0%	0%	(1)100%	0%	1

DISTRIBUTION OF SOIL TYPE IN RELATION TO CULTURE PERIOD

Table 5

CONCLUSION

We know that the site was unoccupied seasonally or for several years at a time because of the large number of flying squirrel remains found at the site (Guilday and Parmalee 1965: 41). Obviously the predator birds, who ate the flying squirrels, and the Indians were not occupying the same rock shelter at the same time. To account for such occupational hiatuses during the prehorticultural era two primary settlement patterns seen possible. One, that the Sheep Rock Shelter was a seasonal habitation site for a single group of nomadic Indians. Possible variations on the theme of the seasonal habitation pattern could exist if the Sheep Rock Shelter was located within the territory of several independent groups. The yearly nomadic cycle of these groups might bring all the groups to the site locality at varying times during the same season of the year. In this case the first group to occupy the site would probably retain the use of the site for the rest of the season. On the other hand, the nomadic cycle of the groups located around Sheep Rock might be interwoven to allow each of the groups to inhabit the site for a specific part of the year. This would be similar to the land use pattern described by Barth (1959).

The second settlement pattern type would be occupation of the immediate locality of Sheep Rock by a single group of a few years duration, followed by an abandonment for several years. One of the ideas basic to this view is that the Indians did not migrate seasonally just for the sake of migrating. There must be a reason for population movement. The reason the majority of Archaic Indians migrated was that they were following seasonal routes which afforded them the best possible food resources. As this paper has attempted to show, all of the essential food resources which made up the Archaic diet were available in the vicinity of Sheep Rock. In other words, there was no need to migrate seasonally to find a productive environmental niche for each specific season.

Of course, the answer to the question of seasonal or yearlong residence can only be answered conclusively by further intensive and extensive analysis of the faunal remains from the Archaic levels of the deposit. If we can recover evidence of occupation from all the seasons of the year in close association, we can be fairly sure the site was inhabited for year-long periods. The presence of fish remains, migratory birds and deer of varying ages would support the thesis of this paper.

The data we have to date leads Guilday and Parmalee (1965:37) to conclude that seasonal occupation was the pattern, although they admit that most of their evidence is negative evidence. However, fish remains appear around 100

inches below datum (Guilday and Parmalee 1965:47), which would appear to be well within the Archaic period. Further analysis of the stratigraphic position of fish scales and other remains will be conducted in the near future. Hopefully, additional excavation can be carried out with this problem in mind.

Wauchope in a recent discussion of the Archaic pointed out that one school of thought stresses the "diversity and complexity of Archaic cultures." The present paper belongs to that school of thought. He also states that in some places a sedentary pattern possibly developed due to such factors as being located near "watering places of wild animals" or "on riverbanks" (Wauchope 1966:5). Sheep Rock certainly fits into the latter category.

Appendix I

PRELIMINARY REPORT ON THE PREHISTORIC ENVIRONMENTS OF SHEEP ROCK SHELTER BY USE OF MOLLUSC SHELL IDENTIFICATIONS

by

Gene J. Paull

Through the use of mollusc shells extracted from the Sheep Rock Shelter, it is possible to determine the ecology of the Raystown River at the time the shell remains were taken from the stream. The basic principle is based on the fact that molluscs do not change through time. What is important is that a certain species of mollusc requires a specific environment. If a mollusc taken from Sheep Rock is identical to a certain mollusc from the river today, the older mollusc came from the same environment as the modern one (Matteson 1960:117-120).

Approximately fifty shells were collected from the Raystown River near Upper Corner Cemetery (C1215). Positive identification of these shells and those extracted from Sheep Rock Shelter can not be made at the present time. A specialist in fresh water biology is needed to make positive identifications of the various species.

The river at the point of collection of these shells was quite shallow; six inches was the average depth while the maximum was one foot. There was much river moss, except in the most rapid portions. Near the shores there was little current, shallow water, much moss, and many mussel shells. The amount of molluscs decreased in the deeper, running water, but larger specimens were found in these waters.

Two hundred yards downstream, a small island was encountered. The current here was very slow, and the water was approximately two to three inches deep. There were numerous molluscs of various shapes and sizes present. All were in association with a fresh water moss.

River Description Where Live Mollusc Shells Collected

Shell Number	River Description
1	River very shallow, much river moss, black river pebbles for bottom, fast current, shell found close to shore, river 40 ft. wide
2	River very shallow, much river moss, black river pebbles for bottom, fast current, shell found close to shore, river 40 ft wide
3	Shell found 15 ft. from east bank, much river moss present, river conditions same as above
4	Shell found 15 ft. from east bank, much river moss present, river conditions same as above
5	Shell found 10 ft. from west bank, river 10 in. deep, current not as swift as for shells 1-4, other river conditions the same
6	Small dark shell found in mid-river, fast current, much moss
7	Large shell, mid-river, much moss, shale bedrock, 8 in. deep, rapid current
No shells found	Waterfall, river 2 ft. deep for 100 yds. beyond waterfall
Shells in bag 2, no individual numbers	Large number of shells found in water just upstream from waterfall, found throughout width of river, water 8-10 in. deep, much moss, most shells found in association with large river pebbles
Bag 3, about 20 shells found in the same area	Shells found in channel near small island, current very slow, water 4-6 in. deep, much river moss, small water ferns plentiful, silty river bottom, all sizes of shells present

REPORT ON THE POLLEN ANALYSIS OF THE SAMPLES FROM THE SHEEP ROCK SHELTER

by

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ABSTRACT

This chapter describes the results of a recent pollen analysis of two sets of continuous stratigraphic columns taken from Sheep Rock in 1960. The method of pollen extraction used is well defined in the report. The abundance of pine pollen, together with a relatively high percentage of liquidambar and hemlock and a relatively low per cent of oak, suggest that a more moist climate existed in the past at Sheep Rock.

TABLE OF CONTENTS

	Page
ABSTRACT	87
TABLE OF CONTENTS	89
LIST OF ILLUSTRATIONS	91
LIST OF TABLES	93
I. INTRODUCTION	95
II. ORIGIN OF THE 1960 POLLEN SAMPLES	95
III. METHOD OF POLLEN EXTRACTION	96
IV. PROBLEMS IN INTERPRETATION OF A POLLEN PROFILE	98
V. REMARKS ON THE SHEEP ROCK SHELTER AS A SITE OF DEPOSITION	98
VI. EXTANT VEGETATION OF THE RAYSTOWN BRANCH AREA	99
VII. DISCUSSION OF THE POLLEN PROFILE OF THE SITE	100
VIII. FUTURE WORK	101
APPENDIX I: List of Scientific Botanical Terms Used in Chapter with Their English Equivalents	113
APPENDIX II: Plants Collected in the Vicinity of the Archaeological Site on the Raystown Branch of the Juniata River by Frank Di Cecco	117

LIST OF ILLUSTRATIONS

		Page
Figure 1.	Soil Sample Profile of the 1966 Field Season	103
Figure 2.	Stratigraphic Profile of the W33-S10 Coordinate	105
Figure 3.	Stratigraphic Profile of the 0-S10 Coordinate	107
Figure 4.	Pollen Profile of the W33-S10 Coordinate. . .	109

LIST OF TABLES

Page

Table 1. Summary of Pollen Percentages for Samples Taken at Coordinate W33-S10. 111

INTRODUCTION

The following report describes the results of our analysis of pollen samples collected in 1960 by Mr. John Witthoft, then in charge of the excavation at the Sheep Rock Shelter. The samples were stored in glass jars until they were processed for their pollen content during the early part of 1966. During the 1966 field season, however, another set of 61 stratigraphic samples was obtained, and it is hoped that these additional samples will allow a more detailed palynological analysis than is presented here in this preliminary report. The author, himself, collected this second set of samples, and took particular care to avoid contamination because the conditions under which the first set of samples was obtained were unknown. A soil profile is given showing the provenience of this recent set of samples (Fig. 1).

The study of this second set of pollen samples is scheduled for Spring 1967. The aim of the study will be not only to outline the probable vegetational and climatic changes of the area, but to also obtain indications of agriculture.

During the 1966 field excavations new collections of megascopic plant material and coprolites were obtained. The study of this material will be undertaken concurrently with the analysis of the pollen samples during the Spring of 1967. It should be of great value in corroborating the palynological results and, since remnants of cultigens are present, in giving a more detailed picture of Pre-Columbian agriculture in this area.

ORIGIN OF THE 1960 POLLEN SAMPLES

A total of 48 jars of material was collected consisting of two sets of continuous stratigraphic columns. One set originated from the coordinate identified by Mr. Witthoft as W33-S10 and contained a continuous column of 12 stratigraphic units. The other set, taken in the 0-S10 coordinate, contained a column of 19 stratigraphic units. Henceforth, the two stratigraphic columns will be referred to as W33-S10 and 0-S10, respectively (Figs. 2,3).

Mr. Frank Potter, a graduate student in the Department of Botany of the Pennsylvania State University, was responsible, under the supervision of Dr. Anton J. Kovar, Associate Professor of Botany, for the processing and counting of pollen. The interpretation of the pollen profile obtained was made by both the above-mentioned investigators.

METHOD OF POLLEN EXTRACTION

The following method of pollen extraction was used for all samples:

1. A certain amount of the material from each jar was passed through a 1-mm sieve. The coarse fraction retained in the sieve was washed repeatedly with a stream of distilled water to remove any minute particles which might have adhered to the coarser fragments. The remains were then examined to determine whether they contained any significant material, such as fruits, seeds, charcoal fragments, etc.

2. The fine fraction, which had passed through the sieve, was collected in a 50-ml plastic centrifuge tube and, after adding distilled water and stirring, was centrifuged at about 3000 r.p.m. for approximately 20 minutes.

3. After pouring off the supernatant water, a 10% KOH solution was mixed with the sample.

4. The centrifuge tube was placed into a water bath and its contents were brought to the boiling point.

5. The sample was allowed to cool, centrifuged, and repeatedly rinsed with distilled water until all KOH had been washed out.

6. After the last washing, the contents of the tube were thoroughly mixed with a saturated solution of $ZnCl_2$.

7. The mixture was let stand for about 10 minutes in order to allow the heavier, non-polliniferous materials to settle.

8. The remaining supernatant liquid was poured into a folded piece of Tygon tubing which was placed, with both ends up, into a 50-ml plastic tube so that both ends protruded about 1/2 inch above the rim of the tube.

9. The mixture was then centrifuged at about 1000 r.p.m. for approximately 10 minutes. During this procedure the heavier inorganic material settled at the bottom (near the bend) of the Tygon tubing while the lighter organic particles, including pollen, remained suspended near the upper end.

10. The top layer, containing the organic material, was collected in another 50-ml plastic centrifuge tube.

11. To make sure that all organic material was extracted from the sample, the somewhat compacted material which had settled at the bottom of the Tygon tubing was stirred and recentrifuged and again in the top layer was collected.

12. The collected top liquid was diluted in distilled water and a few drops of HCl were added in order to eliminate a white precipitate which might have formed at this point.

13. The diluted material was centrifuged and rinsed at least twice in order to make sure that all $ZnCl_2$ had been eliminated.

14. To the very fine material which remained at the bottom of the centrifuge tube a small amount of cellosolve was added and the whole was centrifuged again to eliminate the remaining water.

15. After this, more cellosolve was added to the material which was then stored in a properly-labelled small vial.

After all samples had been thus processed, the permanent slides for each sample were prepared in the following manner:

1. A small drop of semi-liquid diaphane was placed on a cover glass and evenly spread over it.

2. A small amount of the material preserved in the vial was placed on the diaphane, and a drop of Bismark Brown was added.

3. The diaphane, the sample and the stain were thoroughly mixed by means of a dissecting needle.

4. The cover glass was then inverted, placed on a microscope slide and gently pressed against it until the mixture was completely distributed under the cover glass.

5. The properly-labelled slide was allowed to dry for 4 to 5 days and was then ready for pollen identification and pollen count.

The identification and counting of pollen was carried out with a 97-X objective with the exception of the sample from zone 11 of the W33-S10 set of samples. This count was performed with the use of a 43-X objective because of the small amount of pollen.

Approximately 200 pollen grains were counted for each zone with the exceptions of zones 10 and 11 of the W33-S10 set. In zone 10 only 145 pollen grains were counted; zone 11 yielded 33 pollen grains after counting four slides. The actual number of pollen grains counted for zone 11 is give in Table I; the profile in Fig. 4 indicates with an interpreted line the amount of pollen for this zone.

The percentages were computed on the basis of the arboreal pollen sum, that is, by setting the total arboreal pollen equal

to 100%. Table I lists the pollen types encountered and gives the percentage representations for each.

PROBLEMS IN INTERPRETATION OF A POLLEN PROFILE

The interpretation of any pollen profile is beset with many imponderables. Some of these are of statistical origin, others depend on the reliability of the sampling and some are the consequence of the nature of the dispersal of pollen and its unequal preservation in deposits.

Many plants produce large amounts of pollen which can be carried a great distance while others produce smaller amounts of pollen which are less susceptible to long distance transport. Pines are very prolific producers of pollen which, due to its peculiar structure, is easily transported by air currents. Oak pollen is also wind carried, but a lesser quantity is produced.

Many plants depend on insects for pollen transportation (insect-pollinated plants). In consequence, their pollen, having a smaller chance of being transported in large quantities, will be less well represented in deposits, even if the plants themselves are fairly abundant in a particular area.

Certain pollen types, because of the physical and chemical nature of their exine (their outer shell), are better equipped to survive the vicissitudes of deposition. Thus some pollen types, although originally deposited in larger numbers, may eventually break down and disappear from the deposits while other types, originally less numerous, survive and thus give a distorted impression of the kinds of plants that were present or predominant in the past.

REMARKS ON THE SHEEP ROCK SHELTER AS A SITE OF DEPOSITION

This site was not particularly favorable to pollen preservation. Although a stratigraphic sequence, especially of an archaeological nature, is evident, it does not follow that there must also be a corresponding pollen stratigraphic sequence. The prehistoric inhabitants of the Shelter probably reworked the deposits frequently by digging pits or moving things around, etc. The frequent lenses of ash scattered abundantly throughout the thickness of the deposits are palynological deserts.

Of the two sets available for palynological examination the

one identified as 0-S10 was entirely devoid of pollen except in its uppermost zone, zone 1. The other set W33-S10, contained sufficient pollen throughout most of its thickness.

It is difficult to account for such a differential pollen preservation. Apart from the fact that the set 0-S10 contains a much more diversified profile with numberous ash and charcoal layers (indicating frequent fires which would have destroyed any pollen which may have been deposited there), it is possible that its position in the shelter could have prevented a measurable pollen accumulation. It is my impression, however, that the more intensive "use" indicated by the type of the sediments, is the chief reason for the absence of pollen. Only the top layer, which was formed after the period of intensive use of the shelter, contains usable amounts of pollen.

EXTANT VEGETATION OF THE RAYSTOWN BRANCH AREA

A list of plants collected in the vicinity of the site on the Raystown Branch is given in Appendix II. It was compiled in 1960 by Mr. Frank DiCecco who spent a summer at the site. The specimens which he collected are deposited in the Herbario of the Department of Botany at the Pennsylvania State University.

From this list it is apparent that the extant vegetation of the area is typical for the Ridge and Valley Section of Central Pennsylvania. All the plants, especially trees, typical of Central Pennsylvania are found in the vicinity of the site. The forest is mostly second-growth oak (chiefly chestnut oak, red oak, scarlet oak, and white oak found predominantly in high moisture sites). Interspersed with the oaks are pines, mainly pitch pine, an occasional Virginia pine and a few white pines in the moist sites. Chestnut, once abundant in the area, was completely eliminated by the chestnut blight between 1912 and 1930. Only a few sproutings remain in some locations. Hemlocks are found near the water. Various maples, basswood, hickories, walnut, elm, tulip tree, cucumber tree, black gum, and the pawpaw, together with the above-mentioned trees, constitute the bulk of the forests.

The undergrowth consists chiefly of mountain laurel, sassafras, blueberries, maple-leaved viburnum, etc. On the ledges above the site the eastern red cedar is common.

Alder and Willows abound in wet locations along the river. Herbaceous plants are numerous. Some of them constitute the characteristic undergrowth of the forest while others border the river or prefer open sites in full sunlight. It would be impossible to list them all here (see the complete list in Appendix II). However, some of these plants important in view of the pollen

profile, should be mentioned. Grasses are prominent in the alluvial sands of the meandering river and appear even in drier sites when sunlight is abundant. The same must be said of the composites. Epilobium, the fireweed, will grow in disturbed sites and may indicate forest fires. Many members of the rose family, such as blackberries, wild roses, and raspberries are weedy species and their presence indicates almost always some kind of disturbance.

In the lower levels of the W33-S10 profile one very special and characteristic pollen type is present. It is the pollen of Liquidambar or sweet gum. This tree is now absent from Central Pennsylvania, occurring only in the southeastern regions of the Commonwealth. At present it is a typical Coastal Plain tree which is found along the coast of New England and southward. And yet it appears to have been well-represented in the past in the Raystown Branch area. Its presence there is difficult to explain in view of the present knowledge of the postglacial vegetational history. However, there is no mistake as to the identification of this pollen as it is so characteristic and not easily confused with other pollen types.

DISCUSSION OF THE POLLEN PROFILE OF THE SITE

The difficulties involved in the interpretation of a pollen profile have been already mentioned. With all caution possible, it is possible to draw the following conclusions from the pollen diagram presented.

1. To all appearances, pine was somewhat more abundant in the past (see the lower zones of the W33-S10 core). The question is: "What kind of pine is represented in the lower layers?" If the bulk of the pollen belongs to pitch pine then the climate must have been drier. If, on the other hand, it belongs to white pine, then the climate indicated is cooler and more moist. It is impossible, in the present state of palynology, to separate the pollen types of these two species. Thus the increase in pine pollen per se indicates nothing. However, if the accompanying pollen is taken into consideration, it is possible to surmise that indications point to damper, if not cooler, climate. The accompanying species which seem to indicate this are: hemlock (comparatively high), oak (comparatively low), liquidambar (highest), and grasses (aquatic?).

2. The comparatively high percentage of pine in relation to oak in zone 1 indicates perhaps the effect of forest destruction in early colonial times.

3. One peculiarity of the profile is very puzzling. It is the very high percentage of ericaceous pollen in the zones 8

and 9. The pollen of either the mountain laurel or the great laurel may be represented. Probably climatic reasons are not involved at all. It is even possible that the flowers of either of the mentioned plants were intentionally taken into the shelter as they had some ceremonial or medicinal significance.

4. The pollen profile as given here bears no resemblance to that of Bear Meadows Bog which is located about 30 miles northeast of the Sheep Rock Shelter, except for the gradual decrease in pine with the corresponding increase in oak.

5. No correlation corresponding to Dr. Guilday's rabbit/squirrel ratio is detectable in the pollen profile.

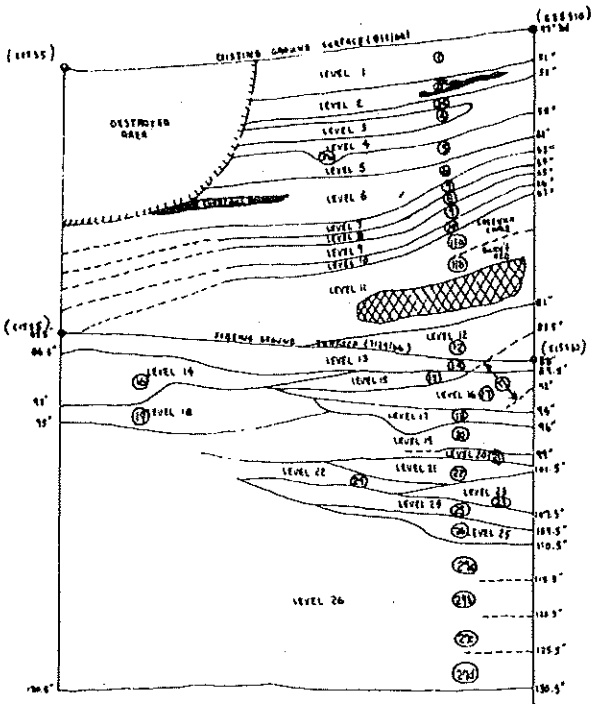
FUTURE WORK

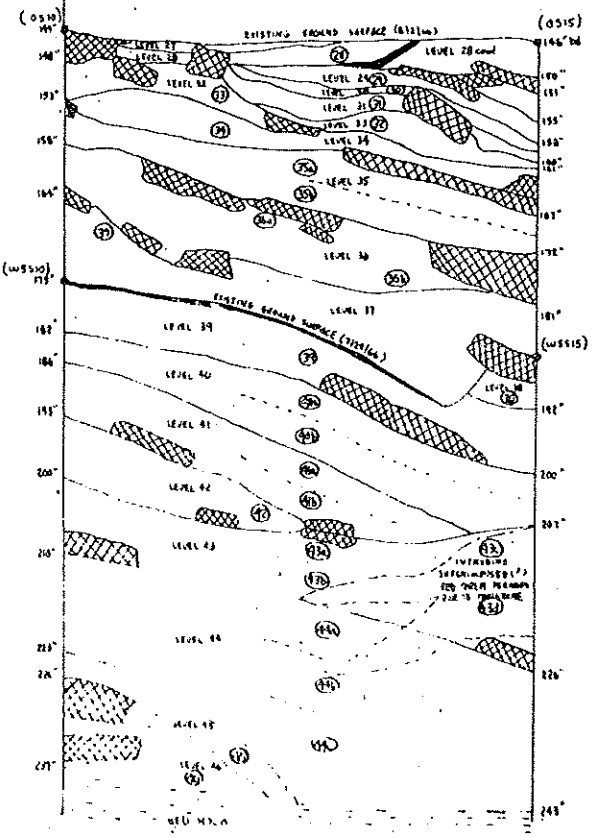
The analysis of the pollen samples collected in 1966, together with an examination of coprolite and megascopic plant material, should contribute a more detailed and definitive set of observations.

Figure 1. Soil Sample Profile for the 1966 Field Season

		Soil Description
Level	1	Reddish Clay-like Soil
	2	Charcoal and Brownish Soil
	3	Fine Brown to Black Soil
	4	Reddish Clay-like Soil
	5	Fine Brown with Shale Chips
	6	White Ash
	7	Charcoal and Shale Chips
	8	Burnt Red Soil
	9	Charcoal
	10	Burnt Red
	11	Red with Large Shale Chips
	12	Shale-Laden
	13	Powdered Gray Soil
	14	Brown Soil with Shale
	15	Greenish Shale
	16	Light Brownish-Gray Soil
	17	Yellowish Ash
	18	Dark Brown Soil, Burnt, Charcoal
	19	Brownish Soil
	20	Yellowish Ash
	21	Charcoal
	22	Burnt Reddish Soil
	23	Light Ash
	24	Burnt Reddish-Orange Soil
	25	Charcoal Lens
	26	Yellowish Clay
	27	Reddish-Brown Fine Texture w/Broken Shale
	28	Lighter Brown w/Fine Slate Green Shale
	29	Coarse Green Shale/Light Brown Soil
	30	Red Shale w/Dark Brown Soil
	31	Broken Green Shale/Light Brown Soil
	32	Pulverized Green Shale
	33	Red-Brown Soil w/Coarse Green Shale
	34	Green Shale-Laden
	35	Pulverized and Broken Green Shale w/Light Soil
	36	Green Slate Shale w/Darker Soil
	37	Multicolored Brown Soil and Fine Shale
	38	(Part of level 37 ?)
	39	Reddish-Gray Soil with Fine Shale Chips
	40	Brownish-Green Soil, Sandy Texture, Fine Green Shale
	41	Greenish Soil, Sandy Texture, Occas. Yellow Soil
	42	Same as Level 41 with less Shale
	43	Yellowish-Green with many Fine Shale Chips
	44	Homogeneous Green Soil
	45	Reddish Shale Chips, Sandy Texture
	46	Green Soil with abundant Red Shale Chips

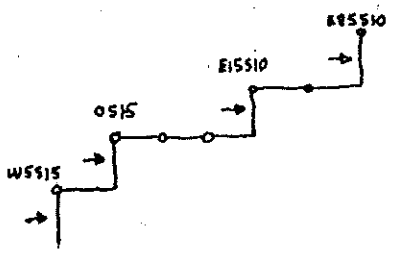
Figure I





LEGEND

- CHARCOAL
- ROCKS
- BED ROCK
- X" INCHES BELOW DATUM 0
- (12) POSITION & NUMBER OF SOIL SAMPLE
- (Ka) POSITION & NUMBER OF ARBITRARY SOIL SAMPLE



CROSS SECTION OF PROFILES

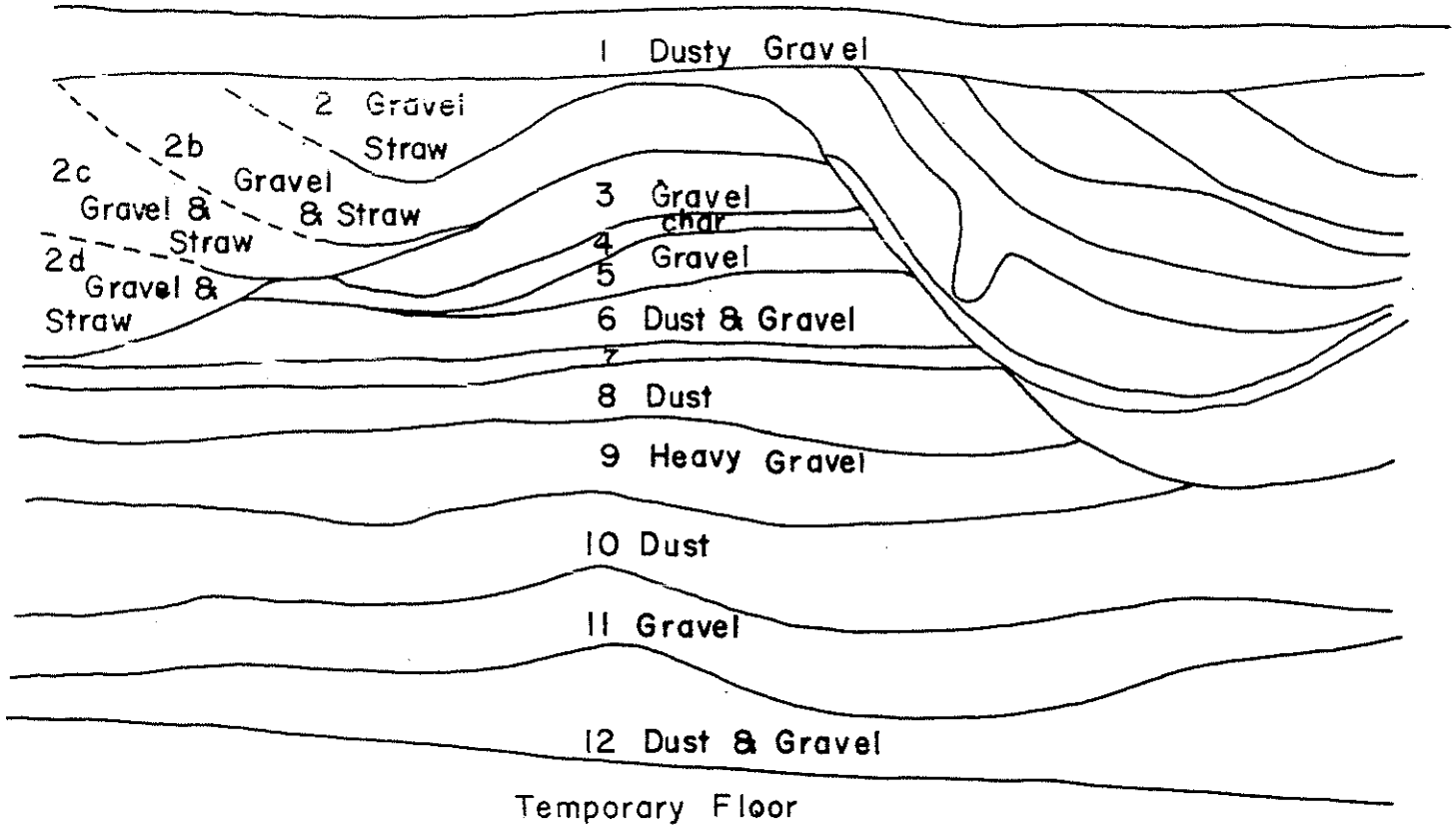
Figure 2

Stratigraphic profile of the W33-S10 Coordinate.

W33-S10

W40-S10

Zones



Scale: 1 in.≈1 ft

STRATIGRAPHIC PROFILE OF THE W33-S10 COORDINATE

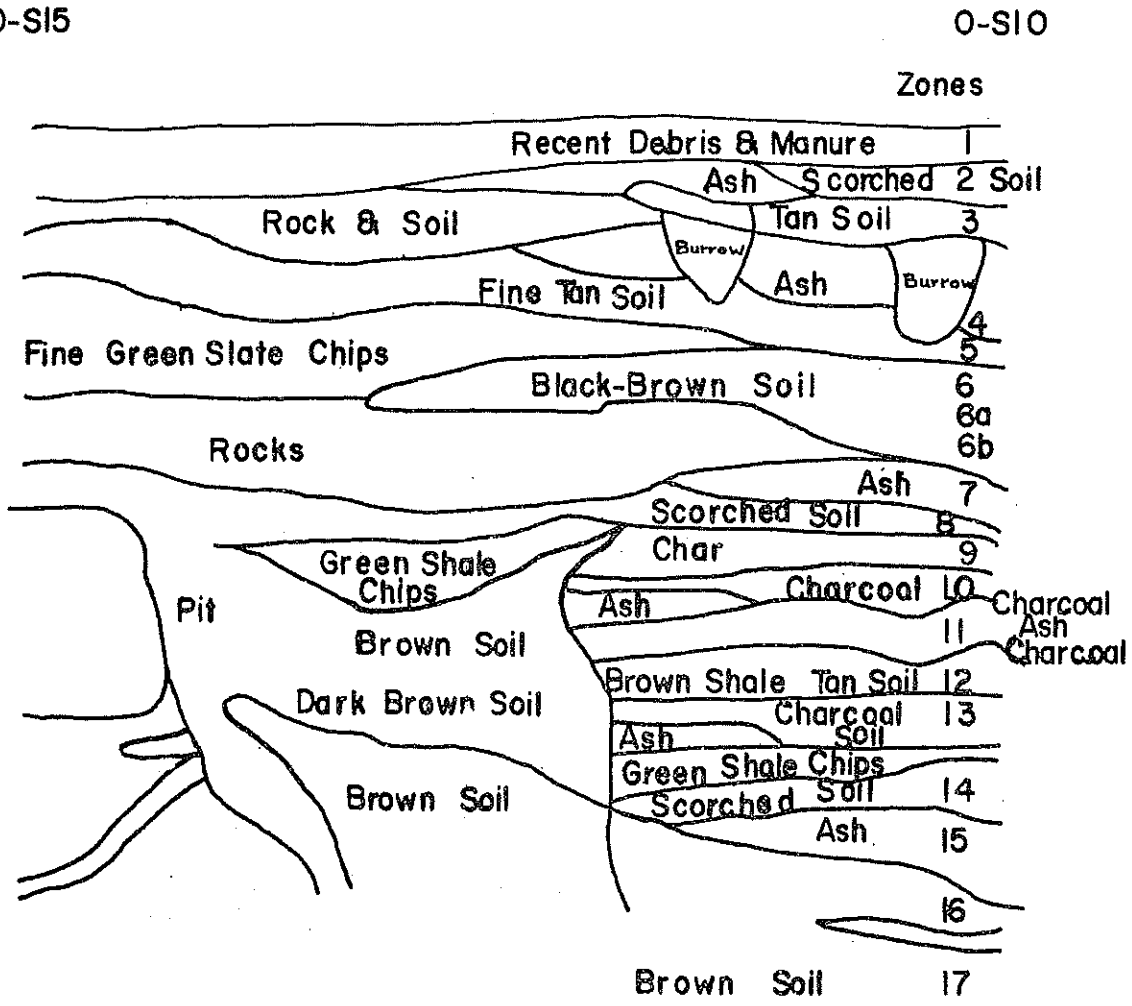
Figure 2

Figure 3

Stratigraphic Profile of the O-S10 Coordinate.

Figure 3

STRATIGRAPHIC PROFILE OF THE O-S10 COORDINATE



Scale: 1 in. ≈ 1 ft

Figure 4

Pollen Profile of the W33-S10 Coordinate.

Figure 4

POLLEN PROFILE OF THE W33-S10 COORDINATE

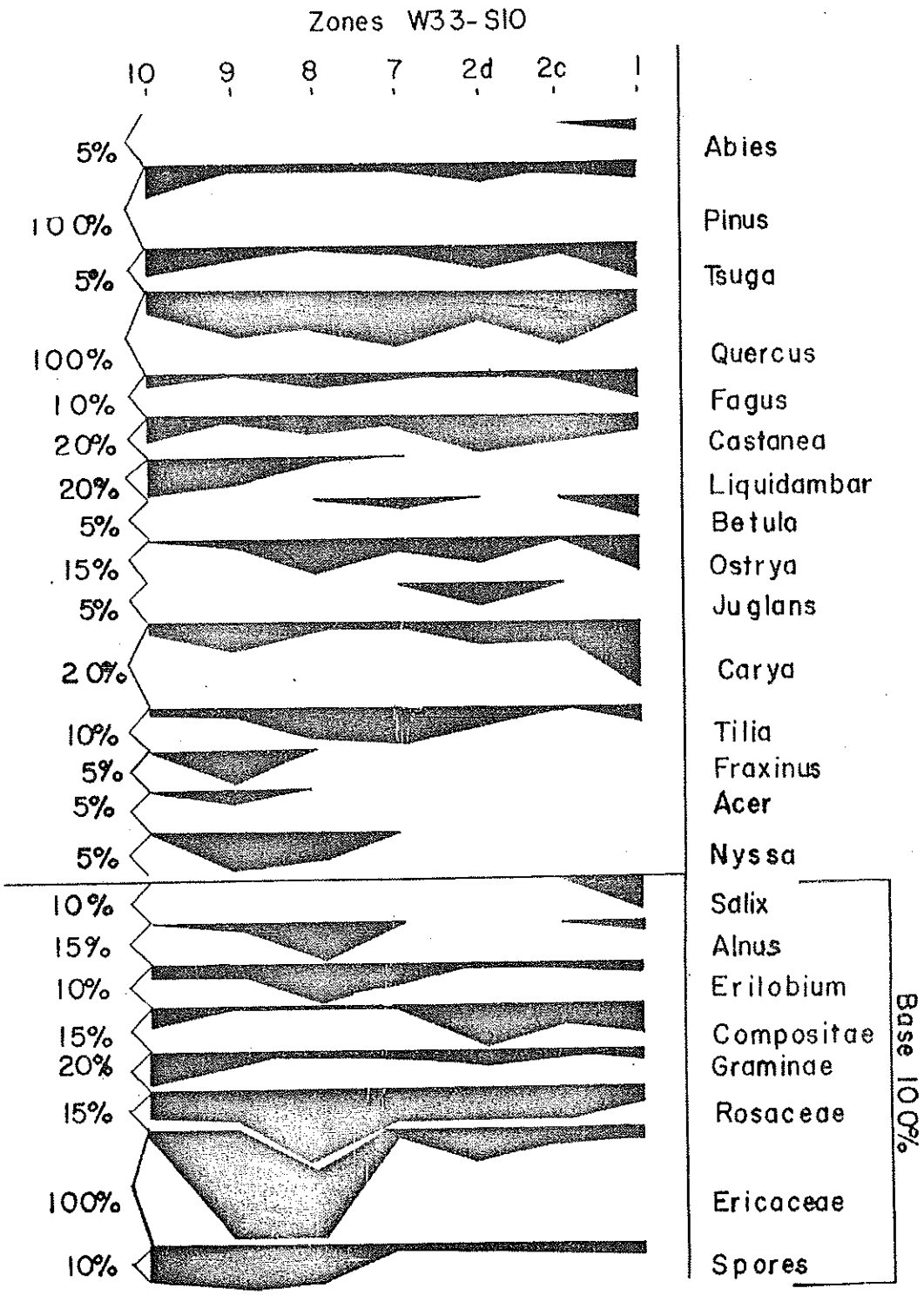


Table 1

SUMMARY OF POLLEN PERCENTAGES FOR SAMPLES
TAKEN AT COORDINATE W33-S10

POLLEN TYPE	Zones Sampled at Coordinate W33-S10							
	1	2c	2d	7	8	9	10	[1]11
Abies				1.0				
Pinus	16.8	10.8	16.8	4.4	10.3	4.0	34.6	(10)
Tsuga	3.7	0.6	1.9	0.5		2.0	3.0	(2)
Quercus	30.4	66.5	40.6	69.7	50.5	58.2	23.7	(7)
Fagus	6.2	3.6	1.9	1.5	3.3		3.0	
Castanea	7.5	13.2	18.1	6.8	7.6	2.0	12.9	(2)
Liquidambar					3.8	15.3	18.8	(2)
Betula	2.5			0.5				
Ostrya	12.4		8.4	5.3	11.4	0.7		
Juglans		2.6						
Carya	16.2	5.3	5.2	1.5	2.2	6.0	2.0	(1)
Tilia	4.3		4.5	8.8	7.6	2.7	2.0	
Fraxinus						4.0		
Acer						0.5		
Nyssa					3.3	4.6		(1)
Base 100%								
Salix	5.8							
Alnus		1.2			14.1	0.7		
Epilobium	1.2	0.6		3.4	9.8	3.3	3.0	
Compositae	10.5	7.8	14.8	0.5	1.6	0.7	7.9	
Gramineae	5.8	3.0	7.1	4.4	4.3	7.9	17.8	(5)
Rosaceae	4.7	10.2	10.3	11.2	39.1	11.9	10.9	(2)
Ericaceae	7.0	12.0	34.2	2.0	138.0	140.4	4.0	(1)
Spores	1.8	0.6	0.6		9.2	9.9	8.9	(2)
						177.8		

[1]Number of grains counted

Appendix I

LIST OF SCIENTIFIC BOTANICAL TERMS USED IN CHAPTER WITH THEIR ENGLISH EQUIVALENTS

Abies - fir
Acer - maple
Alnus - alder
Betula - birch
Carya - hickory
Castanea - chestnut
Compositae - composite
Epilobium - fireweed
Ericaceae - blueberry family (includes mountain laurel, great laurel, etc.)
Fagus - beech
Fraxinus - ash
Gramineae - grasses
Juglans - walnut
Liquidambar - sweet gum
Nyssa - black gum
Ostrya - Log-hornbeam
Pinus - pine
Quercus - oak
Rosaceae - rose family
Salix - willow
Tilia - basswood
Tsuga - hemlock

Appendix II

PLANTS COLLECTED IN THE VICINITY OF THE ARCHAEOLOGICAL SITE ON THE RAYSTOWN BRANCH OF THE JUNIATA RIVER

by

Frank DiCecco

Summer 1960

Aceraceae:
- Acer rubrum L.
- A. saccharinum L.
- A. saccharum Marsh

Anacardiaceae:
- Rhus glabra L.

Annonaceae:
- Asimina triloba (L.) Dunal

Apocyanaceae:
- Apocynum cannabinum L.

Asclepiadaceae:
- Asclepias tuberosa L.

Balsaminaceae:
- Impatiens pallida Nutt.

Campanulaceae:
- Lobelia inflata L.
- L. syphilitica L.

Caprifoliaceae:
- Sambucus canadensis L.
- Viburnam acerifolium L.

Caryophyllaceae:
- Paronychia fastigiata (Raf.) Fern.
- Saponaria officinalis L.

Chenopodiaceae:
- Chenopodium hybridum L.

Commelinaceae:
- Commelina communis L.

Compositae:
- Achillea Millefolium L.
- Ambrosia artemisiifolia L.
- Antennaria sp.
- Aster divaricatus L.
- Bellis perennis L.
- Centaurea maculosa Lam.
- Cirsium vulgare (Savi) Tenore
- Eupatorium maculatum L.
- E. sessilifolium L.
- Galinsoga parviflora Cav.
- Helianthus divaricatus L.
- Hieracium venosum L.
- Rudbeckia serontina Nutt.
- Senecio obovatus Muhl.
- S. vulgaris L.
- Sericocarpus asteroides (L.) B.S.P.
- Solidago juncea Ait.
- Taraxacum officinale Weber

Cornaceae:
- Cornus Amomum Mill

Corylaceae:
- Betula lenta L.

Crassulaceae:
- Sedum sarmentosum Bunge
- S. ternatum Michx.

Cruciferae:
Arabis laevigata (Muhl.) Poir.
A. lyrata L.
Brassica Kaber (DC.) L.C. Wheeler
Hesperis matronalis L.
Rorippa sylvestris (L.) Bess

Cyperaceae:
Carex formosa Dew.
C. typhina Michx.
Scirpus acutus Muhl.

Dioscoreaceae:
Dioscorea quaternata (Walt.) Gmel.
D. villosa L.

Ericaceae:
Epigaea repens L.
Kalmia latifolia L.
Rhododendron maximum L.
Vaccinium angustifolium Ait.

Euphorbiaceae:
Euphorbia carollata L.

Fagaceae:
Quercus alba L.
Q. coccinea Muenchh.
Q. Prinus L.
Q. rubra L.

Gramineae:
Agrostis sp.
A. alba L.
A. tenuis Sibth.
Hystrix patula Moench.
Panicum dichotomum L.
P. scoparium Lam.
Phalaris arundinaceae L.

Guttiferae:
Hypericum sp.
H. gentianoides (L.) B.S.P.
H. perforatum L.
H. virginicum L.

Juglandaceae:
Carya ovata (Mill.) K. Koch
C. tomentosa (Poir.) Nutt.
Juglans cinerea L.

Juncaceae:
Luzula spicata (L.) DC.

Labiatae:
Hedeoma pulegioides (L.) Pers.
Polygala Curtissii Gray
Pycnanthemum incanum (L.) Michx.
Teucrium canadense L.

Lauraceae:
Sassafras albidum (Nutt.) Nees

Leguminosae:
- Cassia fasciculata Michx.
- Cercis canadensis L.
- Desmodium glutinosum (Muhl.) Wood
- Lespedeza intermedia (S. Wats.) Britt.
- Robinia Pseudo-Acacia L.
- Trifolium pratense L.
- T. repens L.
- Vicia caroliniana Walt.

Liliaceae:
- Allium cernuum Roth
- Hemerocallis fulva L.
- Smilax rotundiflora L.
- Uvularia perfoliata L.

Magnoliaceae:
- Liriodendron Tulipifera L.
- Magnolia acuminata L.

Nyssaceae:
- Nyssa sylvatica Marsh

Onagraceae:
- Circaea quadrisulcata (Maxim.) Franch. & Sav.
- Epilobium coloratum Biehler
- Oenothera argillicola Mackenz.

Ophioglassaceae:
- Botrychium multifidum Gmel. Rupr.
- B. virginianum (L.) Sw.

Orobanchaceae:
- Epifagus virginiana (L.) Bart.

Oxalidaceae:
- Oxalis acetosella

Papaveraceae:
- Chelidonium majus L.

Pinaceae:
- Juniperus virginiana L.
- Pinus resinosa Ait.
- P. Strobus L.
- Tsuga canadensis (L.) Carr.

Plantaginaceae:
- Plantago Rugelli Decne.

Plantanaceae:
- Plantanus occidentalis L.

Polygonaceae:
- Polygonum Convolvulus L.
- P. pensylvanicum L.
- Rumex obtusifolius L.

Polypodiaceae:
- Asplenium Trichomanes L.
- Athyrium thelypterioides (Michx.) Desv.
- Camptosorus rhizophyllus L.
- Cryptogamma Stelleri Gmel. Prantl
- Dennstaedtia punctilobula (Michx.) Moore
- Dryopteris marginalis (L.) Gray
- D. spinulosa (O.F. Muell) Watt

Polypodiaceae: (cont)
Onoclea sensibilis L.
Polypodium virginianum L.
Polystichum acrostichoides (Michx.) Schott.
Pteridium aquilinum (L.) Kuhn

Pontederiaceae:
Heteranthera dubia (Jacq.) Mac M.

Primulaceae:
Lysimachia ciliata L.

Pyrolaceae:
Monotropa uniflora L.

Ranunculaceae:
Anemone virginiana L.
Clematis virginiana L.
Hepatica americana (DC.) Ker
Ranunculus abortivus L.
Thalictrum sp.
T. dioicum L.

Rosaceae:
Fragaria virginiana Duchesne
Geum canadense Jacq.
Potentilla intermedia L.
Rosa carolina L.
Rubus sp.

Rubiaceae:
Galium lanceolatum Torr.
G. tinctorium L.
Houstonia longefolia Gaertn.

Salicaceae:
Salix nigra Marsh.

Saururaceae:
Saururus cernuus L.

Saxifragaceae:
Heuchera pubescens Pursh
Penthorum sedoides L.

Scrophulariaceae:
Linaria vulgaris Hill
Lindernia dubia (L.) Pennell.
Verbascum thapsus L.

Solanaceae:
Solanum carolinense L.

Sparganiaceae:
Sparganium eurycarpum Engelm.

Tiliaceae:
Tilia americana L.

Typhaceae:
Typha latifolia L.

Ulmaceae:
Ulmus americana L.

Umbelliferae:
Daucus Carota L.

Vitaceae:
Parthenocissus quinquefolia (L.) Planch.

Zosteraceae:

Potamogeton nodosus Poiret

NOTES ON PLANTS FROM SHEEP ROCK SHELTER

by

Hugh C. Cutler

and

Leonard W. Blake

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ABSTRACT

This paper provides a brief discussion of the corn, squash, pumpkin, and bottle gourd remains found at Sheep Rock. In addition, a listing of all identifiable plant remains recovered is provided, together with tables that summarize their stratigraphic distribution in the site deposit.

ACKNOWLEDGMENTS

We sincerely thank Carl Bebrich, Susan Kovak, Bernard Wydra, Diane Miles, Louise Durham, and Kathryn Crawford for their assistance in preparing the five tables on botanical remains and stratigraphic provenience.

TABLE OF CONTENTS

	Page
ABSTRACT	127
ACKNOWLEDGMENTS	129
TABLE OF CONTENTS	131
LIST OF ILLUSTRATIONS	133
LIST OF TABLES	135
I. EDITORS' NOTE	137
II. PLANT REMAINS	139
APPENDIX I: Stratigraphic Distribution of Plant Remains	147

LIST OF ILLUSTRATIONS

Page

Figure 1. Graphic Illustration of Variation in Row/Cupule Correlations for Two Samples of Corn Recovered at Sheep Rock. 143

Figure 2. Comparative Diagram of Mean Row Numbers and Median Cupule Widths for Archaeological Sites in the Eastern United States 145

LIST OF TABLES

		Page
Table 1.	List of Botanical Remains Recovered at Sheep Rock	151
Table 2.	Stratigraphic Provenience of Botanical Remains -- S5 Profile.	153
Table 3.	Stratigraphic Provenience of Botanical Remains -- S10 Profile	157
Table 4.	Stratigraphic Provenience of Botanical Remains -- S15 Profile	161
Table 5.	Stratigraphic Provenience of Botanical Remains -- Integrated Master Profile. . . .	165

EDITORS' NOTE

An intensive study of the entire range of botanical remains from the Sheep Rock Shelter site is scheduled for this coming summer. Under the direction of Dr. Anton Kovar, Paleobotanist, Pennsylvania State University, six students will spend eight weeks sorting, classifying, and interpreting the vegetational remains recovered during all eight seasons of excavation.

PLANT REMAINS

Large quantities of plant material are often found in cave sites in the southwest, but in the east such material is so rare that we know little of the development of agriculture and the utilization of wild plants. The Sheep Rock shelter material comes from an important time period, before the appearance of the European-introduced plants but after the upheavals caused in the east by movements of Indians toward the west. Only a few notes are included here because more comparisons must be made of the Sheep Rock materials with the scanty, and nearly always carbonized, fragments from other eastern sites.

All of the corn belongs to the race called Northern Flint (Brown and Anderson 1947), a race still grown by the Iroquois and at the time Sheep Rock shelter was used, by most of the Indians of the Eastern United States and as far west as Wisconsin and Illinois. Most of the ears were eight-rowed, with large butts, and usually with large, crescent-shaped kernels. Some flour corn was grown and there was a wide range of colors, although the color was more uniform than that of the southwest. A diagram of the number of rows of grains and the size of the cob as measured by the width of the cupule in which a pair of grains is borne (see Cutler 1966:11-12, or Nickerson 1953 for discussions of the use of this character) indicates that at least four variants were distinguished (Fig. 1). Similar variants are found in corn from other sites but these collections are usually too small to make identification of all the variants possible. Thus, from the Alhart site we have been able to separate only three of the four groups, whereas corn from sites in Ontario usually has only a single variant, possibly a result of selection for the more rigorous environment (Fig. 2).

So far we have been unable to relate the four groups of corn to cultigens identified in collections from living Indians of the east. Since we do not know the color or the endosperm character (flint or flour) of the grains which were borne on the Sheep Rock shelter cobs, we must use cob characters. It is likely that the people who grew the corn used color and endosperm characters as indicators and made selections of what they considered the "best" ears on the basis of these color and grain content characters. Since there is some association of color, grain content, and cob characters, we hope to be able to determine the kinds of corn selected by the Sheep Rock shelter inhabitants.

The most interesting material was the squash, pumpkin, and gourd assortment. All of the squashes and pumpkins belonged to a single species, Cucurbita pepo, but there was an

unusual diversity in the kinds grown. They ranged from large pumpkins, like the horticultural variety "Connecticut Field" (this is the usual large Halloween pumpkin) through most of the common New England summer squashes and white bush scallops, to the ornamental, yellow-flowered gourds which are usually considered a separate botanical variety, C. pepo var. ovifera.

The true gourd, or bottle gourd, Lagenaria siceraria, was present and ranged from small pear-sized fruits to ones which may have been as much as 10 inches in diameter. All of the bottle gourds were of the typical New World form with slender seeds, without the corky wings which are characteristic of Asiatic forms and which are rare in the New World.

Both Cucurbita pepo and Lagenaria are ancient New World plants, having been found in Mexico in pre-ceramic and probably pre-agricultural levels of caves in Tamaulipas, Northern Mexico (Cutler and Whitaker 1961). It is likely that they preceded corn in the United States but there are too few collections to prove this theory. Both these species were found in Salts Cave but corn was lacking (Watson and Yarnell 1966).

All of the beans were the common bean, Phaseolus vulgaris, and these are still being studied.

The plant materials are listed in the accompanying table. In view of reports by early settlers on the abundance of chestnut trees, it is surprising that so few chestnut hulls were found. Possible explanations may be that the hulls were burned or were discarded outside the site.

The most important feature of the plant materials from this site is the great diversity in the corn and squashes. This indicates that not only was there considerable skill in agriculture, but also an organization existed which encouraged the selection of many varieties and the preservation of established kinds of plants through seed selection and isolation of plantings.

Figure 1. Graphic Illustration of Variation in Row/Cupule Correlations for Two Samples of Corn Recovered at Sheep Rock.

Samples

(x)	Square 2 & 3	(Median C.W. 11.5 mm of sample of 30 cobs)
(•)	Square 3, Level 3 (18 to 27 in.)	(Median C.W. 11.1 mm of sample of 12 cobs)

Figure 1

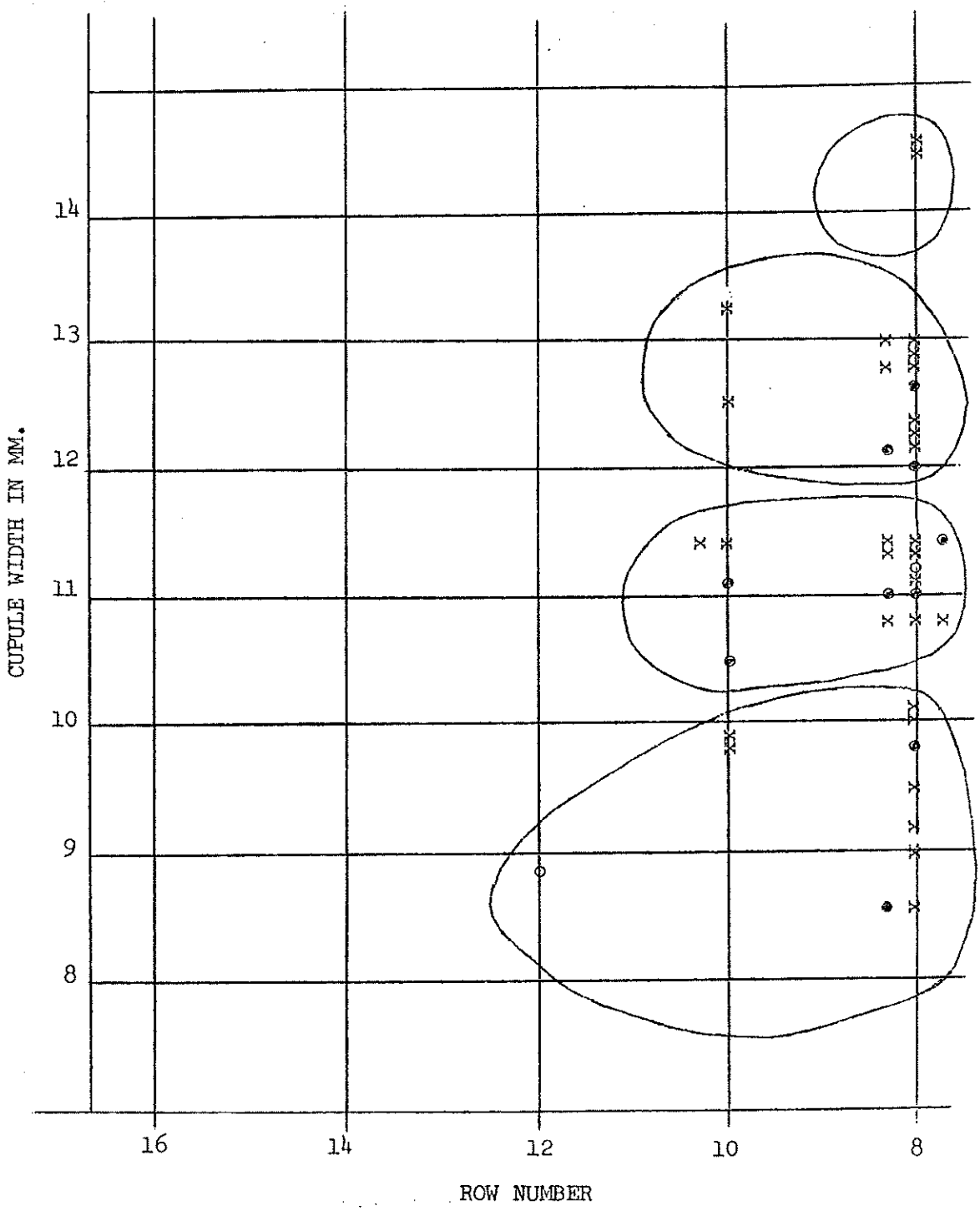
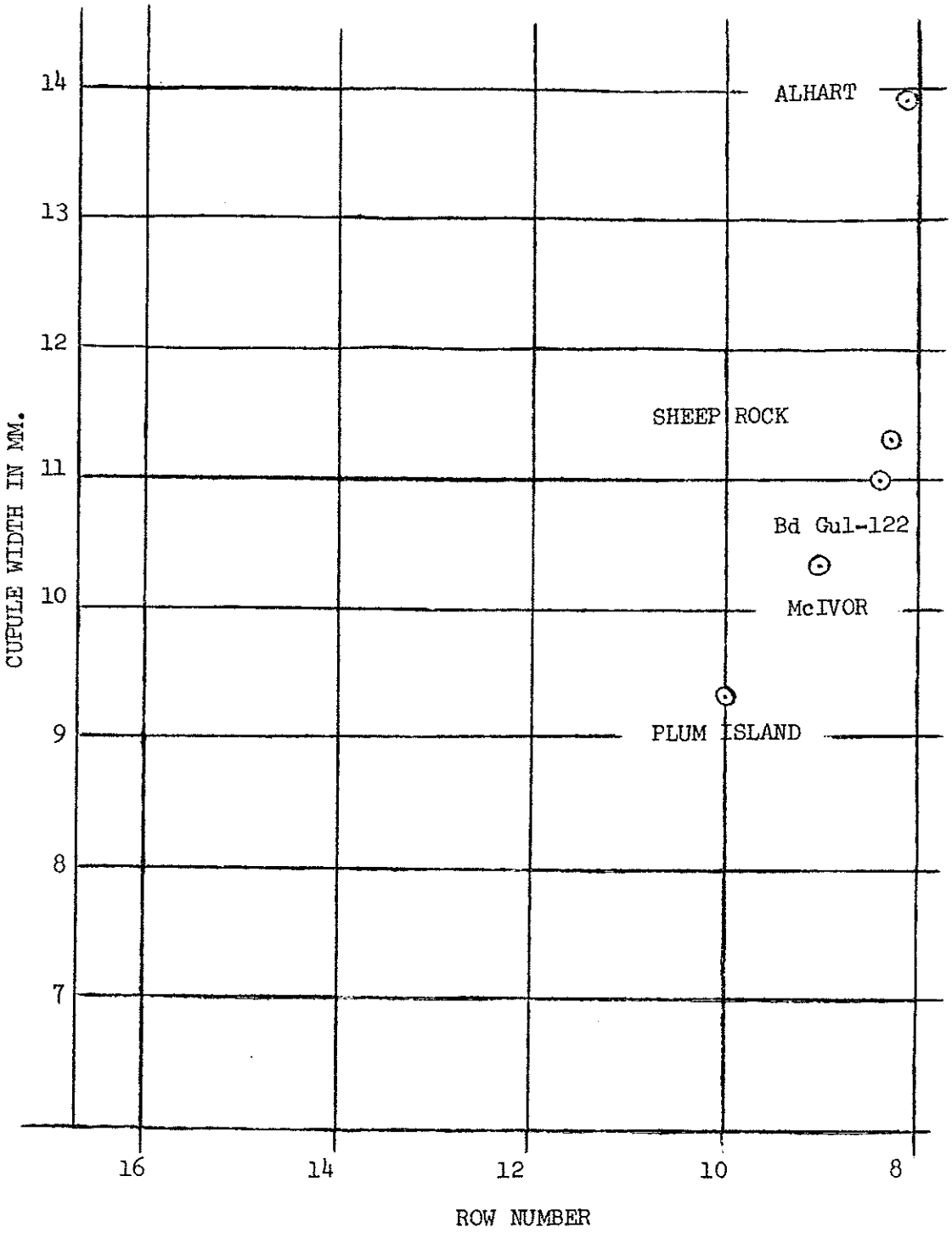


Figure 2. Comparison Diagram of Mean Row Numbers and Median Cupule Widths for Archaeological Sites in the Eastern United States

Charred specimens from Alhart, McIvor, Bd Gul-122, and Plum Island are adjusted for estimated 10% shrinkage in burning. Sheep Rock specimens were not charred.

Sheep Rock - Pennsylvania
Plum Island - Illinois
Bd Gul-122 - Ontario
McIvor - Ontario
Alhart - New York

Figure 2


ALHART
SHEEP ROCK
Bd Gul-122
McIVOR
PLUM ISLAND
CUPULE WIDTH IN MM.
14
13
12
11
10
9
8
7
16
14
12
10
8
ROW NUMBER

Appendix I

STRATIGRAPHIC DISTRIBUTION OF PLANT REMAINS

by

Carl A. Bebrich

Preliminary analysis of the Sheep Rock shelter stratigraphy was completed subsequent to the preceding study of the botanical remains recovered at the site prior to the 1966 field season. These remains are grouped in Table 1 according to six subsistence and three non-subsistence categories using common names as provided by Cutler and Blake. Stratigraphic distribution of the constituents of these categories is presented in Tables 2, 3, and 4 for each of the three north-south profiles, respectively. In Table 5 these profiles are combined into a single Master Profile of the site using the levels reconstructed by Michels from Horn's analysis.

Numbers unaccompanied by a symbol designation indicate the amount of each constituent per level for which no association has been designated. As feature associations are considered useful for a comprehensive analysis of the full complement of botanical specimens eventually to be recovered from the site, specific symbol identification, as defined below, is given where these have already been assigned.

P indicates the amount of a constituent associated with any or all pits for each stated level.

F indicates the amount of a constituent associated with any or all features for each stated level.

NL indicates the amount of a constituent found near a ledge in the site.

RB indicates the amount of a constituent found in a rodent burrow for each stated level.

>1 The term "some" was used in connection with a few constituents in such a way as to imply an amount greater than 1. For example, 4>1 indicates four separate entries in a level, each implying an amount greater than 1.

Table 1

BOTANICAL REMAINS FROM SHEEP ROCK

Food Plants: Domestic

(1) Corn
- Corn cobs: 4, 6, 8, 10, 12, 14, 16 row
- Corn cob fragments
- Corn stalks
- Corn kernels
- Shredded corn husk
- Tied corn husk bundle

(2) Squash
- Gourd fragments
- Pepo fragments
- Pepo seeds
- Pepo stems
- Lagenaria seeds

(3) Bean
- Bean pods
- Bean seeds

(4) Sunflower
- Sunflowers
- Sunflower seeds

Food Plants: Wild

(5) Nuts
- Acorn
- Acorn hulls

- Black walnuts
- Black walnut hulls
- Charred walnut hulls

- Walnuts
- Chestnuts
- Butternuts

- Hickory nuts
- Hickory nut fragments
- Hickory nut hulls
- Dyed red hickory nut

- Hazel nut

Table 1

BOTANICAL REMAINS FROM SHEEP ROCK

(6) Miscellaneous
- Cherry seeds
- Hackberry seeds
- Unident seeds
- Peach stones
- Wild plum pits
- Grape vines
- Onion skin (?)

Non-Food Plants

(7) Fiber
- Bark fiber
- Fiber
- Matted fiber
- Rodent den fiber
- Root fiber
- Shredded fiber
- Twisted fiber
- Shredded stalks

(8) Wood
- Bark
- Bark strips
- Twigs
- Sticks
- Cedar branches
- Wood
- Burnt wood
- Charred wood
- Cut wood

(9) Miscellaneous
- Fodder
- Grass
- Burnt grass
- Marsh grass
- Matted grass
- Fern fronds
- Leaves
- Leaf mold
- Reeds
- Roots
- Wood fungus

Stratigraphic Level	Master Profile Key	FOOD PLANTS — Domestic — Corn										Squash			Bean		Sunflower	
		4 Row	6 Row	8 Row	10 Row	12 Row	14 Row	16 Row	Corn cob fragments	Corn stalks	Corn kernels	Shredded corn husk	Tied corn husk bundle	Gourd fragments	Pepo fragments	Pepo seeds	Pepo stems	Lagenaria seeds	Bean pods	Bean seeds	Sunflower	Sunflower seeds
A	1								5	1						12			3			
B	2	20	18	268 2F 1RB	42	1					1>1	350 1RB	1		60	385 6F	15	4	218 1RB	27	1	9 1?
1	3																					
D	3											5				14	3			1		
C	4																					
E	5															1						
2	5																					
3	6																					

STRATIGRAPHIC PROVENIENCE OF BOTANICAL REMAINS — S5 PROFILE

Table 2

Table 2

FOOD PLANTS

Stratigraphic Level	Master Profile Key	Wild Nuts: Acorn	Acorn hulls	Black walnuts	Black walnut hulls	Charred walnut hulls	Walnuts	Chestnuts	Butternuts	Hickory Nuts	Hickory nut fragments	Hickory nut hulls	Dyed-red hickory nuts	Hazel nuts	Miscellaneous: Cherry seeds	Hackberry seeds	Unident seeds	Peach stones	Wild plum pits	Grapevines	Onion skin ?
A	1	1 1NL		3					2	1		1				2		1NL			
B	2	75 1F 1RB		61 2F	15	2		9	21 1F	51 1P		14				46			1	3	1
1	3															1					
D	3			4					2	1	1	1				5					
C	4																				
E	5			1					1	7						4					
2	5																				
3	6																				

Stratigraphic Level	Master Profile Key	NON-FOOD PLANTS									
		Fiber						Wood			
		Bark fiber	Fiber	Matted fiber	Rodent den fiber	Root fiber	Shredded fiber	Twisted fiber	Shredded stalk	Bark	Bark strips
A	1									1	
B	2		4	1	1	1RB	1		1	27 1P 1F 1RB	4
1	3										
D	3									8	
C	4										
E	5									1	
2	5										
3	6										

Stratigraphic Level	Master Profile Key	NON-FOOD PLANTS						
		Wood						
		Twigs	Sticks	Cedar branches	Wood	Burnt wood	Charred wood	Cut wood
A	1				1			
B	2	10 1F	4 1RB		15 1P 1F 11>1		11>1	
1	3							
D	3				2 1>1		3 1>1	
C	4							
E	5				1	1		
2	5							
3	6							

Table 2

Table 2

NON-FOOD PLANTS

Miscellaneous

Stratigraphic Level	Master Profile Key	Fodder	Grass	Burnt grass	Marsh grass	Matted grass	Fern fronds	Leaves	Leaf mold	Reeds	Roots	Wood fungus
A	1											
B	2	13 1RB	8	1	12			5 1F	1F			
1	3											
D	3		3									
C	4											
E	5											
2	5											
3	6											

Stratigraphic Level	Master Profile Key	FOOD PLANTS: Domestic: Corn										Squash		Bean		Sunflower	
		4 Row	6 Row	8 Row	10 Row	12 Row	14 Row	16 Row	Corn cob fragments	Corn stalks	Corn kernels	Shredded corn husks	Tied corn husk bundle	Gourd fragments	Pepo fragments	Pepo seeds	Pepo stems	Lagenaria seeds	Bean pods	Bean seeds	Sunflower	Sunflower seeds
A	1																					
B	2	1 8F	2 4F	110 220F	10 16F	1F	1	1		2	123 152F	1	1	1F	16 12F	13 48F	1 4F	1F	196 23F	3 17F		5 4F
1	2																					
C	3			47	4						64				15	126		30	38	6		3
D	3																					
E'	4																					
2	4																					
3	5			2							9			2		5			3		2	
E	5																					
8	5																					
H'	6																					

STRATIGRAPHIC PROVENIENCE OF BOTANICAL REMAINS — S10 PROFILE

Table 3

Table 3

FOOD PLANTS

Stratigraphic Level	Master Profile Key	Wild: Nuts: Acorn	Acorn hulls	Black walnuts	Black walnut hulls	Charred walnut hulls	Walnuts	Chestnuts	Butternuts	Hickory nuts	Hickory nut fragments	Hickory nut hulls	Dyed-red hickory nuts	Hazel nuts	Wild: Miscellaneous: Cherry seeds	Hackberry seeds	Unident seeds	Peach stones	Wild plum pits	Grapevines	Onion skin ?
A	1																				
B	2	128 88F		128 18F	65 2F		5F	34 2F	27 6F	18 19F		11 12F			4 1F	15 3F		1	1>1 2F		
1 C	2 3	7		4				1	2	3		1				8		1			
D	3				1																
E'	4	2								1						2					
2	4																				
3	5	2		3					3	3						3				2	
E	5																				
8	5																				
H'	6																				

Stratigraphic Level	Master Key Profile	NON-FOOD PLANTS												
		Fiber					Wood							
		Bark fiber	Fiber	Matted fiber	Rodent den fiber	Root fiber	Shredded fiber	Twisted fiber	Shredded stalks	Bark	Bark strips	Twigs	Sticks	Cedar branches	Wood	Burnt wood	Charred wood	Cut wood
A	1																	
B	2		2F	1						10 8F	5 2F		2	1	8 4>1 4<1F		2 2>1 4<1F	
1	2																	
C	3									2	3				4 3>1		3 4<1	
D	3																	
E'	4									2					1 2>1		1 2>1	
2	4																	
3	5									5	2				1 2>1		1 2>1	
E	5																	
8																		
H'	6																	

Table 3

Table 3

NON-FOOD PLANTS

Miscellaneous

Stratigraphic Level	Master Profile Key	Fodder	Grass	Burnt grass	Marsh grass	Matted grass	Fern fronds	Leaves	Leaf mold	Reeds	Roots	Wood fungus
A	1											
B	2	5	3					2		1		
		3F	6F					1<1				
								21F				
1	2											
C	3	2						1				1
D	4		2									
E'	4		2									
2	5											
3	5											
E	5											
8	6											
H'	6											

| Stratigraphic Level | Master Profile Key | FOOD PLANTS | | |

Table 4

FOOD PLANTS

Stratigraphic Level	Master Profile Key	Wild Nuts: Acorn	Acorn hulls	Black walnuts	Black walnut hulls	Charred walnut hulls	Walnuts	Chestnuts	Butternuts	Hickory nuts	Hickory nut fragments	Hickory nut hulls	Dyed-red hickory nuts	Hazel nuts	Wild Miscellaneous: Cherry seeds	Hackberry seeds	Unident seeds	Peach stones	Wild plum pits	Grapevines	Onion skin ?
A	1																				
B	2	85 8P		92 7P	5 1P			96	20 1P	28 5P 1F		15 6P		1		8 8P	18P		1P	1	
1	2																				
2	2														1						
C	2	21		31	1		2	2	21	21		19							7		
D	3																				
3	3	1	1	2	1				4	1			1			1					
E	3	1	1	4																	
4	3																				
F	4																				
4	4			4						2		3									
G	5	1																			
5	6																				
LoH	7	1														7					
Lo6	7																				

NON-FOOD PLANTS

Stratigraphic Level	Master Profile Key	Fiber: Bark fiber	Fiber: Fiber	Fiber: Matted fiber	Fiber: Rodent den fiber	Fiber: Root fiber	Fiber: Shredded fiber	Fiber: Twisted fiber	Fiber: Shredded stalks	Wood: Bark	Wood: Bark strips	Wood: Twigs	Wood: Sticks	Wood: Cedar branches	Wood: Wood	Wood: Burnt wood	Wood: Charred wood	Wood: Cut wood
A	1																	
B	2		1				1	1P		4	4	4	1		2		2	1
										1>1P	2>1	1>1			2>1		1>1	
															1>1P			
1	2																	
2	2																	
C	2		1			1				7		2			6		1	
															1>1			
D	3																	
E	3																	
4	3																	
3	3																	
F	4							1		5		2			4		1	
4	3														7			
G	5									1					1>1			
	4																1	
	5																1>1	
	6											1						
LoH																		
Lo6																		

Table 4

Table 4

NON-FOOD PLANTS

Miscellaneous

Stratigraphic Level	Master Profile Key	Fodder	Grass	Burnt grass	Marsh grass	Matted grass	Fern fronds	Leaves	Leaf mold	Reeds	Roots	Wood fungus
A	1											
B	2				1			1			1	
1	2											
2	2											
C	3	4>1 1P	2 1P									
2	3	3					1					
D	3					1						
E	3					1						
3	4											
3	4											
F	5		1									1
G	6											
LoH	7											
Lo6	7											

STRATIGRAPHIC PROVENIENCE OF BOTANICAL REMAINS — MASTER PROFILE KEY

Table 5

Master Profile Key	FOOD PLANTS				
	Domestic				
	Corn		Squash	Bean	Sunflower
4 Row					
6 Row					
8 Row					
10 Row					
12 Row					
14 Row					
16 Row					
Corn cob fragments					
Corn stalks					
Corn kernels					
Shredded corn husks					
Tied corn husk bundles					
Gourd fragments					
Pepo fragments					
Pepo seeds					
Pepo stems					
Lagenaria seeds					
Bean pods					
Bean seeds					
Sunflower					
Sunflower seeds					

1																								
2	34	25	676	100	2	2																		
	2P	4F	14 2P	14P	3P																			
	8F		22 2F	16F	1F																			
			1RB																					
3		1	73	8	1		1																	
4																								
5			3					5		9		2	6			3		2						
6																								
7																								

1																								
2					3	519	2	1		9	109	551	26	6	667	33	1	19						
					1>1	17P	1P			1F	13P	90P	1P	1P	15P	2P	6P	4F						
						152F					12F	54F	4F	1F	23F	17F								
						1RB									1RB									
3						90		1	11	19	160			33	42	8		4						
4																								
5					5	9			2		6				3		2							
6																								
7																								

Table 5

FOOD PLANTS

Wild

Nuts

Miscellaneous

Master Profile Key	Acorn	Acorn hulls	Black walnuts	Black walnut hulls	Charred walnut hulls	Walnuts	Chestnuts	Butternuts	Hickory nuts	Hickory nut fragments	Hickory nut hulls	Dyed-red hickory nuts	Hazel nuts	Cherry seeds	Hackberry seeds	Unident seeds	Peach stones	Wild plum pits	Grapevines	Onion skin ?
1	1NL		3				2	1		1					2		1NL			
2	1 279 8P 89F 1RB		312 7P 20F	76 1P 2F	2	2 5F 1RB	141 2F	89 1P 7F	118 6P 12F	1	59 6P 20F		1	5 1F	71 8P 3F	18P	1	3 1P	4 1>1	1 2F
3	9	1	14	1	1			8	5		2	1			16		1			
4	2		8					4	1 2		3				2					
5	3														7					
6	2																			
7	1																			

| Master Profile Key | NON-FOOD PLANTS | | |

Table 5

NON-FOOD PLANTS

Miscellaneous

Master Profile Key	1	2	3	4	5	6	7
Fodder	21	1P 3F 1RB	2				
Grass	16	1P 6F	5	2	3		
Burnt grass	1						
Marsh grass	3						
Matted grass				1			
Fern fronds			1	1>1			
Leaves	8	1>1 22F		1			
Leaf molds	1F						
Reeds	1						
Roots	1			1			
Wood fungus							1

STRATIGRAPHIC PROFILES OF SHEEP ROCK SHELTER

by

Cynthia D. Horn

ABSTRACT

This paper discusses the preparation of master stratigraphic profiles from the individual pit profiles obtained in the field. Seven such profiles of the Sheep Rock Shepter deposit were prepared and are here illustrated. A trial correlation of culture period and stratum is also attempted.

ACKNOWLEDGMENTS

I am indebted to Mary C. Deaterly and Isabelle S. Fries for the many hours they spent assisting me in the arduous task of transcribing and interpreting the dozens of individual sidewall profiles with which I had to work. I want to thank Ira Smith for his help in interpreting a number of the profiles produced during earlier seasons. His familiarity with the events that took place during past seasons enabled him to provide valuable guidance. Finally, I want to thank Dr. Michels for his many valuable suggestions on how to undertake and carry out this project.

TABLE OF CONTENTS

	Page
ABSTRACT	171
ACKNOWLEDGMENTS	173
TABLE OF CONTENTS	175
LIST OF ILLUSTRATIONS	177
I. INTRODUCTION	179
II. DIFFICULTIES ENCOUNTERED	179
III. METHODOLOGY	180
IV. CONCLUSION	185
V. EDITOR'S NOTE	187

LIST OF ILLUSTRATIONS

Page

Figure 1. South 5 Profile 189

Figure 2. South 10 Profile 191

Figure 3. South 15 Profile 193

Figure 4. East 10 Profile 195

Figure 5. East 5 Profile. 197

Figure 6. West 5 Profile. 199

Figure 7. West 10 Profile 201

Figure 8. Trial Integration of S5, S10, S15 Profiles . . 203

Figure 9. View of the Interior of the Shelter. 205

INTRODUCTION

Stratigraphic analysis is an important aspect of every archaeological excavation. At Sheep Rock shelter, an attempt at stratigraphic correlation is necessary, since the site lacks such structures as houses or walls which aid the archaeologist in detecting stratigraphic sequences. He must then rely more heavily on the recording of the stratigraphy which, though exhibiting some disturbance by human occupation, is representative, to a great degree, of the processes of deposition.

Each stratigraphic analysis is unique to a particular site and presents its own difficulties for establishing continuity throughout the site.

This paper is only one part of a larger project which involves the preparation of vertical stratigraphic profiles of relative simplicity from the many complex pit profiles recorded during site excavations. In attempting to systematically correlate and record these face drawings, we were confronted with various difficulties which could be partially overcome by the adoption of a methodology particularly applicable to the site.

Therefore we decided to incorporate a discussion of our methodology and the problems which necessitated the adoption of this particular method of stratigraphic control. This paper also discusses the conclusions which resulted from our analysis, and lists various recommendations which we feel would be particularly helpful in conducting future stratigraphic analyses at the site.

DIFFICULTIES ENCOUNTERED

The task with which we were confronted was to establish a stratigraphic sequence for Sheep Rock which would perhaps indicate a continuous stratigraphic pattern throughout the site, or failing this, would indicate possible sequential variations which might prevail in different sections of it.

In our efforts to establish this continuous sequence or its possible variations, we encountered various difficulties:

1. Available profiles were limited to certain areas of the site. The most extensive excavations were conducted in the western portion of the site where the greatest depth was reached.

2. The sequence of profiles along certain lines of the grid was not continuous due to the absence of certain segments of drawings for these sections.

3. Two profiles prepared of the same wall varied in descriptive detail insofar as the evaluation of levels and soil matrices were concerned.

4. Profiles recorded after walls had been exposed for a length of time showed little correlation with profiles done of the adjacent area during a later season.

5. Certain terms such as "gravel" and "shale" were used interchangeably, whereas each one is actually a descriptive term used to describe a definite set of geologic conditions.

6. Below-datum readings were either completely lacking or insufficient in that only one reading was given to indicate placement of the profile in its proper interval. This problem would not have been as acute if the profile scales had been indicated on the drawing.

7. Certain profiles were missing from the records or did not contain descriptions for all the levels within them.

8. Level descriptions were insufficient in that they often referred to either color or texture of soil, but not both.

9. No below-datum readings were taken of the original site before initial excavation was begun.

We attempted to alleviate these difficulties by adapting various methods applicable to the recorded stratigraphy of the site.

METHODOLOGY

Sheets were prepared from graph paper which had a scale of one-inch equals one-foot (1" = 1'). Each sheet represented a line of the grid and was given a specific title, e.g., N5, E40, etc. A horizontal line was drawn at the top of the sheet and was considered to be level with Datum 0. Divisions were made at five-inch intervals representing five-feet. These intervals were marked by lines perpendicular to the horizontal line. These lines were given an east/west or north/south letter-number designation as they would appear on the actual site grid plan.

Each sheet was then the vertical profile for a specific line of the grid. For example, a line which represented either a north or south grid line had, on its profile sheet, lines going perpendicular to it with designations from W60 to E40. Likewise, a line having either an east or west designation, according to the grid, would be divided by lines going perpendicular to it which had designations from N5 to S35.

Profiles were procured from the records of Witthoft and Kinsey for the excavations of 1959, 1960, 1961, 1962, from Ira Smith's recordings for the 1965 season, and from profiles of the recent 1966 excavation. They were then placed on the correct sheet according to the following method:

1. The stake designations were labeled with the same letter-number character as the line of the grid which the sheet represented. For example, profile with stakes W15-S10 and W10-S10 would be placed on the S10 line sheet.

2. Each profile was arranged as it would be seen from a certain direction. The lines with north or south designations had profiles which were placed as they would be viewed by one looking east. The lines having east or west designations had profiles which were placed as seen by one looking south.

3. Each profile with the top level having a below-datum (b.d.) of twenty-four inches would be placed vertically in the proper interval, i.e., two inches below the line which represented Datum 0.

All of the profiles were placed on graph paper. The sheets which represented the lines of the grid, which contained one or more profiles were: N5, 0, S5, S10, S15, S20, S30, W30, W25, W20, W15, W10, 0, E5, E10, E15, E20, and E25.

Due to lack of sufficient profiles for certain sections of the site and of continuous profiles going both horizontally and vertically on certain lines of the site grid, seven lines were selected, three of which extend in a north-south direction and four of which extend in an east-west direction. The three north-south lines were S5, S10, and S15, and were chosen for the following reasons:

1. These profiles extend the greatest horizontal length across the site.

2. They contained the greatest number of continuous profiles along this horizontal length.

3. Lines S10 and S15 crossed the squares W15-S15 and W10-S15 which had been excavated to greater depths than any other pits in the site.

4. Although line S5 did not cross the pits of deepest excavation, it did cross over the section of the site which had been excavated most extensively down to bedrock. The bedrock was part of a ledge which sloped down to the river, upon which the upper archaeologically significant levels had been deposited.

5. These three lines, which crossed an area ten feet in width from one section of the site to the other, could be used as a possible check for either continuity in site levels or disappearance of certain levels as one progressed along this distance.

The four lines extending from east to west were E5, E10, W5, and W10, and were chosen for the following reasons:

1. They give an indication of a cross-section of the site, particularly the slope of the lower levels from the ledge toward the river and the degree to which the upper levels approximate the horizontal.

2. They contain the most continuous and complete profiles both horizontally and vertically of the entire site.

3. They demonstrate either variance or continuity in levels for a horizontal area of twenty feet.

4. W5 was chosen for its indication of depth and location of bedrock on the profile, particularly in reference to the S10 and S15 lines.

5. E5 and E10 represented the most complete profiles going east to west on the side of the grid designated as east.

The S10 line was chosen as the horizontal line along which distribution of artifacts would be plotted because of its central location in the site and its more complete horizontal and vertical continuity of profiles.

A visit was made to the site to observe exposed side walls and take measurements along the S10 line which goes through the center of the site. These measurements were necessary in order to increase the accuracy of the placement of the profiles at the proper depth, to help indicate their relationship to one another, and to determine a more accurate picture of the area excavated along the S10 line.

The readings which were taken at various points along the S10 line were as follows:

E40 - 112 1/2 in. b.d.
E35 - 41 in. b.d.; 66 1/2 in. b.d.
E30 - 41 1/2 in. b.d.

E25 - 41 in. b.d.; 88 in. b.d.
E20 - 88 in. b.d.
E15 - 88 1/4 in. b.d.; 125.75 in. b.d.
0 - 145.75 in. b.d.; 174 1/2 in. b.d.
W 5-W15 - 220 1/2 in. b.d.
W15-W25 - 145 in. b.d.
W30 - 138 1/2 in. b.d.; 81 in. b.d.
W35 - 78 1/4 in. b.d.
W45 - 72 1/2 in. b.d.
W50 - 4 in. b.d.

The following readings on the bedrock exposed along S5 were taken to help insure accuracy of profile placements.

S0 - 120 1/2 in. b.d.
S5 - 141 in. b.d.
S10 - 145 in. b.d.

After the profiles for intensive correlation had been selected and the above readings plotted on the graph, work was begun on combining various profiles to establish some type of continuity along these lines.

In combining profiles certain basic procedures were followed with as little variance as possible. The soil descriptions were many times the sole indication of possible correlation between levels in various profiles at approximately the same below-datum reading. The most desirable soil descriptions were those which contained both color and textural distinctions. Wherever these distinctions were indicated they were used along with the approximate below-datum readings, plus a reference to the general slope or horizontal position of the beds as a guide to a possible correlation and, thus, continuum of levels from profile to profile.

Another procedure generally followed was to combine large areas which appear to have continuous relationships as to level location and soil description. It was recognized that certain small areas within these larger units might contain soil descriptions which would be at variance with the general description given to the larger units. If these small areas did not extend across the complete profile in which they were originally designated, and if they contained an attribute, such as either color or texture, which was in accordance with the description of the larger area, they were included as part of the larger area. In some instances the smaller areas were in complete variance and were excluded. However, this was not generally the procedure. Usually, these levels were designated as separate levels within the profile or profiles and were counted as being distinct from the larger levels.

Another procedure was to delimit and distinguish areas

which showed evidence of human disturbance by indicating their presence within the larger matrix area by the use of thin lines. Areas such as these were delimited if they were considered or discribed within the original profile descriptions as ash, charcoal, hearth area, pit, burnt soil, charred soil, or red soil and if found near charcoal areas. If the matrix soil was not definitely discernible (this occurred in only one instance), then a large area with indications of occupation was considered to be a level in itself.

The term "dust" was considered, if found to be continuous as a distinct level, to be separate from that described as "soil." Dust was considered to be drier and of generally finer texture than soil which was more moist and compact and contained more organic material. Dust was always assumed to be finer than fine shale which had a more chunky texture. In all instances where dust generally exhibited a continuous horizontal sequence, it was considered to be the matrix soil for any habitational evidence.

Humus was generally considered to be part of a soil description, particularly if the description was "brown soil." If humus was found in areas which were markedly at variance with this condition, such as a heavy shale area, it was marked as a distinct area. However, if humus was found within only a small area of one profile, it was included within a larger unit if the description was other than that of the soil.

Certain of the descriptions used the term "gravel." According to a geological definition, gravel is "a loose detrital (eroded) material composed of small pebbles usually mixed with sand" (Challinor 1962). Familiarity with the textural conditions at Sheep Rock have indicated that actually this "gravel" is shale. Most of these areas with textural characteristics contained pieces or chips of either fine or coarse shale. Therefore, in all levels having textural significance and where the term "gravel" was used the term "shale" was substituted.

The terms manure, dung, refuse, and surface debris were considered to be the same. They were therefore given the title of "sheep droppings" in the final soil descriptions.

After various larger levels were selected and assigned major divisions within a profile, soil descriptions were compiled to include the prevailing color and textural distinctions which had prompted their separate designation. Where an over-all color description was lacking the textural description was used. In all cases where there were prevailing color and textural designations these were incorporated into the final soil descriptions in order to give the most precise stratigraphic data possible.

On the final profiles, soil descriptions were contained on the legend for each drawing and were self-explanatory. Occupational areas were marked distinctly with plus signs to aid in detection. The major areas were given letter designations, while the minor levels were marked with numbers.

Final drawings were prepared on plain paper and profiles were traced using the scale contained on the original graph paper of one-inch equals one-foot. In addition, on each profile, the levels were marked by numbers and letters. The large letters represented what were considered to be the major levels within each profile which could be used for further cross-correlation and analysis. The numbers represented levels within a profile, which were only contained within that profile or which phased into the profile from other profiles not represented on the page and did not continue as significant levels within it.

CONCLUSIONS

Most of the final stratigraphic profiles, with their designated levels and soil descriptions, can be easily read (Figs. 1-7). From the available and more complete profiles, at this particular stage of analysis, the stratigraphic sequences at Sheep Rock seem to indicate sectional differences within the midden.

The deposits overlying the bedrock consist of various combinations of soil, dust, humus, shale, and rockfall. Sheep Rock appears to be an area of much habitational disturbance, particularly in the areas from W5 to the areas around E20-E25. Most of this disturbance seems to be found characteristically within the upper levels, usually in a deep brown soil (designated as brown soil) and underlaid with an area of either green or brown shale which is the second level below the surface. This was evident in the sections of S10 and S15 east of W5 on the lines extending horizontally across the site, and also on profiles E5 and E10 in the areas where these lines intersected S10 and S15. S5 shows occupational disturbance on the upper levels around E15 to E20, and also near W20 to W15. Most of the occupation areas seem to be close to the rock shelter ledge, particularly around E15 or E20. Further excavation may indicate occupation areas in parts of the shelter ledge sloping towards the dock area.

The rock ledge, and the levels which had accumulated in earlier periods next to it, sloped toward the river at a sharp angle. This angle decreased as more recent layers were deposited. The upper levels of the E20 profile slope gently from S15 through S10 into the rock facing of the site.

Throughout the site, there was a continuous mixture of various textures of shale and soil, or various gradations in shale texture with no indication of possible soil content. Therefore, soils were differentiated on the bases of texture and color.

The deposits directly overlying the bedrock and in the western grid area exhibit varying degrees of shale texture. Level distinctions were increasingly difficult to determine, and were made only on the basis of textural differentiation.

Color variation also presented a problem in that pit profiles involving one or more shades of brown soil were labeled according to the excavator's preference. Thus, where a large zone containing a red to brown color gradient was reported, it was arbitrarily designated as red-brown soil. Furthermore, descriptions of contiguous local concentrations also varied within the excavation records, and were designated as either red or burnt.

The factors influencing observational variation in soil color are of two types: intrinsic characteristics, for example, weathering; and transient characteristics, such as lighting and moisture content of the soil.

It appears then that Sheep Rock has sequential continuity only in certain areas. The area where most distinctive soil color can be seen is in the moist section in the eastern quadrant, while in the drier area of the site, the western quadrant, stratigraphic sequence is not easily discernible and seems to exhibit more pure shale and less soil than the moist section.

Further consolidation of levels may be attempted if variations in color are not noted and if certain areas of disturbance and known color change due to disturbance are grouped under what appears to be the matrix soil. Furthermore, distinctions in texture could possibly be eliminated in certain sections of the site.

EDITOR'S NOTE

A trial integration of the three north-south profiles (S5, S10, S15) was attempted by Joseph Michels subsequent to the completion of this manuscript. Eleven depositional layers were identified that appeared to manifest themselves systematically throughout the site midden. Figure 8 depicts the location of these strata on the three north-south profiles.

We have worked with this "Master Profile Key" for several months now, especially with respect to stone and ceramic artifacts, and some revisions seem to be warranted. These revisions and others that will inevitably emerge will be accomplished only after the results of this coming summer's field season.

Figure 1. South 5 Profile

Legend

A	Sheep Droppings
1,9	Green Shale
B	Tan to Brown Soil with Dust
D	Tan Dust with Shale
C	Red Clay with Shale
2	Green Clay with Shale
3	Brown Clay with Shale
4	Green and Brown Soil with Fine Shale
5	Yellow Clay
E	Brown Soil with Shale
11	Clay
6	Gray-Tan Soil with Shale
7	Green Soil
F	Gray Soil with Coarse Shale and Rockfall
8	Humus and Fine Shale
G	Tan-Gray Soil with Fine Shale
10	Clay with Shale
H	Bedrock
	++ = Zones of Ash and Charcoal

Figure 1

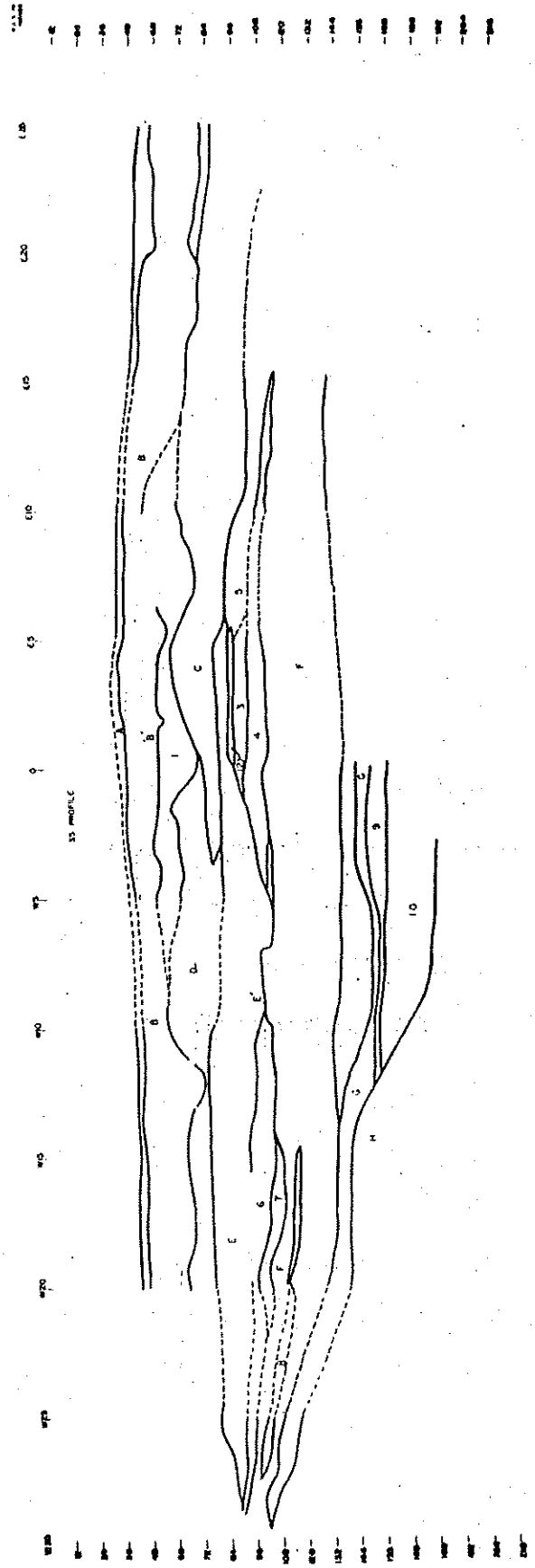


Figure 2. South 10 Profile

Legend

A	Sheep Droppings
B	Red-Brown Soil
D	Red Shale
1,2	Brown Shale
C	Fine Gray to Green Shale
E,7	Brown Soil
8	Ash
G	Fine Green Shale
9	Coarse Green Shale
L,3,10	Dust and Fine Shale
4	Red Soil
F	Brown Soil with Coarse Shale and Rockfall
11	Green and Brown Soil with Fine Shale
5	Fine Tan Soil
6	Gray-Green Soil with Fine Shale
H	Fine Gray Shale
I	Brown Soil with Dust and Fine Shale
J	Coarse Gray to Green Shale
K	Brown Soil with Coarse Shale
12	Brown Soil with Fine Shale
13	Green Soil and Fine Shale
M,P	Brown Soil with Green Shale
N,O	Fine Shale
Q	Green and Red Shale
	++ = Zones of Ash and Charcoal

Figure 2

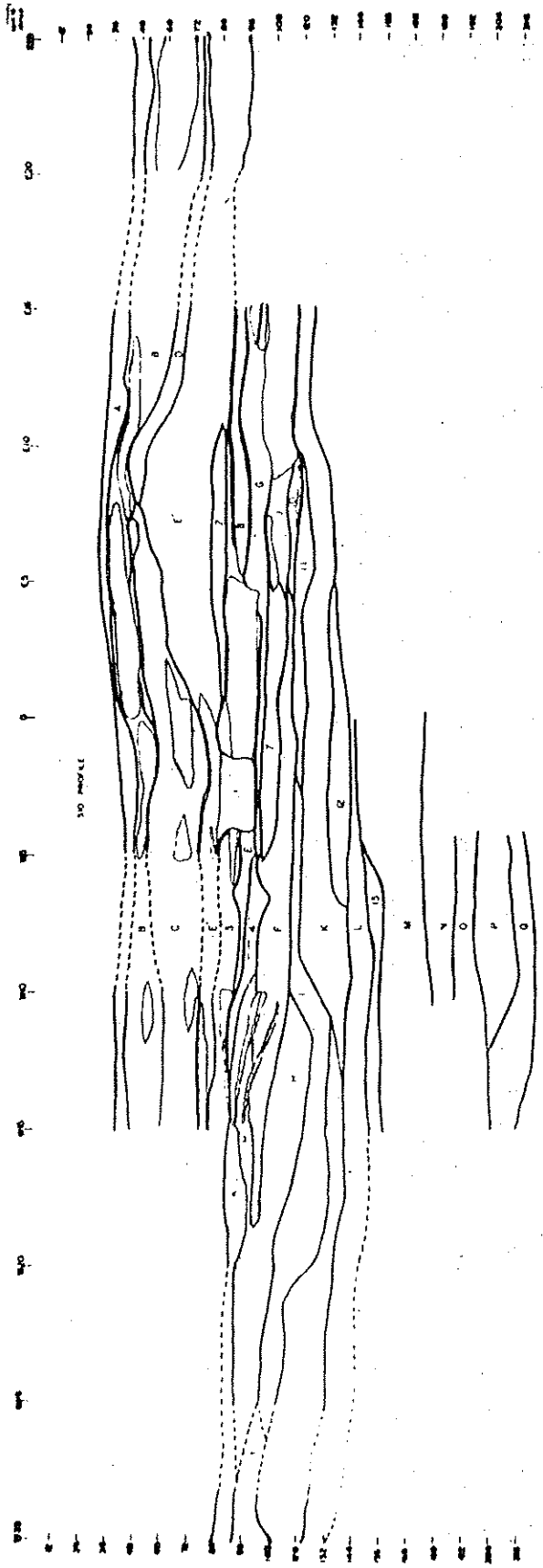


Figure 3. South 15 Profile

Legend

A	Sheep Droppings
1	Brown Soil and Shale
B	Red-Brown Soil
D	Red Shale
2	Black to Brown Soil
E	Gray to Green Shale
4	Brown Soil with Red Shale
C	Tan Soil and Shale
3	Gray Soil and Shale
F	Brown Soil
G	Brown Shale
5	Green Shale
K,M,6	Fine Green Shale
H	Red to Brown Soil with Dust and Fine Shale
I	Brown to Green Soil and Coarse Shale
J	Brown Soil with Coarse Shale
L	Fine Brown Shale
N	Shale
O	Brown Soil and Green Shale
P	Green and Red Shale
	++ = Zones of Ash and Charcoal

Figure 3

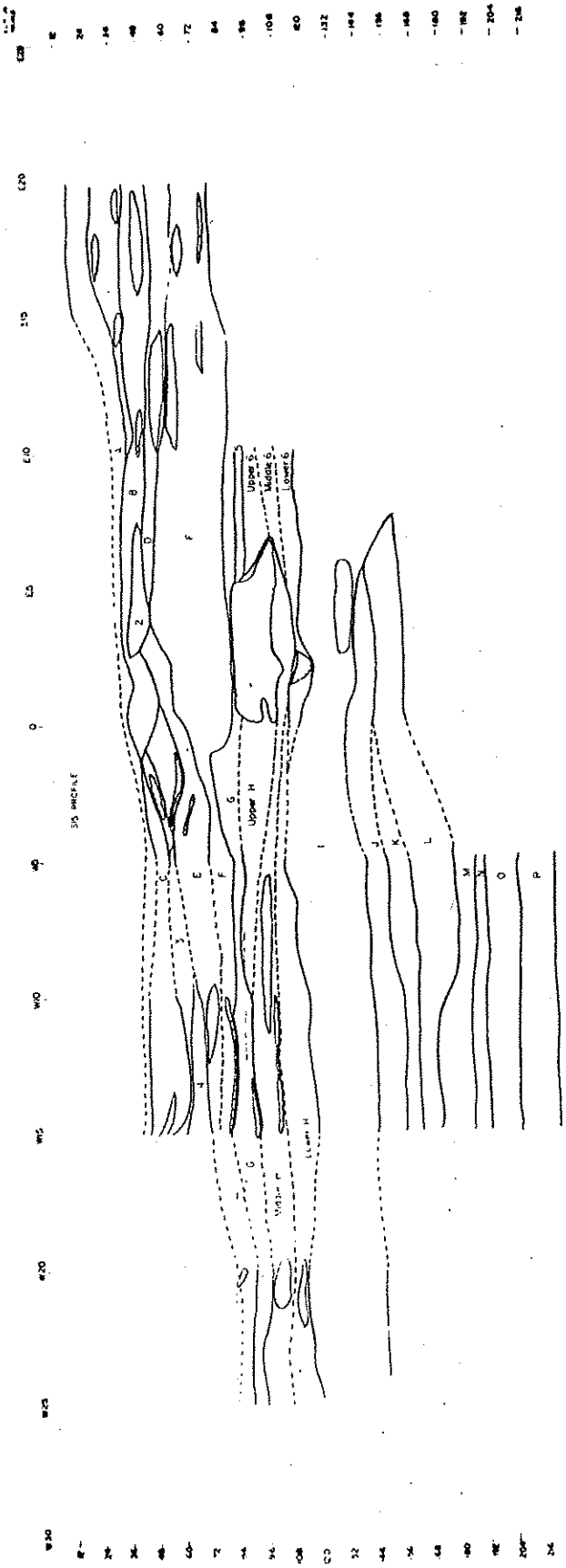


Figure 4. East 10 Profile

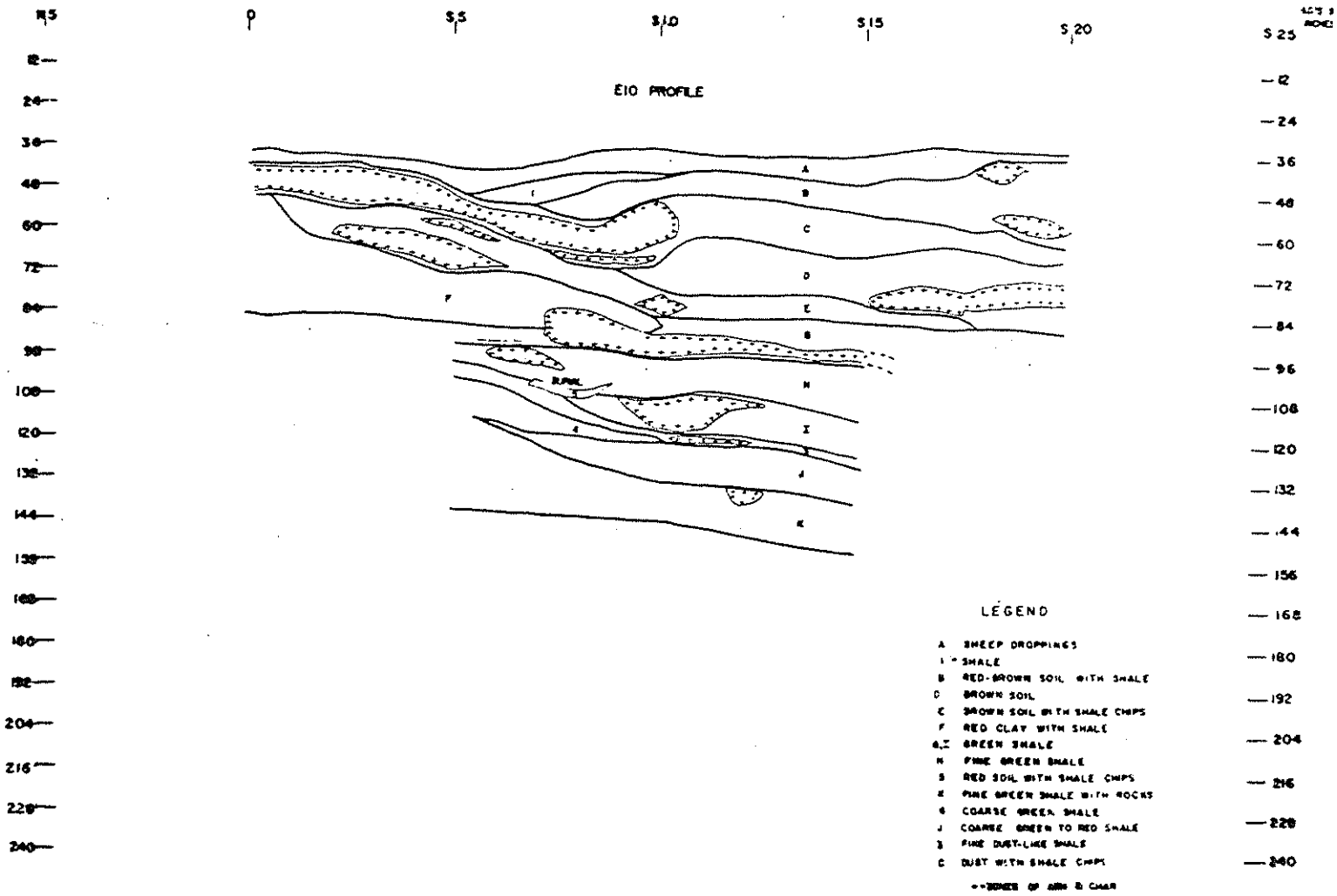

E10 PROFILE
LEGEND
A SHEEP DROPPINGS
B RED-BROWN SOIL WITH SHALE
D BROWN SOIL
E BROWN SOIL WITH SHALE CHIPS
F RED CLAY WITH SHALE
G,I GREEN SHALE
H FINE GREEN SHALE
S RED SOIL WITH SHALE CHIPS
K FINE GREEN SHALE WITH ROCKS
G COARSE GREEN SHALE
J COARSE GREEN TO RED SHALE
L FINE DUST-LIKE SHALE
C DUST WITH SHALE CHIPS

Figure 4

Figure 5. East 5 Profile

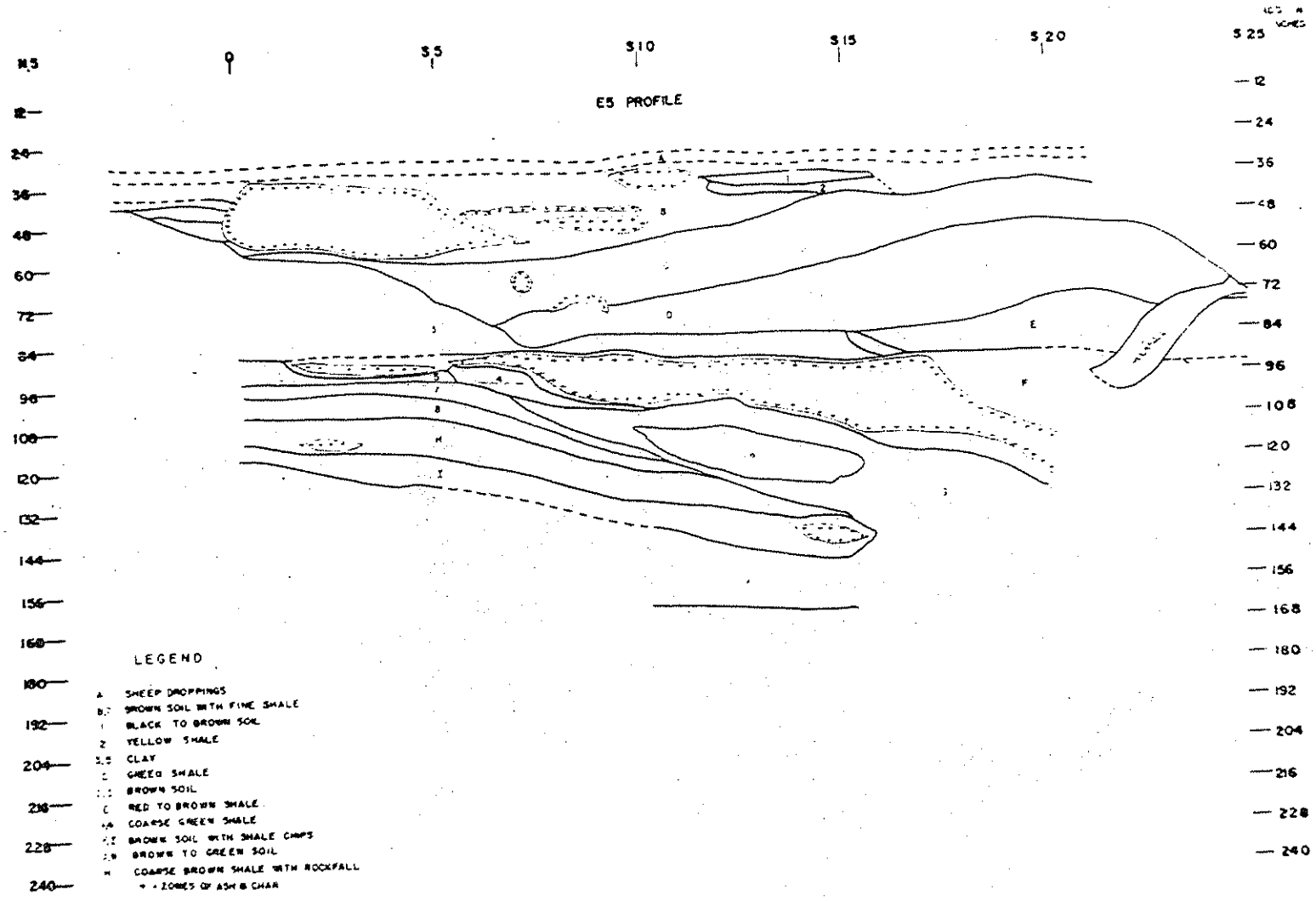

E5 PROFILE
S5
S10
S15
S20
S25
LEGEND
A SHEEP DROPPINGS
B BROWN SOIL WITH FINE SHALE
1 BLACK TO BROWN SOIL
2 YELLOW SHALE
3,5 CLAY
C GREEN SHALE
4 BROWN SOIL
C RED TO BROWN SHALE
6A COARSE GREEN SHALE
6B BROWN SOIL WITH SHALE CHIPS
6B BROWN TO GREEN SOIL
H COARSE BROWN SHALE WITH ROCKFALL
+ + ZONES OF ASH & CHAR

Figure 5

Figure 6. West 5 Profile

Figure 6

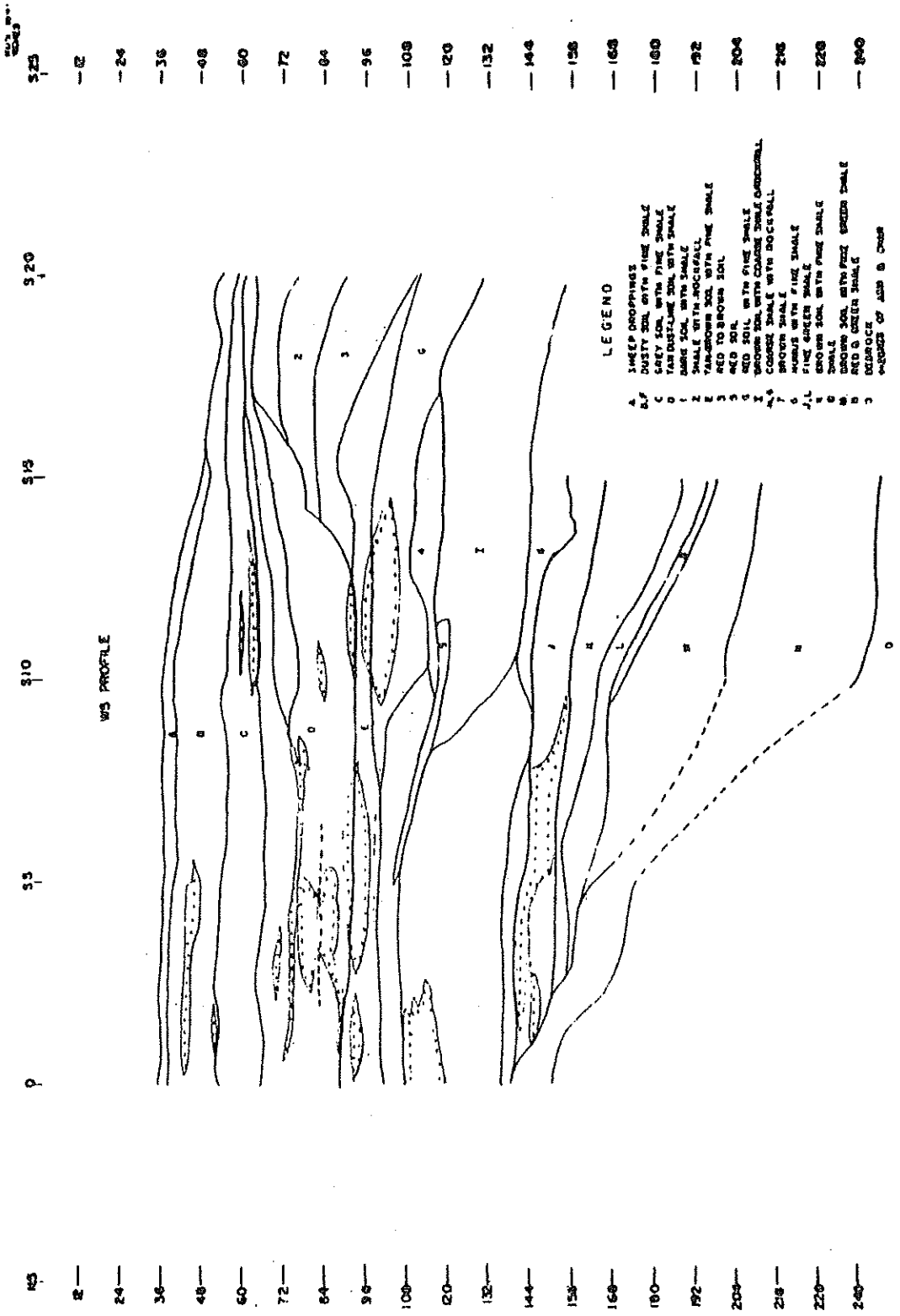


Figure 7. West 10 Profile

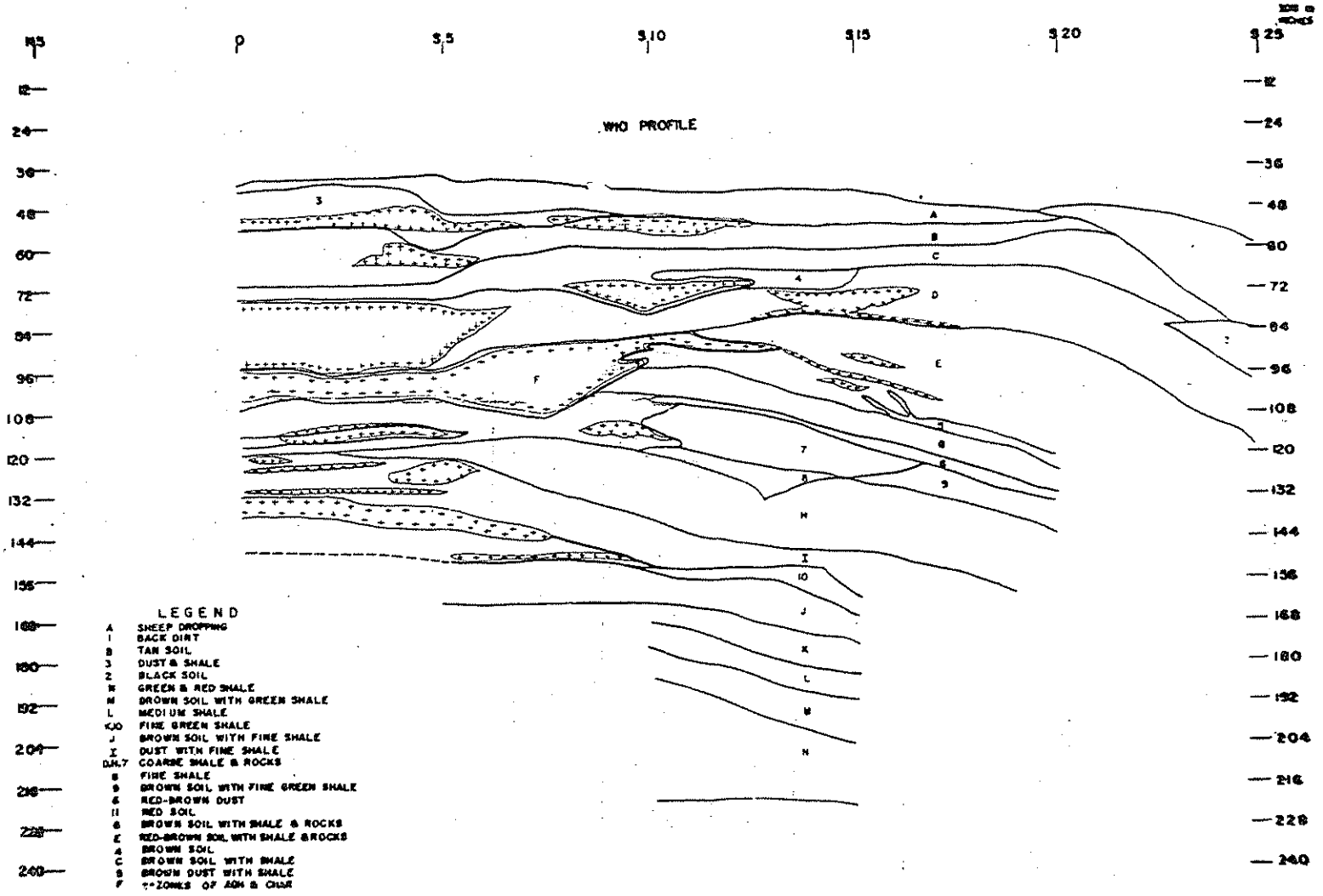

WIO PROFILE
LEGEND
A SHEEP DROPPING
1 BACK DIRT
B TAN SOIL
3 DUST & SHALE
2 BLACK SOIL
N GREEN & RED SHALE
M BROWN SOIL WITH GREEN SHALE
L MEDIUM SHALE
K,O FINE GREEN SHALE
J BROWN SOIL WITH FINE SHALE
I DUST WITH FINE SHALE
D,H,7 COARSE SHALE & ROCKS
8 FINE SHALE
9 BROWN SOIL WITH FINE GREEN SHALE
6 RED-BROWN DUST
11 RED SOIL
G BROWN SOIL WITH SHALE & ROCKS
E RED-BROWN SOIL WITH SHALE & ROCKS
4 BROWN SOIL
C BROWN SOIL WITH SHALE
5 BROWN DUST WITH SHALE
F ** ZONES OF ASH & CHAR

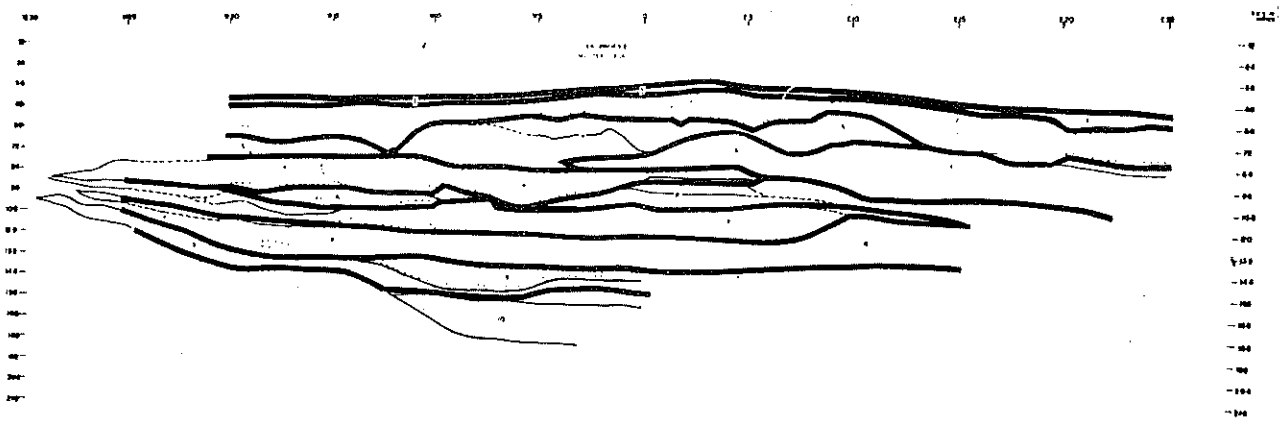
Figure 7

Figure 8. Trial Integration of S5, S10, S15 Profiles

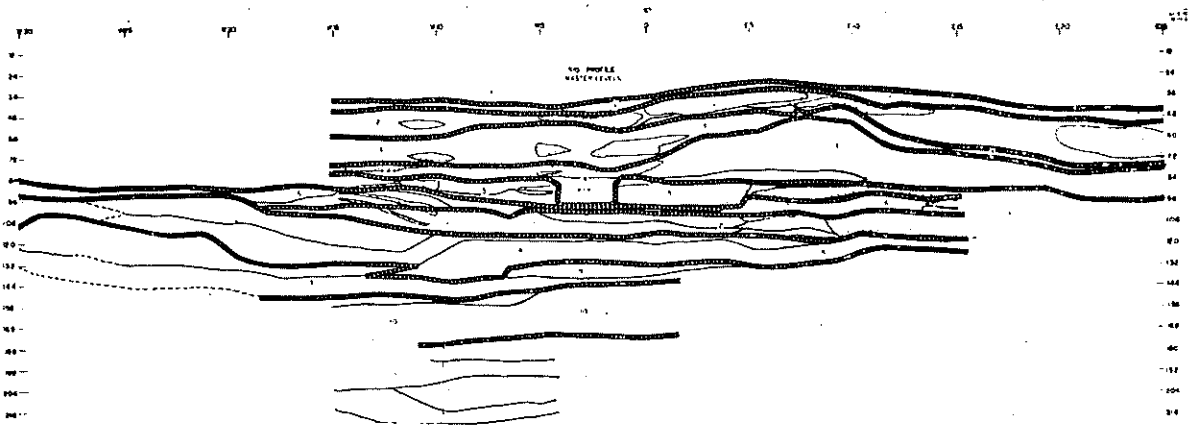
MASTER PROFILE KEY

Figure 8 Level	S10 Legend	S5 Legend	S15 Legend	Cultural Period
1	A	A	A	Mixed
2	B,1	B	B,1,2,C	Proto-Historic Late Woodland Middle Woodland
3	C,D	D,1	D,E,4,3	Early Woodland Transitional
4	E',2	C	F	Sterile ?
5	3,E,8	E,2	G, upper H, 5, upper 6	Late Archaic
6	H',4,G,5	3,4,5,6,E'	middle 6, middle H	Sterile ?
7	9,10,7,F	7, upper F	lower H, lower 6	Middle Archaic
8	K,11,I,H	lower F, 8	I	
9	J,L,12	G	J	Terminal Early Archaic?
10	13,M	9,10	K,L	
11	N,O,P,Q	---	M,N,O,P	

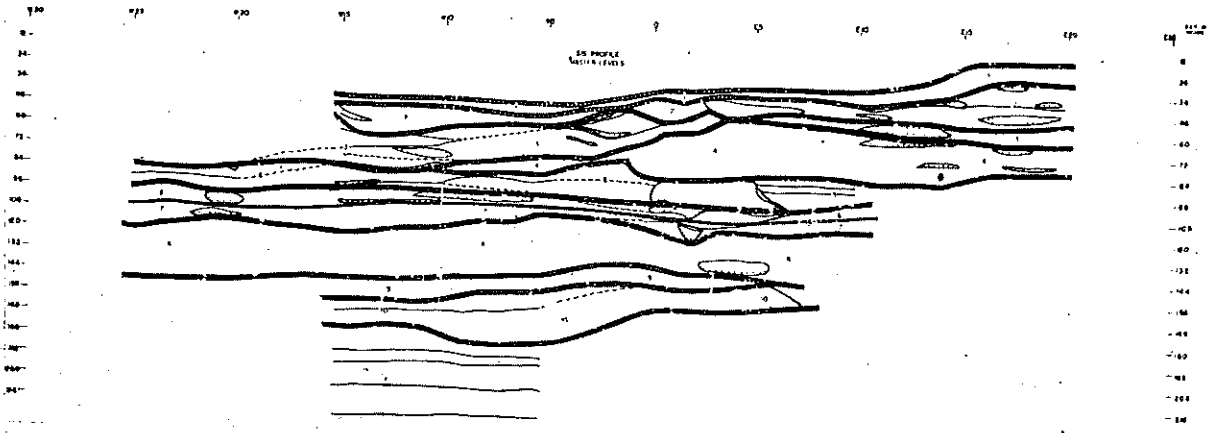
Figure 8



S5 Profile Master Levels



S10 Profile Master Levels

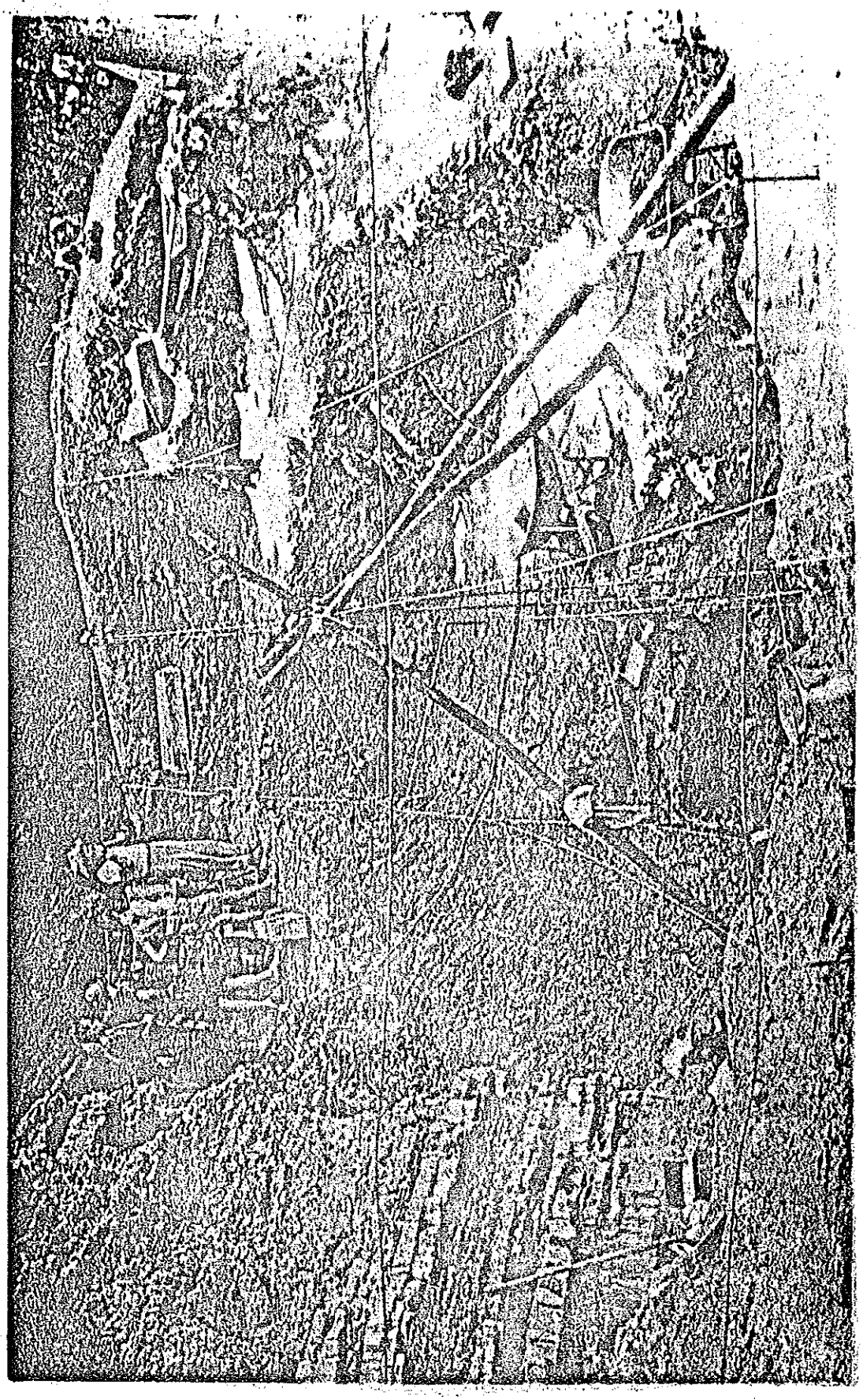


S15 Profile Master Levels

Figure 9. View of the Interior of the Shelter

Picture taken from North end of shelter looking South - 1966 Field Season.

Figure 9



A PRELIMINARY ANALYSIS OF SOME FEATURE TYPES AND BURIALS FROM THE SHEEP ROCK SHELTER

by

Ira F. Smith

ABSTRACT

This chapter is the first step of a much larger, more intensive study to be submitted as a thesis in partial fulfillment of the requirements for a Master of Arts degree in Anthropology at The Pennsylvania State University. The primary objective of the study will be to reconstruct various activity patterns through time and space at the Sheep Rock Shelter and, by combining complexes of activity patterns, to decipher the life-ways or cultures of the different groups of inhabitants.

The primary elements upon which such reconstruction depends are the feature and habitation areas, although many other types of supporting information are equally important. In this chapter the methods to be utilized in such a study and some of the secondary objectives are stated and explained. A summarized description of some of the features uncovered at Sheep Rock is also presented. This was accomplished by classifying the various features into a series of types and describing an ideal example of each. Burials, for the sake of organizational simplicity, have been discussed separately.

ACKNOWLEDGMENTS

I want to thank Mr. John Witthoft and Mr. Fred Kinsey for sharing with me their interpretations of the features uncovered during the early seasons of excavation under their supervision.

I want to also thank Dr. Joseph W. Michels for suggesting this topic for my Master's Thesis and for his continuing encouragement and advice.

I am also indebted to Mr. Frank Saul who has generously agreed to perform an osteobiographical analysis on the human skeletal remains uncovered at the site for the final report.

A special note of thanks goes to all of the many persons excavating at Sheep Rock who have taken the time and care to record accurately and in detail the features that I shall be basing my study on.

Appreciation is also extended to Miss Markie Cleaveland for her help in the preparation of the illustrations in this report.

TABLE OF CONTENTS

	Page
ABSTRACT	209
ACKNOWLEDGMENTS	211
TABLE OF CONTENTS	213
LIST OF ILLUSTRATIONS	215
I. INTRODUCTION	217
II. METHODOLOGY	
Introduction	218
Step I: Organization of Raw Data	218
Step II: Evaluation of Raw Data	218
1. Unit of Evaluation	219
2. Logistics of Evaluation	219
3. What to look for in Evaluation	219
4. Major Difficulties in Evaluation	220
Step III: Interpretation and Reorganization of Raw Data	220
1. Heading	221
2. Stratigraphy	221
3. Feature	221
Step IV: Placement of Unit of Evaluation in its Proper Context	222
Step V: Coordination of Features and Areas of Habitation	222
Step VI: Projected Methodology	222
III. FEATURE TYPES AND BURIALS	223
Stone-lined Fire Pit	223
Stone-enclosed Fire Pit	225
Diffuse Fire Pit	225
Ash Pit	225
1. Bell-shaped Pit	228
2. Conical Pit	228
3. Diffuse Pit and Great Pit	228
Charcoal Pit	228
Charcoal Pit -- Posthole Combination	231
Habitation Floor	231
Post-holes	235
Refuse Pits	235
1. Dispersed Pit	235
2. Restricted Bell-Shaped Pit	237
Unique Bark Feature	239
Bark, Straw, and Leaf-lined Pits (Beds)	239

Page

IV. HUMAN BURIALS 241
Infant Burials 241
1. Burial #1 241
2. Burial #2 241
3. Burial #3 243
Adult Burials 243
1. Burial #4 243
2. Burial #5 245

V. OBJECTIVES 247

APPENDIX I: Archaeological Feature Record. 249

APPENDIX II: Feature Designation and Unit Analysis Sheet. 253

LIST OF ILLUSTRATIONS

		Page
Figure 1.	Stone-lined Fire Pit	224
Figure 2.	Stone-enclosed Fire Pit	226
Figure 3.	Diffuse Fire Pit	227
Figure 4.	Bell-shaped Ash Pit	229
Figure 5a.	Conical Ash Pit (Form I)	230
Figure 5b.	Conical Ash Pit (Form II)	230
Figure 6.	Charcoal Pit, Habitation Floor, Post-holes	232
Figure 7.	Charcoal Pit	233
Figure 8.	Charcoal Pit -- Posthole Combination	234
Figure 9.	Dispersed Refuse Pit	236
Figure 10.	Restricted Bell-shaped Refuse Pit	238
Figure 11.	Unique Bark Feature	240
Figure 12.	Infant Burial	242
Figure 13.	Adult Archaic Burial	244
Figure 14.	Adult Archaic Extended Burial	246

INTRODUCTION

This chapter is a presentation of several feature types excavated from the Sheep Rock deposit to date with a discussion of the methods by which further information of this sort will be analyzed. It must be emphasized that this report is preliminary in nature and by no means represents a comprehensive survey and description of all the various features and habitation areas within the site. Considerable analysis remains to be undertaken before such a picture can be presented. Although the major function of a preliminary report is the description of the materials found, it must be remembered that the final goal in the excavation and analysis of an archaeological site is the reconstruction of the life-ways of the people who once occupied the area. Features constitute an extremely intricate position in such a study.

A "feature" per se seems to be one of those undefined but inherently understood terms so often found in the Anthropological literature. The term "feature" is much like the term "site" in that it can have nearly as many interpretations as people using the word. A feature such as a fire or refuse pit is inherently understood, but to some, a single artifact in situ (i.e., a unique ceramic vessel) constitutes a feature. The author has heard it said that a "feature" is essentially an archaeologist's construct - that which the individual feels is important in relationship to the other materials, be it a single artifact, a complex of artifacts, a soil discoloration, a burial, or what have you. Therefore, for the purposes of this paper this term will be explicitly defined.

The crucial factor in determining whether a particular cultural manifestation should be termed a feature or not is the context within which it is found. A feature consists of a complex of traits both inherent within itself (i.e., shape and size) and in its immediate surroundings. In general, its immediate surroundings refer to relationships with other cultural phenomena, although purely physical relationships could be critical in a minor number of cases. Once a feature is removed from these surroundings, and thus some of its associated traits, it no longer exists as a tangible entity. Therefore, a single artifact in situ could conceivably be called a feature provided the physical relationship was crucial. However, only in such a unique case would one consider the single artifact to be a feature. Since this is generally not the case, our definition excludes the isolated artifact. Several artifacts related to one another in situ can be called a feature, since once they are removed from context the relationship no longer exists. A fire pit is another example. In situ it is a feature, upon excavation it is destroyed and no longer exists as a tangible entity. Once it is decided that something is a feature, a special set of recording procedures goes into operation. A special form is often utilized to aid in this process (Appendix I).

This paper will attempt to describe a number of feature types since time and stage of analysis does not permit description of every single feature or cultural relationship between one feature and another throughout the entire site. Eleven feature types are discussed with a few sub-types. Burials are also discussed within this chapter.

The descriptive analysis of some of the feature types from Sheep Rock is but a single stage in a much broader cultural study. Consequently, much of this chapter is devoted to the discussion of the methodology used thus far and to that methodology which will be applied to the broader study. Objectives of the larger study are also presented at the end of this paper.

METHODOLOGY

Introduction

Certain procedures were followed in the analysis of the raw written documentation for the Sheep Rock Shelter which had accumulated since the initial scientific excavations in 1959. This involved the analysis of contextual information and on-the-spot observations and interpretations, in conjunction with artifact analysis and specialized studies such as palynology and geology reports.

This section is designed to present the step-by-step procedures used in the preliminary analysis of the abundant raw data from Sheep Rock, as well as some of the difficulties encountered. It is also concerned with the basic procedures that will be used as the analysis of the data is carried further. The ultimate objective of these procedures, it should be noted, is the reconstruction of "activity patterns" through time and space at the site.

Step I: Organization of Raw Data

First, the materials to be analyzed have been organized so as to enable the investigator to assess the quantity and quality of materials available to him, and to allow him to extract certain areas of information quickly. The precise system selected for this purpose may vary greatly from one investigator to another. John Witthoft initially organized the documentation by square of excavation. All the documentation for a particular square was arranged in chronological fashion, and the squares lying along two or three east-west lines of the grid were placed in loose-leaf binders. This system was quite adequate and has been incorporated into the methods of later excavating teams.

Step II: Evaluation of Raw Data

Unit of Evaluation. The second step involves the evaluation of the semi-organized raw materials arranged in the first step. First, the size of the unit to be evaluated must be selected since it would be impossible to analyze all the data simultaneously. The unit of evaluation used in this study was the five-foot stepped square. Let us regress somewhat and review briefly the grid format utilized at Sheep Rock. This will help to clarify the meaning of the "five-foot stepped square."

The grid was originally selected by W. Fred Kinsey, the first field director, in 1959. It consisted of surveying the shelter into a series of five-foot units. Two zero-zero lines were established within the shelter to define the base lines of a grid parallel to the cliff face. The zero-zero line running parallel to the cliff, the east-west line, lies approximately 43 degrees off magnetic north. The line perpendicular to this and extending into the cliff face, the north-south zero-zero- line, established the basic rectangular nature of the grid. North, for purposes of grid orientation, is toward the cliff and all lines are then designated in five foot rows either north, south, east, or west of the two zero-zero lines. Excavation units are then specifically designated by the northwest corner stake. The problem that arises, and that has plagued excavators, is whether the northwest corner is the grid northwest or the magnetic northwest. Use of both magnetic and grid north for square designation over the years has caused considerable confusion and has led to difficulties in data analysis.

The excavation was generally conducted in a checkerboard fashion combined with the "stepped" technique. The depth of each step within the excavation, although averaging about five feet, was originally made to correlate roughly with gross cultural divisions. The uppermost step corresponds to the deposit containing Protohistoric and Woodland materials. The second step, slightly thicker than the first, corresponds to what was believed to be the Transitional and Archaic Occupations. The final step, from five to ten feet thick, constituted the lowest portion of the deposit believed to be pre-Archaic (at least geologically speaking). Thus, the excavations at Sheep Rock expanded in five-foot units growing wider at the top as it progresses deeper into the deposit.

Logistics of Evaluation. To evaluate the written materials from one of these five-foot units requires a considerable expenditure of time. Approximately, two to three hours was alloted for the study of each unit. The time, of course, varies with the degree of complexity and clarity of the reports, the recorder and his scientific sophistication, and the difficulty of interpretation of the cultural evidence. There exist in all, 11 loose-leaf binders containing written documents from the excavation. These represent approximately 110 five-foot stepped squares. Within each of the evaluation units, there are three forms of data which must be correlated: the handwritten record, the face drawings looking down upon levels and

features, and the profile drawings made of the surrounding walls after the square had been removed. In evaluating the squares an attempt was made to place these three forms of data into a meaningful picture at each natural or artificial stratigraphic level.

The records of adjacent squares were examined in an ordered series. This allowed us to see feature patterns which might cover several squares, such as living areas. It also allowed us to anticipate feature occurrences in the square next scheduled to be examined. The procedure used on the Sheep Rock data has been simply to evaluate the squares on a particular step moving over the site from magnetic south to north.

What to Look for in Evaluation. In the course of the examination all the existing records were studied. Certain types of information, however, were far more crucial to this type of analysis than others. Many of the natural levels within the deposit are, for all practical purposes, devoid of cultural materials. Such negative evidence through time and on a temporally-defined spacial plane were important for plotting areas of non-habitation and in ascertaining why they are such. More positive information for this type of analysis, however, consisted of the non-artifactual evidence for areas of habitation and activity. There were thus, two primary kinds of evidence utilized in the evaluation of the excavation unit. First, and perhaps the most valuable for activity pattern analysis, were the features themselves. The easiest type of features to analyze and interpret is that which lies wholly within a five-foot unit where its three-dimensional aspects can easily be defined. By far the more difficult type of features examined was that which covered a number of squares. This type of feature is very prevalent in the data; in fact, several conical-shaped ash pits covered as many as eight squares.

We had to be conscious of areas of ash, charcoal, burnt soil, grey dust (which in many cases was the recorder's way of defining ash), major and sharply defined areas of soil differentiation, and particular concentrations of artifacts. These criteria all define areas of human occupation and activity. Within the single unit of evaluation such areas often have no understandable significance, but placed with similar areas in nearby squares they may form a unique feature, or at least a well-defined area of habitation. One technique that has proved fruitful in the analysis of such dispersed areas is the use of colored pencils to fill in the various types of habitation layers on the profiles of the different squares. Later when these profiles are placed together, many of the colored areas will match up, giving one a rapid picture of the feature or habitation area under consideration.

Major Difficulties in Evaluation. A number of items caused great difficulty in the appraisal of the raw data. Since the initiation of the Sheep Rock excavation, 36 students and four different directors have been involved in the project. Consequently, a number of different recording techniques have been used, and the clarity

and quality of the information varies immensely from one recorder to another. In some cases the notes are voluminous and sophisticated for a particular square; in others the information is scanty and unprofessional (drawings may be absent or information misinterpreted). One of the critical difficulties is the placement of the various excavation units in their proper relationship to one another. This arises from the inconsistency with which the squares and profiles have been identified, as was discussed previously in the analysis of the grid format. Datum measurements are another critical problem. Often they are non-existent for a set of notes; sometimes they are recorded in feet, other times in inches, and still other times in tenths of feet. Finally, the absence of a good, well-documented photographic record for the early years of excavation prevents one from cross-referencing photographs when the drawings or written data are inadequate.

Step III: Interpretation and Reorganization of Raw Data

One of the more important aspects of the analysis was the interpretation of the evidence and its reorganization so that it might be readily used in Step V. To cope with this problem and to prevent the time consuming prospect of going back through the original notes later on in the analysis, a standard deposit form has been created (Appendix II). This form is not as suitable as was intended and needs some slight revisions. It, however, serves the purpose for the present. The form is divided into three main parts: Heading, Stratigraphy, and Feature.

Heading. In the upper left hand corner a record is kept of the existing profiles drawn after the excavation of a particular square. These are represented by a red line and can quickly be coordinated with profiles from adjacent squares. The square designation and the depth to which it was dug are immediately available for quick reference. The excavator and the year of excavation of the unit are indicated so that should some type of error be consistently made by a particular individual or in a particular field season, it will be easy to track this error back through the notes. Finally, a space for the feature number is included - each feature receives a unique data sheet. Thus, a number of sheets for each excavation unit are collected.

Stratigraphy. Under General Remarks such information as destruction of the squares, previous "pot-hunting," relationship of drip-line and cliff, etc. are recorded. The Stratigraphy section itself is invaluable, because here is recorded the name of each level, zone, or layer excavated, its upper and lower datum readings, and a verbal description of the level. Since these three terms have been used interchangeably over the years, this section will offer a method of revising the field catalogue so that such designations are more meaningful. General observations such as heavy occupation, no occupation, heavy clay influence, prevalence of rain in the square, etc. belong under the heading of Deposit.

Feature. All information relating to a particular feature is recorded under the heading of Discussion. Space is available for the recording of a feature's proper provenience, dimensions, and for a top and profile drawing of said feature. General types of features, established beforehand, are then recorded under Preliminary Interpretation (i.e., stone-lined fire pit). First-Line Associations refers to the immediate proximity of various artifacts, e.g., burned stone. Second-Line Associations refers to the relationship of one unique feature to another. Finally, under Extension is recorded the designation of the adjacent squares into which a feature may extend.

Step IV: Placement of Unit of Evaluation in its Proper Context

Once a unit was completely analyzed and all information recorded on a Standard Form, the manner in which it fit into the total deposit was examined. The form was then filed for quick reference.

The first step was to prepare a large scale drawing of the entire site. This was photographed by means of a 4-by-5 calumet camera, and a reduced black-and-white 8-by-10 print was made. From such a print a number of xerox copies were produced. On these copies each excavation unit could be given a unique number; underlying units then received a sub-number. These numbers were then placed in the upper right hand corner of the Standard Form and filed numerically in a loose-leaf binder.

Step V: Coordination of Features and Areas of Habitation

This has not yet been undertaken since many single units remain to be evaluated. However, once all the units have been analyzed and incorporated onto the Standard Forms, the exciting part of the analysis will begin. At this time, the various areas of habitation and the features over the whole site will be placed together like the parts of a puzzle. Features which initially could not be interpreted because they encompassed a number of squares will become meaningful; and areas of habitation defined by ash, charcoal, etc. should form meaningful patterns in time and space.

Step VI: Projected Methodology

The final step will be to relate all the artifactual, faunal, floral (pollen studies), and geological materials to the specific features and the general areas of occupation. In order to do this, the areas of habitation or non-habitation, the features with their interrelationships, and the nature of the entire deposit through time and space must be well understood. General activity patterns, based on feature identification, will thus become apparent.

The realization of this objective will be aided by the following: first, the archaeological materials have been adequately defined and described; and secondly, the entire field catalogue has been coded and placed on IBM cards. Therefore, one will be able to

place these cards in an IBM machine and call for all the materials from a particular square or for all the modified stone, unmodified stone, modified bone or any other pre-arranged category from any particular square. This information, in turn, will be coordinated with the pre-defined features and living areas to determine activity patterns, such as pottery-making, which will have been tentatively pre-defined. Finally, face and profile drawings will be incorporated into master plans for viewing the relationship between various activity areas at different time periods.

One can easily see that prodigious tasks remain. At the time of this writing, only the surface has been scratched. Approximately half the notes have been interpreted, reorganized, and recorded on the Standard Form. Types of features are becoming apparent but their relationships to one another and their cultural provenience have not yet been determined.

FEATURE TYPES AND BURIALS

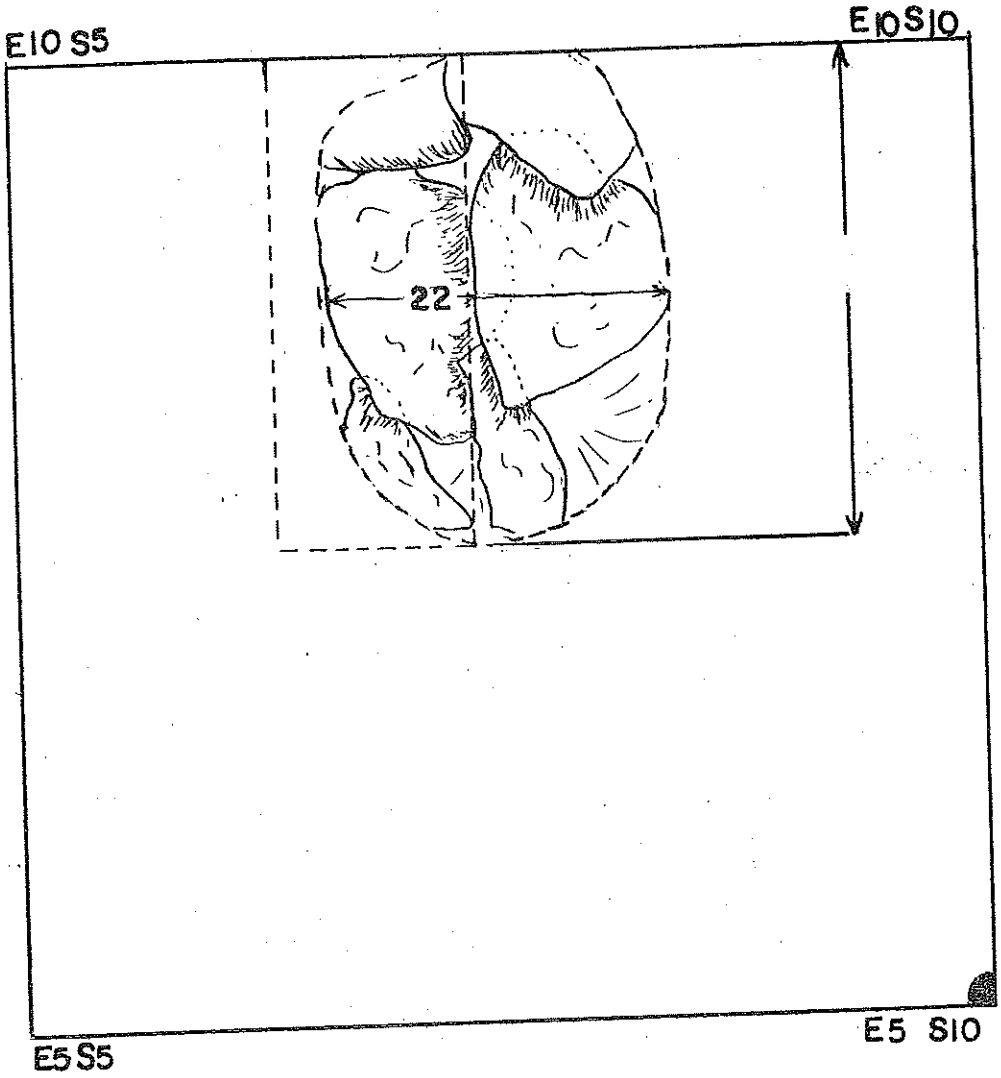
Features are a common type of evidence for human habitation at Sheep Rock. A relatively large number has already been defined, with less than half of the deposit analyzed. Many of these features encompass a number of excavation units and have not yet been fit together into a well-defined whole. Some of the features are, however, confined within the boundaries of a single excavation unit. The information presented in this paper is of necessity based on this type of feature. Types imply that more than one feature of a particular kind exists, which is the case in all but a few of the following examples. Some, however, are unique, although others of the same kind may be found when the entire deposit is studied. Finally, it should be mentioned that the feature types present in the following section do not necessarily represent all the possible types which were or will be found as the analysis proceeds further.

Stone-lined Fire Pit (Fig. 1)

This is a fire pit lined with six large, flat, angular slabs of stone. These stones were intentionally placed against the walls of a five-inch deep depression in the deposit. A considerable amount of charcoal, some bone refuse, and many fire-burned, small, angular blocks of stone were found lying in the pit directly on top of the six larger slabs. Charcoal was found under the six slabs upon their removal. In most cases it was found where it could easily have fallen down between the cracks presented by the intersection of the larger rocks. It is possible, however, that a small ground fire had been built within the pit before the stone-lining was added. In close proximity to this pit were found several cracked river pebbles which perhaps were used for heating foods in a perishable container.

Provenience: Square E5-S10 (90 to 95 inches b.d.)

Figure 1



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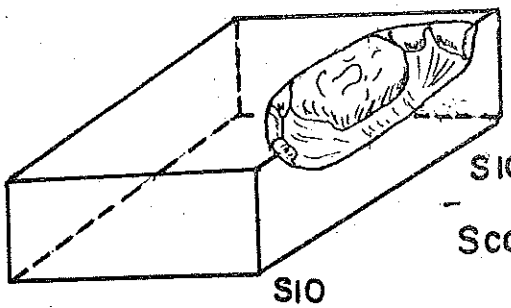


Scale: 1/2 in. = 1 ft

Stone-enclosed Fire Pit (Fig. 2)

A portion of the fire pit lies within an adjacent unexcavated square. Enough of the pit was exposed to suggest its general shape, depth, and particular characteristics. In general, it appears to be a slightly oval-shaped pit about ten inches deep. A large number of rocks, both large and small, were directly associated with the pit. Some of the larger specimens appeared to follow the contour of the interior slope of the pit; others were laid along the outer edge as reflectors. The interior was filled with many rocks having no particular orientation. A number of the rocks associated with the pit appear to have fallen from the cliff directly above sometime after the pit had been used. These rocks generally lie in the same plane of orientation as the natural stratigraphy. This factor, plus the large number of rocks within the confines of the pit itself, makes it difficult to determine whether or not this was actually stone-lined. A considerable amount of charcoal interspersed with the surrounding matrix soils was found within the pit and around the rocks. Many of the rocks were stained with charcoal. No bone refuse was found, although a water-worn non-indigenous river pebble indicated by "A" in Figure 2, was lying at the very bottom of the pit. The stone shows no evidence of working or burning, and its presence within the pit is not yet explained.

Provenience: Square E35-S10 (99 to 109 inches b.d.)

Diffuse Fire Pit (Fig. 3)

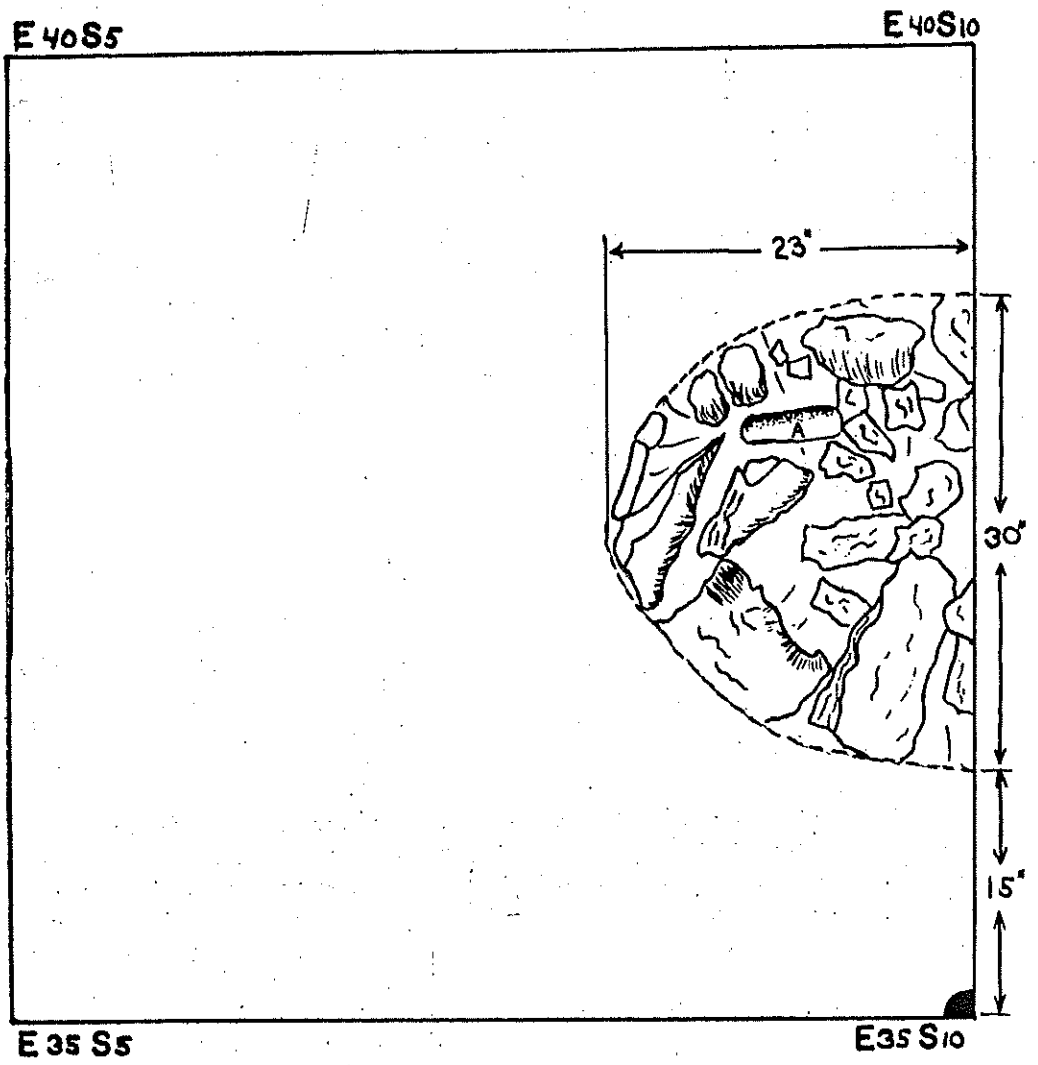
This type of feature has been designated a "diffuse fire pit" because its limits are not particularly well defined and surrounding rocks are not an important defining criterion. The general outline is circular with a conical bottom defined by charred bone, charcoal deposits, ash, and several burned rocks. Charcoal within the pit was intermittently dispersed with ash and matrix soil and is not concentrated in any significant quantity. However, a number of small charcoal concentrations are found scattered outside the primary fire area. No cultural materials were discovered in direct association with the pit, which had been sealed from above by large, flat slabs of shale which had fallen from the shelter's roof.

Provenience: Square E20-S10 (69 to 75 inches b.d.)

Ash Pit

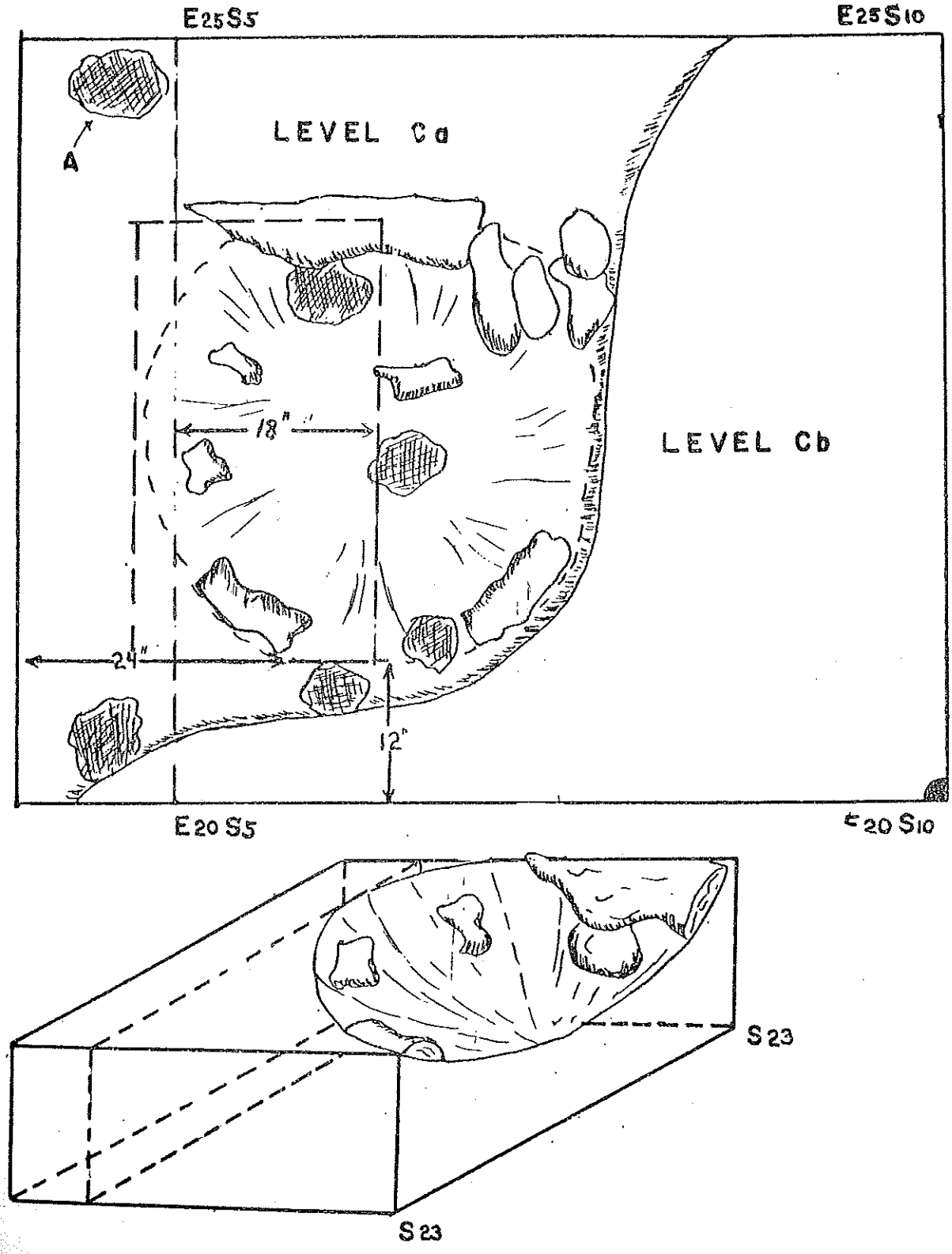
By far the largest number of features defined at this time have been ash pits of one form or another. These pits vary greatly in size, depth, shape, and content. The one common criterion seems to be the general lack of any associated charcoal. The fill is essentially composed of burnt soil and ash, the color of which may vary within a single pit as radically as it does between isolated pits. Cultural materials may or may not be found within the confines of the feature. Four types of ash pits have been tentatively defined: the bell-shaped pit, the conical pit, the diffuse pit, and the great pit.

Figure 2



Scale: 1 in. = 1 ft

Figure 3



Scale: 1 in.=1 ft

Bell Pit (Fig. 4). One particular bell-shaped pit has a very well-defined outline. It is ten inches deep and lies at the corner of four intersecting squares. The upper portion is filled with an orange-colored ash which is underlaid by a blackish ash. The pit has been dug into a larger feature consisting of a layer of yellow ash above a layer of burnt red soil. No cultural materials were found in association.

Provenience: Square E15-S5 (60 to 70 inches b.d.)

Conical Pit (Figs. 5a, b). Two examples of this pit have been drawn to show the degree of variation in shape and size. Figure 5a represents a shallow (5 inch deep) basin-shaped pit. It contained no cultural materials, but exhibited three distinct layers of fill which were, from top to bottom, a greenish-yellow ash, burnt red soil, and burnt grey soil. The matrix into which the feature was dug consisted of a greenish-brown shale with minor amounts of ash and charcoal sweepings.

Figure 5b represents another shallow (3.5 inch deep) pit with a more homogeneous ash fill. The feature like the proceeding was dug into the ash of a much larger feature.

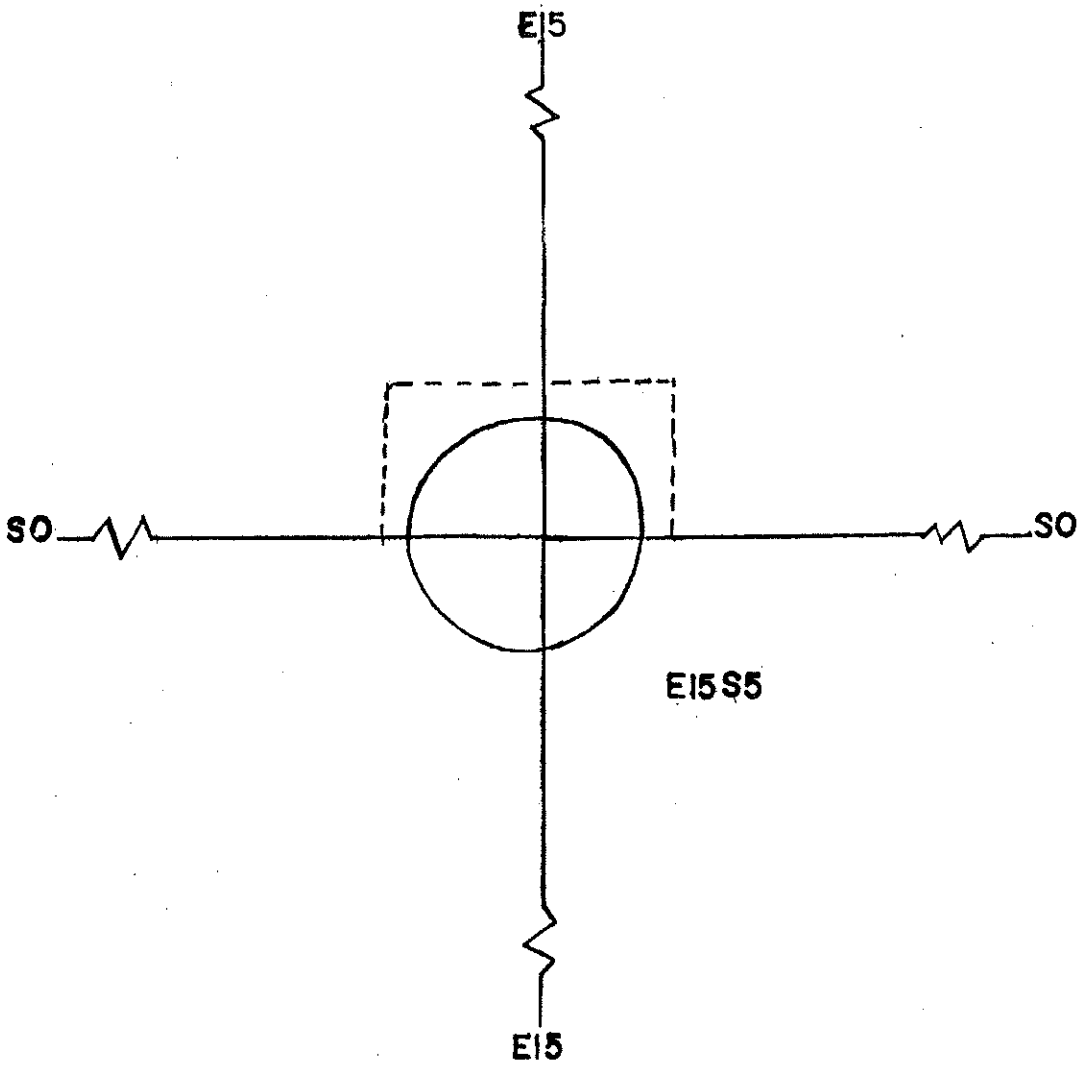
Provenience: 5a -- Square E5-S15 (89 to 94 inches b.d.)
5b -- Square 0-S15 (88 to 91.5 inches b.d.)

Diffuse Pit and Great Pit. These two types of ash pits are mentioned under the same heading because they both represent fairly large areas covering a number of excavation units and, consequently, have not yet been well defined. The "diffuse pit" is in general smaller than the "great pit." Its boundaries are quite amorphous and fade into the surrounding soils. Its shape is usually quite irregular, and its depth may vary within different portions. Although the boundaries are somewhat amorphous, its limits can usually be defined. The "great pit," on the other hand, appears to have a fairly well-defined outline. Thus far only two have been partially recognized in the deposit. The one that comes to mind is very large (perhaps as much as twenty feet in diameter) and quite deep (c. five feet). Within the great pit appears a multitude of smaller intrusive features. The exact significance of such an area is not yet known. It is probably not a pit per se, but rather an area of the site used over a particular time range. The ash is not homogenous, but varies in color and texture, which suggests that a number of separate fires probably contributed to the deposit. Why it appears to have a well-defined conical outline is presently undetermined.

Charcoal Pit (Figs. 6, 7)

A number of small, conical-shaped, circular depressions filled with charcoal have been found throughout the deposit. One particular example is unique in that the fill is made up of large fragments of carbonized bark which have not been reduced to powder by intensive firing.

Figure 4



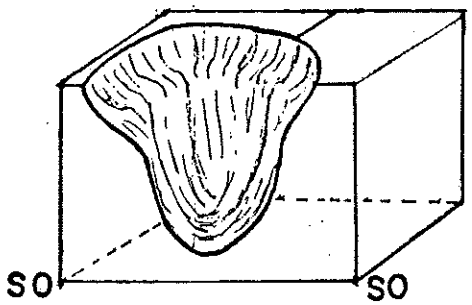
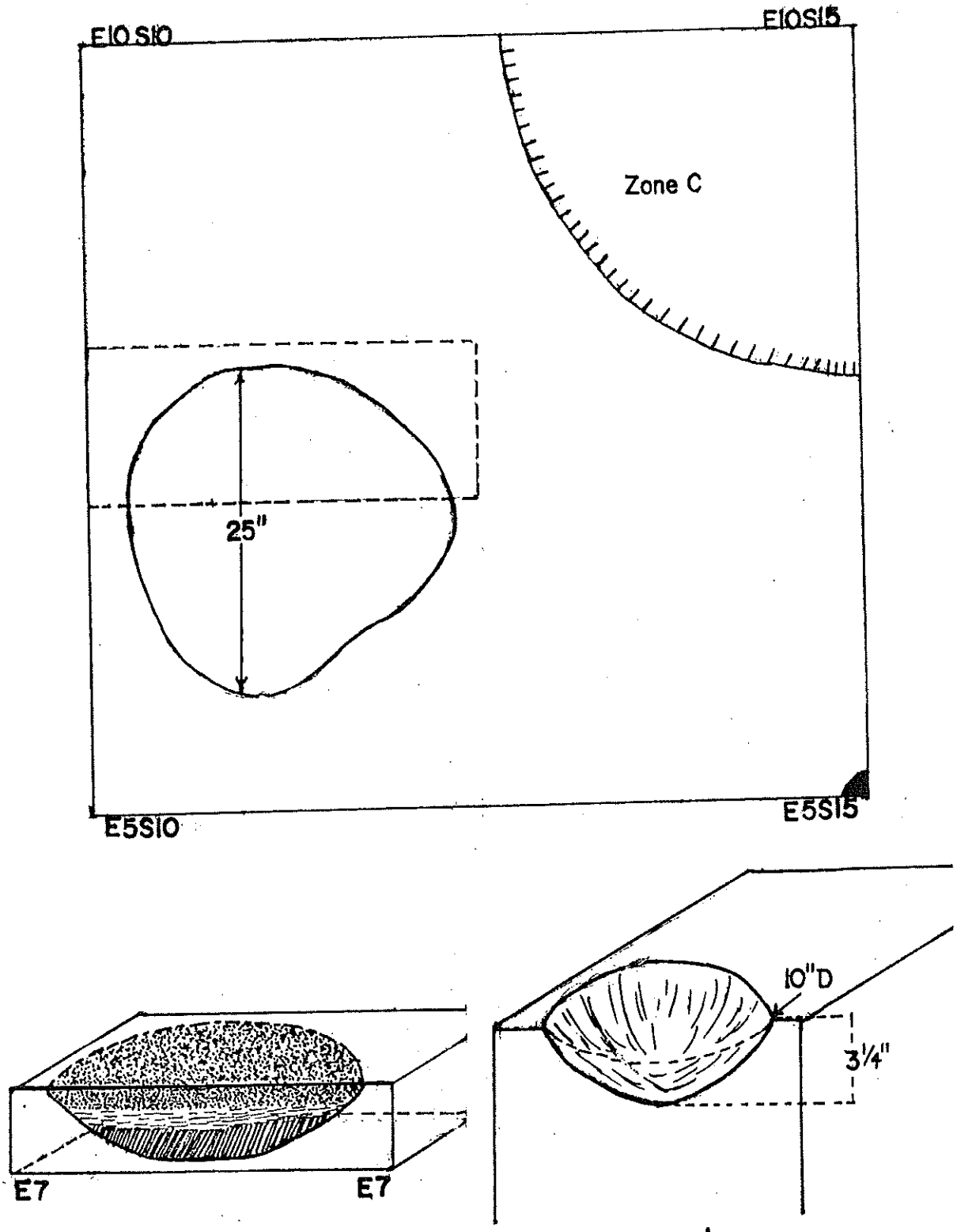


Figure 5



The first example (Fig. 6) consists of a circular hearth nine inches in diameter and three inches deep. The feature, with its conical bottom, is heavily packed with carbonized bark. It is interesting to note that the bark appears to be arranged in a uniform pattern. As seen from the top, the bark lies in a radial fashion expanding from the center of the feature; in cross section (Enlargement A) the bark is seen to slope downward toward the bottom apex. In the immediate center of the feature the bark has no specific orientation. The feature is associated with a number of post-holes, a ground stone tool, and some unmodified bone fragments.

A second example is shown in Figure 7. The pit is approximately 7.5 by 9.5 inches across the top and is 5.0 inches deep. It, too, is filled with carbonized bark, but unlike the previous feature, the bark shows no peculiar orientation. Associated with the pit was one small shell fragment and a single potsherd.

Provenience: 6 -- Square E25-S5 (74.5 to 77.5 inches b.d.)
7 -- Square E20-S0 (66.5 to 70.5 inches b.d.)

Charcoal Pit-Posthole Combination (Fig. 8)

A rather strange combination of criteria is present in this feature. The actual pit is very shallow (2 inches), with a rounded bottom and a diameter of 12 inches. There is no difficulty in distinguishing it from the surrounding soil matrix, which consists of a yellow-white powdered ash. The fill consists of burned bark and wood sloping from the upper edges toward the bottom apex in much the same fashion as the carbonized bark did in the above feature. The unique aspect is that near its center, surrounded by charcoal, lies a small circular area of white ash (1.5 inch diameter). The ash is similar to that surrounding the entire feature, and its outline and the lack of charcoal mixing suggests a posthole. The exact interpretation is not clear, since one would expect some mixing of charcoal with the ash, had the post been driven into the pit at a later date.

Provenience: E25-S5 (79.75 to 81.75 inches b.d.)

Habitation Floor (Fig. 6)

A number of habitation floors were exposed with their related artifacts in situ during the 1966 field season. Such floors have not been well defined in the past, mainly because of the quantitative lack of artifacts within the total deposit. In 1966, however, zones within a five-foot square were exposed over the entire surface showing fragments of pottery, chipped stone tools, worked bone, unmodified bone, post-holes, etc. in relationship to one another. Often there was no natural break in the stratigraphy and the cultural materials were used to define an artificial level. Figure 6 shows a number of postholes (such as B) in association with a circular charcoal pit (A).

Figure 6

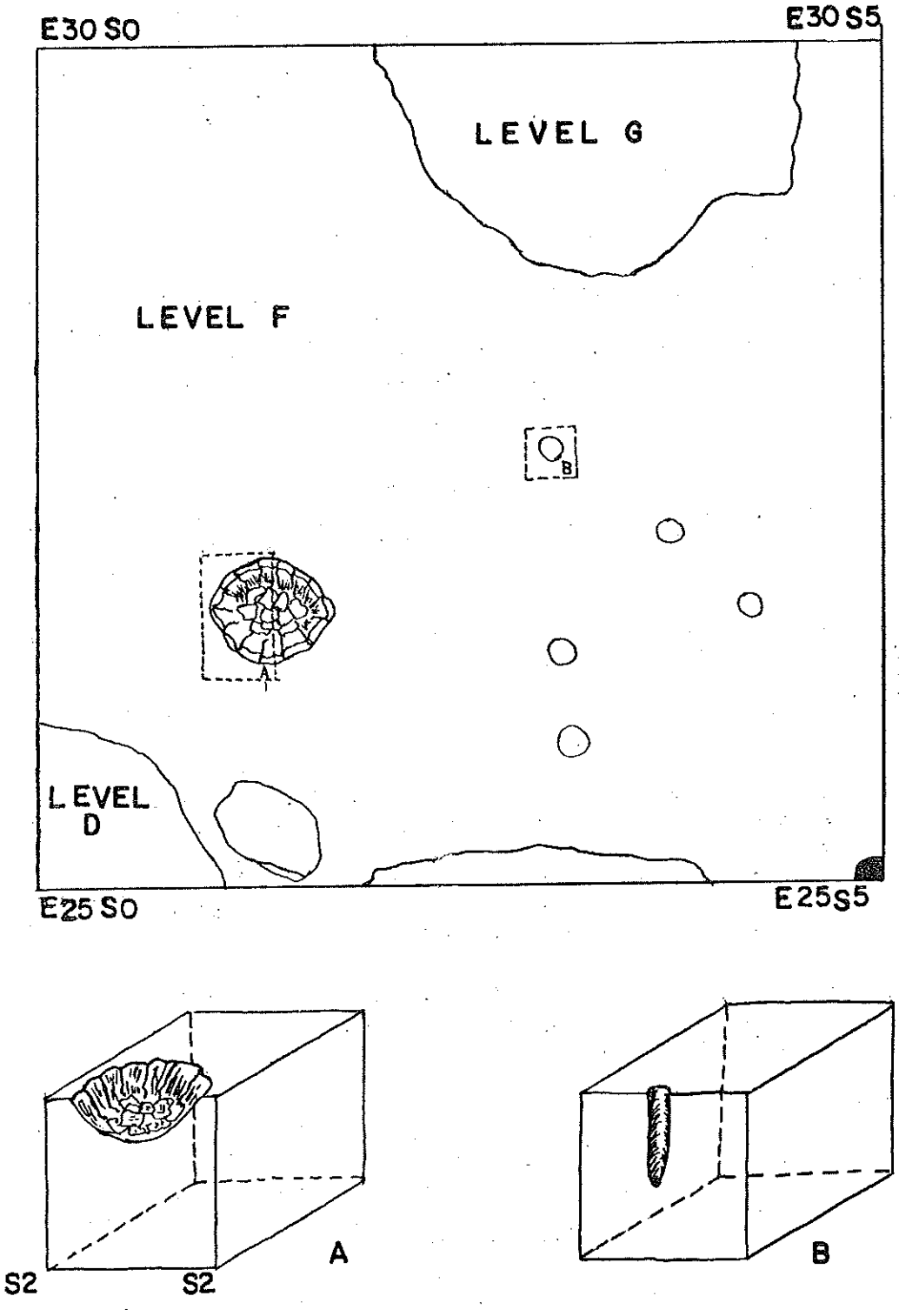
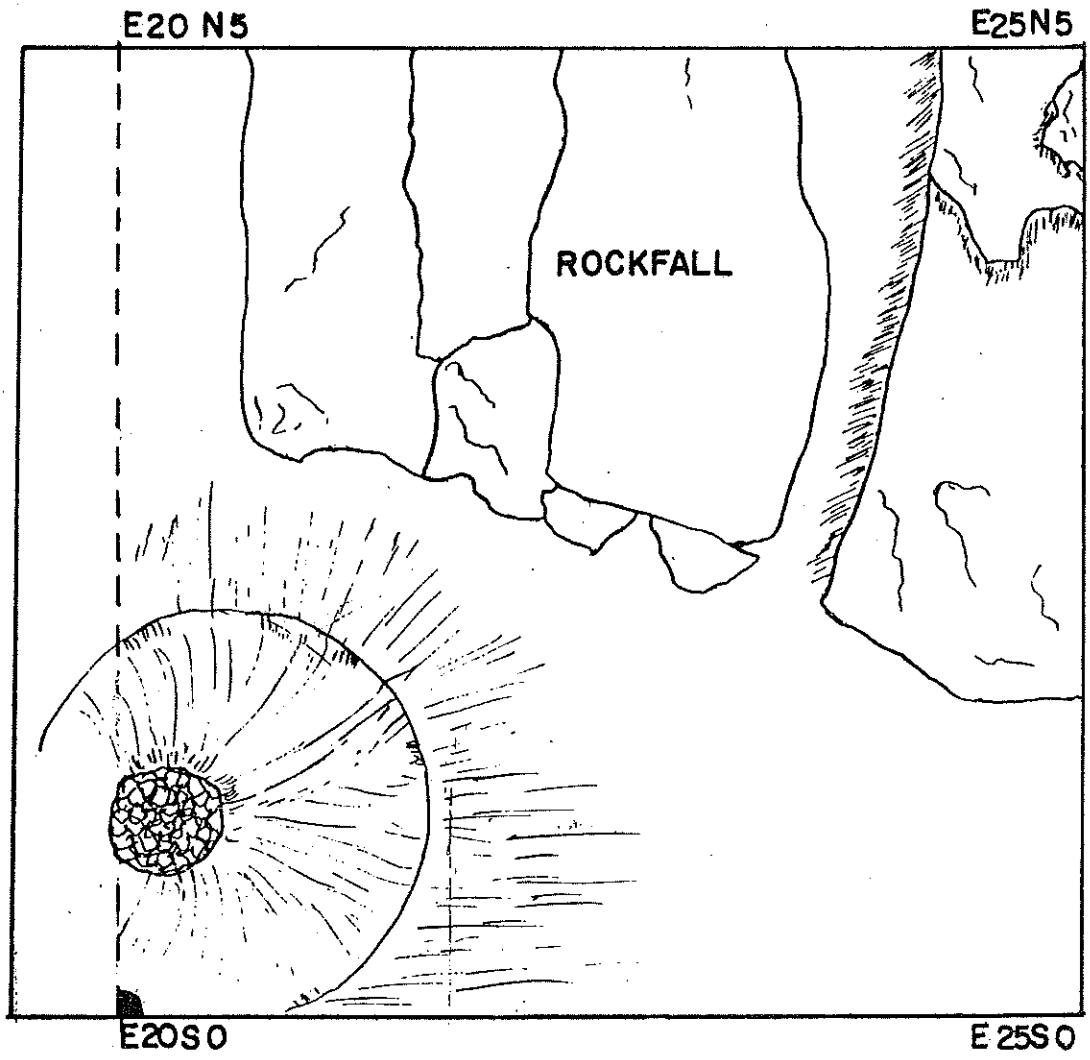
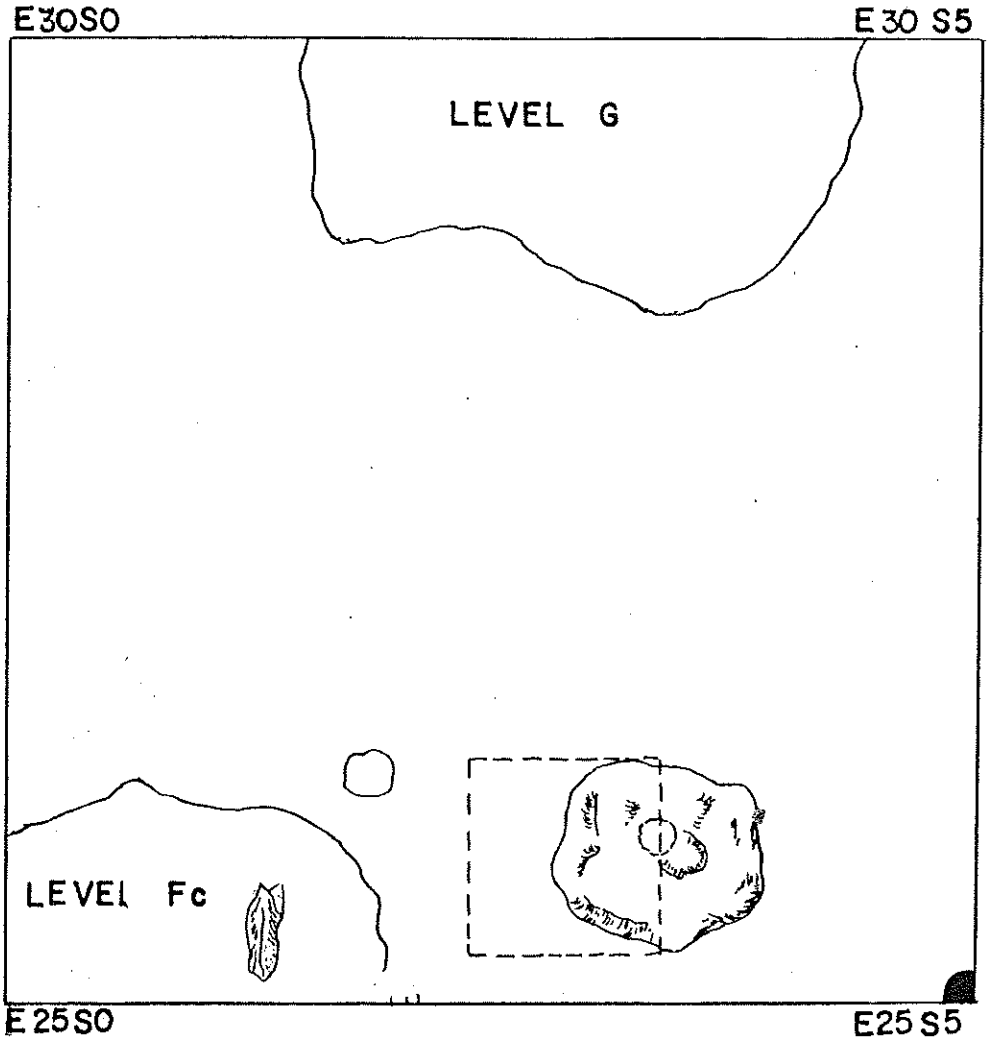


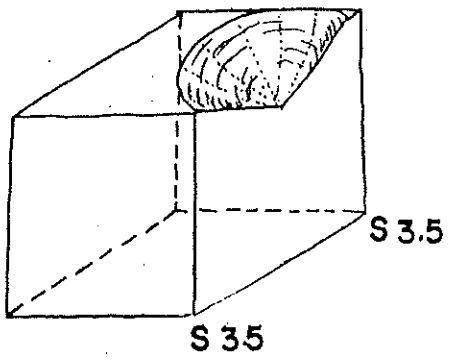
Figure 7



Scale: 1 in.=1ft

Figure 8





Post-holes (Fig. 6, Enlargement B)

Decayed tree roots and rodent burrows are quite common phenomena in the more recent deposits of the shelter. For this reason, over the years researchers have been somewhat hesitant to assign the term post-hole to various small regular areas of soil discoloration. Analysis of the early drawings shows, however, that many of these areas of soil discoloration exhibit very regular outlines, diameters ranging from one to three inches, and fairly well-defined basal limits. It was not until 1966 that the existence of post-holes at the shelter was proved beyond doubt. These tend to be present in a restricted area of the site, the same area in which the possible post-holes of the previous years were found. Consequently, it is fairly safe to assume that at least some of the earlier finds actually were post-holes.

Those features that were thought to be post-holes in 1966 were cross sectioned to prove their existence or non-existence. One example, associated with the habitation floor in Figure 6, is shown in cross section (Enlargment B). This was defined as a brown circular area inset in a white ash matrix. It had a diameter of 1.50 inches, a depth of 6.75 inches, and a pointed bottom. This particular post-hole sloped in a direction suggesting that the original post had slanted directly over the associated charcoal pit. The many different post-holes have not yet begun to exhibit a definite orientation pattern. Eventually it is hoped that they will show the existence of some type of shelter, drying rack, pot-holder, etc.

Provenience: Square E25-S5 (76.00 to 82.75 inches b.d.)

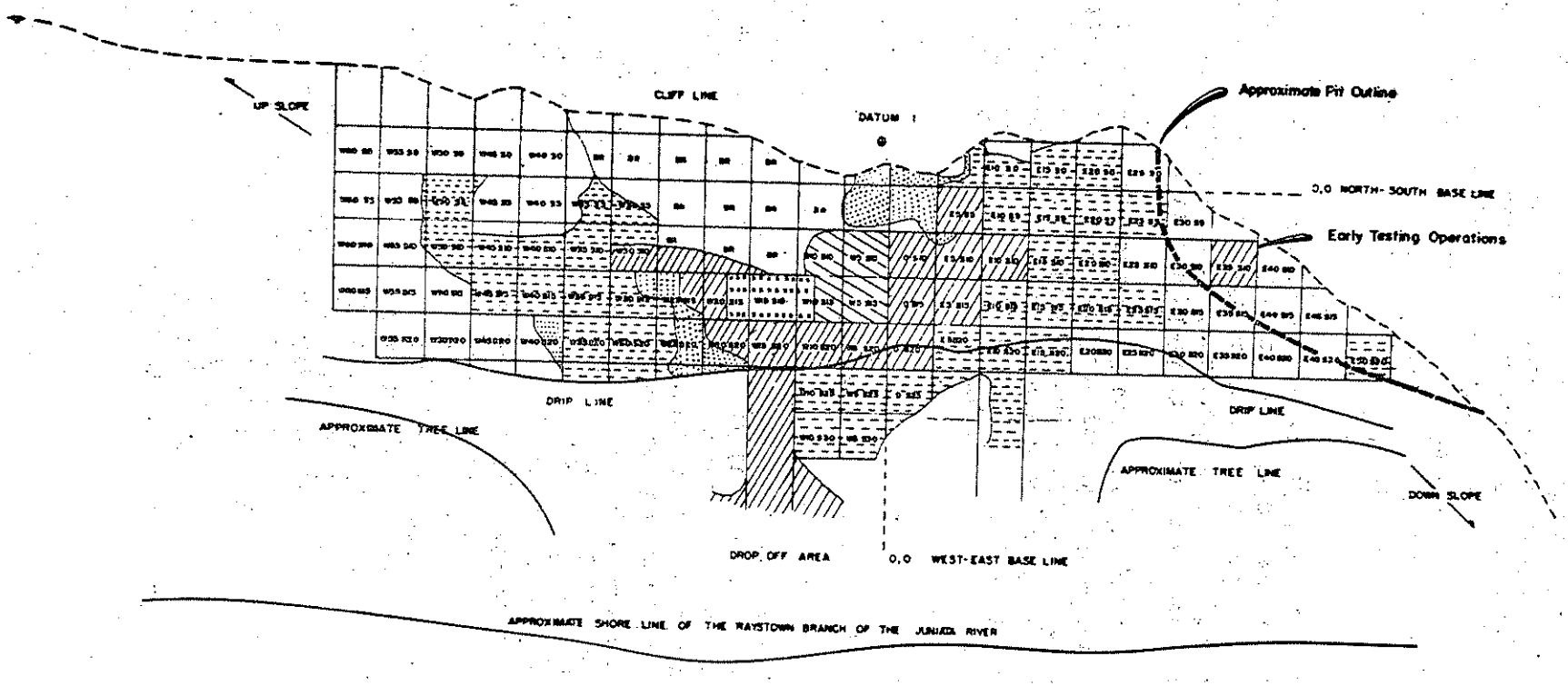
Refuse Pits

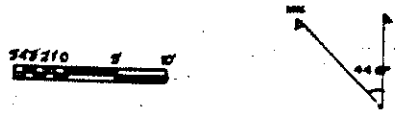
Dispersed Pit (Fig. 9). Two types of refuse pits have been defined: the dispersed and the restricted bell-shaped pit. The limits of the dispersed pit have not yet been precisely defined, as our information comes primarily from the artifactual materials extracted during 1958 testing operations and two five-foot squares excavated in an unexcavated portion of the site in 1966.

The midden and artifact yield from the test area of 1958 is the most prolific that has come from any portion of the site. The range and quantity of the artifacts from the area is very great indeed, and suggests that a high degree of mixing has occurred. Most important was the very high yield of unmodified bone, shell, and fish scales.

Square E35-S10 was excavated within the 1958 test area to determine the depth of the disturbed area and the degree to which it had been backfilled by the early excavators. In the first 30 inches the deposit was extremely heterogeneous, loosely packed, and unstratified; bone, shell, and fish refuse was very heavy; and a considerable number of artifacts representing various cultural periods was mixed. At approximately 96 inches b.d. the soils

Figure 9





LEGEND

SCALE 1" = 5'

243' BELOW DATUM (ALL BELOW DATUM READINGS ARE APPROXIMATE)

185' BELOW DATUM

143' BELOW DATUM

83' BELOW DATUM

TALUS

BR BED ROCK

SQUARE DESIGNATIONS ARE MADE AT THE SOUTH-WEST CORNER

DISPERSED REFUSE PIT

Figure 9

began to exhibit a heterogeneous type of stratigraphy and the yield of cultural materials declined sharply. The in situ stone-lined fire pit, previously discussed, was found at 99 inches b.d. It is at this point that the lower limit of the main body of the fire pit was located. The information obtained from the excavation of E35-S10 was not conclusive enough to determine whether the disturbed deposit was disrupted by the Indian inhabitants or the excavator's backfill from 1958. The depth of the disturbed deposit was defined, and the evidence gathered certainly did not refute the idea of a large refuse area. Therefore, to obtain more data concerning this situation another pit (E50-S20) was excavated.

Excavation of pit E50-S20 supplied additional evidence in support of the refuse pit construct. At the inner side of the square, the deposit was very dry, loosely packed, and quite heterogeneous in nature. The outer portion of the square presented a slightly more compact, homogeneous stratigraphy; the line of demarcation between the two was fairly well defined. The first real evidence of midden occurred with the discovery of a heavy charcoal deposit lying against the cliff face. The overhang at this point was only about 12 inches above the charcoal - not an especially ideal spot to build a cooking or warming fire. Incorporated with the charcoal was both burned and unburned bone, which suggests disturbance of some sort. Most of the cultural debris comes from the inner, disturbed portion of the square. The artifact types showed some mixing, but much less so than in E35-S10. Prolific quantities of unmodified bone, shell, and fish scales were again in evidence. These occurred fairly uniformly throughout the deposit, although specific concentrations of fish bone and scales, or deer bone did occur occasionally.

Presently we can only suggest that a refuse pit, with its limits not yet well defined, is present in this area. One interpretation may be that this was not an intentionally dug pit, but that the natural contour of the Sheep Rock deposit dipped down along and under the cliff face, thereby forming a natural depression into which refuse was thrown.

Restricted Bell-Shaped Pit (Fig. 10). Located in the northern end of the deposit is a bell-shaped refuse pit laden with organic debris. Only half of the pit has been excavated, and a portion of that area has been destroyed by earlier digging. A three-inch band of fine brown soil defines part of the pit limits, and probably at one time defined the entire feature. To one side of this line, the deposit consisted of finely-broken shale chips with no cultural debris present; to the other side (pit interior) the deposit was laden with organic debris - including charcoal, seeds and nuts, straw, fish scales, wood and bark, shell, dung, corn-cobs, cordage, leather, feathers, leaves, etc. but little or no unmodified bone. Several bark pieces were directly associated with the sloping brown soil, and suggest that the pit at one time had a partial bark lining, a phenomenon present in other pits.

The exact dimensions of the pit, as indicated in the drawing,

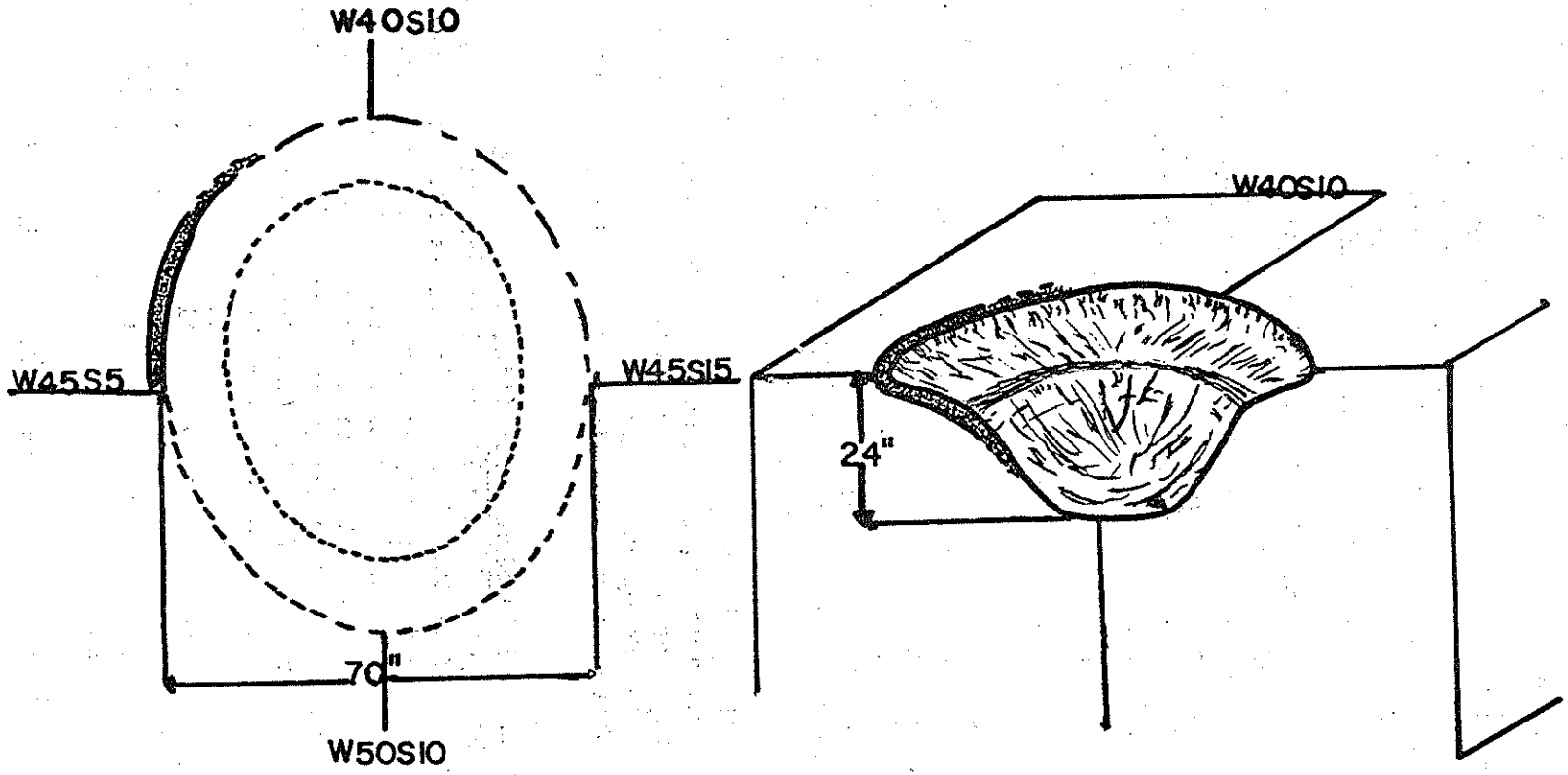


Figure 10

Scale: 1/2 in. = 1 ft

are not known. It appears that it is slightly oval in shape as seen from the top - the width about 70 inches, length about 80 inches, and depth 24 inches. It is definitely bell-shaped. A large rock, fallen from the cliff, defines the bottom of the pit. At 51 inches b.d., approximately the point where the pit constricts into the upper portion of the bell, a three-inch thick leaf layer occurs. The leaves are not matted, but show evidence of disturbance. Two interpretations are possible: first, the leaves may have blown into the pit during a time of inactivity; or second, they may have been intentionally placed to form a temporary bedding base, later abandoned and reused as a refuse pit. Careful excavation of adjacent squares in the future should present data sufficient to obtain precise dimensions.

Provenience: Square W45-S10 (42 to 66 inches b.d.)

Unique Bark Feature (Fig. 11)

Three rectangular strips of bark, each about six inches wide, were found lying in a triangular pattern. Each strip was found to overlap the next in a clock-wise direction. Underlying the bark, and seen in the inner triangle and at the outer edge of two of the strips, appeared a slight case impression of a fabric-like material which at one time had spanned the triangular opening. There were no visible means by which this fabric could have been attached to the bark, nor were there any visible means of attachment between the bark pieces themselves. The function of this object is not known. Perhaps it represents a type of fish scoop, a cradle, or an object functioning similar to a winnowing tray.

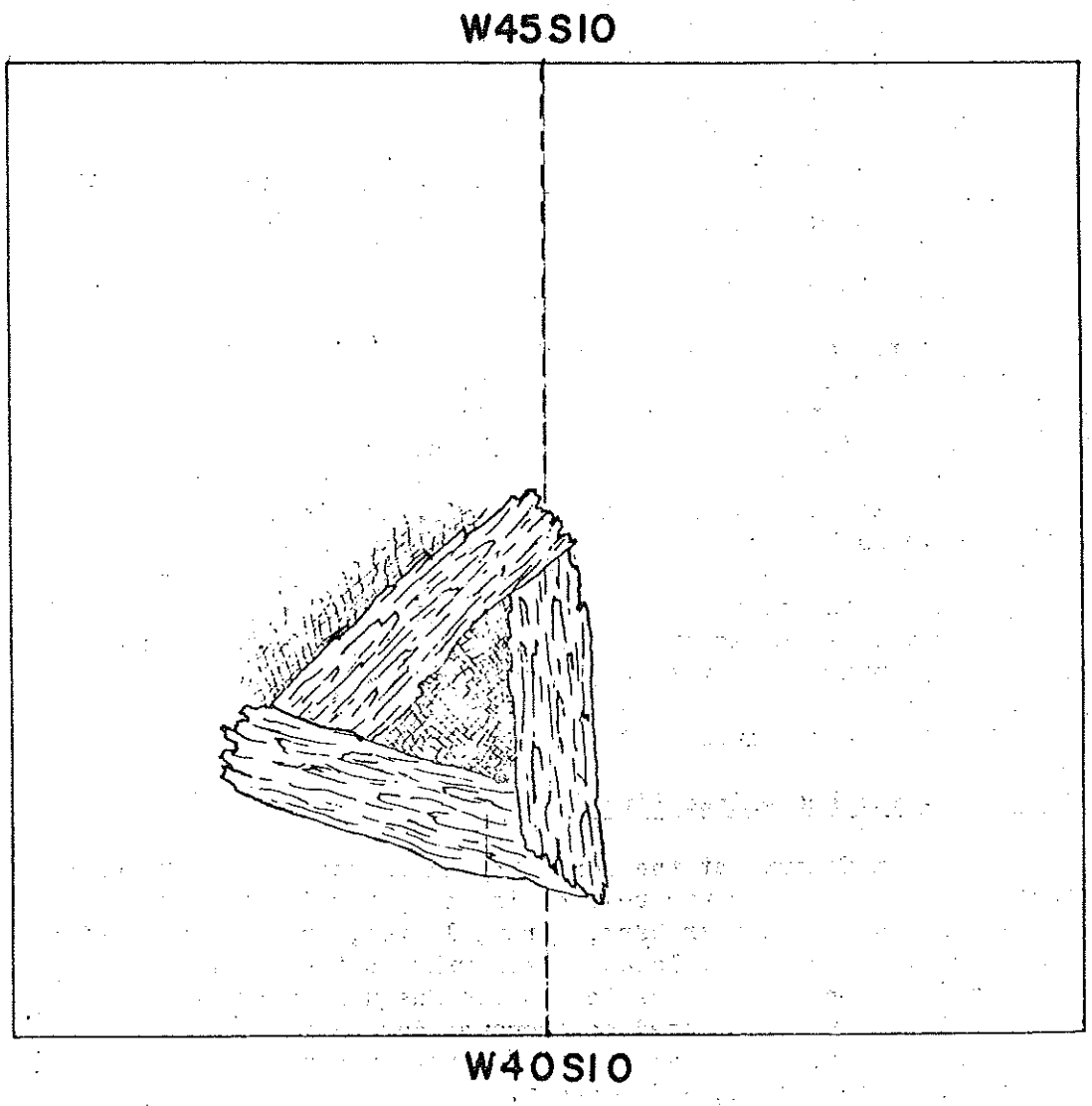
Provenience: Squares W45-S10 and 15 (61 to 69 inches b.d.)

Bark, Straw, and Leaf-Lined Pits (Beds)

A common feature at the northern end of the site, that area containing preserved organic refuse, is the pit which had intentionally been lined with either bark, straw, leaves, or any combination of the three. These pits, located primarily in the upper levels of the deposit and probably belonging to the Susquehannock or Shenk's Ferry peoples, were discovered and removed during the first two seasons of excavation. They vary from one another considerably in their size, shape, depth, and content.

One pit, for example, measured approximately 15-by-21 inches and was roughly egg-shaped in outline (W30-0 [60 to 66 inches b.d.]). It contained a layer of grasses that were orientated cross-wise to one another, overlaid by a partial bark liner which showed evidence of having been burned (a common characteristic). Another pit was oval in form and measured approximately 4-by-5 feet. It was quite shallow and completely lined with bark traces along its gently sloping sides. This pit in turn intruded into a slightly smaller circular pit also completely lined with bark traces. Occasionally the bark linings showed smooth, slick surfaces as though something had been rubbing against them.

Figure 11



HUMAN BURIALS

A number of fragments of human skeleton, teeth, and five human interments have been uncovered at the Sheep Rock Shelter. This material will be analyzed by Frank Saul, a member of the Anthropology faculty at Penn State and a specialist in human skeletal identification. Until the study is completed, precise information concerning such factors as age, sex, stature, etc. is pending. For the present, the discussion will revolve around the five burials, the stratigraphic placement within the deposit, the circumstances of interment, and preliminary cultural interpretations. It is unfortunate that each burial cannot receive equal descriptive treatment; however, in some instances the information is very complete, in others it is quite meagre.

Infant Burials

Three infant burials have been extracted from the Sheep Rock deposit. Each represents an individual who died sometime before the end of his first year of life.

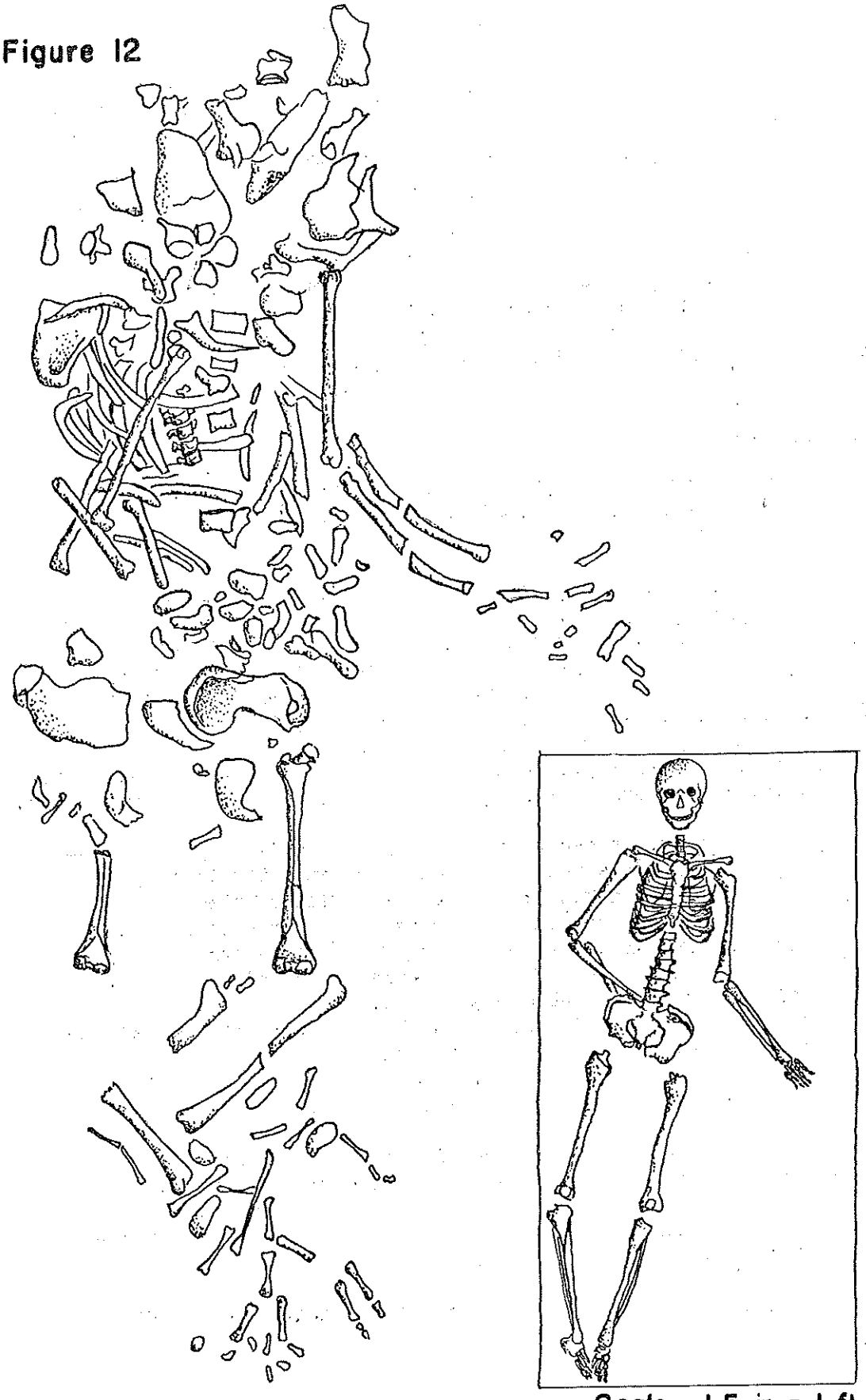
Burial No. 1. The information concerning one of these individuals is very incomplete. It can be said only that the individual was a new-born human. He was interred in the outer portion of the deposit (Square W5-S20), probably in the talus of the living area of that time. Found at the same level (76 to 87 inches b.d.) as the infant were several bone tools and an "Owasco" pottery sherd. It is impossible to determine whether these materials were directly associated with the infant. However, according to its stratigraphic context, the individual appears to date from the Late Woodland Period.

Burial No. 2. A second individual was buried in a tightly-flexed position within a roughly egg-shaped pit. The boundaries of the pit were not well defined; however, the fill of the pit, which contained some charred materials, was considerably different from the surrounding gravel and fine tan soil. The zone immediately above the burial consisted of charcoal-blackened soil and gravel and contained several fire-broken cobbles. It appears that the infant was interred from this level, which belongs to the Susquehannock Horizon. Several small "Schultz" sherds are reported to have been intrusive with the interment. The charred materials within the pit probably also came from the overlying zone.

The infant had been laid on his back within the pit; his arms were spread out somewhat; and the knees were flexed upward. The skull, which had been destroyed by rodent activity, would have laid nearly under the cliff face, and was oriented in a northeast-by-north direction.

Provenience: Square W5-S5 (52 inches b.d.) Susquehannock Burial

Figure 12



Scale: 1.5 in. = 1 ft

Burial No. 3 (Fig. 12). The third infant burial was interred in a natural stratigraphic level consisting primarily of shale detritus from the overhang. Nearby was a large hearth complex defined by its heavy ash content. There is no evidence to suggest that the individual received any special treatment, nor is there evidence to suggest that the burial was intrusive from a higher level. The individual was essentially intact and had been placed in an extended position on his back with the skull orientated in a north-northwest direction. He was buried well back against the cliff and away from the main living area.

Provenience: Square W10-S5 (111 inches b.d.) Archaic Burial

Adult Burials

Two adult burials have been discovered: the first in 1961 and the second in 1965. The first burial has received considerable publicity over the years since it is believed to be the oldest adult skeleton found in Pennsylvania. The second adult, although more recent than the first, still dates from the Late Archaic Period and has a much more exciting history of interment than the earlier one.

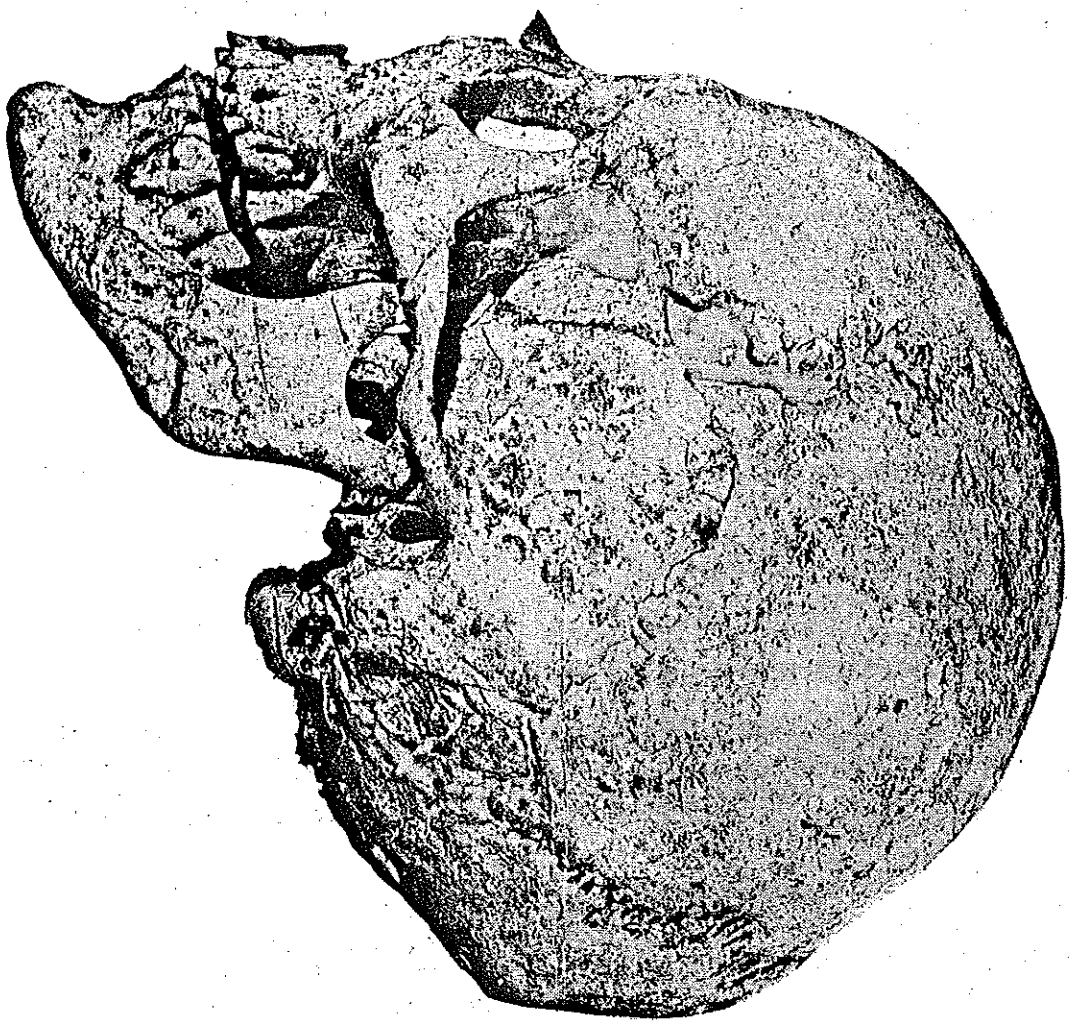
Burial No. 4 (Fig. 13). In 1961 a skull, lower leg, and foot were uncovered in the lower levels of the deposit. The age of the skull was estimated to be approximately 6000 years old, "and as such the oldest human skeletal fragment ever found in Pennsylvania." "In physical appearance, he was practically identical to the Indians who lived in Pennsylvania during Colonial times. He was a slightly built, lean, vigorous man about 5'6" in height, relatively large-brained and well-muscled by modern standards. His teeth are completely worn out but there are no traces of caries. The dental erosion resulted from chewing tough foods."

It has been estimated that the individual died at approximately 45 years of age, "but there is no available evidence from the skull or the other few fragments of the skeleton found nearby to indicate the cause of death."

Close examination of the burial showed traces of no bone material other than the skull, the lower leg, and foot, indicating that this was all of the body that was interred. There (were) no marks to indicate violent decapitation nor are there any tooth marks of rodents or other animals to establish post-burial removal of the missing skeletal parts. It is known that ancient Indian families sometimes would find the remains of missing relatives in the forests and would bring whatever was left back to the campsite for burial. There is too little evidence in the case of the Sheep Rock man, however, on which to reconstruct a sound account of the death circumstances.

The skull was found (approximately) seven feet below present ground level at the Sheep Rock site. The depth is midway in the

Figure 13



period of Archaic cultures (3,500 - 10,000 B.C.). Intense examination of stratified layers above the burial showed no unnatural disturbance which would have been the case had the burial taken place after Archaic times.

The description of the Sheep Rock skull has, out of necessity, been quoted practically word for word from a press release (April 16, 1962) by The Pennsylvania Historical and Museum Commission. It is suspected that the information came from the diligent work of John Witthoft, then State Archaeologist for the Commission, who devoted a great deal of time and energy to an accurate discussion of the find. Although the stratigraphic placement and the skeletal materials will eventually be re-analyzed in the light of new evidence, for the present Mr. Witthoft's interpretations stand as being quite accurate.

Provenience: Square W10-S0 (c. 104 to 115 inches b.d.) Archaic Burial

Burial No. 5 (Fig. 14). The evidence surrounding the circumstances for interment of this skeleton will be presented, followed by one possible interpretation of this evidence. It will be left to the reader to decide for himself what he considers to be a legitimate interpretation of the facts. A detailed analysis of this interment and methods of excavation has been presented in an earlier report by the author (Smith, 1965:9-11). No new evidence has come to light which would alter the facts and interpretations; consequently, much of what follows has been extracted verbatim from the earlier paper. The evidence is as follows:

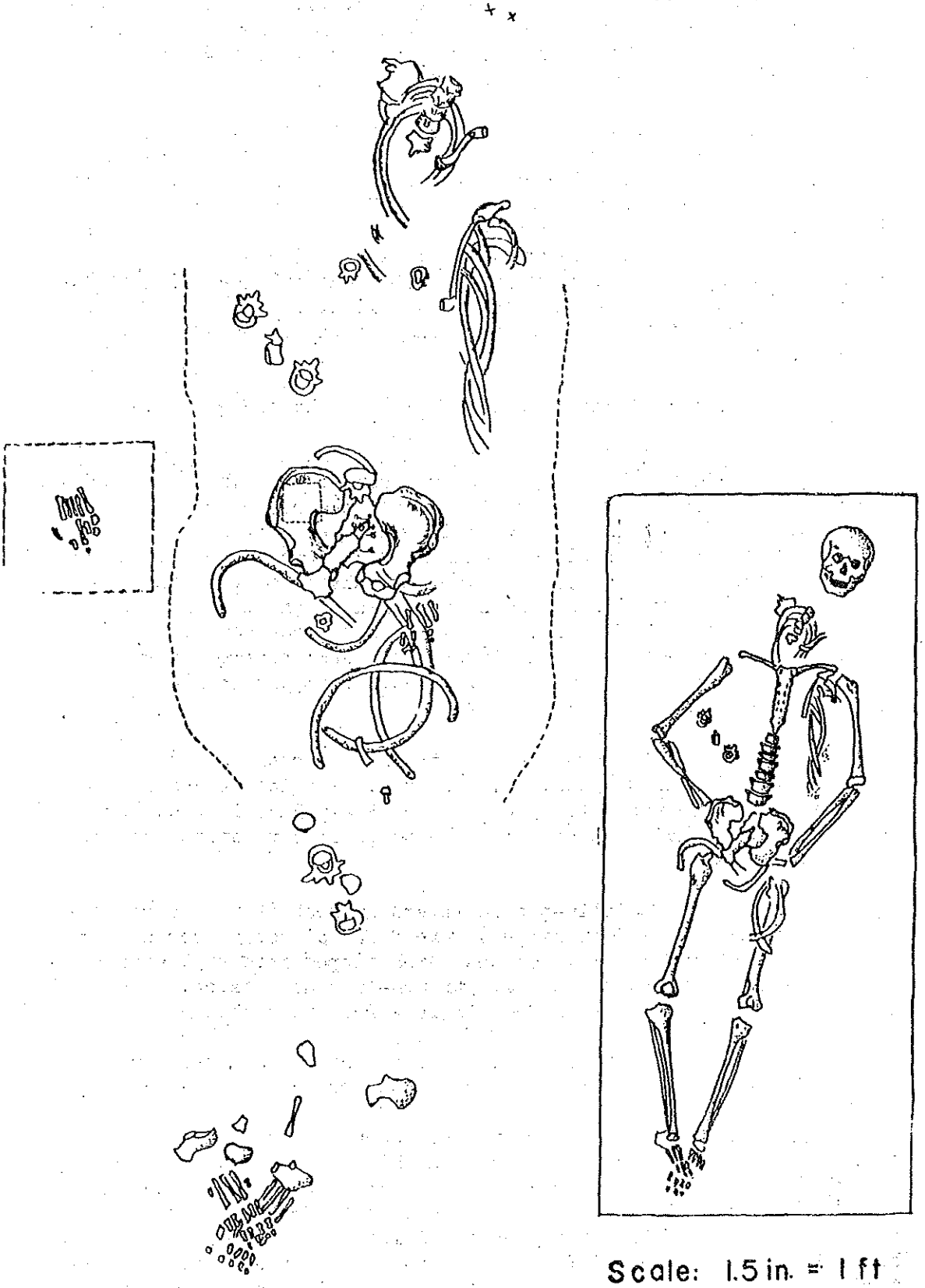
1. The skeleton was found in the Late Archaic Strata at approximately 100 inches b.d. (c. 4000 BP). Two Late Archaic projectile points, tentatively identified as Sheep Rock Type 9, were found in the overlying strata and help to place a relative date on the bones.

2. Two artificially-placed layers of rock (both layers contained two very large flat stones) were found directly over a third accumulation of smaller flat stones which sloped into what appeared to have been at one time a shallow trench-like depression. Bone fragments began to appear among this last rock accumulation.

3. Removal of the largest stone of the third layer revealed smashed bone in direct contact with the stone.

4. The skeleton appears to have been placed in a shallow trench and was probably covered with a thin lens of soil. (The soil covering is speculation only since no evidence was detected.) This speculation is presented because it is felt that crushed bone would not be in direct contact with the third layer of rock unless the rock had fallen or been placed there after the skeleton had begun to deteriorate. It is further felt that since the peoples responsible for the burial had taken the time to dig a trench, they would not

Figure 14



Scale: 1.5 in. = 1 ft

have left the body exposed until it began to deteriorate and then covered it with rock. They would probably first have covered it with soil.

5. There is no doubt that the original orientation of the burial was horizontal. The relationship of the feet, kneecaps, pelvis, cervical vertebrae, and surviving teeth all indicate an extended orientation.

6. There is no skull present. Only two frontal teeth remain in position where the skull should have been. All long bones are absent, but the hands, feet, and kneecaps are still in position.

7. Most of the remaining bones are broken and smashed by overlying rock. They are also, except for those mentioned in point 5, highly disarticulated (i.e., two lumbar vertebrae were within one inch of the two kneecaps).

8. The position of the various bones indicates a somewhat inconsistent pattern of orientation. The feet indicate a face-up position. However, the cervical vertebrae suggest a face-down position; the scapulae are reversed also indicating a face-down position; the pelvis is also reversed, but not fully, indicating a twisted orientation. Consequently, although it is known that the skeleton was extended, it is not known whether it was extended face down or on its side. It may be that ground slump or rockfall has helped alter the original position. With further analysis it is hoped that this point can be clarified.

It appears that what this is, is a Late Archaic extended, probably male burial (Saul -- personal communication). It is felt that the sapien was interred in a shallow trench and first covered with a thin lens of earth. It is possible that as the remains began to deteriorate, scavaging animals disturbed and removed some of the bones. However, the capacity of animals for selectively removing the skull and all the long bones is questionable. It is possible that the peoples of this time period practiced a form of bundle reburial, waiting until the skeleton had partially deteriorated before removing the skull and long bones to another site (Adena Bundle - Dragoo, 1963:29). At this point, then, did they cover the remains with rock? Or, did later peoples notice the remains of this individual protruding from under a rockfall (third rock layer) and add the remaining two layers of rock?

Provenience: Square E10-S10 (92 to 105 inches b.d.)

OBJECTIVES

The study of which this chapter has only been a preliminary

discussion has four primary objectives. The first objective is the analysis of the entire Sheep Rock deposit, in a holistic sense, so as to clarify further and expand the observations presented in this report.

The second objective of the study, which has already been mentioned, is to attempt the reconstruction of the living areas within the site. In other words, to define the portions of the site utilized at each particular time period and why these particular areas were utilized as opposed to areas on the same time horizon which show no evidence of human activity.

The third objective will be to attempt to reconstruct the various human activities that were undertaken within each of the habitation areas of a particular time horizon. By establishing beforehand the various possible activity categories (i.e., food preparation, sleeping, skin processing, pottery making, tool manufacturing, etc.), it should be possible, during a selected time horizon, to demonstrate that portion "X" of the site was used for sleeping, portion "Y" for cooking, etc. If this can be shown, then each of the activity patterns, as they manifest themselves at Sheep Rock, will be described in ethnographic terms.

Finally, comparison of the areas of the site which were utilized and their functions during different time periods will perhaps permit the estimation of population sizes for the various periods represented at the site. This in turn will yield more information concerning the type of social group with which we are dealing and its probable mode of settlement and movement.

Appendix I

ARCHAEOLOGICAL FEATURE RECORD

ARCHAEOLOGICAL FEATURE RECORD

1. Feature No. _____ 2. Site _____

3. Depth from surface _____ 4. Depth from datum plane _____

5. Excavation Unit _____

6. Horizontal location _____

7. Definition _____

_____

_____

8. Associated objects and features _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

9. Dimensions _____

10. Stratigraphic notes _____

_____

_____

11. Remarks _____

_____

_____

12. Exposed by _____ 13. Reported by _____

14. Date _____ 15. Photo _____ 16. Sketch _____

Appendix II

FEATURE DESIGNATION AND UNIT ANALYSIS SHEET

FEATURE DESIGNATION AND UNIT ANALYSIS SHEET
ARCHAEOLOGICAL SITE: 36Hul

Square Designation: _____ ( ) Excavator: _____

Year: _____ Total Depth of Excavated Unit: General _____

Datum: _____ Feature Number: _____

(For convenience of recorder only; these nos. do not correspond to field notes.)

General Remarks about Excavation Unit: _____

_____

Stratigraphy: _____

_____

_____

Deposit: _____

_____

_____

Remarks: _____

_____

FEATURE

Discussion: _____

_____

_____

_____

_____

_____

_____

Depth: General _____ Datum: _____ to _____

Dimensions: _____

Drawing:

Preliminary Interpretation: _____

_____

First-line Association: _____

_____

Second-line Association: _____

_____

Extension: _____

Artifact Concentration:

Lithic

Bone

Shell

Ceramic

Refuse Concentration:

Bone

Shell

Organic

Other

Charcoal:

Photographs:

Additional Observations:

A PRELIMINARY ANALYSIS OF THE CORDAGE AND TEXTILE INDUSTRY OF 36 HU 1

by

Donna Conway

and

Mary Moser

ABSTRACT

The purpose of this report is to describe the accumulation of cordage, woven materials and other associated artifacts found at Sheep Rock (36Hul). This textile industry was divided according to the manufacturing technique into the following categories: cordage, strips (includes coils and loops), braiding and plaiting, and weaving. Each category was then subdivided according to parameters of ply, varying technological styles, direction of twisting and material.

An intensive analysis of the 292 pieces of two-ply cordage revealed that 84% of the hard-fiber cordage was Z-twisted while 72.4% of the soft-fiber cordage was S-twisted, which may indicate a technological preference depending upon the type of fibrous material used. The most predominate knot form found was the granny knot, the majority of which were tied in a manner peculiar to Sheep Rock. All of the textiles were formed from variations of plain twined weaving.

ACKNOWLEDGMENTS

The authors wish to express their gratitude to Ira F. Smith for the consideration and help he has given them throughout the preparation of this report. Sincere appreciation is also extended to Dr. Anton J. Kovar for his advice in the preliminary identification of vegetable fibers and to Michael Steffy whose suggestions were instrumental for the classification of knots.

TABLE OF CONTENTS

	Page
ABSTRACT	259
ACKNOWLEDGMENTS	261
TABLE OF CONTENTS	263
LIST OF ILLUSTRATIONS	265
LIST OF TABLES	267
I. INTRODUCTION	269
II. FIBERS	270
Collecting and Processing	270
Identification	271
III. CORDAGE	275
Two-ply	277
Three-ply	281
Four-ply	282
Multiple Strand	282
Cords Tied Together	283
Snares	284
Netting	284
IV. STRIPS, COILS, AND LOOPS	285
Strips	285
Coils	286
Loops	286
V. KNOTS	287
VI. BRAIDING AND PLAITING	291
Braiding	291
Plaiting	292
VII. WEAVING	292
Plain Twined Weaving	293
Bark Mat	294
Open Mesh Mat	294
Splints With Coiled Bark	295
VIII. SUMMARY AND CONCLUSIONS	296
IX. SUGGESTIONS FOR FURTHER RESEARCH	297
APPENDIX I: List of Textile Artifacts Analyzed	299

LIST OF ILLUSTRATIONS

In general the line drawings used throughout this report illustrate classes or types of vegetable fiber artifacts. In the few cases that a drawing represents a unique artifact, its dimensions have been given in detail in the text. For these reasons it was not considered necessary to place a scale in each illustration.

		Page
Figure 1.	Fibers Found at Sheep Rock	274
Figure 2.	Examples of S- and Z-Twist Cordage	276
Figure 3.	Graph of the Relationship of Cord Diameter and Tightness of Twist	280
Figure 4.	Three-Ply Cordage (A66.1.2664)	281
Figure 5a.	Vegetable Fibers Bound by a Two-Ply Cord (A66.1.2836)	282
Figure 5b.	Two-Ply Cord Bound by Leather Strip (A66.1.2049)	282
Figure 5c.	Four-Ply Cord (A66.1.2836-A)	282
Figure 6.	Multiple-Strand Cord (A66.1.1807-2)	282
Figure 7.	Cordage Composed of Two Yarns and One Strand (A66.1.2245)	283
Figure 8.	Four Cords Tied Together (A66.1.6825)	283
Figure 9.	Snare (A66.1.6761)	284
Figure 10.	Net Fragment (A66.1.3108)	285
Figure 11.	Bark Coil (A66.1.3474)	286
Figure 12.	Braid Loop (A66.1.413)	286
Figure 13.	Knot Types	288

a. Overhand (A66.1.3567)
b. Halfhitch (A66.1.3101)
c. Two halfhitches (A66.1.2218)
d. Clove hitch (A66.1.2256)
e. Girth hitch (A66.1.3580)
f. Square knot (A66.1.1918)
g. Running overhand (A66.1.6761)
h. Granny knot (A66.1.1933)

		Page
Figure 14.	Granny Knots . . . . . a,a'. Typical (A66.1.2191) b,b'. Sheep Rock (A66.1.192)	290
Figure 15.	Corn Husk Bundle (A66.1.114)	289
Figure 16a.	Braid Bound by Two-Ply Cord (A66.1.3104) . .	291
Figure 16b.	Braid Bound by Leather Strip (A66.1.3104). .	291
Figure 17.	Schematic Representation of Plaiting (A66.1.2276)	292
Figure 18.	Plain Twined Weaving, Count 3.5 (A66.1.2017) 7.0.	293
Figure 19.	Plain Twined Weaving, Count 3.0/1.8 (A66.1.2056).	294
Figure 20.	Bark Mat Fragment (A66.1.1772)	294
Figure 21.	Open Mesh Mat (A66.1.2135).	295
Figure 22.	Wooden Splint Wrapped with Bark Strip (A66.1.192)	295

LIST OF TABLES

Page

Table 1. List of Plants Commonly Utilized by the Iroquois of New York for Vegetable Fiber Artifacts. 272

Table 2. Means and Standard Deviations of the Diameter and Tightness of Twist of all Two-ply Cordage, Divided According to Direction of Twist and Fiber Type 278

INTRODUCTION

Cordage and textiles form a most integral part of the material assemblage of any culture, either past or present. This seemingly obvious statement, however, often appears to have been overlooked in the archaeological literature concerning much of North America, and information of this type is especially scarce in the archaeological reports of eastern United States. The fact that textiles are among the most fragile and perishable of all human industrial products has resulted in this omission. Destructive animals, natural decay, climatic conditions, and human use combine to destroy or deface these delicate articles. Climatic conditions seem to have been the most important determinant, since the regions in which cordage and fabrics have survived are generally very dry and arid, such as Mexico and the southwestern United States Thus the preservation of a relatively large accumulation of cordage and textiles, as was found at Sheep Rock, is a highly extraordinary occurrence considering the temperate climate of this geographical area.

Cordage and textiles, deposited by late prehistoric Indian cultures, were protected from prevailing winds and rain in this large rock shelter. Even at Sheep Rock, however, preservation was far from complete. On the south side of the site, the area of possible occupation behind the drip line is much less than that on the north side due to the uneven curvature of the overhanging shale which extends out to cover more ground surface on the northern sector of the site. Evidently the rain was often blown into the south section, as the soil on that side was quite damp; also a small spring originating there may have added to the moisture. The soil of the north side, on the contrary, was extremely dry and fine and became increasingly dessicated toward the back of the rock shelter. Of course, the closer the squares were to the drip line on this dry side, the more moisture they contained; although the moisture content was always less than that found in any square on the south side. As a consequence, all of the cordage found at Sheep Rock came from a small area entirely on the north side of the site.

If the assumption that this site was occupied by Archaic and Woodland Indian cultures is correct, natural decay processes must also have played an important role in the destruction of the animal and vegetable artifacts, since none were found below a certain depth. As a corollary, the concentration of wood, bark, corn cobs, marsh grass, and other vegetable materials showed a corresponding decrease as depth increased. As far as may be determined at the present stage of our investigation of the correlation of the natural stratigraphy of Sheep Rock with definite time and cultural epochs, all of the cordage and textiles found belong to the late prehistoric period and fall into the Susquehannock material assemblage. However, indirect evidence that cordage was manufactured throughout at least the Woodland periods of this site's occupation is provided by the cordmarked pottery which is more durable than the cordage itself.

It has generally been hypothesized that the development of

clothing occurred when man moved from the African tropics northward into colder climates, and thus felt the need to protect himself from the elements. Originally he probably used the pelts of the large game animals which he hunted to wrap around himself, perhaps in the form of a loose cloak which hung from the shoulders to the knees. As time passed, better curing and tanning processes were developed and applied largely by the women since the men were occupied with hunting and fishing. Observation of the fascinating and often complex activities of the birds in weaving their nests may have first inspired man to imitate them to his own advantage. Leaves and bark, as well as large heavy mats, have often been found laid down on the ground surface in order to form a comfortable warm bed for prehistoric man.

The first actual sewing may have been the mending of worn or ripped hide clothing. At first thin bands of sinew may have been used, following eventually with the practice of using strips of bark, the stems of milkweed, bulrushes, grasses, and any other available forms of strong, pliable vegetable fibers. From the repairing of leather, the use of vegetable fibers probably progressed to the making of cordage, baskets, and textiles until finally a large tradition developed around the gathering of materials, their preparation for use in weaving, and the processes of manufacture of the desired items, all of which will be elaborated upon in the following sections in relation to the materials found at Sheep Rock.

FIBERS

Collection and Processing

Nearly all parts of plants, including the roots, stems, bark, leaves, fruits, and seeds, have been used by some tribe or another for the fabrication of cordage, baskets and fabrics. Through a timely process of trial and error, the Indians learned which plants were the most useful and which parts were the most suitable for their various purposes. For instance, the milkweed fiber is very soft and might be better adapted to form a piece of clothing, whereas Indian hemp with its tougher consistency would make a strong basket handle or other item in which durability and strength are important aspects.

Often the gathering of suitable materials must have been as arduous a task as the final weaving of the textiles. If particular fibers were preferred, the Indian woman may have had to walk miles to find their source; once the materials were found, the gathering process may have been quite laborious, especially when it was necessary to dig up roots or cut the bark from trees, an important source of fibers everywhere in the New World. Due to the difficulty of transportation, the chief limitation of the fibers utilized in an Indian culture was the ecological zone. Thus, to an experienced student of climatology and botany, the fragments of baskets, etc. surviving from a past epoch indicate former geographic and physical conditions, the nature of the soil, the color of the minerals, and the vegetal growths of

the area in which the weaver lived. Thus environmental diversity explains the variety of materials used in Indian basketry, such as the Hopi use of yucca and fine grass; the Paiutes, a coarse fiber; the Havasupais, willows; the Southern California Indians, tule root and squaw weed; the Monos, other tender shoots, roots and fibers; and the tribes further north, the bark of the cedar and the root of the spruce (James 1909:73). So well have Indian women searched for and developed techniques for preparation of natural fibers, that today's textile researchers have often been known to visit the few remaining Indian villages to learn the techniques of the Indian squaw, and to later apply this information to the mass production of modern industrial settings.

After gathering the necessary materials, the next step was the processing of these materials. This preparation consisted essentially of separating the desirable from the undesirable portions such as peeling off the outer layer of pliable stems in order to make the fibers just underneath the outer covering accessible to the weaver. This process was hastened by soaking the stems in water for several hours or even days depending upon the thickness of the outer stem layer. After this the process of stripping the fibers from the tough outer layer may have been facilitated by bending and rubbing the entire strip in small amounts between the fingers. At times the fibers were loosened and softened by mastication.

Fiber Identification

A fairly complete survey of food and industrial plants -- used for making dishes, mats, baskets, beverages, dyes, syrup, sugar and for smoking -- has been listed in Hedrick (1933:33). Although this list pertains primarily to the Iroquois of New York State, the ecological environment of Pennsylvania and New York were similar enough at that time, that it is safe to assume that in general the same plants were used by the Susquehannocks of Huntingdon County for the manufacture of their cordage, baskets, and other textiles. A chart of plants pertinent to this report with their common and scientific names, the parts commonly utilized, and their functions is given in Table 1.

The first step in the identification of the fibers found at Sheep Rock was to search the general area to locate the plants given in Table 1. Birch, American elm, and several varieties of grasses were found in abundance all along the Raystown Branch of the Juniata River. Cat-tails were prolific in swamp lands and bulrush was located, after much searching, near the cat-tails, although it was far outnumbered by them. One type of milkweed was plentiful in dry fields and thickets, and other species were found in swamps and fields, Apocynum cannabinum or Indian hemp seemed to be the most scarce but in areas where it was growing it formed a very predominant part of all the vegetation. It is a slender plant about 3 to 4 feet tall and may be easily recognized by the oval-shaped fruits and long slender seed pods growing in a cluster at the apex of the plant.

After the plants were gathered, some of them were dried in the sun and others were soaked in water baths in an attempt to duplicate the manner in which the Indians might have prepared them for extraction of the fibers. The best method for preparing milkweed and cat-tails

Plant	Scientific Name	Part Used	Function
Birch, canoe	Betula papyrifera	bark	canoes, buckets, etc.
Bulrushes	Scirpus validus and other species	stems	mats, baskets, etc.
Cat-tails	Typha latifolia and T. angustifolia	stems, leaves	baskets, mats, etc.
Elm, American	Ulmus americana	bark	withes, nets, etc.
Grasses	Hierochloe odorata and others	stems	baskets, mats, etc.
Indian hemp	Apocynum cannabinum	stems	fiber
Milkweed, swamp	Asclepias incarnata	stems	fiber

LIST OF PLANTS COMMONLY UTILIZED BY THE IROQUOIS OF NEW YORK FOR VEGETABLE FIBER ARTIFACTS

Table 1

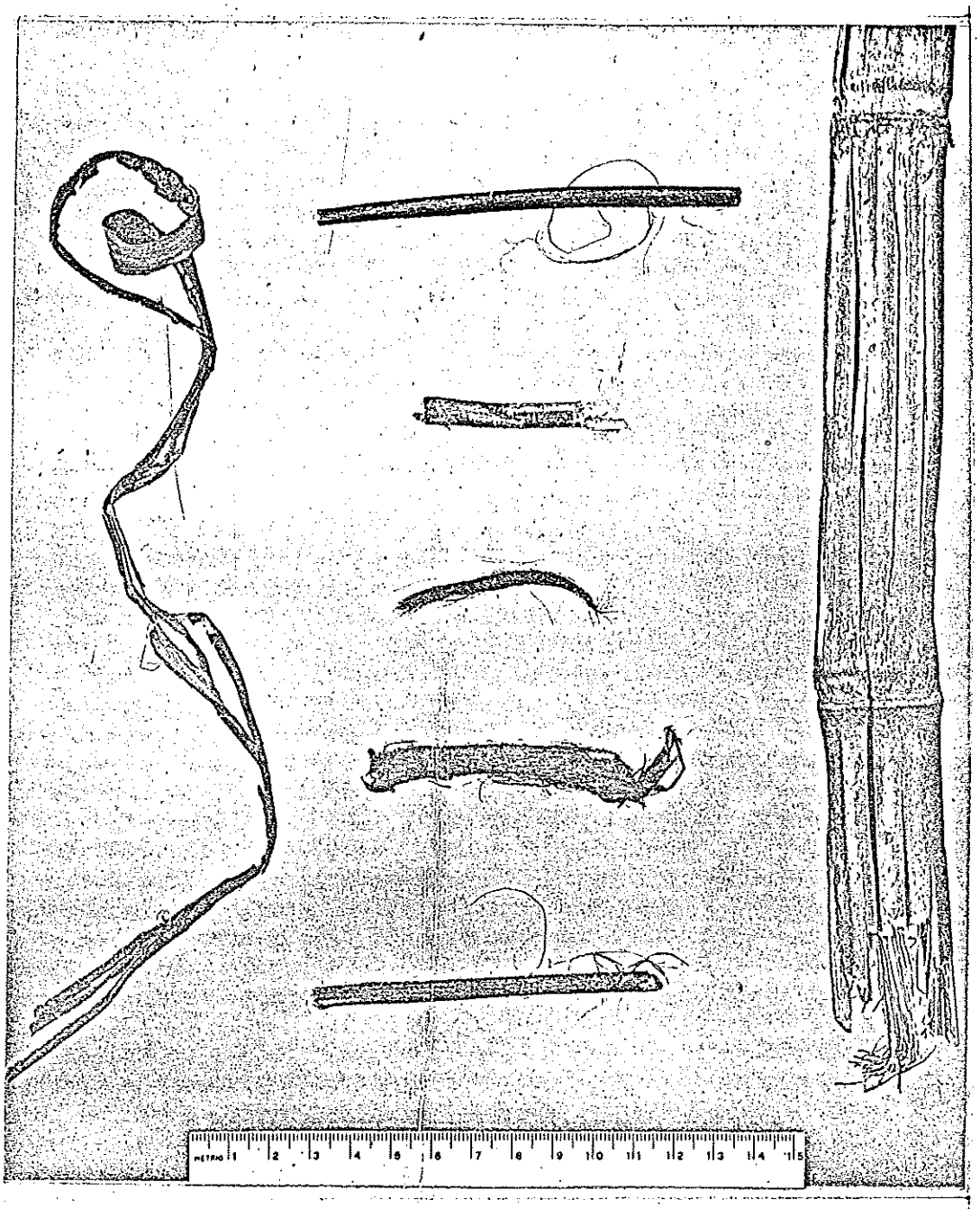
proved to be soaking them for several days in water, then kneading the stems between the fingers to loosen the fibers. If the stems did not split during this process, they were easily sliced longitudinally with the fingernail, and the fibers could then be removed by scraping the interior of the outer green layer with the sharp edge of a stone. It was very difficult, however, to remove the fibers in the long strips which would be needed to make cordage; this is definitely a technique which cannot be perfected overnight and a squaw skilled in this work must have been a valuable asset to an Indian tribe. It is important to collect the tendrils and twigs early in their growing season while they are still tender and pliable since it is then easier to extract the fibers without breakage due to their flexibility. Also, there would be fewer offshoots from the main branch of the plant, and, therefore, less disturbance of the central fibers. In addition, fewer focal points for breakage would occur, since the fibers always seemed most likely to break at the points where a smaller twig had branched off from the central vein of the plant.

The purpose of the above fiber preparation was to supply some known fiber sources that could be used for comparison with the unknowns that had been found at Sheep Rock, some of which are shown in Figure 1. Fibers obtained from small pieces of cordage and woven materials, as well as fibers that appeared to have been partly prepared and ready for twisting into yarn, were cleaned with small amounts of methanol and clorox to remove the accumulation of dirt and stains on them. These fragments of vegetable material were then compared, one at a time, to the knowns that had been recently prepared. This was done with the aid of a 100- and 250-X microscope. The greatest value of these microscopic examinations occurred in the study and tentative identification of an unusually soft material which was found in 9.9% of the cordage. The cell of this soft material was extremely fine and white, strongly resembling the fiber of the milkweed plant. However, it is important to realize that this was a superficial examination, and before these materials may safely be classified into botanical species designations, a more thorough examination is necessary. For this reason the use of the term "milkweed" fiber will be avoided in this report and this fiber will be referred to as "soft" as versus the most common "hard" fibers.

Visual inspection and comparison with known fibers of Indian hemp, collected by the investigator, tentatively identified the majority of the "hard" fibers found at Sheep Rock as Apocynum. Also the thin strips of bark often found in a small coiled form appear quite definitely to be strips of the American elm. Many of the circular loops tied with knots are quite obviously corn husk strips.

A simple preliminary fiber-identification test was used in cases where it was necessary to distinguish animal from vegetable fibers. This was accomplished by pulling a few fibers out of the sample with tweezers and burning the free ends in an open flame and noting the odor, color, and shape of the ash and whether or not the fibers burn slowly or quickly, and whether combustion continues when the flame is removed. If the unknown is wool or hair, it burns slowly, leaving lumps and charred balls in the ashes; also, the characteristic odor of burnt hair is evident if several fibers are ignited. On the contrary,

Figure 1



fibers that burn quickly, leaving a homogeneous ash, and continue to burn after the source of combustion is removed are vegetable seed hairs, bast fibers, and structural fiber bundles.

CORDAGE

By far the most numerous type of vegetable fiber artifact found at Sheep Rock was cordage. Particular attention was paid in this study to type of fiber -- whether soft or hard -- diameter of the completed piece of cord, the tightness of twist as measured by number of half-twists per centimeter, and direction of twist -- Z or S.

Before proceeding further it is necessary to define the terms used in the description of cordage types in this paper.

Fiber - one of the threadlike structures which combines with others to form animal or vegetable tissues

Yarn - formed by laying two or more fibers parallel to each other and twisting them slightly as a group

Strand or Cordage - two or more yarns twisted together

Ply - refers to the number of yarns forming a strand

Multiple Strand Cordage - two or more strands twisted together

The most illustrative description of the preparation of 2-ply cordage has been given by F. M. LeBar (1964:24) in his report on the Turkese, and is as follows:

> The worker, sitting with the left leg bent under the body, takes the unsplit end in the left hand and places the split end on the bare thigh just above the knee. The two ends are rolled forward under the right palm with slight pressure so that each strand is twisted somewhat, although the two strands remain separate, forming two plies. At the completion of the forward roll, the direction is quickly reversed and a backward roll, made with considerable pressure, twists the two strands together into a two-ply twine. The two plies are twisted throughout their length by repeated rolls, the unsplit end being split by pulling against the knee... The plies are kept going by placing new ones parallel and incorporating into the twist.

Although the above description refers directly to the manufacture of yucca cordage, it is apropos to the formation of cordage from materials native to northeastern United States. To apply this to the cordage

found at Sheep Rock, it is best to assume that two loose bundles of fibers were held in the left hand instead of the unsplit end referred to by Mr. LeBar. From there on the process is the same, the two loose ends being rolled forward on the right thigh under the right palm which thereby twists each group of loose fibers together slightly to form two separate yarns. Then the direction of roll is reversed by rolling the yarns up the right thigh toward the worker which twists the two yarns together to form a two-ply cord. The cord thus manufactured is drawn to the right and allowed to dangle off the thigh and the process of rolling the loose fibers together to form a yarn and then rolled backward to bind them together into a two-ply cord is repeated until the entire length of the fibers is exhausted or until the cordage is the desired length. The direction of rolling must be reversed after the yarn is formed by rolling the fibers slightly together because of the tendency of the yarn to untwist. When the yarn is bound into a two-ply cord by twisting two yarns together in a direction opposing that used to form the yarns themselves, the result is that the tendency of the yarn to untwist in one direction and the tendency of the cord to untwist in the other direction balance each other.

On the basis of the above information, it is now possible to explain the difference between S-twist and Z-twist yarns. A Z-twist yarn is formed by rolling the loose parallel fibers under the right palm from the right knee back up to the thigh toward the worker. This motion rolls the fibers in a counterclockwise direction; therefore, in the finished yarn the fibers slope downward to the left or, in other words, in the same direction as the middle bar of the letter Z. On the contrary, S-twist yarn is produced by rolling the loose fibers down the right thigh toward the knee, thus imparting a clockwise twist to the fibers and causing them to slope down to the right, or in the same direction as the middle bar of the letter S. As was explained above, in preparing cordage, the yarns must be rolled in the opposite direction in order to balance their tendency to unravel. Thus S-twist yarns are used to prepare Z-twist cordage and Z-twist yarns for S-twist cordage. For the same reason, a multiple strand cord with S-twist would be prepared from Z-twist strands which were formed from S-twist yarns, and vice versa. Examples of Z- and S-twist cordage are given in Figure 2.

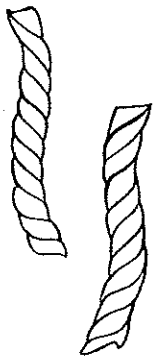


Figure 2

Besides the direction of twisting, the tightness of twist was weighted heavily in the report. Tightness of twist of the cordage was measured in terms of the number of half-twists per centimeter of cordage. It was felt that as the diameter of a piece of cordage increased, the number of twists per cm. would correspondingly decrease. Z- and S-twist, as well as cordage made of hard versus soft fibers, were compared to discover differences in their tightness of twist. This was considered to be an important factor in cordage manufacture since hard twisting compacts the fibers and prevents the penetration of moisture when the

cords are exposed to water; however, the yield of cord from a given length of yarn diminishes in proportion to the increase of twist.

At Sheep Rock were found 292 pieces of two-ply cordage, 2 four-ply cords, 2 pieces of multiple strand cordage, 3 snares, 3 sections of netting, and a 110 cm piece of cordage formed from 4 distinct pieces of cordage. All of these items will be described in the following sections.

Two-Ply Cordage

In order to analyze the 292 pieces of two-ply cordage, they were divided into classifications according to the direction of twist and hardness or softness of fiber. There were found to be 61 pieces of S-twist cordage, 40 of which were composed of hard fibers and 21 of which were of the soft fiber tentatively defined as milkweed fiber. The great majority of the cordage was Z-twist (231 pieces) of which 223 were of hard fibers and 8 were of soft fibers. Thus there were 263 pieces of hard fiber cordage and only 29 pieces of milkweed cordage in the total assemblage.

For the purposes of description and comparison of these four groups of cordage, the mean and the unbiased estimate of the standard deviation were calculated for the cordage diameters and number of half-twists per cm for each of the four distinct groups. The formula used to calculate the unbiased estimate of the standard deviation is given below:

$$\text{Standard Deviation} = \sqrt{\frac{\sum_i X_i^2 - NM^2}{N - 1}}$$

where

N = total number of cords in a group,

X = the diameter (or number of half-twists/cm) of an individual cord,

M = the mean or average diameter (or number of half-twists/cm) of the entire sample of cordage being considered.

The information obtained from these calculations is presented in Table 2.

This data suggests some interesting trends. For instance, although 84.8% of all the hard fiber cordage fell into the Z-twist category, only 27.6% of the soft fiber cordage was twisted in the Z direction. It is also amazing that in the group of all the Z-twisted cords, the mean diameter and the mean number of half-twists per cm are the same for both the hard and soft cordage. It is also highly improbable that there is any significant difference in the standard deviations of these two types of Z-twist cordage. On the other hand, the S-twist cordage for both types of fibers has a smaller diameter than does the Z-twist cordage, and the soft Z-twist cordage is wider than the hard Z-twist cordage. The data also indicate that the S-twist produced a finer cord diameter with a greater tightness of

	Fiber Type	Diameter		Number of half-twists/cm	
		Mean	Stan. Dev.	Mean	Stan. Dev.
	hard (40)*	1.8 mm	0.668	3.94mm	1.44
S-twist (61)*					
	soft (21)	2.12mm	0.773	3.02mm	0.78
Z-twist	hard (223)	2.56mm	1.18	3.12mm	1.31
Z-twist					
	soft (8)	2.56mm	1.03	3.13mm	1.47

*Figures in parentheses indicate the number found in each category.

MEANS AND STANDARD DEVIATIONS OF THE DIAMETER AND TIGHTNESS OF TWIST OF ALL 2-PLY CORDAGE, DIVIDED ACCORDING TO DIRECTION OF TWIST AND FIBER TYPE

Table 2

twist when hard fibers were used. The diameter of the soft fiber S-twist cordage is also smaller, although the difference is not as significant as it is with the hard fibers. Also, the tighter clustering of points around a mean, that is, the smaller variation within a group, which occurred in three out of four cases in the S-twist cordage as contrasted with the greater variation in the Z-twist groups, would most likely be further exaggerated if the sample size of the S-twist cordage were greater.

In studies of twist direction of cordage found at other sites, it has often been hypothesized that variations in twist direction may have been caused by slight variations in left versus right handedness, in which case a left-handed person would produce an S-twist yarn by rolling the fibers down his left thigh rather than the Z-twist produced by a right-handed person rolling fibers down his right thigh. However, since 20.9% of all the cordage found at Sheep Rock was twisted in an S direction, it is unlikely that this was caused by variations in handedness alone. Also the fact that 72.4% of the 29 pieces of soft cordage received the S-twist (which occurred in only 15.2% of the hard cordage) suggests that the weavers deliberately chose one type of twist depending on what fiber they were working with and the result they wanted to achieve.

In order to support the original hypothesis that cordage diameter is inversely proportional to the tightness of twist, a preliminary check was made by plotting in graphical form diameter versus tightness of twist, selecting for this study the 61 pieces of S-twist cordage. As is shown in Figure 3, this inverse relationship is quite apparent; as diameter increases, tightness of twist decreases. The strength of this linear association was estimated by determining the correlation coefficient by use of the following formula:

$$r_{xy} = \frac{\frac{\sum X_i Y_i}{N} - M_x M_y}{s_x s_y}$$

where

r_{xy} = the correlation coefficient

X_i = number of half-twists for an individual piece of cordage

Y_i = diameter of an individual piece of cordage

N = total number of cords in group (61 in this case)

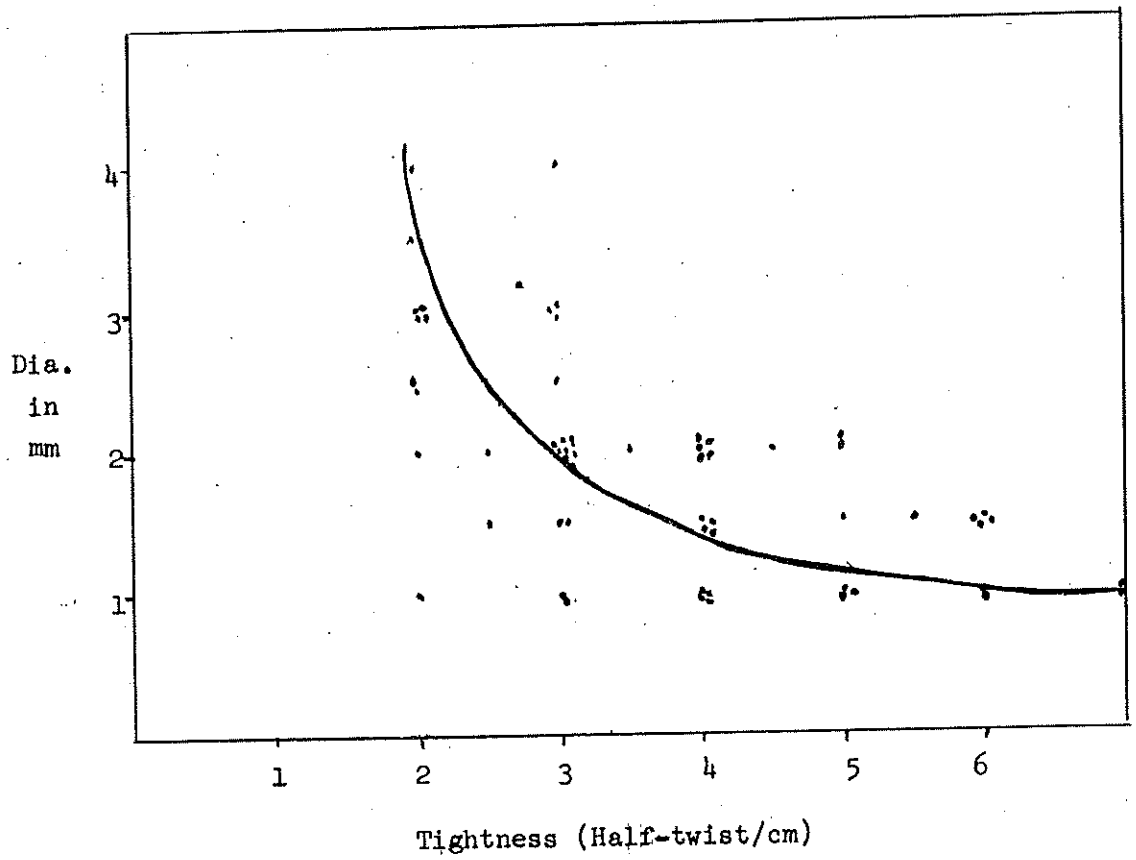
M = mean X or Y for the entire group of cordage

s = standard deviation of the X's or Y's of the group.

Thus, the correlation coefficient, r_{xy}, was -.62 for associating the diameter and tightness of all the S-twist two-ply cordage. Since an r_{xy} = -1.0 represents the most ideal inverse relation between two

Figure 3

RELATIONSHIP OF CORD DIAMETER AND TIGHTNESS OF TWIST



variables, the r_{xy} of -.62 obtained in this study supports the expected inverse relationship between diameter and tightness, and it may be further shown that 38.4% of the variation in one parameter is related to variation in the other. The asymptotes of this curve are sharper than would be theoretically expected because in this sample there were few pieces of cordage with a diameter smaller than 1.0 cm and a tightness of twist greater than 6.0.

In summary, of the 292 pieces of two-ply cordage found at Sheep Rock, 61 were S-twist and 231 were Z-twist. The S-twist group contained 40 pieces of cordage made from hard fibers and 21 from soft fibers; the Z-twist group contained 223 of hard fibers and 8 of soft fibers. In addition, a correlation coefficient test run on the 61 pieces of S-twist cordage indicated a definite inverse relationship between diameter of cord and the tightness of twist.

Three-Ply Cordage

According to the strictest definition of a three-ply cord as being composed of three yarns twisted together in the same operation, that is, that the worker rolls three individual bundles of fibers down or up his thigh depending upon whether an S or a Z twist is desired, only two pieces of three-ply cordage was found at Sheep Rock. Both pieces were made of the hard fibers presumed to be Apocynum (Indian hemp). The average diameter was 1.75 mm, and the average number of half-twists per cm was 5. One piece was twisted in the Z direction; the other in the S direction (Fig. 4).

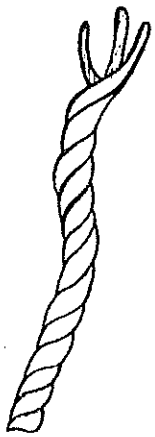


Figure 4

Two other types of cordage will also be considered in this category. One piece of cordage was formed by wrapping a thick bundle of vegetable fibers with a fine two-ply cord made of Apocynum to form a compact piece of cordage 6 mm in diameter. The fibers were completely encircled by the fine two-ply strand once each 0.5 cm of their length (see Fig. 5a). Also found was one piece of 6-mm diameter cord, bound tightly by a 1.5-mm wide strip of leather with the fur turned to the interior of the cord. The basic cord was composed of two hard vegetable fiber yarns twisted in the Z direction; the leather was twisted around the cord in an S direction, completely encircling it once per cm (Fig. 5b). This bound piece of cordage was found in direct association with two pieces of thick two-ply vegetable cordage. The leather may have been wrapped around this particular piece to give it increased strength and resiliency.

Four-Ply Cordage

One piece of four-ply cordage was found which had been manufactured by twisting together four Apocynum yarns in a Z direction. It was 5.5 cm in length and 4 mm in diameter. Both of its ends were burned (Fig. 5c).

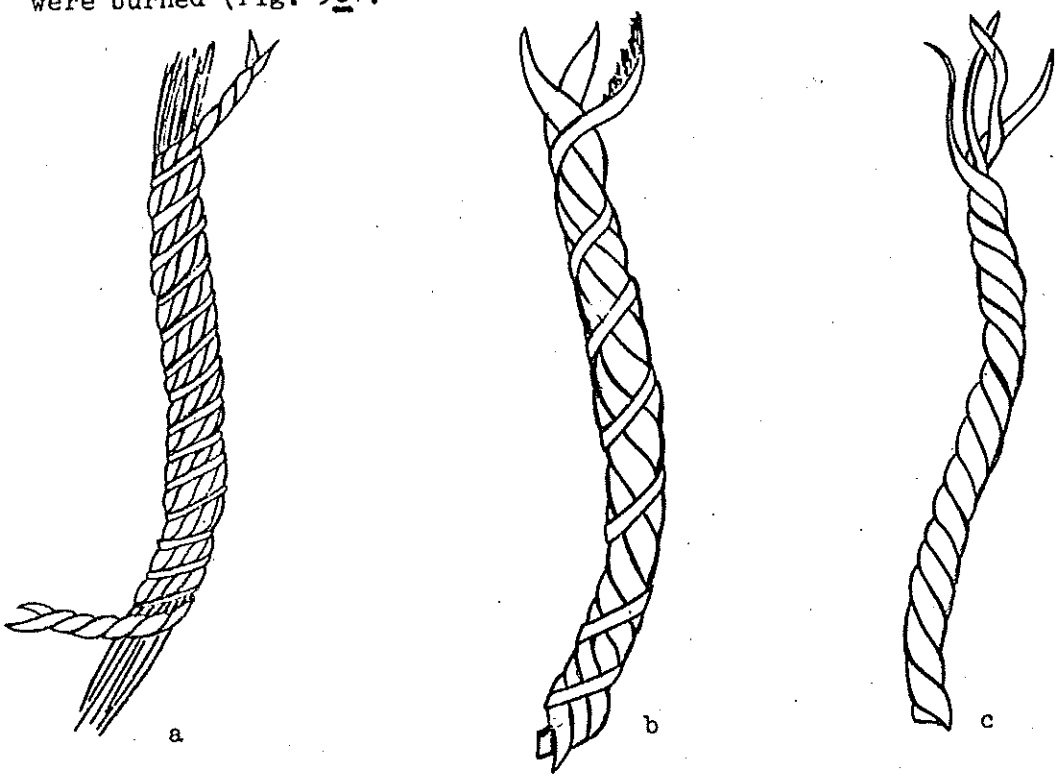


Figure 5

Multiple-Strand Cordage

Only one true example of a multiple-strand cord was found. It was composed of two two-ply strands (cords) of Apocynum, each of which had 4 half-twists per cm. When these two strands were twisted together, the result was a cord 2 mm in diameter which had 1 half-twist per 2 cm. In this case both the individual strands and the resulting cord were twisted in the Z direction which produced poor adhesion of the two strands and, therefore, the loose tightness of twist in the piece of two-strand cordage (Fig. 6).

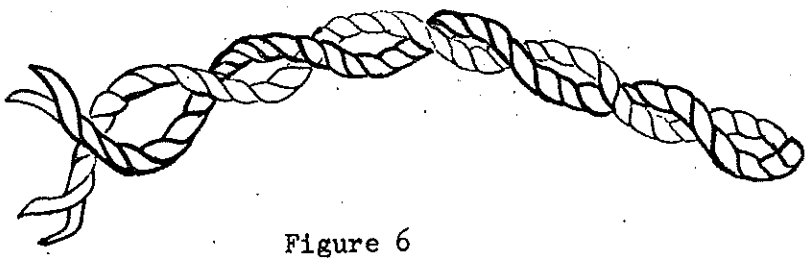


Figure 6

Another unique piece of cordage was formed evidently by rolling together two single yarns and one fine two-ply strand in a Z direction. This piece of cordage was composed of soft fibers and was 7 cm in length and 2.5 mm in diameter (Fig. 7).

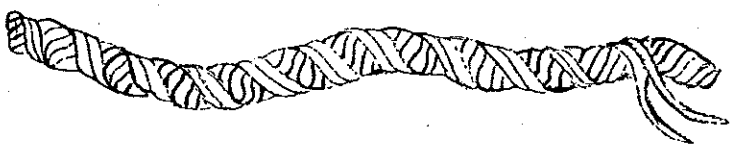


Figure 7

Four Two-Ply Cords Tied Together

The longest cord found at Sheep Rock was 111 cm long and was composed of four individual cords varying from 20 cm to 35 cm in length which were tied together with two granny knots and one square knot. This will be mentioned again in the section on Knots. The four individual strands were quite homogeneous. They were made from Apocynum fibers and were 1.5 to 2.0 mm in diameter. The tightness of twist was measured to be 4 half-twists per cm in a Z direction. One of the loose ends was burned. This is illustrated below.

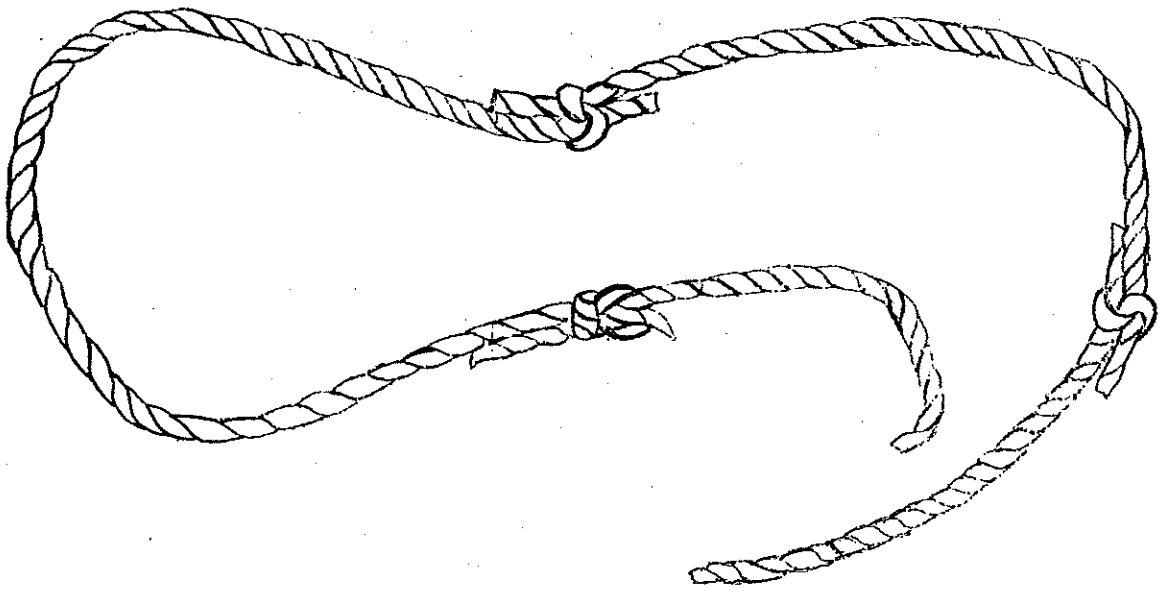


Figure 8

Snares

Three snares composed of Apocynum two-ply cordage were found wrapped together in a bundle. They were in excellent condition and retained much of their original pliancy and strength. They were also very homogeneous in size with an average length of 52 cm, average diameter of 1.5 mm, and 5 half-twists per cm in an S direction. The small loop in one end of each snare was tied with a running overhand knot and was approximately 1.4 cm in diameter (see Fig. 9). These snares were presumably used to catch small animals and birds.

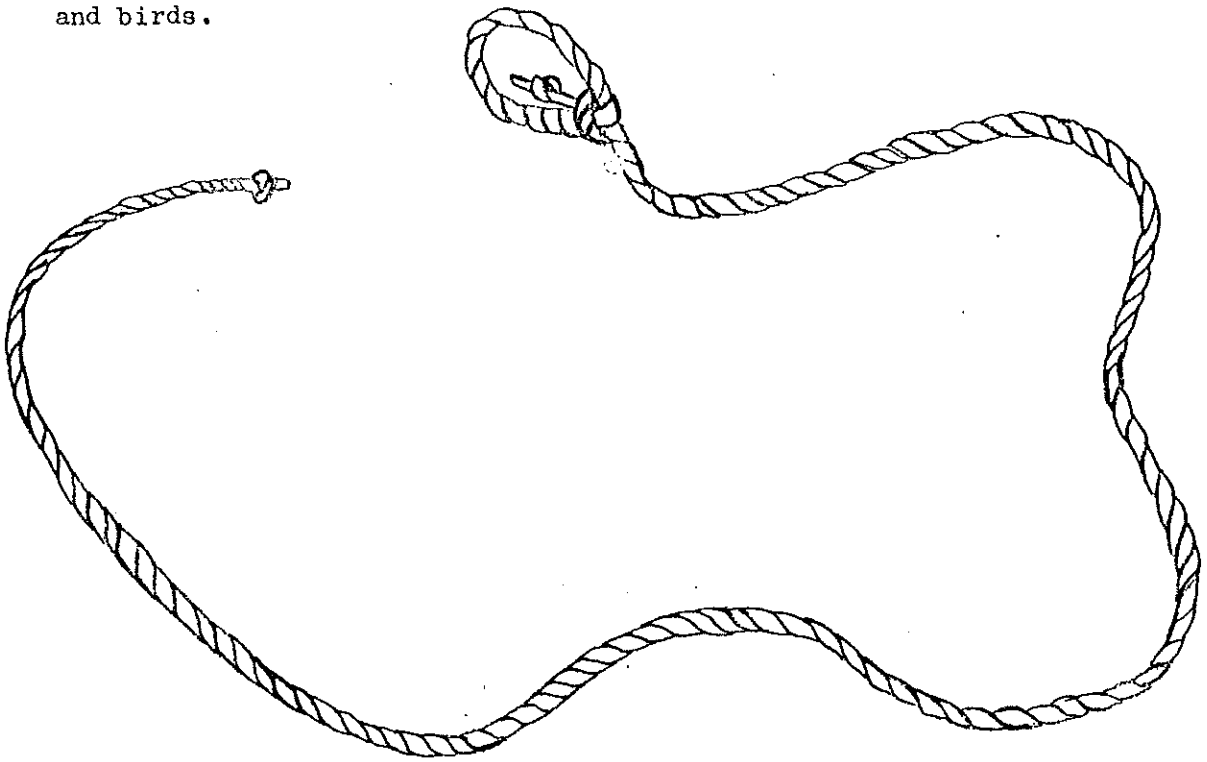


Figure 9

Netting

The three fragments of netting found are presented in this section, as were the snares, because they were formed from cordage and knots. The easiest method of manufacturing the net pieces found at Sheep Rock is by suspending individual lengths of two-ply cordage along a horizontal cord, either supported at each end by two vertical sticks stuck in the ground or extended between the trunks of two adjacent trees. The suspensory cord may also have been circular, in which case it could be attached to the worker's toe while he was netting. The suspensory cord serves as the point of departure for the first row of meshes, after which it functions only as a convenient means of fastening the end of the net to some object while netting. From there on the procedure

involves tying the adjacent cords together with a series of square knots to form a diamond-shaped pattern.

The net fragments found were in very fragile condition and the vegetable material used could not be determined. They were formed from a small diameter cord woven into a net with a 4-cm mesh. The cordage used was 1.5 mm in diameter, the number of half-twists per cm was 5, and it was twisted in a Z direction. These nets could have been used for the capture of very small animals or fish only, due to the fineness of the cordage (see Fig. 10).

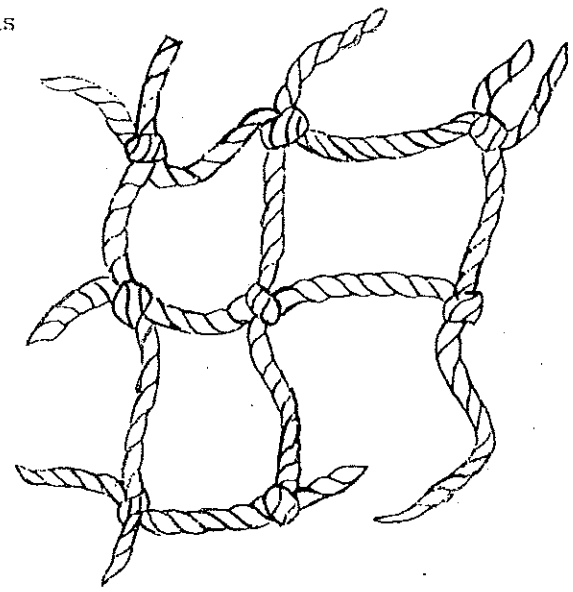


Figure 10

STRIPS, COILS AND LOOPS

Several thin strips of corn husk, elm bark, and leather were found in the dry section at Sheep Rock. Of these strips some were coiled into a tight bundle or in a fashion resembling the mainspring of a watch, while others were tied at the ends to form a loop or circle.

Strips

A great volume of bark material was found at Sheep Rock representing all the stages in the manufacture of cordage from the first stripping of the bark to the final twisting of the finished cord; numerous pieces of thick bark not yet split into a workable form and pieces of partly shredded bark were also found. However, the bark strips referred to in this analysis are those which had been split into sizes suitable for binding clothing together or for the performance of similar functions. In other words, these strips were not intended to be shredded for the manufacture of cordage but had an inherent purpose and were ready for use. Twelve bark strips of this type were found with a mean width of 3.83 mm and a mean length of 18.0 cm.

The eight strips of leather found had a mean width of 2.94 mm and a mean length of 12.0 cm. One of these leather strips still had animal fur attached to it. In general, the leather strips still showed a surprising amount of flexibility and strength. An important

function of the leather strips may have been in the manufacture of moccasins.

One 70-cm long strip of the husk of a corn plant was found preserved in fair condition. It was very thin and was 3-mm wide throughout its entire length.

Coils

Seven tightly coiled strips of bark were also found which appeared to have been rolled up pending future use. The mean width of these strips of bark was 2.79 mm. Of these seven coils, only four could be unwrapped without breaking the brittle bark material; the average length of the strips contained in these four coils was 38.8 cm. One of the coils is illustrated in Fig. 11.

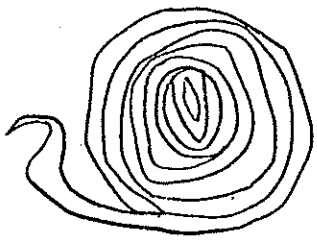


Figure 11

Also found was a large knot composed of several strands of fine cordage and another knot of the same general type but composed of several different kinds of vegetable fibers and yarns. These knots could have been used to bind the cords or fibers together until they were needed, at which time they were cut off and used, and the knot was discarded.

Loops

Fifteen loops, formed by tying together the two ends of a corn husk, bark strip, cord or braid, were found. Seven loops were made of corn husk strips with an average width of 6.0 mm; the average circumference of these seven loops was 35.2 cm. Four loops were made from bark strips with an average width of 2.5 mm; the average loop circumference was 18.0 cm. Two of the loops were made

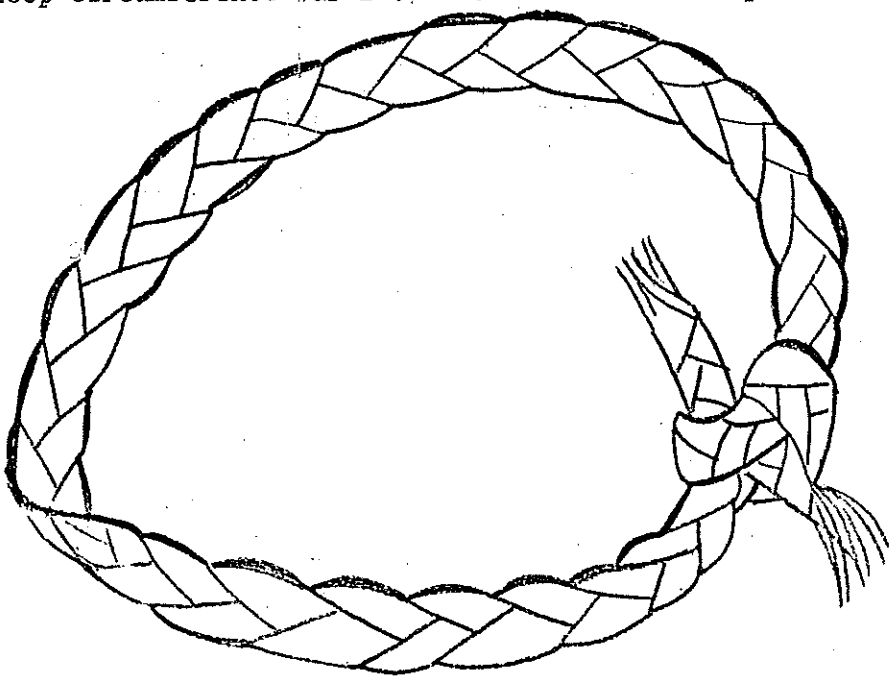


Figure 12

of two-ply cordage with an average diameter of 3.5 mm; the average circumference of these two loops was 10 cm. The two loops made from braiding had a mean circumference of 31.5 cm and a mean braid width of 7.5 mm (see Fig. 12).

KNOTS

Knots form an integral aspect of the cordage and textile industry of any site. For instance, at Sheep Rock knots were composed of almost every vegetable fiber present and were found in loosely bundled fibers, bark and leather strips, corn husks, yarns, cordage and textiles. Since the process of knot analysis required for this report was a lengthy one, the entire study of knot types was done by the assistant, Mary Moser. The rest of this section relates her conclusions concerning the knots found at Sheep Rock.

Two hundred and four knots were found among the dry vegetable artifacts catalogued up to this date. For the purpose of classification, each knot was examined for the method tying. Often it was necessary to look at a specimen through a magnifying glass and pick apart the fibers with tweezers. When a knot was not easily distinguished, it was reconstructed with a test piece of cordage. When each knot was determined, it was placed into a category which had been previously established (Graumont 1939). See Fig. 13 for examples of knot types.

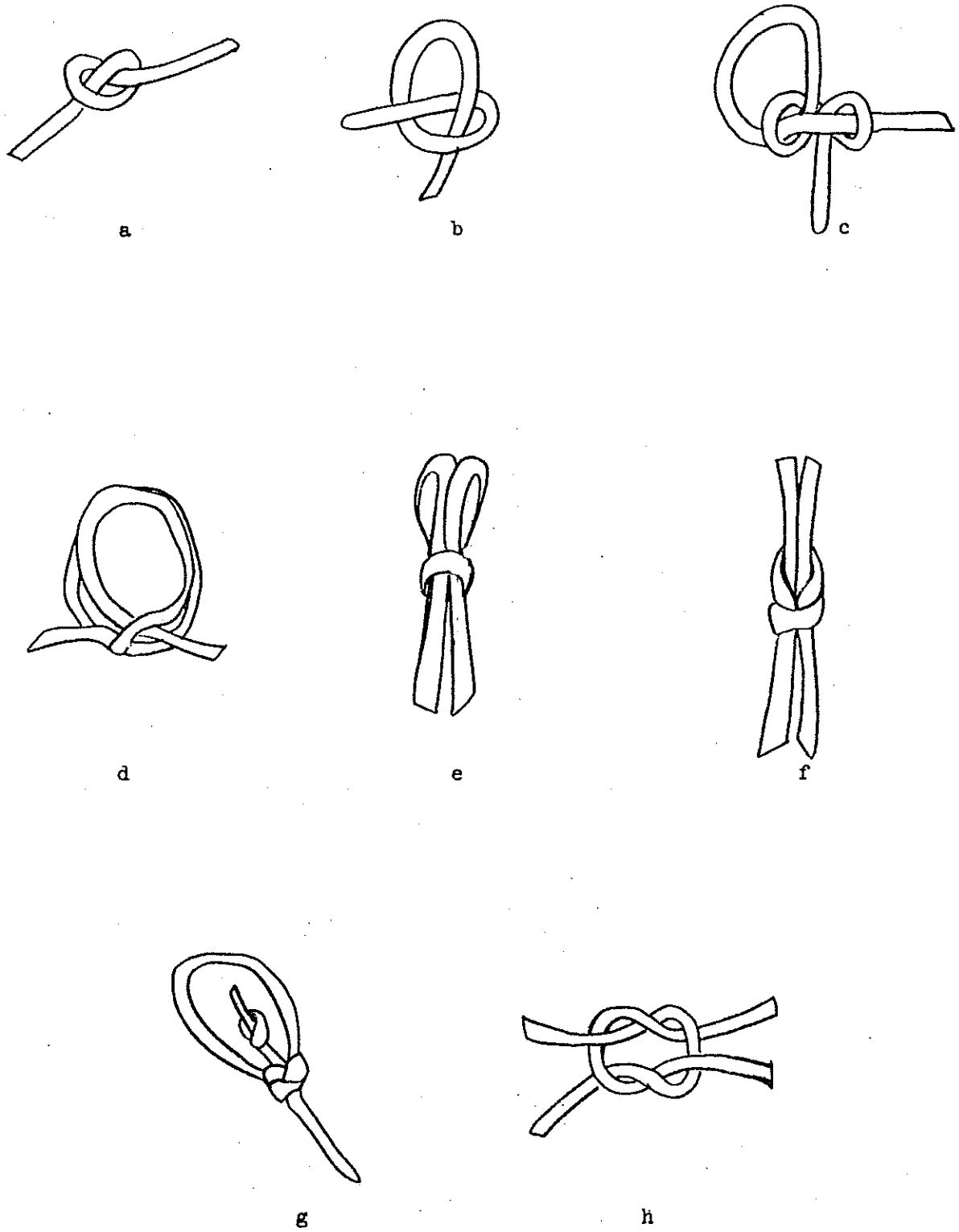
The knots found and the number of each are as follows:

Granny	55
Overhand	50
Square	41
Poorly Preserved	33
Two half hitches	11
Girth hitch	8
Running overhand	3
Half hitch	1
Compound	1
Clove hitch	1
Total	204

All of the girth hitches are tied on themselves rather than around something else, except for one which contains a loop; either the loops of the others broke off, or more likely, they are slipped square knots. Also, of the double half hitches only one contains a loop. The compound knot is one granny knot tied over another. The snare knot is an overhand knot with a slip loop that has an overhand on its end to keep it from slipping out; identical knots were found in Tularosa and Cordova Caves, New Mexico (Martin 1952). The poorly preserved category includes those knots with

Figure 13. KNOT TYPES.

Overhand (a), Halfhitch (b), Two halfhitches (c), Clove hitch (d), Girth hitch (e), Square knot (f), Running overhand (g), Granny knot (h).

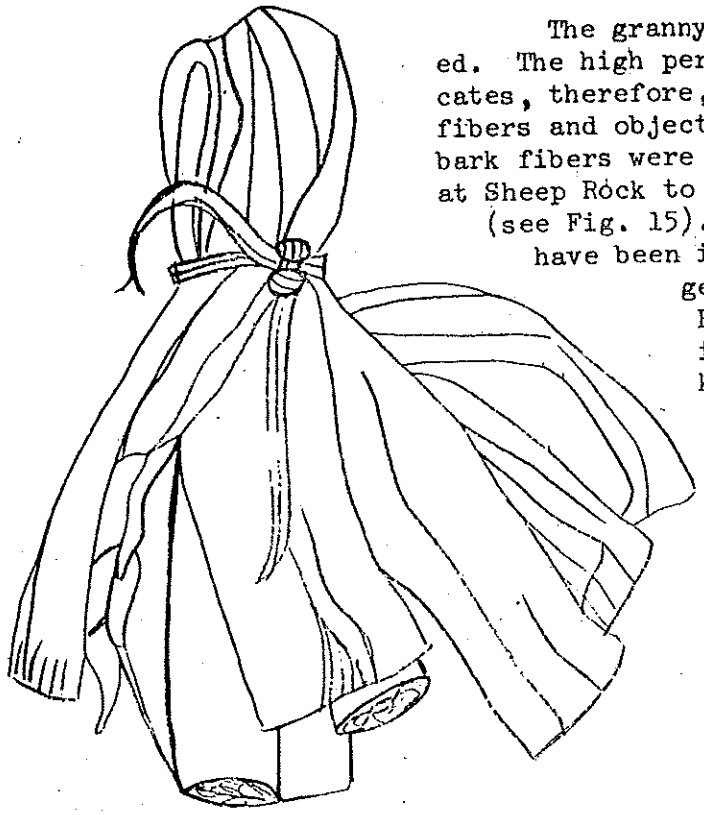


missing ends (making it impossible to determine the origin of each turn of the cord) and those with separated fibers.

It was repeatedly noted during the rough classification of the knots that many of the granny knots were not tied in a typical granny-knot fashion (Fig. 14a,a'). The opposite ends were pulled together. A knot was constructed (Fig. 14b) which looks like the granny knot but which has the two short ends originating from the same side (Fig. 14b'); the pairs of ends which naturally fall together in the tying process were pulled. It was suggested that a knot peculiar to Sheep Rock had been discovered! The entire granny knot division was reexamined. The rarity of long unbroken ends made it difficult to determine whether a knot was a Sheep Rock knot or a granny knot. The results showed, however, that the theoretical knot probably never existed (at least not as a type); there were only four possible Sheep Rock Knots. What was apparent was the tendency of the Sheep Rock Indians to tighten the granny knot by pulling ends a and d instead of ends a and b (see Fig. 14a). The following data was recorded:

Knots pulled with a and d together	26
Knots pulled with a and b together	11
Pull indistinguishable	18
Total	55

A few of the knots had come apart after the first analysis, hampering the job of determining the pull.



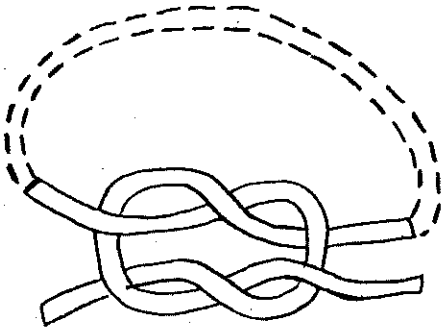
The granny knot comes undone when pulled. The high percentage of granny knots indicates, therefore, that the tension between fibers and object was minimal. Corn husks and bark fibers were probably used most commonly at Sheep Rock to tie material into bundles (see Fig. 15). Pieces of cordage seem to have been indiscriminately knotted together to make longer pieces. For example, the cord shown in Fig. 8 contains two granny knots and one square knot.

The primary use of overhand knots may have been to prevent unraveling. A few, however, were double-stranded and join two pieces of cord.

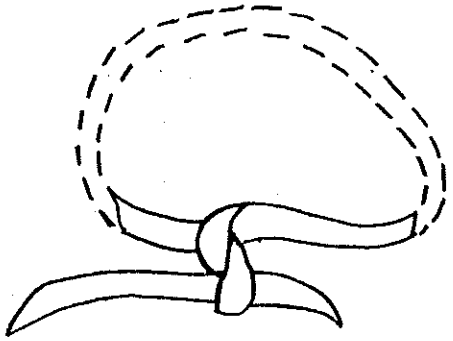
In at least two cases, definite tension would have been present. Both the snares and the netting involved the weight of hanging

Figure 14. GRANNY KNOTS.

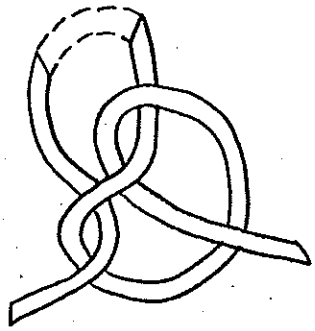
A typical granny knot is represented by a, a'; the variation found at Sheep Rock by b, b'.



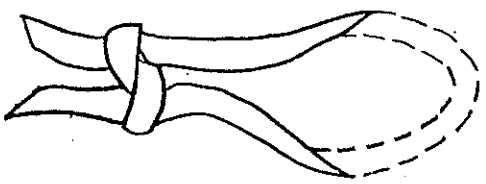
a



a'



b



b'

or struggling animals. Appropriately, square knots (25 of the total 41 square knots were from netting fragments) and running overhand knots were used.

BRAIDING AND PLAITING

Braiding and plaiting are considered separately from cordage in this report because the technique of manufacture is entirely different than that used for cordage. To make a braid, it is necessary to attach the yarn or strand ends to a focal point or suspensory cord; the yarns are then woven by hand over and under in a regular pattern. Some authors make no distinction between plaiting and braiding; however, in this report braid is considered to be produced by the entwining of three yarns or strands; whereas, the process of plaiting involved four or more lengths of yarn or cordage. Braiding may be distinguished from three-ply cordage by its characteristic pattern which is illustrated in Fig. 12. On the other hand, plaiting is distinctive from weaving because it has no framework of supporting warps versus active wefts as there is in weaving; all of the pattern is produced by the interlacing of one set of elements (see the definition of warp and weft given under Weaving).

Braiding

Sixteen pieces of the normal three-ply braiding were found. The average length of these pieces was 14.4 cm; the average diameter at their widest points was 6.23 mm. The widest piece was 9 mm and the narrowest was 2 mm; the median fell at 7.0 mm. Two of these sixteen pieces were knotted to form loops and were discussed under that section.

Two other pieces of braiding were bound by a third element. One was a 6.5 mm wide by 14 cm long piece of corn husk braiding around which was twisted a 1.5 mm diameter two-ply cord of Apocynum with 4 half-twists per cm. This finer cord was wrapped around the braid once per cm in a Z direction (Fig. 16a). The other piece of braiding, composed of a rough vegetable material, was 14 cm long. Around it was twisted a 4 mm wide strip of leather approximately once each 2.5 cm in a Z direction. This strip of leather with the animal fur still attached was very

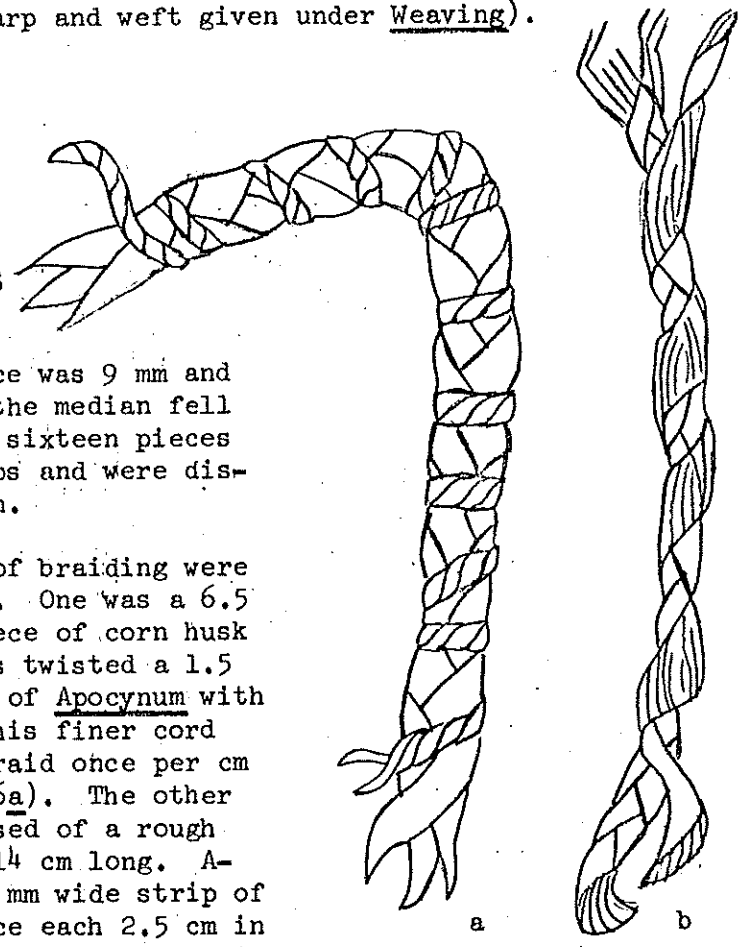


Figure 16

strong and pliable and imparted much flexibility to the braid it encircled. It may be bent much like a piece of heavy metal wire.

Plaiting

Seven pieces of plaiting were found, all of which were extremely deteriorated. Their average length was 8.1 cm and their average width was 1.47 cm. It was impossible to determine the number of strands involved in the manufacture of four of the fragments; in the other three pieces of plaiting 12, 10, and 8 strands were utilized. The average diameter of the strands was 1.75 mm, and the average number of half-twists per cm of each strand was 4.25. The pattern could be discerned on only the plaiting composed of 12 strands of two-ply cordage; this pattern is presented schematically in Fig. 17. In this illustration the strands descending to the left are shaded and those descending to the right are unshaded in order to emphasize the pattern of over-two-under-two, which carried each strand past the other 11 strands until it reached the side opposite from where it had begun. The strands were woven at an interval of over-two-under-two inside the border. At the edge of the border they were bent sharply at an angle to form the outside finished edge and woven back into the body at the same interval to produce a constant pattern.

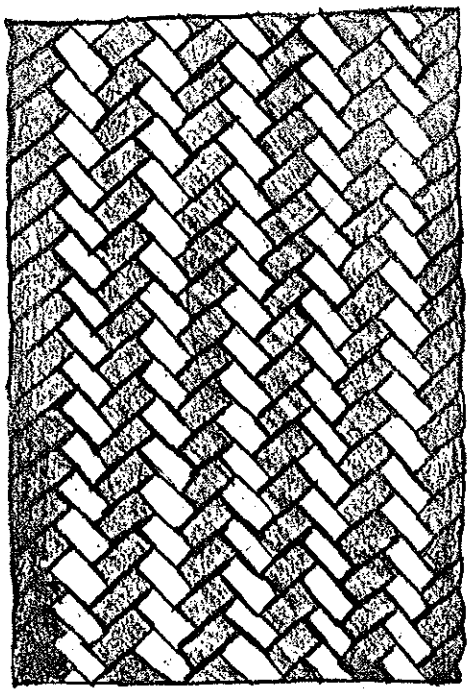


Figure 17

For a more thorough explanation of the techniques and types of plaiting, the reader is referred to Webb (1942).

A knot formed from a strip of plaiting was also found. A possible use for the plaited strips found at Sheep Rock would be as pack straps or as handles on baskets intended to carry heavy burdens. The amount of cordage compacted into a single band by the technique of plaiting results in a very strong strip that would withstand great weights.

WEAVING

Weaving as versus plaiting requires the use of two distinct groups of parallel yarns or strands. One set, the warp, must be kept under tension during weaving, while the other set, the weft, is passed over and under the warps, at right angles to them. Thus, the warps are the passive while the wefts are the active elements in weaving. Since no

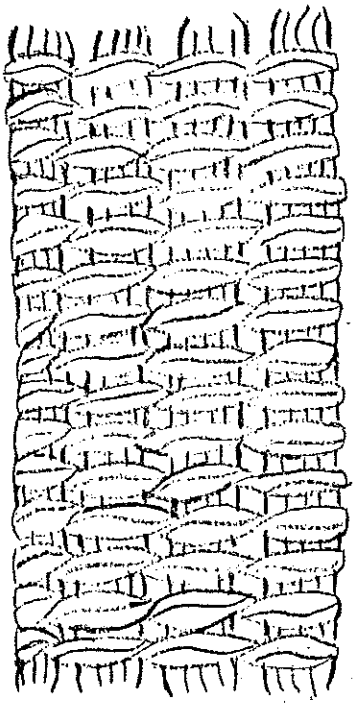
fragments of looms or shuttles have been found at Sheep Rock, it must be assumed that the weaving was done by the fingers, possibly with the use of an awl to separate the yarns to allow the wefts to pass through at points. This is not surprising since all of the textiles found were woven in a very simple manner. In the absence of a loom, all of the warps were probably tied to a suspensory cord, that is, a horizontal cord supported by two vertical branches or a circular loop that could be hooked over the toe, the purpose of which was to serve as a means of securing the cloth during weaving.

Included in this section are the seven pieces of soft cloth textiles, a fragment of an open mesh mat, a piece of a bark mat, and two wooden splints with bark coiled around them.

Plain Twined Weaving

According to W S. Webb (1942), fabrics constructed by interlacing the warp and weft to form a simple twined weave are very characteristic of rock shelter dwellers. The textiles found at Sheep Rock support his statement one-hundred per cent. All of the seven fragments of soft material found illustrate plain twined weaving. According to O. W. Mason (1964), plain twined weaving is formed from a set of warp elements which may be reeds, or splints, or cordage; the weft consists of two strips of root or other flexible material, which are twisted as in forming a two-strand rope passing over a warp stem at each halfturn. A downward lean of the weft is produced by a twist toward the worker.

Two important variations of the plain twined weaving occur when the count, which is the ratio derived from the number of warps per cm/number of wefts per cm, is considered. Two of the fabrics with plain twined weaving had a count of 3.5 warps/7.0 wefts. In both of these cases, the warps and wefts were composed of a two-ply strand which was 1 mm in diameter. Both warps and wefts were composed of the same type and size of cordage. The warps were single with the wefts twisted around them like a figure-8 as explained above. As may be seen by examining the count, since both warps and wefts were of the same diameter, the warps were much farther apart than the wefts; thus, in these two cases the warps were completely obscured by the tightly-packed wefts, which slant downward to the left (see enlarged section in Fig. 18).



Four of the textile fragments had a very different average count of 3.0 warps/1.8 wefts. In two of these cases, the warp was a loose fibrous braid and in the other two the fibers were merely twisted into a loose yarn. In each case the warp diameter was 3.3 mm and they were bound side by side, resulting in 3 warps per cm. In each case the weft was a two-ply cord of Apocynum, 1 mm in diameter,

with about 0.8 cm between adjacent wefts. The wefts in these four fragments sloped downward to the right (Fig. 19). It is interesting that although all of these textiles were woven by the same basic technique, slight shifts in the placement of the warps and wefts in relation to each other as well as the use of different sizes of warps and wefts caused what might be considered two entirely different weaving styles upon superficial examination (compare the enlarged examples given in Fig. 18, 19).

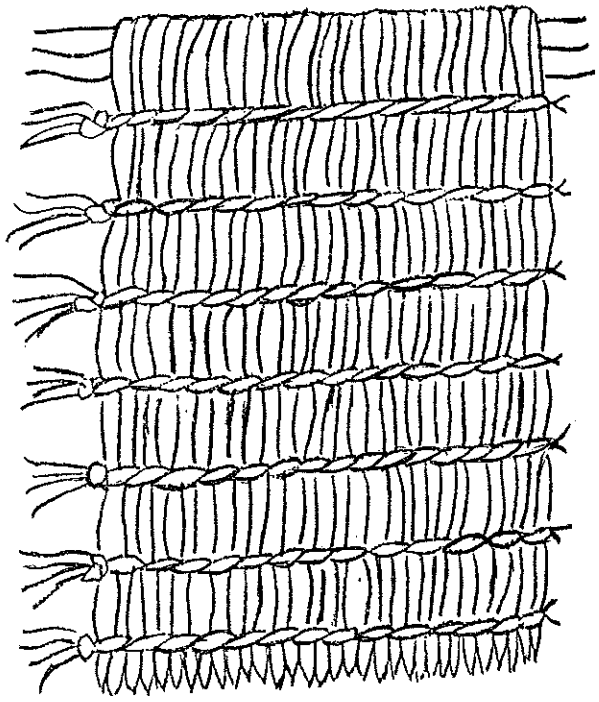


Figure 19

Another piece of textile similar to the four with a high warp-weft ratio was not considered above because it appeared to be in an initial phase of manufacture; since it contained only one weft strand, the count could not be determined. It consisted of two 4-mm fibrous braid warps laid side by side with one double weft twined around them in the simple twined manner. The weft was 1.5 mm in diameter with 5 half-twists per cm. It was found in direct association with four loose braids similar in form and composition to those incorporated in the weaving.

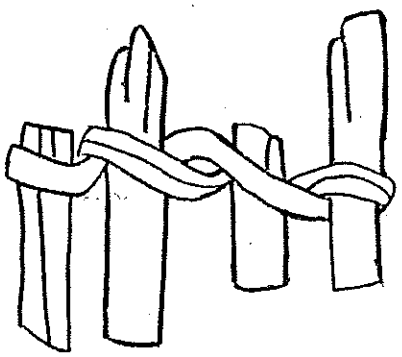


Figure 20

Bark Mat

This piece of a bark basket or mat was 4 cm by 3.5 cm in dimension. The warps were composed of pieces of bark that were 2 mm thick and 6 mm wide. There were 2 mm between adjacent warps. The warps were bound together by only one weft which was a thin strip of bark 2 mm wide. This piece again illustrates the use of plain twined weaving at Sheep Rock. It is shown in Fig. 20.

Open Mesh Mat

This fragment of meshwork, illustrated in Fig. 21, strongly resembles the open mesh mat described by Sharrock (1963). It appeared to be in an initial stage of manufacture since the weft wrapped around the border of four warp elements and then continued into a 3 cm by 7 cm mass of shredded bark material. The weft was formed of twisted bark fibers, but the warps were composed of flattened tubular stems. This fragment seems to be part of the border, the selvage of which was formed by doubling the warp elements and reinserting them under an adjacent stitch. The longest warp was 6 cm in length, and the average width of the warps was 0.75 cm. The weft was 4 cm long across the edge of the warps.

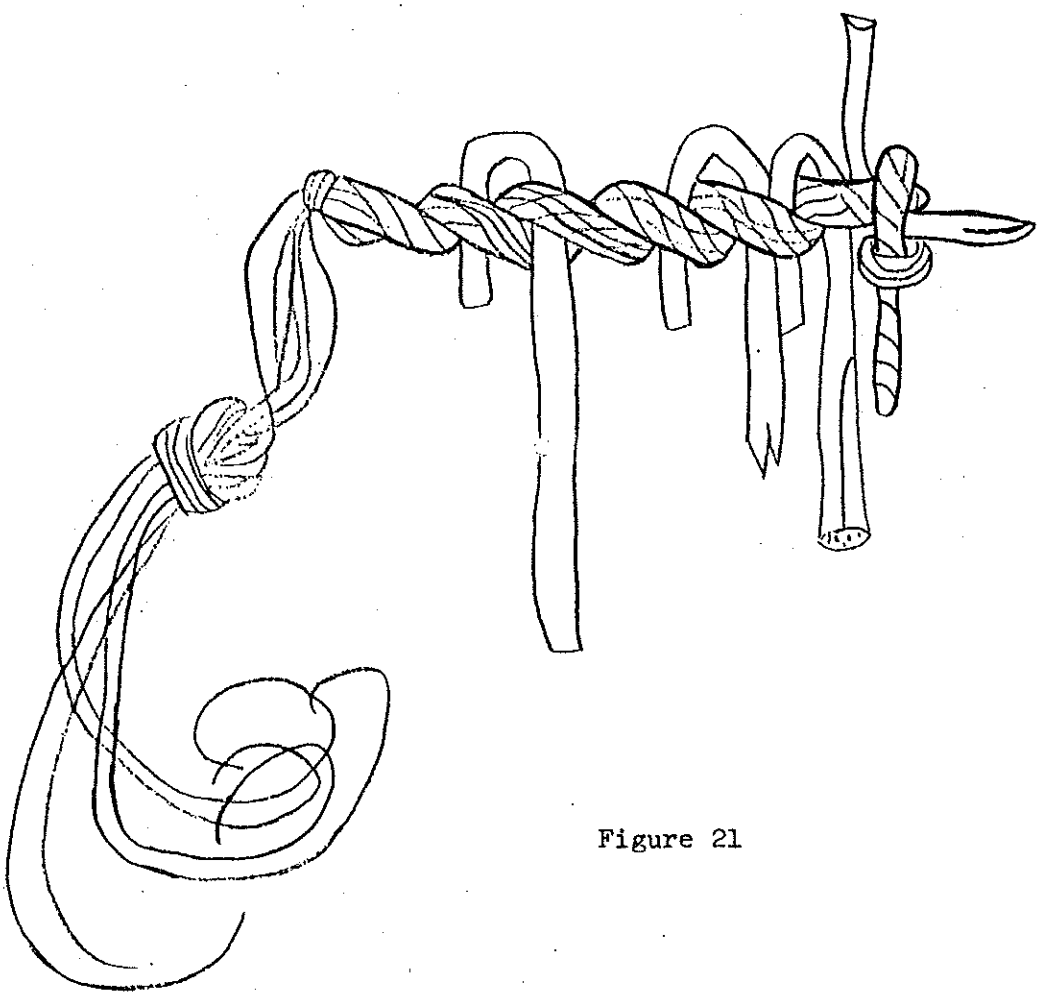


Figure 21

Wood Splints with Bark Coiled Around Them

There were two examples of a bark strip knotted and wrapped around a piece of wood 6.5 cm long and 8 mm wide. The one shown in Fig. 22 was whittled on one end. Although these could merely have been used as spools on which to store bark until it was needed, the curvature of the splints and the manner in which the strips were coiled instead of merely being wound around the splint in a circular fashion suggest that they may represent parts of foundation rods for the manufacture of coiled basketry. It may also be significant that the splints had exactly the same dimensions.

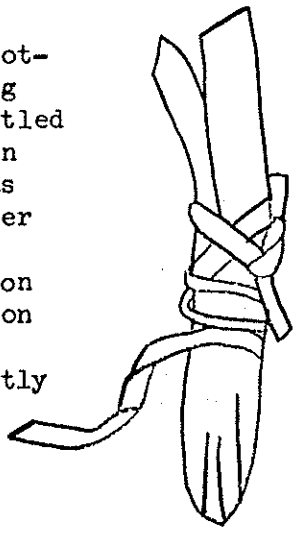


Figure 22

SUMMARY AND CONCLUSIONS

The basic purpose of this report was to describe the accumulation of cordage, woven materials and other associated artifacts found at Sheep Rock (36 Hu 1); therefore, the basic types of artifacts with the number found of each are summarized in Appendix I. This textile industry was divided according to the manufacturing technique into the following categories: cordage, strips (includes coils and loops), braiding and plaiting, and weaving. Each category was then subdivided according to parameters of ply, varying technological styles, direction of twisting or material.

An intensive analysis of the 292 pieces of 2-ply cordage found revealed that 78.9% were Z-twisted. Eighty-four per cent of the hard fiber cordage was Z-twisted while 72.4% of the soft fiber cordage was S-twisted. The average number of half-twists per cm was 3.3. These results are strikingly similar to those for the entire southwestern United States where the most common type of cord is 2-ply Z-twist. The majority of the bast fibers is S-twisted while the majority of hard fibers is Z-twisted. Most of the cords are from 2 to 3 mm in diameter with 3.6 half-twists per cm (Martin 1952).

A detailed study of the 204 knots found was also done. Fifty-five of them were granny knots (some of which were tied in a manner typical to Sheep Rock), 50 were overhand knots, 41 were square knots, and 33 could not be determined. Half hitches, girth hitches and the clove hitch were also present.

All of the woven material was formed using a plain twined weave. These textiles were very simple in composition and the fibers were all natural and undyed. The only variation in patterning was produced by alterations in the materials and relative spacing of the warps and the wefts. Since only fragments of textiles were found, it is difficult to assign a function to them. However, it may be suggested that the heavier pieces could have been parts of rough mats or bags for carrying purposes. This method of plain twined weaving was reported to be the most popular twining technique used at Danger Cave (67.3%) with a count of 4.5 warp/7 wefts (Jennings 1957). This was also a common count at Sheep Rock.

That the inhabitants of Sheep Rock were small game hunters is indicated by the existence of the three snares and the fragments of netting which may also have been used to catch fish. There is no indication of an aesthetic focus on the cordage or woven materials found; they seem to serve merely a utilitarian function.

SUGGESTIONS FOR FURTHER RESEARCH

Since this was only a preliminary report, there are many interesting aspects of the cordage and textile assemblage found at Sheep Rock which have only been touched upon in this paper. One of the most important factors -- that of fiber identification -- needs clarification. This investigation was done visually and with microscopic examinations to compare the unknown fibers with knowns that were collected by the author. Although this is a superficial method, it was chosen because of limited time. Given enough time and the proper equipment, a cross section should be made of each representative type of fiber found at Sheep Rock. Cross sections should also be made of known possible sources of vegetable fibers native to Huntingdon County, which would be suitable for textile manufacture. These cross sections should then be treated by the staining techniques established by the American Association of Textile Chemists and Colorists. By using the microscope first and chemical tests for confirmation the investigator would accumulate familiarity with fiber characteristics which would enable him to easily identify fiber types.

The absolute identification of the vegetable materials utilized at Sheep Rock would open up several avenues of investigation. For instance, is fiber type associated with degree of preservation, cordage strength, cordage diameter, or the direction of twist? Are there any correlations between knot type and vegetable fibers used? Were there any materials used which were foreign to the Sheep Rock vicinity, which might indicate trade with tribes not indigenous to that area?

It might also be of value to attempt to rank the degree of preservation of the materials to determine correlations between preservation and distance from the drip line and depth below ground surface. It should also be noted that many of the pieces of cordage were burned on the ends, which indicates that they may have been part of a fire-making kit. All of the above remarks plus countless others suggest great possibilities for further research on the cordage and textile artifacts of the Sheep Rock site.

Appendix 1

LIST OF TEXTILE ARTIFACTS ANALYZED

	Number
Braid	18
Coils	7
Cordage, four cords tied together	1
Cordage, four-ply	1
Cordage, knot bundle	2
Cordage, multiple strand	2
Cordage, three-ply	4
Cordage, two-ply	292
Knots	204
Loops	15
Netting, fragments	3
Plaiting	7
Plaiting, knot of	1
Snares	3
Splints with coiled bark	2
Strips	21
Weaving, fragments	9

PERISHABLE MATERIALS OF SHEEP ROCK

WOOD, LEATHER, GRASS, FUR, AND FEATHERS

by

Donald E. Hardenbergh, Jr.

ABSTRACT

The perishable material in this report consists of wood, leather, grasses, fur, and feathers. For the purposes of the preliminary report a descriptive typology was constructed as opposed to one based upon function. Physical form was one of the main criteria used in the construction of this typology.

Despite the emphasis of physical characteristics, it is possible to come to some conclusions as to function. It appears that the collection of perishable material can largely be divided into several activity categories. These include hunting, horticulture, and textile manufacture. There are probably other activities represented by the material, but these are the ones which have been identified at the present time.

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TABLE OF CONTENTS

	Page
ABSTRACT	305
ACKNOWLEDGMENTS	307
TABLE OF CONTENTS	309
LIST OF ILLUSTRATIONS	311
I. INTRODUCTION	315
II. WOODEN ARTIFACTS	316
Bundle of Twigs	316
Frayed Twigs	316
Bark Strips Tied Together	316
Grooved Rectangular Board	317
Rectangular Bark Boards	317
Bark Boards	317
Bark Boards With Holes	318
Bark Container	318
Decorated Wood Stick	318
Forked Stick	319
Paddle Shaped Stick	319
Bow Shaped Stick	319
Pointed Splinters	319
Pointed Beveled Splinter	320
Shaft With Inset Cylindrical Point	320
Twig With Blunt End	320
Shaft With Gouged Out End	320
Flat Wood Strips With Rounded End	321
Notched Shafts	321
Twigs Wound With Cordage	321
Hollow Twigs	322
Short Blunt End Shaft	322
Wood Chip With Drilled Holes	322
Split Sticks	322
Long Blunt End Sticks	323
Wooden Sticks With A Hemispherical Socket	324
Shredded Bark	324
Bark Strip With Evenly Spaced Holes	325
Split Blunt Sticks	325
Straight Shafts	325
Blunt Pointed Shafts	326
Teardrop Shaped Splinter	326
Pointed Sticks	326
Wood Strips Woven Together With Bark	327
Strips of Bark, Knotted and Unknotted	327
Flat End Sticks	327

		Page
	Worked Wood Fragments.	327
	Worked Bark Fragments.	328
III.	GRASS AND FIBER MATERIAL.	328
	Fiber Wound With Hair.	328
	Matted Material.	328
IV.	LEATHER AND LEATHER ARTIFACTS	328
	Heavy Piece of Leather	328
	Pleated Leather With Holes Along Its Edge . .	329
	Leather With Holes And A Straight Edge . . .	329
	Leather Thong	329
	Leather With Holes.	329
	Leather With Fringe	330
	Leather Tied Together.	330
	Miscellaneous Pieces of Leather	330
V.	ANIMAL FUR AND HAIR	330
	Fur Scraps	330
	Hair	330
VI.	FEATHER REMAINS.	331
	Large Feathers	331
	Small Pieces of Feather	331
VII.	CONCLUSION	331

LIST OF ILLUSTRATIONS

		Page
Figure 1.	Map showing the distribution of artifacts.	335
Figure 2a.	Bundle of twigs	337
Figure 2b.	Frayed twig.	337
Figure 2c.	Bark strips tied together	337
Figure 2d.	Grooved rectangular board	337
Figure 3.	Rectangular bark board	339
Figure 4a.	Bark board	341
Figure 4b.	Bark board	341
Figure 5a.	Bark board with holes	343
Figure 5b.	Bark container.	345
Figure 5c.	Decorated arrow shaft fragments	343
Figure 5d.	Decorative motif of arrow shaft fragment	343
Figure 6a.	Forked stick	347
Figure 6b.	Paddle shaped stick	347
Figure 7.	Bow shaped stick	349
Figure 8a.	Pointed splinter	351
Figure 8b.	Pointed beveled splinter	351
Figure 8c.	Shaft with inset cylindrical point	351
Figure 8d.	Twig with blunt end	351
Figure 9a.	Shaft with gouged out end	353
Figure 9a.	Flat wood strip with rounded end.	353
Figure 9c.	Flat wood strip with rounded end.	353
Figure 9d.	Notched arrow shaft	353
Figure 9e.	Notched arrow shaft	353

		Page
Figure 9f.	Twig wound with cordage.	353
Figure 9g.	Feathered section of arrow.	353
Figure 9h.	Pipe stem	353
Figure 10a.	Short blunt end shaft	355
Figure 10b.	Wood chip with drilled holes	355
Figure 10c.	Split stick.	355
Figure 10d.	Split stick.	355
Figure 10e.	Split stick.	355
Figure 11a.	Long blunt end stick.	357
Figure 11b.	Long blunt end stick.	357
Figure 11c.	Wooden stick with hemispherical socket. . .	357
Figure 11d.	Wooden stick with hemispherical socket. . .	357
Figure 11e.	Wooden stick with hemispherical socket. . .	357
Figure 12.	Shredded bark	359
Figure 13a.	Bark strip with evenly spaced holes. . . .	361
Figure 13b.	Split blunt end stick	361
Figure 13c.	Split blunt end stick	361
Figure 13d.	Straight shafts	361
Figure 14a.	Blunt pointed shaft	363
Figure 14b.	Blunt pointed shaft	363
Figure 14c.	Blunt pointed shaft	363
Figure 14d.	Blunt pointed shaft	363
Figure 14e.	Teardrop shaped splinter	363
Figure 14f.	Pointed stick	363
Figure 14g.	Pointed stick	363
Figure 14h.	Pointed Stick	363

		Page
Figure 15a.	Wood strips woven together.	365
Figure 15b.	Strip of bark, knotted	365
Figure 15c.	Flat end stick.	365
Figure 15d.	Fiber wound with hair	365
Figure 16a.	Heavy piece of leather	367
Figure 16b.	Pleated leather	367
Figure 16c.	Leather with holes and a straight edge. . .	367
Figure 17a.	Leather thong	369
Figure 17b.	Leather with fringe	369
Figure 18a.	Leather tied together	371
Figure 18b.	Leather tied together	371
Figure 19a.	Fur scrap	373
Figure 19b.	Fur scrap	373
Figure 19c.	Large feather	373
Figure 19d.	Large feather	373
Figure 20a.	Large feather	375
Figure 20b.	Large feather	375

INTRODUCTION

Sheep Rock, located in Huntingdon County along the Raystown Branch of the Juniata River, is unique among archaeological sites in the eastern United States in that it is a dry rock shelter protected from wind and rain by an overhanging cliff of shale. Because of this protection, the site has remained unusually dry, thus allowing the artifactual material to remain in an extremely good state of preservation. This is unlike other eastern sites, which are more exposed to the elements and therefore allow such materials as leather, wood, and feathers to decompose more quickly. Thus at Sheep Rock, due to the dry environment, a more complete picture of the living patterns of those who inhabited the area can be obtained.

However, this is not to imply that there are no limitations. Although the perishable material is well preserved, it by no means represents the entire sample of the perishable artifacts made and used by these people. Despite the dry setting, it is unlikely that any of the perishable material found at Sheep Rock is much older than the Late Woodland period, and it is more likely that most of it belongs to the Susquehannock and Proto-Historic periods, i.e. later than 1500 A.D.

Thus it is still only a guess as to the existence and the use of such materials before this time. However, the fact that there is a limit on the time period involved, is also an asset. The collection of perishable artifacts seems to represent a relatively homogeneous sampling of such material in regard to the time element. Thus the problems associated with stratigraphy and relative dating is of less concern than it is for the non-perishable material. The significance of this is that the collection can be treated as if it all belongs to the same cultural level, at least for the purposes of a preliminary analysis.

Approximately 250 pieces of artifactual material, consisting of wood, bark, grass, leather, fur, and feather were found at the site. This material was concentrated mainly in the "dry area," which is located in the northwest part of the site (Fig. 1). Almost no perishable material was retrieved from the southern area. This concentration of material in one area might be explained in two ways. It is possible that the northwest section was the center of the woodworking and leatherworking activities. However, since the site was occupied, at least on a seasonal basis, almost continuously since Late Woodland times, it seems unlikely that one area would remain as the center of a particular activity over such a long period of time, and especially in the small area involved at Sheep Rock.

A more likely explanation for this concentration of material, is that the southern area of the site is more damp than the northern

and northwest sections. This dampness is probably the result of the spring which is located in that area.

The data used in this report consist mostly of the provenience and physical attributes of the artifactual material, i.e. their size, color, and shape, and the typology worked out for this material is based upon the description of their physical characteristics. It is assumed that function depends upon form and that a typology based upon physical attributes would coincide closely with one based upon function. Further analysis is planned which will focus on function, as a test of this assumption.

For the purposes of this report, all references to pottery and projectile point types, when referring to associated artifacts, are based upon preliminary field indentifications.

WOODEN ARTIFACTS

Bundle of Twigs

Description. Fig. 2a. Four twigs of uniform length tied together by one strip of bark near one end. In cross section the twigs form a square. The bark remains on all four twigs, and all ends are rough, as if they were broken. Length 7.6 cm, width and depth 0.5 cm.

Associations. Found 62-76 inches b.d. just outside of a bark container. Appears to be culturally associated with the container, which is Susquehannock.

Function. Undetermined.

Frayed Twigs

Description. Fig. 2b. The outer layer of bark on the larger is gone, exposing the inner fibrous portion of the bark. On the shorter, the outer layer is also gone, but the inner layer is shredded. Length 8.4 cm, 4.1 cm dia. .7 cm, 3.5 cm.

Associations. The two twigs were found together in the same square.

Function. They were possibly used as a source for the fiber used in the manufacture of cordage and twine.

Bark Strips Tied Together

Description. Fig. 2c. Two narrow pieces of bark tied together with two strips of bark. One piece has two holes cut

through it with the bark strips passing through each and then around the other piece, and then knotted. The same end of each piece is charred and rounded. The other ends are splintered and the outside edges appear not to have been worn. Where the knotted strips of bark pass around the second piece of bark, the edge appears to be worn, indicating wear. The second piece of bark may have had, at one time, holes cut into it, as the other piece does, through which the knotted bark strips may have passed, but it may have since split lengthwise at that point. Length 16.0 cm, width 2.4 cm, thickness 0.5 cm.

Function. May possibly have been part of a larger basket or container.

Grooved Rectangular Board

Description. Fig. 2d. One side is flat and smooth, while the other has five grooves cut into it. One end is burned off diagonally, but the other three edges are straight and smooth. The two edges running parallel to the grooves are notched at one end. Length 3.7 cm, width 3.0 cm, thickness 0.6 cm.

Function. May possibly be a handle or preliminary comb work.

Rectangular Bark Board

Description. Fig. 3a. One end has been broken and is jagged, while the other is rounded and smoothed and cut on one side. One of the long edges is straight and rounded. The other is rough, but worn. The inside of the rounded end is rough and slightly worn at the edge. The rest of the inside is unworked but smooth. Length 17.0 cm, width 6.4 cm, thickness 0.8 cm.

Function. Board might have been used as a trowel for digging.

Bark Boards

Description. Fig. 4a. Five strips of bark. Four of them, two long and two short, are smooth on the inside and rough on the outside. Their edges are rough, except for one which is slightly rounded. The two long pieces are roughly rectangular with the ends rounded and smoothed off. The fifth strip is smooth on both sides. Three of its edges are rough, but the fourth is straight and rounded. Length 11.6 cm, 22.0 cm, 27.5 cm, 6.4 cm, 37.0 cm, width 2.7 cm, 5.7 cm, 6.8 cm, 1.7 cm, 5.1 cm, thickness 0.55 cm, 0.5 cm, 0.8 cm, 0.5 cm, 0.75 cm respectively.

Associations. One of the short boards was found associated with the bark container. Susquehannock.

Function. Boards may have been part of a bark container, or formed part of a tray.

Bark Boards With Holes

Description. Fig. 4a, 5a. The smaller board is rectangular, its inside is smooth and one of its long edges is round and smooth while the other edges are straight and rough. The longer piece is approximately rectangular also. Both its ends are broken and jagged. One edge is straight, but it appears to have been split. All three pieces have one hole near their smooth edge. Length 6.85 cm, 23.5 cm, 7.3 cm, width 3.4 cm, 3.2 cm, 1.9 cm, thickness 0.7 cm, 0.7 cm, 0.6 cm, respectively.

Associations. The shorter strip was found with a rhyolite broad spear, soapstone, and a fish tail point.

Function. In appearance, these boards are the same as the bark boards described above with the exception of the holes, and they were probably part of a container or tray.

Bark Container

Description. A66.1.6938. Fig. 5b. The container is seemingly constructed of a solid piece of bark, which is bound together with cordage where it has split. The sides are straight and the container's mouth is ovaloid in shape. Diameter along the long axis 45.9 cm, diameter along the short axis 30.6 cm, height 35.0 cm.

Associations. Several Schultz incised shell tempered sherds were found in and around the container, and it is believed that these are of the same cultural level as the container. If this is correct, the container is Susquehannock. The upper two thirds of the container was in a dry ash and bedding layer, while the lower portions extended into a damp and wetter layer. It was found at a depth of 66 to 76 inches b.d. The back of the container had been damaged by two large rocks of shale. Because of the moisture in the lower portions, the bottom was not intact, and only traces of the bark bottom remained.

Function. The container was found under an ash and grass layer and it is probable that it was a bark vessel which was buried in a pit and then covered with river grass and matting, and used for storage purposes.

Decorated Wood Stick

Description. Fig. 5c, 5d. A straight smooth stick with the bark removed. Light brown and tan in coloration. A design has been incised into the wood, and there is evidence of red coloring in the grooves. Length 10.3 cm, diameter 0.95 cm.

Function. Mid-shaft section of wide diameter arrow.

Forked Stick

Description. Fig. 6a. Extremely smooth and worn over its entire surface. Both ends are charred, although the entire surface is also lightly charred. One end is blunt and smooth, but the surface near that end is rough with parts of its surface beginning to peel off. The other end is split in half and forked. Its edges are round and smooth. Length 41.5 cm, diameter 3.5 cm.

Function. The forked end appears to have been used for hafting, while the other end was held in the palm of the hand. The hand-gripped end has a smooth, burnished surface which suggests extensive use. The fact that the hafting end is charred together with the evidence of extensive use suggests that this specimen might very well be the handle of some heavy-duty kitchen implement, such as a ladle.

Paddle Shaped Stick

Description. A66.1.6937. Fig. 6b. The one end is blunt, while the other is flat and paddle shaped. One side of the flat end is smooth while the other is rough and appears to have been cut. The stick has been broken in several places due to its extremely dry and brittle nature, and one small section seems to be missing. Length 58.7 cm, diameter 2.55 cm, width of paddle end 5.7 cm.

Associations. Found in association with a bark-lined bedding area, approximately 22 inches in diameter.

Function. Possibly a paddle used as either a canoe paddle or for stirring. Another use might have been digging. This might explain why one side of the paddle end is smooth and the other is rough.

Bow Shaped Stick

Description. Fig. 7. The stick has been completely split in half lengthwise. The bark remains on the outer surface, and the stick is bent almost into a semi-circle. Both ends are broken and splintered. The inside surface is rough and shows no evidence of wear. Length 93.8 cm, width 1.6 cm, thickness 1.25 cm.

Associations. Found in a very dry area with bark, cordage, a notched point, corn cobs, and bedding.

Function. Probably part of a large hoop used for holding a bark basket together.

Pointed Splinters

Description. Fig. 8a. Four splinters of various lengths,

each pointed at one end. All the points are rounded and smooth. The three shorter pieces are broken at the other end, and are nearly square in cross-section. Their pointed ends are also charred. The longest splinter is very thin and its other end is rounded. It has a worn spot about midway along its flat side. Length 19.8 cm, 8.2 cm, 26.6 cm, 50.7 cm, width 1.6 cm, 0.8 cm, 0.9 cm, 1.25 cm, thickness 0.9 cm, 0.8 cm, 0.75 cm, 0.3 cm, respectively.

Function. Undetermined.

Pointed Beveled Splinter

Description. Fib. 8b. The splinter is rectangular in cross-section, and one end is cut diagonally to a point. The other end is beveled on one side to a flat pointed edge. The area near the flat edge is worn on one side, probably as a result of being held while being used. One edge of the flat end is worn more than the other. Length 13.2 cm, width 1.7 cm, thickness 0.7 cm.

Function. Possibly a weaving instrument.

Shaft With Inset Cylindrical Point

Description. Fig. 8c. Splinter, rectangular in cross-section, with an inset cylindrical point at one end. The other end is broken, and the surface of the splinter is smooth. Length 19.8 cm, width 0.9 cm, and thickness 0.6 cm.

Associations. Found with one of the pointed splinters north of the spring above the floor level of the site, and among corn cobs, dry debris, and rodent nesting, which were located among some fallen rocks.

Function. The shaft was probably part of a compound tool.

Twig With Blunt End

Description. Fig. 8d. Twig, smooth over its entire surface, one end is broken and the other end is charred with its edges rounded. Length 6.4 cm, diameter 0.5 cm.

Function. Undetermined.

Shaft With Conically-Bored End

Description. Fig. 9a. Straight twig with its bark removed, and a smooth surface. One end is broken and splintered. The other end has a shallow cup conically bored into it. Length 7.6 cm, diameter 0.75 cm, depth of cup 0.4 cm.

Associations. Found in humidified soil with a few chips and some bone scraps.

Function. Undetermined.

Flat Wood Strips With Rounded End

Description. Fig. 9b, 9c. Two pieces, one is a splinter and the other is a strip of wood with its bark remaining. Both are flat with one end rounded and worn. The edges of the splinter are smooth and rounded, the rounded end is charred and shows signs of working on its bottom side, while the other end is splintered. One edge of the wood strip is rounded and smooth while the other is rough. There are signs of wearing on the underside of the rounded end, and a small indentation has been worn into the wood. Length: (splinter) 9.5 cm, (strip) 11.35 cm; width: (splinter) 1.15 to 1.0 cm, (strip) 1.4 cm; thickness: (splinter) 0.5 cm, (strip) 0.7 cm.

Function. Undetermined.

Notched Shafts

Description.

A. A66.1.4847. Fig. 9d. One end is notched and the other is broken. Just below the notch there is cordage wound around the shaft. The bark has been stripped and the surface is smooth. Length 4 cm, diameter (broken end) 0.85 cm, (midpoint) 0.8 cm, (notched end) 0.9 cm.

B. A66.1.2277. Fig. 9e. One end is notched and the other is broken. The bark has been stripped and the entire surface is charred. No markings or cordage, and the shaft is slightly curved. Length 4.2 cm, diameter 0.55 cm.

Function. Both pieces were the notched ends of arrow shafts. There appears to be both a narrow diameter arrow type and a wide diameter arrow type in the artifact collection. Specimen "A" is of the wide diameter type, and specimen "B" is of the narrow diameter type.

Twigs Wound With Cordage

Description.

A. A66.1.2204. Fig. 9f. Bark has been stripped from the twig, and one end is broken. The other end is cut diagonally and gouged out to form a concave trough, and fiber is wound around the trough. Length 6.65 cm, diameter 0.5 cm.

B. A66.1.1885. Fig. 9g. Twig with the bark only partially removed, and wound with fiber at two places separated by a space of 3.5 cm. One end is slightly charred, and both ends are broken. The twig is naturally curved to a slight degree. Length 15.9 cm, diameter 0.3 cm.

C. A66.1.3109, A66.1.4455, A66.1.2278. Three short pieces of twig each wound with fiber, and with both their ends broken. Length 3.1 cm, 2.45 cm, 2.45 cm; diameter 0.3 cm, 0.14 cm, 0.1 cm.

Function. One of the specimens represents a piece of the feathered end of an arrow shaft. This is unmistakable since a segment of a feather is still intact beneath the binding (A66.1.1885). Function of the other specimens is undetermined.

Hollow Twigs

Description. Fig. 9h. Smooth twig with its bark remaining. One end is broken and splintered. The other end is charred and diagonally cut, and smoother. The entire twig is hollow with both ends open. Length 5.0 cm, width 0.7 cm, thickness 0.5 cm, inside diameter 0.3 cm.

Function. Possibly a reed pipe stem for one of the ceramic pipes found at the site.

Short Blunt End Shaft

Description. Fig. 10a. Smooth shaft with its bark stripped. One end is smooth to a blunt point while the other end has been cut diagonally and then broken off at the end. The cut end has been worn, and the entire surface of the shaft has been charred, indicating that it was burned after being cut. However, the broken portion of the cut end is not charred, thus it was broken after the artifact was made and charred. Length 7.2 cm, diameter 1.3 cm.

Function. A utilized fire drill.

Wood Chip With Drilled Holes

Description. Fig. 10b. Wood chip, roughly rectangular, with both ends broken irregularly. Both sides and all edges are rough. However, the sides do show some signs of wear. There are two holes drilled through the chip, one near each end. The holes are drilled from both sides. Length 7.9 cm, width 2.6 cm, thickness 0.7 cm, distance between the center of the holes 3.35 cm.

Associations. Found with bark, cordage, a notched point, corn cobs, and the split wooden hoop.

Function. Possibly a "pre-form" fire drill hearth.

Split Sticks

Description. Fig. 10c, 10d, 10e.

A. Sticks Split On One Side: Five sticks all split lengthwise on one side. Four of them are split completely in half,

while the other is only split near one end. The longest stick is worn and smooth on the split surface. Its one end is broken and splintered, while the other end is charred and has been rounded and smoothed. The bark has been stripped off, except for a few spots. Of the four remaining pieces, the bark remains on two, but it has been stripped from the others. Where the wood has been split on each piece the surface is smooth, and the ends of the four pieces are broken. On two of the sticks, one end is charred on one and on the other both ends are charred. The edges of these two pieces are also slightly rounded. Length 15.0 cm, 5.5 cm, 4.1 cm, 7.1 cm, 13.6 cm; width 0.7 cm, 1.1 cm, 0.9 cm, 1.65 cm, 0.9 cm; thickness 0.4 cm, 0.6 cm, 0.3 cm, 1.25 to 0.75 cm, 0.5 to 0.9 cm., respectively.

B. Stick Split On Both Sides: Stick, split completely in half on one side, and also split on its other side at one end. Its bark has been stripped and the surface is smooth. Both ends are broken, but one end is splintered and the other is charred and rounded. Length 22.3 cm, width 1.0 cm, thickness 0.4 to 0.75 cm.

C. Stick Split On Both Sides At One End: One end has been split on both sides along part of the length of the stick, and its end has been splintered. The other end is cylindrical and it has been broken and charred. The bark has been almost completely stripped. Length 16.0 cm, width 0.8 cm, thickness 0.35 to 0.75 cm.

D. Two pieces of wood, both part of the same stick. The bark remains on both pieces, and they are both split completely in half. The longer piece is also split on its other side at one end. The split surfaces are smooth as are the edges of the shorter stick. The ends of the longer piece are broken and rough, while one end of the other is broken and its other end is worn and smoothed to a rough point. Length 13.5 cm, 8.5 cm, width 1.6 cm, 1.7 cm, thickness 1.3 cm, 1.0 cm.

Function. One specimen (A66.1.2380) described in paragraph "A" has been tentatively identified as being part of a utilized fire drill. The others have undetermined functions.

Long Blunt End Sticks

Description. A66.1.419, A66.1.3561. Fig. 11a, 11b.

A. One end is worn and rounded to a blunt point. The bark has been stripped from this end and the surface is smooth. The other end is broken and rough. Length 20.7 cm, diameter 1.2 cm.

B. Long stick with its bark stripped off, and a smooth surface. One end has been rounded and blunted. This end has also been flattened by splitting the stick for approximately one third of its length. The other end has been broken and is jagged. Length 32.0 cm, width 1.0 cm, thickness 0.75 to 1.0 cm.

C. Smooth stick with the bark stripped. One end is broken and jagged. The other end is charred and the tip has been rounded and is smooth. The tip of the rounded end is hollowed out. Length 27.5 cm, diameter 0.9 cm, inside diamter of the hole 0.4 cm, depth of the hole 0.9 cm.

Function. They all appear to be utilized fire drills.

Wooden Sticks With A Hemispherical Socket

Description. Fig. 11c, 11d, 11e.

A. Two cylindrical sticks each with a socket drilled near one of their ends. The bark has been stripped from the one stick and both its ends and the area around the socket is heavily charred. The rest of the stick is lightly charred. Both its ends are cut diagonally, and are round and smooth. The second stick has had most of its bark peeled off. Both of its ends are broken, and the socket is drilled slightly off center. There is no evidence of burning except in the socket. There is also evidence of gouging along the stick. Length 7.1 cm, 10 cm; diameter 0.9 cm, 1.0 cm; depth of the socket 0.3 cm, 0.8 cm.

B. Wood splinter with a socket worn completely through along one edge. The splinter is rectangular, and its sides are rough, but they have been rounded. Both ends have been cut and one is jagged, while the other is charred and smoother. Length 11.7 cm, width 1.5 cm, thickness 0.9 cm, diameter of the socket 1.0 cm.

C. Wood splinter, rectangular in cross section. Edges are rounded, both ends have been broken, one is jagged, and the other is charred and slightly smoothed. An oval socket has been worn into one side near the charred end. Length 8.0 cm, width 0.8 cm, thickness 0.5 cm, depth of the socket 0.25 cm.

Associations. One stick was found in a bark lined bed. Another was found with the bark container and with Susquehannock and other sherds. The last piece was found during general clean up and no provenience is given.

Function. The first two definitely appear to be cylindrical fire drill hearths. Similar ones were found in the Reserve Area of New Mexico and Arizona (Brown 1954). The third stick has the appearance of a plano-convex fire drill hearth, but the sides of the socket are rough and do not appear to have been the result of drilling. It may have been part of a larger splinter, similar to the wood chip with drilled holes which was described earlier, which has split in half. The last piece may also have been a fire drill hearth, but the socket shows no evidence of burning, except along one side near the charred end of the splinter.

Shredded Bark

Description. Fig. 12. Two pieces of bark which have been

shredded. The larger piece has almost been separated into two pieces by its being shredded in the center. The smaller piece is only shredded at one end while the other end is rough bark which has been rounded. Both ends have been slightly charred. Length 10.5 cm, 28.0 cm, width 2.4 cm, 6.1 cm, thickness 0.5 cm, 1.0 cm.

Associations. Found in a dry level with some cordage.

Function. They may have been one source for the fiber that was used in the manufacture of cord and twine.

Bark Strip With Evenly Spaced Holes

Description. Fig. 13a. One end is charred, and the opposite end has been punctured along the edge. The effect is similar to that created when leather is cut to make a fringe. Four holes are clearly distinguishable though. Length 4.9 cm, width 0.9 cm, thickness 0.2 cm.

Function. The edges are rough and the strip may have broken off a larger piece, and the holes may possibly have been used to tie it to another piece.

Split Blunt Sticks

Description. Fig. 13b, 13c.

A. The stick is split in half, and its surface is burned. The bark remains on the outside surface. One end is charred and partially rounded, while the other end is not charred and appears to have been whittled and then worn so that the cutting marks are almost indistinguishable. The point has been worked from both sides. Length 7.0 cm, width 1.25 cm, thickness 0.7 cm.

B. The stick is split in half, and one end has been broken and is splintered. The other end is rounded and the outside edge is smooth. The inside edge of the point is flat, and it appears that it was worked on this side only. The outside surface of the stick is smooth and lightly charred.

Function. The latter specimen has been tentatively identified as a fragment of a utilized fire drill (A66.1.3097).

Straight Shafts

Description. Fig. 13d. Two straight sticks with the bark intact, and charred over their entire surface. Both ends of each shaft are broken. The ends of the shorter are clean and jagged while one end of the longer is charred and worn, although it has no distinguishable shape. Its other end is jagged. Length 9.8 cm, 5.6 cm; diameter 0.8 cm, 0.9 cm, respectively.

Function. The two shafts were probably part of the same arrow shaft.

Blunt Pointed Shafts

Description. Fig. 14a, 14b, 14c, 14d. Eleven shafts with one of their ends whittled to a point. Four of them are relatively sharp while the others are blunted. The shafts are smooth and the bark has been stripped. Three of the blunted shafts have a crack which runs with the grain of the wood, beginning at the tip of the point. These shafts have a pithy center and the cracks are probably due to the wood drying. Lengths range from 2.2 to 13.4 cm, and diameters from 0.6 to 1.0 cm.

Associations. One shaft was found with Susquehannock sherds and the bark container at 52 to 56 inches b.d. Another shaft was found with bedding, corn cobs, cordage, and sherds. A third shaft was associated with "Clemson's Island" sherds.

Function. The five sharply pointed specimens (A66.1.3494, A66.1.4455, A66.1.3754, A66.1.4449, A66.1.4439) appear to be narrow diameter self-tipped arrow fragments. The remaining eight specimens (A66.1.3561, A66.1.2882, A66.1.2255, A66.1.2820, A66.1.4602, A66.1.3799, A66.1.2208, A66.1.5596) appear to be fragments of unused fire drills.

Teardrop Shaped Splinter

Description. A66.1.2884. Fig. 14e. Splinter which is curved. One end is bulbed shape and blunted while the other end is worn to a sharp point. The edges are smooth, and the blunt end is lightly charred. Length 11.3 cm, width (blunt end) 2.0 cm, thickness 0.65 cm.

Function. Wooden awl.

Pointed Sticks

Description. Fig. 14f, 14g, 14h.

A. A66.1.3100, A66.1.3494. Rough textured twigs still partially covered with bark, each with one of their ends rounded to a point. The point of one twig is charred while the other is uncharred. Length 14 cm, 13.3 cm, diameter 0.8 cm, 0.6 cm.

B. A66.1.2885. Small twig. The twig is pointed and the end opposite the point is charred. Length 6.6 cm, diameter 0.8 cm.

C. A66.1.4603, A66.1.3720. Pointed sticks which show signs of being peeled. One has had a strip peeled off at its point. Both are smooth with no marks. Length 12.75, 21.5 cm, diameter 0.63, 0.6 cm.

D. A66.1.183. The bark has been stripped. One end has been broken or cut perpendicular to the shaft and the edges are

rounded and smooth. The other end has been whittled to a long blunt point. Length 15.5 cm, diameter 0.9 cm.

Associations. The one twig under section "B" was associated with an ash lens and with small tempered pottery in W15-S10.

Function. All appear to be fragments of self-tipped arrows (two -- wide diameter, four -- narrow diameter).

Wood Strips Woven Together With Bark

Description. Fig. 15a. Four short pieces of wood, broken at each end, are woven together with two pieces of bark strips. The ends of the bark strips are broken and not tied shut, indicating that this is a section of a larger piece and not a complete artifact. There are gaps between the wood strips and they are oriented approximately parallel to one another. Length 3.8 cm, width 3.4 cm, thickness 0.7 cm.

Associations. Fell from the profile of W40-S15, and associated with some cordage.

Function. Possibly part of a basket or mat.

Strips of Bark, Knotted and Unknotted

Description. Fig. 15b. Twelve pieces, ranging from approximately 37.0 to 3.5 cm in length. There are three unknotted strips of bark and two other strips which have been wound and are knotted. The other seven pieces are short knotted strips.

Associations. One of the short unknotted strips was found with a bark-lined bedding area in W25-0.

Function. These strips of bark were probably used for the purpose of tying other objects together.

Flat End Stick

Description. Fig. 15c. The worked end has been whittled on one side to make a flat end which comes to a sharp edge. The stick is smooth, although some of the bark remains. Length 12.8 cm, width 0.65 cm, thickness 0.5 cm.

Function. Possibly used in the manufacture and use of textiles.

Worked Wood Fragments

Description. Seven pieces of wood of various sizes which show signs of being worked. Some show evidence of cutting marks along the shafts while others are either smooth or have had their ends rounded. None are identified as specific artifacts.

Function. They may represent incomplete or discarded stock material.

Worked Bark Fragments

Description. Eleven pieces of bark which show various signs of being worked. Irregularly shaped, but most have one straight edge, and many are smooth on the inside.

Function. May be discarded stock material.

GRASS AND FIBER MATERIAL

Fiber Wound With Hair

Description. Fig. 15d. Vegetable fiber, looped and wound with hair around the looped end and the center. Length 3.4 cm, diameter 0.35 cm.

Associations. Found in a level containing mostly sheep dung and modern debris.

Function. Possibly part of a fiber cord.

Matted Material

Description. Two clumps of matted corn husks. There are also two clumps of matted fiber as well as some dry marsh grass, possibly matting which is mixed with some charred pieces of reed.

Associations. One clump of matted corn husk and the matted fiber were found associated with features in their respective squares.

Function. Possible bedding.

LEATHER AND LEATHER ARTIFACTS

Heavy Piece of Leather

Description. Fig. 16a.

A. Thick irregular stiff piece of leather. All four edges are rough and frayed. One edge is curved and appears to be part of a circle or arc. Length 3.7 cm, width 4.2 cm, thickness 0.25 cm.

B. Thick soft and pliable pieces of leather. Roughly rectangular with one straight edge. The straight edge is smooth and round while the other edges are irregular and rough. Length 6.6 cm, width 4.6 cm, thickness 0.25 cm.

Associations. Both were found with a bark-lined bedding area.

Function. Probably part of some item of clothing.

Pleated Leather With Holes Along Its Edge

Description. Fig. 16b. The top edge is smooth and rounded with regularly spaced holes through which a draw string was probably strung. Another edge is straight and perpendicular to the top while the other edges are irregular and rough. Length 8.0 cm, width 6.0 cm, thickness 0.2 cm.

Function. Possible leather bag with drawstring.

Leather With Holes And A Straight Edge

Description. Fig. 16c. One edge is straight and there are three sets of two holes each punched along another edge. Except for the straight edge, all the edges are irregular and rough. There is a small piece of cord strung through one set of holes. Length 14.0 cm, width 6.35 cm, thickness 0.1 cm.

Function. May have been used for clothing.

Leather Thong

Description. Fig. 17a. Eight pieces of leather thong of various lengths and widths, ranging from 20.0 to 2.55 cm in length and 0.7 to 0.48 cm in width. Some pieces are soft while others are stiff, and one piece is knotted.

Associations. One small piece was found in level 1 of W35-S5 among sheep dung and modern debris. Another small piece was found in W35-S15 on a natural floor west of rock fall. The two longest pieces were found in a very dry level with bedding, cobs, sherds, and cordage.

Function. The leather thongs were probably used for tying wood and other pieces of leather together.

Leather With Holes

Description. Several pieces of leather with holes punched in them. Some of the pieces have cordage strung through the holes. The largest is approximately 10.5 cm in length and 5.8 cm in width.

Function. May have been used for clothing or as parts of such items as bags or footwear.

Leather With Fringe

Description. Fig. 17b. One edge has been slit to produce fringe. Length 10.0 cm, width 3.3 cm, thickness 0.1 cm.

Function. Decoration on clothing or some other object such as a bag.

Leather Tied Together

Description. Fig. 18a, 18b.

A. Three different pieces, each with holes punched in them and one with leather thong strung through it. One piece is roughly rectangular and is worn.

B. Two pieces of leather tied together with cordage. Each piece has holes punched in pairs so that the cordage could be looped through.

Function. The first three pieces appear to be part of the sole and sides of a mocassin. The second two pieces may also be part of a mocassin, or some other item of clothing.

Miscellaneous Pieces of Leather

Description

A. Pieces of leather of various sizes, but mostly small and irregular in shape.

B. Short piece of stiff brittle tendon. Length 9.0 cm.

Function. Undetermined.

ANIMAL FUR AND HAIR

Fur Scraps

Description. Fig. 19a, 19b. Nineteen pieces of fur. Most of them are small clumps or pieces. There is one piece of unworked leather with a few bones which is probably the remains of some rodent.

Function. Some pieces may possibly be the result of butchering while others are only the remains of animals which have died naturally at the site.

Hair

Description. Several strands of hair some of which may possibly be human.

FEATHER REMAINS

Large Feathers

Description. Fig. 19c, 19d, 20a, 20b. Four feathers. The ends of two appear worn and dulled, and a third is also worn and its end is crimped shut. The fourth is the end of a large feather and is splintered and possibly has been chewed.

Function. Possibly worked and used for decoration. Also might represent the remains of butchered fowl.

Small Pieces Of Feather

Description. Thirty-one feathers of various sizes, mostly small pieces or clumps of feathers.

Function. Possibly the result of butchering.

CONCLUSION

As was stated earlier, the main limitation of this report is that it rests heavily upon the description of physical characteristics of the material. To correct this, further research is planned in several areas. First, further work must be done in the study of the distribution of the artifactual material, both spatially and between different stratigraphic levels. The object of this work would be to determine if there is any change in the functional composition of the material from level to level, and from one area of the site to another. Secondly, a more systematic functional analysis needs to be done. And thirdly, work needs to be done to discover what manufacturing techniques were used to make these artifacts.

Despite these limitations some conclusions can be made concerning this material and the people who used it. The large number of specimens recovered which are components of fire making kits suggests that the rekindling of fires might have been a common practice at the shelter. Transient utilization of the shelter might therefore be indicated for the period of time represented by the preserved wooden remains. Such kits, however, can also be explained by noting the probability that male occupants of the site undertook frequent hunting expeditions away from the shelter which may have functioned as a central base camp. The preparation of fire making kits for such expeditions would be a natural industry within the central base camp, and might explain the large number of fire drills that appear to be "pre-forms", that is, shafts that have been shaped into fire drills but not yet used.

A significant inventory of arrow shafts that appear to be self-tipped reveals a dimension of the hunting kit that ordinarily excapes us. The tips are sharp and designed for penetration, and are not blunt, concussion arrows. Their presence in the collection indicates that the final occupants of the shelter had both stone-tipped and self-tipped arrows.

The single example of a feathered arrow shaft with quill remnants remaining indicates that arrows had two feathers mounted at opposite points of the shaft circumference.

The versatile utilization of bark is clearly revealed by the wood inventory. We appear to have evidence of its use as a hearth in a fire-making kit, as the wall and base material of large storage baskets, as a source of fibers for textile and cordage manufacture, as possible digging or shoveling tools, and possibly as trays.

The existence of a textile industry along with horticultural activities and the storage of foodstuffs indicates that Sheep Rock was used as more than just a temporary shelter for groups traveling along the river. It is evident that these people stayed there long enough to plant vegetables, to manufacture textiles, and to justify the storage of foodstuffs.

Figure 2

a. Bundle of twigs. A66.1.2277.

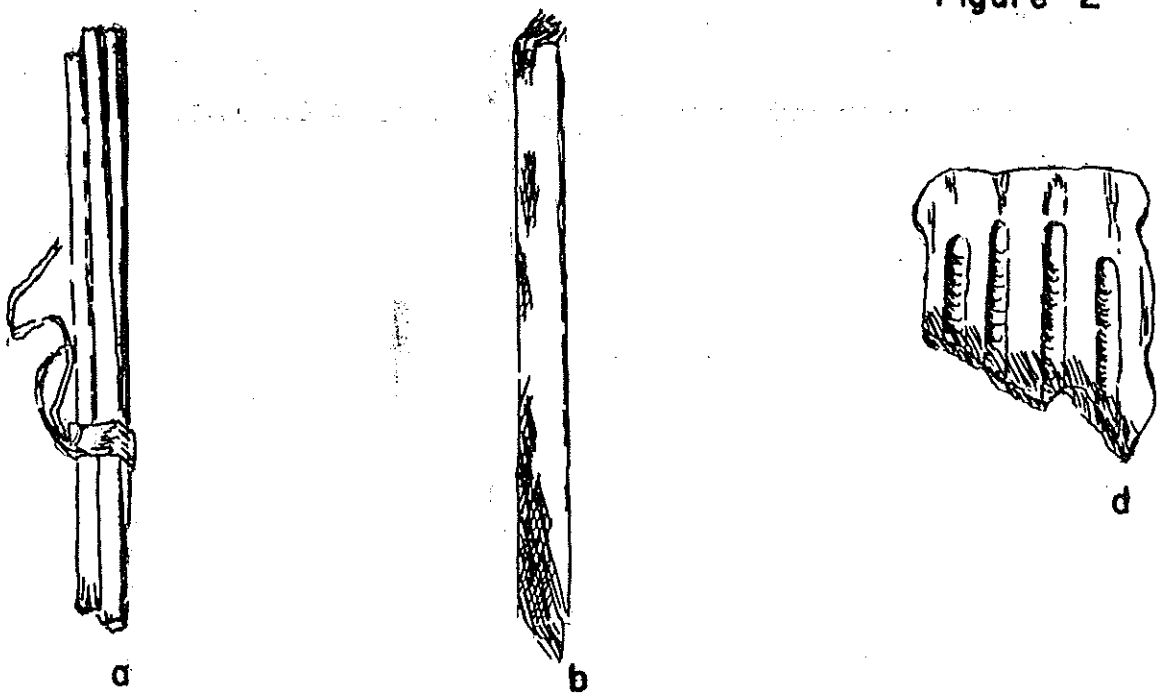
b. Frayed twig; a possible source of fiber for cordage. A66.1.2045.

c. Bark strips tied together; possible section of a bark container. A66.1.3564.

d. Grooved rectangular board; possible handle or preliminary comb work. A66.1.1959.

Scale: Actual Size

Figure 2



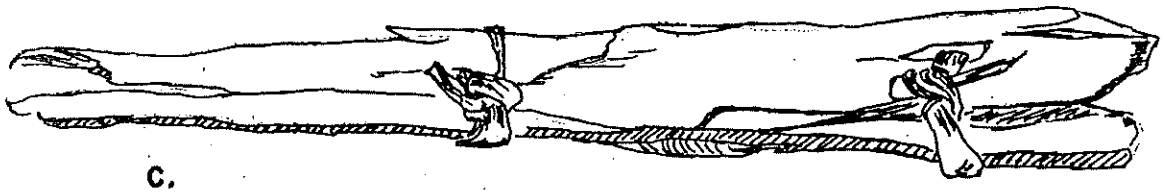


Figure 3

Rectangular bark board used as a trowel. A66.1.2411.

Scale: Actual Size

Figure 3

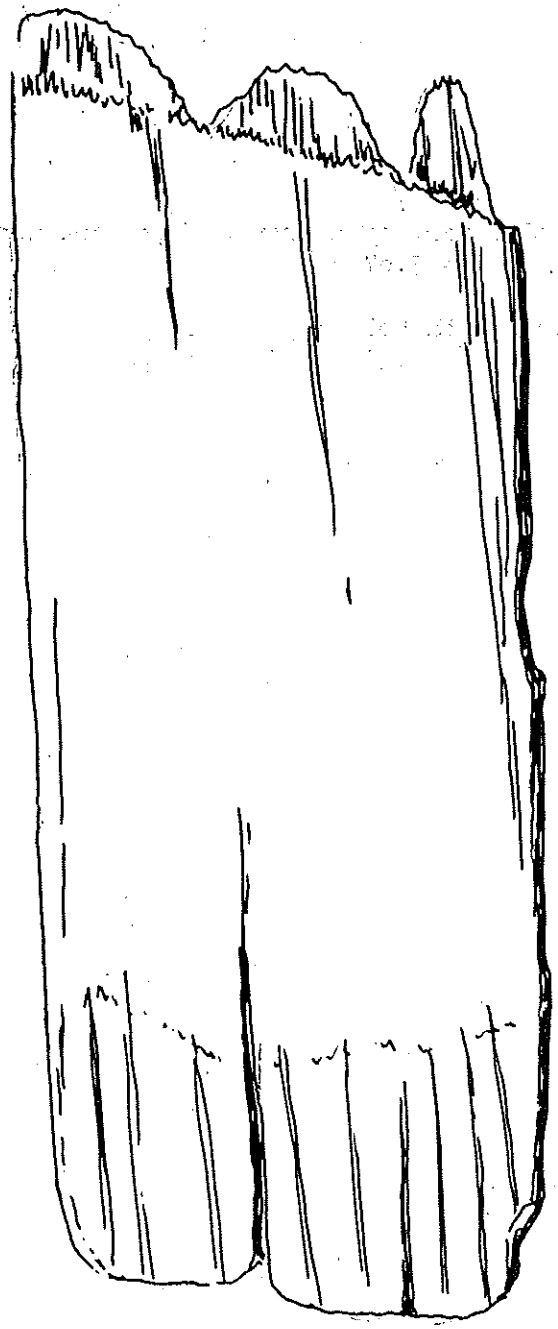


Figure 4

a. Bark boards; part of a tray or bark container. A66.1.3317. Scale: 1 in. = 3.67 cm.

b. Bark boards with holes; probably part of a tray or bark container. A66.1.3702. Scale: Actual Size.

Figure 4

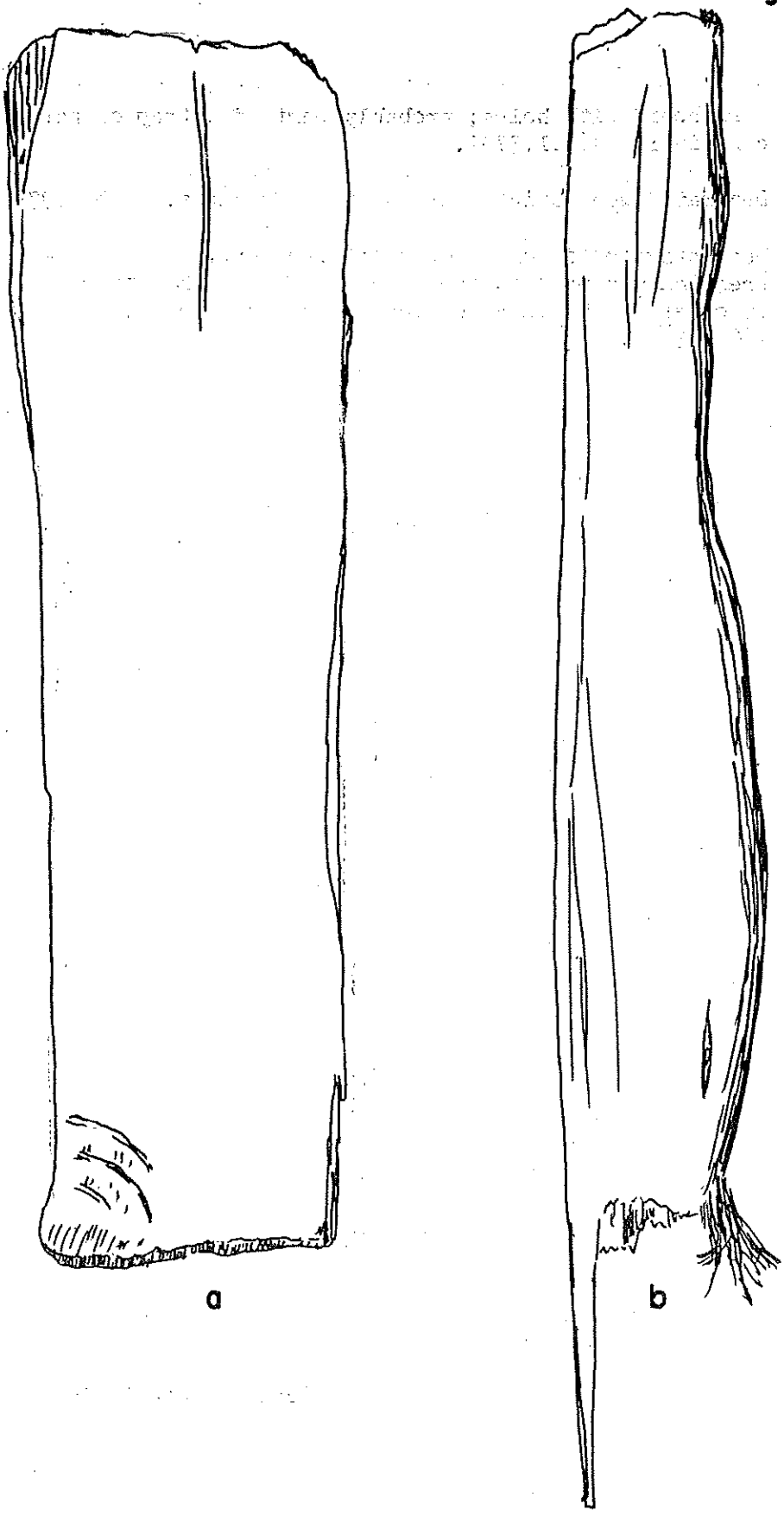


Figure 5

a. Bark board with holes; probably part of a tray or bark container. A66.1.3707.

c. Decorated wood stick. Arrow shaft fragment. A66.1.3798.

d. Decorative motif of arrow shaft fragment. A clay impression was made of the stick which was then traced, in order to obtain a duplication of the design. A66.1.3798.

Scale: Actual Size

Figure 5

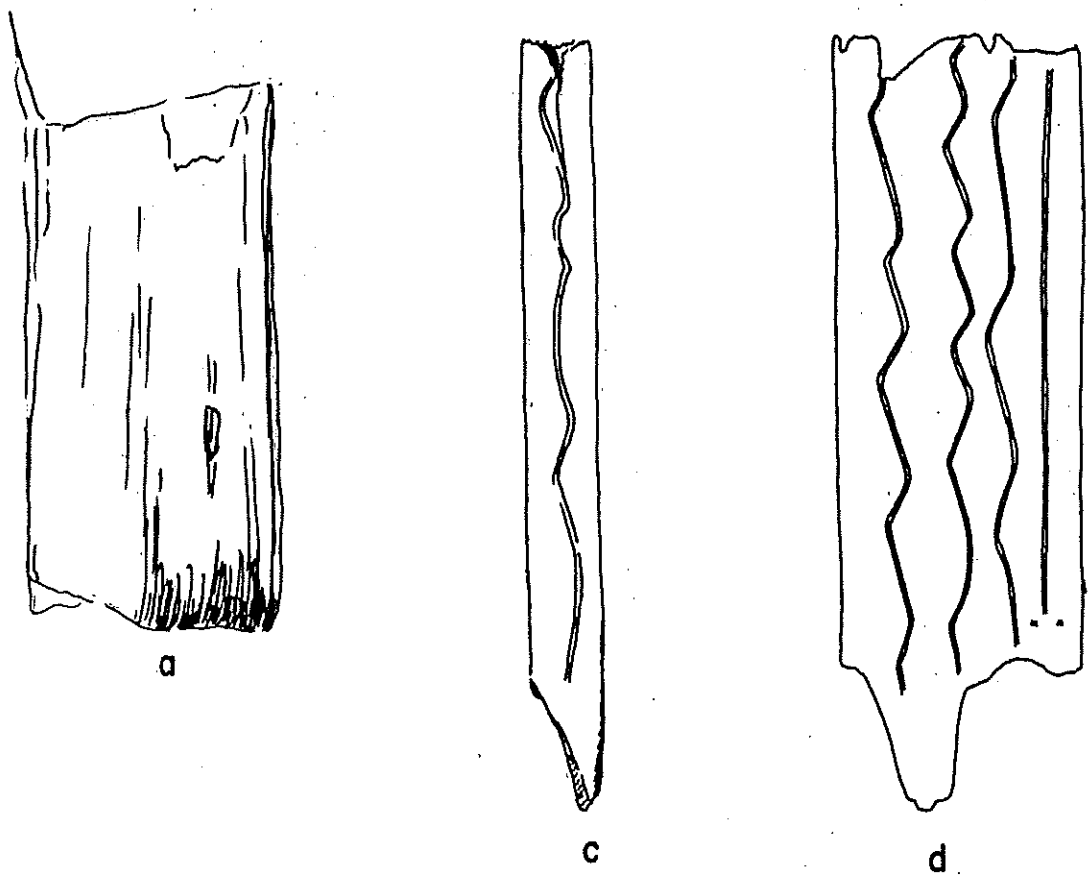


Figure 5

b. Bark Container. A66.1.6938. Diameter along the long axis 45.9 cm, diameter along the short axis 30.6 cm, height 35.0 cm.

Figure 5b

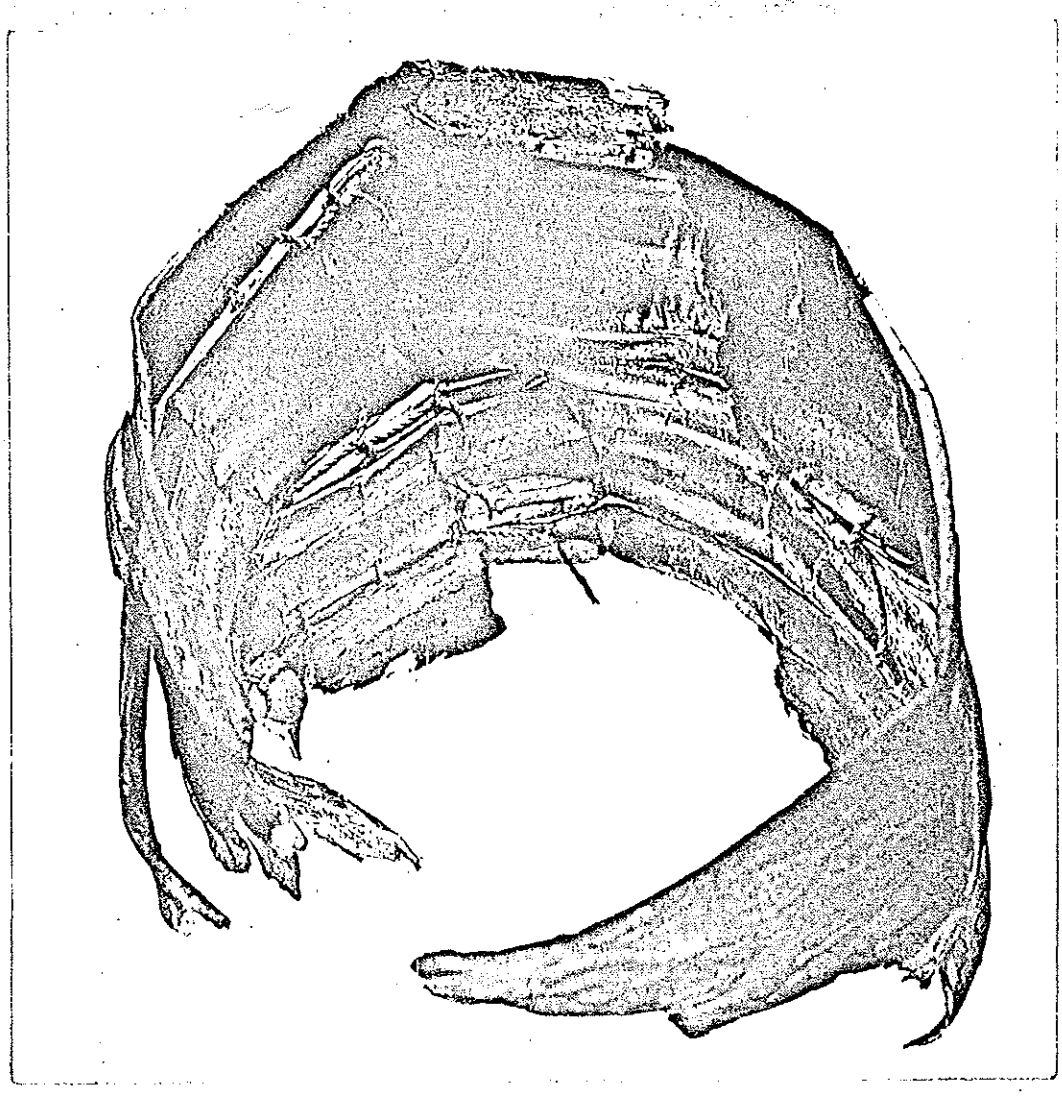
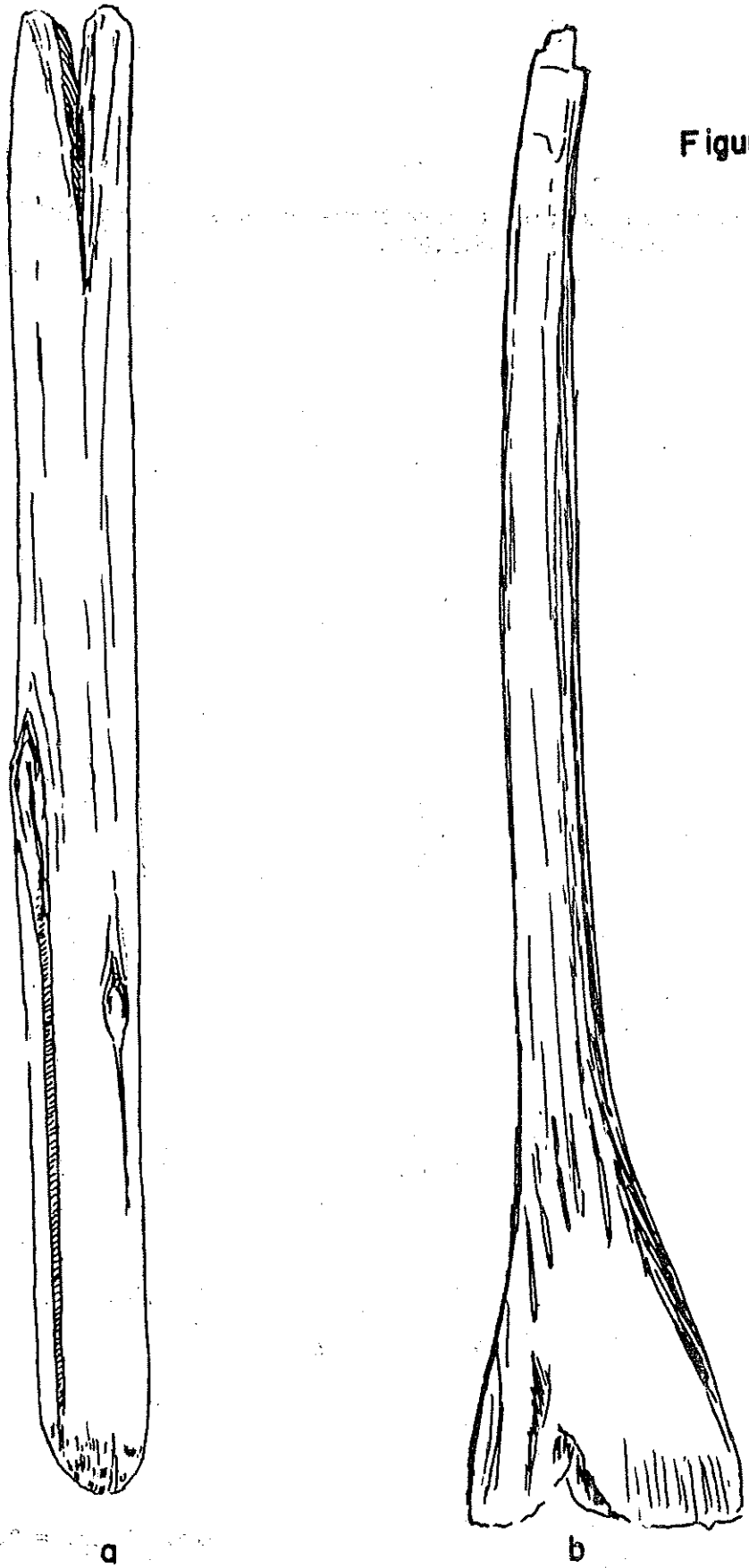


Figure 6

a. Forked stick used as a handle for a compound tool. A66.1.2296. Scale: 1 in. = 3.67 cm.

b. Paddle shaped stick possibly used as a canoe paddle or for stirring. A66.1.6937. Scale: 1 in. = 6.9 cm.

Figure 6



a b

Figure 7

Bow shaped stick; part of a large hoop used for holding bark baskets together. A66.1.979.

Scale: 1 in. = 7.73 cm.

Figure 7

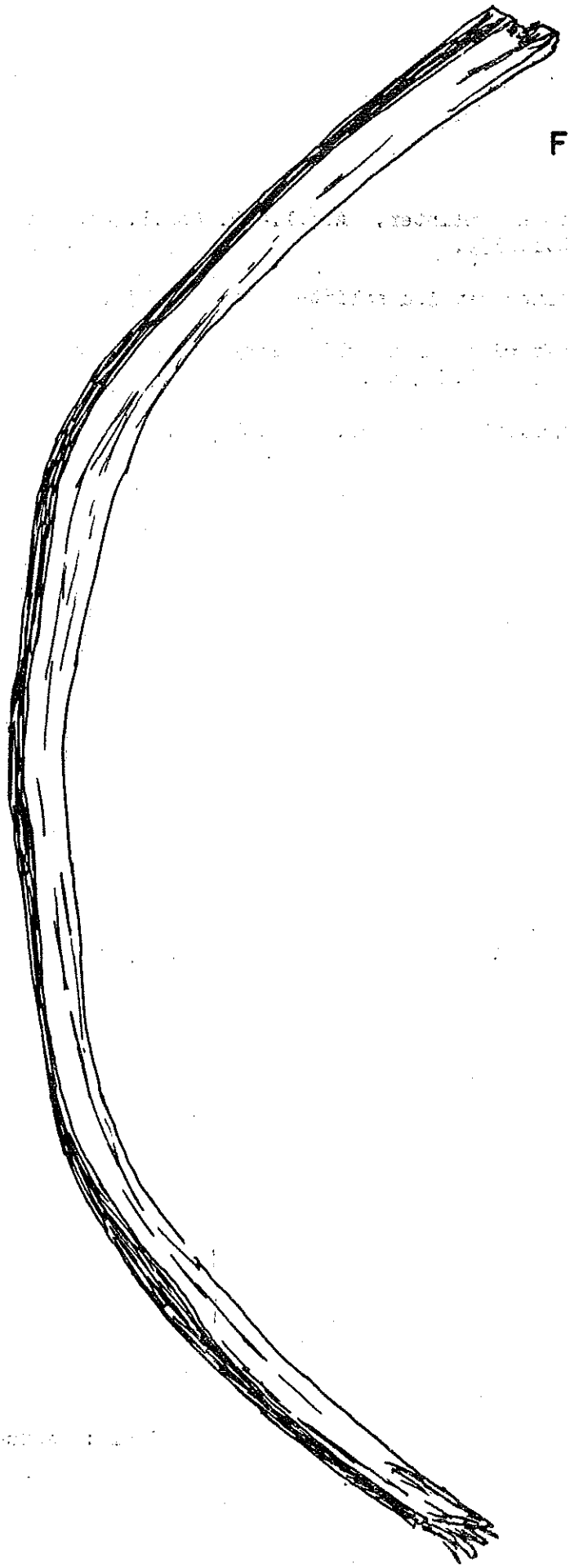


Figure 8

a. Pointed splinter. A66.1.480, A66.1.3060, A66.1.4781, A66.1.2159.

b. Pointed beveled splinter. A66.1.4778.

c. Shaft with inset cylindrical point; part of a compound tool. A66.1.3060.

d. Twig with blunt end. A66.1.4453.

Scale: Actual Size

Figure 8

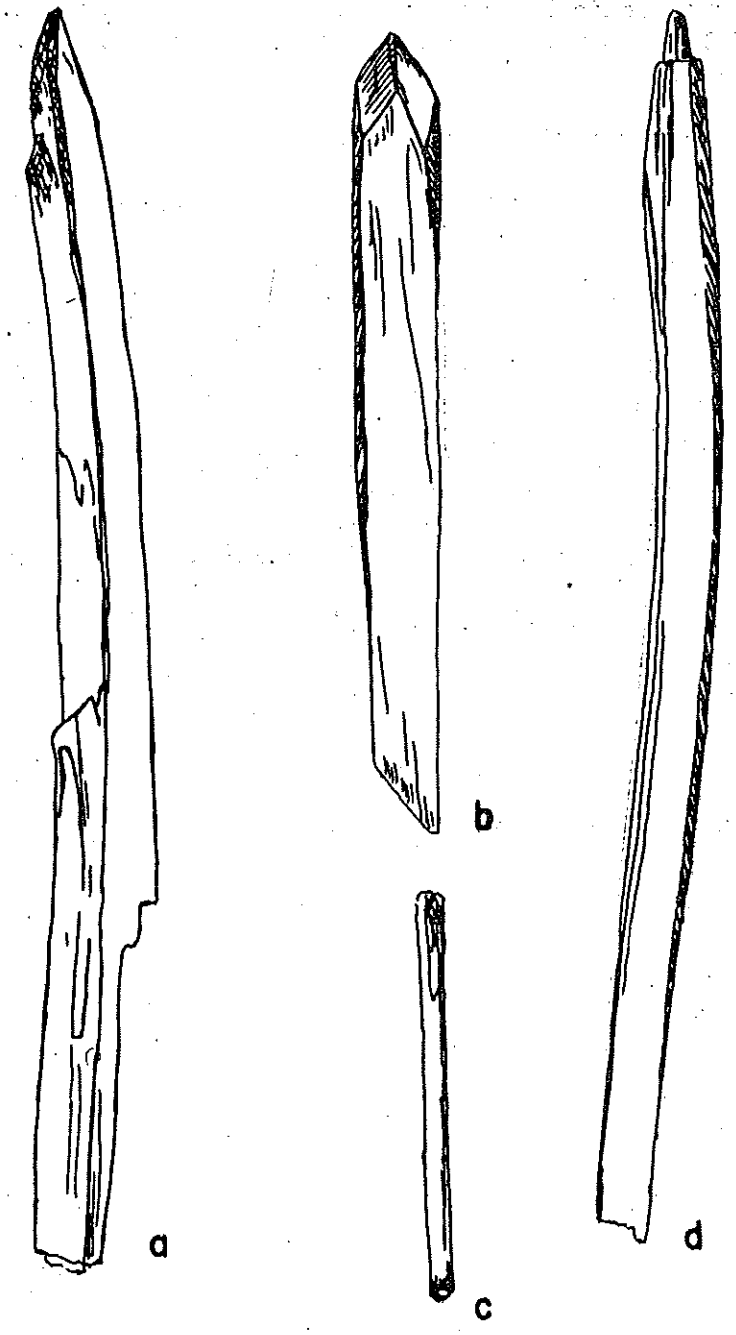


Figure 9

a. Shaft with conically bored end; undetermined function. Dotted line at top end shows the bored out portion. A66.1.2422.

b. Flat wood strip with rounded end. A66.1.2886.

c. Flat wood strip with rounded end. A66.1.3488.

d. Notched arrow shaft; the notched end of an arrow shaft wound with fiber. A66.1.4847.

e. Notched arrow shaft; notched end of an arrow shaft. A66.1.2277.

f. Twig wound with cordage; cordage was used to splice or haft another object to the twig. A66.1.2204.

g. Feathered section of arrow. A66.1.1885.

h. Pipe stem. A66.1.2880.

Scale: Actual Size

Figure 9

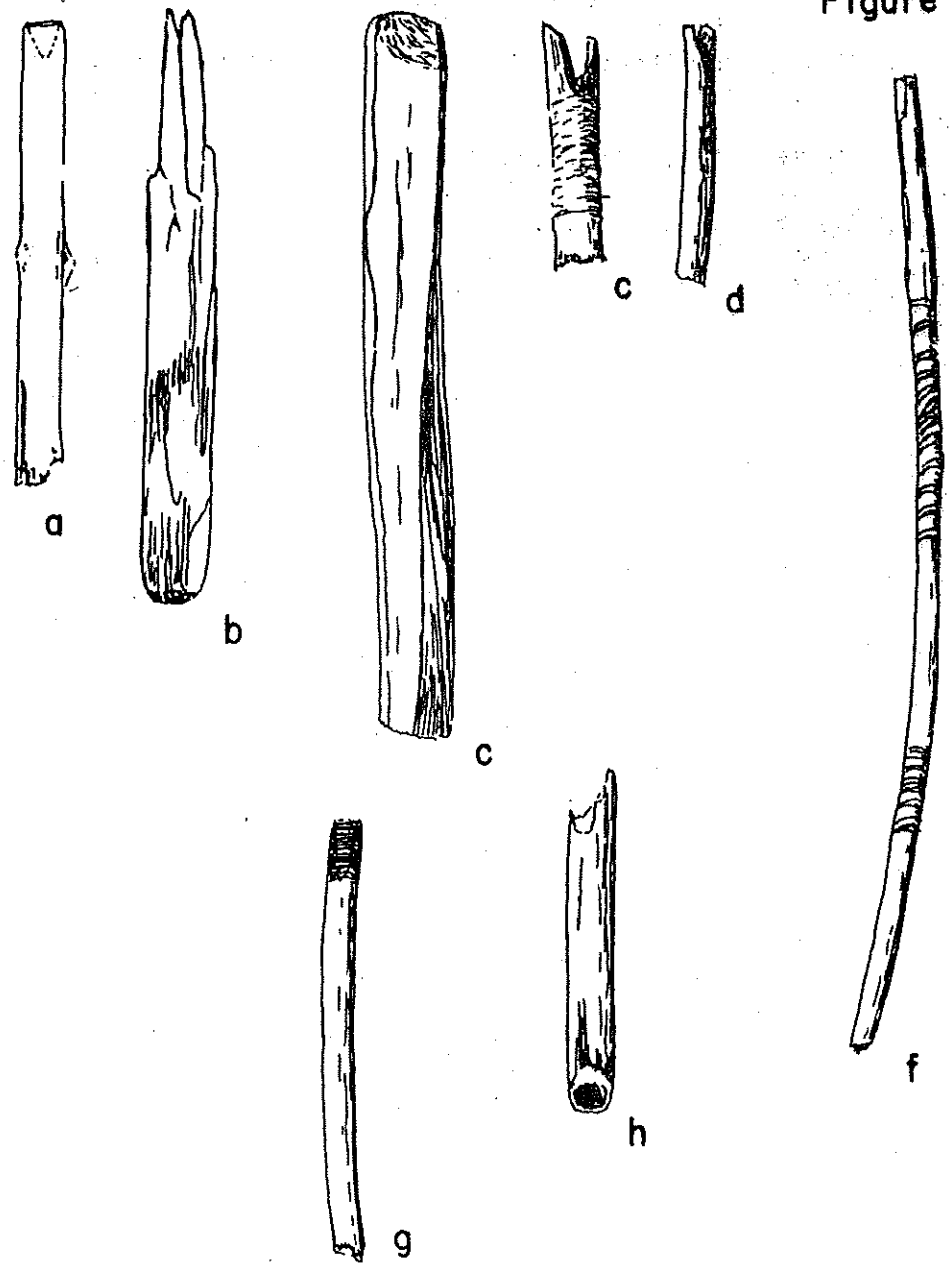


Figure 10

a. Short blunt end shaft (utilized fire drill). A66.1.2883.

b. Wood chip with drilled holes (possible fire drill hearth). A66.1.3700.

c. Split stick. A66.1.3099.

d. Split stick. A66.1.2043.

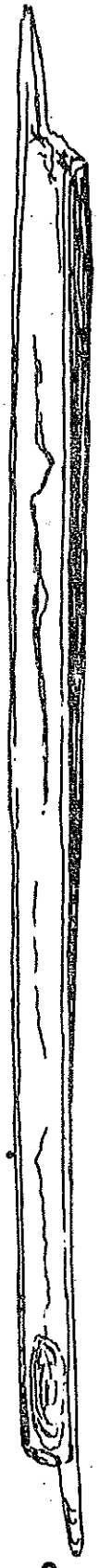
e. Split stick. A66.1.2042.

Scale: Actual Size

Figure 10

a

b



c

d

Figure 11

a. Utilized fire drill. A66.1.481. Scale: 1 in. = 3.8 cm.

b. Utilized fire drill. A66.1.418. Scale: 1 in. = 3.8 cm.

c. Wooden stick with hemispherical socket; possibly an unused fire drill hearth, the socket is rough and not charred. A66.1.3706. Scale: Actual Size.

d. Wooden stick with hemispherical socket; fire drill hearth. A66.1.3728. Scale: Actual Size.

e. Wooden stick with hemispherical socket; fire drill hearth. A66.1.1886. Scale: Actual Size.

Figure 11

Figure 12

Shredded bark; one source for the fiber used in the manufacture of cordage. A66.1.3563.

Scale: 1 in. = 1.27 cm.

Figure 12

Figure 13

a. Bark strip with evenly spaced holes. A66.1.3584.

b. Utilized fire drill fragment. A66.1.3097.

c. Split blunt end stick. A66.1.403.

d. Straight shafts; two almost identical pieces which appear to have been part of the same arrow shaft. A66.1.3494.

Scale: Actual Size

Figure 13

a

b

c

d

Figure 14

a. Blunt pointed shaft; fire drill. A66.1.3561.

b. Blunt pointed shaft; fire drill. A66.1.2820.

c. Blunt pointed shaft; fire drill. A66.1.4602.

d. Blunt pointed shaft; fire drill. A66.1.2255.

e. Teardrop shaped splinter; wooden awl. A66.1.2884.

f. Wide diameter self-tipped arrow. A66.1.2885.

g. Narrow diameter self-tipped arrow. A66.1.4603.

h. Wide diameter self-tipped arrow. A66.1.183.

Scale: Actual Size

Figure 14

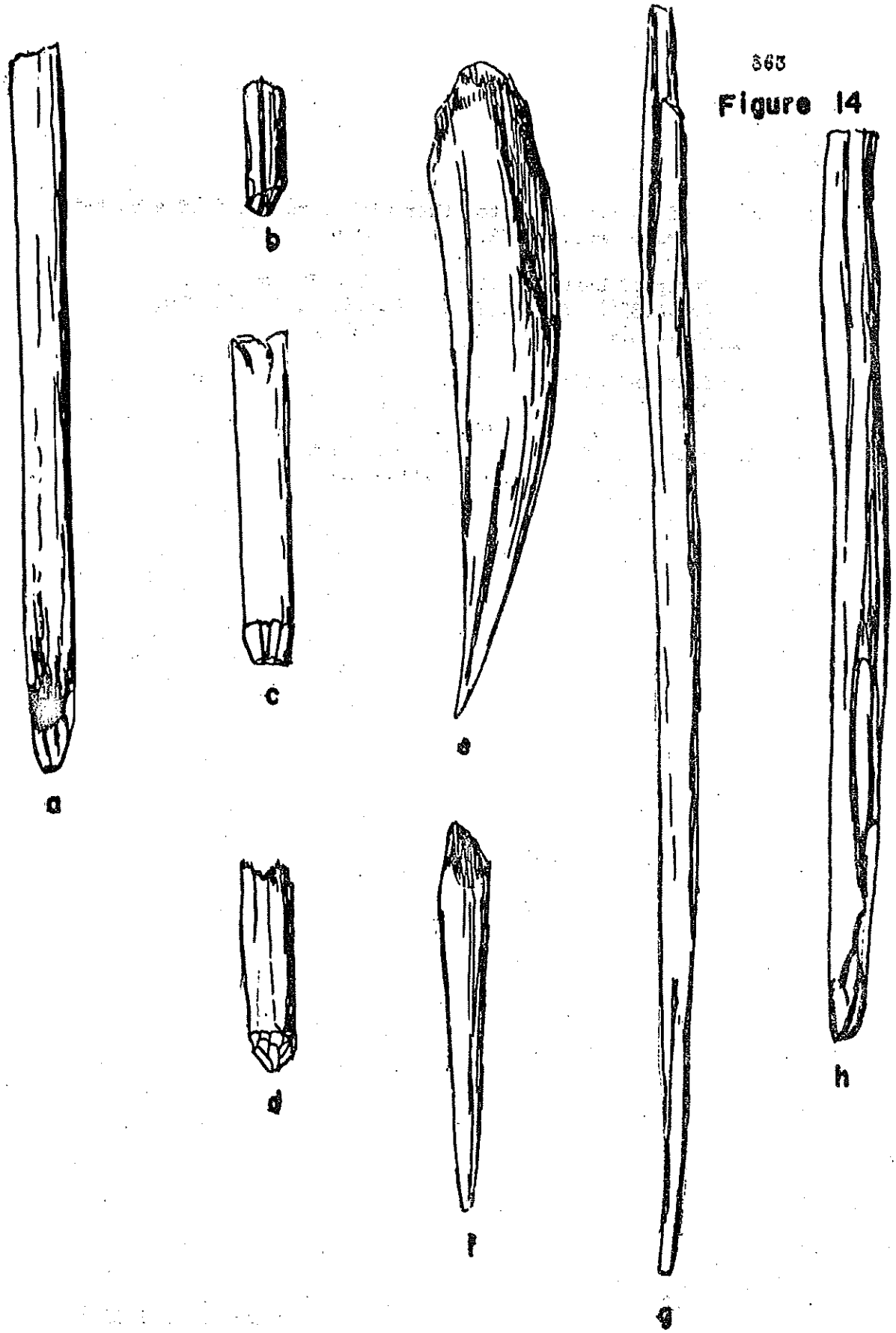


Figure 15

a. Wood strips woven together with bark; part of a basket or mat. A66.1.1772.

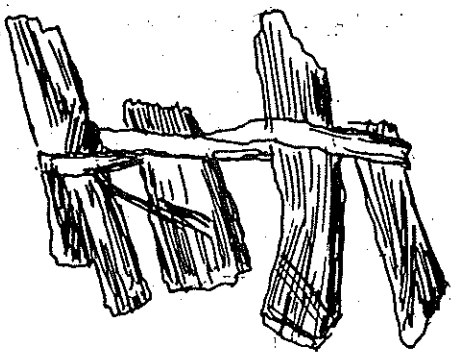
b. Strip of bark, knotted. A66.1.2976, A66.1.3114, A66.1.3582, A66.1.3793, A66.1.3568, A66.1.2210, A66.1.2597.

c. Flat end stick; possibly used in the manufacture or use of textiles. A66.1.378.

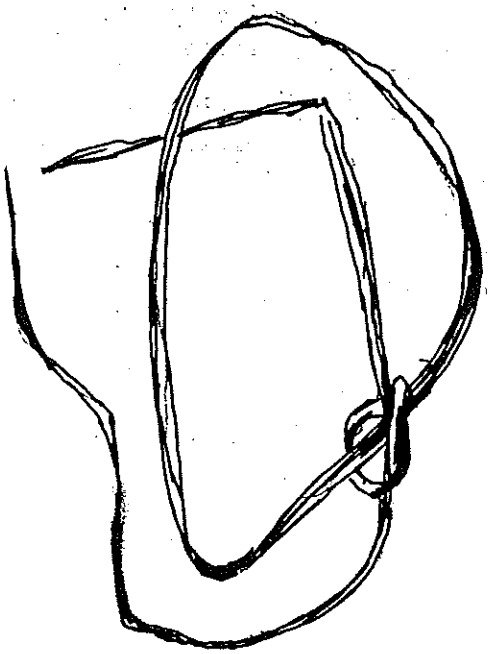
d. Fiber wound with hair. A66.1.2229.

Scale: Actual Size

Figure 15



a.



b

c

d

Figure 16

a. Heavy piece of leather; part of an item of clothing. A66.1.1999.

b. Pleated leather with holes along its edge; part of a leather bag with drawstring. A66.1.3720.

c. Leather with holes and a straight edge; part of a clothing item. A66.1.2177.

Scale: Actual Size

Figure 16

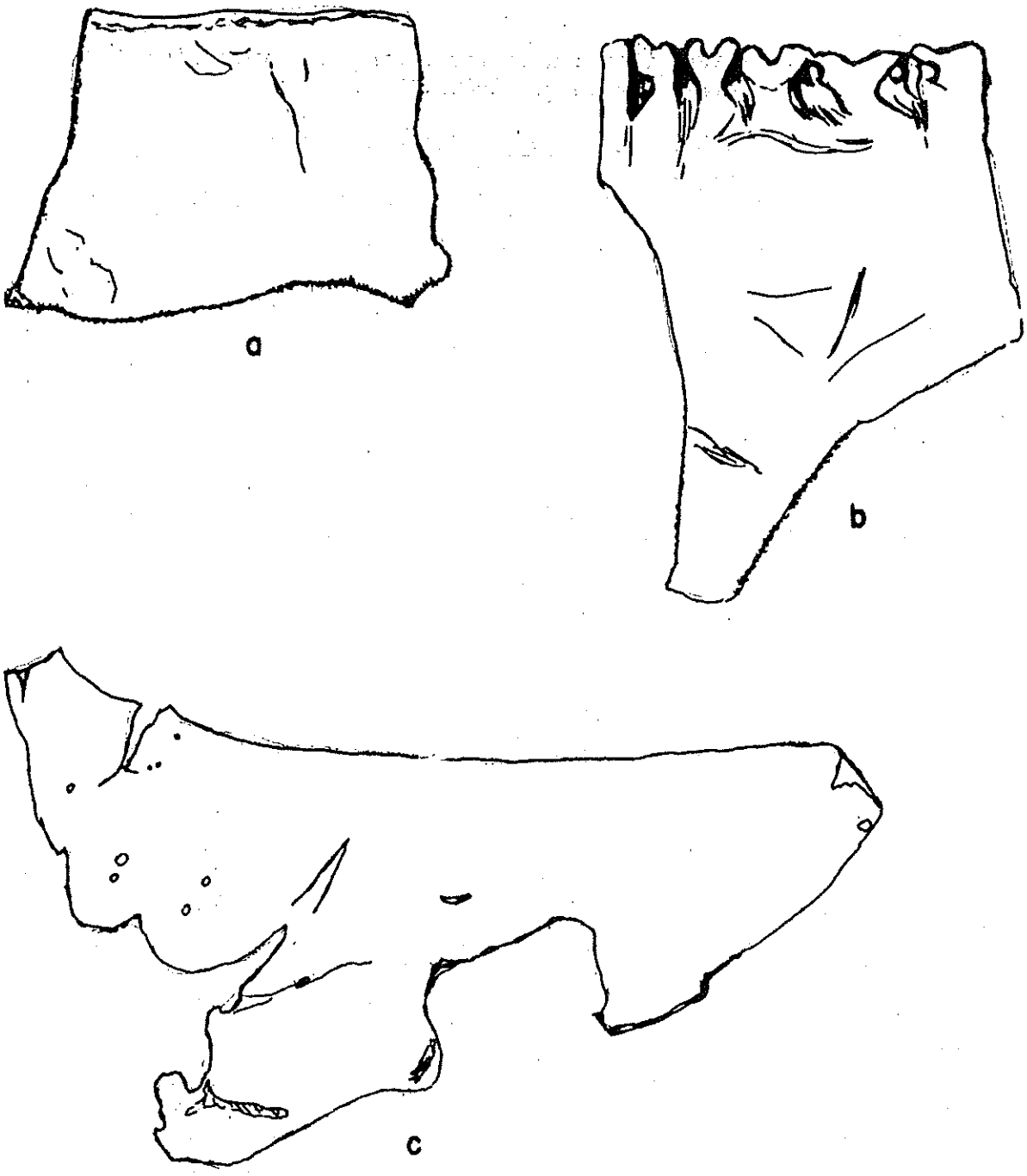


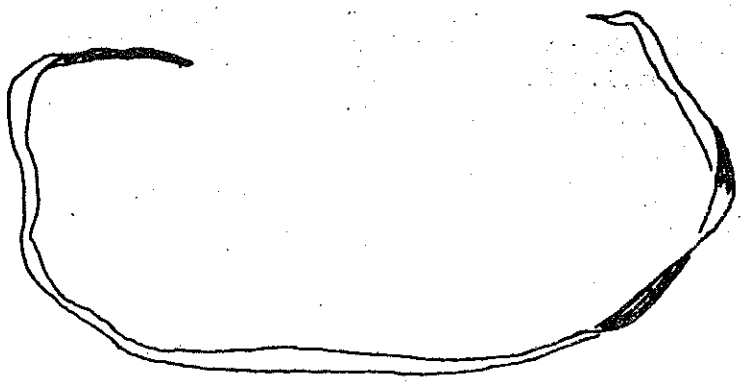
Figure 17

a. Leather thong; used for typing or sewing pieces of leather together. A66.1.3102.

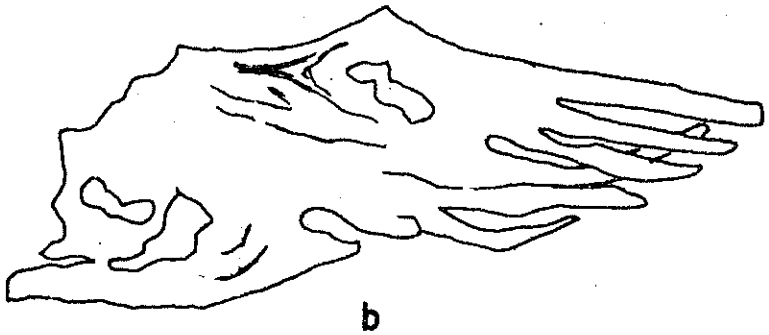
b. Leather with fringe; decoration on clothing. A66.1.1842

Scale: Actual Size

Figure 17



a



b

Figure 18

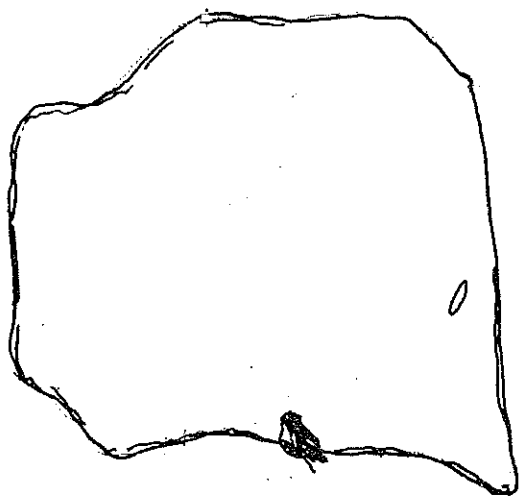
a. Leather tied together; part of a mocassin.
A66.1.4670.

b. Leather tied together; the sole of a mocassin.
A66.1.412.

Scale: Actual Size

Figure 18

a



b

Figure 19

a. Fur scrap. A66.1.2186.

b. Fur scrap. A66.1.6288.

c. Large feather; the tip is worn and dulled. A66.1.2268.

d. Large feather; splintered and possibly chewed. A66.1.2274.

Scale: Actual Size

Figure 19

a

b

c

d

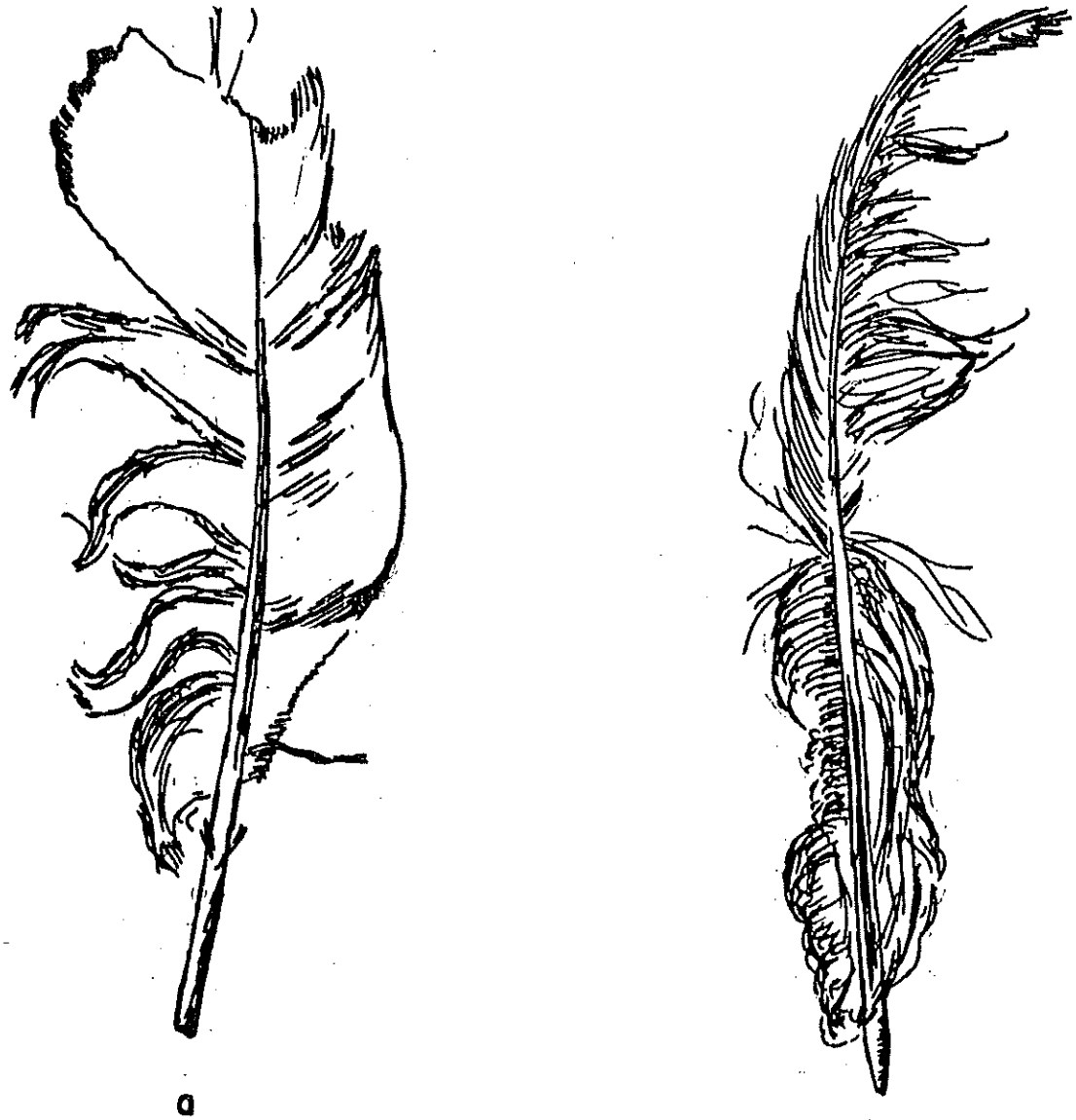
Figure 20

a. Large feather; the tip is worn and crimpped shut. A66.1.2193.

b. Large feather; the tip is worn and dulled. A66.1.2205.

Scale: Actual Size

Figure 20



a

b

ARTIFACTS OF BONE, ANTLER AND TURTLE SHELL FROM SHEEP ROCK SHELTER

by

James S. Dutt

ABSTRACT

This chapter is an analysis of the artifacts of bone, antler and turtle shell which have been found at Sheep Rock. A typology based on form has been set up, and for each type a description has been written, the probable method of manufacture discussed, and the possible functions listed.

ACKNOWLEDGMENTS

I would like to thank Dr. Joseph Michels, Ira Smith, and William Womsley for the advice and assistance which they have given me in the analysis of the bone artifacts.

TABLE OF CONTENTS

	Page
ABSTRACT	379
ACKNOWLEDGMENTS	381
TABLE OF CONTENTS	383
LIST OF ILLUSTRATIONS	385
I. INTRODUCTION	387
II. BONE ARTIFACTS	388
Class A. Pointed Bone Artifacts	388
Class B. Hollow, Cylindrical Items of Bone	391
Class C. Drilled Animal Teeth	392
Class D. Fragments of Long Bones with Blunted Ends	392
Class E. Long Bone Fragments with a Beveled End and Dull Point	393
Class F. Fishhook-Shaped Artifacts	393
Class G. Long Bones with a Joint Attached and a Cut Shaft	394
Class H. Bone Fragment with a Hole	395
Class I. Raccoon Bacculum	396
Class J. Worked Animal Incisors	396
Class K. Cut Sections of Long Bones	396
Class L. Polished Flat Long Bone Section	397
Class M. Bone Fragments with Holes in Them	397
Class N. Engraved Deer Rib	398
Class O. Miscellaneous Bone Artifacts	398
III. ANTLER ARTIFACTS	399
Class A. Worked Antler Tines	399
Class B. Cylindrical Antler Artifacts	400
Class C. Semi-Cylindrical Antler Artifacts	401
Class D. Antler Tines without Tips	401
Class E. Antler Shaft Artifacts	401
IV. TURTLE SHELL ARTIFACTS	402
Class A. Drilled Turtle Shell	402
Class B. Turtle Shell Container	402
Class C. Scratched Turtle Shell Fragment	403
V. CONCLUSIONS	403
APPENDIX I: Microscopic Analysis	423

LIST OF ILLUSTRATIONS

			Page
Figure	1a-b.	Bones with Animal Gnawing Marks	407
Figure	1c-d.	Bones with Man-Made Butchering Marks . .	407
Figure	2a-c.	Pointed Bone Implements Made from Long Bone Fragments	409
Figure	2d,e,j.	Bones with One Joint Intact and the Other End Ground and Polished to a Point . .	409
Figure	2h-i.	Portions of Scapulae and Ribs Which Have One End Ground Down to a Point. . . .	409
Figure	2f-g.	Pointed Tip Fragments of Bone Artifacts .	409
Figure	3a-h.	Hollow, Tubular Pieces of Animal Long Bones	411
Figure	3k-l.	Deer Toe Bones with the Proximal End Cut Off and a Hole Through the Distal End .	411
Figure	3i-j.	Animal Teeth Which Have Had Holes Drilled Through Them.	411
Figure	4a-b.	Lone Bone Fragments with One Rounded, Blunted End	413
Figure	4c-e.	Long Bone Fragments Which Have a Beveled End and Dull Point.	413
Figure	4f-g.	Bones Having the Shaft Cut Off Near the Distal Joint and the Cut Edges Beveled Outward	413
Figure	4h.	Long Bone with the Distal End Cut Off, the Cut Edges Smoothed and Beveled Inward .	413
Figure	4i-j.	Flat Sections of Long Bone or Scapula Roughly Cut into the Shape of a Fish-hook	413
Figure	4k-l.	Sharp, Pointed Objects of Bone which Have Been Carved into the Shape of a Fishhook	413
Figure	5a.	Long Bone Fragment with Hole Drilled Through It	415

			Page
Figure	5b.	Raccoon Bacculum	415
Figure	5c,h.	Sections of Cut Long Bone Shafts. . . .	415
Figure	5d.	Thin, Flat Section of Highly Polished Long Bone.	415
Figure	5e.	Fragment of Worked Animal Incisor . . .	415
Figure	5f.	Fragment of Bone with Hole Drilled through It	415
Figure	5g.	Flat, Triangular Bone Fragment with Notches Along Base.	415
Figure	5i.	Split Deer Toe.	415
Figure	5j.	Long Bone with One Joint Cut Off and the Shaft Forked at that End.	415
Figure	6a-d.	Engraved Deer Rib Knife Handle	417
Figure	7a,c-d.	Long Tip Portions of Antler Tines . . .	419
Figure	7b.	Long, Tip Portion of Antler Tine with Hole in Base.	419
Figure	7e-f.	Cylindrical Antler Artifacts	419
Figure	7g.	Semi-cylindrical Antler Artifacts . . .	419
Figure	7h-j.	Small Tip Fragments of Antler Tines. . .	419
Figure	8a-b.	Utilized Antler Shafts and Butts. . . .	421
Figure	8c.	Fragment of Turtle Shell Having a Large Number of Deep Scratches.	421
Figure	8d-e.	Fragments of Turtle Shell Having Holes Drilled through Them	421
Figure	8f.	Turtle Shell Container.	421

INTRODUCTION

Among the items found at Sheep Rock were a large amount of bone and bone fragments, antler and turtle shell. More bone was found than any other intrusive, non-shale, material. During the years in which the site has been excavated around 100,000 bones and bone fragments have been found. A large sample of the bone materials of the first few years' work has been studied by John Guilday and Paul Parmalee (1965). From a total of 35,000 pieces they were able to identify some 10,791 pieces as to the species of animal from which the bones came, discovering the remains of 114 species of animal life, including both large and small mammals, birds, fish, and reptiles. Many of these animals probably lived and died at the site, especially the smaller rodents and reptiles, but a large number were carried in by man or other animals as food.

Among the bones found at the site were many pieces having unnatural markings -- cuts, scratches, polished areas. Analysis showed that they could be divided into two categories: those having marks made by animals other than man, and those having marks made by man. The animal-made marks are usually small, paired gouges or scratches made by the front teeth of rodents and other small animals. Figure 1a, b illustrates such marks. Many small mammals, especially porcupines, eat bones and antlers for the calcium and other salts which they contain. It is difficult to ascertain how many bones show evidence of this type of marking because these bones were not classified separately from unmodified bone.

The marks made by man were subdivided into two classes, the first of which was composed of those bones accidentally modified. These accidental marks are small scratches and cuts made by stone tools when the animal was skinned and butchered. Usually such marks run perpendicular to the length of the bone and are often found near the joints (Fig. 1c,d). Guilday, Parmalee, and Turner (1962) have made a study of the aboriginal butchering techniques used at a site in Lancaster County, Pennsylvania. Again it is impossible to estimate how many of the bones with marks of this type have been found at the site because they have not been classified separately from unmodified bone.

The second subclass of bone -- bone purposely modified by man -- defines the topic for this paper. Bone artifacts are bones which have been modified by man for use in some way -- perhaps as a tool, as ornamentation, for use in some type of a magico-religious ceremony, or as part of a game.

It is not surprising that bone was utilized by the Indian occupants of Sheep Rock. It was very abundant, and

the supply of raw materials was constantly being renewed as animals were brought into the shelter as food. Bone is also very easy to work and often may be used as it is found without any modification. Bone was probably modified by cutting with flint knives or sharp flakes. Percussion was probably not directly used to form tools but indirectly resulted in pieces of bone which were easily convertible to tools. Percussion was used to break long bones apart so that the marrow inside them might be eaten. Such bones were broken into many fragments, some of which may have been utilized afterward as tools. This inference is supported by the fact that over half of the bone artifacts found were made from long bone fragments. After the initial formation, directly by the use of stone tools or indirectly by percussion, the object may have been finished by grinding. Bone can be ground to a very sharp point on wet sandstone or other gritty material. Many of the artifacts made of long bone fragments could have been completed in a few seconds by grinding.

In the following sections, each class of artifact is described, the possible methods of manufacture and the possible functions are discussed, and the occurrence of the type is given. The description of each class has been kept as objective as possible, while the function and method of manufacture are subjective interpretations.

BONE ARTIFACTS

Class A. Pointed Bone Artifacts

In most of the literature objects of this type have been called awls. The word is not used here because it has a functional as well as a descriptive meaning. It implies that the object termed an awl was used in a punching manner for making holes. A number of the pointed bone tools seem to have been used in other ways, as indicated by scratches perpendicular to the axis of the point which suggests the use of a turning motion similar to that used in driving a screw.

A microscopic examination of the pointed bone artifacts was conducted using a binocular microscope with a 10X ocular and a 2.4X objective lens. The results of this examination and the inference made form it are contained in Appendix I.

SubClass 1. Description. Pointed bone implements made from the fragments of long bones (Fig. 2a-c). Nineteen specimens have been found which range from 6 to 10 cm in

length. Two specimens, Fig. 2b, c, have notches cut into each side at the non-pointed end. Both of these items show considerable amount of polish while the remainder have polish near the tip only.

Possible Methods of Manufacture. These artifacts were made from fragments of long bones which may have been split to get marrow. Most of them show little work except near the point. This suggests that they were not formed purposely. The points could easily have been formed either from the splitting of the bone itself or by rubbing it on some type of gritty material. The polish of the tips probably resulted from wear. It should be noted that all of these items are very crude and show no secondary working beyond that of the point. In all cases the non-pointed end shows no modification.

Possible Functions. These may or may not have complete tools; a number of the items could have easily broken off longer tools. Most specimens of this class have polished points and a few scratches which presumably occurred through manufacture or use. The scratches that are present run lengthwise along the tools, suggesting that they were used in a punching manner or as awls. The relative lack of scratches seems to suggest that the tools were used on relatively soft materials. The two notched items may have been weaving tools, cordage having been tied at the notches. These two objects show wear and polish over their entire lengths, suggesting that they were pulled through a soft material.

Position. Artifacts of this type are found throughout the site and at various levels. This one would expect, for this type of tool is multipurpose, simple to make and to use, and probably would not change much over time.

SubClass 2. Description. Bones with one joint intact and the other end ground and polished to a point (Figs. 1d, e, j). Eleven items of this type have been found which, with two exceptions, are 4 to 10.5 cm long. One specimen is 2.6 cm while another is 14.5 cm. The large item is unique in its length and for the large number of deep scratches running lengthwise and perpendicular to the length of the bone (Fig. 2d). Two of the specimens seem to have been made from deer bone, two others from bones of smaller mammals, and seven from turkey or other bird bones.

Probable Method of Manufacture. One joint was cut from a long bone, either purposely or accidentally, and the end was then ground down to a point.

Possible Functions. This class of tools may have been used to punch holes in soft material, perhaps leather. It would be impossible to punch or turn this type of tool completely through the material in which the holes were made.

because of the large joint at one end. The largest specimen (Fig. 2d) may have been used in a turning motion, for it has scratches perpendicular to its length.

Position. This class of artifact is found in various levels and throughout the site. This indicates that this type of tool probably was a common, multipurpose one which would not be subject to change through time.

SubClass 3. Description. Portions of scapulae and ribs which have one end ground down to a point (Fig. 2h,j). Eight specimens have been found which range from 4.5 cm to 12.8 cm in length. Two of the eight specimens are definitely scapulae fragments, four are rib fragments, and the remaining two cannot be definitely classified. The scapula fragment illustrated in Figure 2i is highly polished, has a very sharp point, and a number of scratches parallel and perpendicular to the axis of the tool.

Probable Method of Manufacture. The end of a rib was removed or an accidentally broken rib was utilized and a point was formed by rubbing it on a gritty material. The scapulae specimens were made by removing the blade of the scapula and cutting it into strips which were later ground down to a point (Webb 1946).

Possible Functions. Objects of this class may have been used as awls, i.e., in a punching manner, but probably they were used with a turning motion. None of the cross-sections of any of these tools is circular, and if a round hole was desired, the tools would have had to have been turned as they were driven inward. The points of most of the items are sharply pointed and highly polished, suggesting that they were not used on extremely hard materials. Tools of this class, therefore, seem to have been used on leather or other soft material. Perhaps they were used in weaving or wood working. It is probable that they had many functions.

Position. Items of this class were found in a number of levels throughout the site. The class seems to have been used for a long period of time.

SubClass 4. Description. Pointed tip fragments of bone artifacts (Fig. 2f,g). Twenty-three specimens have been found which vary from 1.0 cm to 5.0 cm long.

Probable Method of Manufacture. The actual manufacturing technique used cannot be determined. It seems certain that these items are tips broken off longer tools and not utilized after they were broken.

Possible Functions. This class of objects consists of broken tips. It is impossible to make any inferences as to

their functions because of their fragmentary nature. They were probably not used after they were broken.

Position. Found throughout the site at various levels, both deep and shallow.

Class B. Hollow, Cylindrical Items of Bone

SubClass 1. Description. Hollow, tubular pieces of animal long bones (Fig. 3a-h). Seventeen specimens have been found. All examples have cut and polished ends; five have been highly polished, and two have been burned. Two specimens are only fragmentary. One specimen is 21 cm long while the remainder range from 0.7 cm to 6.1 cm. The outside diameters vary from 0.35 cm to 1.25 cm; the inside diameters from 0.2 cm to 0.75 cm.

Probable Method of Manufacture. The ends of the long bones were cut off with stone knives. The cut edges were then smoothed down by grinding. Smaller sections could then be cut from the longer sections, using the same techniques, until the desired size was reached. If small, thin beads were desired, bird bones could be used. If larger beads were wanted, mammal bones were used. The joints which were cut from the bone might have been utilized as handles (see Class G, SubClass 2). A manufacturing sequence is shown in Figure 3a-w.

Possible Functions. These items were probably strung on cordage and used as beads or ornaments. The single long specimen may have been one step in the manufacture of smaller beads or it may have been used as it was. The latter hypothesis seems more likely, for the cut ends have been polished as has the rest of the bone. The core seems to have been cleaned out also. This indicates that the bone had been utilized.

Position. Bones of this class are much more prevalent on the northern side of the site, the dry area, than on the south. However, they are found at both shallow and deep levels, indicating that this class of objects has a long time span.

SubClass 2. Description. Deer toe bones with the proximal end cut off, the edges of the cut smoothed down, and a hole drilled lengthwise through the distal end of the bone (Fig. 3k,l). Three specimens have been found.

Probable Method of Manufacture. The proximal end of the bone was removed with stone tools, the center hollowed out, perhaps with a sharp long bone fragment, and the distal end then perforated with a stone drill or a sharp bone.

Possible Functions. These items may have been strung on cordage and used as beads or ornaments. Willoughby (1935) reports that the Algonquin Indians used similar artifacts in a game which they played called the cup and pin game. A deer toe bone was first modified as described above, a leather thong with a knot at one end was threaded through the hole at the distal end. The other end of the thong was tied to a thin long bone fragment or stick. The idea was to throw the toe bone up in the air and catch it on the end of the long bone or stick. John Guilday (1963) has surveyed the literature on the cup and pin game in Northeastern United States and presents evidence that the game was played by Indians in Pennsylvania.

Position. The sample is too small to draw any conclusions from position.

Class C. Drilled Animal Teeth

Description. Animal teeth which have had holes drilled through them (Fig. 3i,j). Two specimens have been found. One has a hole drilled through it lengthwise and has been broken in half. The other specimen has two holes drilled through it laterally (Fig. 3i,j).

Probable Method of Manufacture. The holes were drilled through the teeth with stone drills.

Possible Functions. Hung on cordage as ornaments.

Position. The sample is too small to make any inferences as to distribution through time.

Class D. Fragments of Long Bones with Blunted Ends

Description. Fragments of long bones with one rounded, blunted end (Fig. 4a,b). Three specimens have been found. Two of these are only tip fragments, 1.5 cm and 3.0 cm long, while the other item which may or may not be a complete tool is 5.9 cm long. The two tip fragments have both been burned.

Probable Method of Manufacture. The sample is so small that there is little evidence concerning how the tools were constructed. Probably they were utilized fragments of lone bones. The blunted end may have resulted from use, although it is likely that the tool was never very pointed. The blunt end shows scratches indicating that it was used after it became blunt.

Possible Functions. This class of objects may have been used as flaking tools. It is also possible that they were used as tools for incising pottery. It has been taken for granted by most archaeologists that sticks were used to produce incised pottery, but bone could have been used just as easily.

Position. The sample is too small to make any inference about position. All three specimens were found at different levels in different squares.

Class E. Long Bone Fragments with a Beveled End and Dull Point

Description. Fragments of split long bones having a beveled end and a dull point and worn edges near the point (Fig. 4c-e). Five specimens have been found, two of which have been broken.

Probable Method of Manufacture. Unknown. These items may have been utilized fragments of long bones which were utilized with very little work. A flint knife could easily have been used to produce the beveled end.

Possible Functions. These items may have been used as knives or scrapers to clean hides. They also may have been used as gouges for working soft wood.

Position. The sample is too small to make any inference about position.

Class F. Fishhook-Shaped Artifacts

SubClass 1. Description. Fairly flat sections of either long bone or scapula which have been roughly cut into the shape of a fishhook (Fig. 4h,j). The stems of these items show the most work, the curved portions the least. Five items have been found, one of which has a knob on the end of the stem.

Probable Method of Manufacture. This class of artifacts is known in the literature as fishhook blanks. William Webb (1946) describes in detail the procedure used by Indians in making fishhooks. First, a long strong spatula of bone was made, then an elongated slot was made in the middle. A bone loop was formed which was subrectangular in shape and then part of the loop was cut away forming a fishhook (Webb 1946). Too few examples have been found at the site to form a complete manufacturing sequence. Further information on the manufacture of fishhooks may be found in the report by Webb or in a book by Moorehead (1910).

Possible Functions. These were unfinished tools -- stages in the manufacture of fishhooks. Some may have been discarded because they had broken while being made. Others may not have been finished.

Position. Four of the five specimens were found in the dry northern section of the site, approximately 1 to 2 feet below the original surface. This would date them as being no earlier than the Early Woodland Period. This may indicate that before this time fishing was not important. The scarcity

of specimens also seems to indicate that fishing with a hook and line was never of great significance. It is probable that fishing with a net was much more prevalent.

SubClass 2. Description. Sharp pointed objects made of bone which have been carved into the shape of a fishhook. Two specimens have been found. One is a complete fishhook with notched stem (Fig. 4j), while the other is a partial specimen with part of the stem missing (Fig. 4k).

Probable Method of Manufacture. A description of the manufacturing procedure is given in the section on manufacturing in the preceeding subclass.

Possible Function. These items were tied to lengths of cordage and used as fishhooks which may or may not have been baited. It should be noted that both notches and knobs at the ends of the stems were used as places to tie cordage. One of the fishhooks is notched while one of the blanks has a knobbed end.

Position. The fishhooks were found within two feet of the surface. This supports the statements made about the fishhook blanks.

Class G. Long Bones with a Joint Attached and a Cut Shaft

SubClass 1. Description. Long bones which have the distal end cut off squarely and the cut edges smoothed and beveled inward (Fig. 4h). Two specimens have been found and measure 14.5 cm and 15.25 cm long. One item is made from the ulna of a trumpeter swan, the other from a humerus of the same type of bird. This is the first record of a trumpeter swan in Pennsylvania (Guilday and Parmalee 1965). The inside of each bone has been hollowed out and the beveled edges have been smoothed and polished. The outside surface of each has been highly polished.

Probable Method of Manufacture. Evidentally the shaft of the long bone was cut near the distal joint with a flint knife or sharp flake. The edges of the cut were then beveled inward with a chipped stone tool. The polish may have been acquired through use or by design during the manufacture of the items.

Possible Functions. These items may have served as handles for objects of wood, stone, or bone could have been easily hafted at the hollow end. The lack of scratches on the outside near the cut end and on the inner beveled edges suggests that they were not used as gouges. The inside surface, that which can be seen, shows little sign of wear. There are no scratches which would have resulted if a stone object had been hafted. It may be inferred from the polish on the

outside that these objects were handled a great deal and were of some importance. It is quite possible that they were used in connection with some magico-religious practice. The rarity of the trumpeter swan in Pennsylvania suggests this.

Position. One specimen was found in square W15-S5, in the second level. No information exists on the provenience of the outer specimen. It is difficult to make any statement on position.

SubClass 2. Description. Deer bones having the shaft cut off near the distal joint and the cut edges beveled outward (Fig. 4f,g). Two specimens have been found, 4.6 cm and 3.7 cm long with inside diameters of 0.7 cm and 0.8 cm, respectively.

Probable Method of Manufacture. The shaft was cut off near the distal joint with a stone tool. These may be unused ends which were formed while making beads.

Possible Functions. The two items may have been waste products of a bead industry or they may have served as handles. Chipped stone tools or animal incisors may have been hafted to this type of artifact and the composite tool used as a scraper or gouge. Figure 4f, shows how a beaver incisor found at the site fits perfectly into one of the specimens. The resulting tool makes a fine small gouge or scraper or even a flaking instrument. Unfortunately the exact provenience for the tooth is not known. However, the fit is perfect and the tooth seems to have been perfectly carved to its shape so that the two objects probably formed the tool described.

Position. This class is too small to make any statement about time distribution.

Class H. Bone Fragment with a Hole in It

Description. Fragment of a long bone with a hole through it (Fig. 5a). One specimen was found. It has a hole 0.7 cm by 1.1 cm approximately in its center and seems to be from the long bone of a deer. The hold is not circular, is only roughly made, and the cut edges have not been smoothed.

Probable Method of Manufacture. The hole was probably cut with a chipped stone drill.

Possible Functions. This specimen may have resulted from random efforts in a spare moment, something done to pass the time. However, it may have had some function. Moorehead (1910) describes similar objects and states that they were used as arrowshaft straighteners. However, the

hole is neither very round nor as large as the arrowshafts may have been. Leather straps could have been pulled through the hole to soften them but the edges of the hole do not show the wear that one would expect if this were the purpose of the object.

Position. The class is too small to make any statement on position.

Class I. Racoon Bacculum

Description. Highly polished raccoon bacculum (Fig. 5b). One specimen present.

Probable Method of Manufacture. Unknown. The specimen seems to be an entire bone which has been highly polished. The polish may have resulted either from use or from manufacture.

Possible Functions. Unknown. Perhaps this type of artifact had some magico-religious significance. It may have had some fertility significance.

Position. Sample size is too small to make any inferences on position.

Class J. Worked Animal Incisors

Description. Fragments of lower jaw animal incisors (Fig. 5e). Two specimens have been found. Both are the frontal halves, including the biting edge, of incisors, and both show a series of scratches across the edges of the teeth. One specimen is 1.6 cm long and the other 2.6 cm. The back of the longer tooth has been trimmed away and the cut edges have been highly polished.

Probable Method of Manufacture. These items seem to have been animal teeth which were utilized with little or no modification. The longer teeth may have been carved to fit a handle. This was the specimen which, as noted before, fit exactly into one of the deer bones which may have served as a handle (Fig. 4f).

Possible Functions. The artifacts of this class were probably used as small scrapers or gouges and may have been hafted to bone handles for use.

Position. The sample size is too small to make any statements based on position.

Class K. Cut Sections of Long Bones

Description. Sections of cut long bone shafts (Fig. 5h). Three specimens have been found and are 6.4 cm, 7.15

cm and 8.9 cm long. The ends and the sides of all three items show polish and wear. One specimen, Figure 5h, has notches near each end and deep scratches running lengthwise between the notches.

Probable Method of Manufacture. A tube of long bone shaft was formed by cutting off both joints. The tube was then split lengthwise into three or four sections.

Possible Functions. The longer specimen was probably used as a gouge or as a scraper for cleaning skins. The function of the two smaller items is unknown. Cordage may have been tied to the one which had been notched.

Position. The sample size is too small to make any inference from position.

Class L. Polished Flat Long Bone Section

Description. Thin flat section of a long bone which has been highly polished (Fig. 5d). One specimen has been found, and it is 9.6 cm long, 0.27 cm thick, and 0.91 cm wide at its midpoint. One end is round and the other is flat. The surface has a very high polish and shows a large number of scratches which run in all directions.

Probable Method of Manufacture. The scratches present probably resulted during the manufacture of the artifact as their edges have been worn and are polished. The procedure for manufacturing the item is unknown.

Position. There is no exact provenience for this specimen.

Class M. Bone Fragments with Holes Through Them

Description. Small fragments of bone with holes drilled through them (Fig. 5f). Two specimens have been found. One has a hole with a diameter of 0.25 cm, the other has two halves of two holes each approximately 0.35 cm in diameter.

Probable Method of Manufacture. If purposely done, a stone drill or piece of sharp bone may have been used to make the holes.

Possible Functions. Unknown. Possibly they may have been strung on cordage or leather straps as ornaments. It is also possible that they had no function and were the results of a few idle moments.

Position. Sample size is too small to make inferences.

Class N. Engraved Deer Rib

Description. A section of deer rib which is 7.5 cm long, 3.0 cm wide and 1.3 cm thick. The piece is highly polished and is engraved on both sides. Figure 6a, b, c, d shows the specimen and the engravings. A hole was drilled through it at the smaller end. At the wider end the center of the rib had been hollowed out.

Probable Method of Manufacture. The artifact was made with stone tools. The engraving was done with stone. The polish probably resulted from use.

Possible Functions. This particular specimen was a knife handle. A chipped flint knife was probably hafted to this specimen and the composite tool used as a knife. A chipped flint knife was found in an adjoining square which perfectly fitted the hole in the handle. A leather strap or piece of cordage was run through the hole in the other end and enabled the tool to be hung from the waist or hung on a stake, etc.

Position. Unfortunately the exact provenience of this object does not seem to have been recorded.

Class O. Miscellaneous Bone Artifacts

SubClass 1. Description. Small, flat triangular piece of bone with three notches along base (Fig. 5g).

Probable Method of Manufacture. Unknown.

Possible Functions. Unknown. It may have been used as an ornament, as part of a game, or as a small scraper.

Position. Sample size is too small to draw conclusions based on position.

SubClass 2. Description. A small mammal or bird long bone with one end cut off and the shaft forked at that end (Fig. 5j). The specimen is highly polished.

Probable Method of Manufacture. The piece probably is a utilized broken long bone.

Possible Functions. The forked end shows striations running parallel to the length of the bone which suggest that it may have been used as a small gouge or scraper. However, it could cover an area of only 0.5 cm which seems rather small for the tool to have been practical.

Position. Sample size is too small to make any inferences.

SubClass 3. Description. A deer toe which has been split lengthwise with the split edges smoothed and polished (Fig. 5i). The specimen is nearly flat and is 4.6 cm long.

Probable Method of Manufacture. Unknown. The deer toe was probably split on purpose and the smooth edges may have resulted from use.

Possible Functions. Unknown. The smooth, polished appearance of the specimen may indicate that it was used as some type of rubbing tool.

Position. Size of sample is too small to make any inferences.

Although not a class of modified bone, there were a number of bone fragments which were quite small (the largest dimension was always less than 1 cm) and highly polished with no sharp edges, but which had no other signs of modification. These are probably fragments of bone which had been eaten by various animals and passed through their digestive tract. Some of the particles may have been eaten by men but most were probably eaten by other carniverous animals which inhabited the area.

ANTLER ARTIFACTS

Class A. Worked Antler Tines

SubClass 1. Description. Long, tip portions of antler tines (Fig. 7a,c,d). Nineteen specimens were found. Of these, thirteen have definitely been used while the remainder may or may not have been used. One specimen is 16.3 cm long, another 12.8 cm, and the rest range between 4.5 cm and 8.5 cm. The longest item, that shown in Figure 7a, has deep scratches running lengthwise from the tip.

Probable Method of Manufacture. The tines were probably broken off the main antler and used without further alteration.

Possible Functions. This class of items was used as flaking tools to make tools out of flint and chert.

Position. Artifacts of this type are not concentrated in any one area of the site nor at any particular level.

SubClass 2. Description. An antler tine with a hole drilled in its base (Fig. 7b). The hole has a diameter

of 0.6 cm. The point is slightly curved and has been broken. One specimen was found.

Probable Method of Manufacture. The tine was broken off the antler and a hole bored into its base with a stone drill or sharp pointed bone.

Possible Functions. This object was probably used as a projectile point. The shaft of an arrow was hafted to the point by inserting it into the hole at the base of the point. While fairly common at other sites in the Northeast (Ritchie 1965), this seems to be the only bone or antler projectile point found at the site.

Position. Sample size is too small to make any inferences.

SubClass 3. Description. Small tip fragments of antler tines (Fig. 7h,i,j). Fifteen specimens have been found and range from 1.5 cm to 3.4 cm in length. Four have been burned, and all show sings of use.

Probable Method of Manufacture. All of these items are small, worked tip fragments. They are too small to be functional as they now exist. They are probably types of larger antler tools that broke off through use and were discarded.

Possible Functions. These were tips of larger antler flakers.

Position. Items of this type were found all over site and at various levels.

Class B. Cylindrical Antler Artifacts

Description. Round, cylindrical objects of antler (Fig. 7f). Six items have been found. They range from 4.8 cm to 6.7 cm in length and from 0.5 cm to 0.85 cm in diameter. One of the specimens has been burned and another has been gnawed by a rodent.

Probable Method of Manufacture. Kidder (1932:275) describes how similar artifacts were made. Antler was split into sections using stone tools and the sections were then carved into cylindrically shaped objects.

Possible Functions. These objects were probably used as flaking tools for fine pressure flaking (Kidder 1932; Ritchie 1965).

Position. The sample is small and there does not seem to be a distribution pattern present.

Class C. Semi-Cylindrical Antler Artifacts

Description. Small, thin semi-cylindrical objects of antler (Fig. 7g). Two specimens have been found. They are 4.75 cm and 4.8 cm long and have a flat base or side 0.4 cm and 0.7 cm wide, respectively.

Probable Method of Manufacture. Unknown. The semi-cylindrical appearance may have possibly come about through use.

Possible Functions. These items may have served as rubbing tools. They may have been used to soften skins. It is possible that these items may have been used to smooth pottery; however, the flat surface shows no sign of scratches which would indicate that it had been rubbed over a gritty surface. They also may have been used as flakers as the cylindrical antler pieces seem to have been.

Position. The sample size is too small to make any inferences about position.

Class D. Antler Tines Without Tips

Description. Portions of antler tines from which the tips have been broken. Nine items have been found. They range from 2.1 cm to 4.45 cm in length and from 0.65 cm to 1.35 cm in diameter. Two specimens have been burned. One specimen has a small hole 0.3 cm in diameter drilled through it. Four of the nine items have been used since the tips were broken.

Probable Method of Manufacture. These were tines which had been broken from antlers for use as flaking tools. During use the tips broke off. A number were used after the point broke, while a few were discarded.

Possible Functions. The specimens which were used after the tips broke probably were utilized as flaking tools. The specimen with the hole drilled through it may have been a broken antler projectile point or it may have been strung on cordage as a bead.

Position. This class of artifacts was found in all areas of the site and at many different levels.

Class E. Antler Shaft Artifacts

Description. Antler shafts and butts which have been utilized (Fig. 8a,b). Six specimens have been found. One item is 12.4 cm long and 2.8 cm in diameter. Another is 8.2 cm long and 2.0 cm in diameter. All of the specimens have a rounded and smoothed end while two of them have both ends

rounded and smoothed. Three still show the cutting marks made when the rest of the antler was cut away.

Probable Method of Manufacture. The objects were cut from pieces of antler from which the tines had already been removed. Little further preparation was required.

Possible Functions. The large specimen (Fig. 8a) was probably used as a hammer for indirect percussion of direct percussion flaking. The smaller objects may have been used as flakers or they could have been used to soften hides. Kidder (1932:277) shows similar artifacts and states that they were used to rub hides. The utilization of these pieces does not point out that every bit of the antler was used by the Indians for tools.

Although not a class of artifacts, there were two pieces of antler which showed signs of human alteration -- cutting marks. These two pieces do not seem to have been used and had no other marks of human modification. They, therefore, have not been included in the category of worked antler.

TURTLE SHELL ARTIFACTS

Class A. Drilled Turtle Shell

Description. Fragments of turtle shell with holes drilled through them (Fig. 7d,e). Two specimens have been found. Both specimens are very irregular in shape.

Probable Method of Manufacture. Holes were drilled through the shell with stone drills or sharp flakes.

Possible Functions. Specimens are fragments of turtle shells. They may have been parts of a whole shell which was used as a rattle. Holes were drilled through two shells and leather straps were used to tie the halves together. It is possible that the items may have been ornaments but this is doubtful because of their irregular shapes.

Position. The sample is too small to make any inferences from distribution.

Class B. Turtle Shell Container

Description. The top half of a turtle shell which has the edges smoothed where it had been joined to the bottom (Fig. 8f). One complete and one partial specimen have been found.

Probable Method of Manufacture. The turtle was removed from the shell, the plastron was cut from the top with a flint knife, and the edges were smoothed with sand or sandstone.

Possible Functions. These items may have been used as cups or bowls. Both specimens were recovered in a number of pieces and reconstructed.

Position. The exact provenience is not known for either specimen.

Class C. Scratched Turtle Shell Fragment

Description. A fragment of turtle shell having a large number of deep scratches on both sides (Fig. 8c). The scratches run in all directions.

Probable Method of Manufacture. Unknown. Scratches may have been caused by being located on the surface of a living floor and being trampled under foot.

Possible Functions. The scratches seem too numerous to have resulted when the shell was cleaned or the turtle was removed. The piece may have served as some type of a cutting board or may have been part of a larger turtle shell container.

CONCLUSIONS

During the years in which the site was dug, 117 bone artifacts, 57 antler artifacts, and 5 turtle shell artifacts have been found, making a total of 178 artifacts. This classification includes only those objects which show definite signs of human usage, and there is probably a large number of bone fragments found at Sheep Rock which were used to meet some special need and then discarded. Such bones would escape detection because of lack of any noticable wear and would be classified as unmodified bone.

Most of the artifacts were found in the upper two to three feet of the deposit. This may be the result of differential preservation, for bone which is buried deeper is more likely to have decayed and disintegrated. It may also signify that there was a heavier population at the site during the later periods. However, it probably does not mean that there were more bone tools used in the later periods than in the earlier ones. This hypothesis is supported by the fact there is very little change in types of tools and there are very few, if any, new types of tools introduced. The larger classes of implements are represented in deep

and shallow levels. It is very difficult to make statements on time distribution in many of the classes because of the small sample size.

Classes of artifacts such as pointed bone artifacts and antler tines are very simple to make, and in many cases do not need any secondary preparation to be used. They are also extremely multipurpose. One might compare a bone awl with a modern jackknife for both can be used in hundreds of ways. In this type of artifact one would not expect and does not find any change over time.

Fishhooks and fishhook blanks are perhaps the only classes of artifacts which seem to show a definite time distribution. They are all from the top levels of the site. This may be a result of differential preservation, but probably indicates that it was not until Woodland times that fishing with a hook and line was of any importance.

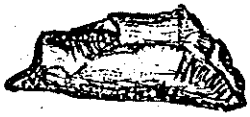
One striking fact about the bone artifacts found at the site was their crudeness and lack of elaboration. Only one engraved bone artifact was found and the design on it seems to be rather crude and unelaborate. No carved bone or antler artifacts were found.

Figure 1.

a-b. Bones with animal gnawing marks.

c-d. Bones with man-made butchering marks.

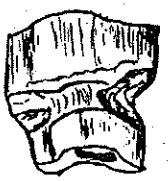
Figure 1



a

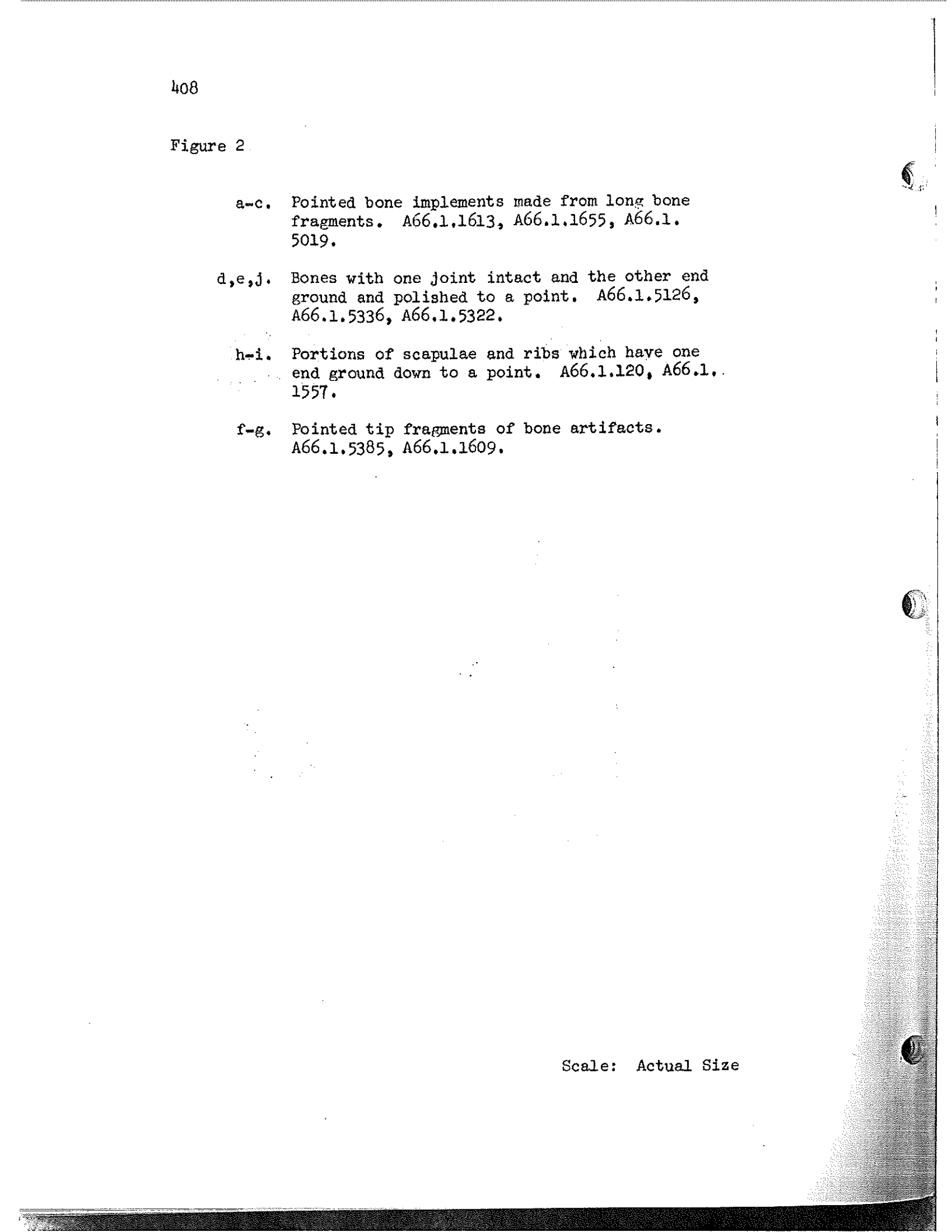
b

c



d

Figure 2



a-c. Pointed bone implements made from long bone fragments. A66.1.1613, A66.1.1655, A66.1.5019.

d,e,j. Bones with one joint intact and the other end ground and polished to a point. A66.1.5126, A66.1.5336, A66.1.5322.

h-i. Portions of scapulae and ribs which have one end ground down to a point. A66.1.120, A66.1.1557.

f-g. Pointed tip fragments of bone artifacts. A66.1.5385, A66.1.1609.

Scale: Actual Size

Figure 2

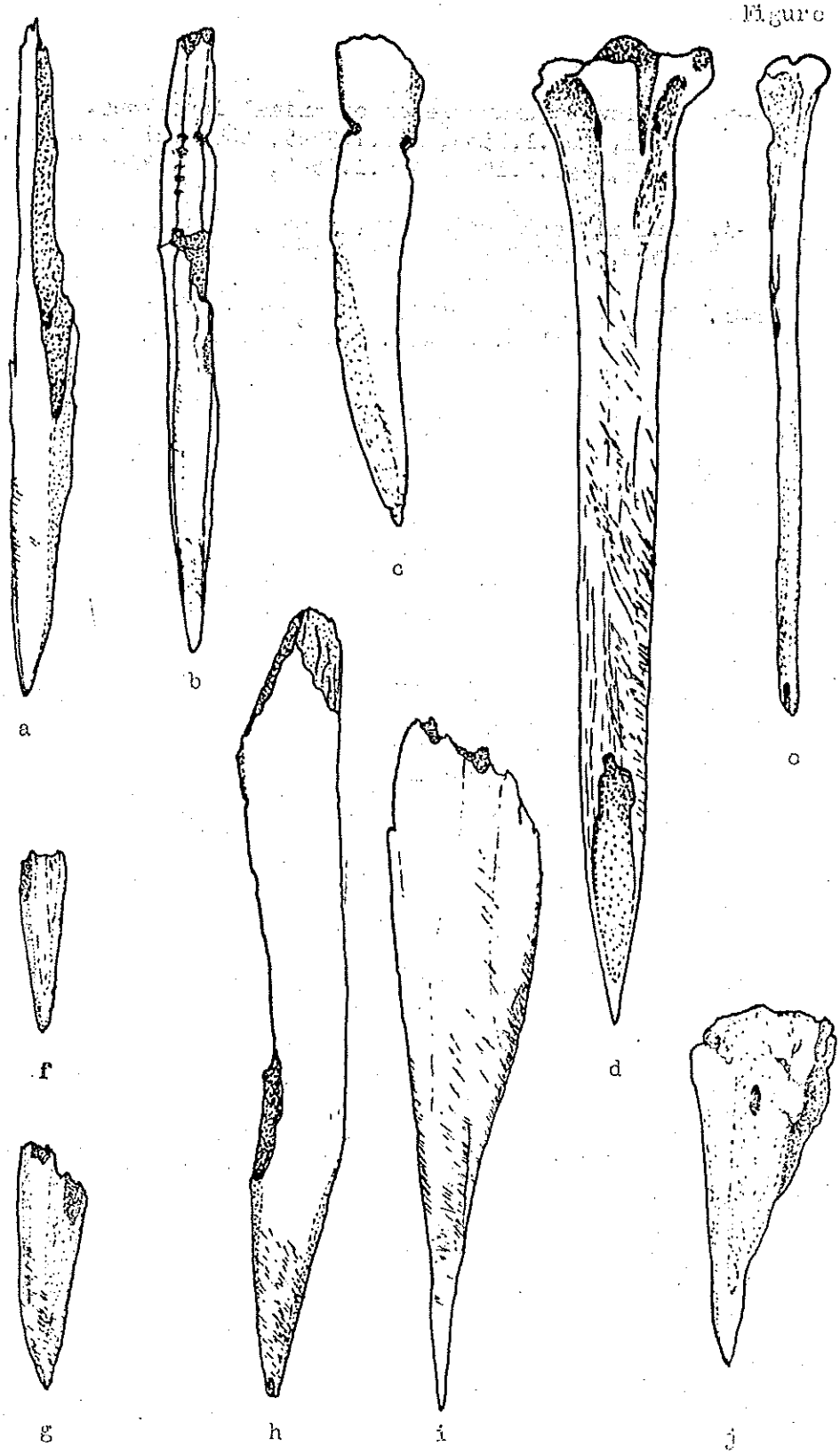


Figure 3.

a-h. Hollow tubular pieces of animal long bone. A66.1.5171, A66.1.1565, A66.1.3225, A66.1.2785, A66.1.3687, A66.1.1405, A66.1.5595, A66.1.5316.

i-j. Animal teeth which have holes drilled through them. A66.1.1895, A66.1.1625.

k-l. Deer toe bones which have had holes drilled through them. A66.1.3942, A66.1.5172.

Scale: Actual Size

Figure 3

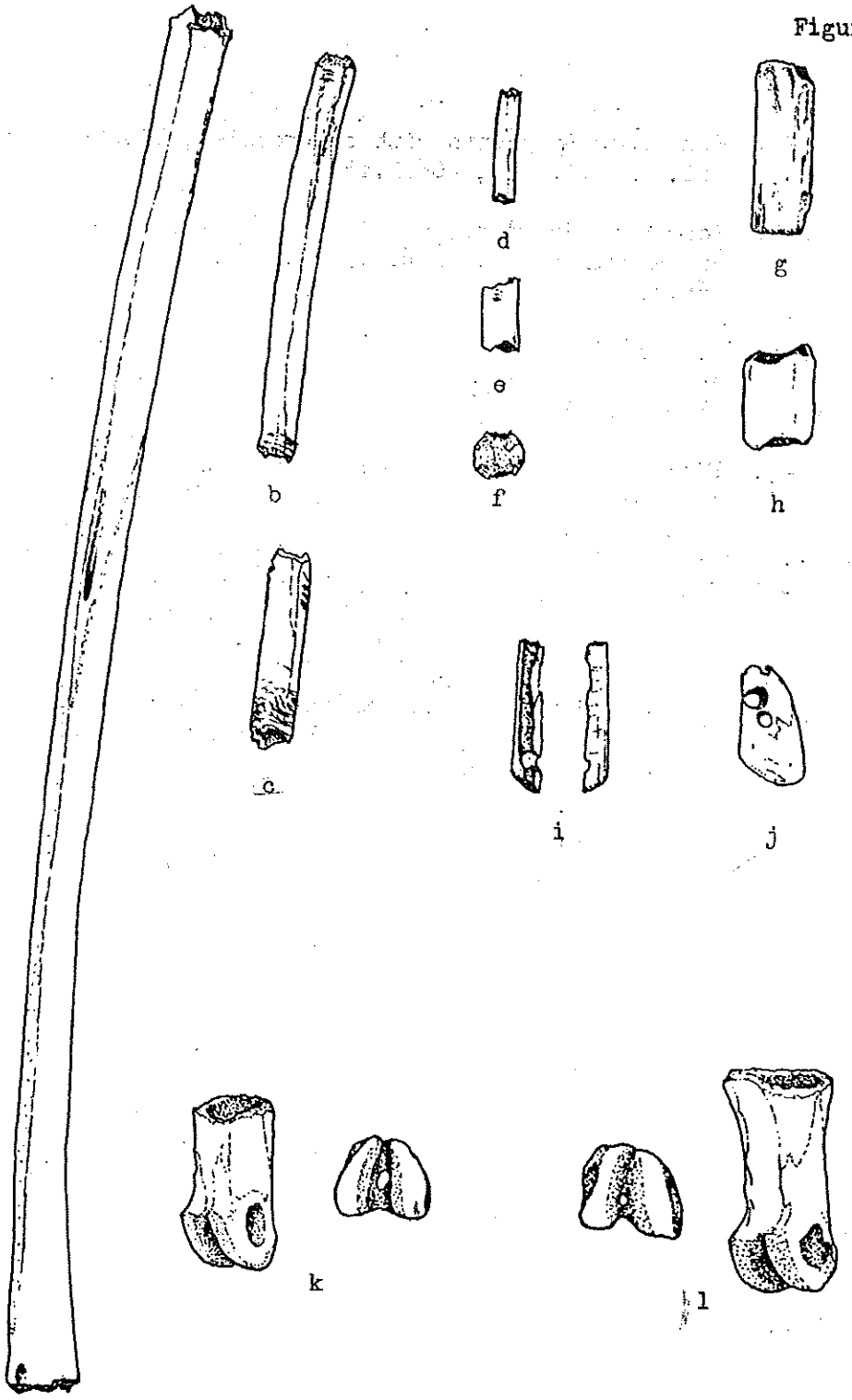


Figure 4.

a-b. Long bone fragments with one rounded, blunted end. A66.1.1580, A66.1.1583.

c-e. Long bone fragments which have a beveled end and a dull point. A66.1.3037, A66.1.1621, A66.1.1619.

f-g. Bone having the shaft cut off near the distal joint and the cut edges beveled outward. A66.1.5594, A66.1.401.

i-j. Flat sections of long bone or scapula roughly cut into the shape of a fishhook. A66.1.5317, A66.1.1516.

k-l. Pointed objects of bone which have been carved into the shape of a fishhook. A66.1.5128, A66.1.14.

h. Long bone with the distal end cut off and the cut edges smoothed and beveled inward. A66.1.1600.

Scale: Actual Size

Figure 4

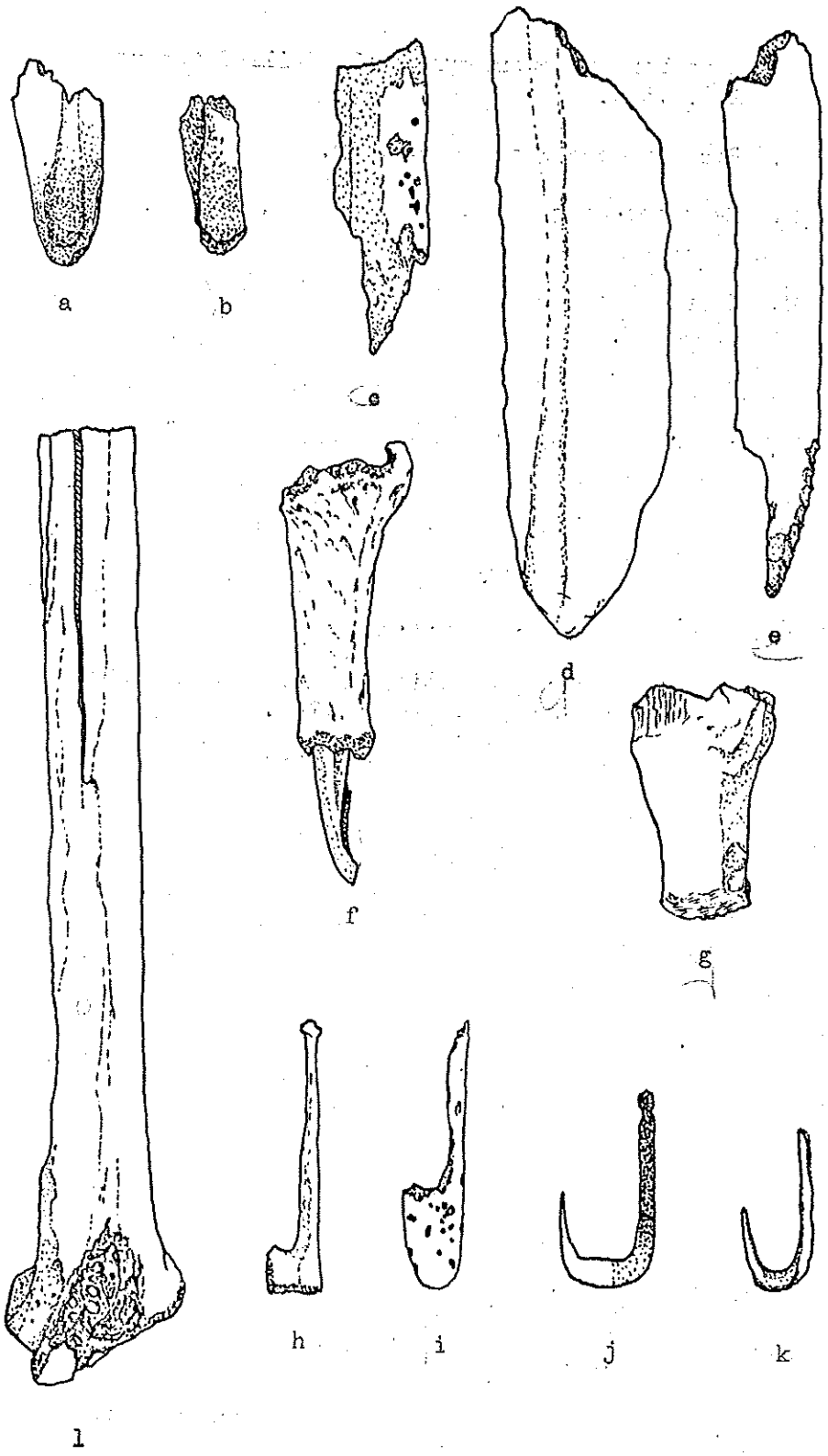


Figure 5

a. Long bone fragment with hole drilled through it. A66.1.613.

b. Raccoon bacculum. A66.1.279.

c,h. Sections of cut long bone shafts. A66.1.1622, A66.1.363.

d. Thin, flat section of highly polished long bone. A66.1.5335.

e. Fragment of worked animal incisor. A66.1.6246.

f. Fragment of bone with hole drilled through it. A66.1.4675.

g. Flat, triangular bone fragment with notches along its base. A66.1.1820.

i. Split deer toe. A66.1.5591.

j. Long bone with one joint cut off and the shaft forked at that end. A66.1.3742.

Scale: Actual Size

Figure 5

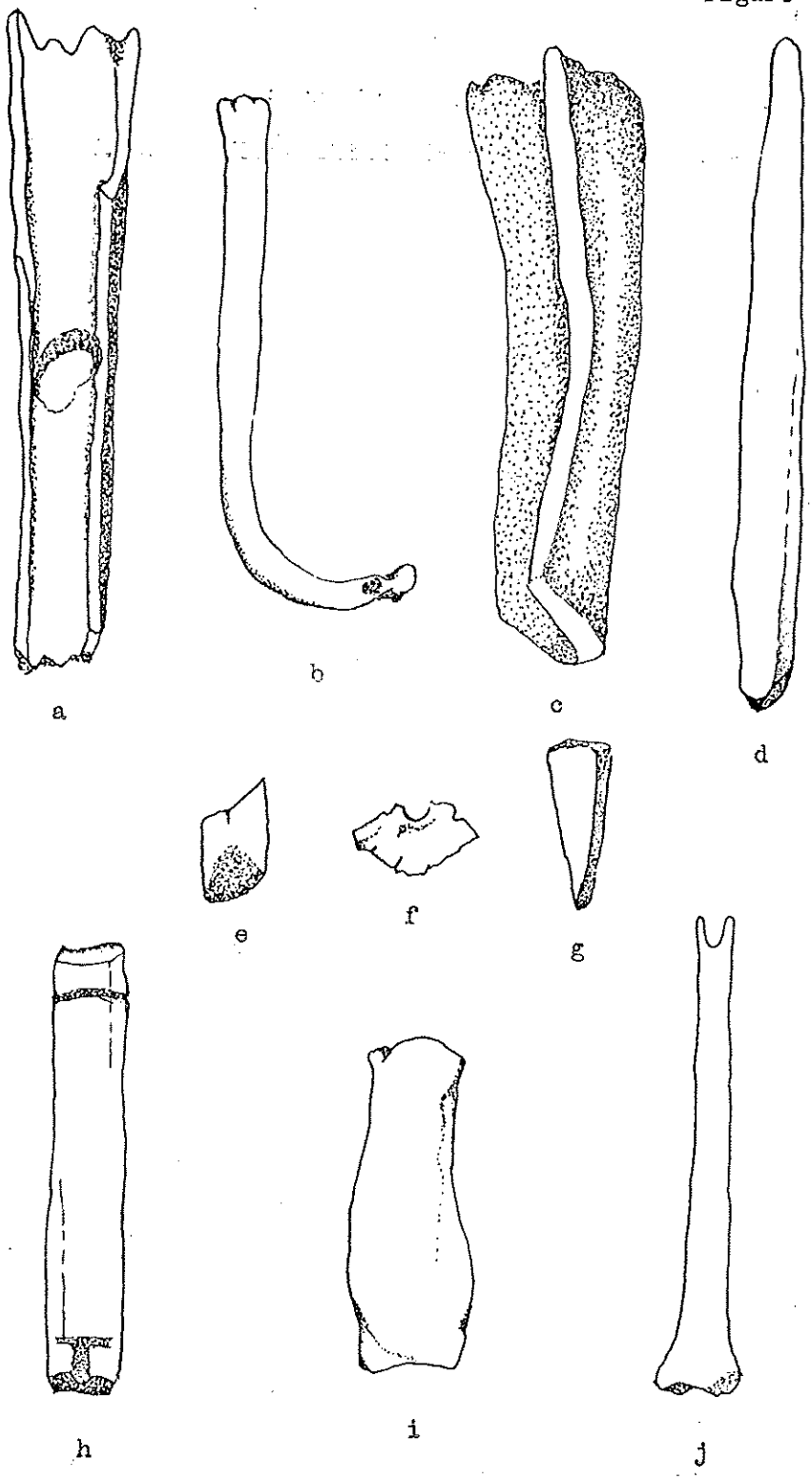
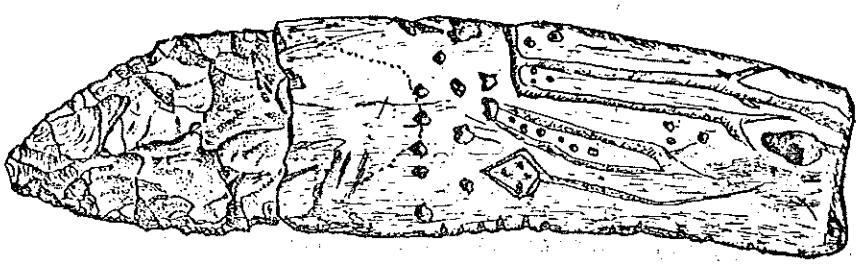


Figure 6

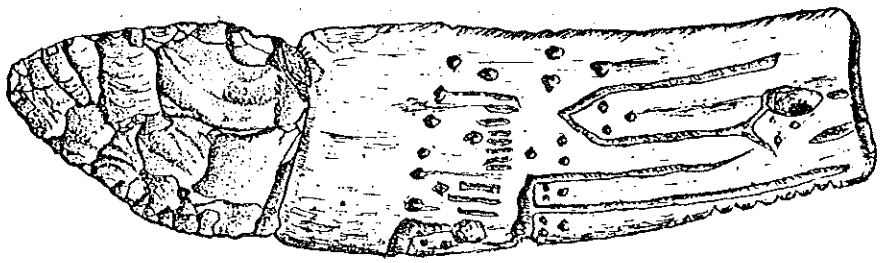
a-d. Engraved deer rib knife handle. A66.1.6939

Scale: Actual Size

Figure 6



a



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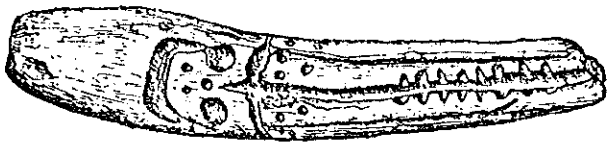

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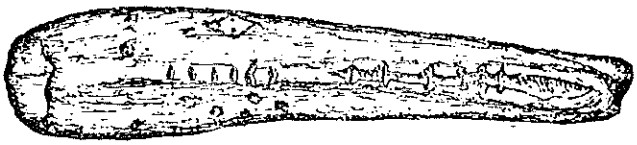


d

Figure 7

a,c-d. Long tip portions of worked antler tines. A66.1.5112, A66.1.344, A66.1.87

b. Long, tip portion of antler tine with hole in base. A66.1.5025.

e-f. Cylindrical antler artifacts. A66.1.1564, A66.1.5022.

g. Semi-cylindrical antler artifacts. A66.1. 1625.

h-j. Small tip fragments of antler tines. A66.1. 6146, A66.1.4843, A66.1.4476.

Scale: Actual Size

Figure 7

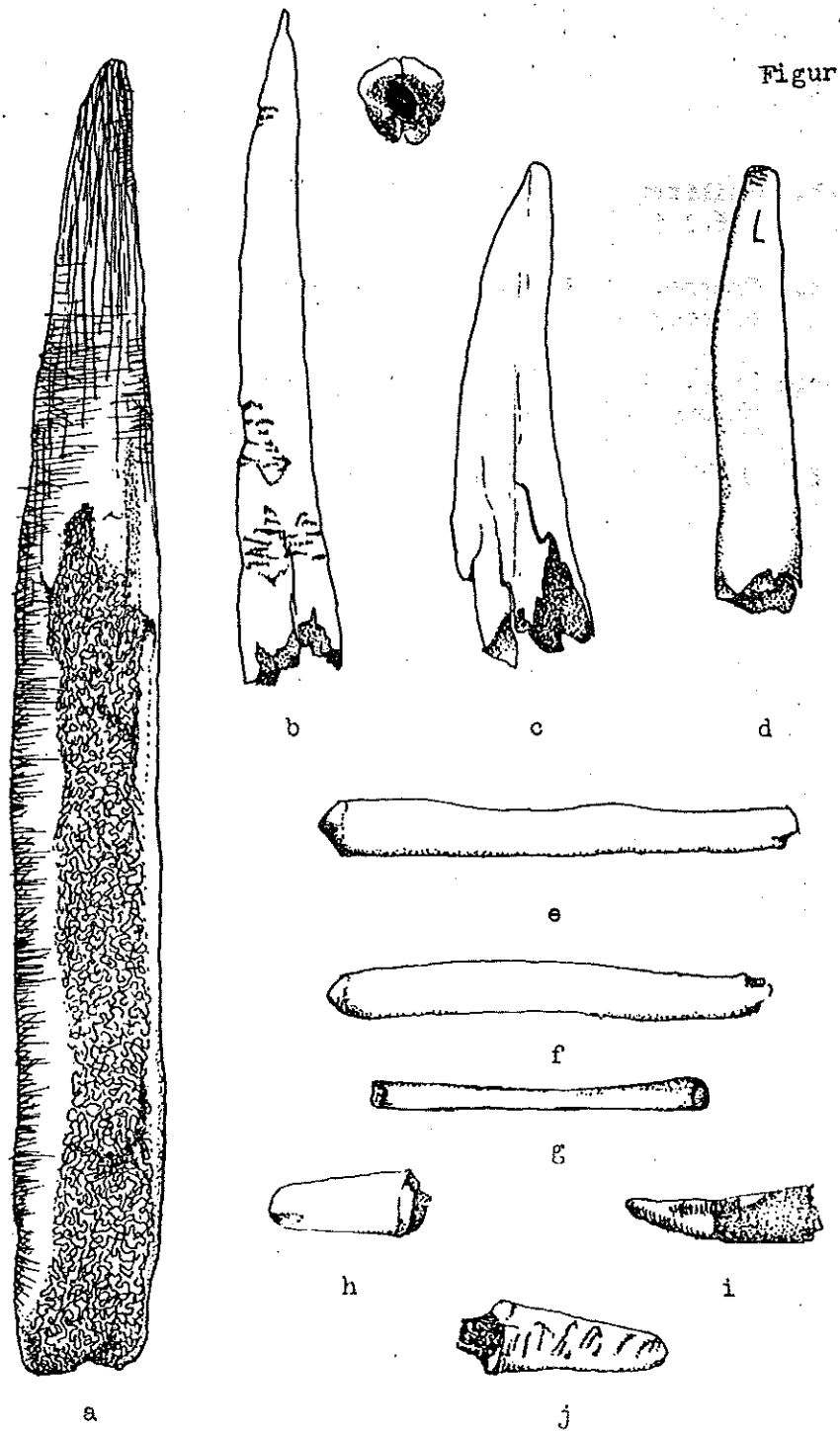


Figure 8

a-b. Utilized antler shafts and butts. A66.1.5167, A66.1.5464.

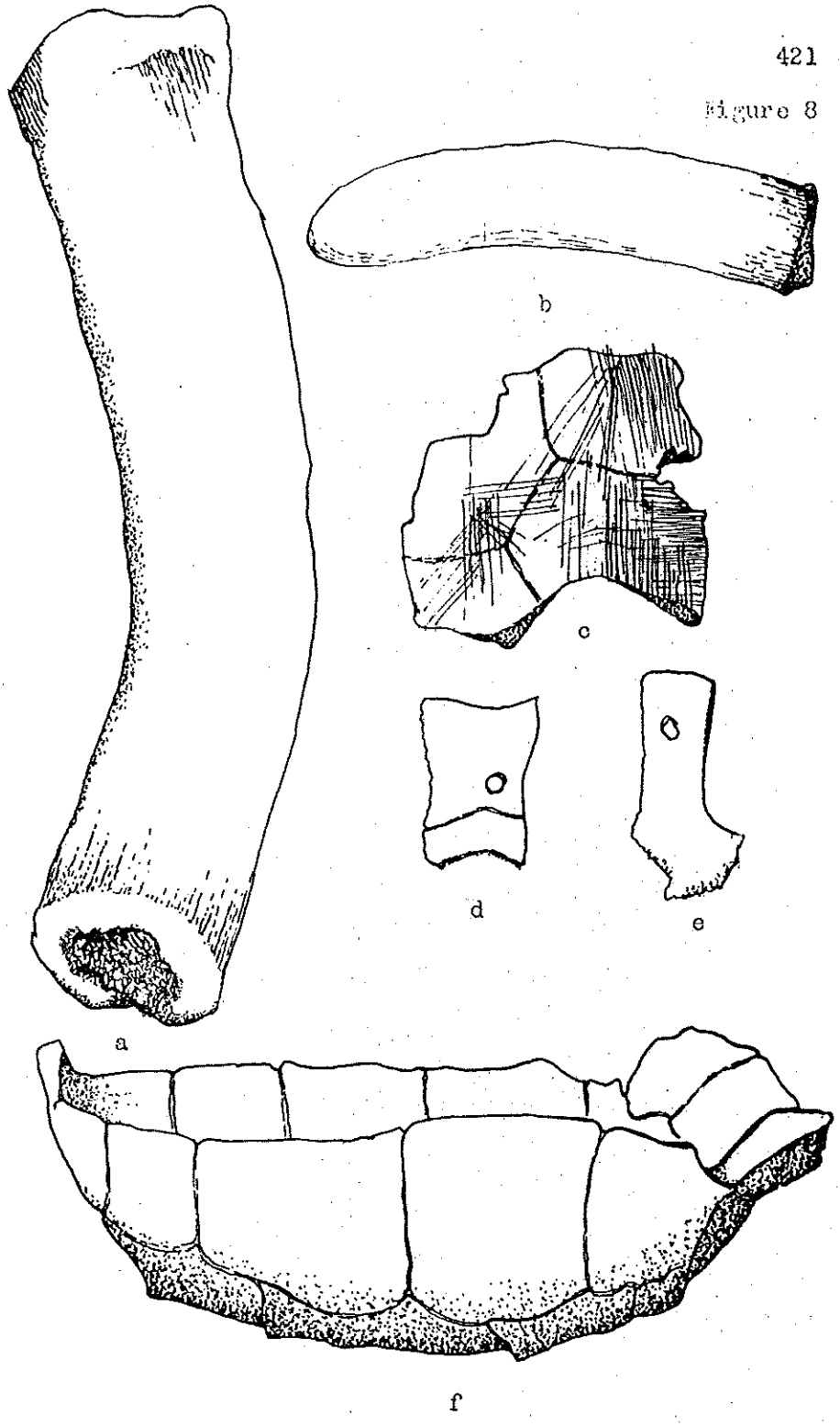
c. Fragment of turtle shell having a large number of deep scratches. A66.1.2322.

d-e. Fragments of turtle shell having holes drilled through them. A66.1.5176, A66.1.5177.

f. Turtle shell container. A66.1.1598.

Scale: Actual Size

Figure 8

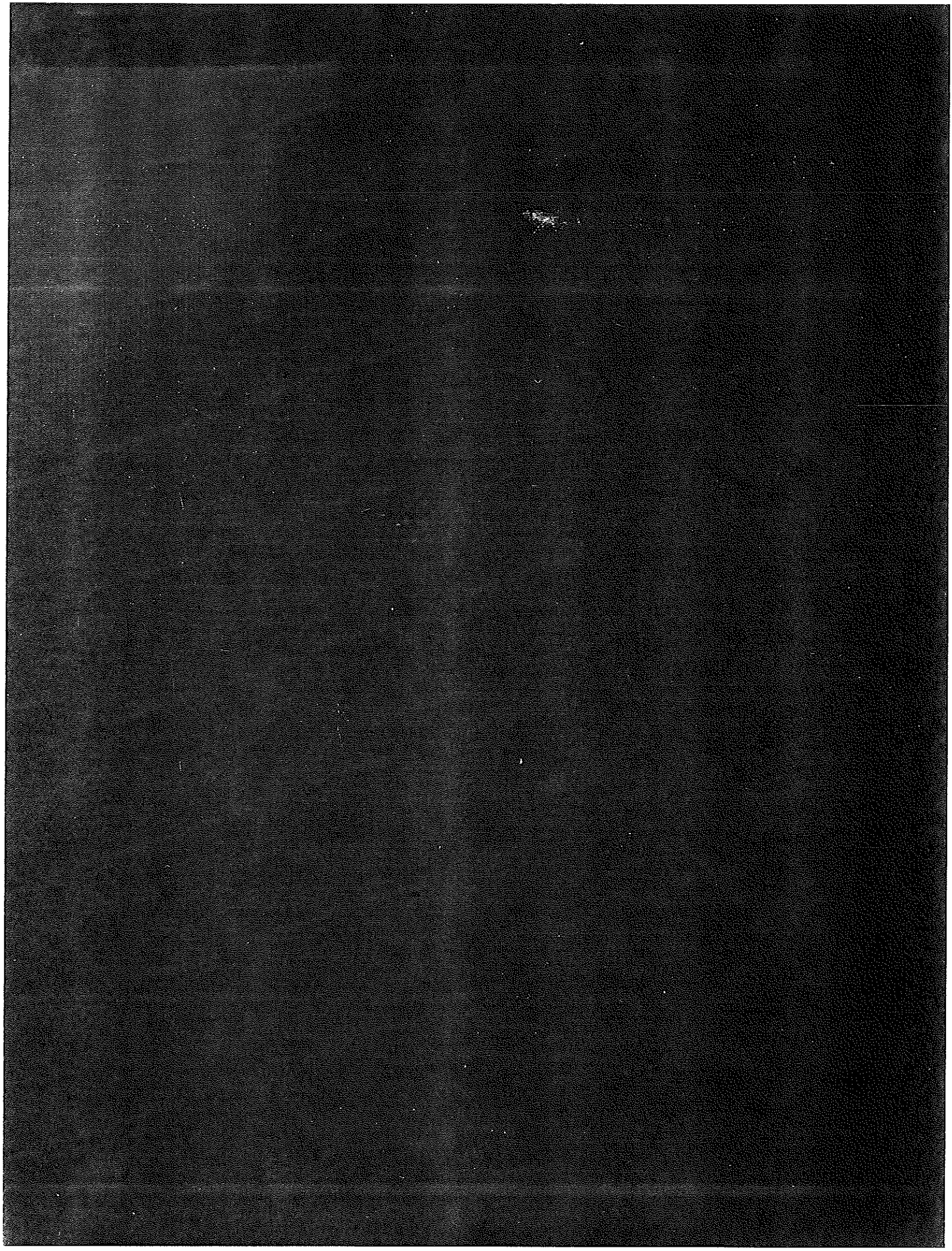


Appendix I

MICROSCOPIC ANALYSIS

The bone artifacts found at Sheep Rock were examined microscopically for marks of manufacture or use. The study was done using a binocular microscope which had a 10X ocular and a 2.4X objective lens. Each artifact was carefully studied and all scratches, striations, and other markings were noted.

It was thought before use of the microscope that many of the marks resulted from use and that they would give a good indication of the function of a particular type of artifact. However, the conclusion after microscopic analysis was that most of the scratches were the result of the modification of the bone into a tool. Most of the scratches had very shiny polished edges, indicating that the tool had been utilized after the scratches or other marks had been made.

Bone is not a particularly hard substance and can easily be scratched with a piece of stone. A bone tool would not be well suited for working stone unless it was used as a flaking tool. However, bone is much harder than leather and is not scratched by it. Continual use of an awl or pointed bone in leather would give the tool a high polish and would not result in deep scratches, and any scratches that were present would become polished.

Microscopic analysis has not allowed functional conclusions to be made on the bases of striation types and patterns since most of the scratches have very smooth polished edges.