THE WYOMING ARCHAEOLOGIST

VOLUME 27(1-2)

SPRING 1984

THE WYOMING ARCHAEOLOGIST

WYOMING ARCHAEOLOGICAL SOCIETY, INC.

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THE WYOMING ARCHAEOLOGIST is published quarterly by the Wyoming State Archaeological Society, with the financial assistance of the Wyoming Recreation Commission. Address manuscripts and news items for publication to: George Brox, Editor, The Wyoming Archaeologist, 1128 11th Street, Rawlins, Wyoming 82301. Please send a minimum of two (2) copies of each manuscript submitted. A third copy would speed the review process. Readers should consult the articles in this issue for style and format. Figures and photographs should preferably be such that they can be reproduced directly into either a single column or page width. See this issue for size examples.

Membership period is from January through December and includes all issues published during the current year regardless of the month the subscription commences. All subscriptions expire with the Winter Issue and renewals are due the first part of January each year.

If you move or have a change of address, please notify the Executive Secretary. Your WYOMING ARCHAEOLOGIST will not be forwarded unless a payment of 50¢ is received for return and forwarding postage.

Checks for chapter subscriptions and renewals should be sent to the chapter secretary involved. All other checks, subscriptions, and renewals should be addressed to the Treasurer. Correspondence and orders for back issues should be addressed to the Executive Secretary.

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Individual Associate Member @ $10.00
Single Active Member @ $ 5.00
Family Active Member @ $ 7.50
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Other memberships, including supporting and contributing are available. Contact the Treasurer for information.

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LETTER FROM THE EDITOR

This issue of the Wyoming Archaeologist presents the report on the Dead Indian Creek site in Park County. Because of the length of the total report, and the number of individual chapters by different authors, this is the only report in this issue. Individual chapters of the report were prepared over a number of years by graduate and undergraduate students at the University. We are pleased to be able to include them in the Archaeologist.

We have received numerous manuscripts already, which are being prepared for the fall 1984 issue. Please continue to submit manuscripts. We especially need articles from the membership of the society. Please send them.

ANNOUNCEMENTS

1. The summer meeting of the Wyoming Archaeological Society will be held in Saratoga July 20-21. Limited camp sites are available, but arrangements should be made early. This is especially so in regards to motel rooms if you do not plan to camp out. Deborah Chastain and the Saratoga-Platte Valley Chamber of Commerce provided the following information on motel accommodations:

THE HACIENDA MOTEL - Dan and Rita Meadows, P.O. Box 1283, Hwy. 130 South, 326-5751.

THE HOTEL WOLF - Doug and Kathy Campbell, P.O. Box 1298, 1st and Bridge, 326-5525.

MEDICINE BOW GUEST RANCH-CABINS - Dr. William and Betty Prather, P.O. Box 742, Snowy Range Hwy., 326-5439.

RIVIERA LODGE - Oakley and Millie Anderson, P.O. Box 1209, 303 N. 1st, 326-8651.

SAGE AND SANDS MOTEL - Brad and Sue Cary, P.O. Box 928, 311 S. 1st, 326-8331.

SARATOGA INN - Bob Herring, Mgr., P.O. Box 869, Pic-Pike Road, 326-5261.

SILVER MOON MOTEL - Mike and JoAnn Capellen, P.O. Box 731, 412 E. Bridge, 326-5974.

Again, make reservations early because this is also the week of Saratoga's Hundred Year Anniversary Celebration.

2. Ada Jackson wishes to announce Camp Paleo will once again take place, the same weekend as the summer meeting. The same format as last year will be followed, with the addition of "parent-kid teams". Contact Ada for additional information.

3. Scholarship winners for 1984 are as follows:

Mulloy Scholarship: Dave McKee
Frison Scholarship: William Eckerle

Both recipients are graduate students at the Anthropology Department, University of Wyoming.

4. As announced in the minutes of the Spring Meeting, Dr. Mark Miller is the new State Archeologist. He begins his duties on May 1, 1984. Mark received his B.A. and M.A. degrees in Anthropology at the University of Wyoming, and his Ph.D. in Anthropology at the University of Colorado, Boulder.

5. Deborah Chastain wishes to remind members to be sure and read

the minutes of the Annual Meeting of the Wyoming Archaeological Foundation, especially the part where we need more money donated to the Foundation. The larger the monetary base with which we have to operate, the more archaeological research we will be able to support. If you would like to really help Wyoming Archaeology, think about making a donation. If you are aware of a business or corporation that might be interested in supporting the Foundation, let Debby or other Foundation officers become aware of it. This is a very worthy cause to support. Research money is becoming harder and harder to find.

WYOMING ARCHAEOLOGICAL SOCIETY
MINUTES OF SPRING MEETING
APRIL 6-7, 1984

FRIDAY EVENING, APRIL 6, 1984

A formal meeting was held Friday, April 6, 1984. Gerald Carboni and Mary Helen Hendry were appointed to audit the Treasurers report.

CERTIFICATION OF DELEGATES

President Hanson asked that Mimi Gilman certify the delegates. Roll was called, and credentials were presented by the following chapters; Sublette Chapter--Ken Sydenstricker and Nicholas Hakiel, North Big Horn--Debra Elwood and Jim Platt, Casper Chapter--Carl Belz and Kerry Lippincott, Fremont Chapter--Lucille Adams and Helen Lookingbill, Sweetwater Chapter--Alvin and Alice Walker, Cherokee Trail Chapter--Deborah Chastain and John T. Gilman, Sheridan Chapter--Glenn Sweem and Gerald Carboni. There were no representatives present from High Plains Chapter and Cheyenne Chapter.

SECRETARY'S REPORT

President Hanson asked for the minutes of last year's annual meeting. Mimi Gilman passed the minutes to attending members to read and approve. As there were no corrections to be made, George Brox moved the minutes be approved. John Gilman seconded, the motion carried.

TREASURER'S REPORT

The audit reports by Gerald Carboni and Mary Helen Hendry were presented with recommendations they be accepted. Treasurer Hanson gave an explanation of expenditures by both The Wyoming Archaeological Society and Wyoming Archaeological Foundation (copy attached). Glenn Sweem made the motion to approve the Treasurer's report. John Gilman seconded it and the motion carried.

ARCHAEOLOGIST'S REPORT

Dr. George Frison made a short statement with regards to the Recreation Commission appointment of Dr. Mark Miller, Ph.D. as the new State Archaeologist. He will take over the full time position on May 1st, 1984. Mark was introduced and said a few words to the membership with regards to the summer meeting, and continuous relationship between the Society and the State Archaeologist Office and the University of Wyoming. Mark also announced to the membership the phone number where he can be reached in Laramie. That number is: 766-5301.

EDITOR'S REPORT

George Brox announced he appreciated the good reports he has received from the membership about the new format of the Archaeologist. He also announced that due to funding problems, the membership might have to look for a new place to have our Archaeologist printed. This means we will have to pay to have it printed

WYOMING
ARCHAEOLOGICAL SOCIETY, INC.

FINANCIAL STATEMENT

1983 - 1984

Balance checking 3/18/83		$3,319.53
Income		1,272.75
		$4,592.28

EXPENDITURES:

Executive Secretary	$200.00	
Editor	200.00	
Treasurer	235.72	
Scholarships	700.00	
Speaker- April meeting	209.00	
Secretary of State	3.00	
Summer Meeting	33.50	
Transferred to savings	1,500.00	
Safety Deposit Box	5.00	
	$3,086.22	-$3,086.22

Balance checking	$1,506.06
Less Outstanding Checks: #441,443,445	- 324.22
Balance 3/18/84	1,181.84
CD #13737	6,325.63
CD #5299	2,047.07
Net Worth 3/18/84	$9,554.54

This report respectfully submitted by: Milford Hanson, Treas.

Audited by: [illegible]

[illegible]

Date: 4/6/84

also. (At present, the Recreation Commission and State Archaeologist Office does our printing at no charge.)

Dr. George Frison made the motion that the Society recognize Danny Walker, Robyn Rupe, and Terri Craigie for all of their work they have done in efforts to publish the Archaeologist. The motion did not carry, as there was not a second, but Imogene Hanson instructed Mimi Gilman to write letters of recognition to Danny Walker, Robyn Rupe, and Terri Craigie.

OLD BUSINESS

No old business was presented.

NEW BUSINESS

Mimi Gilman asked that chapter secretaries send information about new officers and membership lists as soon as dues are paid.

Milford Hanson wanted the membership to known that he has had a change of address and everyone should take notice. The new address is as follows:

Milford Hanson
1631 26th Street
Cody, Wyoming 82414

Mr. George Brox announced a joint venture of WAS and WAPA to sponsor a research paper contest involving undergraduate students in Archaeology at the University. The papers would be judged by a joint committee of both organizations with the winner giving a presentation at the next annual meeting and to be awarded $75.00 as prize money. John Gilman made the motion we accept the competition as presented and that the Executive Committees of both organizations be in charge of judging papers. Seconded by Milford Hanson, and the motion carried.

SCHOLARSHIP REPORT

Carolyn Buff gave her report on the Scholarship Committee meeting, where Dr. George Frison had recommended the scholarships be awarded to non-recipients. This year the committee had several applicants. Guidelines for the scholarships were passed to the membership for comments. The winners of the Mulloy and Frison Scholarships will be announced Saturday night at the banquet.

SUMMER MEETING

Mrs. Hanson asked for suggestions for summer meeting location. Dr. Mark Miller announced he would not have any funds available for working on sites, but that there were different possibilities. Milford Hanson made the motion we have the summer meeting in Saratoga, July 20-21, in conjunction with the Atlatl Contest. Evelyn Albanese seconded and the motion carried.

ELECTION OF OFFICERS

Dr. George Frison made the motion the same slate of officers be re-elected. Seconded by Helen Lookingbill and the motion carried.

Mr. Sweem made the motion we thank the Cody Chapter for their hospitality and that a very special thanks be extended to Susan Huges. Seconded by John Gilman and the motion carried.

The last item on the agenda was the introduction of Mr. Clark McInroy from Wheatland who reported the future plans for a new chapter in the Wheatland area.

Meeting was adjourned at 9:25 p.m.

SATURDAY, APRIL 7, 1984, BUFFALO BILL HISTORICAL CENTER

An introduction and welcome to the combined meeting of WAPA and WAS members and the general public was made.

Programs presented Saturday were as follows:

TECHNOLOGY AND ITS RELATIONSHIP TO PREHISTORIC MAN ON THE HIGH PLAINS
Dr. Bruce Bradley

FLINTKNAPPING WORKSHOP
Dr. Bruce Bradley, Dr. Charles Reher, Paul Sanders, Steve Moore and Ron Moore

BIG HORN BASIN ARCHAEOLOGY
Dr. George Frison

BANQUET

The Banquet was held at the Holiday Inn at 7:30 p.m. Mrs. Hanson thanked the Cody Chapter and all those involved with the planning. Special thanks were extended to Mr. Warren Stadfeld for center pieces (which later were given as door prizes); to Northwest Community College; Buffalo Bill Historical Center; Wyoming Archaeological Society and to the North Big Horn Chapter. Special guests at the dinner were Muriel and Pearl Dutton, owners of the Horner site.

SCHOLARSHIP AWARD

Carolyn Buff announced the names of the Scholarship winners, they are as follows:
Mulloy Scholarship - Dave McKee
Frison Scholarship - William Eckerle

Since neither recipient was present, it was announced they would be notified by mail.

GOLDEN TROWEL AWARD

George Brox presented Carolyn Buff with the Golden Trowel award in recognition for all her volunteer work in Wyoming Archaeology.

GUEST SPEAKER

Dr. Richard Morlan was our guest speaker. The title for his interesting talk was "Pleistocene Archaeology of Eastern Beringia". The content of the talk was earliest man sites in Alaska and the Yukon.

Dr. Morlan received his Ph.D. from the University of Wisconsin, Madison, in 1971. At present, he is Curator of Plains Archaeology at the National Museum of Man. Through the years, Dr. Morlan has conducted fieldwork in Alaska, the Yukon, Alberta, Ontario, Michigan, Wisconsin, Wyoming, Japan and Nicaragua. One of his more significant contributions to Archaeology has been the excavations in Old Crow Basin in the Yukon. These documented man's presence in the New World as early as 29,000 years ago. Besides early man studies, Dr. Morlan's research interests include: paleoenvironmental studies and the prehistory of the Arctic, Subarctic, and Great Plains. Dinner meeting adjourned at 9:45 p.m.

Respectfully submitted,
Mimi Gilman, Executive Secretary

WYOMING ARCHAEOLOGICAL FOUNDATION MINUTES OF SPRING MEETING APRIL 8, 1984

The annual meeting of the Wyoming Archaeological Foundation was called to order by President Deborah Chastain on April 8, 1984 at 7:30 a.m. in the Medicine Room of the Holiday Inn in Cody, Wyoming.

The minutes of the annual meeting in 1983 were read and approved as read.

The treasurer's report was presented by Treasurer Milford Hanson (copy attached). It was moved by George Brox and seconded by Dr. George Frison we approve bills and accept the treasurer's report.

OLD BUSINESS

Debbie Chastain presented the new brochures and the only discussion was praise for the brochures.

NEW BUSINESS

A proposal from Susan Hughes was made concerning excavation of a site in southeastern Montana this summer. She requested $700.00. Dr. George Frison made the motion we approve a $500.00 grant, which was seconded by Imogene Hanson. Motion carried.

A large discussion took place with regards to base money of the Foundation funds. Dr. George Frison made the suggestion money be left out of base amount for emergencies, but that we seriously need to increase awareness in Wyoming of our Foundation for the purpose of getting more money donated to us. A discussion initiated by Carl Belz dealt with raising dues within the WAS, since we have not had a raise in dues for a long time. John Albanese made the motion we consider raising dues and that a portion of the raise go to the Foundation. Seconded by Carl Belz, and the motion carried.

Mimi Gilman made the motion we have minutes of the Foundation meeting published in the Archaeologist. Seconded by George Brox and the motion carried.

ELECTION OF OFFICERS

John Albanese made the motion to re-elect the same slate of officers. Seconded by Dr. George Frison, and the motion carried.

With no further business, the meeting was adjourned at 8:40 a.m.

Bob Randall, Secretary

Wyoming Archaeological Foundation

FINANCIAL STATEMENT
1983 - 1984

Balance in Checking		$ 137.13
Income		1,000.28
		$1,137.41
EXPENDITURES:		
Mark Miller	$500.00	
Secretary of State	3.00	
Bugas Site	153.77	
Les Davis (Publication)	300.00	- $956.77
Balance Checking 3/18/84		$ 180.64
CD #13736		11,115.21
Interest to 12/31/83		477.30
		11,773.15
Projected interest to April 16, 1984		266.63
		$12,039.78

This report respectfully submitted by: Milford Hanson, Treasurer.

Audited by: Date:

4-6-84

April 6, 1984

THE DEAD INDIAN CREEK SITE: AN ARCHAIC OCCUPATION IN THE ABSAROKA MOUNTAINS OF NORTHEASTERN WYOMING

INTRODUCTION

BY
GEORGE C. FRISON AND DANNY N. WALKER

The Dead Indian Creek site (Figure 1) was discovered as the result of lateral stream cutting that revealed bone and artifacts in deposits slumping into the stream. The investigation of the Dead Indian Creek archeological site consisted of work in five areas along Dead Indian Creek (Figure 2). Area 1 is along the east side of the stream and is the location of site discovery. The Cody Chapter of the Wyoming Archaeological Society began work here in the summer of 1969 and also expanded into Area 2 and finally made a test in Area 3. The senior author visited the site briefly in early August of 1969 and a few days later received an urgent and somewhat excited message that unusual features consisting of nearly complete deer heads with antlers were appearing in excavations at Area 1. These features were excavated and recorded in 1969 (discussed below) and a few days were spent in the summer of 1971 to align excavation units and further test Areas 1 and 2. The results indicated a need for data recovery.

Two weeks were spent at the site in 1972 with an experienced crew to aid the Archaeological Society members. This is when the major part of the excavations was accomplished. It was known from the earlier work that a wide range of projectile point styles were present, a situation reminiscent of the McKean site in northeastern Wyoming (Mulloy 1954b). One of the major goals in 1972 was to attempt to determine if there were stratigraphic or horizontal separation in the cultural level

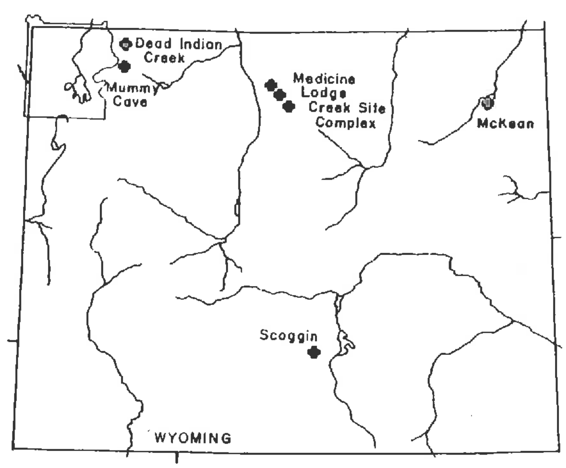

FIGURE 1: Locality map showing Dead Indian Creek site in relation to other Middle Archaic occupation sites in Wyoming.

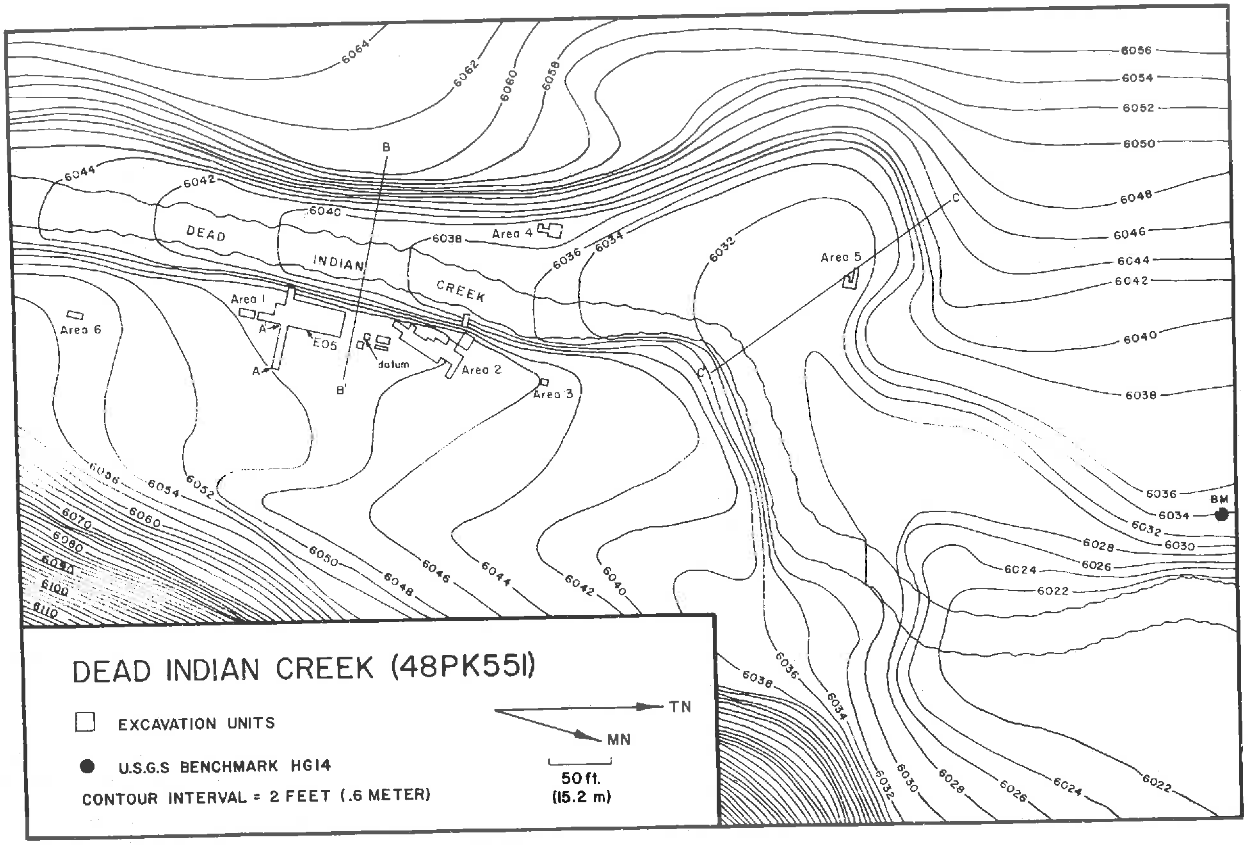

FIGURE 2: Topographic map of Dead Indian Creek site showing distribution of excavation units in relation to Dead Indian Creek and local topography.

that would offer an explanation for the phenomena of what some investigators might consider as different projectile point types occurring together without evidence of mixing of components.

The other site areas, 4 and 5, were testing in 1972. Area 4 was a low terrace immediately above the level of Dead Indian Creek on the west side (Figure 2). Evidence of a single component Late Prehistoric Period camp was found here. Further downstream, tests were made along the edge of another terrace and a Late Plains Archaic component was found here at about .5 m below the surface. At just over a meter, another cultural level was found, but with no diagnostic artifacts. Both of these site areas warrant further investigation, as does Area 3.

Both Areas 1 and 2 were comparatively rich in artifact and faunal materials that proved to be of Middle Plains Archaic age. The cultural materials were distributed through a level that varied as much as 90 cm thick in places to as little as 31 cm thick in others. This cultural level begins at or very close to the surface in Areas 1, 2 and 3, but in many places it disappears completely as stream gravel and cobble features form the present surface. In other places, the cultural deposits appear to fill old stream channels. Below the cultural level are banded light and dark deposits that are often truncated by the deposits containing the cultural materials. Fire pits had been dug into these deposits in many cases (Figure 23), but the banded deposits appear devoid of cultural materials. Below the banded deposits are stream gravels (Figure 3). The cultural level changes color noticeably from brown at the top to gray at the bottom, but no natural or artificial stratigraphic layering could be discerned. The color change is gradational with no sharp break. There is a typical stone circle or tipi ring on the surface slightly to the east of Area 1. This is believed to be of Late Prehistoric Period age based on a small side-notched projectile point found inside the circle. Otherwise, the material recovered from this area of the site is of Middle Plains Archaic age.

The Dead Indian Creek site is relatively close to the Yellowstone Plateau and sources of obsidian. The presence of this material and fire hearths with large charcoal samples in good context was enough to interest Irving Friedman of the U.S.G.S. who was working with hydration dating of natural glasses. Dr. Friedman was able to obtain two radiocarbon dates 4430 ± 250 B.P. (W-2599) and 4180 ± 250 B.P. (W-2599) from Site Area 1 and obsidian hydration dates from associated samples compared favorably. Another date of 3800 ± 110 B.P. (RL-321) was obtained later and all fit comfortably within the Middle Plains Archaic Period (Frison 1978).

During the spring semester of 1973, an attempt to analyze the Dead Indian Creek material was made in an upper level undergraduate and graduate seminar. The results were not considered adequate for a journal or similar publication and the seminar results were filed away. With the passage of over a decade since that time, some sort of publication of the material is long overdue so that other students who are concerned with Middle Plains Archaic sites will have some knowledge of the site. This report is a melange of original 1973 seminar papers, reworked seminar papers, and recently prepared short reports in the case of the introduction, geology, soils, human skeletal remains, and the conclusions. The author(s) of each section are responsible for the content of that section. A basic attempt to draw the sections together and provide continuity was the main emphaiss of editing of the report. Many more recent literature citations will be seen to be missing from many of the sections of this report. The editors made no attempt to totally update most of the original seminar papers.

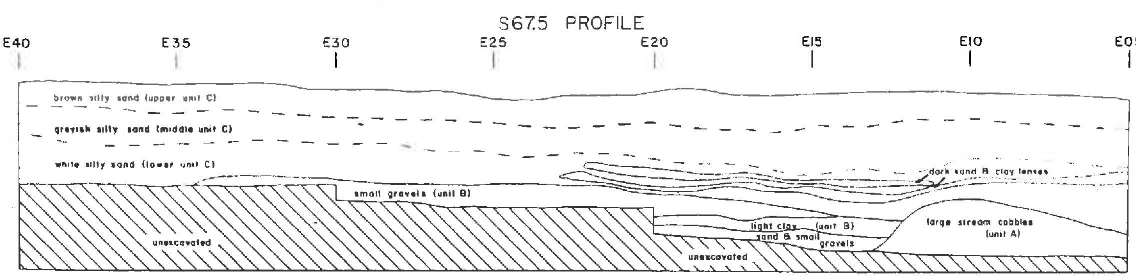

FIGURE 3: Profile through main excavation unit in site area 1. See Albanese (this volume) for lithologic descriptions of sediments.

THE DEAD INDIAN CREEK SITE AND ITS ENVIRONMENT

BY
MICHAEL WILSON

The Dead Indian Creek site is located in the southeastern portion of the Sunlight Basin in Park County, Wyoming about forty kilometers northwest of the city of Cody (Figure 1). The basin lies to the east of Yellowstone National Park, on the east flank of the Absaroka Range (Figures 4 and 5) and is in the Shoshone National Forest. Present land use consists of a large forest grazing allotment, some deeded land and a small amount of wilderness area (Hyde and Beetle 1964:4, 8).

Most of the Absaroka Range is of volcanic origin, including both extrusive and intrusive deposits of complex interrelationships (Rouse 1947). Such bedrock deposits characterize most of the Sunlight Basin; however, there are a number of small areas in which limestones of the Paleozoic Madison and Pilgrim Formations outcrop. Such an area is the lower half of Dead Indian Creek, where the site under discussion is located. The distribution of limestones and volcanic rocks has profoundly affected the distribution and composition of soils in the basin; as has the distribution of glacial till and lacustrine deposits derived from the other two sources.

Glaciers and permanent snow fields exist in the region today above 10,000 feet, providing water for a number of permanent watercourses in the basin. Sunlight Creek, Dead Indian Creek, and Russell Creek flow into the Clark's Fork of the Yellowstone River at the mouth of the basin. Sunlight Creek is the major drainage outlet of the central and western portions of the basin, while Dead Indian Creek drains a lobate secondary basin developed in the southeast part of Sunlight Basin proper. The Dead Indian Creek site is located in a steep-walled valley east-southeast of Steamboat Point and just upstream from the bridge where the Dead Indian Hill road crosses Dead Indian Creek (Figure 4).

Climate

Hyde and Beetle (1964:7) summarize the climate of Sunlight Basin, based upon information from recording stations at Crandall Creek (northwest of the basin) and the city of Cody:

> Average annual temperatures at the Crandall station were 39.5°F [4.2°C] in 1961 and 39.0°F [3.9°C] in 1962. These temperatures were computed from monthly mean temperatures. The 1961 maximum summer temperature was 96°F [35.6°C] on Aug. 5, and 88°F [31.1°] on Aug.

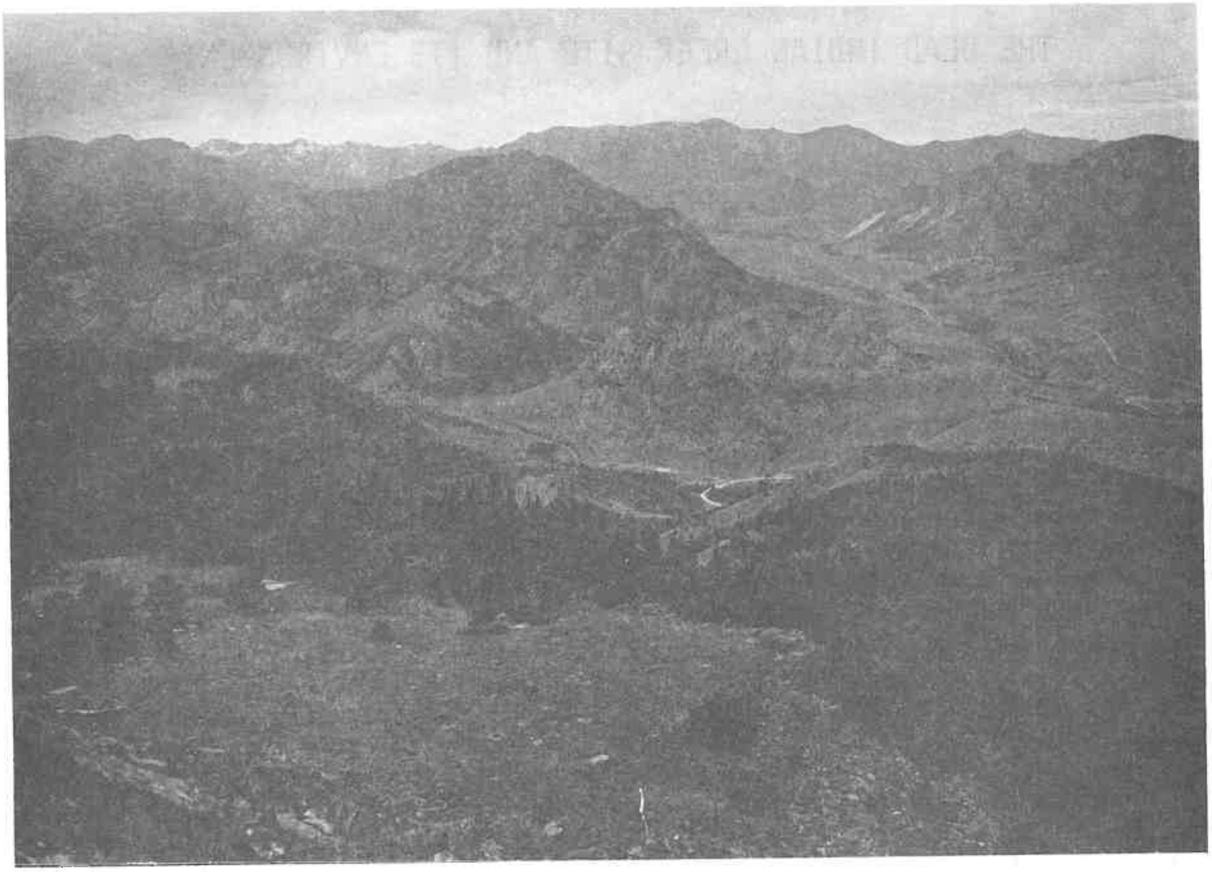

FIGURE 4: View of Sunlight Basin from top of Dead Indian Pass. Site is located in center of photograph where road crosses Dead Indian Creek.

16, 1962 at Crandall. Minimum winter temperature was -27°F [-32.8°C] on Dec. 10, 1961 and -37°F [38.3°C] on Jan. 21, 1962. The length of growing season, based on continuous time that the temperature was not below 28°F [-2.2°C], was 104 days in 1961 and 85 days in 1962. Frost-free period (temperature not below 32°F [0°C]) was 80 days in 1961 and 77 days in 1962.

The annual precipitation reported from the Crandall weather station was 14.34 inches [364 mm] in 1961 and 16.41 inches [417 mm] in 1962. In 1961, 46.7 percent of the total precipitation fell between May and August. In 1962, the equivalent figure was 50.6 percent (Hyde and Beetle 1964:7).

Becker and Alyea (1969a:4-5) note that Wyoming's altitude gives the state a relatively cool climate. Rapid outgoing radiation loss is rapid because of the thin, dry air. This feature of the weather becomes even more important in mountainous areas. Summer nights are cool throughout the state. In the winter, Wyoming's

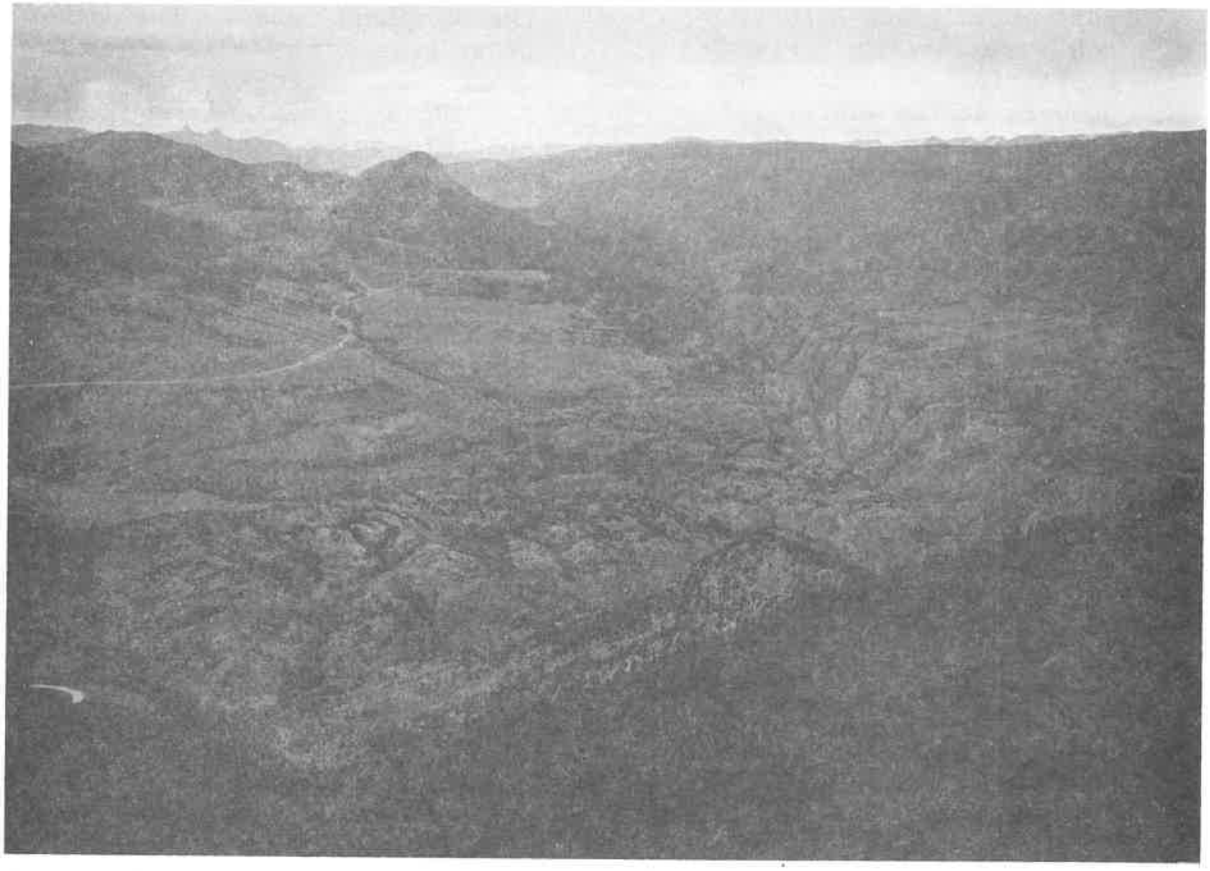

FIGURE 5: View of northern portion of Sunlight Basin showing intersection of Sunlight Creek and Clark's Fork of Yellowstone River.

basins and small valleys frequently trap cold air masses, causing cold temperatures to persist until strong winds eventually force the cold air to move. The same authors provide extended data for the Cody and Crandall Creek recording stations. Observations at Cody (altitude 5002 feet [1524 m]) from 1931 to 1960 has shown an overall annual range of temperatures from -46°F [-43.3°C] to 103°F [39.4°C]. Mean monthly temperatures ranged from 25°F [-3.9°C] in January to 69°F [20.6°C] in July (Becker and Alyea 1969a:25). Forty years of records from Crandall Creek (altitude 6600 feet [2012 m]) showed an overall annual range from -49°F [42.8°C] to 96°F [35.6°C]; mean monthly temperatures ranged from 18°F [-7.8°C] in January to 60°F [15.6°C] in July (Becker and Alyea 1969a:113).

Becker and Alyea (1969b:5) also describe the precipitation patterns for Wyoming:

> East of the continental divide, the seasonal precipitation pattern is typical for the high plains region, i.e., increasing amounts of precipitation during spring to early summer with a sharp drop during the latter part of June, a leveling off or possibly increasing amounts during the last

> part of July and August, and decreasing precipitation to minimum amounts during winter...
> West of the continental divide the seasonal rainfall pattern is typical of that found in the intermountain region where the variation is not great (Becker and Alyea 1969b:5).

The probability of receiving 0.2 inches [5 mm] of precipitation per week in Cody, reaches a peak at 60 percent in early June, and drops to a minimum of seven percent in early December.

Plant Communities

Hyde and Beetle (1964:10-30), in studying the Sunlight Basin plant communities, found the "Life Zone" zonation concept (Cary 1917; Porter 1962) inadequate, and further subdivided the region into communities on the basis of vegetation composition, growth form and soil differences. The communities named were:

1. Sagebrush grassland. This community is found on deep volcanic soils at the lower ends of drainages. Big sagebrush (*Artemisia tridentata*) cover is greater than ten percent with Idaho fescue (*Festuca idahoensis*) being the dominant grass species. Wheatgrasses (*Agropyron* spp.) are more common on drier sites and shallower soils.

2. Open grassland on deep volcanic soil. This community is found along various drainages in the basin, in small hillside pockets and on benches dividing the drainages. Idaho fescue is the dominant grass, but several other grasses are also common.

3. Open grassland on shallow volcanic soil. This community is found on slopes, especially those south and west facing, in the upper half of the basin. Muttongrass (*Poa fendleriana*) dominates the community, along with bluebunch wheatgrass (*Agropyron spicatum*) and other grasses.

4. Open grassland on limestone soil. This is found in the lower part of the basin on areas that are drier than those found with volcanic soils. Bluebunch wheatgrass is dominant here, with prairie junegrass (*Koeleria cristata*) closely associated.

5. Open grassland on mixed volcanic-limestone soil. This is a small local community found on glacial moraines. Muttongrass and bluebunch wheatgrass are dominant on this intermediate soil.

6. Reseeded. This is an unnatural community in the basin and is of no direct relevance here. It is present due to recent construction and crop raising activities in the basin.

7. Wet meadow. This occurs in small limited areas, such as Dead Indian Meadows on Upper Dead Indian Creek. It is characterized by deep, rich sub-irrigated soils, with abundant bush cinquefoil (*Potentilla fruticosa*) and buffaloberry (*Shepherdia canadensis*).

8. Conifer with forage. This community occurs primarily on north-facing slopes and is composed of Douglas fir (*Pseudotsuga taxifolia*), limber

pine (Pinus flexilis), lodgepole pine (P. contorta) and understory herbs. This community may be invading adjacent grasslands today.

9. Broadleaf trees with forage. This community occurs in scattered locations in the basin where additional moisture of some nature is available. It is typified by aspen stands (Populus tremuloides) with understory grasses and forbs. Wapiti (Cervus elaphus) and moose (Alces alces) are presently cropping and preventing the establishment of regrowth in the community. In some areas, aspen root shoots may persist to the height of the winter snow bank and never become trees because of winter cropping by the animals (Beetle 1968:8).

The communities of particular importance in the vicinity of the Dead Indian Creek site are the open grasslands on limestone soil, wet meadow, conifer with forage and broadleaf trees with forage (Figures 6 and 7). The wet meadow community is of minor importance to the present discussion due to its relative remoteness from the site. Knowledge of these communities is essential as a basis for the understanding of the subsistence activities and faunal distributions in the area. The open grassland on limestone soil community occurs on terraces and some valley slopes of Dead Indian

FIGURE 6: Dead Indian Creek site area, looking north. Site areas 1 and 2 are between small road in cneter of figure and trees on left side of figure.

FIGURE 7: Looking east across west bank of Dead Indian Creek. Site area 4 is excavation unit in center of figure and areas 1 and 2 are on opposite bank.

Creek (Figure 6), while the conifer with forage community occurs on valley slopes and broadleaf trees with forage community are found along the margin of Dead Indian Creek (Figure 7). Table 1 presents a listing of vegetation found on the site area in 1982.

Trees	
Juniperus spp.	juniper
Pinus contorta	lodgepole pine
P. flexilis	limber pine
Populus sp.	cottonwood
P. tremuloides	aspen
Prunus virginiana	chokecherry
Pseudotsuga menziesii	common douglas fir
Salix sp.	willow
Shrubs	
Artemisia cana	silver sagebrush
A. pedatifida	birdsfoot sagewort
A. tridentata	big sagebrush
Chrysothamnus nauseosus	rubber rabbitbrush
C. viscidiflorus	douglas rabbitbrush
Ribes spp.	currant
Forbs	
Allium sp.	onion
Antennaria sp.	pussytoes
Arenaria sp.	sandwort
Astragalus spp.	milkvetch
Erigeron spp.	daisy or fleabane
Eriogonum sp.	wild buckwheat
Fragaria sp.	strawberry
Mertensia sp.	bluebells
Opuntia polyacantha	plains pricklypear
Rosa sp.	rose
Senecio sp.	groundsel
Taraxacum officinale	dandelion
Tragopogon dubius	yellow salsify
Graminoids	
Agropyron smithii	western wheatgrass
A. spicatum	bluebunch wheatgrass
Festuca sp.	fescue
Stipa comata	needleandthread
Riparian Community	
Trees	
Abies sp.	spruce
Populus tremuloides	aspen
Prunus virginiana	chokecherry
Forbs	
Erigeron sp.	daisy or fleabane
Rosa sp.	rose
Taraxacum officinale	dandelion

TABLE 1: Modern vegetation at Dead Indian Creek site, Park County, Wyoming. Most plants found in subalpine fir/lodgepole pine community, except as noted being from riparian along Dead Indian Creek.

ARTIFACT AND FEATURE DESCRIPTIONS

BY

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PROJECTILE POINTS

by
Caryl W. Simpson

A wide range of stylistic variation can be seen in this McKean (Middle Plains Archaic) Complex assemblage of 565 complete and fragmentary projectile points. Three basic variations, including lanceolate, stemmed, and side-notched points are present. However, intergrades between these three are also present. This would seem to suggest a range of variation around a single norm rather than three distinct types. A total of 396 fragments, including 187 bases, represent these three types ,of their intergrades (Figure 8).

Material used in making these points has been divided into the following major stone types: chert, chalcedony, quartzite, metamorphosed shale, ignimbrite, obsidian, and basalt. It appears that flaking patterns were somewhat dependent upon material types. Deliberate heat treatment to improve flaking quality is suggested in some points, although some accidental burning is also likely. Flaking varies from long, thin, parallel collateral flakes to almost nonpatterned flaking. Bilateral retouch of the blade edges by fine pressure flaking is also common. Throughout the assemblage, bases are concave or notched regardless of stylistic type. Blade edge serration is observed among some projectile

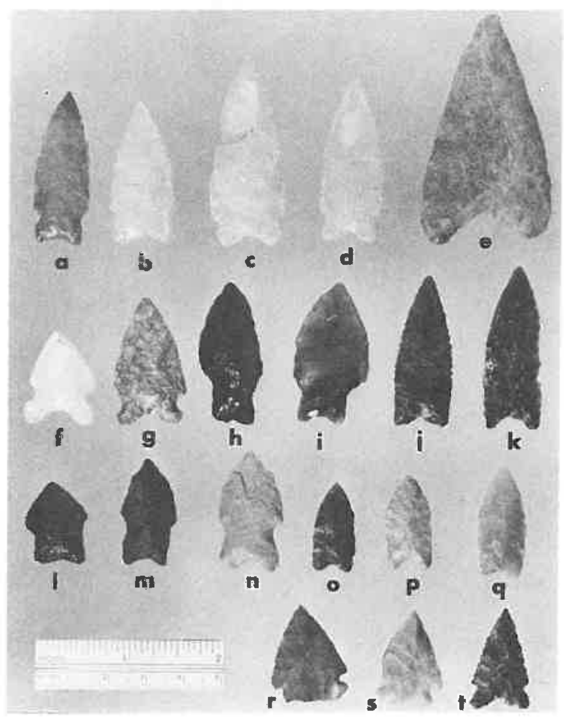

FIGURE 8: Projectile points from main site area of Dead Indianc Creek site. The inclusion of a Late Archaic component is indicated by specimens r and s.

points made of the fine grained materials, usually chalcedony and chert. Only complete or nearly complete points were measured (Table 2).

REWORKED PROJECTILE POINTS AS TOOLS

Several artifacts appear to be tools made from projectile points. Bases are intact and distal ends were modified (Figure 9a-d, Figure 11f-h). Several other tools are similar but were probably made on projectile point preforms (Figure 9i, k, o, s, t; Figure 10a, c, d, g). Several items are unifacially shaped so that in outline form they closely resemble projectile points, but it is not believed they were intended for use as projectile points. They were probably used as hafted tools (Figure 9e-h, 1-m, p).

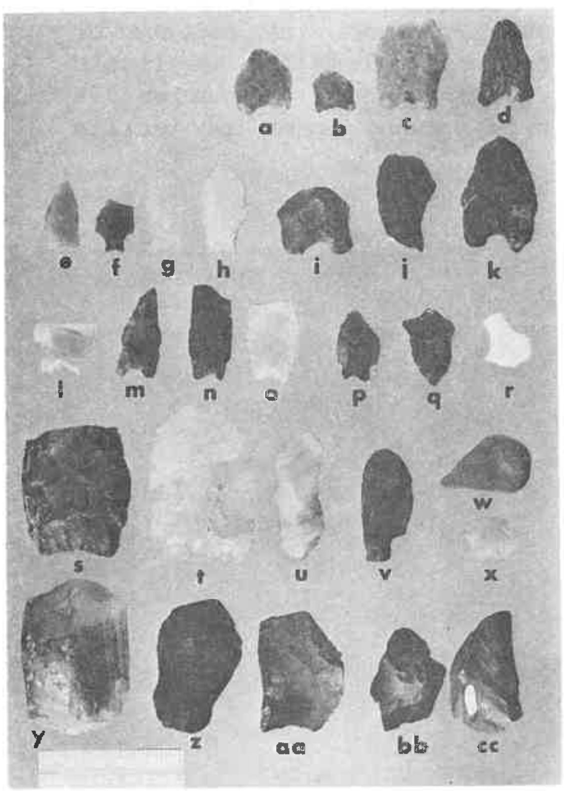

FIGURE 9: Tools (a-r, v-cc) and bifaces (s,t) from main area of Dead Indian Creek site; reworked projectile points (a-d, i-o); flakes unifacially shaped to projectile point outlines (e-h, p) and retouched flakes (q, r, v-cc).

SUMMARY OF PROJECTILE POINT DATA

The 566 Middle Plains Archaic projectile points and fragments from the Dead Indian Creek site demonstrate that analysis based upon strict typological variation would not adequately define the projectile points represented. Although three basic types are used in the analysis, the intergrades which comprise the remainder of the assemblage indicate that a range of stylistic variation from a single norm is exhibited by this McKean Complex assemblage. Projectile point metric data are presented in Tables 2-5.

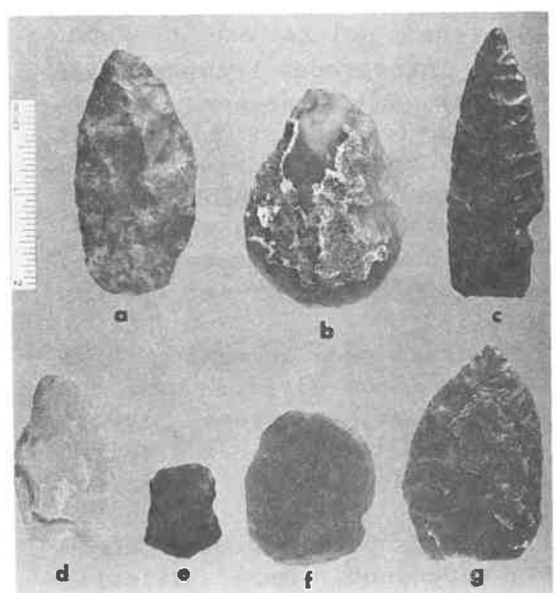

FIGURE 10: Bifaces (a, c, d, q); end scrapers (b, e); and retouched flake scraping tool (f).

Catalog No.	Type	Base	Material	Length (cm)	Width (cm)	Thickness (cm)	Height of Stem (cm)	Width of Stem Base (cm)	Height of Notch (cm)	Width of Base (cm)	Blade Outline
65788	Stemmed	Concave	Chert	3.45	1.70	.400	.750	1.50			Convex
65809	Lance.	Concave	Agate	4.60+	1.70	.600				1.30	Serrated Straight
65842	Stemmed	Concave	Chert	2.80	1.45	.550	1.10				Convex
65875	Lance.	Concave	Jasper	3.00+	1.40	.600				1.30	Straight
65893	Lance.	Notched	Chert		1.50	.450	.500			1.40	Convex
65898	Lance.	Concave	Chert	2.40+	1.10	.500				1.00	Convex
65940	Notched	Notched	Chert	4.25	1.30				.750	1.15	Convex
65955	Stemmed	Straight	Chalcedony	3.10+	1.30	.500	.600	1.00			Serrated Straight

TABLE 2: (continued)

Catalog No.	Type	Base	Material	Length (cm)	Width (cm)	Thickness (cm)	Height of Stem (cm)	Width of Stem Base (cm)	Height of Notch (cm)	Width of Base (cm)	Blade Outline
65011	Stemmed	Notched	Chert				2.2	2.1			--
65048	Lance.	Notched	Chert							2.95	--
65246	Lance.	Notched	Chert							2.1	--
65281	Lance.	Concave	Chalcedony	4.4	3.3	.75				2.85	Convex
65318	Lance.	Notched	Chert							2.2	Convex
65592	Lance.	Notched	Chert	7.5	2.45	.70				1.5	Convex
65702	Lance.	Notched	Quartzite	6.1	3.4	.70				2.5	Convex
65807	Lance.	Concave	Chert							3.5	--
65101	Lance.	Straight	Flint	7.3	2.6	.60				2.2	Convex
65234	Lance.	Straight	Chalcedony	5.9	3.7	.80				3.0	Convex
65516	Lance.	Concave	Chalcedony	5.5	3.6	.75				3.1	Convex

TABLE 3: Projectile point or knife data from Dead Indian Creek site.

Catalog No.	Type	Base	Material	Length (cm)	Width (cm)	Thickness (cm)	Height of Stem (cm)	Width of Stem Base (cm)	Height of Notch (cm)	Width of Base (cm)	Blade Outline
65250	Lance.	Concave	Chert	2.3	2.0	0.7				2.0	Convex
65254	Lance.	Concave	Shale	3.9	2.6	0.8				2.3	Convex
65273	Lance.	Concave	Chert	3.2	2.7	0.7				2.1	Convex
65561	Lance.	Concave	Chert	1.7	1.4	0.5				1.4	Convex
65773	Lance.	Concave	Petrified Wood	3.0	1.6	0.7				1.9	Convex
66001	Lance.	Concave	Chert	2.6	2.7	0.8				2.4	Convex

TABLE 4: Blunt tip projectile point data from Dead Indian Creek site.

Catalog No.	Type	Base	Material	Length (cm)	Width (cm)	Thickness (cm)	Height of Stem (cm)	Width of Stem Base (cm)	Height of Notch (cm)	Width of Base (cm)	Blade Outline
65019	Corner-notched	--	Chert			.03					Straight
65146	Corner-notched	Convex	Chert	2.7	2.0	0.4				1.7	Serrated Concave
65298	Corner-notched	Convex	Shale		2.0	0.4				1.7	Convex
65406	Corner-notched	--	Quartzite	2.6	2.1	0.35					Convex
65692	Side-notched	Straight	Ignimbrite	1.9	1.4	0.3				1.4	Straight
65811	Corner-notched	Convex	Chert	2.6		0.4					Convex
65817	Corner-notched	Straight	Chert	2.2	1.6	0.4				1.3	Convex
65866	Corner-notched	--	Chalcedony	3.5	2.2	0.6					Straight
65870	Corner-notched	Straight	Jasper		2.5	0.4				1.7	Base only

TABLE 5: Late Prehistoric projectile point data from Dead Indian Creek site.

Catalog No.	Type	Base	Material	Length (cm)	Width (cm)	Thickness (cm)	Height of Stem (cm)	Width of Stem Base (cm)	Height of Notch (cm)	Width of Base (cm)	Blade Outline
65382	Lance.	Concave	Chert	2.18	1.22	.430				1.10	Convex
65384	Lance.	Concave	Chert	3.00	1.20	.550				1.10	Convex
65388	Lance.	Concave	Shale	2.80+	1.30	.400				1.25	Convex
65391	Notched	Concave	Chert	2.20	1.50	.450			.700	1.50	Straight
65392	Stemmed	Concave	Agate	3.80	1.60	.500	.800	1.00			Convex
65393	Stemmed	Notched	Quartzite	3.20	1.65	.550				1.50	Convex
65394	Lance.	Notched	Chert	3.60	1.20	.600				1.30	Concave
65395	Lance.	--	Chert	3.45+	1.25	.450				1.00	Convex
65396	Notched	Concave	Quartzite	2.40	1.35	.400			.700		Convex Serrated
65398	Lance.	Notched	Chalcedony	3.50	1.50	.500				1.50	Straight
65399	Notched	Notched	Chert	3.45	1.90	.500			.800	1.80	Convex
65401	Notched	Notched	Chalcedony	2.30	1.00	.400			.700	.900	Convex
65402	Stemmed	Concave	Chalcedony	2.35+	1.35	.400	.900	1.30			Convex
65407	Lance.	Notched	Chert	3.05	1.20	.550				1.1	Convex
65408	Stemmed	Notched	Quartzite	2.30	1.60	.300	1.20	1.25			Convex
65409	Lance.	Notched	Knife River Flint	4.35	1.60	.500				1.50	Convex
65420	Lance.	Notched	Agate	2.65	1.40	.500				1.25	Convex
65423	Lance.	Notched	Quartzite	2.80	1.45	.600				1.20	Convex
65424	Lance.	Concave	Chert	3.50	1.30	.450					Convex
65425	Stemmed	Concave	Obsidian	2.10+	1.70	.600	.800	.600			
65426	Lance.	Notched	Chert	2.50+	1.50	.500				1.30	Convex
65427	Lance.	Concave	Chalcedony	2.66	1.23+	.420				1.02+	Convex
65428	Lance.	Concave	Quartzite	2.65	1.20	.500				1.00	Convex
65430	Lance.	Notched	Chert	2.30	1.60	.450				1.53	Convex
65432	Lance.	Concave	Chert	2.90	1.49	.360				1.02	Convex
65434	Lance.	Convex	Chert	2.50	1.08	.500				1.00	Convex
65435	Lance.	Concave	Chert	2.51	1.10	.330				1.00	Convex
65438	Lance.	Concave	Chalcedony	2.20	1.33	.500				1.30	Convex
65441	Stemmed	Concave	Agate	3.82	2.08	.730	.900	1.30			Convex
65443	Lance.	Concave	Petrified Wood	2.41	1.19	.390				1.08	Convex
65444	Lance.	Concave	Quartzite	2.65	1.36	.540				1.11	Convex
65445	Lance.	Concave	Quartzite	2.17	1.27	.520				1.10	Convex
65446	Stemmed	Concave	Chalcedony	3.90	1.77	.620	.950	1.60			Convex Serrated
65452	Notched	Notched	Chalcedony	2.40+	1.60	.400	.600	1.60	.500		Convex
65453	Stemmed	Concave	Quartzite	2.30	1.24	.500	.72	1.43			Convex
65457	Stemmed	Concave	Chert	2.78	1.62	.560	1.18	1.40			Convex
65476	Stemmed	Notched	Chert	2.40+	1.60	.400	1.70	1.50			Convex
65488	Lance.	Straight	Chert	2.42	1.12	.490				1.12	Convex
65500	Lance.	Concave	Basaltic	2.50	1.41	.500				1.29	Convex
65513	Lance.	--	Chert	3.00	1.10	.250					Straight
65520	Lance.	Concave	Chert	2.02	1.23	.490				1.12	Convex
65522	Lance.	Concave	Chert	2.40+	1.30	.500				1.20	Convex
65533	Lance.	Notched	Chert	2.80	1.20	.480				1.10	Convex
65539	Lance.	Straight	Chalcedony	1.90	1.35	.300				1.30	Convex
65562	Lance.	Concave	Chalcedony	2.40	1.40	.500				1.30	Convex
65586	Lance.	Concave	Chert	4.32	1.90	.560				1.80	Convex
65589	Lance.	Notched	Chert	2.70	1.30	.500				1.35	Straight
65597	Lance.	Concave	Petrified Wood	2.83	1.62	.580				1.20	Convex
65553	Lance.	Concave	Chert	2.03	1.30	.360				1.20	Convex
65604	Lance.	Concave	Quartzite	2.27	1.22	.580				1.03	Convex
65607	Lance.	Concave	Chert	1.90	1.24	.450				.980	Convex
65612	Stemmed	Notched	Chert	4.10	1.50	.440	.820	1.80			Convex Serrated
65613	Notched	Notched	Chalcedony	2.95	1.55	.500			.800	1.45	Convex Serrated
65638	Stemmed	Concave	Ignimbrite	3.85	1.65	1.05	1.30	1.15			Convex
65661	Lance.	Concave	Chert	3.20	1.40	.550				1.10	Convex
65718	Stemmed	Concave	Shale	3.40+	1.70	.800	1.00	1.10			Convex
65720	Lance.	Concave	Agate	3.15	1.45	.450					Convex Serrated
65721	Lance.	Concave	Chert	4.10	1.40	.550					Convex
65732	Notched	Concave	Chalcedony	4.15	1.50	.500			.900	1.20	Convex Serrated
65733	Lance.	Notched	Agate	3.25		.600					Convex
65734	Notched	Concave	Chert	3.45	1.65	.600			1.00	1.40	Convex
65735	Lance.	Concave	Chert	2.80+	1.70	.700				1.30	Convex
65738	Stemmed	Concave	Quartzite	2.40+	1.30	.600	1.00	.800			Convex
65740	Notched	Notched	Chert	2.65	1.30	.450			.700	1.40	Convex Serrated
65743	Lance.	Concave	Chert	4.00+	1.60	.600				1.50	Convex
65746	Stemmed	Concave	Chert	2.45	1.50	.550	1.10				Convex
65750	Lance.	Notched	Chert	2.50	1.30	.600				1.20	Convex
65755	Stemmed	Concave	Chert	2.50+	1.90	.600	1.00	1.50			Convex
65756	Stemmed	Concave	Quartzite	2.10+	1.70	.500	1.00	1.50			Convex
65765	Notched	Notched	Chert	2.45	1.50	.450			.600	1.40	Convex Serrated
65767	Stemmed	Concave	Chalcedony	2.50+	1.70	.500	.800	1.30			Convex
65782	Notched	Notched	Shale	2.60	1.50	.450			.600	1.45	Convex Serrated

TABLE 2: (continued)

Catalog No.	Type	Base	Material	Length (cm)	Width (cm)	Thickness (cm)	Height of Stem (cm)	Width of Stem Base (cm)	Height of Notch (cm)	Width of Base (cm)	Blade Outline
65001	Lance.	Notched	Chalcedony	2.30	1.20	.450				1.20	Convex
65002	Stemmed	Concave	Basaltic	1.75+	1.80	.500	1.20	1.00			Straight
65010	Stemmed	--	Chert		1.20	.400	.400				Convex
65018	Lance.	Notched	Chert	3.30	1.80	.500				.950	Serrated Convex
65021	Lance.	Concave	Quartzite	3.00	1.60	.500				.450	Convex
65025	Stemmed	Notched	Chalcedony	2.50	1.30	.400	.400	1.30			Straight
65030	Stemmed	Concave	Quartzite	3.40+	1.80	.600	1.20	1.10			Straight
65038	Lance.	Concave	Chert	2.60	1.10	.450				.900	Convex
65041	Lance.	--	Chalcedony	1.15	.450						Convex
65051	Stemmed	Concave	Obsidian	2.10+	1.70	.600	1.20	.950			Convex
65060	Stemmed	Concave	Quartzite	2.90	2.00	.600	1.05				Convex
65063	Stemmed	Concave	Basaltic	2.90	1.50	.600	1.10	1.25			Convex
65066	Stemmed	Notched	Chert	3.60	1.50	.400	1.80	1.45			Convex
65071	Lance.	Notched	Quartzite	4.80	2.70	.800				2.00	Serrated Convex
65074	Stemmed	Notched	Chert	4.35	1.55	.450	.80	1.45			Convex
65075	Stemmed	Notched	Chert	2.50	1.30	.450	.70	1.30			Serrated Straight
65076	Stemmed	Concave	Chert	2.50	1.40	.600	.950	1.10			Serrated Convex
65092	Lance.	Concave	Chert	3.00	1.30	.560				1.05	Convex
65084	Lance.	Concave	Chert	3.90	1.40	.500				1.10	Convex
65098	Stemmed	Notched	Chalcedony	4.40	1.75	.500	.750	1.50			Serrated Convex
65104	Lance.	Concave	Chert	2.50	1.10	.500				1.10	Serrated Convex
65116	Stemmed	Notched	Chalcedony	2.50	1.30	.400	.600			1.20	Convex
65119	Lance.	Concave	Chert	2.20	1.10	.450				1.05	Serrated Convex
65125	Lance.	Concave	Chert	1.70+	1.20	.400				1.20	Convex
65133	Lance.	Concave	Chalcedony	2.40	1.20	.300				1.10	Convex
65134	Lance.	Notched	Shale	2.00+	1.30	.450				1.30	Convex
65144	Lance.	--	Petrified Wood	3.70+	.170	.500					Convex
65156	Stemmed	Concave	Quartzite	3.10	1.60	.500	1.20	1.05			Serrated Convex
65161	Notched	Notched	Chert	3.70	1.90	.450			1.00	1.50	Convex
65170	Stemmed	Concave	Obsidian	2.50	1.90	.750	1.30	1.20			Serrated Convex
65194	Stemmed	Straight	Jasper	3.13	1.80	.500	.79				Straight
65236	Lance.	Concave	Agate	3.00+	1.50	.550				1.20	Convex
65238	Notched	Notched	Chalcedony	1.95	1.53	.380			.600	1.53	Straight
65241	Stemmed	Notched	Chert	3.49	1.70	.420	.062	1.50			Convex
65244	Stemmed	Notched	Chalcedony	3.40	1.25	.490	.520	1.18			Serrated Convex
65245	Notched	Concave	Chert	5.18	2.06	.500			.700	1.79	Serrated Convex
65247	Stemmed	Notched	Quartzite	3.03	1.20	.430	.780	1.10			Convex
65251	Stemmed	Notched	Chalcedony	2.83	1.42	.420	.650	1.29			Convex
65252	Notched	Notched	Chert	2.74	1.61	.420			.720	1.61	Serrated Convex
65262	Lance.	Notched	Jasper	4.12	1.61	.340				1.49	Serrated Convex
65265	Notched	Notched	Chalcedony	2.52	1.51	.450			.710	1.51	Serrated Convex
65266	Stemmed	Concave	Ignimbrite	2.80+	2.00	.700	1.35	1.7			Serrated Convex
65268	Stemmed	Concave	Chert	2.79	1.30	.460	.650	1.25			Convex
65269	Stemmed	Concave	Chalcedony	2.39	1.23	.460	.720	1.20			Convex
65272	Notched	Notched	Chert	2.30	1.39	.300			.760	1.36	Serrated Convex
65279	Stemmed	Notched	Chalcedony	3.88	1.68	.430	.700	1.51			Serrated Convex
65280	Lance.	Concave	Shale	2.50+	1.60	.400				1.40	Serrated Convex
65297	Stemmed	Concave	Ignimbrite	2.70	2.00	.640	1.42	1.62			Straight
65299	Notched	Concave	Chalcedony	2.53	1.83	.420			1.00	1.83	Convex
65304	Stemmed	Concave	Ignimbrite	2.23	1.70	.610	1.10	1.37			Serrated Straight
65308	Stemmed	Concave	Ignimbrite	2.78	1.53	.680	1.10	1.43			Convex
65346	Stemmed	Concave	Quartzite	2.02	1.30	.500	.870	1.08			Convex
65352	Lance.	Concave	Chert	2.85+	1.90	.400					Convex
65353	Stemmed	Notched	Chalcedony	3.69	1.68	.500	.730	1.41			Convex
65361	Lance.	Notched	Chert	3.30	1.40	.500				1.40	Straight
65362	Lance.	Concave	Agate	3.00		.600					Convex
65363	Lance.	Concave	Quartzite	2.80	1.10	.510				1.00	Convex
65364	Stemmed	Concave	Basaltic	2.30	1.48	.500	1.02	1.15			Convex
65366	Stemmed	Notched	Chert	2.67	1.32	.380	.790	1.32			Convex
65374	Lance.	Concave	Agate	2.98	1.40	.570				1.35	Serrated Convex
65376	Lance.	Notched	Petrified Wood	2.70	1.50	.500				1.30	Convex
65380	Stemmed	Concave	Obsidian	2.88	2.00	.600	1.00	1.41			Convex
65381	Lance.	Concave	Quartzite	2.28	1.14	.410				.980	Convex

TABLE 2: Projectile point data from Dead Indian Creek site excavations.

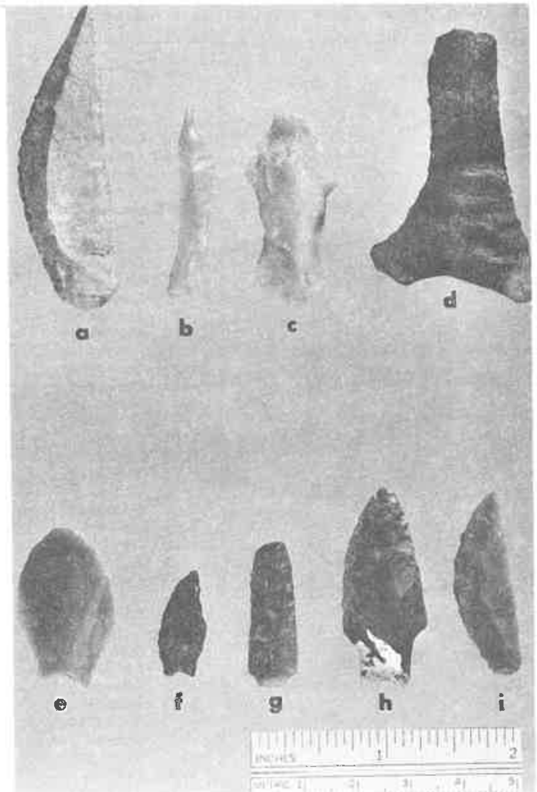

FIGURE 11: Flake tools (a-e, i) and reworked projectile points (f-h) from the main Dead Indian Creek site area.

LITHIC MATERIALS AND STONE TOOLS

by
KAREN WEST SCOTT
and
GEORGE M. ZEIMENS

This is an analysis of lithic materials recovered from the Dead Indian Creek site. Lithics are identified morphologically as to suggested function. Where possible, raw material is identified. However, due to the abundance of igneous, metamorphic and sedimentary rocks suitable for knapping that outcrop in northwestern Wyoming, exact source areas cannot be determined.

LITHIC DEFINITIONS

Definitions of pertinent stone artifact and debitage categories identified in this analysis are as follows.

Blade

A flake whose length is twice or more than twice its width is called a blade (Newcomer 1974).

Biface

Bifaces are defined as bifacially flaked artifacts that lack basal modification for hafting (Chapman 1977:412; House 1975:61). The term biface is applied based upon the morphological qualities of the specimens, and not function.

Chopper

"Heavy core tool presumed to be used for chopping--may be uniface or biface" (Crabtree 1972).

Core

A piece of lithic raw material which has been modified by the removal of smaller segments of the raw material, i.e., flakes. The parent material must have at least one flat surface from which force can be directed, which is known as a striking platform (Chapman 1977:375).

Drill

Drills are bifacially flaked stone implements that have a bifacially retouched tip that is more pronounced than a graver. They are sometimes called perforators as they are used to drill or perforate items such as bone, shell, wood, or hide. Drills are often reworked projectile points.

Flake

Flakes are chips of raw material (chert, quartzite, etc.) produced in stone tool manufacture. Flakes that are waste products of this manufacturing process are referred to as debitage.

Retouched and Utilized Flakes

These artifact categories are distinguished from the more formal tool types as they are considered to "represent rather casual *ad hoc* modification of the edges of flakes or use (of a flake) without prior modification (House 1975:62). Retouched flakes exhibit marginal retouch flaking on at least one edge. Utilized flakes exhibit use wear on at least one edge.

Graver

Gravers are defined as marginally retouched flakes where the retouching has been directed toward the production of a small tip or spur. Gravers are thought to have been incising or engraving tools (Eckles and Welty 1980).

Projectile Point

Projectile points are defined as bifacially flaked artifacts that have modified proximal or basal ends. This modification often takes the form of corner or side-notching; sometimes basal notches are present. Points without notches most often display grinding on basal and lateral edges near the proximal end (Chapman 1977:413). Their primary function is assumed to have been in the killing of game. Impact fractures would indicate such use. Other uses, such as cutting and scraping, have also been reported (Ahler 1970).

Scraper

Scrapers are defined as unifacially flaked artifacts which display a very steep, straight to convex working edge. Two types of scrapers are usually distinguished: end and side scrapers. End scrapers have the working edge on one of the ends of a flake, while side scrapers have the working edge on one of the lateral edges. Scrapers are distinguished from other unifacially retouched flakes in that the former are thought to represent considerable care in making or selecting the preform flake (Eckles and Welty 1980).

Multipurpose Tools

One tool in the collection from Dead Indian Creek has two or more working edges which were apparently used for different functions (e.g., a unifacially retouched scraping edge and a notch or spokeshave).

RAW MATERIALS

Definitions of raw material types identified from the site are included below.

Chalcedony

This material type is a combination of cryptocrystalline quartz and much chert, and is commonly microscopically fibrous. It is the material of which agate is formed (AGI 1976).

Moss Agate

A chalcedony containing dendrites. The dendrite is produced on or in a rock by the crystallization of a foreign mineral, usually an oxide or manganese (AGI 1976).

Chert

Cherts are a crystalline siliceous material which exhibit homogeneous structure and a controllable conchoidal flaking (AGI 1976). A large variety of chert is present in the lithic assemblage collected at Dead Indian Creek. These cherts occur in a variety of colors: browns, blacks, whites, purples, reds, and greens.

Madison Formation Chert

Madison Formation cherts are known from three major quarries in Wyoming. The Spanish Point agate quarry (48BH85) is the best known of the quarry sites (Francis 1982). Francis believes Madison Formation materials were procured in a highly deliberate manner as quarries are located at high elevations and restricted to summer and fall months by snow.

Phosphoria Formation Chert

"The Phosphoria Formation is exposed over the open sagebrush grasslands of the Bighorn Mountains. Cherts from the Phosphoria Formation were obtained from surface exposures of nodules eroding out of bedrock. These exposures are highly variable and many are extremely frost-fractured (Francis 1982). This chert is known to occur in the Shell Creek - Trapper Creek area, as well as the Paintrock - Medicine Lodge Creek and Tensleep Creek areas (Francis 1982).

Knife River Flint

The material type is a dense, fine-grained form of silica. It is very tough and breaks with a conchoidal fracture and cutting edges (AGI 1976). This material source is in North Dakota, though some cherts from the Black Hills are similar (Frison 1978:157).

Ignimbrite

The material type is chiefly a fine-grained rhyolitic tuff formed mainly of glass particles (shards) in which crystals of feldspar, quartz, and occasionally hypersthene or hornblends are embedded. The glass particles are firmly "welded" and bend around the crystals, and evidently were of a viscous nature when they were deposited. The rock type is believed to have been produced by the eruption of dense clouds of incandescent volcanic glass in a semi-molten or viscous state from groups of fissures (AGI 1976:221).

Obsidian

This material is formed by volcanic lavas which have cooled so quickly that crystals have not had time to form. Obsidian is characterized by its glassey texture, a Moh's hardness of around 6, and breakage with a conchoidal fracture (Loomis 1923:191-192).

Porcelanite (Metamorphosed Shale)

This is a light-colored, porcelaneous rock resulting from the contact metamorphism of marls. It is often formed from fused shales and clay, that occur in roofs, and floors of burned coal seams (AGI 1976:338). It is common throughout the Powder River Basin of Wyoming (Frison et al. 1968).

Quartzite

Quartzites are a material type that range in texture from fine-grained to coarse and also exhibit a range of uneven to conchoidal fracture properties. They vary from dull to vitreous and exhibit a wide variety of colors (Scott and Reiss 1981).

Morrison Quartzite

Morrison quartzite derives its name from the Morrison Formation of Upper Jurassic age in the Bighorn Mountains and Black Hills. This particular quartzite itself is a fine-grained material that is mostly light gray in color, but sometimes grades into yellow and rust (Francis 1979).

Mudstone

Mudstone includes clays, silts, siltstone, claystone, shales, and argillite. Shales, when exposed to atmosphere, are rapidly decomposed and converted to their primitive state. This descriptive term now is applied to all similar shales in whatever formation they occur (AGI 1976:291).

Petrified Wood

This material is silicified wood, often found with accessory minerals (AGI 1976:324).

TOOL TYPES AND LITHIC RAW MATERIALS

Of the lithic categories analyzed in this study, only a few will be specifically discussed here. The representatives of these and other categories and the percentages of each in the total assemblage can be seen by referring to Figure 12.

Biface Fragments

A total of 113 small bifaces or fragments were found. They are probably broken and discarded remnants of knives, scrapers, and other bifacial implements.

Bifaces need a special note of explanation. This category is a broad one and comprises all bifacially worked lithics that are not relegated to the more specialized artifacts, such as projectile points, gravers, and drills. These bifacial tools are judged morphologically only, primarily because their functional uses likely range widely. Artifacts in this category consist of crude, broken bifacial fragments, preforms, bifaces that resemble McKean points though larger, and finely worked knives. Raw materials seen in this tool category include chalcedony, petrified wood, porcelanite, obsidian, chert, quartzite, Morrison quartzite, moss agate, ignimbrite, Madison Formation chert, basalt, phosphoria, chert, Knife River flint, and mudstone.

One category present in the collection, at first glance, resembles projectile points. This is represented by nine specimens that all appear to have been fashioned from flakes. Each, in outline, resembles a projectile point, with concave bases, retouched on one or both sides, and in some cases, stems and side-notches. Each appears expediently fashioned from a flake, exhibiting a curve that would seem to prohibit any accura-

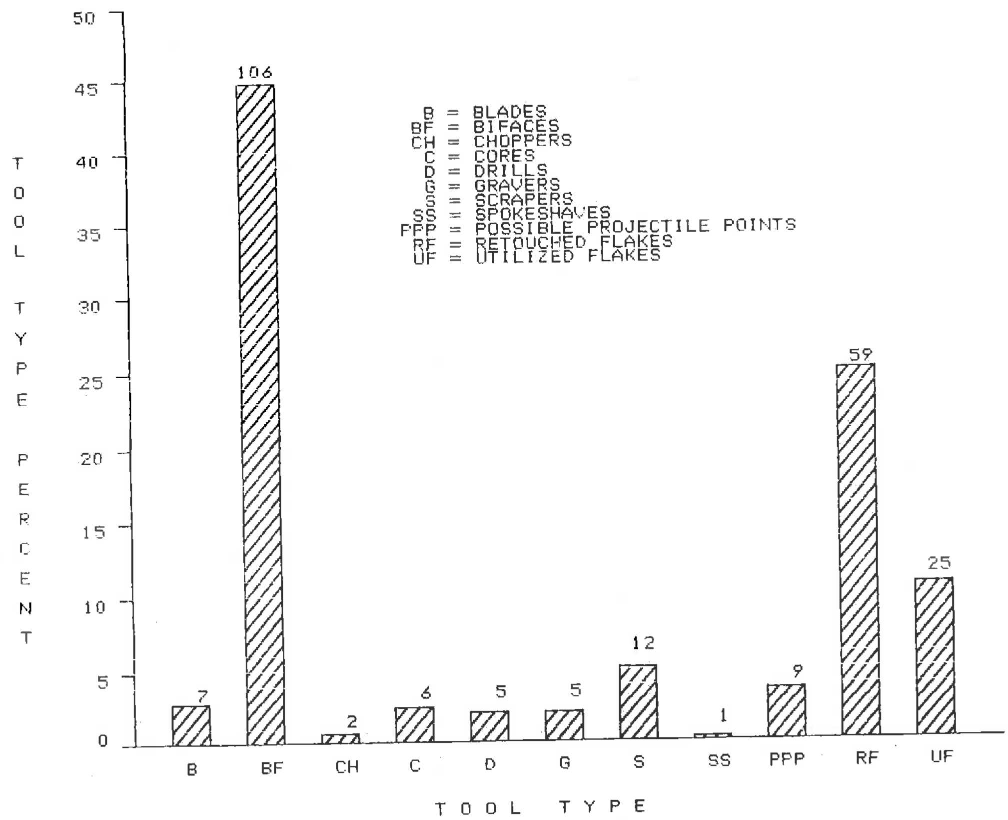

FIGURE 12: Histogram showing relative percent of each tool type identified from Dead Indian Creek. Numbers above each bar refer to number of specimens for that tool type.

cy or penetration if used as projectile points. With one exception, in which a tip is missing, they are all complete. These specimens may actually have functioned as projectile points, or they may have only represented projectile points such as toys or charms. Because it is impossible to ascertain their function, they must be referred to only as "possible projectile points". A similar specimen has been found at Daugherty Cave, Wyoming (Frison 1968:287). This more finely worked specimen is still hafted to a wooden shaft. Obsidian, basalt, chalcedony, chert, moss agate, and quartzite comprise the raw materials present in this category.

Retouched Flakes

This category consists of 84 flakes of varied size and shape displaying fortuitous use retouch or crude unilateral preparation of edges. In many cases, it is difficult to decide whether retouch is due to use or intentional. A variety of material is represented and one gets the idea that when a sharp tool was momentarily needed, a waste flake was picked up from the ground, used, and then discarded. One specimen (65483) is a slightly more sophisticated uniface with steep beveled concave edges. Specimen 65736 is a long, narrow, thin flake with one end prepared to a very sharp point with the opposing end being concave. One edge is slightly concave and the other slightly convex and both show use retouch or edge preparation. Two implements (65123 and 65610) are unique in that they seem to be composite tools. Specimen 65123 is a long, narrow "S" shaped unifacial flake with both edges prepared for cutting or scraping with one end forming an end scraper. Specimen 65610 is a unifacial flake with both edges being concave and prepared for scraping or possibly hafting. Both ends are prepared, one possibly for use as a graving tool and the other as a scraper.

Twelve specimens are apparently small, hafted flake tools. They are thin, slightly convex percussion flakes and are projectile like in outline with a prepared base which suggests hafting. Edges vary from straight to convex and were prepared by fine, unifacial pressure flaking. The function of these tools is unknown, but they possibly represent small hafted cutting tools. Maximum length ranges from 21 mm to 38 mm, maximum width from 9 mm to 19 mm, and maximum thickness from 2 mm to 5 mm.

CHIPPED STONE TOOLS

End Scrapers

At least seven specimens are included in this category. In general, these artifacts are made on percussion flakes by unifacially preparing the back side on the end opposite the bulb of percussion. In contrast to the projectile points, none show evidence of heat treatment. Most are elongated flakes with either prepared or naturally constricted edges which may suggest hafting. Four specimens possess a lateral spur near the prepared end which may be either fortuitous or functional. In most cases, only one end was prepared, but two specimens are double ended and seven specimens display some thinning of the bulb of percussion which may further suggest hafting. The prepared end forms a convex or straight beveled edge 45 degrees to 90 degrees to the longitudinal axis and varies from 2 mm to 14.8 mm in thickness. Maximum length ranges from 14 mm to 59 mm, maximum width from 12 mm to 43 mm, and maximum thickness from 4 mm to 15 mm.

Knives

Four of these are bifacially percussion-flaked, ovoid blades, pointed at one end with a straight or concave base. One edge is slightly more convex than the other and both edges show a secondary pressure retouch. All four are made from chert.

The fifth specimen is narrower and shows fine transverse pressure-flaking on both sides. The base is straight and stemmed on one edge which suggests hafting. Material in this case is Knife River flint.

Stone Drills

Specimens included in this category are one broken blade, one broken base, and three other pieces. The blade is narrow and bifacially pressure-flaked. The base is expanded, bifacially thinned, and bears definite evidence of heat treatment.

Gravers

One well-shaped graving tool was found. It is a small, thick, triangular, bifacially pressure-flaked implement. Edges are steeply beveled. Both ends are pointed with a lateral spur on one edge near the broad end.

Blunt Retouched Projectile Points

Seven implements resemble thick, shouldered lanceolate points. These seem to be broken points with the broken ends reworked into a rounded blunt working edge of unknown function. One specimen bears five heat spalls on the longitudinal surfaces. Two specimens display heavy grinding of lateral edges of the bases. Maximum length varies from 14 mm to 48 mm, maximum width from 14 mm to 27 mm, and maximum thickness from 5 mm to 11 mm. The largest is quartzite while the rest are chert.

Hammerstones

One small, ovoid, unifaced hammerstone was found. Edges are not prepared, but all edges display crushing which indicates use as a hammerstone. Material is a hard, clear chert.

Debitage

A large number of waste flakes were recovered from the preliminary excavations. The debitage exhibits a wide variety of lithic materials with chert, quartzite, ignimbrite, and obsidian predominating.

It was not possible to define possible manufacturing areas during the excavations, but it is apparent that much tool sharpening and possibly manufacturing was done at the site.

Because of the seeming impossibility of differentiating soft from hard hammer technique (Bradley 1973), at most the large debitage sample shows that lithic work was done at the site.

In summary, of the 259 specimens of tools represented in this collection, the following breakdown of types is noted: bifaces 106 (44.7%), blades 7 (2.9%), choppers 2 (.8%), cores 6 (2.5%), drills 5 (2.1%), gravers 5 (2.1%) scrapers 12 (5.1%), spokeshaves 1 (.4%), possible projectile points 9 (3.8%), retouched flakes 59 (25.0%), and utilized flakes 25 (10.6%). Detailed analysis of unmodified debitage is not treated in this paper.

Of the raw materials present in the tool assemblage, the following percentages were recorded: basalt 6 (2.4%), chalcedony 54 (21%), chert 103 (40%), Madison Formation chert 1 (.3%), Phosphoria chert 2 (.7%), ignimbrite 4 (1.5%), obsidian 19 (7.3%), porcelanite 2 (.7%), quartzite 10 (3.9%), Morrison quartzite 26 (10%), moss agate 3 (1.2%), petrified wood 19 (7.3%), Knife River flint 2 (.7%), and mudstone 8 (3%).

Figures 12 and 13 are histograms that display visually the above percentages. It must be remembered that while the above breakdowns are good indicators to be used in site analyses, they do not present conclusive facts since the entire collection is not represented in this analysis.

GRINDING STONES

by

Mark Miller and Jean Bedord

Manos

This artifact category consists predominantly of local stream cobbles exhibiting striations and/or polish on at

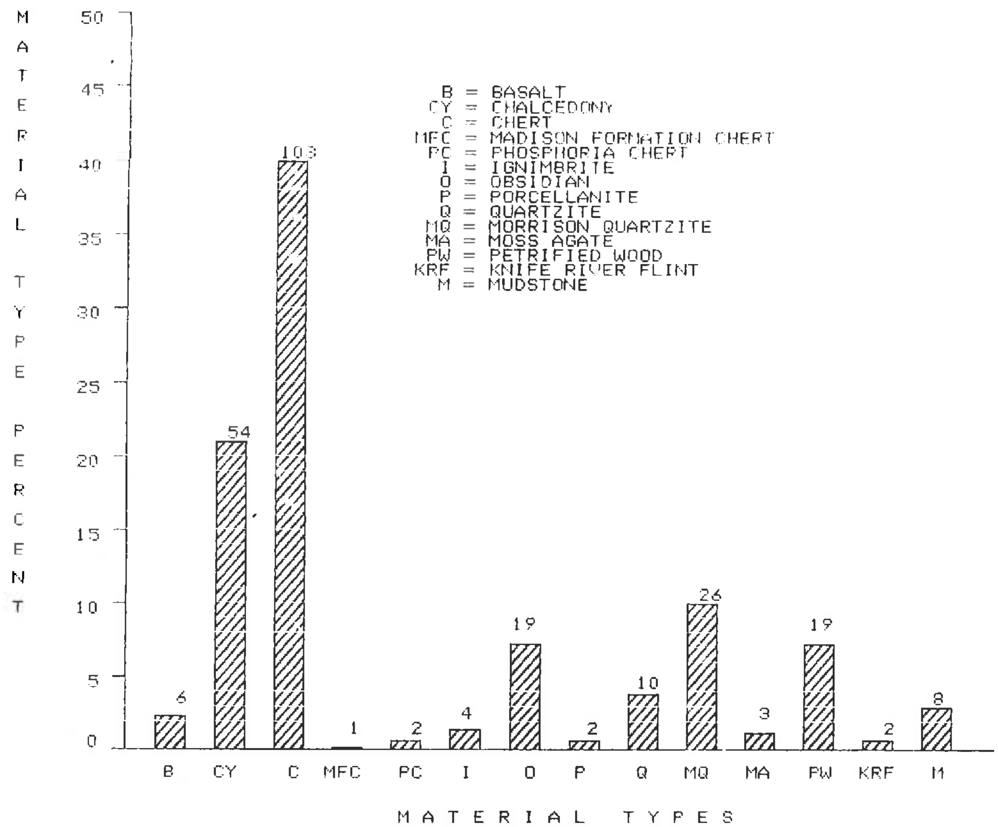

FIGURE 13: Histogram showing relative percent of each material type identified from Dead Indian Creek. Numbers above each bar refer to number of specimens representing that material type in the sample examined. Total debitage sample not analyzed in this report.

least one surface (Table 6). This criteria separated the manos from other stream cobbles that were found in large quantities at the site. Four of the complete manos show a single worked surface, and four complete specimens show two worked surfaces. There are 16 fragmented manos which are fire-cracked and broken. The specimens made from sedimentary rocks were shaped in a basic stylized oval, whereas the igneous stones are much more irregular in their shape. These attributes are probably the result of the selective choice of raw materials, and in some cases, the result of cobbles being worked into preferred shapes. Grinding surfaces range from flat to varying degrees of "keel". Two specimens (both of sedimentary material) have distinctly convex grinding surfaces.

Metates

Only three complete or nearly complete metates were recovered from the Dead Indian Creek site. One of these varied from 47 mm to 77 mm in thickness and was 220 mm wide and 500 mm long. One other complete specimen (Figure 14) was 19-22 mm in thickness, but approximately the same width and length (180 mm to 485 mm respectively) as the thicker metate described above. All complete or fragmen-

Specimen #	Max. Length*	Min. Length*	Thickness*	Hardness*	Material	Artifact
65020	?	22	16	5 h 3.5	sandstone	shaft smoother (abrader) frag.
65151	118	41	26-36	5 h 3.5	shale	hammerstone
65159	?	?	38-41	6.5 h 6	sedimentary	grinding stone frag.
65160	?	?	?	3.5 h	sandstone	grinding stone frag.
65166	?	32	39-31	7 h 6.5	igneous	hammerstone
65168	?	?	21-23	5 h 3.5	sandstone	metate frag.
65169	?	?	4	---	quartzite	broken perforated disk
65183/65186	?	?	10-13	3.5 h 2.5	sedimentary	metate frag.
65184	?	?	13-14	2.5 h	sandstone	metate frag.
65185	?	?	15	5 h 3.5	sandstone	metate frag.
65201	109	102	61-71	5 h 3.5	sedimentary	grinding stone
65202	?	?	31-44	6.5 h 6	igneous	grinding stone frag.
65206	?	?	15-17	3.5 h 2.5	sandstone	metate frag.
65208	?	?	14-19	5 h 3.5	sandstone	metate frag.
65324	142	66	58-63	9 h 8.5	igneous	hammerstone
65330	?	?	?	6 h 5	igneous	grinding stone frag.
65400	?	?	---	---	grn. steatite	pipe frag.
65623	119	78	54-58	6.5 h 5	igneous	grinding stone
65624	129	83	51-52	6.5 h 5	sandstone	grinding stone
65625	?	?	16	2.5 h	sedimentary	metate frag.
65626	?	?	16	5 h 3.5	sandstone	metate frag.
65627	?	?	32-34	5 h 3.5	sandstone	metate frag.
65628	?	?	20-26	5 h 3.5	sandstone	metate frag.
65629	?	?	10-11	3.5 h 2.5	sandstone	metate frag.
65630	117	90	39	6.5 h 6	igneous	hammerstone
65631	78	72	61	5 h 3.5	igneous	grinding stone frag.
65635	155	86	48-54	5 h 3.5	quartzite	grinding stone
65701	?	?	5	---	shale	incised decorative object
65805	151	82	62	5 h 3.5	granite	composite tool
65822/65823	?	?	41-44	3.5 h 2.5	sandstone	metate frag.
65826	98	64	52-54	8 h 7.5	sandstone	hammerstone
65827	99	89	35-40	6.5 h 6	sandstone	grinding stone frag.
65828	?	?	14	2.5 h	sandstone	metate frag.
65849	?	16	16-17	---	igneous	shaft smoother (abrader) frag.
65855	?	?	35-40	3.5 h 2.5	sedimentary	grinding stone frag.
65858	135	101	41-50	5 h 3.5	sandstone	grinding stone
65859	?	?	49-50	5 h 3.5	sandstone	grinding stone frag.
65860	?	?	16-17	2.5 h	sandstone	metate frag.
65861	?	97	39-49	7 h 6.5	igneous	grinding stone frag.
65862	?	?	34-38	2.5 h	sedimentary	metate frag.
65863	?	62	32	6.5 h 6	igneous	grinding stone frag.
65864	?	?	61-63	5 h 3.5	igneous	grinding stone frag.

TABLE 6: Grinding, abrading, perforated and incised stone data from Dead Indian Creek site.

Specimen #	Max. Length*	Min. Length*	Thickness*	Hardness*	Material	Artifact
65865	112	43	13-15	3.5 h 2.5	shale	metate frag.
66010	?	?	19-20	5 h 3.5	sedimentary	metate frag.
66012	71	42	24-27	3.5 h 2.5	quartzite	grinding stone frag.
66013	?	?	?	7 h 6.5	sedimentary	grinding stone frag.
66015	?	?	43	5 h 3.5	igneous	composite tool
66016	117	56	36-38	5 h 3.5	igneous	grinding stone frag.
66017	?	?	30-32	3.5 h 2.5	sedimentary	grinding stone frag.
66018	?	?	?	5 h 3.5	sedimentary	grinding stone frag.
66020	485	180	19-22	5 h 3.5	sandstone	metate
66050	104	62	42-46	5 h 3.5	sedimentary	grinding stone
66051	500	220	47-77	6.5 h 6	sandstone	metate
66065	129.5	56	17-24	3.5 h 2.5	sandstone	grinding stone
66066	148.5	95.1	32	3.5 h 2.5	sandstone	grinding stone

* All measurements have been calculated in millimeters. Maximum length is defined as the longest possible measurement that can be observed on the specimen. Minimum length (width) is the narrowest distance across the specimen. Both of these measurements were taken only on complete specimens since the measurements would have been misleading on fragments. Thickness is defined as the perpendicular distance from one grinding surface to the opposite surface. In the case of hammerstone tools, thickness is the measurement parallel to the worked surface. Uneven thicknesses are indicated by their ranges.

Hardness was gauged using a hardness testing kit ranging from 5 to 10. Below 5, hardnesses of 3.5 were gauged using a penny, and 2.5 using a thumbnail. On the chart in the appendix, hardness of a particular specimen is indicated by the letter "h" between the harder and the softer values indicated by the numerals.

TABLE 6: (continued)

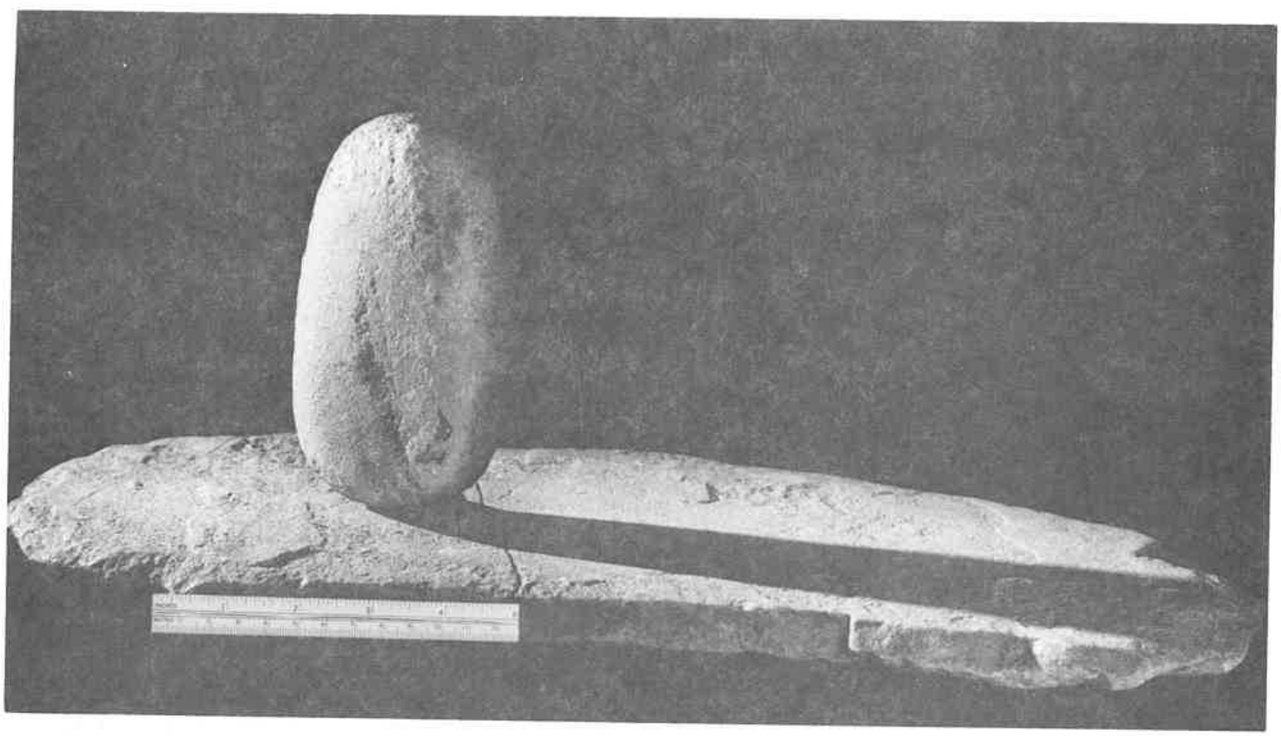

FIGURE 14: Grinding tools from the main site area at Dead Indian Creek.

tary specimens exhibited striations and/or polish indicating use as grinding materials. Most fragmentary specimens are generally rather small. Several fragments appear to belong to the same metate, having nearly identical proveniences and appearances, though attempts to fit them together were unsuccessful. All of the metate specimens were of sedimentary material.

Hammerstones

There were five hammerstones recovered from the site (Figure 14. Four of these exhibited work on only one end, the fifth hammerstone showed work on two ends. This latter specimen was made from igneous material, while the others are all of sedimentary material.

Composite Tools

Two specimens in the sample show both a grinding surface indicated by striations and polish, and at least one hammered end (Figure 14).

Perforated Stone

One artifact (Figure 15c) consists of one half of a flat disk 4 mm thick with a central perforation. This specimen may have been a pendant.

Incised Shale Object

One fragmented specimen with a thickness of 5 mm has gouged areas and incised lines that parallel and intersect each other forming a complex design on both surfaces of the artifact (Figure 15d). The outer edge of the specimen has two notches, though

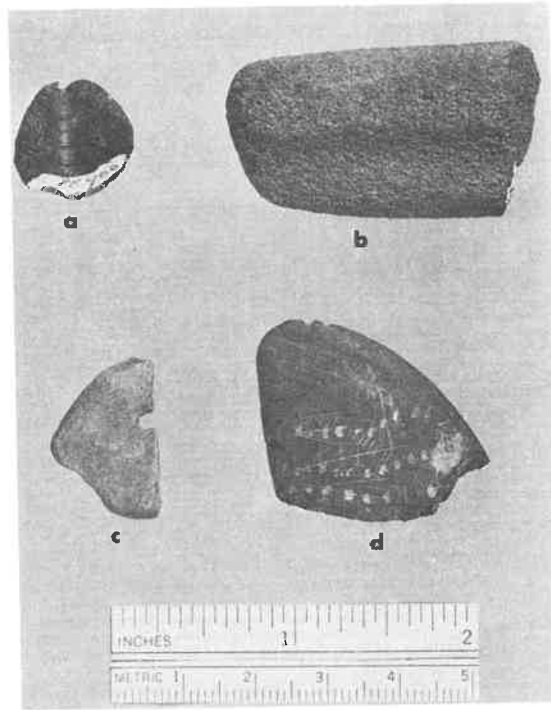

FIGURE 15: Pipe fragment from the surface (a); sandstone grinding tool (b); perforated and ground piece of shale (c); and a ground, incised, and pecked piece of shale from the main site area at Dead Indian Creek.

there may have been more on the missing portion of the shale object.

Abraders

One nearly complete abrader (Figure 15b) and one abrader fragment are included in the artifact assemblage. The former artifact is sedimentary material, while the latter is composed of igneous material.

Steatite Pipe

A single fragment of a green steatite pipe (Figure 15a) was found at the site. The interior of the pipe exhibits circumferential striations remaining from the production of the central cavity.

SUMMARY OF GROUND STONE DATA

A total of 55 grinding, abrading, perforated or incised stone artifacts were recovered from the Dead Indian Creek site. The majority of these artifacts (43) belong in the category of grinding stones, comprised of both manos and metates. Grinding stones are indicative of a foraging economy reminiscent of the Desert Culture of the Great Basin identified by Jennings (1964, 1974). Foraging is a subsistence strategy based primarily on the gathering and processing of edible plants. The geographical and temporal distribution onto the Plains of an economy seemingly more adapted to the arid climate and zerophytic vegetation of the Great Basin is yet to be completely understood. Syms (1970:136) noted that as manos and metates seem plentiful in Middle Plains Archaic sites from the Montana and Wyoming portions of the Northwestern Plains, they are absent in Manitoba sites from the same time period. This regional difference raises serious questions concerning the adaptive strategies employed by the cultural groups in the Northern Plains between approximately 4,500 and 2,500 years ago. Hypotheses concerning seasonal activities, regional differences in assemblages and cultural continuity among these sites can best be generated when the literature on the subject provides necessary comparative data. This data should include both artifact and natural resource inventories necessary for constructing an ecological model for explaining such cultural patterns. Assuming that prehistoric man organized and scheduled his individual and communal activities to maintain a functional subsistence level, then it seems misleading to observe and analyze cultural remains independent of their environmental contexts.

From the sample of 43 grinding stones recovered at the Dead Indian Creek site, 19 may be recognized as metates or metate fragments. Nine complete metate slabs are relatively larger and heavier than the hand-held manos, one might expect that they would most likely be left at the areas where the food products were processed and not be brought back to camp. Since only three of the metates at Dead Indian are complete or nearly so, this may indeed be the case. It is also possible that the metate fragments in the campsite may have been utilized as grinding stones of some sort subsequent to initial breakage.

It must also be considered that a large amount of plant and/or meat processing could have taken place at the Dead Indian Creek site. Situated along Dead Indian Creek in the Sunlight Basin, the site is central to a considerable range of vegetative diversity conducive to pedestrian gathering activities. It is also probable that the entire grinding stone sample was not used solely for plant processing. Each stone is also a potential tool for meat processing as well. Controlled experimentation using grinding stones with both plant and meat substances may yield insights as to functional attributes of these tools. As far as the Dead Indian Creek sample is concerned, the specific function of the grinding stones remains to be determined.

Since site context is an important variable in establishing functionality of tools, future investigations at the site and in the Sunlight Basin will continued to be directed toward controlled documentation of horizontal and vertical proveniences of such artifacts in sites, as well as within limited activity areas in those sites. The more evidence we can obtain under these conditions, the better chance we will have in explaining Middle Archaic Period subsistence strategies.

BONE TOOLS AND ARTIFACTS

by
Charles Jefferson

In the butchering of animals at Dead Indian Creek (described below), a number of bone tools appear to have been used. In fact, most of the bone tools collected at the site were apparently for butchering. Generally, these tools were made with only a slight amount of modification of long bones previously broken, probably for marrow extraction. Many broken or worn-out tools were often found in cooking pits. The bones most often used for tools were ulnae, radii, and pieces of tibiae, metacarpals and metatarsals (Figures 16-17). Because of lesser structural strength, humerii and femora do not appear to have been used. Occasionally smoothed antler tips were found (Figure 18c-e). Two deer antler bases were used as some sort of hammer (Figure 18a-b), probably knapping hammers. The proximal shaft of a radius was cracked and used as a gouging tool (Figure 16c). Ulnae shafts were sharpened and used to a blunt edge with the olecranon serving as the handle. Many broken ulna shaft tips were also found (Figure 17).

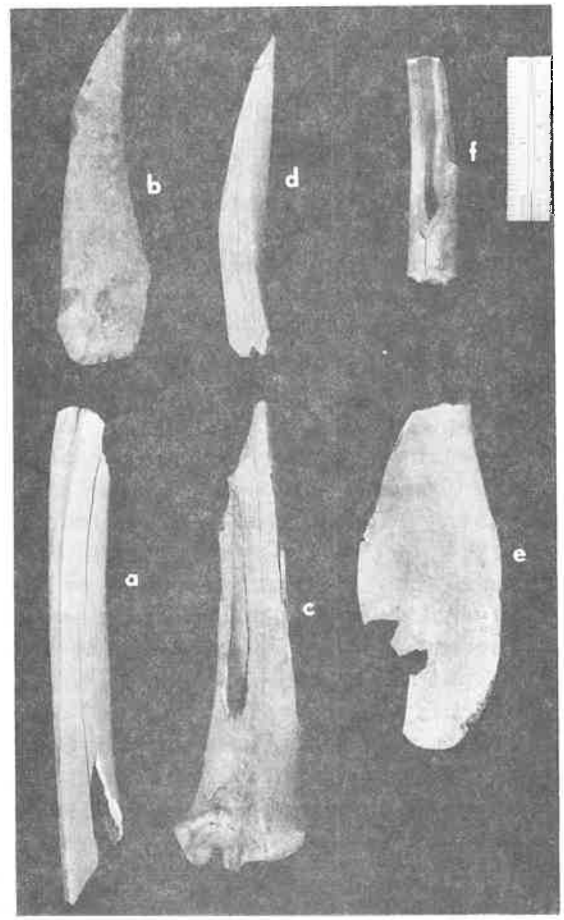

FIGURE 16: Rib tool (a); worked long bone (b); radius tool (c); possible long bone tool (d); scapula tool (e); and cut long bone (f) from the main site area at Dead Indian Creek.

One spoon-shaped tool made from an ungulate scapula was found. The sides of the scapulae were often split out to make awls (Figure 16e). Two tibia tools were found with sharpened breakage edges (Figure 16b, d). One large rib had a worked edge on the proximal end (Figure 16a), and a small rib had been worked into a fine needle (Figure 17a). Several awl tools were made from shafts of metacarpals and metatarsals (Figure 17b-m).

Ornamental bone artifacts consisted of bone beads (Figure

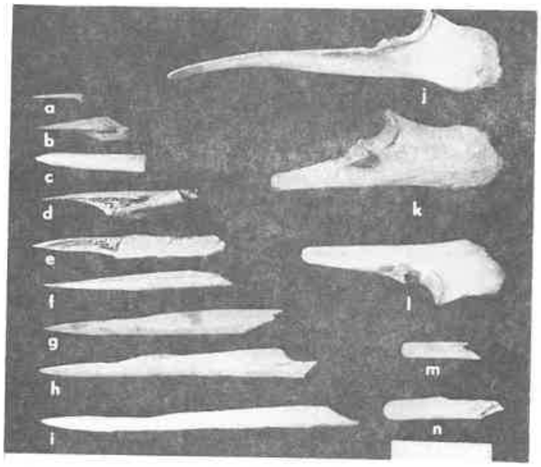

FIGURE 17: Bone awls (a-i) and ulna tools (j-n) from the main site area at Dead Indian Creek.

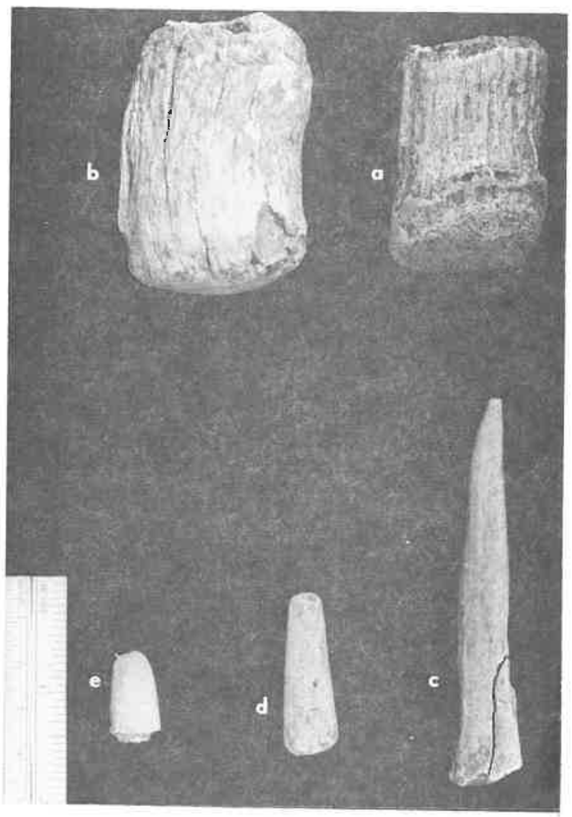

FIGURE 18: Deer antler tools from the main site area at Dead Indian Creek.

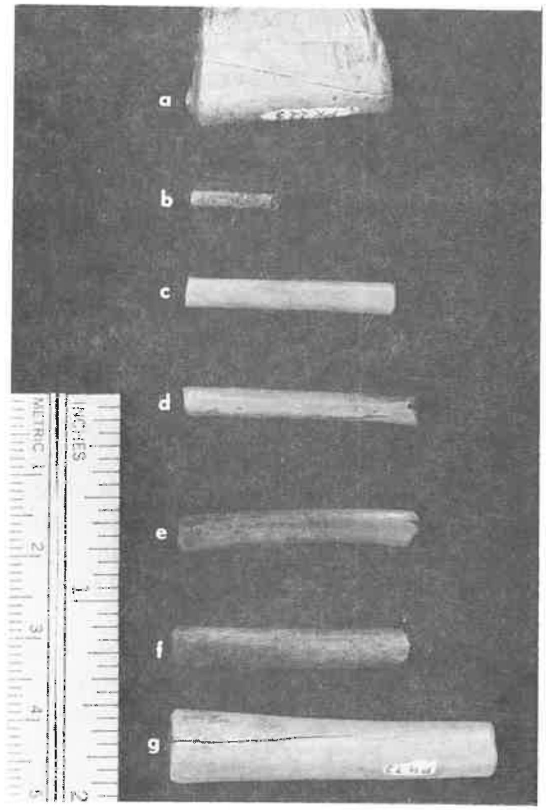

FIGURE 19: Cut bone tubes from the main site area at Dead Indian Creek.

19). Several pieces of grooved bone were found, probably preforms for bead manufacture. None of them appeared to be a finished product. One small rib had red paint on it (Figure 19b).

FIRE HEARTH AND PIT FEATURES

by
Ross Hillman

During the excavations at the Dead Indian Creek site, numerous fire pits and hearths were encountered. Careful study of such features will yield important data concerning the food preparation techniques and subsistence patterns of prehistoric peoples. Certain food resources available at different times of the year may require special cooking and processing techniques. Such special treatment would necessitate specific construction and arrangement of fire hearths and related features. The number of fire hearths and their contained debris may also give useful estimations of population sizes and the duration of site occupancy.

Table 7 presents a list of characteristics of 42 pits and fire hearths located throughout the site. The features are listed in order of descending depth. The sequence numbers assigned to the features in the table do not represent any real order and are included only to facilitate referrals to the table.

Fire hearths and pits are most easily classified by observable morphological characteristics. Mulloy (1954b:30) has described the following six classes or types of fire hearths:

1. Stoneless, basinless, surface hearths with little or no hearth preparation.

2. Stone containing, basinless, surface hearths. The stones being added to retain heat.

3. Basinless surface hearths with widely dispersed stones.

4. Stone containing hearths with semi-spherical prepared basins.

5. Stone containing hearths with truncated conically prepared basins.

6. Metate and mano crematories.

A high percentage of fire hearths at Dead Indian Creek can be easily grouped as Mulloy's type 4 (Figure 20). These hearths have a semi-spherical basin with an average surface diameter of 21 to 29 inches, and an average depth of 6 to 10 inches.

Several surface hearths containing stones were also encountered during the excavations (Mulloy's type 2). The limited number of hearths representative of this type at Dead Indian Creek precludes the formation of any accurate size parameters for this type (Figure 21). Even though there were numerous grinding stones in the site (see discussion above), no hearths suggestive of metate and mano crematories were found.

While the descriptions listed above can be applied to most hearths at the Dead Indian Creek site, some notable exceptions do exist. Distributed throughout the site are a great number of hearths with semi-spherical basins lacking stones (Figures 22 and 23). These do not differ significantly in size from the aforementioned hearths containing stones.

Another striking exception is hearth number 18. Although this fire hearth was only partially excavated, it appears to be basically rectangular in shape. It is very large, 5 ft x 3 1/2 ft, this being the dimension extending into the trench wall. It is seven

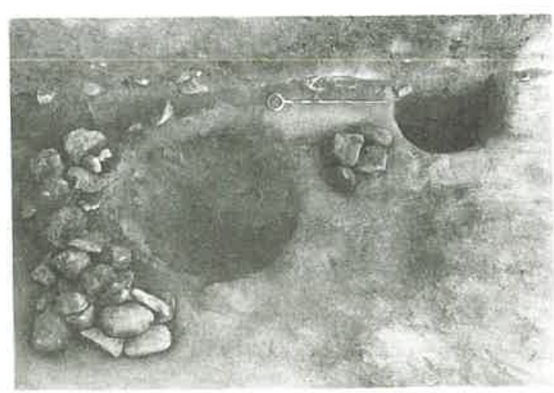

FIGURE 20: Stone filled fire pits in the main site area at Dead Indian Creek.

No.	Provenience	Surface Shape	Profile Shape	Diam.	Depth of Hearth	Depth from Surface	Stones	Faunal Remains	Charcoal	Other General Info.
1	Grid one					1-8"	Very few		Flecks	
2	Grid two					0-12"	Several			
3	Unit 1	Circular	Shallow Basin	29"	6"	3"	Stone Lined	Bone Fragments	None	
4	Unit 1	Circular		15"		3"				Smudged Basin
5	Unit X	Circular		18"		3-6"	Cracked Stones			
6	Unit X	Circular		18"		3-6"	Stones			
7	Unit 3	Circular		19"		3-6"		1 Thorax 2 Phalanges 2 Ribs 9 Long Frag.	Ash	
8	S044.5 E000	Circular		19"	6½"	7.5"				
9	S020-030 E000-005	Circular		29"		7.5"	Some Stones		Charcoal	
10	S030-040 E000-005	Elongated	Surface			8"	Stones			
11	Unit X	Circular		24"		9"	Cracked Stones			
12	S062.5-067.5 W000-010			21"	4"	10"	Stone Lined			
13	SW000-005 NW010-015		Surface		Surface	12"	Stones			
14	Unit 2	Circular	Round Basin	28"	9"	12"				
15	Grid 1-A Plot III					14"				
16	Pre Grid 2-A		Surface		Surface	15"		Bone Fragments	Charcoal	
17	S040-050 E000-005	Circular		27"		15"	Stones			
18	Unit 2	Rectangular		3.5' x 5'	7"	15"		Deer Antler		
19	S062.5-067.5 W000-010	Circular			7"	17"				
20	SW000-005 NW000-005	Circular	Surface	21"	Surface	17.5"	6 stones			
21	S031-040 E000.5	Circular	Round Basin	24"	12"	21"	Stone Lined			
22	S030-040 E000-005	Circular		30"	16"	21"	Many Stones			
23	S025-030 W000-003.8	Circular		18"		22.5"	Stones			
24	Grid 2-B	Circular	Round Basin			24"				Baked Clay
25	S030-030 E000.5	Circular	Round Basin	15"	9"	24"				
26	Plot IV Grid 2A	Circular	Round Basin	32"	8"	26"	Stone Lined			
27	SW010-020 NE	Circular		24"	24"	27"	Stones			
28	S067.5-077.5 E000-005	Circular		18"		27"	4 stones			

TABLE 7: Characteristics of fire hearth and pit features at Dead Indian Creek.

No.	Provenience	Surface Shape	Profile Shape	Diam.	Depth of Hearth	Depth from Surface	Stones	Faunal Remains	Charcoal	Other General Info.
29	E020-030 S062.5-067.5	Circular		20"		27"	Stones			
30	S025-030 W000-003.8	Circular		24"		30"				
31	SW010 NE	Circular		24"	6"	30"				
32	SW010 NE	Circular		21"	6"	30"				
33	S067.5-077.5 E000-005	Oval		18" x 24"		11"				
34	S067.5-077.5 E000-005	Circular		18"		33"	2 stones			
35	S067.5-077.5 E000-005	Circular		12"	9.5"	33"	6 stones			
36	S067.5-077.5 E000-005	Circular	Surface	9"	Surface	33"	5 stones			
37	S067.5-077.5 E000-005	Circular		21"	6"	33"	17 stones			
39	S30-35 W5-10	Circular		20"			10 stones			
				LATE OCCUPATION						
40	Site #2	Elongated					Stones		Burned Area	
41	Site #2	Circular		24"			Stones			
42	Site #1	Circular		29"			Stones			
43	Site #1	Circular	Conical	15"						
	Unit 4	Circular	Round Basin	36"	3"	21"				

TABLE 7: (continued)

inches deep and contained fragments of deer antler.

There is also one very unique stone-covered pit. This pit has a semi-spherical basin that appears to have been refilled and then covered with stones. This may have served as a storage pit or, more likely, a baking pit. The stones at the top of the pit may have been heated to lengthen the duration that cooking heat could be retained in such a feature.

The position of some of the hearths in a portion of the site is represented graphically in Figure 21. It is interesting to note the cluster of hearth numbers 8, 9, and 10 at a depth of seven to eight inches, substantially above adjacent hearths at a depth of 21 to 24 inches (Table 7). The cluster of hearths numbers 34 to 37 at a depth of 33 inches and their relationship to each other is highly suggestive of an activity area (Table 7). Future excavations in these areas of the site may clarify these possible relationships.

After future excavations expose greater areas of the site, the significance of the hearth and pit features should greatly increase. When larger numbers of features are exposed, their relationship to each other should become clearer and activity areas may be better defined. If the site locality had an important economic attraction for prehistoric people, this may also be determined.

FIGURE 21: Stone filled fire pits the Main site area at Dead Indian Creek.

ACROSS THE CREEK EXCAVATIONS

by
John Jameson

Site Area 4

Testing was done on the west side of Dead Indian Creek to determine if other evidence of human occupation was present. Directly opposite the main site excavation and on a terrace remnant about 4 feet above normal water level was a single occupation level about .3 m below present ground surface (Area 4, Figure 2). The thickness of the level (Figure 24) suggests an extended period of use or more than one period of use separated by short periods of time.

FIGURE 22: Stone filled and cobble lined fire pits (left and top) and an unlined fire pit (bottom right) at the Dead Indian Creek site main site area.

However, there is no strong basis for claiming more than a single component. Age of these levels is Late Prehistoric Period based on projectile points (Figure 25i, j). Faunal materials include scattered and broken elements of Bison bison, Ovis canadensis, and Odocoileus hemionus. Other fragments may be Cervus canadensis and Canid fragments may be dog. Land snails (Oreohelix spp.) were present but were probably not of cultural origin. The intent of smashing of long bone suggests intense use of animal products.

A fire pit surrounded by river cobbles was the only feature encountered in the test (Figure 26). This feature is highly reminiscent of those at the Big Goose Creek site (Frison, Wilson, and Walker 1978:13) and the Piney Creek site (Frison 1967) and, along with the side-notched and base notched projectile points, a date within the last 400 years is

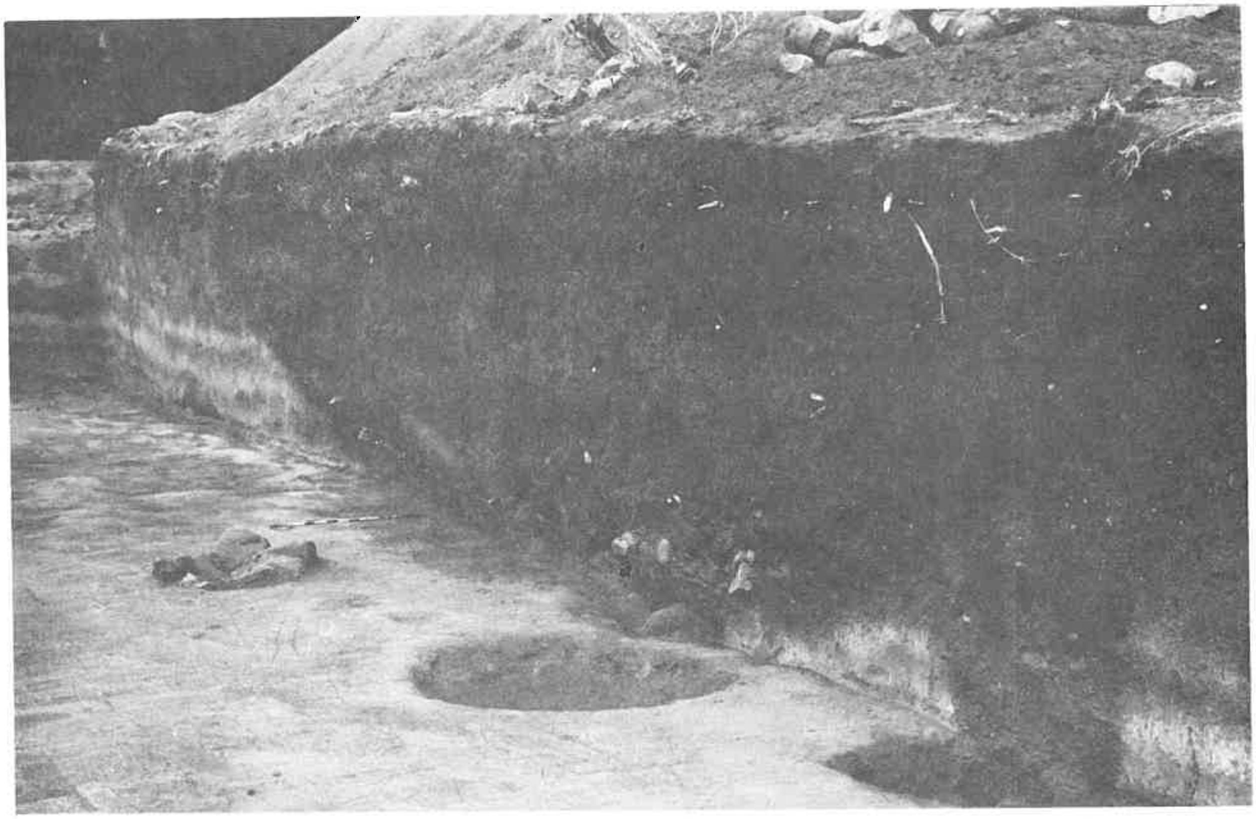

FIGURE 23: Fire pits at the Dead Indian Creek site. Note the one on the right excavated into the light colored deposits below. Note also the old channel cut and fill which contains the site materials in the main area.

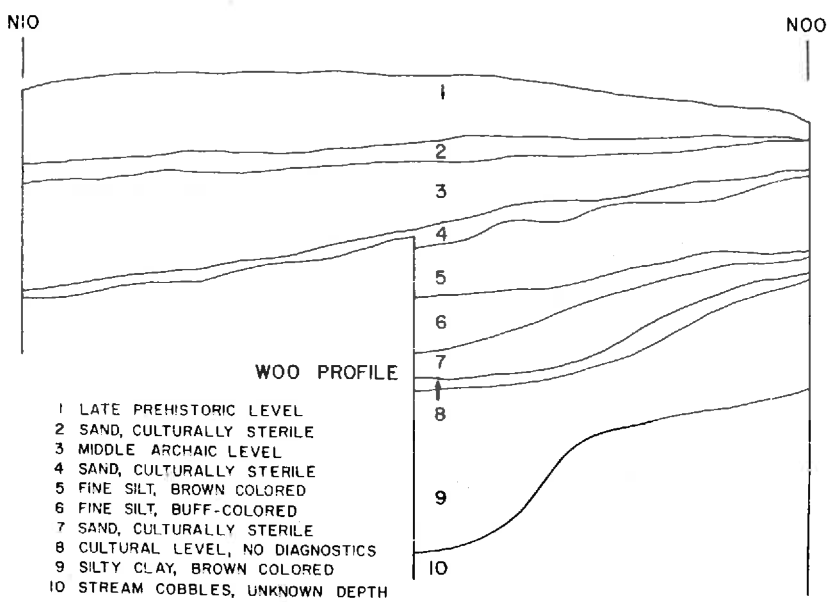

FIGURE 24: Profile of stratigraphic units at site area four, Dead Indian Creek.

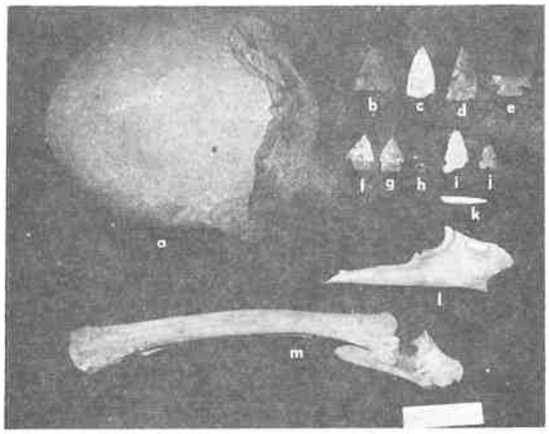

FIGURE 25: Chopper from site area four (a) and projectile points (b-j) broken bone awl (k); broken ulna (l) and radius-ulna unit (m) from site area 5.

FIGURE 26: Bone, anvil stones, and stone enclosed, shallow fire hearth from site area 4.

highly likely. A possible anvil stone and a hammerstone along with broken bones near the fire pit strongly suggest extraction of bone marrow by boiling as was also suggested for the Big Goose and Piney Creek sites.

The base of an elk antler attached to part of the skull also came from this level. The antler demonstrates the results of deep grooving (Figure 27) presumably to move strips for tool manufacture or other items made of elk antler.

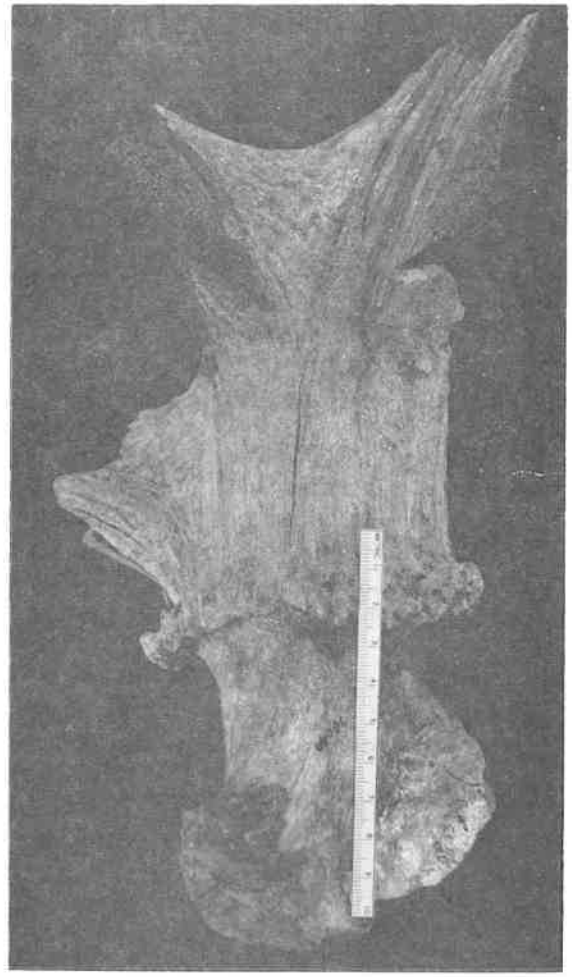

FIGURE 27: Grooved elk antler from site area four.

The distal end of an awl (Figure 25k) was made of unidentified long bone.

Site Area 5 ITE AREA 5

The excavations in Site Area 5 were of an exploratory nature. Three superimposed cultural strata were encountered that were separated by sterile levels. The first was at the surface and slightly below and is believed to be of Late Prehistoric age although no diagnostic artifacts were recovered.

At 30-308 cm below the

surface was a Late Plains Archaic level that produced 11 broken to complete projectile points of which p5 (Figure 25d-h) are diagnostic of the Late Plains Archaic Period.

Other stone artifacts include the following:

Drill tip: One specimen of chert has dulled working edges. Small flake-scars along the shaft suggest that the specimen is a reworked projectile point.

Knives: Three knives or knife fragments of chert were found. One has dulled working edges, while another is more crudely flaked and is possibly a modified projectile point base.

Gravers: Three specimens of chert were recovered; two appear to be made on slightly curved percussion flakes, however, a third, with a heat spall on one side, is possibly a modified projectile point.

Chopper: An igneous river pebble is 173 mm long, 143 mm wide, and 53 mm thick. It has worn edges and a possible flaked working edge (Figure 25a).

Scrapers: Six chert specimens include three side scrapers, two end scrapers, and one unidentified specimen which resembles a knife, but is beveled on one edge. One of the side scrapers has dulled working edges, and the other two appear unused. Both end scrapers have working edges rounded in outline form.

Bifaces: Four specimens are classified as bifaces and biface fragments. Three are of chert and one is of obsidian. One chert fragment is finely flaked and has dulled working edges. Another specimen has a rounded base and is possibly a projectile point preform or knife fragment.

Core: A small irregular nodule of chert is possibly a worked core.

Retouched Flakes: Two chert specimens are modified percussion flakes, and another of chert is use retouched.

Hammerstone: An igneous river pebble fragment may be a hammerstone fragment and has an area of one end demonstrating wear suggestive of hammerstone use.

Bone

Represented species include deer, sheep, bison, canid (possible dog), and possibly elk. Specimens of deer and sheep predominate. Chopped and crushed bone fragments suggest processing of animal products.

MULE DEER ANTLER FEATURE

by
George C. Frison

A feature of interest and one that provides alternative interpretations appeared in the McKean occupation of the Dead Indian Creek site. A basin shaped pit, approximately .8 m in diameter and .4 m deep, was excavated into a cobble bar near the present edge of Dead Indian Creek. Inside the pit was a mature mule deer skull cap and antlers (Figure 28). In the area adjacent to the pit were five other skull caps and antlers. Four of these were intact and one was broken, and the two parts were separated by about 1 m (Figure 29). Several large cobbles (up to 20 cm) were covering the skull cap

FIGURE 28: Deer antler in a pit at the main site area at Dead Indian Creek.

FIGURE 29: The pit and associated deer antler feature in the main site area at Dead Indian Creek.

in the excavated pit.

There was no evidence that any of the latter five skulls had been placed in a pit, but instead rested on a campsite level that contained diagnostic lanceolate, stemmed and notched varieties, of projectile points along with fire pits of the McKean cultural complex (Figure 30). Although the skull caps and antlers were badly deteriorated, they were recovered nearly intact. At least two of the specimens were relatively large and would easily be regarded as trophy specimens today. The bone had deteriorated to the extent that actual chopping marks

FIGURE 30: Deer antler feature in relation to the fire pits seen in Figure 22.

were not visible. There was also no evidence of carnivore chewing of the skull caps, nor was there evidence of rodent chewing of antlers.

The original interpretation (Frison 1978:271-272) was that this represented a ceremonial or ritual treatment of mule deer remains, which is still regarded as highly probable. An alternative is that it might have been some sort of cache. Meat or other products could have been placed in the pit and the deer antlers would have afforded ample protection for short term storage. The time of year of occupation, according to the analysis of the age of the deer dentitions, was during the winter so that temporary surpluses of meat could have been frozen or dried or both and saved for future use.

The antler feature was apparently covered with alluvium within a short time after their placement. Otherwise, they would have acquired a more advanced stage of deterioration. In addition, antlers exposed for even short periods of time are rapidly lost through rodent chewing. The alluvial materials covering the feature were relatively loose and unconsolidated and were derived from volcanic deposits.

DEAD INDIAN CREEK LOCAL FAUNA

BY

KAREN WEST SCOTT AND MICHAEL WILSON

INTRODUCTION

This section identifies the various animal taxa (17 mammals, three birds and three invertebrates) that are represented at the Dead Indian Creek site and are here named the Dead Indian Creek Local Fauna. This species by species discussion is followed in later sections by two in-depth analyses of ungulate remains from the site: butchering and processing of the mule deer and mountain sheep and a discussion of the population dynamics of the mule deer sample. None of the species from the local fauna are extinct and except for those species extirpated by the activities of the Euro-American settlers in the area, all are found in Sunlight Basin today.

Results of the faunal analysis presented here suggests the employment of several procurement systems by the Dead Indian Creek site inhabitants. Table 8 is a list of the fauna recovered from the site, including a minimum number of individuals count. A list of these species in relative abundance at the site is also presented below for comparison. The terms utilized here are unfortunately subjective, but will suffice for the present purpose of introducing the fauna.

1. Group I (abundant): Oreohelix strigosa, Thomomys talpoides, Erethizon dorsatum, Odocoileus sp., cf. O. heminous, Ovis canadensis. Erethizon dorsatum is less abundant than the other species, but occurs in several excavation units throughout the site and the remains do show signs of cultural utilization.

2. Group II (scarce but regular): Spermophilus armatus, Canis sp., Cervus elaphus, Bison bison ssp.

3. Group III (rare, usually a single occurrence): river mussel, Oreohelix sp., cf. O. amariradix, Dendragapus obscurus, Pica pica, Sylvilagus sp., Lepus americanus, Microtus sp., Marmota flaviventris, Ursus americanus, Antilocapra americana.

With the exception of the bison and pronghorn, all of the large ungulate forms are found in the area today. None of the species recovered from the site suggest any major climatic change has occurred since the occupation of the site.

However, all of the larger animal bones show signs of cultural utilization, as does the porcupine. In addition, there are a few rodent bone beads from the site. These are discussed in an earlier section. The mollusks do not appear to have been utilized. The abundance of Oreohelix at the

	M.N.I.
Phylum Mollusca	
Class Pelecypoda	
Family Unionidae, unident.	1
Class Gastropoda	
Family Camaenidae	
Oreohelix strigosa	82
Oreohelix sp., cf. *O. amariradix*	2
Phylum Chordata	
Class Aves	
Order Galliformes	
Family Tetraonidae	
Dendragapus obscurus	1
Order Passeriformes	
Family Corvidae	
Pica pica	1
Order Passeriformes, unident.	1
Class Mammalia	
Order Lagomorpha	
Family Leporidae	
Sylvilagus sp.	3
Lepus sp., cf. *L. americanus*	1
Order Rodentia	
Family Sciuridae	
Marmota flaviventris	2
Spermophilus armatus	10
Tamiasciurus hudsonicus	2
Family Geomyidae	
Thomomys talpoides	9
Family Cricetidae	
Neotoma cinerea	1
Microtus sp., cf. *M. montanus*/ *longicaudus*	2
Ondatra zibethicus	1
Family Erethizontidae	
Erethizon dorsatum	4
Order Carnivora	
Family Canidae	
Canis sp.	2
Family Ursidae	
Ursus americanus	1
Order Artiodactyla	
Family Cervidae	
Cervus elaphus	2
Odocoileus hemionus	50
Family Antilocapridae	
Antilocapra americana	3
Family Bovidae	
Bison bison ssp.	4
Ovis canadensis	16

TABLE 8: Faunal list from Dead Indian Creek site, with minimum number of individuals (MNI).

site is explained by the high calcium carbonate content of the soil. This form of terrestrial gastropod is very site-specific to limestone localities.

SYSTEMATIC DESCRIPTIONS

Phylum Mollusca
Class Pelecypoda
Family Unionidae
genus and species unident.--river mussel

Material: five broken pieces of shell.
Discussion: These specimens are probably referrable to the genus Lampsilis, the only member of the family to occur in Wyoming (LaRocque 1967) but identifying characters are missing. No readily apparent cultural utilization of the specimens could be seen, however, the broken edges of the shells were highly abraded and may have masked or destroyed any such cultural marks. These remains are probably a natural occurrence in the site, introduced by some unknown method from Dead Indian Creek.
Distribution and habitat: Two species of Lampsilis (L. ovata and L. radiata) occur in the upper Missouri River drainage (LaRocque 1967). Both species normally occur on gravel or sand bottoms of lakes and streams and only rarely in mud situations.

Class Gastropoda
Family Camaenidae
Oreohelix strigosa -- land snail

Material: 82 mostly complete shells, some damaged in the last whorl. A few are fragmentary. All specimens are leached and fragile except those from the very uppermost levels. A few specimens were damaged during excavation.
Discussion: There is no direct evidence of cultural utilization of the Oreohelix specimens from the Dead Indian Creek site, although the vertical distribution

of the sample within the site does not appear to be random. The concentration of shells between 15 and 21 inches below the surface (Table 9, Figure 31) could reflect selective gathering by the inhabitants of the site. Roscoe (1963) cites two records of snail-eating by historic Great Basin Indians, and suggests the snails were Oreohelix. Snails were then recorded from two Utah archeological sites, but their concentrations at these sites could have been from the fortuitous result of the fact that the genus favors limestone substratas and has a tendency to disperse by climbing cliff faces. In the course of this dispersal, many individuals die of exposure, so that their shells form "middens" at the bases of the limestone cliffs (Jones 1940:22). The case for cultural utilization of the Oreohelix at this site is moot.

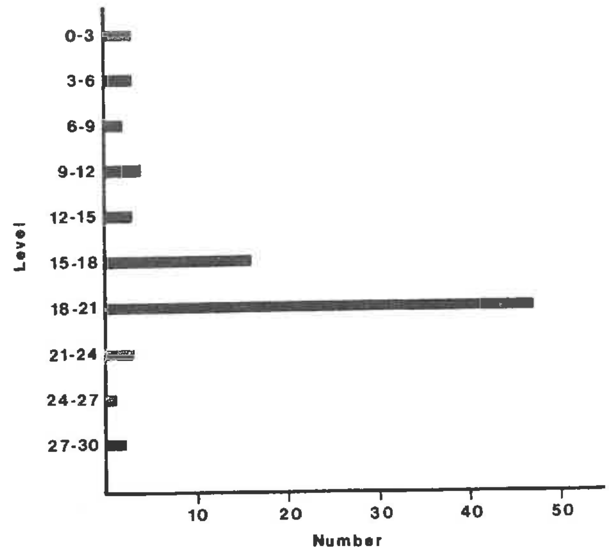

FIGURE 31: Distribution of Oreohelix by excavation level.

Unit	Level 0-3	3-6	6-9	9-12	12-15	15-18	18-21	21-24	24-27	27-30
1972 #1	--	2	--	--	--	--	--	--	--	--
1972 #2	--	--	--	1	--	5+1F*	30	3	--	--
1972 #3	--	--	1	--	1	1	--	--	--	--
1972 #4	--	--	--	1	--	3	14+2F	--	--	--
Subtotal	0	2	1	2	1	10	46	3	0	0
S030-040 W000-005	--	--	--	--	--	1F	--	--	--	--
S040.5-049.5 E000.5-004.5	--	--	--	--	--	--	1	--	--	--
S060-067.5 E000-010	--	--	1	1	--	--	--	--	--	--
S060-065 E000-005	--	--	--	1	--	3+1F	--	--	--	2
Subtotal	0	0	1	2	0	5	1	0	0	2
SW000-010 NW000-002.5	--	--	--	--	2	1	--	--	--	--
SW000-005 NW005-010	--	--	--	--	--	--	--	--	1	--
SW000-002 NW010-015	2+1F	--	--	--	--	--	--	--	--	--
NE005-010 SE000-010	--	1	--	--	--	--	--	--	--	--
Subtotal	3	1	0	0	2	1	0	0	1	0
Total	3	3	2	4	3	16	47	3	1	2

*Fragment

TABLE 9: Occurrence of Oreohelix strigosa by excavation unit and level.

Most of the Oreohelix specimens from the site belong to a medium-sized species with a smooth embryonic shell. These shells display rounded whorls, and are more carinate in youth than in maturity, as the carina or keel is generally lost in mature individuals. Most shells show two light brown spiral lines, one above the periphery and one below it. Heights range from 9.7 to 14.1 mm and diameters range from 14.0 to 19.1 mm in the adult specimens. The height/diameter ratio ranges from 0.62 to 0.79. Height is thus somewhat intermediate between O. strigosa depressa and O. subrudis, but is closer to the former. The fine spiral striae are virtually obsolete as in many O. s. depressa and some O. subrudis. Although it is sometime impossible to distinguish the two taxa by shells alone, the characters cited above would tend to indicate the bulk of the Oreohelix specimens should be referred tentatively to O. strigosa depressa.
Distribution and habitat: The range of this genus is restricted to the Great Basin and Rocky Mountains, with an occasional record from the western Great Plains (Pilsbry 1939:413). They are locally abundant today in the Absaroka Mountains on a suitable limestone substrate.

Oreohelix sp., cf. O. amariradix -- land snail

Material: two complete shells, both slightly leached in appearance.
Discussion: These two specimens do not resemble the O. strigosa depressa specimens discussed above in that they are strongly carinate and depressed. An adult shell has a height of 8.3 mm and a diameter of 17.1 mm, giving a height/diameter ratio of 0.49 -- well outside the observed range of O. s. depressa. Neither of these two carinate shells possess spiral coloration. Since the embryonic shell apparently lacked the spiral striae, the specimens cannot be referred to the Oreohelix yavapai group. A tentative comparison is therefore made with O. amariradix, a somewhat smaller species. O. amariradix is poorly known, and its type site is a considerable distance north of Dead Indian Creek in Montana (Pilsbry 1948). The Dead Indian Creek site specimens are tentatively referred to this species.
Distribution and habitat: See the discussion under O. strigosa.

Phylum Chordata
Class Aves
Other Galliformes
Family Tetraonidae
Dendragapus obscurus -- blue grouse

Material: UWA-68405, distal 2/3 of left femur.
Discussion: This specimen is very well preserved with only slight damage during recovery. It shows no evidence of butchering or other cultural utilization. All the breakage on the specimen is fresh. However, it must be remembered that the species is a potential food source. The size and morphological characteristics indicate a large tetraonid galliform, probably the designated species. It is also possible that the specimen could be referred to a large sharp-tailed grouse, Pedioecetes phasianellus, but most preserved identifying characters indicated a closer similarity to the blue grouse.
Distribution and habitat: The blue grouse is "common in deciduous woodlands in summer, in

mountain thickets of fir in winter" (Robbins *et al*. 1966:84). The species is common in Sunlight Basin today, and can be found throughout the western United States (Robbins *et al*. 1966:84).

Order Passeriformes
Family Corvidae
Pica pica -- black-billed magpie

Material: UWA-68406, left tibiotarsus; 68407, anterior portion of mandible.
Discussion: These specimens are both well preserved and are only slightly abraded. They were both recovered from the same excavation trench and the same level. The tibiotarsus was broken at midshaft during the excavation. No old breaks or marks were observed that could be referred to some type of cultural usage. The mandible is also freshly broken.

The agreement in size and morphological characteristics is very close to known specimens of *Pica pica*. The specimen is clearly corvid, but is too large for the Clark's nutcracker (*Nucifraga columbiana*), the only closely related species that approaches the specimen in size.
Distribution and habitat: This corvid is found throughout the mountainous regions of the western United States and is "common and conspicuous in open country near heavy brush or occasional trees . . ." (Robbins *et al*. 1966:210).

Order Passeriformes
Genus and species unident.

Material: UWA-68608, medial portion of a left humerus shaft; 68609, tibiotarsus shaft fragment.
Discussion: Both specimens are well preserved but broken during recovery. No old breaks or marks could be discerned that could be attributed to cultural usage or modification. The humerus is clearly passeriform, and is from a bird somewhat smaller than the magpie. The size agrees well with a flicker (*Colaptes cafer*) and the specimen could be from a woodpecker. Sufficient diagnostic characters were not present on either specimen in order to make a positive identification.

Class Mammalia
Order Lagomorpha
Family Leporidae
Sylvilagus sp. -- cottontail

Material: UWA-66121, fragment of right mandible; 66199, left ulna; 66110, 66201, 66301, right ulnae; 66164, astragalus; 66111, radius.
Discussion: The mandibular fragment shows an abrupt fracture vertically through the horizontal ramus halfway along the tooth row, with the ascending ramus being broken away. This could reflect either butchering or the work of a scavenging carnivore, although tooth marks are not present. All ulnae are broken distally. One also had the olecranon process chopped or chewed off. Cultural utilization is possible on these specimens. The element distribution is unusual in that so many ulnae are present. This is presently felt to result from sampling factors rather than any selective cultural filtering.

The material is inadequate for specific diagnosis and identification. Both *S. audubonii* and *S. nuttallii* occur in the general area (Long 1965:543-545) but *S. nuttallii* is more likely to be represented here given the intermontane setting and the relatively high altitude.
Distribution and habitat: Both

cottontail species are found throughout the state in suitable habitat and are usually locally allopatric based on ecological requirements (Hall and Kelson 1959:264).

Lepus sp., cf. L. americanus -- snowshoe hare

Material: UWA-66194, left ulna lacking olecranon.
Discussion: This specimen has been broken at midshaft and the olecranon process has been chewed or chopped off. It is possible that this breakage was due to cultural utilization. The size of the specimen agrees well with L. americanus. The individual was probably mature.
Distribution and habitat: This species of hare is characteristic of montane coniferous forests and requires dense ground cover (Hoffman and Pattie 1968:20). The species is found in the area of the site today as well as areas with similar habitat throughout Wyoming (Long 1965:546-549).

Order Rodentia

Family Sciuridae

Marmota flaviventris -- yellow-bellied marmot

Material: UWA-66178, left mandible; 66373, distal 3/4 of left humerus; 66193, distal 2/3 of immature right humerus; 66196, proximal 1/2 of left radius; 66169, immature right radius; 66188, right ischium; 66164, left astragalus.
Discussion: No cut or other butchering marks were observed on any of these specimens. The mandibular incisor in 66178 was spalled, perhaps through use as a tool, although breakage due to natural causes may be more probable.
Distribution and habitat: This is the only species of marmot found today in Wyoming and can generally be seen in the mountainous and higher elevation areas of the state (Long 1965:568-572). The animal is normally found in rocky talus slopes and crevices of cliffs (Howell 1915:8).

Spermophilus armatus -- Uinta ground squirrel

Material: UWA-66100, pelvis; 66109, maxilla and mandible; 66113, lumbar vertebra; 66120, skull, tibia, three skull fragments; 66123, right mandible; 66124, lumbar vertebra; 66126, left mandible; 66127, left mandible; 66128, left pelvis; 66130, lumbar vertebra; 66138, left femur; 66137, mandible; 66145, two lumbar vertebrae, axis, atlas, two humeri, mandible, femur, scapula, mandible; 66149, right ulna, right femur, left tibia, right pelvis, humerus, cervical vertebra, lumbar vertebra, sacrum; 66154, right scapula; 66156, lumbar vertebra; 66157, pelvis, right and left mandible; 66158, left pelvis, right femur; 66159, right femur, left mandible; 66160, left mandible; 66162, left mandible; 66163, right mandible; 66165, skull; 66166, skull; 66167, right mandible; 66172, left humerus; 66170, left pelvis; 66173, left mandible; 66177, right femur; 66180, thoracic vertebra, lumbar vertebra; 66181, maxilla, skull; 66184, left scapula, left pelvis, four lumbar vertebrae, thoracic vertebra, skull; 66189, cervical vertebra; 66198, left femur; 66200, right tibia; 66347, left mandible.
Discussion: Most of the maxillae and mandibles recovered from the site have teeth present and all remains are in good shape. None

exhibit any butchering marks or other signs of cultural utilization. It is believed that these ground squirrels were intrusive into the site deposits (Wood and Johnson 1978). It is possible though, that the inhabitants of the Dead Indian Creek site may have been utilizing the ground squirrels as a food source. Due to the fact that no large concentrations of rodent material was recovered in any one locality at the site (see Walker 1975a), the probability for cultural utilization is very low.
Distribution and habitat: The Uinta ground squirrel is found throughout the mountain ranges of western Wyoming and adjacent areas of other states (Hall 1982:386-387). For the most part, this species is allopatric to the closely related, and similar appearing, Richardson's ground squirrel (S. richardsonii). Only in a very small portion of their ranges are the two species sympatric (Howell 1938:78-81; Long 1965:575-577). The Uinta ground squirrel is found in various habitats in high mountain valleys and ranges up to timberline. It appears to prefer localities near water (Howell 1938:10-11).

Tamiasciurus hudsonicus -- red squirrel or chickaree

Material: UWA-66118, right mandible with I,P_4; 6158, left mandible with I,P_4,M_{2-3}.
Discussion: At first glance, these two mandibles appear to be from the same individual. However, they are from widely separated areas of the site and also show differential preservation and coloration. The amount of wear on the P_4's from the two mandibles is also not quite the same amount, therefore, the minimum number count of two individuals.
Distribution and habitat: The red squirrel is the native tree squirrel for most of the state of Wyoming. It is found throughout the state wherever coniferous forests occur (Long 1965:593-598).

Family Geomyidae
Thomomys talpoides -- northern pocket gopher

Material: UWA-66108, left mandible; 66114, right mandible; 66117, right mandible; 66118, right mandible and skull, 66122, left mandible and skull; 66125, left mandible; 66129, left pelvis, right mandible, left humerus; 66131, left mandible; 66133, incisor; 66135, right mandible; 66139, right mandible; 66141, right mandible and skull; 66142, skull, left humerus; 66143, skull; 66144, left mandible; 66146, left mandible, right mandible, sacrum; 66147, skull; 66150, skull, right mandible, right pelvis, lumbar vertebra; 66151, left mandible, skull; 66152, skull; 66153, left mandible; 66155, left femur, right humerus, left pelvis; 66161, tibia, left humerus; 66168, humerus, pelvis, tibia, left femur, right femur, incisor; 66203, skull; 66207, left mandible.
Discussion: Twelve subspecies of northern pocket gophers occur in Wyoming. These are burrowing animals, commonly intrusive into archeological deposits (Wood and Johnson 1978), and it is likely that such is the case here. The count of nine individuals is based on a count of right mandibles. These specimens range in appearance from relatively fresh and only lightly stained to being somewhat leached. There was no evidence for prehistoric cultural utilization seen on the specimens. The variable preservation of the

specimens marks this species as an intrusive member of the fauna, probably added over a long period of time. The species is well represented in the area today.
Distribution and habitat: The northern pocket gopher is found throughout the state today (Long 1965:600-611). The species occurs in a wide range of habitats, from desert valleys to meadows above timberline (Bailey 1915:23-25).

Family cricetidae
<u>Neotoma</u> <u>cinerea</u> -- bushy-tailed woodrat

Material: UWA-67035, mandible; 67201, mandible with M_1.
Discussion: The presence of only two woodrat specimens cannot be attributed to the fact they may represent a food source. It is more a probability that the specimens are intrusive into the site and are not related to the cultural occupation.
Distribution and habitat: This species of woodrat prefers montane areas of rocky outcrops and talus slopes (Hoffman and Pattie 1968:40) and is found throughout the state today (Long 1965:638).

<u>Microtus</u> sp., cf. <u>M.</u> <u>montanus/longicaudus</u> -- montane or longtailed vole

Material: UWA-66175, right mandible with M_{1-2}; 66202, skull (fragmentary); 66132, pelvis.
Discussion: These two species of vole are usually separated on the basis of pelage coloration and appearance, a method that cannot be used to identify archeological specimens. The tooth cusp patterns are identical between the two species and the mandibles are usually separable only on the basis of mean size differences between populations. Again, this is not possible here due to the small sample.

It is highly probably that these specimens are intrusive into the site deposits and are not related to the human occupation.
Distribution and habitat: These two species of voles are found throughout montane habitats in the state, although <u>M.</u> <u>longicaudus</u> may also be found in riparian habitat in lower, more arid areas as well (Long 1965:649-656).

<u>Ondatra</u> <u>zibethicus</u> -- muskrat

Material: UWA-67039, immature humerus.
Discussion: No signs of cultural modification or usage could be seen on this specimen. The presence of the creek close to the site could explain its presence.
Distribution and habitat: Two subspecies of muskrat occur in the state (Long 1965:661-663). The species is present wherever permanent or semi-permanent water can be found.

Family Erethizontidae
<u>Erethison</u> <u>dorsatum</u> -- porcupine

Material: UWA-66171, right DP^4; 66179, right M^{1-2}; 66168, right upper incisor, spalled distally; 66188, right mandible, missing some of the ascending ramus; 66188, left mandible with M_3 unerupted and in bud; 66136, lower incisor fragment, snapped at both ends; 66188, left immature humerus, distal epiphysis missing; 66134, right immature humerus, freshly broken; 66182, right adult humerus, lacking proximal end; 66074, left adult ulna, coronoid eminence chopped off; 66188, left radius proximal end, barely mature; 66190, right immature femur, all epiphyses are unfused but a big specimen; 66193, left humerus; 66196, radius; 66352, ulna; 66373, left humerus.

Discussion: Some of this material is clearly butchered. Right mandible 66188 was chopped obliquely behind the M_3, removing the gonial angle and condyle and leaving the coronoid process. On left mandible 66174, the coronoid process had been snapped away. Maxilla fragment 66179 was sharply truncated ahead of, behind, and above the roots of M^{1-2}. The incisor 66136 was spalled distally, suggesting a possible use as a tool. The proximal half of left humerus 66188 had clearly been chewed away, as tooth marks of a scavenging carnivore were present. However, ulna 66074 had its coronoid eminence abruptly chopped off, and tiny cut marks, apparently from skinning or defleshing were visible on several areas of the shaft. Femur 66190 showed similar fine cut marks on its antero-external aspect just below the proximal end of the diaphysis.

Considerable variation in size suggests that specimen 66188 was from an immature (or subadult) female, while specimen 66174 was from a subadult male. The minimum number count is based on the three right humeri and two left humeri. One of the left humeri is considerably smaller than any of the three right ones, indicating the presence of the fourth individual.

Distribution and habitat: The porcupine is common in the Sunlight Basin area today (Long 1965:669). While primarily adapted to coniferous forest habitats, it also is known to occur in grasslands, sagebrush areas and along streams and rivers where there are marginal stands of trees (Hoffman and Pattie 1968:36).

Order Carnivora

Family Canidae

<u>Canis</u> sp. -- dog or wolf/dog hybrid

Material: UWA-66197, ulna; 66206, maxilla with I^{1-3},C,P^{1-4},M^1; 66906, mandible; 66205, maxilla with P^{1-4}; 67987, tibia; 66211, axis; 67176, calcaneum; 66210, calcaneum; 66209, astragalus; 66192, phalange; 66112, phalange, tt191, phalange; 66208, phalange; 66140, incisor.

Discussion: Specimen 66206 (a maxilla) is large; exhibiting heavy wear on the molars, premolars and incisors. The canine is badly broken. Maxilla 66205 is smaller and exhibits considerably less wear on its teeth. This may represent a younger animal or perhaps a female, although it also appears mature. Both maxilla are broken in a similar manner, although no definite butchering signs are evident. The axis fragment does, however, exhibit cut marks. It is not known whether the animal was butchered for food, but the at Big Goose Creek site, large canids also showed similar butchering marks on numerous elements (Frison, Wilson and Walker 1978).

The minimum number count is based on the presence of the two right maxillae fragments. Specimen 66206 is the larger of the two, and could conceivably be referred to the grey wolf (<u>Canis lupus</u>). Both specimens, however, have been recently referred to a wolf/dog hybrid or domesticated dog population found throughout the Northwestern Plains (Walker and Frison 1982). Specimen 66206 represents the upper limit of the size spectrum for this hybrid form while 66205 is close to the lower size limit.

Walker (1975b, 1980) presents a comparative analysis of coyote

(*C. latrans*), wolf (*C. lupus*) and domestic dog (*C. familiaris*) from the Vore Bison Jump in northeastern Wyoming. While the Vore site study is based on Late Prehistoric Period canids, and the Dead Indian Creek site specimens date from the Middle Plains Archaic, it is probable that the Dead Indian Creek canids also represent either domesticated wolves or a wolf/dog hybrid. It is further interesting to note that specimen 66206 exhibits a badly broken canine. This trait was also seen among the Vore site canids and may have been a means of rendering the animal less harmful in domestication (Walker 1975b:222).

Family Ursidae
Ursus americanus -- black bear

Material: UWA-66218, maxilla with M^{1-2}; 66855, carpal; 68252, right immature pelvis; 66245, pisiform.
Discussion: The left maxilla fragment contains M^{1-2}, both of which are badly worn on the lingual side, indicating an older, more mature animal than that represented by the immature pelvis. There are no evident butchering marks present on any specimen. The pelvis fragment does appear to be rodent/carnivore chewed.
Distribution and habitat: Black bears were, and still are, fairly abundant in the mountainous areas of Wyoming (Long 1965:682-685), and were even more abundant prehistorically than today because of modern hunting pressures and habitat destruction.

Order Artiodactyla
Family Cervidae
Cervus elaphus -- wapiti or american elk

Material: UWA-66187, mandible; 66330, ascending ramus; 67914, pelvis; 66690, calcaneum; 67766, astragalus; 67500, astragalus; 66840, first phalange; 67572, first phalange; 67100, first phalange; 68187, astragalus; 66086, antler; 66087, long bone fragments; 67045, long bone fragments; 66219, antler fragment; 68402, premolar; 68403, premolar; 68404, premolar.
Discussion: The mandible (66187) contains P_2-M_3 and is estimated to be about seven years of age (Giles 1969). Since the mandible appears to be broken in the same manner as the mule deer mandibles discussed below, it is likely that the elk mandible was also intentionally broken for bone marrow extraction. Elk specimens that exhibit cut marks are 67914 (pelvis), 66690 (calcaneum), and 68132 (scapula). Several antler splinters appear to have been grooved for removal from the rest of the antler (66086, 66087, 67045). An antler fragment that is probably elk (66219) appears to have been modified for some unknown use or purpose. Present evidence from Wyoming prehistoric sites suggests that the elk was never a major food source until the Late Prehistoric Period (Frison 1978:273-275), although it has been utilized since at least Folsom times (Frison and Bradley 1981). The minimum number count is based on the presence of one complete and one fragmentary right astragalus.
Distribution and habitat: Many wapiti winter in Sunlight Basin today and are very abundant at higher elevations in the Absaroka Mountains throughout the year (Long 1965:711). This is a grazing species, which was historically also abundant in the foothills regions.

Odocoileus hemionus -- mule deer

Material: The vast majority of faunal remains from the Dead Indian Creek site is referrable to the mule deer. This material includes hundreds of complete or fragmentary bones from all parts of the body.
Discussion: Literally hundreds of bones representing at least 50 mule deer were recovered at the Dead Indian Creek site. Extensive utilization and processing of these animals was very evident on the remains. The butchering and processing sequence performed on the mule deer is found in a later section of this report. Similarly, an extensive population dynamics study of the mule deer remains can also be found below.
Distribution and habitat: The mule deer is found throughout the state of Wyoming, generally in forested areas, but is also found in meadows or the sagebrush-grassland savanna, and occasionally ranges into all life zones and habitats (Long 1965:712).

Family Antilocapridae
Antilocapra americana -- pronghorn

Material: UWA-66238, left maxilla with P^2-M^2; 67859, right mandible fragment with P_{3-4}; 68203, right ascending ramus; 67192, atlas; 66884, right scapula; 67959, left scapula; 67917, left ulna; 66719, right medial carpal; 66361, 67478, right first phalanges; 67840, left first phalange, 66703, right second phalange, 66470, 68146, right innominate; 67457, 68095, left innominate; 66325, right proximal metatarsal; 67788, left distal metatarsal; 66294, 67384, 67494, right astraguli; 66313, 67878, left astraguli; 68102, central and fourth tarsal; 68610, right maxilla with P^{2-4}, alveolus for M^1; 68611, right mandible fragment with P_3-M_1; 68612, right mandible fragment with M_3; 68613, right mandible fragment with P_2-M_1; 68614, right mandible fragment with P_3-M_1, alveolus for M_{2-3}.
Discussion: Only a very small amount of pronghorn remains were recovered from the Dead Indian Creek site faunal sample. It is highly probable that this low number of specimens and the related low number of minimum individuals is due to the fact that the site locale is not typical pronghorn habitat. While it is possible for pronghorn to be found in Sunlight Basin, it has not been seen there in the past fifteen or so years (Terry Killough, personal communication, 1982). It is probable that the remains recovered from the site represent parts of animals that were carried into the basin from the nearby Bighorn Basin to the east of the site by the occupants of the site.
Distribution and habitat: The pronghorn is found throughout the state in open valleys, prairies and arid lowlands (Long 1965:716). It is not found in Sunlight Basin today.

Family Bovidae
Bison bison ssp., c.f *B. b. bison* - American Bison

Material: UWA-66185, lateral malleolus; 66216, tibia; 66220, tibia; 66221, upper molar; 66222, right P^2, 66223, M_3; 66255, right humerus; 66385, lateral malleolus; 66436, third phalange; 66437, second phalange; 66438, rib; 66439, right humerus; 66440, left humerus; 66441, first phalange;

66631, distal metapodial; 66677, left tibia; 66912, tibia fragment; 66915, right rib; 66955, right tibia; 66957, fused second and third tarsal; 67108, rib; 67110, humerus fragment; 67198, 67199, 67200, 67204, long bone fragments; 67425, right humerus; 67278/67231, tibia; 67428, scapula fragment; 67455, long bone fragment; 67465, right humerus; 67772, tibia; 67909, two ribs; 67912, right scapula fragment; 67920, left tibia; 67921, humerus fragment; 68100, left mandible fragment; 68170, hock unit consisting of tibia, calcaneus, astragalus, metatarsal, lateral malleolus, second and third tarsal, fourth tarsal; 68171, radial carpal; 68180, radius; 68183, right rib, 68338, right tibia fragment.

Discussion: Almost all of the bison remains were recovered from the "Across the Creek" area at the Dead Indian Creek site. Most of the long bone fragments referred to bison display probable impact fractures (66220, 66216, 67465, 66255, 66440, 66439, 67921, 67765, 67425, 66631, 67482, 67199, 67198, 67200/67204, 67772, 67920, 66810, 66955, 67499, 67466, 67455, 67228/67231, 68180, 68338, 68170). Carnivore or rodent chewing and gnawing has also been observed on some of these specimens (66255, 66912, 67491, 67110, 68170) while other specimens demonstrate apparent cut or butchering marks (67425, 66461, 66437, 67482, 66438, 66912, 68338). The minimum number count is based on four left distal tibiae.

Distribution and habitat: Two subspecies of bison were found historically in Wyoming. Long (1965:717-720) places the Dead Indian Creek site on the boundary line between the two subspecies; _B. b. bison_ and _B. b. athabascae_. Based on this, it is probable that _B. b. athabascae_ is the subspecies found at the Dead Indian Creek site. However, it must be remembered that the taxonomy of recent bison subspecies has not been fully resolved (Wilson 1975; MacDonald 1981). In the absence of a complete skull from the site, the Bison specimens can only be tentatively referred to the subspecies _B. b. athabascae_. This subspecies was supposedly found in the mountainous areas of the Rocky Mountains while _B. b. bison_ was found on the open prairies.

Ovis canadensis -- mountain sheep

Material: While not as large as the mule deer sample in terms of numbers of specimens, the remains of bighorn sheep recovered from the Dead Indian Creek site also number in the hundreds and represent all portions of the body.

Discussion: A discussion of the bighorn sheep remains can be found below. Apparently, an extensive procurement system related to bighorn sheep was in use at or near Dead Indian Creek. Bighorn sheep was the second most common animal used as a food source at the site.

Distribution and habitat: The Absaroka Mountains today contain one of the most populus herds of bighorn sheep in Wyoming (Long 1965:722). They were formally much more abundant than today throughout the state, and even were known to occur throughout the basin areas, as well as the mountains where they are more commonly found.

MEDIUM-SIZED ARTIODACTYL BUTCHERING AND PROCESSING

BY

JOHN W. FISHER, JR.

INTRODUCTION

The following presents the results of an analysis of the mule deer (Odocoileus hemionus), mountain sheep (Ovis canadensis) and pronghorn antelope (Antilocapra americana) remains from the Dead Indian Creek site. These three big game species, of which the pronghorn constitutes only a miniscule portion, make up a large part of the total faunal assemblage from the site. Bone preservation was generally very good, the bones remaining durable with the outer surfaces being generally unweathered.

A major objective of this study was to ascertain how the carcasses of the animals were being utilized by the inhabitants of the site. Were all parts of the carcass used, or did the site inhabitants select only certain portions? How were the animals butchered and processed? Were the deer and mountain sheep carcasses treated identically or are differences apparent? In order to answer these objectives, each species was treated separately in the analysis. A minimum number of individuals was calculated for each species, along with an element frequency determination. Bone breakage patterns and the location and frequency of cut marks were recorded. The location of what appears to be carnivore or scavenger tooth marks and or chewing was also recorded in an attempt to assess the degree to which the bone assemblage might have been modified by such factors.

The reader should be aware of several constraints that might temper the findings of this analysis. First, was the bone assemblage used in the analysis representative of the total site? Much of the site (70-80 percent) was not excavated. Recent floodwaters have eroded sizeable areas of the site. The site boundaries are not known and could well extend onto adjacent terraces. Perhaps there also exists a spatial distribution of discrete activity areas of which we are not aware. Second, no micro-stratigraphy was discernible in the cultural deposits. That is, no subdivisions within the stratigraphy could be seen that might reflect separate Middle Plains Archaic occupations. The possibility exists that by treating the assemblage as a single occupation, we may be masking subtle differences in animal utilization. Third, the relatively large quantity of long bone shaft fragments and ribs have not been subjected to the same intensive analyses as the remainder of the bone assemblage. A large quantity of long bone shaft fragments, some that can be identified to element, but to which distinctions between deer, mountain sheep and pronghorn cannot be made, remains to be analyzed. Even though the species cannot be determined on these fragments, insights into meat removal (cut marks) and processing (breakage) might be gleaned from the bones. A preliminary analysis has indicated that a detailed analysis would only tend to support the conclusions made during analysis of the assemblage reported here. Finally, little information was available describing articulations of skeletal units. Four left hock joint articulations (two deer and two mountain sheep) and two cervical vertebrae units were glued together during excavation. There is apparently no record of other articulations.

MULE DEER (*Odocoileus hemionus*)

Analysis of the mule deer mandibles established that 50 animals, or perhaps slightly fewer, are represented in the assemblage. This happens to be the largest number of any single element. Table 10 presents the frequency of skeletal elements in relation to the minimum of 50 individuals, and Figure 32 displays this information on a schematic skeleton drawing.

A discussion of the element frequency is presented later, but a few introductory comments are appropriate here. The skull and associated elements (especially the mandible) had a very high representation at the site. Thoracic, lumbar, sacral and caudal vertebrae are very rare. Cervicals, in particular the atlas and axis, occur somewhat more frequently. Most limb elements are fairly poorly represented. Notable exceptions include the distal ends of the humerus and tibia, and the astragalus.

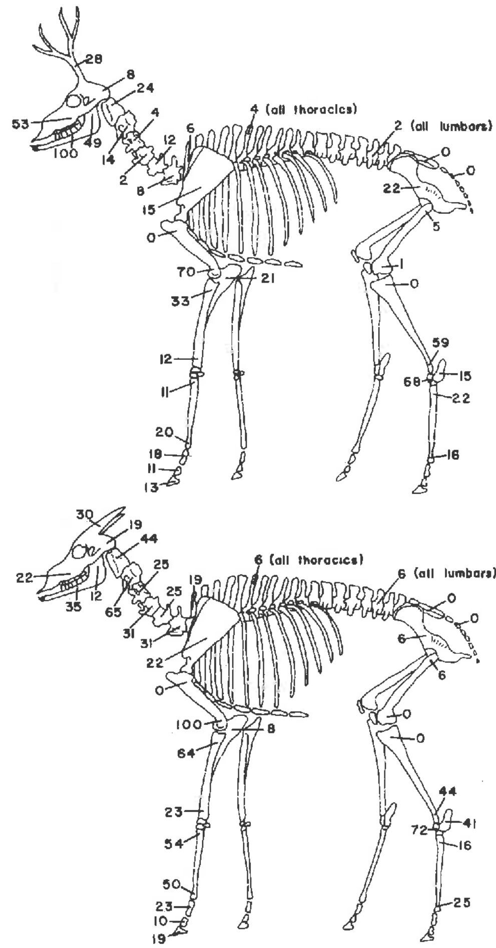

FIGURE 32: Schematic drawing of mule deer and mountian sheep skeleton showing minimum number of elements represented in sample.

Cranium: Three types of cranial units were found in the assemblage. Most numerous are the maxillae, consisting of the teeth and adjoining maxillary bone (Figure 33c, d). Many of these units consist of less than the total complement of teeth, but whether this resulted from post-depositional breakage and subsequent loss could not always be determined. About 27 individuals are represented by left maxillae, and about 26 by right maxillae. Cut marks occur on about 85 percent of the left and

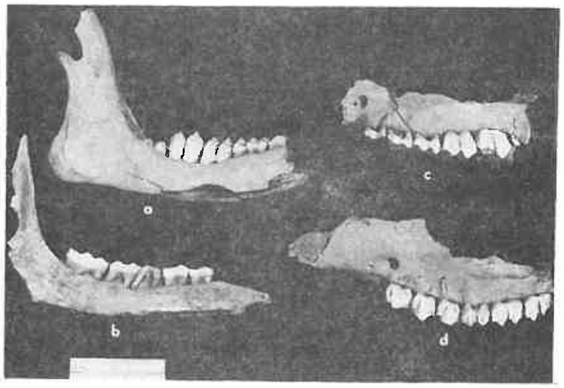

FIGURE 33: Butchered mule deer mandibles and maxillae.

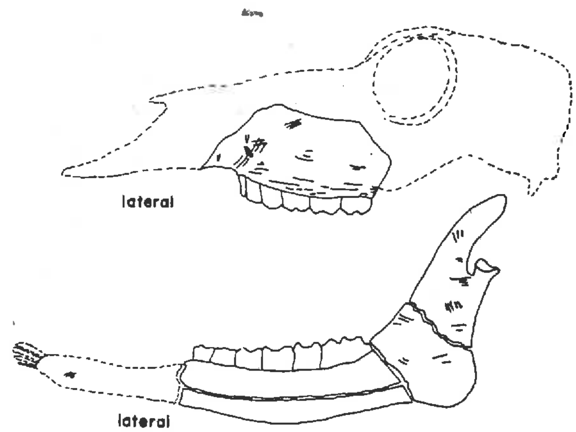

FIGURE 34: Schematic representation of cut mark location on mule deer mandibles and maxillae.

69 percent of the right maxillae and are usually oriented roughly parallel to the tooth row. Some are nearly vertical, especially at or near the infraorbital (facial) foramen located near the front of the maxilla (Figure 34).

Six skull caps with both antlers (Figure 35) and eight with a single antler were found at the site. Three of the complete skullcaps and one skullcap with a single antler exhibited cut marks on the antler base.

Four occipital condyles are present in the assemblage. The larger of these consists of the occipital bone and parts of the adjacent parietal and temporal bones, essentially the skull posterior to the antlers.

Two large pieces of frontal bone were present. One of these included the base of an antler, which was encircled by cut marks. The other piece contains part of an eye orbit. Cut marks were evident on the posterior margin of the orbit, as well as further behind the orbit.

Mandible: About 50 individuals are represented by either complete or partial mandibles. These show a very patterned breakage into two units. One consists of the horizontal ramus, running the length of the cheek tooth row

FIGURE 35: Butchered mule deer cranium and antlers; from feature described above.

(Figure 33a, b). The diastema and incisors occur only rarely (Figure 34). However, a single left mandible was represented only by the diastema and incisor teeth.

About 17 percent of the fragments of left mandibles and 14 percent of the right mandible fragments had cut marks. These marks occurred on either or both the lateral and medial sides of the mandibles and most often were located below M_3, although some also occurred more anteriorly (Figure 34). The ventral border of virtually all mandibles had

Bone	Number	Percentage of MNI
Cranium, occiput	4	8
antler, right / left	14	28
maxilla, right	26	52
left	27	54
Mandible, ascending ramus, right	23	46
left	26	52
horizontal ramus, right / left	50	100
gonial angle, right	5	10
left	3	6
Vertebrae, atlas	12	24
axis	7	14
third cervical	2	4
fourth cervical	1	2
fifth cervical	6	12
sixth cervical	4	8
seventh cervical	3	6
thoracic (all)	4	2
lumbar (all)	2	2
scapula, complete, right	3	6
left	5	10
glenoid cavity, right	4	8
left	3	6
blade, right	2	4
Humerus, distal, right	31	62
left	39	78
Radius, proximal, right	14	28
left	19	38
distal, right	6	12
left	6	12
Ulna, proximal, right	12	24
left	9	18
Metacarpal, proximal, right	7	14
left	4	8
distal, right	9	18
left	11	22
First phalanx, right	35	18
left	33	18
Second phalanx, right	28	14
left	27	14
Third phalanx, right	25	14
left	22	12
Innominate, right	11	22
left	10	20
Femur, proximal, right	1	2
left	4	8
distal, left	1	2
Tibia, distal, right	23	46
left	36	72
Astragalus, right	35	70
left	33	66
Calcaneus, right	10	20
left	14	28
Naviculo-cuboid, right	9	18
left	15	30
Metatarsal, proximal, right	7	14
left	15	30
distal, right	4	8
left	12	24

TABLE 10: Frequency of elements and percentages relative to MNI in mule deer.

been removed and cut marks occurred in several places on these ventral borders.

The mandibles also had been broken behind the cheek teeth, resulting in the second mandibular unit--the ascending ramus. Some 26 individuals are represented by left ascending rami and 23 by right. Fifty percent of the left and 91 percent of the right ascending rami show cut marks. Ten left rami have cuts only on the lateral sides. Three show cuts on both the lateral and medial sides, and one left ascending ramus has cuts only on the medial surface. Eleven right ascending rami display cuts on the lateral side only, seven on both the lateral and medial sides, and two only on the medial side. Two left and two right rami show possible carnivore tooth marks.

Vertebrae: Eight of the 12 atlas vertebrae are complete while the others were split into left and right halves. Ten of these 12 display cut marks: five on the ventral surface only, two on only the dorsal surface and the others on both surfaces (Figure 36i). Most cuts on the ventral side occur near the articulation with the occipital condyles. Cuts on

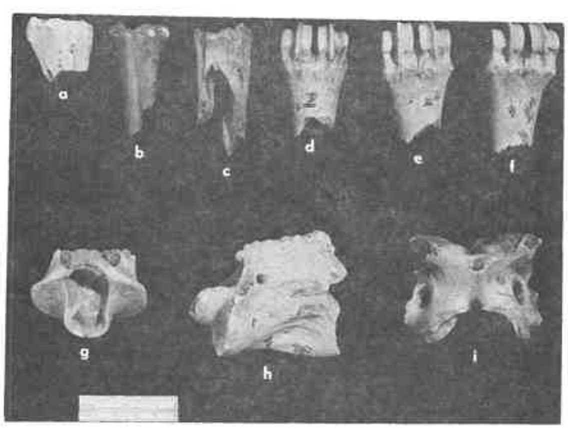

FIGURE 36: Butchered artiodactyl metapodials and cervical vertebrae, with cut mark locations shown.

the dorsal surface are somewhat more random in placement. Seven of the atlases seem to have been chewed by carnivores to some extent, usually on the edges of the bone, giving them a ragged appearance.

One of the seven axis vertebrae is complete. Another might have been, but recent damage prevents a secure assessment. The posterior halves of four have been broken away, leaving only the front half and the dens. Two axis vertebrae have cut marks (Figure 36g, h). These are oriented dorsoventrally on the dorsal spine of one and are on the ventral and lateral surfaces of the other. In addition, two show signs of possibly having been chewed by a scavenger (Figure 36h).

Both third cervical vertebrae are intact, and both display cut marks. The cuts occur on the lateral surface of one and on the top, bottom, and sides of the other. Most cut marks orient antero-posteriorly. The one fourth cervical vertebra lacks the dorsal spine, but otherwise is intact. Five of the fifth cervical vertebrae are relatively intact. The body has been chopped away from the sixth. Three of these vertebrae have cut marks: on one, they are present on the left side of the body and on the ventral surface, another has cuts on the anterior zygapophyses, and the third has cut marks on the left side. Two fifth cervical vertebrae appear to have been chewed by a carnivore. The ventral projections from the body of all four sixth cervical vertebrae are missing, perhaps chewed off. All but one also lack the dorsal spine. Three display cut marks: one has cuts on the right side, another on the ventral and lateral surfaces and on the dorsal spine, and the third has cuts on the left side of the vertebral body. All three seventh cervical vertebrae are essentially intact. None show evidence of chewing, but all have cut marks on the dorsal spine (Figure 37a, b).

Seventeen of the 24 thoracic vertebrae exhibit cut marks. They are found for the most part on the dorsal spines (Figure 38g) and, less frequently, on the body of the vertebrae. Eleven of the thoracics are intact, part of the dorsal spine has been broken off of five others, all of the dorsal spine was missing from two and only the dorsal spine remained of four.

Two of the lumbar vertebrae are complete. The left transverse process was broken off of one, both left and right broken from another, and the body was broken from the fifth. Cut marks are evident on two lumbar vertebrae: on the dorsal spine and dorsal surface of the body of one, and on the right side of the body of the other. The transverse and dorsal processes probably had been chewed off of one lumbar vertebrae, and the transverse process of two others display what looks like rodent gnawing. This gnawing is recent in appearance in one instance and older looking on the other.

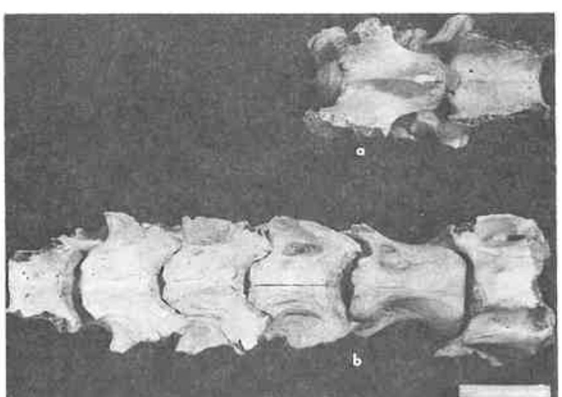

FIGURE 37: Butchered artiodactyl cervical vertebrae units.

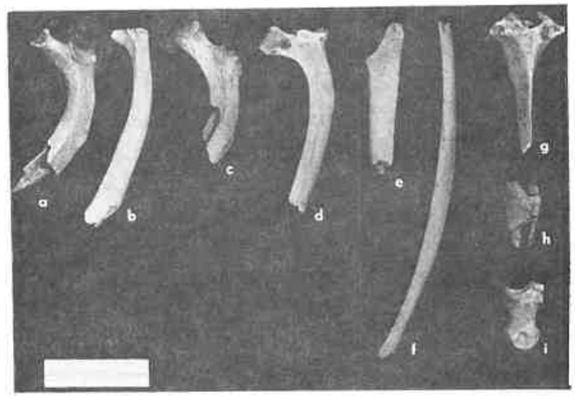

FIGURE 38: Butchered artiodactyl ribs (a-f); thoracic vertebrae (g); and phalanges (h-i).

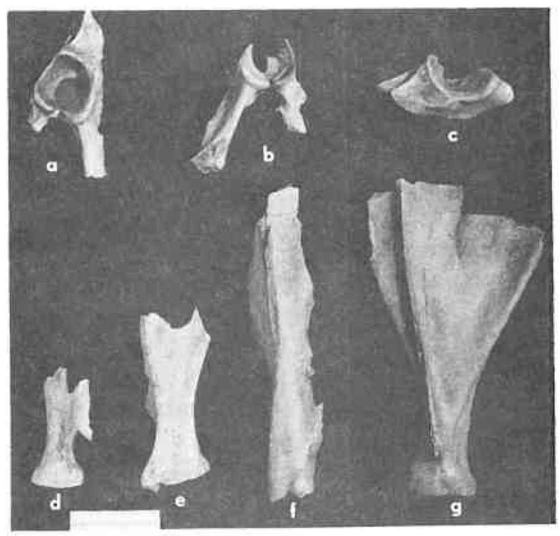

FIGURE 39: Butchered artiodactyl innominates and scapulae.

Scapula: Three right and five left scapulae are essentially intact (39g). The blades of four right scapulae have been broken away at the neck, leaving only the glenoid extremity (Figure 39d, e). The same is true of three left scapulae. Two other right scapulae lack the glenoid extremity (Figure 39f). Five left scapulae and all right scapulae show cut marks. These cuts occur on the glenoid extremity, the neck, and the blade of the scapula (Figure 40). Possible tooth or

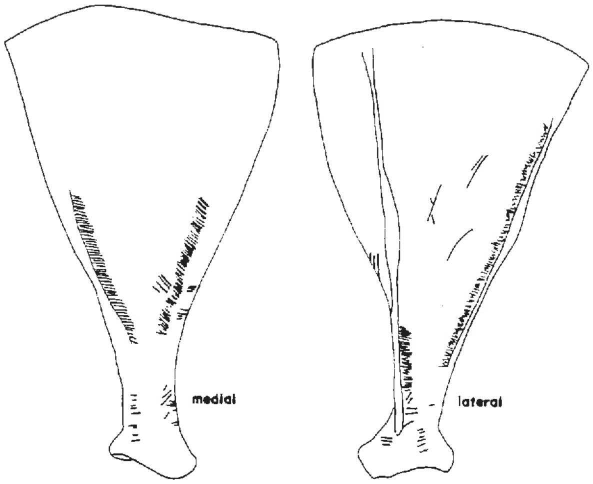

FIGURE 40: Schematic representation of mule deer scapulae, showing cut mark locations.

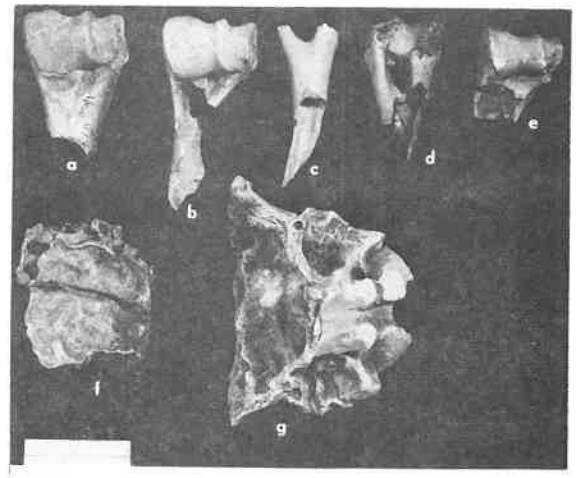

FIGURE 41: Butchered artiodactyl distal humeri (a-e) and crania fragments (f-g).

chewing marks are evident on two left and three right scapulae.

The frequency of deer scapulae (and probably mountain sheep as well) listed on Table 10 is artificially low because about twenty left and twenty-four right scapulae could not be distinguished to species, as they lack diagnostic parts. These scapulae are omitted from the tables and from all calculations.

Humerus: Only distal ends of humeri were present in the sample (Figure 41a-e); 39 from the left side and 31 from the right. The longest of these measures about 13.5 cm (total length, including epiphysis and shaft). The majority are much shorter since shafts were broken from two to four cm above the medial epicondyle (Figure 42). Twenty-nine (74 percent) of the left humeri show cut marks. Cuts occurred on the lateral surface of 22, on the anterior surface of 21, on the medial surface of 13, and on the posterior surface of 10. What seem to be tooth marks are present on two left and four right humeri. Cut marks are displayed on 26 (84

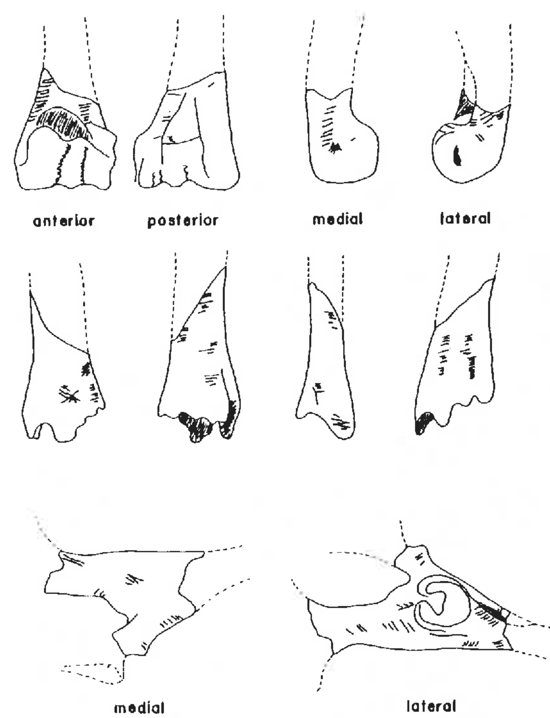

FIGURE 42: Schematic representation of cut marks on mule deer elements: distal humeri (upper row); distal tibiae (middle row); innominates (bottom row).

percent) of the right humeri: on the anterior surface of 19, on the lateral surface of 15, the medial surface of 11, and the posterior surface of 3.

An interior impact cone was found on three right humeri. On all, the shaft had been struck on the medial surface at a distance of 1.5 to 2.5 cm above the top of the medial epicondyle. One left humerus shows interior impact cone on the anterior surface about 1.5 cm above the top of the articular surface. Only one humerus had been split lengthwise while the bone was green.

Radius: The proximal and distal ends of radii are both present in the sample (Figure 43b, d). There are 19 left and 14 right proximal ends of radii. These range in length from about 4 cm to 9 cm. Ten left proximal ends had been split lengthwise, as had eight right ends. The remainder had not been split. Cut marks occur on 11 left and 12 right proximal ends, and two rights also show possible tooth marks. One proximal end has an impact cone located on the posterior side of the shaft 4.5 cm below the proximal extremity of the bone.

There are six distal ends of radii in the sample. The total length of these units ranges from about 5 to 8 cm. One from each side has cut marks. Two lefts and a right show signs of chewing. Several radii shaft fragments were also recovered (Figure 43h).

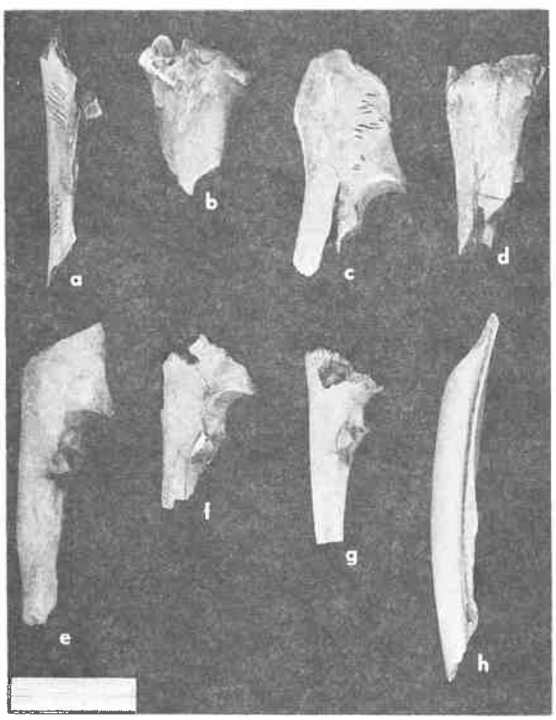

FIGURE 43: Butchered artiodactyl ulnae (a,c,e-g) and radiae (b,d,h).

Ulna: There are 9 left and 12 right ulnae. Several had been used as tools and are described above. Some ulnae consist only of the olecranon, others of the semilunar notch and the olecranon, others of the semilunar notch and the articular process immediately below (Figure 43e-g), and some consist of the articular processes and a portion of the shaft (Figure 43a). The ulnae range in length from about 4.5 to 16 cm in length but most are shorter than 10 cm. Cuts occur on four left and five right ulnae. Almost all cuts are found on the shaft at the level of or below the semilunar notch. Only one has cuts on the edges of the semilunar notch. One left and five right ulnae show evidence of carnivore chewing. Usually the top of the olecranon had been chewed off.

Carpals: Carpals are very rare in the sample, perhaps due to their small size and recovery problems. No cuts or other butchering marks could be seen on any carpals that were recovered from the site.

Metacarpal: Metacarpals occur in two pieces, the proximal (Figure 36a, b) and distal (Figure 36d-f) ends. No complete metacarpals were found. The proximal ends range in length from about 3.5 to 7 cm. All but two from each side had also been split lengthwise. Cut marks occur on two lefts and one right, and possible tooth marks are present on one from the left side. Most distal ends range in length from about 4.5 to 10 cm. One had been split lengthwise and measures 13.5 cm in length. Five pieces consisting of a single distal condyle are present. Cut marks are evident on four left and five right distal pieces as well as on three that could not be sided. Three distal pieces from each side display possible tooth marks.

Phlanages: Phalanges were identified in this study only to the left or right side within a foot, and not to either fore or hind limb nor to left or right limb. About six percent of the first phalanges are intact, as are about 14 percent of the right first phalanges. The remainder had been broken into proximal (Figure 38h) and distal pieces. Most second phalanges also had been broken, with only 18 percent of the lefts being complete and 30 percent of the rights intact (Figure 38i). Only one of the 22 left third phalanges had been broken, and all 25 right third phalanges are complete.

Cut marks are relatively abundant on the phalanges. Both of the complete left first phalanges have cut marks, as do 54 percent of the proximal ends and 74 percent of the distal ends. Cuts occur on 33 percent of the proximal end pieces of the right first phalanges and on 53 percent of the distal end pieces. Forty-three percent of the proximal end pieces of the left second phalanges have cuts as do 67 percent of the distal end pieces. Eighty-six percent of the complete right second phalanges have cut marks, as do 56 percent of the proximal ends and 67 percent of the distal ends. Cut marks are present on 27 percent of the left third phalanges and 24 percent of the rights.

Six phalanges (both first and seconds) have a smoothed, slightly eroded exterior surface, occasionally accompanied by slight pitting. Possibly this resulted from a scavenger chewing, swallowing and passing the bone through its digestive tract.

Innominate: There are 10 left and 11 right innominates in the sample. All but one consist of the acetabulum and adjacent bone (Figure 39a, c). This could be due to the fact most of the characters used to speciate innominates occur near the acetabulum. No innominates were complete, with the largest piece measuring 15 cm in length. About 10 innominates had been broken through the acetabulum with the acetabulum remaining intact on the others. Cut marks, often fairly numerous, are present on six (60 percent) and nine (82 percent) of the left and right innominates, respectively. Evidence of carnivore chewing was found on two left and four right innominates (Figure 42).

Femur: Femoral parts, consisting of both proximal and distal ends, are rare in the sample. Four left and one right proximal end, consisting of the head and a small amount of adjacent bone, are present. A single greater trochanter is also present. Cut marks are evident on two of the left and one right proximal end. One left end shows what are probably tooth punctures.

A single lateral half of an unfused distal epiphysis is the only piece of the distal end of the femur identified in the sample.

Tibia: One proximal end of a tibia is present in the sample, but is not identifiable to species. The remainder of the sample of deer tibia consists of distal ends (Figure 44a-c) and shaft fragments (Figure 44d, e). There are 36 left and 23 right distal ends. One left piece measures 18.5 cm in length, but most are shorter, usually less than 10 cm long. Five distal ends of left tibiae display impact cones, three of these are on the lateral surface of the shaft 3.5 and 10 cm above the distal extremity. The other two occur on the posterior surface of the shaft at 3.5 and 4 cm above the distal end. Four left tibiae had been split lengthwise, as were five rights. The rest of the tibiae were not split. Cut marks occur on 53 percent of the left tibiae and 39 percent of the rights. They are found mainly on the anterior, posterior and medial surfaces and less commonly on the lateral surfaces. The cuts on the medial surface very often occur horizontally on the medial malleolus (Figure 42). One distal end of a left tibia shows evidence of carnivore chewing.

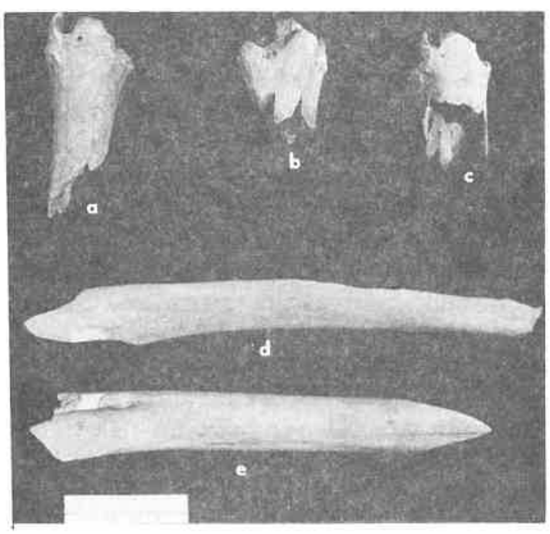

FIGURE 44: Butchered artiodactyl distal tibae (a-c); tibia shaft (d); and humerus shaft (e).

Tarsals: Astragali are relatively common in the sample (Figure 45b, c), there are 33 lefts and 35 rights. Four lefts and two rights display cut marks, which occur most frequently on the medial surface. Calcanei are much rarer but show a higher frequency of cut marks, which occur most frequently on the medial surface. Calcanei are much rarer but show a higher frequency of cut marks, and quite a few show signs of being chewed (Figure 45d-f). Six lefts and two rights display cut marks, and seven lefts and six rights probably had been chewed; several lack the tuber calci, and on others, deep puncture marks are evident. Four of 15 left naviculo-cuboids show cut marks as do three of the nine rights. A tarsal unit consisting of the distal end of the tibia, astragalus, calcaneus, and naviculo-cuboid exhibits the usual breakage of this type of butchering unit (Figure 45a).

Metatarsal: The metatarsals also were broken for the most part into the proximal (Figure 36c) and distal (Figure 36d-f) ends. The length of the proximal end pieces ranges from about 2.5 to 20 cm in length, but most are less than 9.0 cm long. All seven from the left

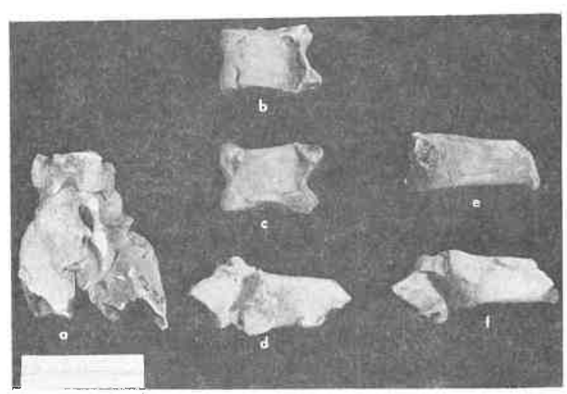

FIGURE 45: Butchered artiodactyl tarsal unit (a); astraguli (b,c) and calcanei (d-f).

side show impact cones, one has two on the lateral surface of the shaft 8.0 and 12.5 cm from the proximal end. Another has one cone on the lateral surface of the shaft 2.5 cm from the proximal end. A third has two on the anterior surface of the shaft 4.5 and 7.5 cm from the proximal end. The fourth has opposing cones on the medial and lateral surfaces 2.0 cm from the proximal end. The fifth has three impact cones on the lateral surface located 2.5, 4.0 and 5.0 cm from the proximal end. Cut marks occur on 11 (73 percent) of the left proximal ends and on 6 (86 percent) of the rights. They are most commonly found on the anterior surface of the bone.

The distal ends of the metatarsals range in length from 2.5 to 8.0 cm. Three single condyles that had been split could not be identified to side. One left metatarsal has two impact cones on the lateral surface, located 6.0 to 7.0 cm from the distal end. Cut marks occur on seven of the 12 distal lefts and on three of the four rights. One of the unsided pieces also has cut marks. The cut marks almost always occur on both the anterior and posterior surfaces. One left distal metatarsal end displays possible tooth marks.

MOUNTAIN SHEEP (Ovis canadensis)

The following describes the butchering and processing evidence seen on the mountain sheep bones. A minimum of 16 mountain sheep are represented in the sample with the distal end of the left humerus giving highest count of individuals. Table 11 presents the frequency of skeletal parts, and Figure 32 displays this information schematically. Basically, the same pattern exists in frequency of skeletal parts as was seen for the mule deer. The most notable exceptions are the skull and mandible, which are substantially rarer in the mountain sheep remains.

Cranium: The crania fall into three basic units: horn cores, occipital areas and maxillae. Some 11 partial and complete horn cores are present, and all but three are from females. Cut marks occur on three of the nine horn cores which are sufficiently complete such that at least part of the base of the core and adjacent bone are present. Eight maxillae are present, only four are relatively complete (all or most teeth in place). Cut marks are evident on two left and two right maxillae. These generally run roughly parallel to the tooth row. The sample contains three occipitals consisting of the condyles and all or part of the occipital bone, and in some cases adjoining portions of the parietal bones (Figure 41f, g). One frontal bone from a ewe is relatively complete and displays a large area of crushed, inwardly directed bone from a blow (Figure 46).

Mandible: Mandibles occur in various degrees of completeness: one juvenile mandible is complete, one left adult mandible has all of the cheek teeth, the diastema and the incisors present, six mandibles consist only of the cheek teeth and adjacent bone. One of these has also retained the ventral border. Four left mandibles are represented by ascending rami only. From the right side, one mandible consists of the cheek teeth, diastema and incisors, as well as having the ventral border intact. Five are cheek teeth units and adjacent bone. One of these latter also has the ventral border still

Bone	Number	Percentage of MNI
Cranium, occiput	3	19
horn core, right	2	13
left	5	31
maxilla, right	4	25
left	3	19
Mandible, complete, left	1	6
ascending ramus, left	4	25
horizontal ramus, right	4	25
left	7	44
Vertebrae, atlas	7	44
axis	10	63
third cervical	4	25
fourth cervical	5	31
fifth cervical	4	25
sixth cervical	5	31
seventh cervical	3	19
thoracic (all)	4	6
lumbar (all)	1	6
Scapula, complete, right	2	13
left	1	6
glenoid cavity, right	2	13
left	2	13
blade, left	1	6
Humerus, distal, right	11	69
left	16	100
Radius, proximal, right	7	44
left	14 (+ 1 complete)	96
distal, right	4	25
left	3	19
Ulna, proximal, right	9	56
left	10	63
Metacarpal, proximal, right	7	44
left	10	63
distal, right	9	56
left	7	44
First phalanx, right	11	19
left	13	25
Second phalanx, right	7	13
left	4	6
Third phalanx, right	4	6
left	2	6
Innominate, right	1	6
left	1	6
Femur, proximal, right	1	6
left	1	6
Tibia, distal, right	7	44
left	7	44
Astragalus, right	8	50
left	15	94
Calcaneus, right	4	25
left	9	56
Naviculo-cuboid, right	6	38
left	5	31
Metatarsal, proximal, right	1	6
left	4	25
distal, right	4	25
left	4	25

TABLE 11: Frequency of elements and percentages relative to MNI in mountain sheep.

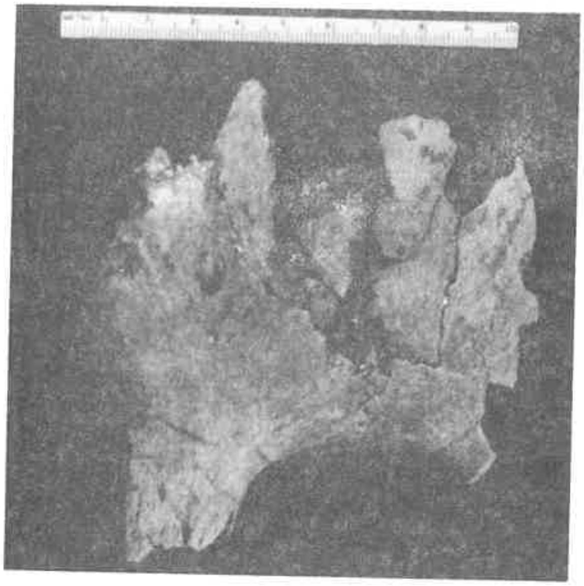

FIGURE 46: Butchered mountain sheep ewe cranium. Note depression in center of frontal.

present. One left and two right mandibles show cut marks in areas similar to the mule deer.

Vertebrae: All seven atlas vertebrae in the sample are intact. Four of these display cut marks: one on the dorsal side only, one on both the dorsal and ventral sides, and two on the ventral side only. Any one atlas has relatively few cuts, as opposed to some deer atlases that had many cuts. Possible chewing is evident on the edges of one atlas. Six of the ten axis vertebrae show cut marks. These occur in various combinations of locations on the sides and bottom of the bodies and on the dorsal spines. One dorsal spine also shows possible carnivore chewing marks. Two of the four third cervical vertebrae show cut marks. They are abundant on the sides of the body of one and are located on the ventral surface of the other. All four of these vertebrae are essentially intact. All five fourth cervical vertebrae are also complete and four have cut marks located on the bottom and sides of the vertebral bodies. All four fifth cervical vertebrae are complete. Two of these have cut marks on the left side of the body. A third has cuts on the dorsal and ventral surfaces and on the right side of the body. The ventral projections are absent from four of the six sixth cervical vertebrae, probably chopped away. One displays cut marks on the right side of the body and dorsal spine. The three seventh cervical vertebrae are complete. One has broad cuts or scrapes on the right side of the dorsal spine and the left side of the body.

Two fairly complete thoracic vertebrae (one is missing only the dorsal spine) and two other dorsal spines are present in the sample. Both isolated dorsal spines have cut marks, as does the dorsal spine of the intact vertebra. A single lumbar vertebra is present and has cut marks on the dorsal spine and on the dorsal and ventral surfaces of the body.

Scapula: Three intact scapulae are present in the assemblage, two rights and one left. Two more scapulae are present from each side in the form of the glenoid extremity only, the blade having been broken off. The blade of a single left scapula is also present. Cut marks occur on two left and four right scapulae. They are most common on the neck and glenoid extremity, but are found also on the blade. One scapula from each side displays what could be tooth marks.

Humerus: Distal ends are the only parts of the humerus that have been identified. There are 16 lefts and 11 rights in the sample. These pieces range in length from about 3.5 to 15.0 cm, with the majority being 10 cm or less in length. Cut marks are present on nine (56 percent) of the lefts and 10 (91 percent) of the rights. These cuts occur on the anterior, posterior, medial and lateral surfaces, although they are least common on the posterior surface (Figure 47). In a few instances, the cuts on the lateral and medial surfaces lie on the condyles and probably occurred when disarticulating the joint.

Radius: Two portions of the radius occur, the proximal and distal ends of the bone. A single complete radius was recovered from the Late Prehistoric Period levels in the "Across the Creek" section of the site. The proximal ends range in length from 3.0 to 7.5 cm. Two lefts have impact cones: one on the anterior surface of the shaft 2.0 cm below the proximal end and the other on the posterior surface 4.5 cm below the proximal end. Five lefts had been split lengthwise, as had five rights. Cut marks occur on 10 (67 percent) of the lefts and three (43 percent) of the rights. Some cuts are located very near the articulation with the humerus (Figure 47). One left proximal end displays possible tooth marks.

The distal ends range in length from 5.5 to 17 cm, but all except one are 10 cm or less in length. Two from the right side show probable carnivore tooth marks.

Ulna: The ulnae range in length from 5.5 to 13.0 cm. Some are nearly complete except for the distal end of the shaft. Others consist of the semilunar notch and/or the articular processes directly below the notch with a bit of the shaft. Two left and four ulnae show cut marks. Three lefts and one right show evidence of carnivore chewing. Frequently, the top of the olecranon had been partially chewed away.

Carpals: Carpals occur with a frequency of up to 25 percent of the minimum number of individuals. A single intermediate carpal has cut marks on both the anterior and posterior surfaces.

Metacarpal: The metacarpals fall into two categories, proximal and distal ends. The proximal end pieces range in length from 3.5 to 12.0 cm. Most are 7.0 cm or less in length. Four right proximal pieces (57 percent) display cut marks, and two lefts have possible tooth marks. Two right pieces have impact cones: one on the medial surface of the shaft 4.5 cm below the proximal end; the other example has three cones on the medial surface of the shaft 4.5, 6.0 and 8.0 cm below the proximal end and a fourth cone on the lateral surface 4.5 cm below the proximal end. This last cone could be the result of opposing pressure against an anvil.

Four of the seven distal ends of metacarpals have cut marks, as do three of the nine rights. Some of the cuts occur on the condyles, probably to remove the phalanges.

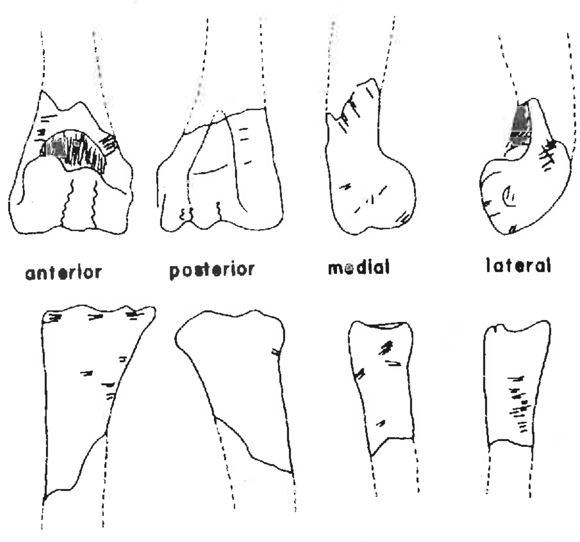

FIGURE 47: Schematic representation of mountain sheep elements, showing cut marks: distal humeri (upper row); proximal radiae (lower row).

The distal pieces range in length from 4.5 to 12.0 cm. One piece from the left side has an impact cone on the lateral surface of the shaft located 5.0 cm above the distal end. Possible tooth marks occur on one left and three rights.

Phalanges: Many of the first phalanges had been broken at the midshaft into proximal and distal units. Only 23 percent of the lefts and 55 percent of the rights were complete. Cut marks occur on three of the proximal and three of the distal pieces of the left first phalanges. Cut marks are present on one complete right first phalanx and on three proximal and one distal piece.

Second phalanges had been processed less frequently than first phalanges. Sixty-seven percent of the left and 57 percent of the right second phalanges are intact. Cut marks occur on one complete left second phalanx and on two proximal pieces of right second phalanges.

Three complete right third phalanges are present. The proximal end of one right and two lefts are also present.

Nine phalanges show evidence of chewing (possible tooth marks). The smooth and slightly eroded outer surface of two of these suggests that they had passed through the digestive tract of some carnivore, similar to the deer phalanges discussed above.

Innominate: Only three pieces of innominate are present. One from each side consists of the acetabulum and bears evidence of chopping (Figure 39b). The third piece is a segment of illium. The longest of these pieces measures about 10.5 cm in length. Cut marks occur on all of these pieces.

Femur: Only the proximal ends of the femora have been identified, one from the left side and one from the right. The maximum length of these pieces is 5.0 cm. The left one shows cut marks on the anterior, posterior, and medial surfaces below the femoral cap.

Tibia: Only the distal ends of seven left and seven right tibia are present. These range in length from about 2.0 to 13.0 cm and most are 9 cm or less in length. Two lefts and one right display cut marks. Two pieces of left tibia, conceivably from the same bone, had been split lengthwise.

Tarsals: Astragali have a high frequency of occurrence at the site, there are 15 lefts and eight rights. Four (27 percent) of the lefts and two (25 percent) of the rights have cut marks, in all but one instance, these are found on the medial surface of the bones. Calcanei occur less commonly; there are nine lefts and four rights. Two lefts and one right bear cutting marks on the dorsal and lateral surfaces. The tuber calcis probably had been gnawed off of at least two of these bones.

Naviculo-cuboids are uncommon and none had cut marks or carnivore chewing evidence.

Metatarsal: Two categories of metatarsals occur, proximal ends and distal ends. Five proximal pieces are present, with four being from the left side. These range in length from 5.0 to 18.0 cm. Four distal ends are present from each side, and vary in length from 4.5 to 11.5 cm. Cut marks are evident on two left distal ends and possible tooth marks show on one left proximal and two left distal ends.

DISCUSSION

The character of the faunal

assemblage permits some interpretations and hypotheses regarding the use of the deer and mountain sheep at the Dead Indian Creek site. Too few pronghorn antelope remains exist to make any generalizations and this present discussion excludes the pronghorn. Again, the reader is reminded that only a small portion of the site has been excavated, and the representativeness of our sample might be questioned.

Mule deer: Deer skulls, especially the mandible and maxilla, have a very high representation at the site. Cut marks are very common on the maxillae and ascending rami of the mandibles. This is probably attesting to skinning of the skull and, even more so, to the disarticulation of the mandibles from the skull (see Frison 1971). The tongue and brains might have been highly desired parts, explaining the abundance of these skull parts. Ceremonialism (Frison 1978:271-272) might have been an incentive for bringing mule deer buck skulls to the site.

The vertebral column is poorly represented at the site, except for the atlas and axis which might have remained attached to the head when it was brought back to the site. Cut marks are relatively common on the vertebrae, in particular on the atlas. Cuts on the atlas probably reflect disarticulation of the skull. The low frequency of vertebrae in general might be the result of generally abandoning them at kill sites.

The deer mandibles show very patterned processing. Virtually all of the horizontal rami lack the diastema and incisor teeth, as well as the ascending ramus. This leaves the cheek teeth row and adjacent bone representing most of the deer mandibles. The ventral border of the horizontal rami had been removed in virtually 100 percent of the mandibles. This high frequency suggests deliberate work of humans, not the action of carnivores which can do the same thing (Binford 1981:63). What appear to be tooth marks are present on a few of the specimens that were examined, suggesting that perhaps scavengers contributed somewhat to mandible breakage. Among the Nunamiut Eskimo, the ventral border of the mandible is broken off in times of food scarcity (Binford 1978). If this analogy is appropriate to the Dead Indian Creek site, it seems that the inhabitants perhaps were facing food shortages or were practicing a high degree of carcass utilization.

Taken as a whole, the large limb bones have a fairly low representation at the site. At first glance, this might seem anomalous, since much of the meat on a carcass is found on the limbs. However, one or more of several explanations could account for this apparent shortage of limb elements:

1. The meat was usually removed from the limbs at the kill site and the bones were abandoned at the kill.

2. The limbs were brought to the site intact and the meat was removed there. Subsequently, the long bones could have been broken open for marrow and the articular ends of the long bones processed for grease (Binford 1978). Processing in this case would have consisted of pulverizing the long bone ends and boiling them to extract the grease. This hypothesis receives support from the high frequency of long bone shaft fragments and the high frequency of occurrence of the distal ends of the humeri and the distal ends of tibiae. These are the most

durable and compact parts of the limb bones and contain comparatively little grease. There would have been little incentive to pulverize and boil them. The proximal ends of the humeri, femora and tibiae and the distal ends of the femora have the highest grease content and are comparatively easy to break. Their low frequency would be expected at a site where bone grease processing was an important subsistence activity.

3. The limbs had been brought to the site intact and the meat was then removed for consumption. Subsequently, scavengers (camp dogs, small carnivores, and possibly even wolves and coyotes) may have feasted on the bones. The same parts of bones that are best for grease processing would have been attractive to carnivores and would have been the easiest for them to consume. In this way, carnivore scavenging could have altered the assemblage. What seem to be tooth marks (coring, pitting and broad shallow grooves) and signs of chewing (ragged edges) on some bones seem to be fairly conclusive evidence that scavengers had chewed some bones. However, the evidence does not indicate scavenging alone of a magnitude to have altered so drastically the bone assemblage.

It is suggested here that all three of the hypotheses outlined above were responsible to some extent for the low frequency of most limb bone epiphyses, although the second hypothesis is suggested as the major cause in determining the assemblage character. The high frequency of the distal ends of humeri and tibiae, the large quantity of long bone shaft fragments and other durable limb bones such as the astragalus, indicates strongly that many limbs had been brought to the site.

Another possible factor that could contribute to selective bone attrition is decomposition and weathering (Brain 1976). However, the excellent state of preservation of most bones from the assemblage would seem to discount this as an important agent, but perhaps appearances are deceptive. Brain (1976) calculated the frequency of skeletal parts of domestic goats that survive natural attrition, including scavenging and decomposition, and human use for food.

A comparison between Brain's Hottentot assemblage and the Dead Indian Creek deer and mountain sheep assemblages is interesting (Figure 48). The deer assemblage from Dead Indian Creek has a strong similarity to the Hottentot assemblage, but the mountain sheep assemblage differs considerably. The explanation for these similarities and differences are not clear. Brain's assemblage has undergone attrition from three agents: 1) human consumption; 2) weathering, and 3) scavenging by dogs. Unfortunately, individual effects of each agent are hard to isolate. Thus, we do not know if the dissimilarity of the mountain sheep assemblage resulted from human usage, weathering, scavenging, or a combination of the three.

Comparison of the Dead Indian Creek mule deer to the mountain sheep without Brain's Hottentot data is also interesting (Figure 49). The two assemblages still differ considerably. In this comparison, it seems safe to presume that weathering, decomposition and carnivore scavenging affected the two assemblages about equally, so the differences seem to be primarily due to human utilization. However, if selective transport of carcass parts to Dead Indian Creek by the site

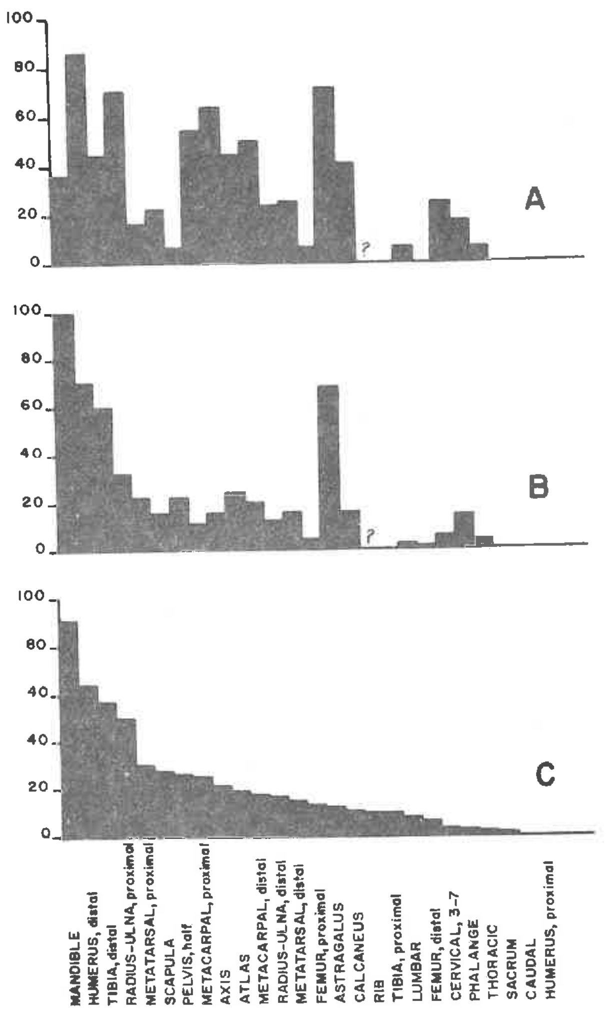

FIGURE 48: Percentage of MNI present in samples: A: Dead Indian Creek mountain sheep. B: Dead Indian Creek mule deer. C: Hottentot natural bone accumulation (from Brain 1976).

inhabitants was operating, the true effects of natural attrition might be masked and the assemblage could not be expected to duplicate Brain's.

It could be argued that a comparison between assemblages from the desert country of South Africa to an intermountain basin in northwestern Wyoming is inappropriate. However, Brain's results are based on the durability of the bones themselves, which should be approximately the same

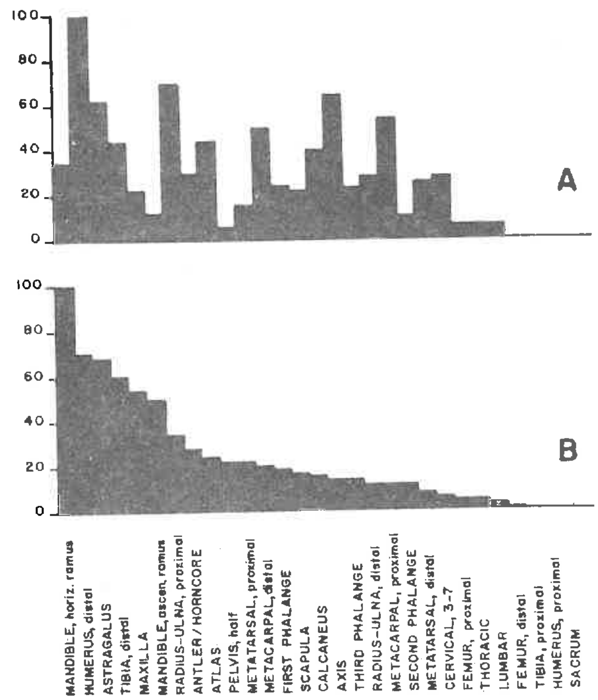

FIGURE 49: Percentage of MNI present in faunal remains from Dead Indian Creek site: A: mountain sheep. B: mule deer.

for domestic goats, mule deer and mountain sheep. It should be expected that the rate of decomposition should differ between the two environments, but not the sequence or pattern of attrition.

At least two explanations can account for the low frequency of vertebrae at the site. First, the ribs and vertebrae had been stripped of meat at the kill site and abandoned, or secondly, the vertebral columns and associated flesh, were dried on racks away from the main site area (see Binford 1978:100-102). The data base at this time makes it difficult to choose between these two alternatives. Another factor contributing to the absence of vertebrae could have been scavengers actively carrying off and consuming the vertebral columns.

With regard to the manner of limb disarticulation, the evidence indicates that cutting ligaments and separating the articulations rather than chopping through the joints was carried out. The majority of long bone ends that are present at the site are intact and many bear cutting marks. Most of these were probably imparted during flesh removal, but others undoubtedly reflect disarticulation. All the glenoid cavities of the scapulae are intact, even though a number of scapulae had been broken at the neck. Had the humeri been chopped free of the scapulae, chopping marks and broken glenoids would be expected. Some innominates had been broken through the acetabulum, suggesting that femora sometimes had been chopped free.

After meat removal, the long bones probably had been broken to extract the marrow. Impact cones on the interior of several long bone shafts below and above the epiphyses document this activity. Experimental bone breakage has demonstrated that interior impact cones are not always produced by blows to the shaft. Further experimentation is required to recognize the point of impact when cones are absent.

Perhaps these bones which have split articular ends (proximal radii, proximal metacarpals and metatarsals) had been split during marrow removal or may have been split open to enhance the rendering of grease.

Mountain Sheep: The element frequency pattern in mountain sheep demonstrates a general similarity to mule deer with regard to many carcass parts. The thoracic, lumbar, sacral and caudal vertebrae are rare or absent, but the cervicals occur in greater numbers. The general pattern for the limbs is the same also, a high frequency of durable parts (distal ends of humeri and tibiae and the astragalus). The same alternative hypotheses are offered to explain the pattern of limb elements and vertebrae in mountain sheep that were advanced for the mule deer.

Dispersal of meat and attached bones from the Dead Indian Creek site to other locations should be considered as another possible mechanism contributing to the observed differential frequency of parts within the deer and mountain sheep sub-assemblages. Hunting parties or groups moving elsewhere, and taking supplies of meat and bone with them for food, exemplify behavior that might have contributed to the absence of anatomical parts at the site.

Differences are evident in the treatment of the skull, in that only 35 percent of the minimum number of mountain sheep is represented by mandibles, while deer mandible constituted 100 percent of the minimum number. The maxillae represent only 22 percent of the minimum number for mountain sheep as opposed to 53 percent for mule deer. Clearly, mountain sheep skulls were not as well represented in the sample as were those of deer.

Processing of mountain sheep mandibles was less patterned than among deer in that some mountain sheep mandibles were complete, others were missing only the incisor teeth and diastema and not all had the ventral border removed.

Differences were also apparent in the location and frequency of cut marks. Cuts occurred in large numbers on occasions when their presence was observed on mule deer cervical vertebrae, in direct contrast with those of mountain sheep, where only a few cut marks were seen on the cervical vertebrae.

Noticeable differences are also seen in the frequency of cut marks on the distal ends of tibiae, astragali, calcanei, and the naviculo-cuboids while sheep have more cuts on the astragali. Perhaps this relates to differences in the manner of joint disarticulation. Dissimilarity in the frequency of cut marks is also evident on the proximal ends of the metatarsals. Mountain sheep have no cut marks while mule deer show cuts on 73 percent of the left and 86 percent of the right proximal metatarsals. The distal ends of the same bones have a high frequency of cut marks in both species, but deer have many more (deer: 58 percent of lefts and 75 percent of rights; mountain sheep: 50 percent of lefts and 0 percent of rights), although the small sample of mountain sheep bones (relative to the number of mule deer bones) could be giving spurious results.

Certain skeletal elements in addition to the skull, including the axis, metacarpal and proximal ends of the radius and ulna, show a considerable difference in relative frequency between the deer and mountain sheep sub-assemblages (Figure 46). These and other dissimilarities discussed above probably result from differences in the use of the carcasses of the two species. Explanations as to why these species were treated differently remain speculative at this time. Perhaps each species was best hunted and killed with a different strategy, and thus the hunters subsequently faced different logistical situations regarding butchering and transporting the carcasses back to the Dead Indian Creek site. Differential redistribution or deletion of anatomical parts from the Dead Indian Creek site might have added to inter- or intra- specific variation in the relative frequency of skeletal parts.

POPULATION DYNAMICS OF MULE DEER

BY
TANA SIMPSON

INTRODUCTION

Data recovered from Great Plains and Rocky Mountain archaeological sites frequently includes some quantity of animal bone. Often this bone represents the residue of hunting activities and as such, has been found to yield unique information about the subsistence efforts of prehistoric human groups.

Recent studies of faunal assemblages in archaeological contexts have emphasized the utility of population dynamics as an analytical tool. Briefly, population dynamics is based on the observation that the probability of mortality is differential but predictable for certain age groups within a naturally occurring population (Deevey 1947:309-312). If the characteristics of what Nimmo calls ". . . the balance between natality and mortality. . ." (Nimmo 1971:285) are known for a species, it is then possible to compare the structure of this ideal for the natural population with that of a faunal assemblage in an archeological context.

There are, however, several assumptions of population modeling that have to be made prior to the application of the techniques to prehistoric samples. Emerson (1980) discusses these in some detail in relation to a study conducted on a white-tailed deer (Odocoileus hemionus) population in the Midwest. The necessary assumptions rely on the population being stable:

> . . .(1) that the population involved is infinite in size, (2) that no significant immigration or emigration occurs, and (3) that there exist reasonably fixed rates of mortality and fertility within each age group. . ." (Emerson 1980:118-119).

These assumptions necessary for stable population theory have been made in the following discussion of the remains of mule deer (O. hemionus) from the Dead Indian Creek site. If a population of big game can be assumed to be stable, a prehistoric population would be more so than a modern population under the stresses of modern man and his influences.

Theoretically, the age distribution of a killed population reflects the nature of its mortality. Attritional mortality is the normal death rate for members of a natural population (Reher 1970:51). An instance of attritional mortality in a faunal assemblage could be expected to show a preponderance of juvenile and senescent animals -- those members of the population most likely to succumb to hardship or predation. The occurrence of these deaths would be staggered throughout the year, with possible clustering during periods of seasonal minimum. Figure 50a illustrates the age structuring typical of attritional death in a population sample.

Catastrophic mortality refers to the sudden demise of an entire population, without regard for individual fitness or adaptability. What is reflected, therefore, in the killed population is the same age distribution that would be found in a living population. A large proportion of juveniles, a moderate proportion of adults and a small proportion of aged adults could be expected (Reher 1970:53). The occurrence of death by catastrophe would appear uniform temporally. The characteristic age composition of a catastrophic mortality is shown in Figure 50b).

To date, several studies of mortality have been made on faunal material from archeological sites. Reher (1970, 1973, 1974) and Reher and Frison (1980) have described population dynamics of Bison bison ssp. from several prehistoric kill sites in Wyoming. A similar situation involving pronghorn antelope (Antilocapra americana) from the Eden-Farson site in southwestern Wyoming, was described by Nimmo (1971). These studies and others on population dynamics of prehistoric animals have been recently reviewed by Frison (1980).

This present study offers a continuation of this line of investigation to another family of ungulates: the Cervidae, specifically to the mule deer (Odocoileus hemionus) remains from the Dead Indian Creek site. The primary objective of this study was to discover the nature of the mortality -- how and when this collection of mule deer remains was killed -- from the evidence found in the osteological material recovered from the site. Two aspects of this objective are of particular concern:

1. The strategy of predation -- whether the animals in the assemblage were killed catastrophically (i.e., from a jump or pound type of killing strategy) or attritionally (i.e., from a normal year long accumulation of animals).

2. The time span -- during which season or seasons of the year was the site used for hunting deer.

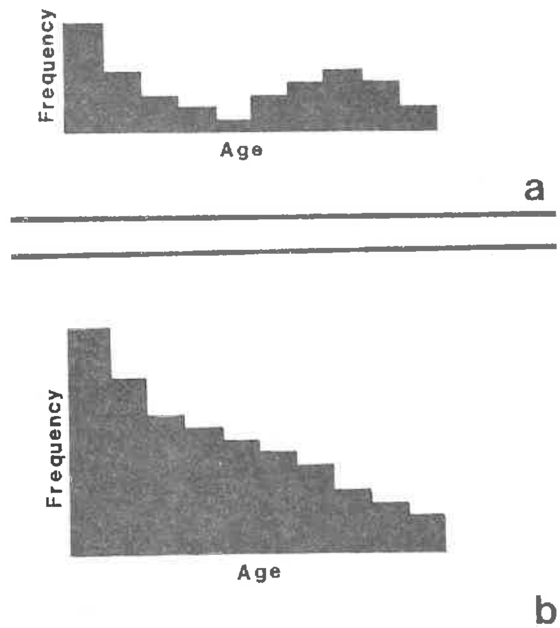

FIGURE 50: a: Age distribution for attritional mortality. b: age distribution for catastrophic mortality (from Voorhies 1969:47).

FAUNAL MATERIAL

The faunal assemblage from the Dead Indian Creek site includes two species of cervids: elk or wapiti (Cervus elaphus) and mule deer (O. hemionus). Elk exists in the sample as a single right mandibular ramus with a complete tooth row, one upper first premolar and fragments of postcranial bone and antler (discussed previously by Scott and Wilson in this paper). Table 12 presents measurements on the elk mandibular teeth. However, a single specimen such as this has little utility in a population dynamics study and no further population dynamics or other data will be presented on the elk material from the Dead Indian Creek site in this present report.

Specific affinities of the Odocoileus remains has not been positively identified. The skull, which is the portion of the skeleton most amenable to species identification, is not complete on any specimen from the site. It is assumed that the sample is chiefly, probably completely, O. hemionus for three reasons:

1. The dentition of the sample as a whole shows a tendency toward robusticity subjectively considered to be in excess of that expected for a corresponding population of O. virginianus, the white-tailed deer.

2. Six complete and several partial antlers of mule deer were recovered from the site. No white-tailed deer antlers were found.

3. The dental eruption pattern of the subadult Dead Indian Creek deer approximates that of mule deer. Dead Indian Creek animals estimated to be eight to ten months old by the degree of development and wear on premolar teeth have a partially erupted second lower molar. This tooth would be fully functional in the white-tailed deer at the same age. Furthermore, while both the mule and white-tailed deer are reported to lose deciduous molars at approximately eighteen months of age, permanent teeth succeed deciduous teeth rapidly in the white-tailed deer, within a month (Severinghaus 1949:206-209). The growth rate is slower in the mule deer, concluding at twenty-four months (Cowan 1938:192). Specimens from the Dead Indian Creek site determined to be twenty-eight to thirty months of age all have permanent premolars, but the fourth of one left and one right ramus are not fully in place. To conclude, based on eruption schedules in the subadult category, there is no indication of any

	First Molar	Second Molar	Third Molar
Lingual height (in mm)			
anterior cusp	9.4	19.1	21.2
posterior cusp	11.8	19.5	
medial cusp			21.2
Maximum width (in mm)			
anterior cusp	16.8	19.9	19.5
posterior cusp	18.0	20.2	
medial cusp			18.3

Maximum length tooth row = 152.7 mm

TABLE 12: Tooth measurements of Cervus elaphus lower dentitions, Dead Indian Creek site.

white-tailed deer being present in the sample, at least in the cranial portion of the sample.

Although the above speaks strongly for the presence of the mule deer, it does not positively preclude the existence of the white-tailed deer and the possibility of a mixed population is acknowledged. However, since direct evidence of such a mixed population has not been found, the sample will be referred to, and dealt with, as if it were uniformly mule deer.

In general, both cranial and post-cranial bone was well preserved, but fragmentary, often resulting for the most part from the butchering process. This butchering treatment has restricted the information potential of the post-cranial material for purposes of this population dynamics study and the post-cranial material is therefore not taken into consideration.

Certain cranial elements are suitable for the study, despite the butchering fragmentation. All maxillae have been separated superiorly from the rest of the cranium and anteriorly from the premaxillae. The inferior borders of the horizontal rami have been broken during butchering, presumably to facilitate extraction of bone marrow. Typically, the coronoid process, the mandibular condyle or the entire vertical ramus are all missing. Broken and absent teeth were a serious problem in the study, reducing significantly the numbers of teeth and mandibles which could be accurately measured.

A count of mandibular rami was made to determine the approximate number of animals present in the sample. The left or right ramus was used, depending upon which side was better represented in each of the various age categories. According to this count, a minimum number of fifty individuals are present, although the actual number may be more or less. It is possible that some fragments assumed to represent separate animals actually came from a single individual, thus reducing the number.

PROCEDURES

Establishing the ages of individual animals is crucial to the reconstruction of age distributions within a total population. The age of mule deer is most often calculated by wildlife managers according to the condition of the mandibular dentition (Cowan 1936; McLean 1936; Moreland 1932), in the absence of incisors needed for annuli aging (Thomas and Bundy 1973). Although it may be feasible to age mule deer by the maxillary dentition as well, definitive schedules have not been established for maxillary tooth eruption and attrition. Insufficient known-age comparative material was available to attempt to develop this procedure for the Dead Indian Creek sample.

The adult mule deer has thirty-two teeth, twelve in the maxillae and twenty in the mandible. As is typical of advanced ruminants, upper incisors are absent in the mule deer. The most anterior teeth are the three lower incisors plus an incisiform canine which abuts against the third incisor. A diastem separates this canine from the premolars. The first premolar of both the upper and lower dentitions has been evolutionarily deleted (Riney 1951:100). Therefore, the most anterior premolar is the second premolar. The form of the adult fourth premolar resembles that of the first and second molars in having two transverse divisions or lobes. The deciduous fourth lower premolar has three such lobes as does the adult lower third molar.

Among subadult deer, the aging criteria used here are the degree of attritional wear, especially on the deciduous teeth, and the progress along the eruption and replacement schedules of the deciduous and permanent teeth. Adult deer must be aged solely by the relative degree of attritional wear.

Variation at both the individual and populational levels may introduce inconsistencies in the eruption and attrition schedules. Possibly the greatest amount of individual variation occurs as a result of the length of the fawning season. Robinette et al. (1957:135) estimated that in a Utah mule deer herd ". . .95% of the fawns are born within a period of plus or minus twenty-two days from the fawning peak mid June". Thus, a possible difference in development of one and a half to two months could exist between early and late fawns.

Individual age was identified initially by comparing the mandibular dentition of the Dead Indian Creek deer to that of known-age mule deer specimens from the University of Wyoming Zoology Department collections. This visual comparison was especially valuable for partial rami which contained the premolars but no molar teeth.

In addition to the above, measurements were taken of the lingual height of the mandibular molars. Molar height has been found to correlate directly with the degree of eruption of subadult teeth and the progress of attritional wear on adult molars (Robinette et al. 1957:136-147).

The height of the molars is expressed as the average lingual height. This is the average of the metaconid and entoconid heights measured inferiorly from the enamel line to the most superior point on the cusp (Figure 51). The average lingual heights calculated for the Dead Indian Creek deer molars is shown in Table 13.

Average lingual height measurements were found to have value in this study in that they reflected general trends toward an increasing height in erupting molars and a decreasing height in molars in wear. Figure 52 illustrates this point for the lower first molar. As an indicator of specific individual age, lingual height was deemed unsatisfactory. Much variation was found to exist between individual animals determined by other means to be approximately the same age. No doubt the small sample size served to accentuate this situation.

Specific aging was accomplished primarily by comparison with the known-age specimens mentioned previously. By this method, virtually all Dead Indian Creek mule deer specimens could be assigned an age group. Metric aging techniques (the average lingual height) was also used in the study, but in a corroborative capacity.

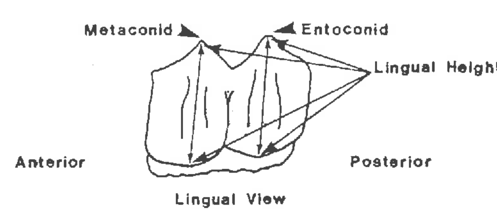

FIGURE 51: Average lingual height measurement for mule deer.

Age Group	Side	First Molar	Side	Second Molar	Side	Third Molar
Ia (5-6 mo)	L	11.6				
Ib (608 mo)	R	13.7				
Ic (8-10 mo)	L	11.4	L	6.6		
	R	11.1				
	L	12.0				
		($\bar{X}$ = 11.5)				
Id (16-18 mo)	R	12.8	R	14.2	R	3.6
	L	12.8	R	13.9	L	4.9
	R	11.7	L	14.9		($\bar{X}$ = 4.3)
	L	12.1	R	13.7		
	R	10.3		($\bar{X}$ = 14.2)		
	R	12.2				
	R	12.3				
	L	11.1				
		($\bar{X}$ = 11.9)				
Ie (20 mo)					L	11.1
II (28-30 mo)	L	10.3			R	14.5
III (2.5-3.5 yr)	R	7.5	L	12.5	L	14.6
	R	8.7	R	12.5		
	L	9.9	R	13.3		
		($\bar{X}$ = 8.7)		($\bar{X}$ = 12.8)		
IV (3.5-4.5 yr)	L	7.2	L	9.9	L	11.1
	R	8.7	R	11.2		
	R	10.8		($\bar{X}$ = 10.6)		
	R	9.1				
	R	8.0				
		($\bar{X}$ = 8.8)				
V (4.5-5.5 yr)	R	7.3	R	11.4	L	10.6
	L	8.2	L	12.9	L	10.8
	L	6.5	L	8.4	R	10.4
	L	8.0	L	12.7	R	11.3
	R	7.0	R	10.6		($\bar{X}$ = 10.8)
		($\bar{X}$ = 7.4)		($\bar{X}$ = 11.2)		
VI (5.5-6.5 yr)	R	6.3	R	10.0	R	11.3
	L	7.2	L	6.2	L	10.4
	R	7.3	R	10.7		($\bar{X}$ = 10.9)
	L	5.9	L	9.4		
	L	5.4		($\bar{X}$ = 9.1)		
	L	6.7				
		($\bar{X}$ = 6.5)				
IX (8.5 plus yr)*	L	1.2	L	3.7	L	5.2
	L	1.5	L	5.1	L	6.4
	R	4.4	R	7.0	R	7.1
	R	3.3	R	5.6	R	7.4
		($\bar{X}$ = 2.6)		($\bar{X}$ = 5.4)		($\bar{X}$ = 6.5)

* No figures were available for groups VII and VIII.

TABLE 13: Lingual heights of lower molar teeth, Dead Indian Creek mule deer.

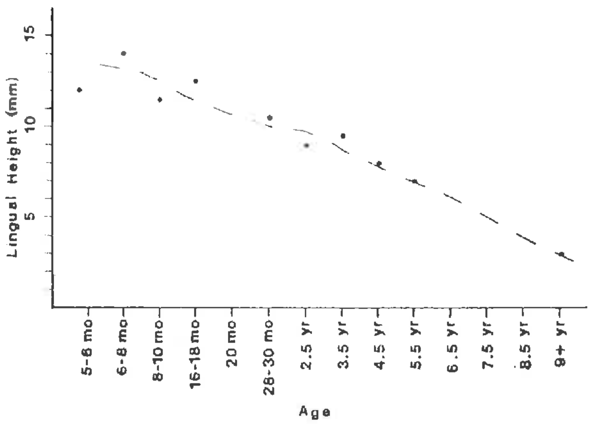

FIGURE 52: Relationship between average lingual height and age in Dead Indian Creek mule deer.

AGE GROUPS

Based on the results of the age analysis, the Dead Indian Creek deer assemblage was divisible into nine age groups:

Group I: 5-20 months. This group consists of subadults, that is, animals which retain the deciduous dentition. Group I is divisible into five subgroups.

Subgroup Ia: 5-6 months (12 specimens, minimum of 7 individuals). The characteristics of this subgroup are that wear on the second and third deciduous premolars is slight or negligible and that the first molar is only partially erupted.

Subgroup Ib: 6-8 months (7 specimens, minimum of 5 individuals). The deciduous premolars show slight to moderate wear. The first molar is almost completely erupted and in place.

Subgroup Ic: 8-10 months (7 specimens, minimum of 6 individuals). The deciduous third premolar shows moderate to heavy wear. The enamel reentrant angles are obscure on the posterior two-thirds of both the deciduous third and fourth premolars. The first molar is fully erupted and its cusps are slightly worn. Four cusps of the partially erupted second molar are above the bone line.

Subgroup Id: 16-18 months (12 specimens, minimum of 7 individuals). Third deciduous premolar is heavily worn. The second molar has nearly reached full height and its cusps are slightly worn. Four cusps of the third molar are visible above the bone line.

Subgroup Ie: 20 months (1 specimen, minimum of 1 individual). In the single representative of this age class, the posterior lobe of the third molar is visible above the bone line, but the tooth is not fully erupted.

Group II: 28-30 months (4 specimens, minimum of 2 individuals). The posterior lobe of the third molar is well above the bone line and the anterior and medial lobes have come into wear. The premolars of two specimens are adult, but the fourth premolar is not fully in place.

Group III: 2.5-3.5 years (13 specimens, minimum of 9 individuals). Both the second and third premolars show slight wear but the cusps of all molars and premolars are still sharp.

Group IV: 3.5-4.5 years (11 specimens, minimum of 7 individuals). Wear has proceeded to the point that the dentine of all molars is visible. The dentine of the third molar is not yet as wide as the enamel however. Occlusion with the upper dentition has caused a slightly concavity in the crown of the posterior lobe of the third molar.

Group V: 4.5-5.5 years (14 specimens, minimum of 7 individuals). Enamel crests of all molars are dulled and the exposed dentine of the lingual crests is approximately as wide as the enamel. The dentine on the buccal crests is wider than the enamel. The anterior and posterior segments of the first molar infundibula have become joined.

Group VI: 5.5-6.5 years (6 specimens, minimum of 4 individuals). Both the fourth premolar and first molar show heavy wear. The first molar has retained the infundibula but the cusps have been worn smooth. The infundibula of the third molar's posterior lobe is joined to that of the medial lobe.

Group VII: 6.5-7.5 years (2 specimens, minimum of 2 individuals). The first molar's infundibula are faint but present. The third molars are damaged in both rami, but it appears that the anterior and medial crests rise at least two millimeters above the posterior crests.

Group VIII: 7.5-8.5 years (1 specimen, minimum of 1 individual). The infundibulum has been obliterated on the posterior lobe of the first molar. On the anterior lobe, it is still faintly visible. The three lobes on the third molar have been worn to approximately equal heights.

Group IX: 8.5 plus years (4 specimens, minimum of 2 individuals). The first molar has been worn to within 1.2 mm of the enamel line on the lingual side. The infundibula are absent on the first molar and have been greatly reduced antero-posteriorly on the second molar. Despite the fact that wild mule deer have been reported to live beyond fifteen years, no specimens older than this age group were present in the Dead Indian Creek sample (Robinette et al 1957:147).

SEXUAL GROUPS

The Dead Indian Creek mule deer assemblage was tested for sexual makeup as well as age. The procedure for determining sex in the sample was based on the assumption that adult male deer are more robust than adult females and that the frequencies of greater and lesser robusticity would display a bimodal distribution. Reher (1970:52) found this assumption valid in studies of Bison bison, in which width of mandibles was the criterion for sexual differentiation.

Mandibular width was also the criterion used in the present study. Width of the horizontal ramus was measured with sliding calipers below both the first and third molars. The first molar test included 34 specimens and the third molar test covered a total of 21 specimens. Only adult mandibles with fully erupted dentitions were measured to avoid possible bias due to the smaller sizes of the adolescents.

These width figures were then plotted against their frequencies to obtain the histograms in Figure 53. The smaller modes are felt to

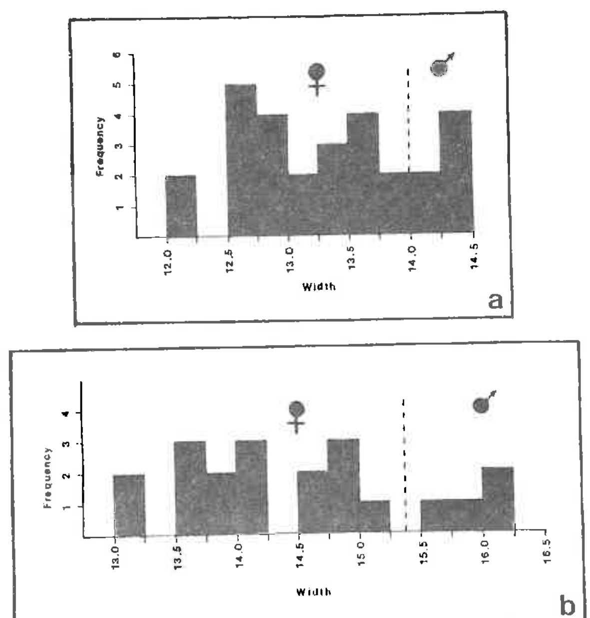

FIGURE 53: a: Frequency of mandibular width at M_1. b: frequency of mandibular width at M_3.

indicate the male animals while the females are indicated by the larger modes, representing the narrower mandibles.

According to the data from the first molar measurements, the ratio of males to females i the sample is 1:3.6. The slightly smaller third molar sample yielded a ratio of 1:4.0. A sex ratio compiled by Robinette et al. (1957:422) for mule deer populations from nine states was 1:3.4. The representation of male mule deer in the Dead Indian Creek sample thus appears slightly smaller than that in the Robinette et al. sample. A possible explanation for this will be discussed below.

DISCUSSION

Age values derived for subadult animals indicate significant gaps in the temporal distribution of subadult mortality shown in Figure 54. No specimens are present representing animals younger than five months of age. Taking the yearly fawning peak to be mid-June, the sample lacks the young of the year animals representing the calendar months of June to October (Robinette et al. 1957:135). Progress in eruption and attrition appears continuous among the specimens representing the calendar months October or November through March -- that is, the five to ten months age classes and the sixteen to twenty months age classes.

A gap occurs between age groups Ic and Id, corresponding to the months of April to October. Similarly, there is an absence of specimens between the ages of twenty and twenty-eight months -- March through September. Therefore, it appears that deer were being killed regularly during the late summer, fall and winter, but that they were not being killed during the spring and early summer.

This may be due, at least in part, to the tendency of some mule deer populations to migrate seasonally (Hunter and Yeager

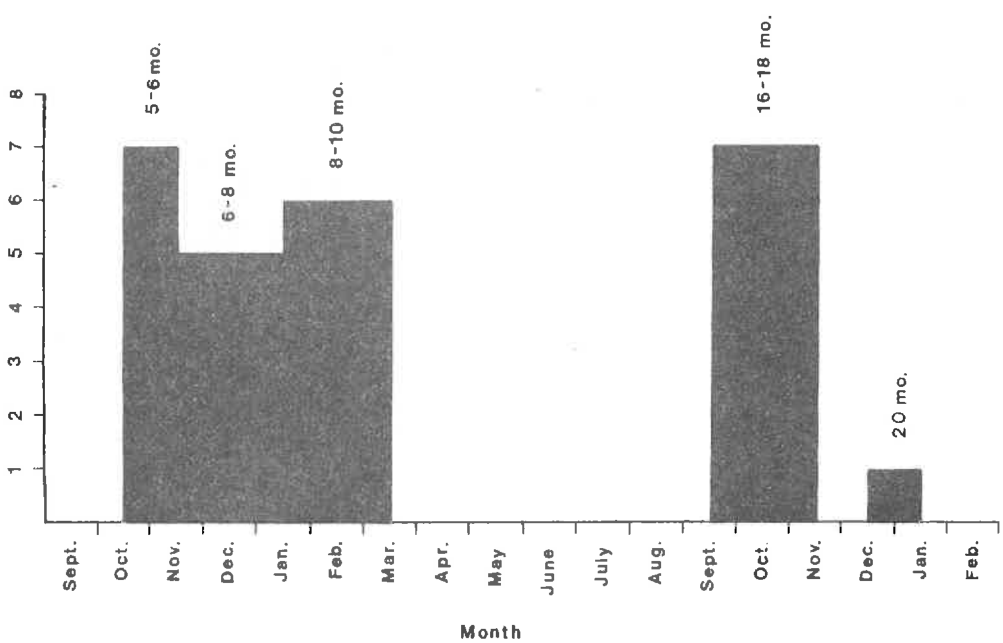

FIGURE 54: Temporal distribution of subadult mortality.

1956:461). According to Spencer (1956:146), "Mule deer in territories where there is a distinct difference between summer and winter ranges develop strong migratory tendencies". The typical pattern is to spend the spring and summer months in mountainous areas and the fall and winter months in the lower altitude foothills or valleys (Hunter and Yeager 1956:461; Williamson 1950:2).

Thus, it may have been the habit for the prehistoric Dead Indian Creek mule deer to locate in the Sunlight Basin during fall and winter and in the spring and summer, to relocate in the Absaroka Mountain Range which surrounds the basin (Hyde and Beetle 1964:7). Such is the pattern observed in the mule deer of Sunlight Basin today (T. Killough, personal communication 1982).

Migration, however, would not necessarily account for a total deficit of deer during a particular period of the year. Not all deer in a region participate in the seasonal migration. As Spencer (1956:485) observed ". . . there are, of course, a few deer scattered over nearly all deer ranges at most seasons. . ."

It may be that the hunters themselves were absent during the spring and summer months. Examples of seasonal habitation and movement are not uncommon in accounts of historic American Indian groups. The Wind River Shoshone, for instance, are known to have spent winters camped in mountainous regions of northwestern Wyoming and to have abandoned these camps in the spring (Shimkin 1947:268). The Dead Indian Creek site may then have been used seasonally as a fall and winter camp, with the human occupation extending roughly from October through March.

Figure 55 depicts the relative frequency of the various mule deer age classes discussed above. For purposes of illustration, certain age classes have been combined to approximate cohorts, or ". . .groups whose members start life together" (Voorhies 1969:24). In the histogram, group Ia, b, c, represent the young of the year, group Id, e, represents the long yearlings and groups II and III represent all of the 2.5-3.5 year old animals.

The histogram clearly shows a preponderance of juvenile and prime adult individuals. The relatively high frequency of viable adults -- two and one-half to six and one-half years old -- is reminiscent of the age distribution situation described above for catastrophic mortality. Because of this appearance, a

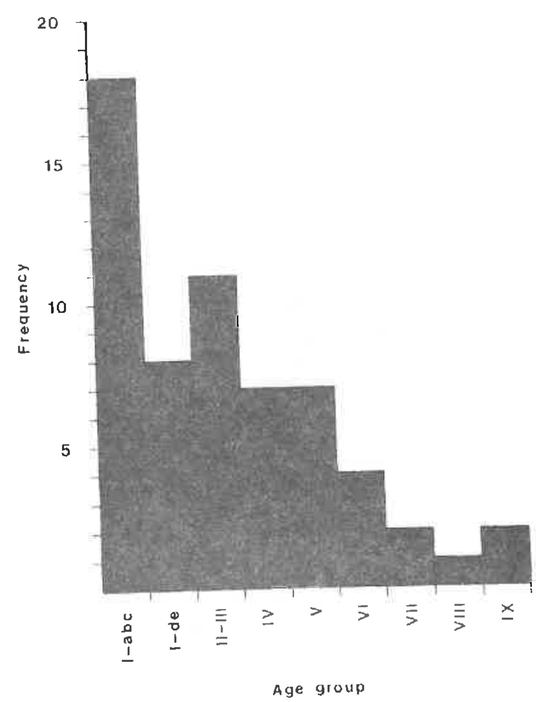

FIGURE 55: Age group frequencies, Dead Indian Creek mule deer.

vertical or time specific life table (Table 14) for non-selective mortality was set up to summarize the fatality and survivorship of the population (Deevey 1947; Voorhies 1969).

The ages represented by the individual cohorts are found in the first column of the life table. The number of individual animals in each cohort is given in the second column, calculated from a base of 100 animals. It is a common practice in population dynamic studies to convert the actual number in each cohort to such a base, mainly for ease in calculations and comparisons (Caughley 1977).

The next column in the table presents the probability of a member of that cohort surviving from birth until age X. This probability (l_x) is calculated by dividing the number of individuals present in that cohort at birth:

$$l_x = \frac{n_x}{n_o}$$

Column d_x is referred to as the mortality rate or the probability of dying between age x and x+1. It is calculated by subtracting the probability of survival (l_x) at age x+1 from the probability of survival at age x:

$$d_x = l_x - l_{x+1}$$

This figure (d_x) is often called the frequency of mortality.

Column q_x is the mortality rate of that cohort. It is that proportion of animals alive at time x that die before time x+1 and is the mortality rate (d_x) divided by the survivorship probability (l_x):

$$q_x = \frac{d_x}{l_x}$$

The next column, p_x, is the survival rate and is that proportion of animals alive at time x that survive until time x+1 and is calculated by subtracting the mortality rate from 1.0:

$$p_x = 1.0 - q_x$$

Column L_x is the average number of animals alive from time x to time x+1 and is approximated by:

$$\frac{l_x + l_{x+1}}{2}$$

Column T_x is the total number of years lived by the animals in

Cohort Age	n_x	l_x	d_x	q_x	p_x	L_x	T_x	e_x
5-10 mo	18	1.00	.56	.56	.44	72	241	2.41
16-20 mo	8	.44	.17	-.39	1.39	53	169	3.84
2.5 yr	11	.61	.20	.39	.64	5	116	1.90
3.5 yr	7	.39	.00	.00	1.00	39	111	2.85
4.5 yr	7	.39	.17	.44	.56	31	72	1.85
5.5 yr	4	.22	.11	.50	.50	17	41	1.86
6.5 yr	2	.11	.05	.45	.55	9	24	2.18
7.5 yr	1	.06	-.05	-.83	1.83	9	15	2.50
8.5 yr	2	.11	.00	.00	1.00	6	0	0.00

TABLE 14: Vertical life table, Dead Indian Creek mule deer.

the cohort after age x and is calculated by adding all L_x figures below a specific cohort in the table:

$$T_x = L_x + L_{x+1} + L_{x+2} + \ldots + L_{x+n}$$

The final column in the life table is the observed life expectancy for an average animal at age x. This is calculated by dividing the T_x figure for a cohort by l_x for the same cohort:

$$e_x = \frac{T_x}{l_x}$$

Survivorship in the population is further illustrated by the survivorship curve shown in Figure 56. A departure from a typical catastrophic survivorship curve (see Figure 50b) occurs in the frequencies of Group Id-e, the long yearling cohort. This age group, including animals aged sixteen to twenty months of age, appears drastically under-represented. It is possible, considering the small sample size, that this inconsistency is the result of a slight collection bias. Less than twenty percent of the known site area has been excavated. Therefore, it is conceivable that a more realistic representation of long yearlings may be present in the unexcavated eighty percent of the site.

In order to clarify the curve shown in Figure 56, and to ascertain if the data collected during this study did represent a catastrophic mortality, the numbers of individuals representing each cohort was converted using a method described by Butler and McDonald (1979), a common technique in population modeling. These converted population numbers and their corresponding age groups are presented in Table 15. Figure 57 presents these as a survivorship curve. It is immediately apparent that this curve is now typical for such a human predation

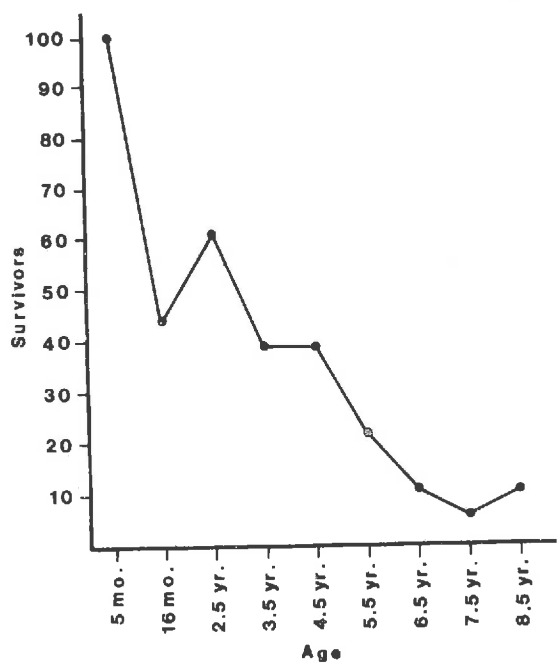

FIGURE 56: Survivorship curve, Dead Indian Creek mule deer.

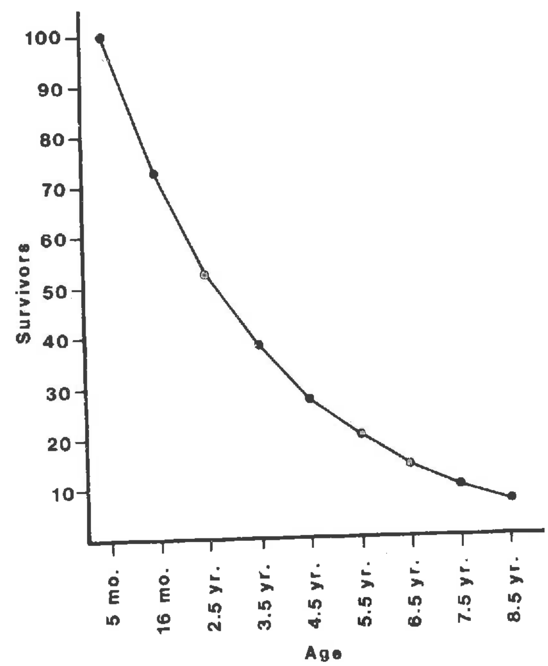

FIGURE 57: "Smoothed" survivorship curve, Dead Indian Creek mule deer.

Cohort Age	n_x	l_x	d_x	q_x	p_x	L_x	T_x	e_x
5-10 mo	18	1.00	.28	.28	.72	86	292	2.92
16-20 mo	8	.72	.20	.28	..72	62	206	2.86
2.5 yr	11	.52	.14	.27	.73	45	144	2.77
3.5 yr	7	.38	.11	.29	.71	33	99	2.61
4.5 yr	7	.27	.07	.26	.74	24	66	2.44
5.5 yr	4	.20	.06	.30	.70	17	42	2.10
6.5 yr	2	.14	.04	.29	.71	12	25	1.79
7.5 yr	1	.10	.03	.30	.70	9	13	1.30
8.5 yr	2	.07	.00	.00	1.00	4	0	0.00

TABLE 15: Transformed vertical life table, Dead Indian Creek mule deer.

population model (see Krantz 1970).

Assuming for a moment that the sample is not biased by the collection procedures, an explanation may be sought in some type of natural event to explain the discrepancy in the numbers Group Id-e. For instance, an unusually harsh environmental condition during the previous year could have claimed a high percentage of young, vulnerable animals.

Despite the fact that the frequencies of adults in the assemblage approximates the expectation for a living population, the mortality is clearly not that of the classic catastrophic type. As demonstrated earlier, mortality, at least among the subadult animals, was staggered throughout a six month period.

It is therefore proposed that the particular hunting strategy or strategies employed for deer procurement at the Dead Indian Creek site are responsible for a resemblance of catastrophism from temporally distinct kills. Hunters may have used cooperative trap or drive techniques to capture numbers of deer during the course of single hunting sessions. From the standpoint of prey behavior, fall and winter would be propitious times of the year for capturing large numbers of deer by trap or drive techniques. "In fall and winter, deer become more social, forming large groups of various sizes" (Spraker 1973:19). A series of these trap or drive situations throughout the fall and winter might well have produced the mortality pattern discernible in this assemblage.

If it can be assumed that all age groups are equally susceptible to death of this method, then there is reason to suspect that multiple kills of this type (over a period of time) would still reflect a catastrophic kill situation.

Another point in favor of the multiple catastrophic hypothesis is the nature of the sex ratio. As was stated earlier, the ratio of males to females was found to be 1:3.6 and 1:4.0 -- both of which figures were found to be slightly deficient in males according to a census made on modern mule deer herds (Robinette 1956:422).

A plausible explanation can be found in a set of behavioral conditions which prevail during mule deer breeding season. Breeding season in the Rocky Mountains extends from mid-October through December and for its duration, the gregarious tendencies already noted for wintering mule deer are in effect (Mohler _et al_. 1951:137; Einarsen

1956:371-375). The segregation of males and females (which is the rule for most of the year) is relaxed at this time and males may frequently be seen associating with female bands (Mohler et al. 1951:137).

The sex ratio among bands of mule deer during the breeding season has been observed to be slightly skewed in favor of females. Einarsen (1956:368) reports that:

> Active bucks, in mating season, are fewer in number than does, even though sex ratios may be balanced at birth and sometimes in preseason inventories. This is because of the fact that at any one time, only a small segment of the males are in the proper stage of development to carry out effectively the dictates of nature.

The sex ratio of the Dead Indian Creek sample therefore, is probably more reflective of the sex distribution in bands of breeding deer than that of the total population. This would seem to suggest it is the population structure of a breeding band of mule deer that is represented in the Dead Indian Creek sample and that the form of this population structure was captured by a catastrophic-type mortality.

CONCLUSIONS

1. Mule deer were killed at the Dead Indian Creek site during a period corresponding to the calendar months of late October through March.

2. According to measurements of mandibular widths, the ratio of males to females in the sample was determined to be 1:3.6 or 1:4.0.

3. The age structure of the killed population of mule deer was found to resemble that for catastrophic mortality in spite of the fact that the mortality was known to be temporally attritional.

4. The hypothesis was offered that the Dead Indian Creek mule deer sample reflects attritional-catastrophic mortality, or a series of catastrophic kills occurring throughout an extended time period.

THE PARTIAL SKELETON OF A CHILD FROM DEAD INDIAN CREEK

BY
GEORGE W. GILL

The human remains (HR002) from the Dead Indian Creek burial represent the partial post-cranial skeleton of a child. The burial was excavated August 10, 1969, by Dr. George C. Frison from the Dead Indian Creek site (48PA551), Park County, Wyoming. Points, flakes and bone were found in association with the remains, and radiocarbon and obsidian dates obtained. A Middle Plains Archaic date has been assigned to the site, and unless the human bones are intrusive into the other deposits, they can thus be assigned a similar age.

A chipped and worn molar tooth, not associated with the human child, was also recovered (Unit 1, 15"-18"). The remains of the child consist of the following bones: a proximal hand phalanx and a right 4th metatarsal (from Plot V, 2-B); another proximal hand phalanx (from S 087.5-090, E 000-005, 9"-12"); a left clavicle, fibula, segment of corpus sternum, and a left true rib (not designated as to plot or depth); and several additional bones from another location (division wall, 24"-36"). These latter remains consist of a complete left radius and ulna; a partially developed 2nd maxillary molar tooth; a broken left true rib; a partially formed left cuboid and two cuneiforms; three metatarsals; all four phalanges of the two great toes and four additional proximal toe phalanges; a partially formed left lunate and a capitate; five partially developed epiphyseal ossification centers; three metacarpals and three hand phalanges (two proximal and one medial).

Age of the young individual at the time of death was between 8 and 9 years, based upon the developmental level of the 2nd molar tooth (Ubelaker 1978). This is consistent with the stages of epiphyseal development and length of the long bone diaphyses.

Correlations of the stages of long bone development with dental root development are consistent with American Indian racial affinities. The two do not correlate at all well if white ancestry is assumed (and the Shour and Massler stages of caucasoid dental development used). This suggests that the child was American Indian, and this is in turn consistent with the assumed chronological placement of the interment. Unfortunately, the very fragmentary skeleton possesses no other traits diagnostic of race.

No indications of cause of death or other paleopathological conditions could be discerned on this small, partial skeleton.

AN OBSERVATION ON SOIL DEVELOPMENT AT THE DEAD INDIAN CREEK SITE

BY
RICHARD G. REIDER

Preliminary observation in August, 1982 of the soil on the T3 terrace (Albanese this volume) of Dead Indian Creek at the Dead Indian Creek site indicates the probability of part of an Altithermal soil overlain by soil horizons of post-Altithermal age (Figure 58). The Altithermal soil (Leopold and Miller, 1954) appears to be represented by strong calcium carbonate accumulation in stream sediments within its subsoil, the calcium carbonate lying below units in which McKean (ca. 4400 to 3800 B.P.) artifacts were found. As shown in stream cuts, soil horizons that appear to be associated with post-Altithermal cultural levels (Middle Archaic and younger) are podzolized units developed under gallery coniferous and aspen forest which presently occurs along the stream banks.

The calcareous subsoil noted here appears to correspond to Unit B described by Albanese (this volume). He notes that his Unit B is unconformably overlain by stream sediments that contain McKean and younger artifacts, i.e., by Unit C. Thus, the calcareous paleosol in Unit B is apparently the truncated Cca horizon of an Altithermal soil buried by sediments of Unit C of post- Altithermal age containing the McKean and younger artifacts. Albanese (this volume) also notes that an early Archaic (Altithermal) projectile point was found within Unit B.

Unit C contains podzolized soil horizons indicative of forest vegetation in the area during post-Altithermal times, perhaps this forest being principally confined to the stream banks. The underlying truncated calcareous soil in Unit B, on the other hand, indicates drier environments, perhaps forming under sagebrush and grasses with no forest. The total soil morphology indicates a polygenetic profile, first formed under dry conditions of the Altithermal, at which time calcium carbonate accumulated in the soil. Subsequently, following erosion of this soil to its Cca horizon and deposition of overlying stream sediments, forest has locally occupied the site and has superposed podzolized horizons -- complete with A2 or E horizons -- into the truncated, carbonate-rich subsoil. This superposition may coincide with climatic changes to more humid conditions in post-Altithermal time when forest locally invaded the site. The podzolized horizons were noted to occur at present under sagebrush and grasses, implying the former presence of coniferous trees at these locations. This superposition, however, has not been either intense enough or sufficiently long-term during post-Altithermal times to leach carbonates from the subsoil. Such pattern of soil development is similar Altithermal and post- Altithermal events recognized in soils of the eastern Medicine Bow Range of Wyoming (Sansom and Reider, 1974; Reider, 1977; Reider, 1983).

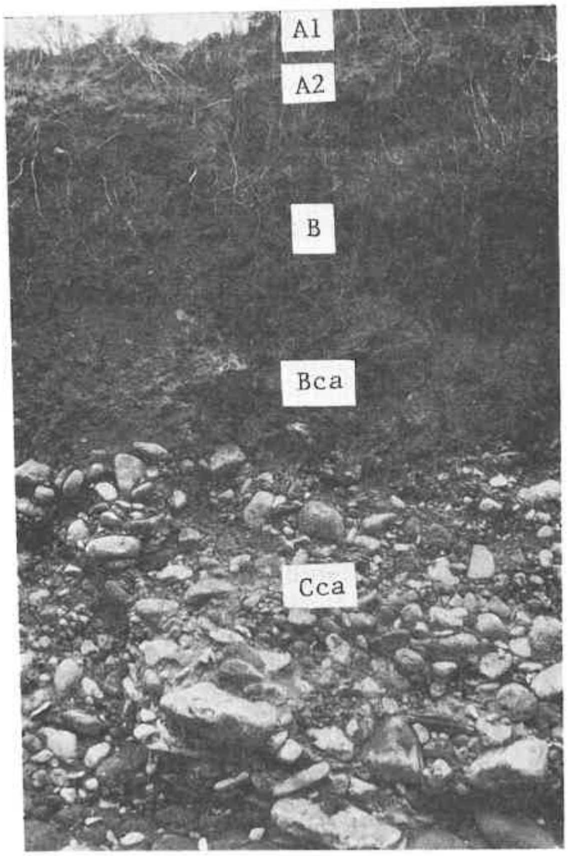

FIGURE 58: Soil horizonation in stream cut at Dead Indian Creek site. Horizonation (Soil Survey Staff 1962) is shown with a post-Altithermal A2 horizon indicative of forest at the locality overlying an Altithermal calcareous subsoil (Cca horizon) in gravels indicative of drier conditions possibly grassland and sagebrush. An unconformity (Albanese, this volume) would apparently exist at the top of the gravels, which separates fine-grained alluvium from coarse gravels beneath. Carbonate accumulation in the gravels approximates Stage II (Gile et al. 1966). Pocket knife (8.2 cm long) at lower right gives scale.

GEOLOGY OF THE DEAD INDIAN CREEK SITE

BY

JOHN P. ALBANESE

INTRODUCTION

The Dead Indian Creek site was visited on two occasions in August of 1972. The geologic field investigation was limited and of a reconnaissance nature. Several topographic cross-sections were made of the terrace system and stratigraphic sections were measured in the archeological test excavations. Lithologic samples were collected and examined under the binocular microscope. No attempt was made to construct a geologic map of the site area or to interpret the paleo-topography.

GENERAL GEOLOGIC SETTING

The Dead Indian Creek site lies within the valley of Dead Indian Creek. The valley is V-shaped and approximately 1,400 feet deep. It trends N20°E and is drained by the fairly straight, 20-30 foot wide channel of Dead Indian Creek, a perennial stream. The valley floor is 400± feet wide. The ground elevation in the site area is approximately 6,000 feet. Rocks of Cambrian age are exposed on the floor of the valley. The Paleozoic rocks that constitute the Heart Mountain Thrust Sheet overlie the Cambrian and form the steep walls of the main valley (Pierce 1957). The channel of Dead Indian Creek is bordered by a Holocene, alluvial terrace system. Two Pleistocene terraces border the Holocene terrace system on the northwest, in the vicinity of the main site excavations. A 100± foot high, terminal glacial moraine lies approximately one-half mile upstream from the site area. The moraine is oriented at a right angle to the valley axis and has been breached by Dead Indian Creek.

The Absaroka Mountains, which are composed of Tertiary volcanic rocks, border Sunlight Basin on the west. Dead Indian Creek drains the volcanic rock terrain and then passes out of it at a point located 9± miles upstream from the archeological site area (Pierce 1957). The Pleistocene and Holocene sediments present at the archeological site area are composed of a mixture of volcanic rock fragments and Paleozoic sediments. The volcanic rock fragments at the site were originally derived from the Absaroka Mountains, as <u>in situ</u> exposures of volcanic rock are not present along the valley floor in the vicinity of the archeological site.

HOLOCENE TERRACES

Three, paired Holocene

alluvial terraces are present along the margins of Dead Indian Creek. The relative positions of these terraces are shown on profiles A-A' and B-B' (Figure 59). The terraces are labeled T_1, T_2, and T_3 in ascending order. The maximum height of the T_3 terrace tread above the modern channel of Dead Indian Creek is 12 feet. The main excavation area of the site is situated on the tread of the T_3 terrace which lies 8 feet above and adjacent to the southeast side of the channel of Dead Indian Creek. At this area, McKean and McKean variants projectile points were recovered within three feet of the surface. Three radiocarbon dates ranging between 3800 and 4300 years B.P. were obtained from these McKean horizons (Frison 1978:47). At a point located 400 ± feet downstream from the main McKean occurrence, late Archaic style projectile points were recovered just below the tread of the T_3 terrace (cross-section B-B'). The site called Across the Creek One (Area 4) lies 12 feet above the northwest side of the stream channel. The tread of the T_3 terrace within the general area is an erosional surface that truncates Holocene sedimentary units of different ages. These truncation surfaces form during the period of erosion that occurs just prior to and during the

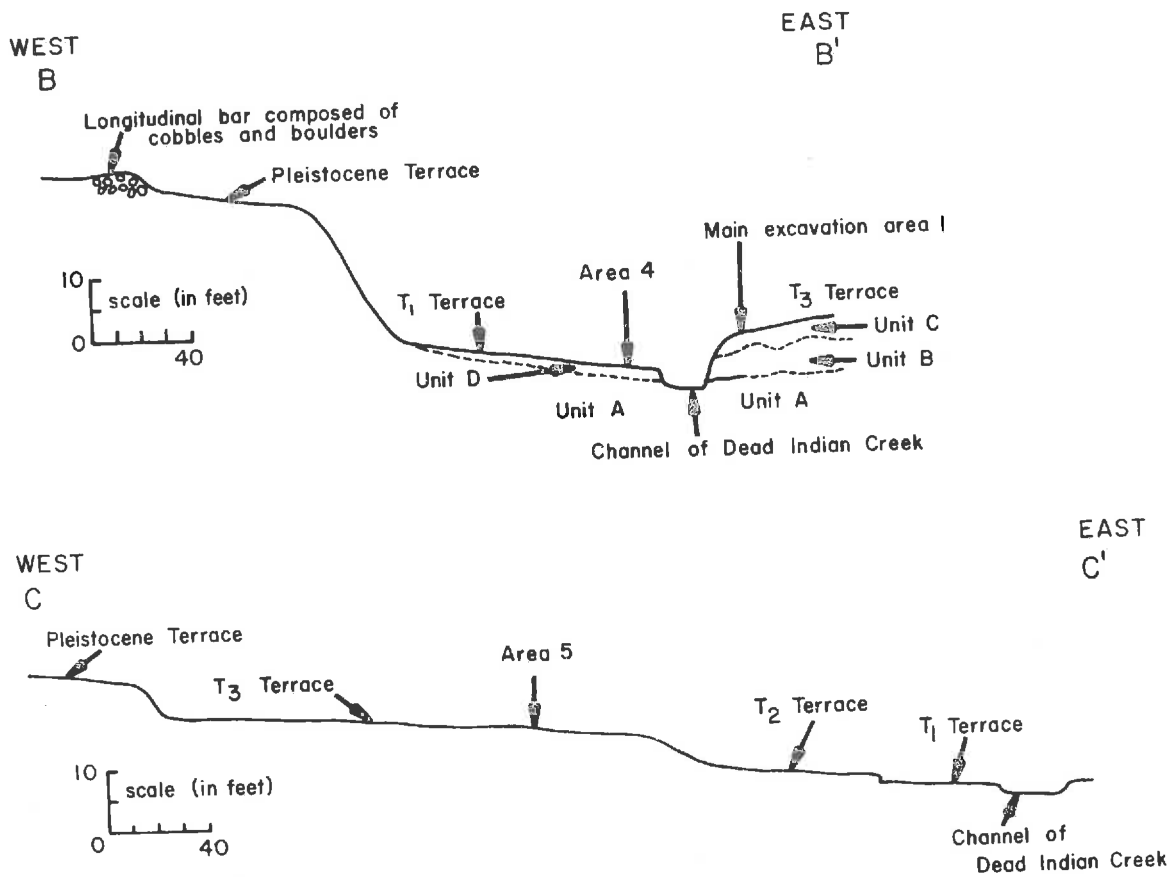

FIGURE 59: Geologic cross-sections across Dead Indian Creek site. See Figure 2 for location of sections.

renewed downcutting of the stream channel that results in the creation of a younger and lower terrace. A third archeological occurrence (Across the Creek Two [Area Five]) of Late Prehistoric affiliation lies just below the T_1 terrace surface. This area is located adjacent to the northwest margin of the creek channel opposite the main site excavations.

STRATIGRAPHY

Holocene sediments were examined at the main site area and at Across the Creek Two. Three distinctive depositional units are present in the main excavation area. These units are labeled A, B and C in ascending order. The top of unit C forms the tread of the T_3 terrace. Unit C varies in thickness from 34-46 inches and contains the McKean cultural horizons. It is composed of a generally massive, dark gray, poorly sorted, silty sand, which contains pebbles of volcanic rock and pieces of sandstone. Much of the sand size fraction is composed of volcanic rock debris. Unit C was deposited intermittently by a combination of slope wash and fluvial overbank deposition.

A pronounced, undulating, erosional surface separates unit C from the underlying unit B. This contact has 2± feet of relief. Root molds are common features along the erosional surface. These are 4-8 inches long and penetrate the surface of unit B. They are filled with the dark gray sand of unit C.

Unit B varies in thickness from 33-60 inches. It is composed of 1-3 foot long, individual lenticular beds that vary in thickness from 2-10 inches. Very fine-grained poorly sorted, silty sand lenses constitute the bulk of the unit. Coarse, conglomeritic sands and gravels do occur and are most abundant in the lower half of the unit. These coarse fractions occur as fill in shallow (1-3 foot thick) scour channels. Bedding inclination within these channels varies from horizontal at the top to 25° on the sides. The sediments in unit B were deposited in a braided stream environment.

The Cca horizon of a soil is superimposed on unit B. Calcium carbonate permeates the entire unit. The A horizon of the soil was removed by the erosional episode which formed the upper contact of the unit. The Cca horizon formed after deposition of unit B had ceased and a period of geomorphic stability ensued. The Cca horizon is correlated with the late Altithermal soil described by Haynes (1968:607).

An early Archaic style projectile point was recovered 12 inches below the top of unit B (George M. Zeimens, personal communication). Three firehearths were also exposed within unit B, as well as lithic debitage.

Unit A is composed primarily of a massive appearing conglomeration of pebbles, cobbles and some boulders. These clasts are mostly composed of volcanic rocks though some limestone cobbles are also present. A sharp, undulating contact with 3± feet of relief separates units A and B. The maximum thickness of exposed unit A is 3 feet. The total thickness of the unit is not known, as the base was not exposed. Unit A is a fluvial deposit that formed under a high stream flow regime. It is probably late Pleistocene in age.

At the area referred to as Across the Creek Two, (see cross section A-A'), the T_1 terrace tread is underlain by 10-40 inches of sandy sediment. This sandy sediment is termed unit D and is composed of horizontal layers of coarse to fine grained sands which vary from 3-13 inches in thickness. Unit D overlies unit A. Late Prehistoric artifacts were recovered from a 5 inch thick lens situated 6 inches below the terrace tread.

LITHOLOGIC SECTIONS

Section Number 1: Southeast wall of trench oriented N45°W.

Sample Depth From Surface (in inches)	Unit	Lithographic Description
1	C	Sand, dark grayish tan, generally fine grained though grain size varies from silt to coarse, poorly sorted, grains are angular to sub-angular. Sample contains abundant grass root molds and root fibers. Most sand grains are composed of quartz but grains of magnetite and siltstone plus pyroxene? crystals and grains of plagioclase are present. This sand is a mixture of sedimentary and volcanic rock detritus. Silt size particles comprise 20%± of the sample.
4-10	C	Sand as above, increase in loose pyroxene? crystals (20%± of sample). Sand contains some pink quartz grains and white siltstone fragments plus a few bone fragments which are 0.5-7.0 mm long.
14-18	C	Sand as above, contains abundant root fibers. Increase in silt content to 30%±.
19		Erosional surface
19-20	B	Sand, very light, yellowish tan, very fine grained, silty, slightly argillaceous, very calcareous, fair sorting, grains are sub-rounded to angular. Contains some root fibers and abundant root molds that are 1-2 mm long. The sand grains are primarily quartz though fine grained shale fragments are present. The sample reacts strongly with HCl. This sand marks the top of the Late Altithermal soil.
24-25	B	Sand as above, prominent white amorphous appear-

		ing calcareous cement. Sample contains 1%± scattered charcoal grains that are 0.5-1.5 mm long.
28-31	B	Sand as above, increase in charcoal grains, some of which are 7.0 mm long. Sample contains isolated, very fine grain size, pink silt grains.
31-33	B	Sand as above, increase in silt content, decrease in root molds and fibers, increase in large charcoal grains.
33-35	B	Sand, light grayish tan, very fine to fine grained, slightly silty, fair sorting, subrounded to subangular, calcareous. Contains abundant gastropod shells and shell fragments, 3-7 mm long. Grass root fibers and molds are abundant. Sample contains scattered, very fine size orange and green grains. Sample marks change in lithologic type.
38-40	B	Sand, light grayish tan, very fine grained, silty, slightly argillaceous, calcareous, fair sorting, subrounded to subangular grains. Contains scattered dark gray and light green grains. Sample contains limonite staining and abundant grass root fibers impregnated with a white gypsum?.
43-46	B	Silt, light tan, argillaceous, sandy (very fine grained), grades to silty, sandy clay. Interval contains prominent, white, amorphous appearing, calcareous cement plus some limonite stain. Sample also contains abundant grass root fibers and molds lined with earthy gypsum.
49-50	B	Sand, light tan, very fine grained, silty, grains subrounded to subangular, calcareous. Sample contains scattered gray and white grains plus some grains composed of plagioclase. Limonite staining present plus a few grass root fibers and molds

coated with gypsum?.

52-53	B	Sand as above, contains prominent white calcareous cement. Fine grained, gray volcanic rock grains are abundant. Trace of obsidian grains plus some gastropod shell fragments.
55-58	B	Sand, tan, very fine grained, silty, sub-rounded to sub-angular grains, well sorted, white amorphous calcareous cement, some limonite staining. Contains scattered, very fine grain size, red and green grains plus a few grains of plagioclase. Sample contains abundant grass root casts.
58-61	B	Sand, tan, fine grained, silty, sub-rounded to sub-angular sand grains, fair sorting, prominent white calcareous cement. Contains scattered pyroxene crystals plus plagioclase and gray chert grains. Marked decrease in root molds from above interval.
61-63	B	Sand, light tan, very fine grained, sub-rounded to sub-angular grains, fair sorting. Sample contains prominent white calcareous cement. Root molds are abundant and lined with $CaCO_3$. Sample contains some limonite staining and a few wood fragments.
65-68	B	Sand, light tan, very fine to coarse grained, poorly sorted, silty, calcareous. Contains root molds filled with $CaCO_3$. Sample also contains white clusters of $CaCO_3$. Grains of dark gray volcanic rock, 0.5-6.0 mm long, are abundant. Sample contains 1%± of medium size grains of obsidian plus coarse size grains of white, quartzitic sandstone. Pink volcanic rock, sub-rounded grains up to 6.0 mm long, are numerous. Sample also contains pyroxene crystal grains plus plagioclase grains.

70		Erosional surface
70-106	A	Deposit of cobbles, pebbles and some boulders. No apparent stratification. Clasts are composed mainly of volcanic rock plus some limestone. Individual clasts range from 2.5-30 cm in length.

Note: Unit B was deposited intermittently under a braided stream environment. Pauses between periods of sedimentation allowed the development of weak soil horizons. Archaeological material is present on some of these stabilized surfaces. Incipient A horizons of Azonal soils are present in intervals (inches below surface) 19-24, 35-46, and 61-70. These weak soil horizons are very local and erratic in distribution. The vertical intervals between soil horizons also varies. These weak soil horizons formed prior to the period of pedogenesis which resulted in the formation of the Late Altithermal soil.

Section Number 2: Northeast face of trench oriented N70°W.

Sample Depth From Surface (in inches)	Unit	Lithologic Description
3	C	Sand, grayish tan, fine to coarse grained, silty, poorly sorted, grains are sub-rounded to sub-angular, the grains are mainly composed of quartz, sample is unconsolidated. Approximately 25% of the sample is composed of dark gray volcanic rock grains which vary from 0.5-4.0 mm in length and sub-angular in shape. Other constituents are fine sized grains of plagioclase, pink rhyolite? and loose pale green pyroxene crystals (4± mm long).
6	C	Sand as above, contains white, calcareous, siltstone fragments (8± mm long).
9	C	Sand, light gray, very fine to coarse grained, poorly sorted, sub-rounded grains. Sample contains coarse size grains,

		composed of very fine grained sandstone, plus magnetite grains. Obsidian grains constitute 5%± of the sample.
12	C	Sand as above, silty, slightly argillaceous. Accessory grains include lithographic limestone, pink quartz and a lone fragment of orange, slightly calcareous fossilized wood. White chert debitage flakes are present.
15	C	Sand as above, root fibers are present.
18	C	Sand as above.
21	C	Sand as above, increase in grain size, 20%± of grains are coarse size and subrounded.
23	C	Sand, light grayish tan, very fine to granule size, slightly argillaceous, silty, poorly sorted, grains are mostly subangular in shape. 5%± of sample consists of granule size grains of white sub-lithographic limestone. 25%± of sample consists of light gray, volcanic rock grains. Sample contains debitage flakes of white chalcedony and obsidian plus some pink rhyolite? and plagioclase grains. A few grass root molds and fibers are present.
27	C	Sand as above, decrease in coarse and grit size grains.
30	C	Sand, grayish tan, very fine to fine grained, grains subangular, fair sorting. Contains some medium and coarse size grains. Sample contains scattered obsidian and magnetite grains plus 15%± light gray, volcanic rock grains. Red rhyolite?, limestone and white chert grains are also present.
33	C	Sand, light tannish gray, coarse grained, fair sorting, some fine size grains are present. 25%± of grains are composed of light gray, volcanic rock grains. 5%± are composed of

		fine grained, calcareous sandstone grains. Red rhyolite? grains are present as well as some grass root molds and fibers.
34		Erosional surface
36	B	Sand, light tan, very fine to fine grained, silty, sub-rounded grains, some medium to coarse size grains, sand is cemented by white, amorphous appearing $CaCO_3$. Sample contains scattered red and green grains plus numerous grass root molds and some root fibers.
39	B	Sand, light tan, fine grained, sub-rounded to sub-angular grains, fair sorting, slightly silty, slightly argillaceous, calcareous cement. 5%± of sample consists of light gray, volcanic rock grains. Other accessory grains are composed of light green, sub-rounded shale grains plus bright red colored grains (chert?).
41	B	Sand as above. Contains numerous root molds. Some portions of sample contain white calcareous cement while other portions do not.
44	B.	Sand, light tan, very fine grained, well sorted, grains sub-rounded.
47	B	Sand, light tan, very fine to coarse grained, poor sorting, sub-rounded grains slightly silty. Trace of medium size limestone grains plus obsidian and volcanic rock grains.
50	B	Sand, gray, coarse grained, some granule size grains, poorly sorted, sub-angular grain shape. 30%± of sample composed of loose, black to dark green translucent, pyroxene? crystals (4± mm long), 20%± of sample composed of quartz grains, 15%± red rhyolite? grains, 20%± light gray volcanic rock grains. Remainder of sample composed of 2-3 mm long fragments of white coarsely

crystalline limestone; grains of fine grained, quartzitic sandstone; white, fine grained, calcareous sandstone; green shale; white chert and pebbles (sub-angular to sub-rounded) of light gray volcanic rock.

Note: The base of unit B was not exposed in this section. The weak A horizons of Azonal soils are present in intervals 36-41 inches and 44-47 inches. The Late Altithermal soil is developed on unit B.

Section Number 3: Across the Creek Two (see cross section A-A', Figure 59).

This stratigraphic section is composed of the sediments which underlie the T_1 terrace tread and lie above unit A. This section, herein called unit D, was not examined in detail or examined under the binocular microscope as were sections 1 and 2. A cursory examination of unit D indicated that at Across the Creek Two, it varies from 10-32 inches in thickness. It consists of horizontal, lenticular layers of sand which vary from 3-13 inches in thickness. Individual sand layers pinch and swell in thickness and vary from 1-3 feet in length. Cross stratification and ripple features were not observed. The individual sedimentary layers probably formed during separate discrete stream flooding events. The Late Prehistoric artifacts recovered from unit D lie within a 5 inch thick sand layer located 5 inches beneath the surface.

CONCLUSIONS

BY

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McKean as a cultural complex is supported by a relatively large body of data, but the cultural systematics are far from well understood. McKean sites are widespread over the Central, Northern and Northwestern Plains, and the data base is integrated largely through a number of projectile point types and styles and by radiocarbon dates. The southern part of the area is manifested by grinding tools (metates and manos), a material trait that fades out toward the north. Deep, wide, prepared pits that contain evidence of fire and heat-fractured stones are a common feature along with the grinding stones and, together, they may reflect that part of their economy, at least, was strongly oriented toward vegetable food gathering.

From a number of stratified sites in the Bighorn Basin and the contiguous mountain slopes, we do know that McKean immediately followed the Early Plains Archaic or Altithermal period cultural groups. The latter are not yet as well known as the former, probably for geologic reasons, but they appear to have been engaged in similar life ways but restricted somewhat more by the economic limitations imposed by the dry Altithermal Period.

The confusion encountered in attempting to explain McKean begins with projectile point typology. Each investigator has experienced and will experience in the future, different reactions according to the particular site that each is investigating and also to the different philosophy that each investigator applies to the data base. The McKean site itself was large and rich in cultural content. The projectile point assemblage was large and contained a number of varying styles that at first glance suggest separate types (Smith 1970; Frison 1978). However, a closer look indicates that an alternate interpretation is that they are variants of a single type, as was pointed out by Mulloy (1954b). The fact also that all of these different styles occurred together at the McKean site without apparent horizontal or vertical separation of the culture bearing deposits into discrete components that separate the different styles strengthens the argument for several variants of a single type.

The relative obscurity of the site data recovered in the Black Hills area by Wheeler (n.d.) is unfortunate. Wheeler encountered sites that produced single projectile point styles rather than the full range as the McKean site. In this situation it is somewhat easier to rationalize his decision to name projectile point types such as Duncan and Hanna. There are other sites such as

Scoggin (Lobdell 1973; Frison 1978) in which two variant styles of the McKean projectile point occurred together in a bison kill situation. Style variation, as seen in the projectile points of the so-called "Yonkee" bison kill sites in the Powder River, may possibly represent a seasonal or some other aspect of the McKean cultural complex although this is far from being satisfactorily demonstrated. "Yonkee" may be something else.

The situation at the Dead Indian Creek site parallels that of the McKean site. The melange of projectile point styles from lanceolate to stemmed, to laterally restricted to side-notched is present here also. No known data recovery technique could separate components, although serious attempts to do this were made. The only present conclusion is that the different styles occur together and the societal mechanisms responsible are hypothetical.

The McKean (Middle Plains Archaic) occupation at Dead Indian Creek was at least partly a cold weather month occurrence based on the deer remains recovered. Lower tooth eruption schedules indicate an accumulation over several winter months contrasting with the tooth eruption schedules that are found in large instantaneous animal kills. Grinding slabs and manos argue for a plant food orientation also that may or may not be seasonally concomitant with the winter time animal procurement. Deep fire pits, some partially lined with cobbles, containing fire-fractured river cobbles were probably for food preparation, but could also have been used to heat simple structures in cold weather.

Mule deer and mountain sheep dominate the Dead Indian Creek faunal assemblage. The arrangement of several deer skulls and antlers strongly suggests some degree of deer ceremonialism. The nature of animal procurement is speculative and was probably single and/or small group hunting. Communal mountain sheep traps are found in the general area, but so far date only to the Late Prehistoric and Early Historic Periods. There is no known evidence in this general area to indicate large scale trapping of mule deer at any prehistoric period.

The relatively small amount of elk remains in the faunal assemblage is consistent with the evidence from other Middle Plains Archaic sites and suggests that these animals were either relatively scarce or not highly regarded as food. Bison would probably have moved out of the Sunlight Basin area in winter to more favorable wintering areas. Pronghorn would probably not have been attracted to the site area even in summer, although the area immediately adjacent to Sunlight Basin on the east toward the Bighorn Basin is, and has been in the past, good pronghorn habitat.

Raw stone flaking materials suggest local movements from the high to low elevations. Much of the Absaroka Mountains area is poorly known archeologically, but a few sources of distinctive materials are known. Silicified wood is common throughout much of volcanics in the Absaroka Mountains. Plate chalcedony has been deposited in cracks in volcanic rocks and in some cases demonstrates excellent flaking qualities. A greenish chert occurs occasionally also in the volcanics. Ignimbrite has been collected in the area of the western boundary of Yellowstone National Park and west of the Dead Indian Creek site. Obsidian occurs at a number of locations further west inside Yellowstone National Park. Morrison formation quartzites occur in quantity along the base of the mountains along with several indurated shales of various colors, and of somewhat questionable quality, but still they were used in limited quantity. Seasonal movements from the interior Bighorn Basin to the higher Sunlight Basin and from there to the higher mountains would have provided all of the raw stone flaking materials along with a wide variety of plant and animal foods.

Another aspect of the Dead Indian Creek site that is strikingly similar to the McKean site is the occurrence of human skeletal material directly beneath the living floor. The small amount of bone from a single immature person suggests a secondary burial and was interred in a shallow pit with no burial offerings.

Younger site components are present at other nearby locations along Dead Indian Creek. A Late Plains Archaic component appeared nearly a meter deep in a slightly lower terrace downstream and on the opposite side from the Middle Plains Archaic site area. Directly across from Dead Indian Creek from the Middle Plains Archaic site and buried in a flood plain surface is a Late Prehistoric component. A stone circle or tipi ring lies directly on the Middle Plains Archaic site surface and a small side-notched projectile point close by suggests that it is also Late Prehistoric in age.

No components older than Middle Plains Archaic were found. However, Mummy Cave nearby produced a number of Early Plains Archaic and Late Paleoindian components. The Dead Indian Creek site area is located so that any travel in the Sunlight Basin area had to pass through it. Since the location is one favorable to stopover by human groups as indicated by the Archaic and Late Prehistoric components present, older ones would also have been expected. Such components may be present, but are as yet undiscovered. However, there were very likely older components present that were removed by lateral cutting of Dead Indian Creek.

In final summary, the Dead Indian Creek site demonstrates relatively heavy human use during Middle, and Late Archaic and Late Prehistoric times. The heaviest was during the earlier period, but it may be that this reflects better preservation factors. The evidence from here and from other McKean sites suggests it was a true Archaic complex in the Northwestern Plains and mountains with a strong orientation toward a broad spectrum hunting and gathering economy.

The Dead Indian Creek site was used during the winter months in Middle Plains Archaic times and deer and mountain sheep were the major food sources. We can only speculate as to why these human groups stayed in the Sunlight Basin during the winter rather than move a short distance into the Bighorn Basin which would seem a better location to spend the winter where snow is significantly less. However, the animal remains present argue for a favorable wintering area for both deer and mountain sheep and consequently a location that provided winter subsistence for a human group.

A lack of evidence that would allow different projectile point styles to be separated into discrete site components requires some attempt at explanation. It is possible that a number of small bands congregated at the site simultaneously or at different times, but within a short period of time, and this cannot be separated in the stratigraphic record. It is possible also that there were designated functional or ritualistic differences in the different point styles. It may also be that the acceptable range of variation in projectile point morphology in Middle Plains Archaic or McKean cultural groups was much greater than we have been accustomed to observing in other archeological contexts. Whatever the explanation, the true answer has not yet appeared and must await the results of further investigations.

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