MUSEUM OF NEW MEXICO

OFFICE OF ARCHAEOLOGICAL STUDIES

TEST EXCAVATIONS AT LA 114103 ALONG U.S. 82, OTERO COUNTY, NEW MEXICO

Stephen C. Lentz

ARCHAEOLOGY NOTES 259

SANTA FE 1999 NEW MEXICO

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ADMINISTRATIVE SUMMARY

In December 1996, the Office of Archaeological Studies, Museum of New Mexico, conducted archaeological test excavations at High Rolls Cave (LA 114103) along U.S. 82 in Otero County. This project was conducted at the request of the New Mexico State Highway and Transportation Department, which plans to reconstruct a portion of U.S. 82. The site is on land administered by the USDA Forest Service and Lincoln National Forest.

LA 114103 is a cave site along U.S. 82 in a cliff face south of the highway. Numerous potholes had been dug into the deposits, and materials were eroding from the northern edge of the deposits. Testing revealed deep deposits dating from the Archaic period. The site contains important information on the prehistory of the area.

Submitted in fulfillment of Joint Powers Agreement J00343/1 between the New Mexico State Highway and Transportation Department and the Office of Archaeological Studies, Museum of New Mexico.

MNM Project No. 41.6391
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INTRODUCTION

Stephen C. Lentz and Linda Mick-O'Hara

At the request of the New Mexico State Highway and Transportation Department (NMSHTD), the Office of Archaeological Studies (OAS) undertook an archaeological testing project at LA 114103 (High Rolls Cave), a cave site along U.S. 82 near High Rolls, New Mexico. LA 114103 is on Lincoln National Forest land in a cliff face south of the highway (Figs. 1 and 2).

The consultation between representatives at the Lincoln National Forest and several Native American groups was completed on December 6, 1996. The Office of Archaeological Studies Special Use Permit with the Lincoln National Forest (User #2017) was modified to include limited testing at LA 114103. Archaeological testing at LA 114103 was conducted from December 9 through December 13, 1996, after all necessary consultations were complete. The project supervisor was Linda Mick-O'Hara, and the crew was composed of Dorothy Zamora and Susan Moga. The intent of the testing program was to determine the nature and extent of subsurface materials at High Rolls Cave. The front part of the cave had been removed during the initial construction of U.S. 82, and there was some question about the extent of cultural materials that had remained intact at the site.

Prior to conducting fieldwork, current listings of the *National Register of Historic Places* (NRHP), the *State Register of Cultural Properties*, and the site files of the New Mexico Cultural Resource Information System were consulted. LA 10101, Fresnal Shelter, part of the Alamogordo Site, multiple property No. 152 (including rockshelters LA 114736 and LA 115521), was listed on the *State Register*. However, it was not listed on the *National Register*. Fresnal Shelter is in the vicinity of LA 114103.

Work included mapping the cave and documenting numerous vandalized areas that had been dug into the deposits and materials that were eroding from the northern edge of the deposits. The NMSHTD environmental section and Lincoln National Forest staff visited LA 114103 and determined that test excavations at the site should stop because significant cultural materials had been encountered, though the extent and depth of these deposits remained unknown. The results from radiocarbon samples place cultural layers encountered during the limited testing within the San Pedro phase of the Cochise tradition (1500-200 B.C.). This overlaps the occupational sequences at other Archaic shelters in the area (e.g., Fresnal Shelter, LA 10101).

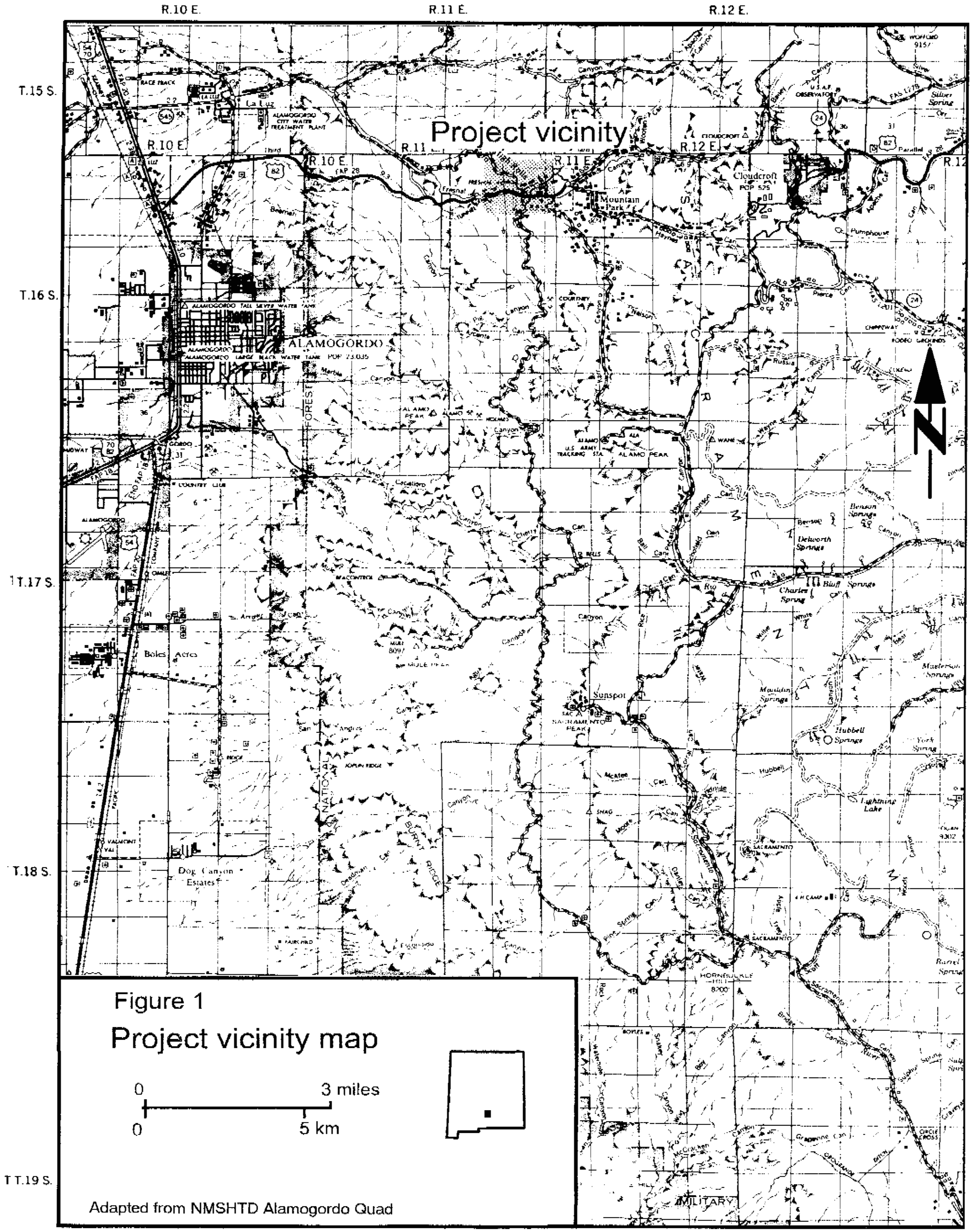

Figure 1

Project vicinity map

Adapted from NMSHTD Alamogordo Quad

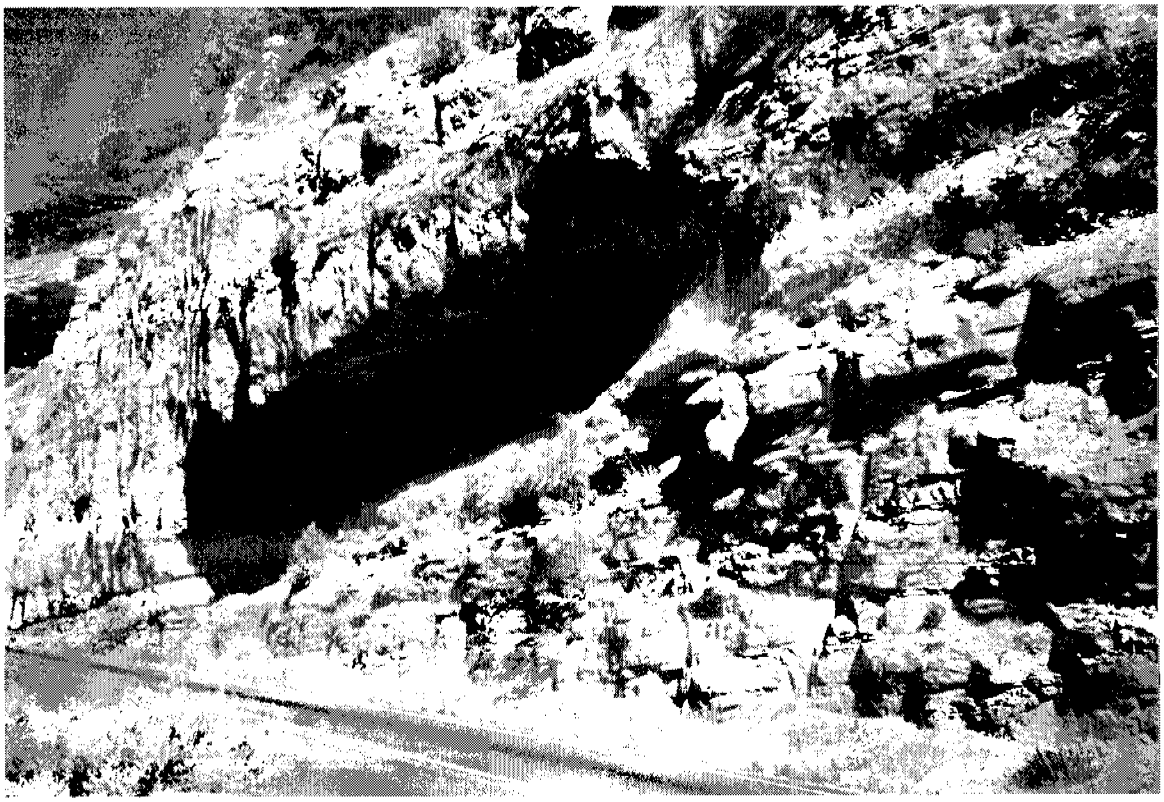

Figure 2. High Rolls Cave.

ENVIRONMENT

Nancy Akins

Geology and Soils

The project area is within the Sacramento section of the Basin and Range physiographic province (Fenneman 1931:394). The Sacramento Mountains are part of one of the largest mountain ranges in southern New Mexico. The northern part of this range includes the Sierra Blanca, composed primarily of igneous rocks. The southern portion, or Sacramento Mountains, form a *cuesta* with a rugged escarpment to the west and a gentle eastern slope extending to the Pecos River. The steep western escarpment contains a thick section of sedimentary rocks (Pray 1961:1).

The project area lies along a high canyon wall on the west side of the Sacramento Mountains in a subarea of south central New Mexico called the Tularosa Basin. The transition between the low, flat, arid Tularosa Basin floor and the high rugged mountain rim is striking. The basin floor, ranging in elevation from 1,188 to 1,768 m (3,900 to 4,800 ft) rises up to the Sacramento Mountains, which average 2,743 m (9,000 ft). The project area is at 1,905 m (6,250 ft).

Tertiary age Sierra Blanca volcanics, which are characterized by igneous rocks, characterize the area northwest of the project area. Within the project area are Permian age limestones of the Yeso formation and San Andres limestones and Hondo sandstones. San Andres limestone is a fossiliferous dolomite that occurs in thin to thick beds. That of the Yeso formation is yellow and pink interbedded siltstone, limestone, dolomite, shale, and fine-grained sandstone. Hondo sandstone is well-sorted fine- to medium-grained sandstone in massive beds of limestone (Walt 1980:10-11).

Soils in the project area are predominately of the Arosa series, formed in alluvium and derived from mixed igneous and sedimentary rocks. These soils are confined to narrow mountain valley floors and support mid to tall grasses, forbs, shrubs, and scattered ponderosa pine. Arosa soils are only slowly permeable and are generally used for livestock grazing, recreation, and wildlife. Mountain soils are Peso series or cobbly clay loams or stony silty clay loams formed from limestone and limestone bedrock. Mid to tall grass, forbs, shrubs, ponderosa pine, and mixed conifers are supported by these soils. Peso soils are moderately to slowly permeable and are used mainly for timber, recreation, and watershed. Grazing is limited to the less wooded areas (Neher 1976:6, 21; Walt 1980:14).

Climate

Between 1931 and 1983 Ruidoso had an average of 100 frost-free days per year (Prince 1980:16). Temperatures are cool, averaging 48.2 degrees F, with a high of only 64.6 degrees in July and a low of 33.1 degrees in January. Annual precipitation over this period averaged 54 cm (21.36 inches). The greatest amounts fell in July and August (38.3 percent of the annual average). April, May, and November are the driest months (Mueller 1991:2). This combination produces a high, cool, and moist zone within a generally dry region where elevation is the key determinant of precipitation and temperature (Prince 1980:18). Mountain valleys of the Mescalero Apache area with Arosa series soils receive 45.7 to 50.8 cm (18-20 inches) of precipitation per year, with an mean annual temperature of 41 to 45 degrees F. The frost-free season lasts from 80 to 110 days. Mountain areas nearby receive similar amounts of precipitation, 45.7 to 55.9 cm (18-22 inches) and have a mean annual temperature of 38 to 45 degrees F (Neher 1976:6, 21).

Over the past 8,000 years, this portion of the state has undergone drying with cycles of wetter and dryer periods and a change from winter-dominant precipitation to one of summer monsoons. This has resulted in forest communities shifting to higher elevations but little overall change in the composition of the plant communities. During the early Holocene the climate was much cooler than today, and a larger area was covered by vegetative associations that are unproductive for hunters and gatherers. Paleoindian activities would have been restricted to portions of the Tularosa Basin and the plains to the east. The middle and late Holocene (8,000 B.P. to the present) was characterized by warmer temperatures and summer monsoons, producing conditions more favorable for hunters and gatherers (Keesling 1980:44).

Vegetation and Wildlife Associations

The project area falls within the Transition life association. In this association, trees are the major feature of the vegetation. Ponderosa pine is the most important tree, with occasional alligator and Rocky Mountain junipers. Less important are southwestern chokecherry, black chokecherry, and black walnut in canyons and mesic areas. In riparian habitats, the narrow-leafed cottonwood, ash-leaf maple, and the Rocky Mountain maple grow. Gambel's oak is common and chestnut oak occasional. Numerous shrubs and shade-loving herbaceous plants occur in this association. Commonly noted grasses are prairie junegrass, several muhly grasses, three-awn, Arizona fescue, nodding brome, Kentucky bluegrass, Bigelow bluegrass, several wheat grasses, squirrel tail, foxtail barley, grama grasses, red top, sleepy grass, and wild rye (Martin 1964:174-175).

Mountain soils associated in the Mescalero-Apache area support a native vegetation of ponderosa pine, fir, aspen, spruce, blue grama, side-oats grama, mountain brome, mountain muhly, needlegrass, fescue, mountain mahogany, oak brush, serviceberry, cliff rose, sedge, piñon pine, and juniper. This habitat is excellent for elk, bear, and turkey; fair for deer; and poor for fish, pheasant, dove, quail, waterfowl, and pronghorn (Neher 1976:46). Valley soils support a native vegetation of western wheatgrass, Arizona fescue, bluestem, sleepygrass, blue grama, scattered snowberry, mountain mahogany, cliff rose, oak brush, piñon pine, juniper, and ponderosa pine, with mixed conifers at higher elevations. This habitat is excellent for pronghorn and fair for dove, quail, bear, fish, pheasant, waterfowl, deer, and elk (Neher 1976:45).

During the testing phase of this project, late summer rains resulted in lush vegetation throughout the area. Plants were dense and left little bare ground. The valley bottom was covered with annual and perennial plants, with occasional woody shrubs, ponderosa pines, and alligator bark and Rocky Mountain juniper. Higher elevations are composed primarily of dense ponderosa pine forests, interspersed with white pine and Douglas fir.

CULTURAL OVERVIEW

The project area, at the northern margin of the Mescalero Apache Reservation in the central Sacramento Mountains, is between several better known localities. The Sierra Blanca Region lies to the north and east, the Tularosa Basin to the southwest, and the Chupadero Region to the northwest (e.g., Kelley 1984:36). Since little comprehensive work has been done in or near the project area, background information is limited to generalities derived from the surrounding area, with a focus on adaptations rather than detailed descriptions derived from previously defined cultural phases.

Paleoindian

As noted, the climate during the Pleistocene and early Holocene was cooler and less productive at higher elevations. This lack of hunting and gathering resources would have severely limited utilization of the project area by early populations while favoring those of the Tularosa Basin and eastern plains (Keesling 1980:44-46).

Paleoindian sites have been found in the lower Tularosa Basin near dry lake beds at elevations below 1,524 m (5,000 ft) in the Jornado del Muerto south of Socorro, the lower Rio Grande Valley, and near the Texas-New Mexico state line (Dodge 1980:48-49). In a survey of over 7,000 acres (2,833 ha) in the Lincoln National Forest south of the Mescalero Apache Reservation, numerous lithic scatters and isolated projectile points were found, but none were assigned to the Paleoindian period (Spoerl 1985:38). With the exception of rockshelters and caves at elevations between 5,000 and 6,000 ft, Paleoindian use of mountain areas is rare (Sebastian 1989a:37). A Paleoindian projectile point and a biface or preform midsection reminiscent of a Paleoindian artifact were found during the BIA survey of Mescalero Apache commercial timber land. The point is a Folsom preform fragment found on a Late Archaic site at an elevation of 2,268 m (7,440 ft) (Broster 1980:93, 97).

Some researchers contend that the small quantity of sites from this period is due to our inability to recognize aspects of the Paleoindian adaptation other than the diagnostic projectile points associated with big game hunting (Sebastian 1989a:33). However, the near lack of evidence in the Sacramento and other mountainous areas may also reflect the general absence of important resources in mountainous regions during the Paleoindian period.

Archaic

The Archaic period, considered a broad-spectrum hunting and gathering adaptation, began about 6000 B.C. in response to a warmer and drier climate (Dodge 1980:49; Sebastian 1989b:41). As in the case of the Paleoindian period, recognizing Archaic sites in absence of diagnostic projectile points has led to inconsistent assignment of sites to this period.

Archaic sites are rare in southern New Mexico (Dodge 1980:50; Sebastian 1989b:46). Eighteen Archaic or possible Archaic sites were recorded during the BIA survey of Mescalero Apache lands. Projectile points collected during the survey represent two Archaic traditions, a possible regional variant of the Cochise culture and the Oshara tradition (Broster 1980:94-95). The presence of isolated projectile points and sites indicates the upper elevations of the Sacramento Mountains were used, especially during the Late Archaic. The exact nature of this utilization has yet to be determined. Fresnal Shelter, part of the Alamogordo site complex (which includes two other rockshelters), dates from about A.D. 1 to 1600 B.C. or earlier (Wimberly and Eidenbach 1981). This site will ultimately shed light on Archaic settlement and subsistence strategies used in this area and possibly reveal a specialized highland hunting pattern (a more detailed description of this site is provided below). A serial foraging strategy in which groups move to take advantage of the seasonal availability of particular food resources as opposed to task groups returning food to a base camp (e.g., Sebastian 1989b:55) is an option for this area. More direct evidence of subsistence systems during the Archaic is needed to address this issue.

Jornada Mogollon

The Mogollon tradition begins with the introduction of ceramic technology, accompanied by an increasing reliance on agriculture and more sedentary lifestyles around A.D. 400 (Dodge 1980:50). Kelley's (1984) sequence for the Sierra Blanca region is the closest and most applicable to the project area. Early Glencoe phase (A.D. 400 to 1100) habitation sites are pithouse villages near streams and usually at elevations below 2,134 m (7,000 feet). Pithouses continue into the late Glencoe phase (A.D. 1100 to 1200) but are accompanied by jacal and occasional masonry structures. A diversity of ceramic wares demonstrates an increase in contact and exchange with groups well outside the region. Lincoln phase (A.D. 1200-1400) habitation sites are linear blocks of masonry rooms with subterranean square kivas and are generally on ridges or terraces, often away from major streams but usually in the piñon-juniper zone. Ceramic evidence of contact with other groups increases over the Glencoe phase (Dodge 1980:541-52).

The Glencoe phase population was small, sparse, and agriculturally based. Kelley's Glencoe phase sites occur in two valleys on the eastern slopes of the Sacramento and Sierra Blanca Mountains. Subsistence was mixed and adapted to an Upper Sonoran environment. Gathering appears to have played a larger role than in other parts of the region, while hunting may have been somewhat less important until the late Glencoe phase (Kelley 1984:48-49). Lincoln phase populations also supplemented agriculture by gathering, and game may have been a substantial element of the diet. Deer, pronghorn, and smaller animal bones are numerous in sites of the Lincoln phase (Kelley 1984:54).

In Lincoln National Forest, south of the Mescalero Apache Reservation, Glencoe phase sites dating between A.D. 1100 and 1300 are along the southern tributary drainages of the Peñasco Valley on broad terraces adjacent to streams or where canyons or ridges extend toward drainages. Most are at the upper end of the piñon-juniper belt or just within the ponderosa pine–dominated transitional zone. Habitations are pit structures, and ceramic types associated with this phase include Chupadero Black-on-white, El Paso Polychrome, Three Rivers Red-on-terracotta, and Mimbres Black-on-white. These higher elevation sites suggest a pattern of low site density with selective and intense use of some areas (Spoerl 1985:33-35).

The Sierra Blanca region was abandoned by agriculturalists by A.D. 1400. They may have withdrawn to the north and northeast. Evidence of hostilities at one excavated site where the structures were burned and the inhabitants killed coincides with the abandonment of the region. Kelley suggests that the hostilities that may have ended sedentary occupation of the region involved pre-Apache nonsedentary inhabitants of the area, other agricultural groups, and Plains nomads. She also sees a deteriorating climate as a factor in causing the conflicts (Kelley 1984:156-159; Sebastian and Levine 1989:94-95).

Protohistoric and Early Historic

The era just before the Spaniards entered the Southwest is one of the most poorly known. Mobile groups, including the ancestors of the Mescalero Apaches, left few distinctive remains. Even those areas known to have been heavily utilized in the historic period have few sites that can confidently be identified as Apache (Sebastian and Levine 1989:93).

Much debate has centered around the question of when Apachean groups entered the Southwest. Early entry scenarios place them in southeastern New Mexico in the 1400s, while another view considers an entry date in the 1600s (Sebastian and Levine 1989:99). The Mescalero Apaches were recognized as a distinct group in the 1600s. Their territory extended from the Rio Grande east into Texas and south into Mexico. Settlements were west of the Pecos River, and buffalo hunts and expeditions to acquire salt and horses extended farther east (Opler 1983:419).

The Spanish presence in New Mexico disrupted established relationships between native groups. Apache and Pueblo interactions alternated between raiding and trade, probably depending on climatic and other factors that disturb basic subsistence systems. Spanish Colonial practices cut off access to items and resources necessary for Apache subsistence. With the introduction of firearms, horses, slave raids, restriction of hunting and gathering areas, and competition from Comanches, Apache raiding of Spanish and Pueblo settlements increased (Broster and Dart 1980:77-78). Historic documents relate that in 1778 the Apaches in the Sierra Blanca area had been forced out of their homes by Comanches but returned by 1789 (Schroeder 1973:134-135). Apache raiding continued until the 1880s, when attempts by the United States government to turn the Mescalero Apaches into farmers were unsuccessful (Schroeder 1973:140-142).

The Mescalero Apache Reservation was established by executive order on May 29, 1873 (but not confirmed by Congress until 1922), beginning a long period of conflicts with ranchers and government officials (see Harrill 1980; Opler 1983; Opler and Opler 1950; and Sonnichsen 1958 for detailed descriptions of historic relationships).

Mescalero Apache territory is characterized by mountain ranges and peaks separated by valleys and flats. Severe winters and short growing seasons discourage agriculture and greatly influence subsistence options, resulting in the continuation of relatively small groups of hunters and gatherers until the late historic period (Opler 1983:419-420). Extended families formed local groups of as many as 30 families, which moved constantly within a particular area. By around 1850, settlements or headquarters were serving as centers from which small parties left to obtain resources, returning to process what was acquired. The geographical distribution of plants and animals required that the Mescalero Apaches be very mobile. Their small inventory of possessions included many perishable items. The economy was based on hunting, harvesting wild plants, and a little agriculture. High elevation game included elk and bighorn. Buffalo was a major meat source, but pronghorn and rabbits were also taken from the plains. Other food animals included deer, opossums, woodrats, squirrels, prairie dogs, ringtails, and peccary. Some groups ate fish and birds such as turkey, quail, and dove. Carnivores and reptiles were avoided unless taken for their skins or body parts or when no other food was available. Mescal was an important resource in later spring. Other utilized plants were sotol, bear grass stalks, amole, datil, prickly pear cactus tunas and fruit, mesquite pods, vetch pods, wild peas, locust, screwbean, evening primrose, tubers of sedge, rootstocks of cattail, wild potatoes, juniper berries, and agarita berries. Pine nuts, acorns, and walnuts were also gathered. Breads were made of pigweed, tumbleweed, and grass seeds. Berries, mint, wild onion, sage, wild celery, pennyroyal, horsemint, and hops were also components of the diet (Basehart 1973:145-170;

Opler 1983:428-433; Prince 1980:80-83).

The BIA survey of commercial timber lands in the Mescalero Apache Reservation located 53 historic sites and 9 isolated occurrences. Most date from the 1950s and 1970s . The earliest date from 1880 to 1915. The majority of these sites are attributed to the Mescalero Apaches, but a few are Euroamerican or undetermined (Broster and Dart 1980:133-135). None reflect the early hunting and gathering use, which may be a reflection of the inability to distinguish these sites from those of earlier groups.

PREVIOUS WORK IN THE AREA

Stephen C. Lentz and Dorothy A. Zamora

Several surveys have been conducted and many sites recorded within the area around High Rolls Cave (Table 1). Most of the surveys were conducted by the Lincoln National Forest for timber sales. The NMSHTD surveyed the existing highway right-of-way in 1996 and recorded LA 33221, LA 33222, LA 114520 (highway tunnel), and LA 114103 (High Rolls Cave). These are also the closest major archaeological sites.

Table 1. Recorded Sites from Area around High Rolls Cave

LA Number	Date	Work By	Site Type
10101 (Fresnal Shelter)	1969, 1997, and 1972	Wimberly and Eidenbach (1972)	Rock shelter
22948	1986	Lincoln National Forest	Lithic artifact scatter
22949	1986	Lincoln National Forest	Lithic artifact scatter
24020	1992 and 1996	Lincoln National Forest	Historic mine
24021	1986	Lincoln National Forest	Lithic artifact scatter
33221	1981 and 1983	OAS (Hannaford 1987)	Late Archaic and Mogollon camp
33222	1981	NMSHTD	Lithic artifact scatter
56912	1980 1991	A. Beaty Arboles Contract Archaeology	Historic
56937	1980 1991	A. Beaty Arboles Contract Archaeology	Historic
60860	1987	Lincoln National Forest	Historic
60997	1987 1989 1991	NMSHTD Lincoln National Forest Arboles Contract Archaeology	Historic
61063	1980	NMSHTD	Historic
61064	1980 1991	Arboles Contract Archaeology Lincoln National Forest	Historic
61133	1987	Lincoln National Forest	Historic
61361	1983	Lincoln National Forest	Historic
61502	1993 1994	Department of Defense Lincoln National Forest	Ring midden
61503	1980	Lincoln National Forest	Lithic artifact scatter
61504	1980	Lincoln National Forest	Lithic artifact scatter
61505	1980	Lincoln National Forest	Rock midden
61506	1980	Lincoln National Forest	Rock midden
61507	1980	Lincoln National Forest	Roasting pit
61508	1980	Lincoln National Forest	Rock midden
61509	1980	Lincoln National Forest	Rock midden
60510	1980	Lincoln National Forest	Rock midden
61511	1980	Lincoln National Forest	Rock midden
61918	1985	Lincoln National Forest	Rock cistern
61977	1985	Lincoln National Forest	Historic
65504	1979	Lincoln National Forest	Lithic artifact scatter
65505	1979	Lincoln National Forest	Lithic artifact scatter
66005	1980	Lincoln National Forest	Fire ring
72320	1989	Lincoln National Forest	Lithic artifact scatter
72634	1989	Lincoln National Forest	
72635	1989	Lincoln National Forest	Lithic artifact scatter and hearth

72637	1989	Lincoln National Forest	Lithic artifact scatter and rock alignment
72638	1989	Lincoln National Forest	Lithic artifact scatter
75716	1991	Arboles Contract Archaeology	Historic
76411	1990	Lincoln National Forest	Lithic artifact scatter
76412	1990	Lincoln National Forest	Lithic artifact scatter
76413	1990	Lincoln National Forest	Lithic artifact scatter
78083	1989	Archaeological Research Inc.	Lithic and ceramic scatter
78259	1990	Lincoln National Forest	Historic
78260	1990	Lincoln National Forest	Historic
83154	1991	Human Systems Research	Lithic artifact scatter
84593	1991	Arboles Contract Archaeology	Historic
84595	1991	Arboles Contract Archaeology	Historic
84598	1991	Arboles Contract Archaeology	Historic
84599	1991	Arboles Contract Archaeology	Historic
84600	1990 and 1991	Arboles Contract Archaeology	Historic
89388	1992	Lincoln National Forest	Historic
107268	1994 and 1995 1996	Lincoln National Forest NMSHTD	Historic railroad
108587	1995 1996	Lincoln National Forest NMSHTD	Historic
110331	1995	Lincoln National Forest	Historic
114103	1981	NMSHTD	High Rolls cave
114520	1981	NMSHTD	Highway tunnel
115184	1996	NMSHTD	Lithic artifact scatter
115185	1996	NMSHTD	Lithic artifact scatter
115522	1996	Natural Resources Conservation Services	Historic
115523	1997	Natural Resources Conservation Services	Historic

Fresnal Shelter (LA 10101) is a very important site northwest of High Rolls Cave in Fresnal Canyon. It was excavated by Wimberly and Eidenbach (1972). At Fresnal Shelter, the sequence of development dates from about A.D. 1 to 1600 B.C. or earlier and should ultimately permit internal chronologic segmentation. The excavations have yet to be fully reported, but preliminary studies have shown that Fresnal Shelter is one of two sites in southern New Mexico with directly dated evidence of early cultigens. Food remains include wild plants (cactus, sotol, grass seed, and wild squash), but also, even in the earliest deposits, chapalote maize, a smaller eight-rowed maize, and domestic beans. Artifacts here are characterized by shouldered, straight-stemmed concave- or straight-based projectile points, contracting-stemmed projectile points, well-made small end scrapers, choppers, flake scrapers, and manos and metates. In addition, preserved remains include coiled and twilled basketry bags and sandals. Indication of a specialized highland Archaic-hunting pattern was also encountered at this site. Wimberly and Eidenbach (1981:2) found evidence of large game hunting and butchering of mule deer, pronghorn, bighorn sheep, and bison.

A previously mentioned BIA survey on the Mescalero Apache Reservation (Broster and Dart 1980) recorded 53 late historic sites. Hannaford (1987) excavated LA 33221 near High Rolls and found a multicomponent camp with Archaic materials and Mogollon sherds. At the base of the Sacramento Mountains along U.S. 82, OAS excavated portions of an early Mesilla phase pit structure village (Oakes 1998). A nearby portion of this site contained an El Paso phase room unit dating to approximately A.D. 1200 (Hunter 1988).

TESTING RESULTS

Limited testing followed the procedures and practices outlined in the *Testing and Site Evaluation Proposal* (SHPO Log 43648). The purpose of the testing program was to determine the amount and extent of subsurface materials at High Rolls Cave (LA 114103). The front part of the cave had been removed during the initial construction of U.S. 82, and there was some question about the extent of cultural materials that remained intact at the site.

The late Al Bassett stated that during the 1940s, construction of U.S. 82 many perishable items and human bones were picked up after the initial construction at High Rolls Cave (interview with Pete Eidenbach). Several other men who were in the area at the time were able to shed more light on the accounts given by Mr. Bassett (see oral history section). These oral histories are important because they are the only accounts of the original size and cultural contents of High Rolls Cave.

Testing at the cave confirmed the existence of perishable cultural materials in the deposits remaining in the cave. The cultural layer explored during the limited testing at the site also contained lithic artifacts, charcoal, and faunal materials. No human bone was encountered. The small number of lithic artifacts recovered have been analyzed. The few pieces of animal bone recovered have been analyzed, and a summary is presented here. Test Pit 2 contained a Middle to Late Archaic projectile point and a possible eroded basket that contained some bone and shell. The possible prayer stick was photographed, drawn, and returned to the archaeology section of Lincoln National Forest for curation.

Materials recovered from LA 114103 were taken to OAS for processing and analysis. Samples were sent out for C-14 analysis and pollen analysis. All perishables recovered from the testing phase were sent to the Museum of New Mexico Conservation Division for conservation prior to analysis.

Methods

The limited testing program included mapping the cave and the documentation of numerous vandalized areas that had been dug into the deposits and materials that were eroding from the northern edge of the deposits (Figs. 3 and 4). Datum A was established near the west extent of the cave, and Datum B near the center of the remaining deposits. Three test pits were established. Test Pit 1 was placed toward the center of the deposits to determine the depth of cultural materials in that area, and Test Pits 2 and 3 were placed next to a large vandalized area to investigate cultural remains that might have been impacted by pothunting in the cave, as well as the depth of the deposits in that area. Excavation in both test pits proceeded by 10 cm levels. Natural strata were determined within these levels, and Test Pit 2 was excavated in five levels.

Test Pit 1

Test Pit 1, at 101N/105E, was excavated through three arbitrary 10 cm levels and was arbitrarily stopped at .9305 mbd (northeast corner, measured from Datum B) (Fig. 5). The soil consisted of soft silty sand with a few pebbles and limestone spalls from the ceiling of cave. The southwest quad consisted of a hardened caliche area at .115 mbd. Just north of this area were two medium-sized limestone fragments, which were blackened on the underside. A number of charcoal fragments were found in this vicinity. The extreme northeast corner contained a large charcoal pocket at .515 mbd. A possible dendrochronological sample was found under the charcoal fragment in the southwest quad. This pocket, 10 cm east-west by 14 cm north-south, was 1 cm deep, with a darker brown soil around the edge. One lithic artifact, one historic glass fragment, one macrobotanical sample, one rodent bone, and radiocarbon samples were collected from the fill. Cow manure in the fill may have been imported for fuel during historic times. We were curious why someone would sit inside a confined space and burn cow manure when there was abundant firewood in the vicinity. However, ethnohistorical sources identify many types of animal manure as an efficient fuel. Pete Eidenbach suggested that the "cowpies" may have been bison droppings, which were used in nearby Fresnal shelter by Archaic groups. Further, the lenses of charcoal might be microlenses representing hearths. (Fresnal Shelter had very subtle and convoluted microstratigraphy, in which thermal features were represented by pockets of white ash and charcoal.)

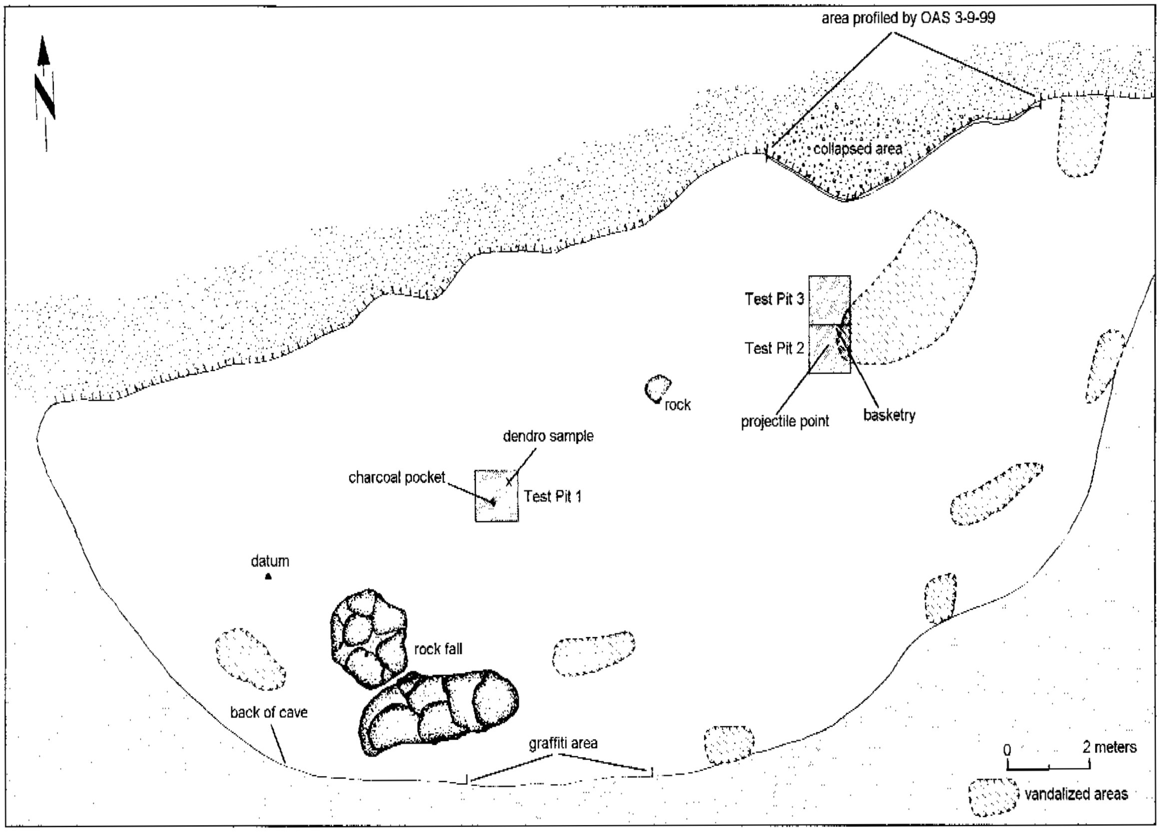

Figure 3. Plan view of High Rolls Cave.

Level 2 went from .565 mbd to .715 mbd (northeast corner). The soil was soft silty sand, and its color was lighter than that of Level 1. The tree-ring sample was collected from the northeast corner of this grid; however, this sample did not yield usable data. A small charcoal lens was noted in the vicinity. It was 1 cm thick, with some easily dispersed white ash. A few centimeters into Level 2 in the southeast corner were clasts of hard limestone, which continued across three-quarters of the grid. Below the limestone level, soft silty sand continued to the bottom of Level 2. A large chunk of yellowish fine-grained limonite was near the northwest corner with a yellow lens of soil eroding from the fragment. Only one lithic artifact in the southern portion of the grid was recovered from the fill. Also, a soft white caliche pocket about 3 cm thick was visible in the extreme northeast corner of the grid, running along the entire north wall and varying from 1 to 2 cm in depth. At Stratum 3, a dark brown organic level surrounded the caliche lens. The southern wall consisted of soils like those in Stratum 2.

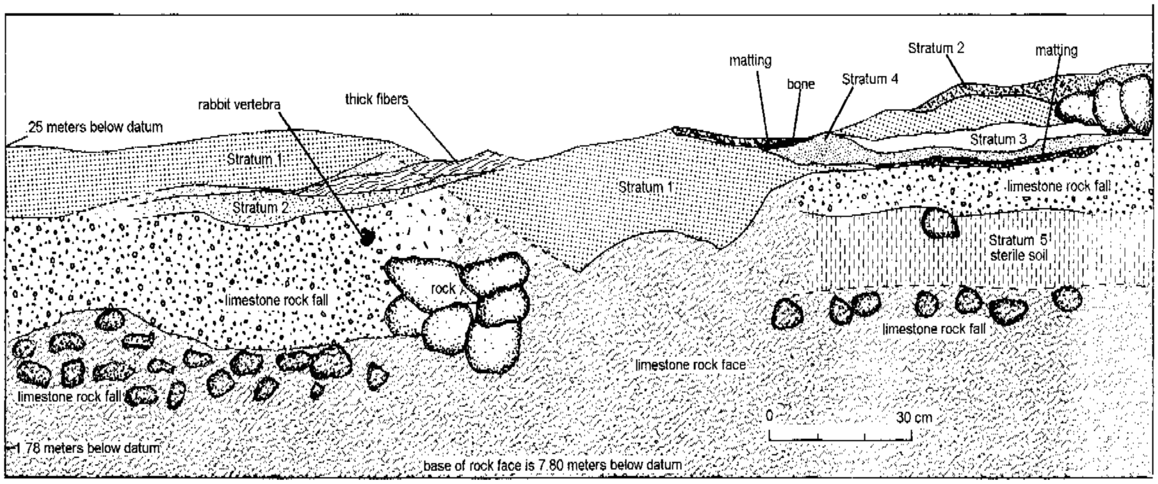

Figure 4. Profile of cave face.

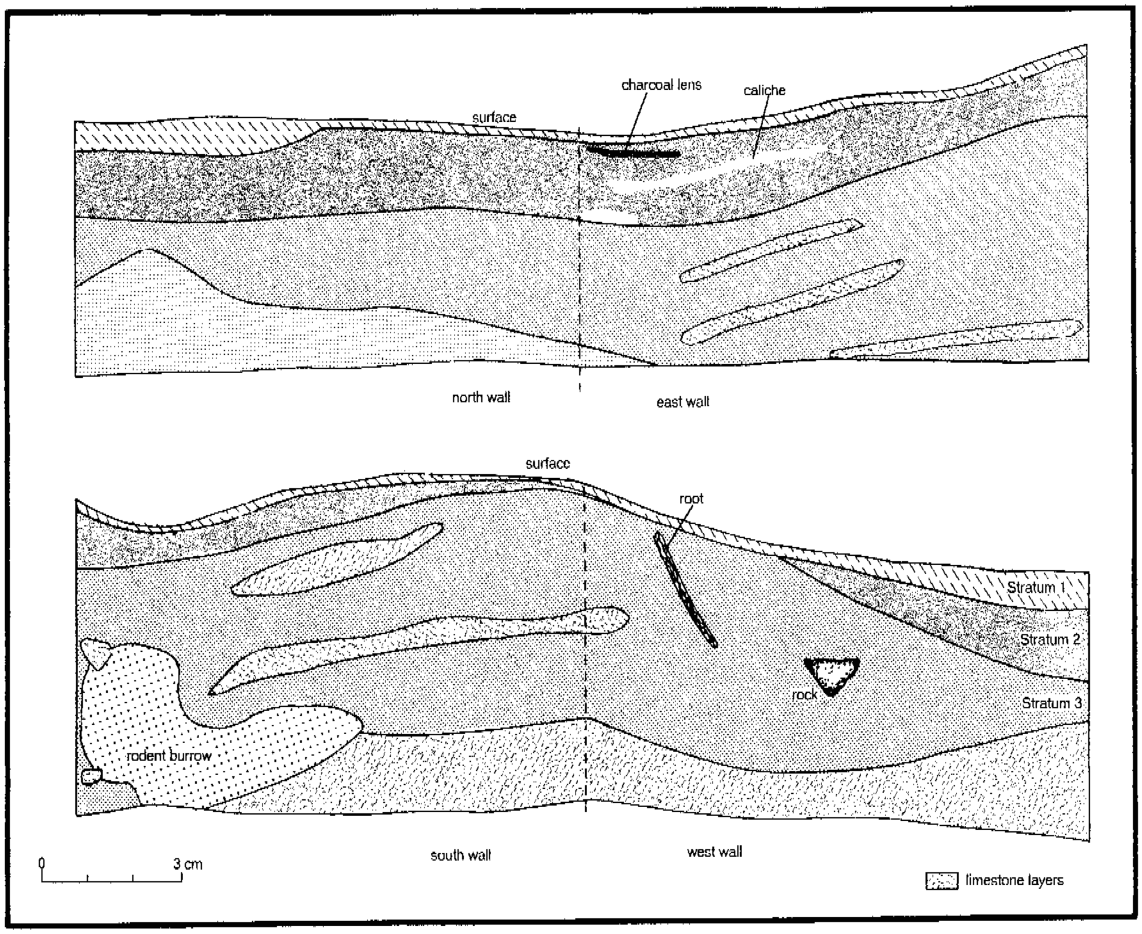

Figure 5. Profiles of Test Pit 1.

Level 3 was excavated from .7105 to .8105 mbd (northeast corner). The soil was compacted silty sand and flat overlapping layered limestone slabs 2 cm thick. A long root and insect burrows were in the middle of the grid, midway down the level. The root was surrounded by a darker brown organic-like soil. A black chunk of charcoal was embedded in the extreme southwest wall. At the base of the level and along the northern wall was a pocket of limestone or dark gray fine-grained siltstone. Two bone fragments and a chert biface were recovered in the fill above this pocket. The remaining fill was devoid of charcoal. Stratum 2 continued below the limestone stratum on the south wall. A large rodent burrow was present in the south wall. The soil was a soft, moist, light-brown sand, and Stratum 2 (soft silty sand) undercut the limestone layer. Along the north wall (Stratum 2), soft, silty sand underlay Stratum 3, which was a darker brown organic sand lens with roots, mixed with white ash or caliche. It appeared very soft and may have been disintegrated limestone. The sterile level was void of cultural materials. It measured from .8105 to .9305 mbd (northeast corner). The entire level was extremely rocky and covered with small overlapping limestone spalls. A pocket of dark gray siltstone was located in the northwest corner. It was sterile, and the fill consisted of large (20 by 10 by 4 cm), medium, and very small siltstone fragments.

Test Pit 2

Test Pit 2 was placed in 104N-113E along the western edge of a large vandalized area (Figs. 6 and 7). It was excavated in five arbitrary levels containing three discrete strata. The soil was dry silty loam.

Level 1 was surface stripped from .685 to .785 mbd. The soil was dry silty loam and disturbed by foot traffic and vandalism. Its color on the Munsell scale was 10YR 6/2, light brownish gray. The removal of the disturbed soil ranged from 10 to 30 cm. Because of the outcropping bedrock, it was impossible to maintain 10 cm levels.

Level 2, Stratum 2, went from .785 to .915 mbd. The level was disturbed by the same agents as Level 1. Level 2 had a definite break in which a layer of compact caliche (calcium carbonate) lay on top of the cultural soil. A root had grown horizontally along this caliche layer. No artifacts were present down to the caliche. Below the calcareous layer, the soil became darker. Rodent burrowing was noted throughout the grid, and a rodent nest was present. The nest contained fragmented leaves, piñon nut shells, and roots. Several roots branched out from the nest. No artifacts were encountered. The Munsell color was 10YR, dark grayish brown.

The soil of Level 3, Strata 2 and 3 (.985-1.015 mbd), was classified as Stratum 3, a semicompacted silty loam with some calcium carbonate pebbles. The color was Munsell, 10YR 5/3 brown, and it was disturbed by pothunting. The soil changed in color to the west, and it was more compacted. There were large limestone rocks in this area, but none to the east. No artifacts were present. Small charcoal flecks were noted in Stratum 2.

In Level 4, Stratum 3 (1.015-1.14 mbd), the soil consisted of silty loam identical to that in Stratum 3, but it was confined to this level. Cobbles on the west one-quarter of the grid slope to the east occupied one-half of the unit. The vandalized area was confined to the northeast quarter. One basalt projectile point was encountered at the end of the level along with two pieces of angular debris. Rodent disturbance continued throughout this level. Charcoal became increasingly smaller as the excavation continued.

In Level 5, Stratum 3 (1.154-1.215 mbd), the soil was disturbed dry silt. On the edge of limestone bedrock (?) or ceiling spall (?) was a mass of plant fibers, possibly matting (Figs. 8 and 9). It was confined to a 22 cm north-south by 30 cm east-west area. The fibers were mixed with what seem to be yucca strips. Mixed with the fiber mass were leaves and piñon nuts. An object intermingled with the fibers was first identified as a possible prayer stick *(paho)*, but further investigation cast doubt on that conclusion (Figs. 9 and 10). Charcoal was also present, and there was a concentrated ash area along the southeast quarter of the grid. The soil around the fiber material was silty and dry. Rodent disturbance was evident throughout the grid. Bone fragments were also associated with the fiber mass, and a single lithic flake was recovered from this level. A C-14 sample was collected. The ash pit (not a formal feature) abut the limestone rocks and contained some charcoal. No occupational surface was encountered. The excavation in Test Pit 2 was stopped at the level of the fiber artifacts. To continue to expose these materials, a contiguous unit (Test Pit 3) was opened up on the north side of Test Pit 2.

Test Pit 3

Work on Level 1 (105N-113E) consisted of removing 2 cm of dirt fill from the top of this grid in the vandalized areas. It was grayish silt and disturbed by foot traffic and vandalism.

A possible basket was found 4 cm below the surface stripping in Level 2. Only the southwest one-quarter of the grid was excavated to remove it. The excavation ended when it was determined that significant cultural materials existed and further testing was not warranted.

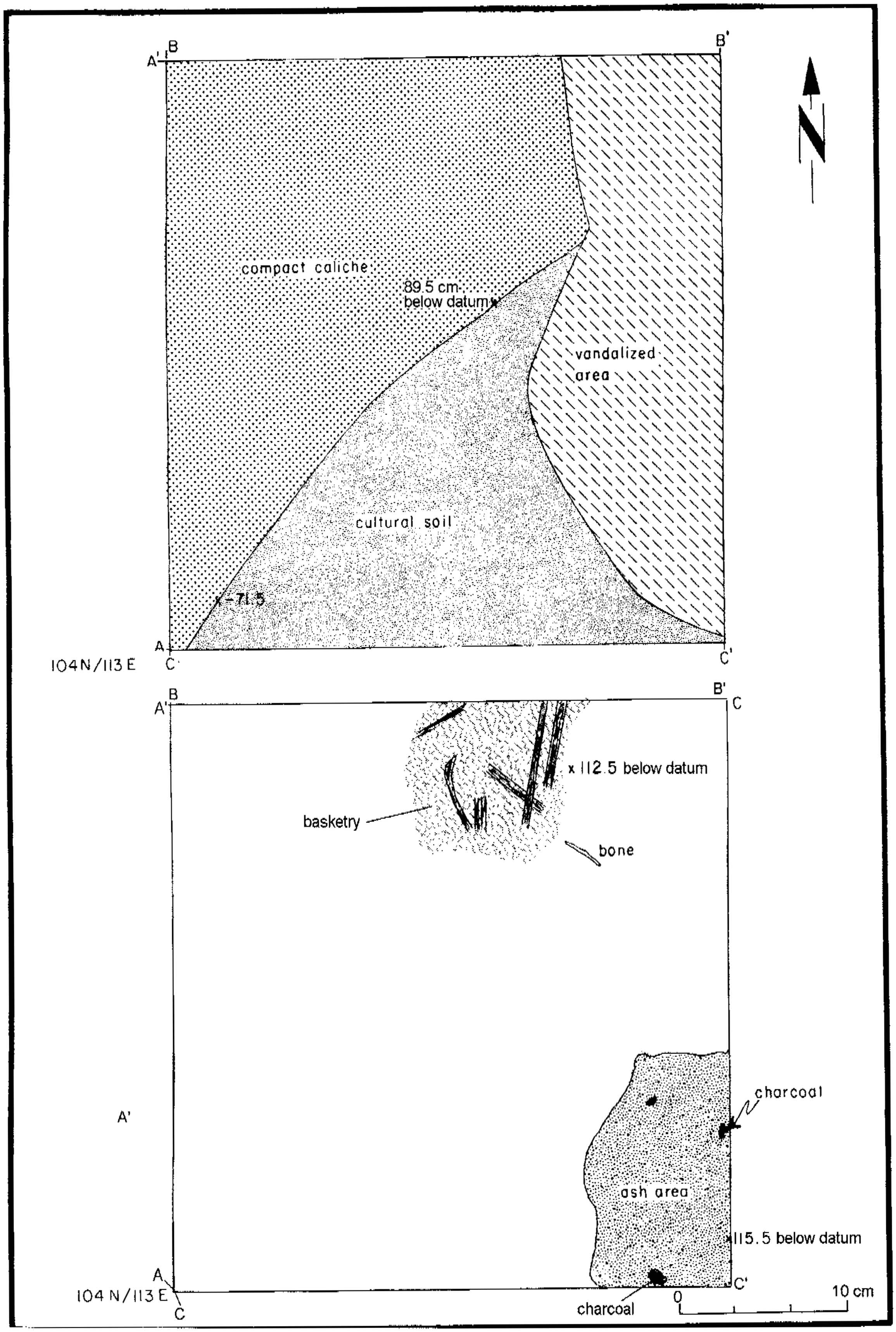

Figure 6. Plan views of of Test Pit 2 at 1 m and 110 cm below datum.

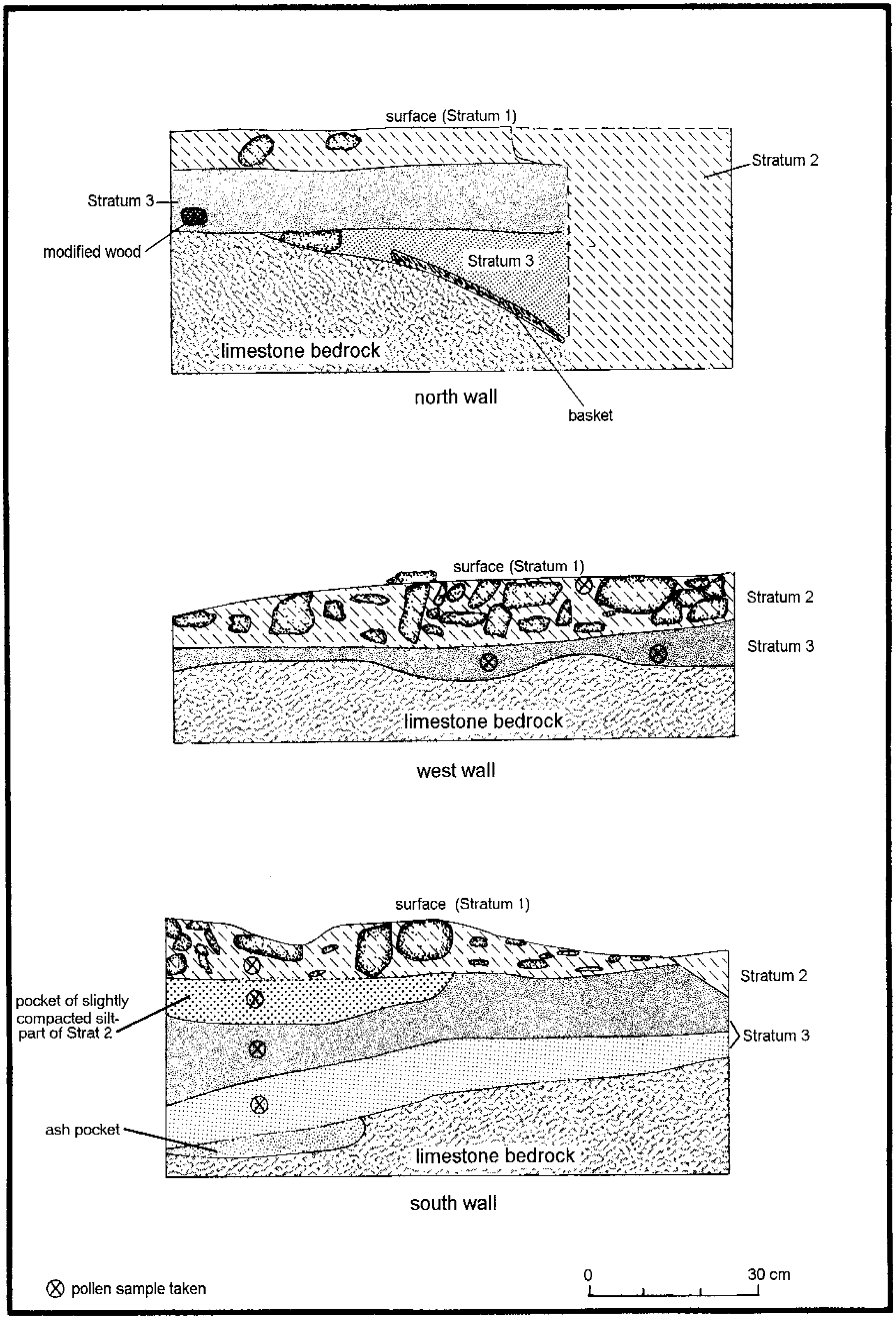

Figure 7. Profiles of Test Pit 2.

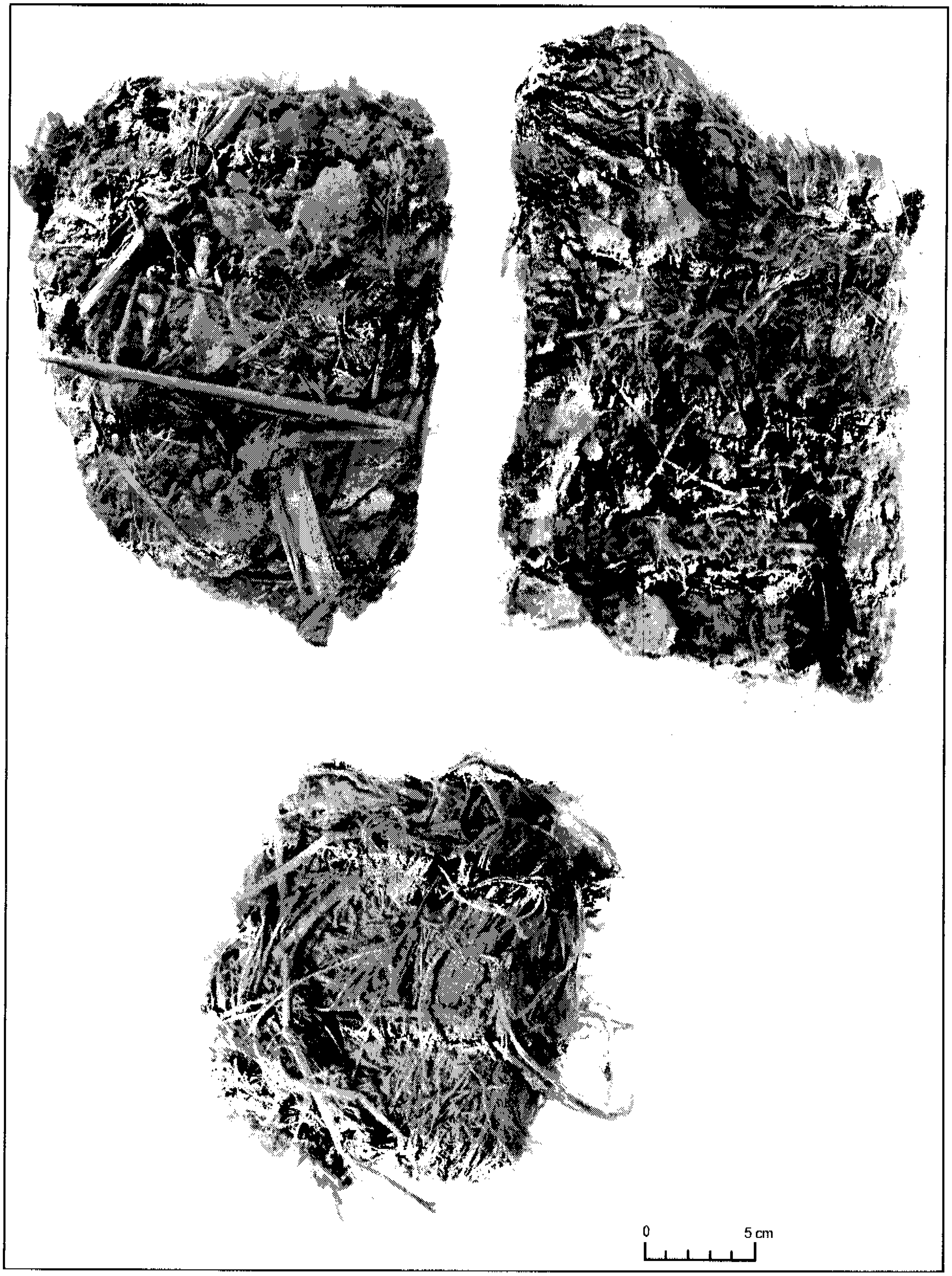

Figure 8. Fiber mass.

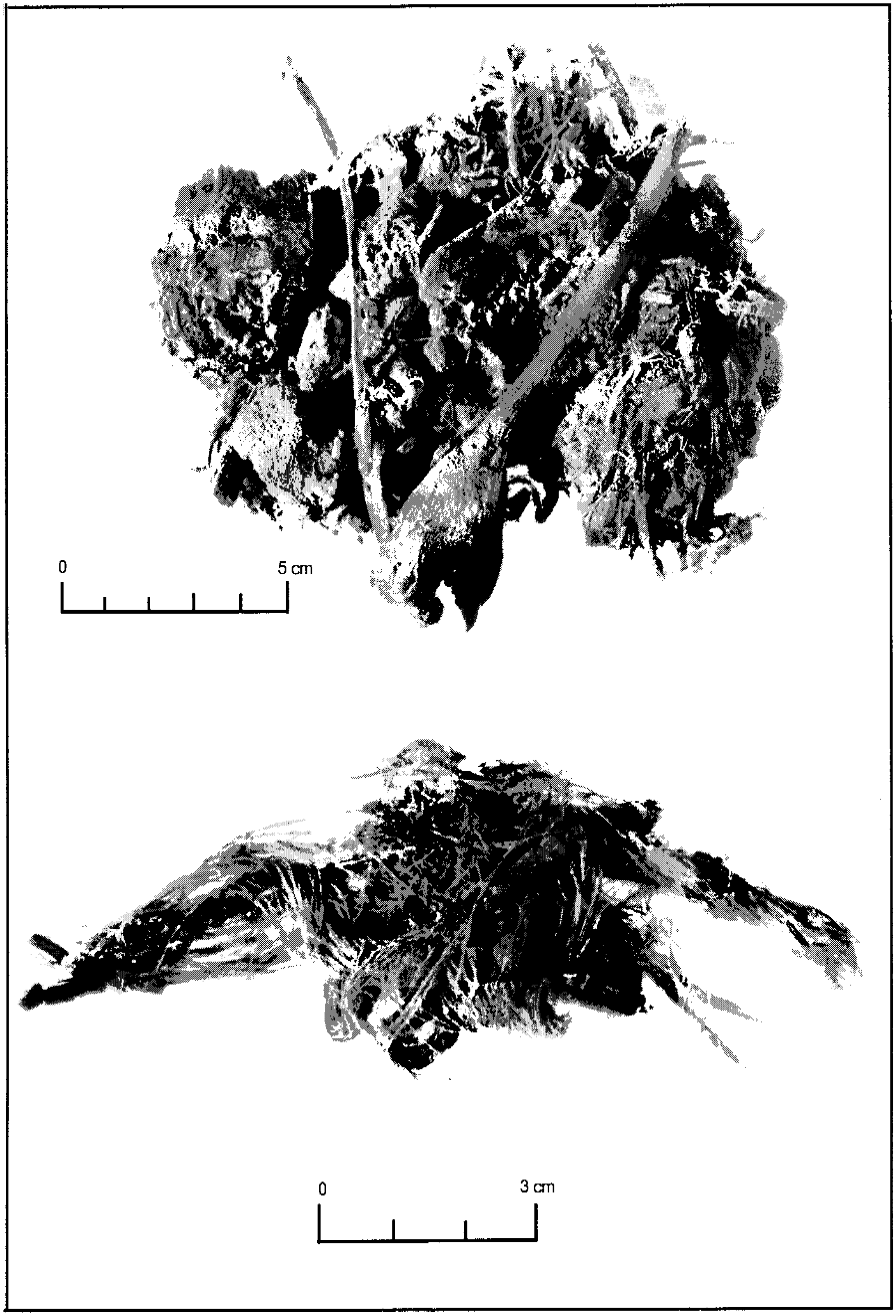

Figure 9. Fiber mass, showing possible prayer stick (top).

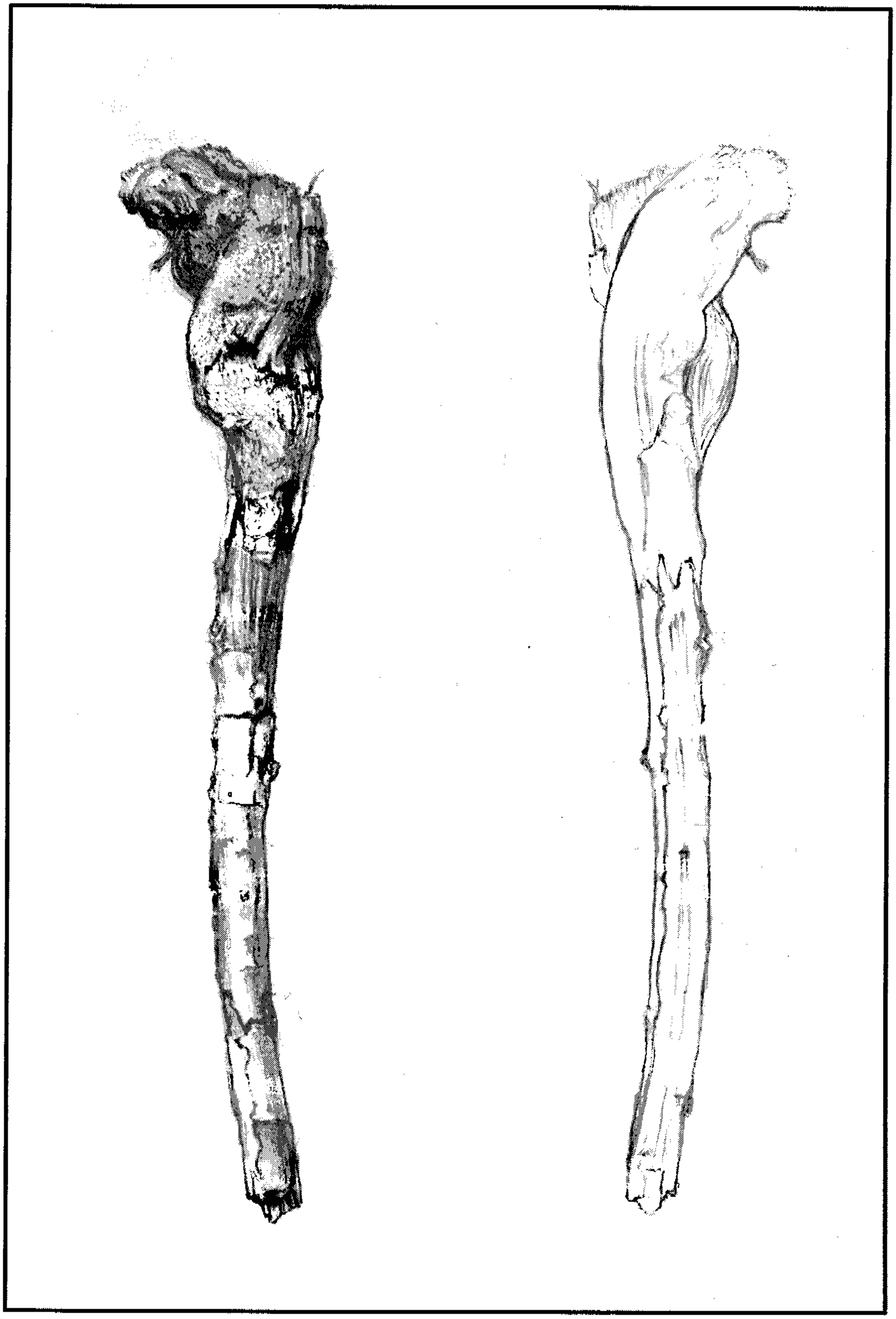

Figure 10. Possible prayer stick. Its actual length is 11.5 cm.

CHIPPED STONE ANALYSIS

James L. Moore

Twelve chipped stone artifacts were recovered from High Rolls Cave. Each artifact was analyzed for material type and quality, artifact morphology and function (if any), size, portion, and other characteristics that seemed important, such as platform and termination data for flakes, edge angles and wear patterns for tools, and evidence of thermal alteration. Each artifact was examined under a binocular microscope to determine certain attributes and whether it was used as a tool. The level of magnification varied between 15x and 80x. Higher magnification was used to identify wear patterns and other modifications. Edge angles on tools were measured with a goniometer; other dimensions were measured with a sliding caliper. Four artifact categories were recognized: flakes, angular debris, cores, and formal tools. These categories are defined as follows:

1. Flakes are debitage that were intentionally struck from parent material and possess definable dorsal and ventral surfaces, a bulb of percussion, and a striking platform. Flake fragments often lack some of these attributes but are assigned to this category when one or more are present.

2. Angular debris are debitage generated incidentally to the production of flakes. They lack definable ventral and dorsal surfaces, bulbs of percussion, and striking platforms.

3. Cores are pieces of parent material from which flakes have been struck and are defined by two or more negative scars originating from one or more surfaces. Nodules on which only a single negative scar occurs are defined as tested cobbles.

4. Formal chipped stone tools are artifacts that were intentionally altered to produce specific shapes or edge angles. If edge damage was incidental to use rather than a by-product of intentional alteration, artifacts were classified as informal tools.

Four attributes were noted for flakes only: platform type, platform lipping, dorsal scarring, and distal termination. Platform type is an indicator of reduction technology and stage. Any modifications on platforms were noted, as were missing and collapsed platforms. Platform lipping usually indicates soft hammer reduction (Crabtree 1972) and later reduction stages. Analysis of dorsal scarring entailed noting whether scars originating at the distal end of a flake were present. These are opposing scars that are often evidence of removal from a biface. The type of distal termination was noted to help determine whether it was a successful removal or ended prematurely, and to provide data on manufacturing versus postremoval breakage.

Flakes were divided into removals from cores and bifaces using a polythetic set of variables (Table 2). A polythetic framework is one in which fulfilling a majority of propositions is both necessary and sufficient for inclusion in a class (Beckner 1959). Rather than requiring an artifact to satisfy the entire array of conditions, only a set percentage in any combination need be fulfilled. The array of conditions models an idealized biface flake and includes data on platform morphology, flake shape, and earlier removals. When a flake fulfills 70 percent of the conditions it is considered a removal from a biface. This percentage is high enough to isolate flakes produced during the later stages of biface production from those removed from cores, while at the same time it is low enough to permit flakes removed from a biface that do not fulfill the entire set of conditions to be properly identified. While not all flakes removed from bifaces can be identified by the polythetic set, those that fit the model are considered definite evidence of biface reduction. Flakes that fulfill less than

70 percent of the conditions are classified as core flakes. Instead of rigid definitions, the polythetic set provides a flexible means of categorizing flakes and helps account for variability seen during experiments.

Table 2. Polythetic Set for Distinguishing Manufacturing Flakes from Core Flakes

Whole Flakes

1. Platform:
    a. has more than one facet
    b. is modified (retouched and/or abraded)
2. Platform is lipped.
3. Platform angle is less than 45 degrees.
4. Dorsal scar orientation is:
    a. parallel
    b. multidirectional
    c. opposing
5. Dorsal topography is regular.
6. Edge outline is even, or flake has a waisted appearance.
7. Flake is less than 5 mm thick.
8. Flake has a relatively even thickness from proximal to distal end.
9. Bulb of percussion is weak (diffuse).
10. There is a pronounced ventral curvature.

Broken Flakes or Flakes with Collapsed Platforms

1. Dorsal scar orientation is:
    a. parallel
    b. multidirectional
    c. opposing
2. Dorsal topography is regular.
3. Edge outline is even.
4. Flake is less than 5 mm thick.
5. Flake has a relatively even thickness from proximal to distal end.
6. Bulb of percussion is weak.
7. There is a pronounced ventral curvature.

Artifact Is a Manufacturing Flake When:

If whole, it fulfills 7 of 10 attributes.
If broken or platform is collapsed, it fulfills 5 of 7 attributes.

Only twelve chipped stone artifacts were recovered from test excavations at High Rolls Cave. Three artifacts were found in Test Pit 1 (101N/105E), four in Test Pit 2 (104N/113E), and two in backdirt from a vandalized area. The three remaining specimens were included with a large number of small limestone spalls adhering to a mass of fiber found at the edge of the cave. Only one excavation level--Stratum 3, Level 4, in Test Pit 2--produced more than one artifact. Considering the small size of the assemblage and the probability that the provenienced artifacts may represent multiple occupations, a detailed discussion of this assemblage is useless.

Test Pit 1

Level 1

One chipped stone artifact was recovered from this excavation unit--a medial fragment of a fine-grained tan chert flake. No dorsal cortex was noted, and there is no evidence of informal tool use. The flake fragment is 9 mm long by 19 mm wide by 2 mm thick and has snap fractures at both ends. Though too little of this flake remains to be accurately placed by the polythetic set, it is likely that it represents a removal from a large biface. An opposing scar was noted on the dorsal surface in addition to several parallel scars, which means that flakes were removed from platforms at both ends of the flake when it was still attached to the surface of the parent artifact. In this case, a biface flake seems indicated.

Level 2

One chipped stone artifact was recovered from this excavation unit: a whole fine-grained light brownish gray chert flake. No dorsal cortex was noted, but it contains some small flaws, including crystalline inclusions and an incipient fracture plane. The flake is 22 mm long by 27 mm wide by 6 mm thick. It has a multifaceted and abraded platform, with no lipping. The termination has been obscured by use.

This artifact appears to represent a removal from a core, even though the platform was modified to facilitate removal. No opposing dorsal scars were noted, though the directionality of dorsal scarring was rather difficult to define because no ripple marks were evident on that surface. The angle between the platform and the dorsal surface is 96 degrees, suggesting that some difficulty in removal may have been encountered. As Whittaker (1994:93) notes, striking a platform with an angle of more than 90 degrees will usually not detach a flake, and instead will simply crush the platform or produce an incipient cone that will cause difficulties during later flake removals. This sort of problem is evident on the ventral surface of this flake, where two adjacent bulbs of percussion occur. The first blow struck a platform with an angle of 117 degrees, which is even more obtuse than the platform for the successful removal. The high angle of the successful strike resulted in a flake that is rather short and thick and trends toward the right, producing an irregular shape.

The prominence of both bulbs of percussion and the fact that there was a successful flake removal even though the platform was slightly over 90 degrees suggest that a hard hammer was used to strike this flake. The platform width is 1.37 mm, indicating that the blow struck pretty much at the edge of the core platform, and this also helps account for the relative shortness of the flake.

Two edges on this specimen were used as informal tools. A lateral edge with an angle of 27 degrees exhibits bidirectional use scars, mostly consisting of scoops, though a few small feathers are also visible. The termination has an angle of 26 degrees and exhibits similar scoops and a few feathers, but in this case a unidirectional pattern of edge attrition is present. The damage on both of these edges suggests they were used against a hard material (Schutt 1980; Vaughan 1985). Unfortunately, experiments demonstrate that it is virtually impossible to assign such patterns of use to a specific task such as cutting or scraping (Schutt 1980; Vaughan 1985).

Level 3

One chipped stone artifact was recovered from this excavation unit--a proximal fragment of a fine-grained light brownish gray chert biface. No cortex was noted on this artifact, but it contains a few flaws including small crystalline inclusions and short incipient fracture planes. This appears to be the same material as the flake from Level 2. The biface fragment is 21 mm long by 43 mm wide by 9 mm thick and exhibits a lateral snap. Percussion flake scars are evident on both surfaces, and no evidence of use was noted. However, the presence of tiny flake scars along the basal edge indicates that retouch was used to facilitate flake removal by rubbing perpendicular to that edge. The remaining sections of lateral edges have angles of 38 and 53 degrees, while the angle of the basal edge is 51 degrees.

A large general-purpose biface seems to have been the goal of this manufacturing episode. Because this tool fragment is bifacially worked and has semiregular flake scars and a semiregular edge outline, it was assigned to the middle stage of manufacture. The pattern of the fracture--a lateral snap-- is indicative of breakage during manufacture. Johnson (1979, 1981) has defined a series of fracture types for bifaces, including lateral snaps, which he tends to blame on end shock. Essentially, this is the use of excessive force while thinning a biface from an end. However, Rondeau (1981) notes that lateral snaps also occur when thinning a biface from a lateral edge. Indeed, all examples of this type of break experienced by the author during experimental flint knapping have occurred during thinning from a lateral edge. My impression of the process is that when excessive force is used and passes through the point where the biface is gripped tightly between fingers, the force is sometimes redirected and causes the biface to split rather than removing a flake.

Some indications of an attempt to rework the broken tool fragment were noted. A flake was removed from the edge created by the lateral snap, and this could only have occurred subsequent to that fracture. In addition, three adjacent and interlocking ring cracks (or incipient cones) were noted on that same edge, evidence of repeated unsuccessful strikes with a hard hammer. Unfortunately, it was impossible to determine whether the attempt at reworking occurred immediately after the tool was broken or at a later time.

Test Pit 2

Stratum 3, Level 4

Three chipped stone artifacts were recovered from this excavation unit. Artifact 1 is a piece of fine-grained light gray chert angular debris. Some yellow and black mottling occurs in this material, and it contains occasional inclusions that may be fossils. No cortex was noted. The artifact measures 40 mm long by 17 mm wide by 11 mm thick, and there is no evidence of use as an informal tool.

Artifact 2 is another piece of angular debris, this time of a fine-grained grayish brown chert that contains some black dendritic inclusions and short white and black streaks. No cortex was noted. The artifact measures 21 mm long by 10 mm wide by 6 mm thick, and no evidence of informal tool use was noted.

Artifact 3 is a fine-grained fossiliferous chert projectile point (Fig. 11). In color, this material is a mottled light to dark gray containing small white fossils, yellow inclusions, and occasional small voids. No cortex was noted on either surface. The point is nearly complete but is missing both barbs and one tang. This artifact measures 34 mm long by 22 mm wide by 7 mm thick. Lateral edge angles are 63 and 41 degrees, and the basal edge angle is 51 degrees. No evidence of secondary use was seen.

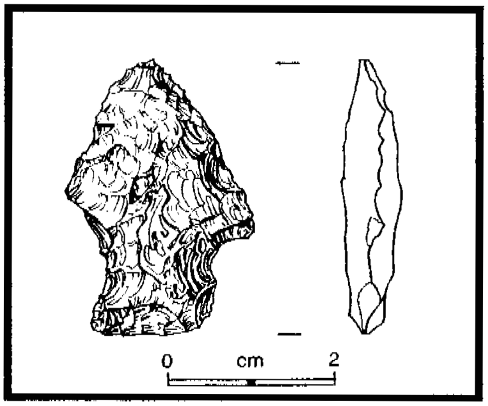

Figure 11. San Pedro projectile point.

The point is a medium-sized late stage biface and was probably corner-notched, though this is uncertain because both barbs are missing. The blade is triangular in shape, and the hafting element expands outward from the notches, with a straight base that was dulled by abrading to facilitate hafting. The initial shaping of this tool was accomplished by percussion and produced an irregular flake pattern. Final shaping was probably done by pressure, and certainly the notches were cut by that method. Evidence of resharpening by pressure flaking was noted on both blade edges, producing a small degree of beveling. This suggests that part of the tip may have been broken off, necessitating a reworking of the blade edges to repair this damage.

In form, this specimen is a variety of the San Pedro point, a type characteristic of the Cochise Archaic tradition. It is also similar to the En Medio point of the Oshara Archaic tradition, which has a similar date. However, corner-notched forms commonly co-occur with the more classic lateral notched form of the San Pedro point, indicating that they are variations on a common theme rather than intrusives from the more northerly Oshara Tradition area.

The San Pedro point is characteristic of the Late Archaic San Pedro phase, and though it is the best-dated point of the Cochise tradition, its temporal range is still questionable. Initially, both the San Pedro point and phase were dated between 3500 and 2000 B.P. (Sayles 1983:125). Huckell (1988:58) suggests that they date between 3500 or 3000 and 1800 B.P. but indicates that good radiocarbon dates from clear Late Archaic contexts are only available for the period between 2900 and 2400 B.P. This date is revised by Roth and Huckell (1992:356) to 3000 to 1800 B.P. Upham et al. (1986) suggest a date of 3500 to 900 B.P., which contrasts with all other dates suggested for the type. However, their dates were derived using the induced obsidian hydration method without environmental controls, rendering their conclusions questionable. Roth and Huckell's (1992:356) date, probably the most accurate, is used here. Thus, the occurrence of a San Pedro point in this stratum suggests that it dates sometime between 1000 B.C. and A.D. 200.

Stratum 3, Level 5

One chipped stone artifact was recovered from this excavation unit--a whole fine-grained pink chert flake. This material exhibits some red and dark gray mottling, and a few small voids were noted, some of which are filled with crystals. No dorsal cortex was noted. The flake is 25 mm long by 12 mm wide by 3 mm thick. It has a multifaceted and abraded platform, which is very slightly lipped. It terminates in a slight hinge with a transition into a feather. No edges exhibit evidence of use as informal tools.

This flake was removed from a biface. Parallel and perpendicular dorsal scars were noted, and some possible opposing scars were seen but could not be defined as such for certain. It is bladelike in shape, the angle between the platform and the dorsal surface is 77 degrees, the platform is only .83 mm wide, the bulb of percussion is diffuse, and there is a distinct ventral curvature. These attributes are all characteristic of a biface flake, and this specimen fits the polythetic set for that class of artifact. Though the platform angle is low enough that there should not have been trouble detaching this flake, the presence of two diffuse bulbs of percussion below the platform indicates that the first blow was unsuccessful and a second was required to remove the flake. The diffuse bulb(s) and lipped platform suggest that a soft hammer was used to strike this flake (Crabtree 1972).

While it is not possible to determine the exact size of the biface this flake was struck from or the stage of manufacture during which it was removed, it is possible to provide some tentative conclusions. The length of the flake indicates that it was struck from a comparatively sizable biface. Using the position of the possible opposing dorsal scars yields a minimum width of 24 mm for the parent biface. If those scars do not represent removals from an opposing platform, the maximum width of the biface would be about 50 mm. The relatively high platform angle suggests that it was removed during initial shaping, so it is likely that the biface was in the early or middle stage of manufacture when this flake was struck.

Debitage associated with Fiber Mass

Three small pieces of debitage were recovered from among a large number of limestone spalls that were adhering to a mass of fiber found in grid 107N/117E at the edge of the current cave opening. Artifacts 1 and 2 from this provenience are fine-grained light gray-brown chert containing visible flaws which occur as areas of coarser material. The coarser material is a carbonate, probably limestone, since it reacted with hydrochloric acid. Thus, it was impossible to determine whether these specimens are evidence of cultural activities or are fragments of chert present with the native limestone that contains the cave. Artifact 1 is a piece of angular debris measuring 10 mm long by 9 mm wide by 4 mm thick. Artifact 2 is a possible flake fragment measuring 3 mm long by 2 mm wide by 1 mm thick. Unfortunately, the small size of this specimen coupled with a lack of good diagnostic characteristics made it impossible to determine whether it is a culturally produced flake or a natural spall.

Artifact 3 is almost certainly of cultural derivation. This specimen is a fine-grained white chert flake fragment measuring 5 mm long by 2 mm wide by 1 mm long. Because of a lack of clear diagnostic characteristics, it was impossible to determine whether this specimen is a lateral or terminal edge.

Pothunter's Backdirt Pile

Two artifacts were recovered from this area. Artifact 1 is a whole fine-grained grayish brown chert core. This material is virtually identical to that seen in Artifact 2 from Stratum 3, Level 4. It exhibits multiple platforms and no evidence of use as an informal tool. This specimen measures 64 mm long by 47 mm wide by 24 mm thick and retains no cortical surface.

Artifact 2 is a piece of fine-grained fossiliferous chert angular debris. This material is virtually identical to that seen in the projectile point (Artifact 3) from Stratum 3, Level 4. No cortex was noted. It measures 42 mm long by 22 mm wide by 17 mm thick, and no evidence of informal tool use was noted.

Discussion

Both core and biface reduction are evidenced in this small assemblage. If Stratum 3 is related to a single occupation, which is uncertain, it contains evidence of both core and biface reduction, as well as tool use. Otherwise, little can be said concerning reduction strategy. All of the flakes in this assemblage that are large enough to show diagnostic characteristics were removed by percussion, and both soft and hard hammers were used. The single projectile point provides the only temporal data available from this limited assemblage and indicates that at least one occupation occurred during the Late Archaic period.

It is interesting to note that none of the chipped stone artifacts have cortical surfaces, and all are chert. This suggests that materials were being transported to High Rolls Cave in an already partly reduced form. At a minimum, the cortical surface appears to have been removed from cores before they were carried to the site. Only high-quality materials that would produce sharp edges for cutting seem to have been used. No materials of coarser but more durable quality were recovered. Thus, this site may not have been used for activities that involved chopping or pounding.

While it is possible that one or more large bifaces were made at the site, this is fairly unlikely because the manufacture of large bifaces produces quite a bit of debris (Moore n.d.), amounts that are not reflected in the excavated sample. Thus, it is more likely that bifaces were carried to the cave in a prepared form. Flakes were probably removed from bifaces for use as informal tools at the site. The large biface fragment could be part of a biface core that was broken while being flaked. Conversely, it could be a fragment of a tool that was broken at another location and salvaged for use. It may have been discarded here because it could not be efficiently reworked.

The limited amount of data available from this assemblage suggest that a wide range of manufacture, processing, and maintenance activities were not accomplished at this site. At a minimum, tasks that require the use of chipped stone tools were not commonly pursued at this location. A short-term logistical function may be indicated. Archaic deposits at nearby Fresnal Shelter are indicative of a specialized Archaic highland hunting pattern (Wimberly and Eidenbach 1981). Evidence of large game hunting and butchering was found at Fresnal Shelter. Most of the identified bone was mule deer, though some pronghorn, bighorn sheep, and bison bones were also found. The butchering pattern suggested that meat packages including major long bones and attached muscle were removed and carried away, while parts that contained less meat were processed and consumed on-site (Wimberly and Eidenbach 1981:27). This suggests a logistical pattern of meat acquisition for transport to base camps located elsewhere, with little associated consumption of meat at the butchering locus. It is quite possible that further excavation would recover evidence of a similar pattern of meat acquisition and consumption at High Rolls Cave.

Use as a short-term logistical camp aimed at collecting meat for consumption at lowland base camps could explain the smallness of the High Rolls chipped stone assemblage. Kelly (1988) models what the chipped stone assemblage at a logistical site should look like, and our assemblage resembles his expectations, at least in part. There is little, if any, evidence for biface manufacture at the site, but bifaces seem to have been used as cores. Presumably, flakes removed from bifaces at High Rolls were used as informal tools, but unless hard materials were encountered, there is little chance that recognizable damage indicative of such usage would occur.

DATING

Species of wood were identified in the radiocarbon samples taken during testing, and species with adequate sample size were sent for analysis. The site is surrounded by ponderosa forest, and a few piñon and juniper trees are also present. Small mesquite are found growing in the talus slopes of several shelters with prehistoric occupations. The limited samples were collected from "matted" areas exposed during testing. These samples were recovered from the cultural strata in Test Pit 2. Floral species encountered in this unit include juniper, piñon, ponderosa, Douglas fir, white fir, mesquite, and undetermined conifer. It is unclear which wood yielded the radiocarbon dates. Three samples were sent to the Beta Analytic, and the results of these assays are listed in Table 3.

Table 3. Radiocarbon Results

Sample	Conventional C-14 Date	Calibrated C-14 Date 2 Sigma
114103-26	2160 +/- 50 BP	Not calibrated
114103-27-1	2890 +/- 60 BP	1260 to 905 B.C.
114103-27-2	3000 +/- 50 BP	Not calibrated

The results from these samples place the cultural layer encountered during testing within the San Pedro phase of the Cochise tradition (1500 to 200 B.C.). This also overlaps with the occupational sequences known for other Archaic shelters in the area, particularly Fresnal Shelter. A dendrochronological (tree-ring) sample taken from Level 2 of Test Pit 1 did not yield an absolute date. No other chronometric specimens were recovered.

FAUNAL ANALYSIS

Nancy Akins and Stephen C. Lentz

Fifteen bone specimens were recovered from the test excavations (Table 4), including deer, cottontail, dog, and turkey.

Table 4. Faunal Species

FS No.	Species	Portion*	Comments
1-1	*Sylvilagus* sp. (cottontail)	right innominate @ 70%	possible carnivore bites
1-2	*Sylvilagus* sp. (cottontail)	left calcaneous @ 70%	possible carnivore bites
1-3	small mammal	longbone shaft fragment < 70%	
2-1	*Neotoma* sp. (wood rat)	right tibia, complete	young adult
5-1	medium to large mammal	longbone shaft fragment < 25%	
5-22	medium to large mammal	longbone shaft fragment < 25%	
7-1	medium to large mammal	longbone shaft fragment < 25%	
7-2	small artiodactyl	thoracic vertebral spine fragment	carnivore puncture
7-3	small artiodactyl-sheep, white tailed deer or peccary	thoracic vertebral spine fragment	scat or boiled
7-4	*Odocoileus hemionus* (mule deer)	left femur-posterior shaft fragment	carnivore gnawed
7-5	gastropod	partial shell fragment	unaltered
No FS, collected from pothunter's backdirt pile	*Sylvilagus* sp. (cottontail)	right femur-complete	2 piece fresh break
No FS, collected from pothunter's backdirt pile	*Odocoileus hemiones* (mule deer)	left femur-posterior, proximal shaft fragment	carnivore gnawed < 10%
No FS, collected from pothunter's backdirt pile	*Odocoileus hemiones* (mule deer)	left proximal radius	impact and abrasion < 10% on shaft- lateral; boiled or lightly roasted-greasy < 25%
No FS, collected from pothunter's backdirt pile	*Odocoileus hemiones* (mule deer	phalanx 3 @ 30%	leached or sun bleached

* mature unless otherwise noted

The identifications from these test excavations cannot be used to infer the role of these species in the human diet, but only to note their presence and use by the groups at the shelter. Evidence of nonhuman carnivore activity in 33 percent of the specimens suggests that the bones were scavenged by carnivores after they were introduced into the site, or that carnivores used the shelter as a lair and consumed game at that location. The presence of sun-bleached bone and redeposited mammal bones suggests such activities. However, the gastropod (probably a fresh water mussel from the nearby creek) was probably brought into the cave by its occupants.

BOTANICAL ANALYSIS

Mollie S. Toll

Limited archeological testing at LA 114103 produced some preliminary information about plant species utilized by Late Archaic inhabitants (ca. 1500-200 B.C.) of this limestone shelter. Of clear interest are comparisons with nearby Fresnal Shelter, where successive occupations spanned a slightly later but largely overlapping period of 1000 B.C. to A.D. 325.

Floral samples from the High Rolls Cave include three very small soil samples (ranging from 40 to 100 ml) collected for flotation, and charcoal from three carbon-14 samples and one of the flotation samples. Perishable artifacts constructed of plant materials were also examined. Samples were taken from near the center of the shelter (Test Pit 1) and an area bordering a large vandalized area at the front (north edge) of the shelter (Test Pit 2).

Results

All three flotation samples contained unburned conifer parts, including a juniper twig and seed, and piñon nutshell and needles (Table 5). Present on the piñon needles are empty coverings of the piñon needle scale (*Matsucoccus acalyptus*), a tiny sap-sucking insect that infests natural piñon populations and ornamental piñons throughout the state (Cain et al. 1990:3-4). There is some erosion and oxidation present, but all of these conifer parts may be quite recent. Coniferous charcoal, on the other hand, likely relates to human use of the cave, either prehistoric or recent (Table 6). FS 15, representing contents of a basket found in the north wall profile, consisted largely of decomposed unburned leaves, interspersed with bits of insect exoskeleton, larval cases, several small land snails, and very fine charcoal. Also present in this sample were five tiny goosefoot seeds. Though this seed type is recovered widely in archeological sites of all types and time periods in a variety of southwestern habitats, these unburned seed specimens may also be noncultural ambient debris.

Charcoal in FS 9 (Test Pit 1, Stratum 2) was largely coniferous (83 percent by weight; Table 6). Juniper was the most significant component, and piñon and undetermined conifer also contributed. Mormon tea, another gymnosperm, was also present. Of the three charcoal samples submitted for identification prior to carbon-14 dating, two (FS 20 from Level 1 and FS 27 from Level 5, Stratum 3) were made up of substantial chunks, while the other (FS 26, from an ash area in Level 5, Stratum 3) consisted of a few tiny crumbs. The Level 1 sample was entirely coniferous, with elements of white fir, spruce/Douglas fir, and piñon. Samples from Level 5, Stratum 3, contained mesquite as well as the considerable variety of conifers. The ash in Level 5, Stratum 3, had such tiny pieces that important diagnostic traits such as presence of resin ducts became a sampling issue. A few pieces clearly fit trait complexes of juniper or mesquite, but most had to be classified as simply undetermined conifer. Crystalline inclusions (presumably precipitate from the shelter roof) were common on surfaces and interstices of the tiny charcoal pieces of Level 5, Stratum 3, samples.

An irregular felted fiber mass (FS 11) consists of split leaves, with individual fibers comparing well in cross-sectional dimensions and their translucent quality. Individual fibers and fiber bundles have been softened by some combination of pounding, scraping, or retting (Osborne 1965), producing a compacted, springy surface. Pounding is suggested by intermittent areas of finely split and tangled fiber masses. The fiber mass varies in thickness from a maximum of 3 cm over the parallel bundle to a minimum (where not obviously affected by erosion or tearing) of 1.5 cm. There is no evidence of plaiting, twining, or coiling, and no selvage. No cordage is involved in the

Table 5. Flotation Results

	Test Pit 1 Stratum 1 FS 9	South Wall Profile Level 4, Stratum 3 FS 13	Possible Basket in North Wall Profile FS 15
Conifer parts: *Pinus edulis* needle	+	+	
Pinus edulis nutshell			+
Juniperus twig			+
Juniperus seed			+
Seeds: *Chenopodium*			5
Other:			Abundant decomposed leaf vein skeleton fragments; small land snails

Table 6. Species Composition by Weight of Charcoal Samples

	Flotation	C14 Samples: Test Pit 2		
	FS 9 Test Pit 1	**FS 20 Level 1**	**FS 26 Level 5 Stratum 3**	**FS 27 Level 5 Stratum 3**
Juniperus juniper	8 .16g		4 0.10g	3 0.16g
Pinus edulis piñon	1 .01g	1 1.69g		6 1.07g
Pinus ponderosa ponderosa pine				9 2.46g
Abies-type white fir		3 2.61g		1 0.23g
Pseudotsuga/Picea-type Douglas fir/spruce		3 2.94g		
Ephedra-type Mormon tea	1 .01g			
Undetermined gymnosperm	4 .06g		18 0.09g	2 0.11g
Prosopis mesquite			1 [trace]	2 0.20g
Undetermined ring-porous dicot	6 .05g			
Total	20 .29g	7 7.24g	23 0.19g	23 4.23g

construction. The mass is folded to a width of about 20 cm. However, the original dimension may have been as much as 30 cm wide. Evidence that the original surface was wider centers on a layer of dirt and roof spalls sandwiched between matted layers of yucca fiber that can be lifted apart. Fiber bundles connecting the layers are folded more or less perpendicular to the length of the artifact. The maximum length of the mass is 29 cm; one corner is clearly missing. One side is bordered by a mass of parallel fiber bundles, 2.5 cm wide (broken or torn off at 23 cm long). Though the specimen certainly appears to be the product of human manipulation and organization of raw plant fiber materials, the artifact lacks sufficient shape to be clearly recognizable. Possible identities include a cradleboard mat like the one illustrated in Guernsey and Kidder (1921: Plate 21). It may also be a fragmentary "flexible cradle," but examples include a more distinct edge and base framework than is present in the High Rolls Cave example (Kidder and Guernesy 1919: 165, Plate 71). Cradle padding described in the published literature includes "soft fiber" covered by "deer or mountain-sheep hide dressed with the hair on" (Guernsey and Kidder 1921:56), "a loose bundle of shredded cedar bark (Guernsey and Kidder 1921:54), and "finely shredded soft grass" (Cosgrove 1947:118).

Discussion and Summary

High Rolls Cave contains abundant botanical debris, which must be evaluated element by element to determine which items are likely to relate to any prehistoric human occupation. The assemblage includes only piñon and juniper parts and a few goosefoot seeds, all unburned. The small quantities and ready ambient availability of these taxa leaves considerable doubt about their cultural role. Yucca fiber is more clearly a human-utilized species since it served as a manufacturing material.

Charcoal consists largely (98 percent by weight) of gymnosperms. The piñon and juniper woodland that dominates the north-facing side of the canyon provides two of these taxa. Though ponderosa pine, white fir, spruce, and Douglas fir don't grow today in the immediate environs of the cave, the rapid elevation gain from the cave (6,300 ft, or 1920 m) to Sacramento Peak (9,000 ft, or 2,743 m) in less than 6 miles (9.7 km) encompasses the natural range of these conifers. Mesquite and Mormon tea find a habitat on the south-facing slope, across from the cave. While Holloway interprets ash pollen in the High Rolls shelter as long-distance transport of a landscape species (1997:8), ash seeds and charcoal at Fresnal Shelter (Bohrer 1981a:217) argues that this tree was harvested from the nearby riparian community along Fresnal Creek.

The botanical assemblage at Fresnal Shelter provides a distinct contrast (Table 7). This much larger cave, ideally situated to gather winter solar warmth and provide summer shade, evidences a long period of successive domestic occupations. The extensive floral assemblage encompasses some 55 taxa, heavily dominated by perennial food and manufacturing materials. Taxa common to both shelters include largely woodland and forest conifers. Goosefoot is one of just four edible annuals taxa recovered at Fresnal. Taxa found throughout Fresnal deposits but absent across the canyon at LA 114103 include several cacti and succulent species, four grasses, several perennials (four o'clock, saltbush, buffalo gourd), and pigweed. Some meager appearances are enigmatic at both sites. As at Fresnal Shelter, the low constancy of piñon nuts or nutshell and yucca fruits or seeds "seems to contrast with their natural abundance" (Bohrer 1981a:45) and demonstrated economic utility.

Floral differences between Fresnal and High Rolls shelters have several overlapping explanations. The smaller size and limited testing at LA 114103 surely is responsible for significant sampling error in comparing the two sets. More importantly, Fresnal seems to evidence broad spectrum, multiseason habitation repeatedly and over a long period of time. High Rolls Shelter, on the other hand, is smaller, poorly suited for winter use, and carries signs of ceremonial or specialized use. In addition to expectations of less original deposition and poorer preservation, we should not anticipate finding the full array of food and manufacturing debris of everyday life.

Table 7. Overview of Plant Materials Recovered at High Rolls Cave and Fresnal Shelters

	High Rolls		**Fresnal Macrobotanical**
	Macrobotanical	Pollen	
Local vegetation: piñon-juniper woodland ponderosa pine	charcoal	*	+ bark
piñon pine	charcoal; unburned needle, nutshell	*	+ nuts, nutshell, cone fragments
juniper	charcoal; unburned twig, seed	*	+ seeds, berries
agave			+ leaves
oak		*	+ acorns
Mormon tea	charcoal		
skunkbush sumac			+ seeds
cliff rose		*	
desert four o'clock			♦ root pulp
wild onion			+ bulbs
wild gourd			♦ seeds, rind
semidesert grassland (south-facing) broadleaf yucca	matting (FS 11)		+ fruits, leaves, fiber
sotol			♦ carpels
mesquite			+ pod segments
saltbush			♦ fruits
cacti			♦ prickly pear, barrel cactus seeds, aereoles + hedgehog, cholla, pincushion seeds, stem, spines
creosote bush			♦ carpels
[annuals]	goosefoot seeds		♦ pigweed seeds + goosefoot, marsh elder, sunflower seeds

	High Rolls		Fresnal Macrobotanical
	Macrobotanical	Pollen	
[grasses]		* Poaceae	♦ grama, dropseed, Paniceae, feathergrass spikelets, florets, seeds + ricegrass, others
riparian ash		*	+ seeds, charcoal
chokecherry			+ pits
hackberry			+ pits
cat-tail			+ reeds, heads
sedge			+ seeds
Higher elevation imports: white fir	charcoal		
Douglas fir/spruce	charcoal	*	
Domesticates: maize			+ cobs, roots, stems, husk, kernels
squash			+ split seeds, rind
beans			+ beans

* present (Holloway 1997)
+ present in less than 80% of strata (Bohrer 1981a)
♦ present in 80% or more of strata (Bohrer 1981a)

POLLEN ANALYSIS

Richard G. Holloway

Ten samples for pollen extraction and analysis were sent to Quaternary Services. The samples were collected by personnel of the Office of Archaeological Studies, Museum of New Mexico, during excavations at LA 114103. The site is only about 500 m south of Fresnal Shelter in Fresnal Canyon at an elevation of 6,250 ft on a 35 degree slope. The deposits likely date to the Middle Archaic Period. The samples were collected from exposed plant fiber areas within two test pits. Test Pit 1 was near the center of the cave just west of center, while Test Pit 2 was in the northeast portion of the cave.

The site is surrounded by a ponderosa pine forest. *Pinus ponderosa* is dominant, and *Pinus edulis* and *Juniperus* sp. trees are sporadic. *Prosopis* (mesquite) was also present on several of the talus slopes from several shelters with prehistoric occupations.

Methods and Materials

Chemical extraction of pollen samples was conducted at the Palynology Laboratory at Texas A&M University, using a procedure designed for semiarid southwestern sediments. The method, detailed below, specifically avoids use of such reagents as nitric acid and bleach, which have been demonstrated experimentally to be destructive to pollen grains (Holloway 1981).

From each pollen sample submitted, 25 grams (g) of soil were subsampled. Prior to chemical extraction, three tablets of concentrated *Lycopodium* spores (batch 307862, Department of Quaternary Geology, Lund, Sweden; 13,500 ± 500 marker grains per tablet) were added to each subsample. The addition of marker grains permits calculation of pollen concentration values and provides an indicator for accidental destruction of pollen during the laboratory procedure.

The samples were treated with 35 percent hydrochloric acid (HCl) overnight to remove carbonates and to release the *Lycopodium* spores from their matrix. After neutralizing the acid with distilled water, the samples were allowed to settle for a period of at least three hours before the supernatant liquid was removed. Additional distilled water was added to the supernatant, and the mixture was swirled and then allowed to settle for 5 seconds. The suspended fine fraction was decanted through 150μ mesh screen into a second beaker. This procedure, repeated at least three times, removed lighter materials, including pollen grains, from the heavier fractions. The fine material was concentrated by centrifugation at 2,000 revolutions per minute (RPM).

The fine fraction was treated with concentrated hydrofluoric acid (HF) overnight to remove silicates. After completely neutralizing the acid with distilled water, the samples were treated with a solution of darvan and sonicated in a Delta D-9 Sonicator for 30 seconds. The Darvan solution was removed by repeated washing with distilled water and centrifuged (2,000 RPM) until the supernatant liquid was clear and neutral. This procedure removed fine charcoal and other associated organic matter and effectively deflocculated the sample.

The samples were dehydrated in glacial acetic acid in preparation for acetolyis. Acetolysis solution (acetic anhydride: concentrated sulfuric acid in 9:1 ratio) following Erdtman (1960), was added to each sample. Centrifuge tubes containing the solution were heated in a boiling water bath for approximately eight minutes and then cooled for an additional eight minutes before centrifugation and removal of the acetolysis solution with glacial acetic acid, followed by distilled water. Centrifugation at 2,000 RPM for 90 seconds dramatically reduced the size of the sample yet, from periodic examination of the residue, did not remove fossil palynomorphs.

Heavy density separation ensued using zinc bromide ($ZnBr_2$), with a specific gravity of 2.00, to remove much of the remaining detritus from the pollen. The light fraction was diluted with distilled water (10:1) and concentrated by centrifugation. The samples were washed repeatedly in distilled water until neutral. The residues were rinsed in a 1 percent solution of potassium hydroxide (KOH) for less than one minute, which was effective in removing the majority of the unwanted alkaline soluble humates.

The material was rinsed in ethanol (ETOH) stained with safranin-O, rinsed twice with ETOH, and transferred to 1 dram vials with tertiary butyl alcohol (TBA). The samples were mixed with a small quantity of glycerine and allowed to stand overnight for evaporation of the TBA. The storage vials were capped and were returned to the Museum of New Mexico at the completion of the project. Any remaining unprocessed soil was also returned at the completion of the project.

A drop of the polliniferous residue was mounted on a microscope slide for examination under an 18 by 18 mm cover slip sealed with fingernail polish. The slide was examined using 200X or 100X magnification under an aus-Jena Laboval 4 compound microscope. Occasionally, pollen grains were examined using either 400X or 1,000X oil immersion to obtain a positive identification to either the family or genus level.

Abbreviated microscopy was performed on each sample in which either 20 percent of the slide (approximately four transects at 200X magnification) or a minimum of 50 marker grains were counted. If warranted, full counts were conducted by counting to a minimum of 200 fossil grains. Regardless of which method was used, the uncounted portion of each slide was completely scanned at a magnification of 100X for larger grains of cultivated plants such as *Zea mays* and *Cucurbita,* two types of cactus (platyopuntia and cylindropuntia), and other large pollen types such as members of the Malvaceae or Nyctaginaceae families.

For those samples warranting full microscopy, a minimum of 200 pollen grains per sample were counted as suggested by Barkley (1934), which allows the analyst to inventory the most common taxa present in the sample. All transects were counted completely, resulting in various numbers of grains counted beyond 200. Pollen taxa encountered on the uncounted portion of the slide during the low magnification scan are tabulated separately.

Total pollen concentration values were computed for all taxa. In addition, the percentage of indeterminate pollen was also computed. Statistically, pollen concentration values provide a more reliable estimate of species composition within the assemblage. Traditionally, results have been presented by relative frequencies (percentages), where the abundance of each taxon is expressed in relation to the total pollen sum (200+ grains) per sample. With this method, rare pollen types tend to constitute less than 1 percent of the total assemblage. Pollen concentration values provide a more precise measurement of the abundance of even these rare types. The pollen data are reported here as pollen concentration values using the following formula:

$$PC = \frac{K * \sum_p}{\sum_L * S}$$

Where: PC = Pollen Concentration
K = *Lycopodium* spores added
$\sum_p$ = Fossil pollen counted
$\sum_L$ = *Lycopodium* spores counted
S = Sediment weight

The following example should clarify this approach. Taxon X may be represented by a total of 10 grains (1 percent) in a sample consisting of 1,000 grains, and by 100 grains (1 percent) in a second sample consisting of 10,000 grains. Taxon X is 1 percent of each sample, but the difference in actual occurrence of the taxon is obscured when pollen frequencies are used. The use of *pollen concentration values* are preferred because it accentuates the variability between samples in the occurrence of the taxon. The variability, therefore, is more readily interpretable when comparing cultural activity to noncultural distribution of the pollen rain.

Variability in pollen concentration values can also be attributed to deterioration of the grains through natural processes. In his study of sediment samples collected from a rockshelter, Hall (1981) developed the "1,000 grains/g" rule to assess the degree of pollen destruction. This approach has been used by many palynologists working in other contexts as a guide to determine the degree of preservation of a pollen assemblage and, ultimately, to aid in the selection of samples to be examined in greater detail. According to Hall, a pollen concentration value below 1000 grains/g indicates that forces of degradation may have severely altered the original assemblage. However, a pollen concentration value of fewer than 1,000 grains/g can indicate the restriction of the natural pollen rain. Samples from pit structures or floors within enclosed rooms, for example, often yield pollen concentration values below 1,000 grains/g.

Pollen degradation also modifies the pollen assemblage because pollen grains of different taxa degrade at variable rates (Holloway 1981, 1989). Some taxa are more resistant to deterioration than others and remain in assemblages after other types have deteriorated completely. Many commonly occurring taxa degrade beyond recognition in only a short time. For example, most (ca. 70 percent) angiosperm pollen has either tricolpate (three furrows) or tricolporate (three furrows each with pores) morphology. Because surfaces erode rather easily, once deteriorated, these grains tend to resemble each other and are not readily distinguishable. Other pollen types (e.g., cheno-am) are so distinctive that they remain identifiable even when almost completely degraded.

Pollen grains were identified to the lowest taxonomic level whenever possible. The majority of these identifications conformed to existing levels of taxonomy with a few exceptions. For example, cheno-am is an artificial, pollen morphological category which includes pollen of the family Chenopodiaceae (goosefoot) and the genus *Amaranthus* (pigweed), which are indistinguishable from each other (Martin 1963). All members are wind pollinated (anemophilous) and produce very large quantities of pollen. In many sediment samples from the American Southwest, this taxon often dominates the assemblage.

Pollen of the Asteraceae (sunflower) family was divided into four groups. The high spine and low spine groups were identified on the basis of spine length. High spine Asteraceae contains those grains with spine length greater than or equal to 2.5μ, while the low spine group have spines less than 2.5μ (Bryant 1969; Martin 1963). *Artemisia* pollen is identifiable to the genus level because of its unique morphology of a double tectum in the mesocopial (between furrows) region of the pollen grain. Pollen grains of the Liguliflorae are also distinguished by their fenestrate morphology. Grains of this type are restricted to the tribe Cichoreae, which includes such genera as *Taraxacum* (dandelion) and *Lactuca* (lettuce).

Pollen of the Poaceae (grass) family are generally indistinguishable below the family level, with the single exception of *Zea mays*, identifiable by its large size (80ų), relatively large pore annulus, and the internal morphology of the exine. All members of the family contain a single pore, are spherical, and have simple wall architecture. Identification of noncorn pollen is dependent on the presence of the single pore. Only complete or fragmented grains containing this pore were tabulated as members of the Poaceae.

Clumps of four or more pollen grains (anther fragments) were tabulated as single grains to avoid skewing the counts. Clumps of pollen grains (anther fragments) from archaeological contexts are interpreted as evidence for the presence of flowers at the sampling locale (Bohrer 1981b). This enables the analyst to infer possible human behavior.

Finally, pollen grains in the final stages of disintegration but retaining identifiable features, such as furrows, pores, complex wall architecture, or a combination of these attributes, were assigned to the indeterminate category. The potential exists to miss counting pollen grains without identifiable characteristics. For example, a grain that is so severely deteriorated that no distinguishing features exist closely resembles many spores. Pollen grains and spores are similar in size and are composed of the same material (sporopollenin). So that spores are not counted as deteriorated pollen, only those grains containing identifiable pollen characteristics are assigned to the indeterminate category. Thus, the indeterminate category contains a minimum estimate of degradation for any assemblage. If the percentage of indeterminate pollen is between 10 and 20 percent, relatively poor preservation of the assemblage is indicated, whereas indeterminate pollen in excess of 20 percent indicates severe deterioration to the assemblage.

In those samples where the total pollen concentration values are approximately at or below 1,000 grains/g, and the percentage of indeterminate pollen is 20 percent or greater, counting was terminated at the completion of the abbreviated microscopy phase. In some cases, the assemblage was so deteriorated that only a small number of taxa remained. Statistically, the concentration values may have exceeded 1,000 grains/g. If the species diversity was low (generally these samples contained only pine, cheno-am, members of the Asteraceae family, and indeterminate grains), counting was also terminated after abbreviated microscopy even if the pollen concentration values slightly exceeded 1,000 grains/g.

Results

The raw pollen counts are presented in Table 8. The calculated pollen concentration values are provided in Table 9. In the above tables, the samples are arranged by test pit and level. The results are presented by test pit below. The pollen samples contained extremely large quantities of pollen. In fact, counts in excess of 200 grains/sample were obtained from seven of the ten samples in only two of four transects. Thus, the majority of these samples provided full pollen counts at the abbreviated microscopy level of investigation.

Table 8. Raw Pollen Counts

FS #	Provenience	Stratum	TP	Period	*Pinus*	*Juniperus*	*Picea*	*Ulmus*	*Quercus*	*Prosopis*	*Fraxinus*	*Fabaceae*	Solanaceae
18	S wall area	1	1	Middle Archaic	113	2			8				
08	S wall area	2	1	Middle Archaic	413	1	2	1	37			1	2
16	S wall area	3	1	Middle Archaic	59				2				
21	N wall area	1	2	Middle Archaic	161	2			47				
22	S wall area	1	2	Middle Archaic	206	2	1		77	6			
24	w. wall area	1	2	Middle Archaic	168	1			53	2			2
23	N wall area	2	2	Middle Archaic	155				41	5	1		
19	S wall area	2	2	Middle Archaic	102				1				
25	W wall area	2	2	Middle Archaic	128	2			32	1		1	
17	S wall area	4	2	Middle Archaic	150				6				

Table 8 (continued)

FS #	Rosaceae	*Polygala*	*Eriogonum*	Caryophyllaceae	Poaceae	Cheno-am	Asteraceae High Spine.	Asteraceae Low Spine	*Artemisia*	*Ephedra*	Indeterminate
18					2	123	11	17	4	20	17
8	3				23	35	31	18	34	17	2
16						6	2		3	3	1
21	3				15	21	20	10	37	5	2
22	5				32	46	23	15	34	10	12
24	2				36	29	19	19	56	3	13
23	3				14	15	11	4	61	9	1
19					2	27	16	11	1	12	12
25	1	1	2		19	21	11	5	45	8	7
17				1	1	7	2		1		7

Table 8 (continued)

Low Magnification Scan					
FS #	**Sum**	**Indeterminate**	**Onagracea**	**Cary a**	**Nyctaginaceae**
18	317	5.363			
8	620	0.323	1		
16	76	1.316			
21	323	0.619			
22	469	2.559		1	6
24	403	3.226			
23	320	0.313			
19	184	6.522			
25	284	2.465			
17	175	4.000			

Table 9. Pollen Concentration Values

FS #	Provenience	Stratum	TP #	Period	*Pinus*	*Juniperus*	*Picea*	*Ulmus*	*Quercus*	*Prosopis*	*Fraxinus*	*Fabaceae*	Solanaceae
18	S wall area	1	1	Middle Archaic	2206	39			156				
08	S wall area	2	1	Middle Archaic	37170	90	180	90	3330			90	180
16	S wall area	3	1	Middle Archaic	605				21				
21	N wall area	1	2	Middle Archaic	26082	324			7614				
22	S wall area	1	2	Middle Archaic	11508	112	56		4301	335			

FS #	Provenience	Stratum	TP #	Period	*Pinus*	*Juniperus*	*Picea*	*Ulmus*	*Quercus*	*Prosopis*	*Fraxinus*	*Fabaceae*	Solanaceae
24	W wall area	1	2	Middle Archaic	10467	62			3302	125			125
23	N wall area	2	2	Middle Archaic	8659				2290	279	56		
19	S wall area	2	2	Middle Archaic	3443				34				
25	W wall area	2	2	Middle Archaic	9874	154			2469	77		77	
17	S wall area	4	2	Middle Archaic	865				35				

Table 9 (continued)

FS #	Rosaceae	*Polygala*	*Eriogonum*	Caryophyllaceae	Poaceae	Cheno-am	Asteraceae High Spine	Asteraceae Low Spine	*Artemisia*	*Ephedra*	Indeterminate
18					39	2401	215	332	78	360	332
8	270				2070	3150	2790	1620	3060	1530	180
16						62	21		31	31	10
21	486				2430	3402	3240	1620	5994	810	324
22	279				1788	2570	1285	838	1899	559	670
24	125				2243	1807	1184	1184	3489	187	810
23	168				782	838	614	223	3408	503	56
19					68	911	540	371	34	405	405
25	77	77	154		1466	1620	849	386	3471	617	540
17				6	6	40	12		6		40

Table 9 (continued)

								Low Magnification Scan			Estimated Maximum Potential Concentration Values
FS #	Sum	Concentration	Marker	Trans/ Total Trans	Marker/ Slide	*Lycopodium*	Weight (g)	Onagraceae	*Carya*	Nyctaginaceae	
18	317	6187	83	4/24	498	40500	25				3.25
8	620	55800	18	1/23	414	40500	25	3.91			3.91
16	76	779	158	4/23	909	40500	25				1.78
21	323	52326	10	2/22	110	40500	25				14.73
22	469	26199	29	2/24	348	40500	25		4.65	27.93	4.66
24	403	25110	26	2/22	286	40500	25				5.66
23	320	17876	29	2/22	319	40500	25				5.08
19	184	6210	48	4/24	288	40500	25				5.63
25	284	21909	21	2/25	263	40500	25				6.17
17	175	1009	281	4/22	1546	40500	25				1.05

Test Pit 1

FS 18 was taken from Stratum 1 and contained 6,187 grains/g total concentration. *Pinus* (2,206 grains/g) was high, with high amounts of *Quercus* (156 grains/g) and moderate *Juniperus* (39 grains/g). Cheno-am (2,401 grains/g) pollen was high, with high amounts of high spine (215 grains/g) and low spine (332 grains/g) Asteraceae, *Ephedra* (360 grains/g) and moderate amounts of *Artemisia* (79 grains/g) and Poaceae (39 grains/g).

FS 08 was taken from Stratum 2 and contained 55,800 grains/g total pollen concentration values. *Pinus* (31,170 grains/g) pollen clearly dominated the assemblage, with extremely high values for *Quercus* (3,330 grains/g) and high values for *Juniperus* (90 grains/g), *Ulmus* (90 grains/g), and *Picea* (180 grains/g), although these were based on only one or two grains. Cheno-am (3,150 grains/g), Poaceae (2,070 grains/g), high spine (2,790 grains/g) and low spine (1,620 grains/g) Asteraceae, *Artemisia* (3,060 grains/g) and *Ephedra* (1,530 grains/g) were all very high. Smaller amounts of Fabaceae and Solanaceae pollen were also present. A single grain of Onagraceae pollen (3.91 grains/g) was observed in the low-magnification scan of the slide.

FS 16 was taken from Stratum 3 and contained only 779 grains/g total concentration values. *Pinus* (605 grains/g) pollen dominated the assemblage, with small amounts of *Quercus* and high spine Asteraceae (21 grains/g each), cheno-am (62 grains/g), and *Ephedra* and *Artemisia* (31 grains/g each).

Test Pit 2

Three pollen samples were taken from Stratum 1 from this test pit. FS 21 was from the north wall profile and contained 52,326 grains/g total concentration values. *Pinus* (26,082 grains/g) dominated the assemblage, with *Quercus* (7,614 grains/g) pollen secondarily dominant. *Juniperus* (324 grains/g) was also very high. Cheno-am (3,402 grains/g), Poaceae (2,430 grains/g), high spine (3,240 grains/g) and low spine (1,620 grains/g) Asteraceae, *Ephedra* (810 grains/g), and *Artemisia* (5,994 grains/g) were all very high. Pollen of Rosaceae (486 grains/g) was also high.

FS 22 was from the south wall profile and contained 26,190 grains/g total concentration. *Pinus* (11,508 grains/g) dominated the assemblage, along with high amounts of *Quercus* (4,301 grains/g), *Juniperus* (112 grains/g), Prosopis (335 grains/g), and smaller amounts of *Picea* (56 grains/g). Cheno-am (2570 grains/g) was high, along with Poaceae (1,788 grains/g), *Artemisia* (1,899 grains/g), high spine (1,285 grains/g) and low spine (838 grains/g) Asteraceae, and *Ephedra* (559 grains/g). Rosaceae pollen (279 grains/g) was also high. *Carya* (4.65 grains/g) and Nyctaginaceae (27.93 grains/g) were also observed in the low magnification scan of the slide.

FS 24 was from the west wall profile and contained 25,110 grains/g total concentration. *Pinus* (10,467 grains/g) was very high along with high amounts of *Quercus* (3,302 grains/g) and *Prosopis* (125 grains/g) and small amounts of *Juniperus* (62 grains/g). Solanaceae and Rosaceae (125 grains/g each) were present. Poaceae (2,243 grains/g) pollen was high, with high amounts of cheno-am (1,807 grains/g), high and low spine Asteraceae (1,184 grains/g each), *Artemisia* (3,489 grains/g), and *Ephedra* (187 grains/g).

Three samples were also taken from Stratum 2 in this test pit. FS 23 was from the north wall area and contained 17,876 grains/g total concentration. *Pinus* (8,659 grains/g) was very high, with high amounts of *Quercus* (2,290 grains/g) and lesser amounts of *Prosopis* (279 grains/g) and a single occurrence (56 grains/g) of *Fraxinus*. Cheno-am (838 grains/g) was moderate to high, with high amounts of Poaceae (782 grains/g), high spine (614 grains/g) and low spine (223 grains/g) Asteraceae, *Ephedra* (187 grains/g), and *Artemisia* (3,408 grains/g).

The south wall profile (FS 19) contained 6,210 grains/g total concentration values. *Pinus* (3,443 grains/g) was high, with a moderate amount of *Quercus* (34 grains/g). Cheno-am (911 grains/g) was high, with high amounts of high spine (540 grains/g) and low spine (371 grains/g) Asteraceae pollen. Poaceae (68 grains/g) and *Artemisia* (34 grains/g) pollen were moderate, with high amounts of *Ephedra* (405 grains/g).

The west wall profile (FS 25) contained 21,909 grains/g total *concentration. Pinus* (9,674 grains/g) was very high with very high amounts of *Quercus* (2,469 grains/g) and *Juniperus* (154 grains/g) pollen. *Prosopis,* Solanaceae, Rosaceae, and *Polygala* were present in moderate to high amounts (77 grains/g each). Cheno-am (1,620 grains/g), Poaceae (1,469 grains/g), high spine (849 grains/g) and low spine (386 grains/g) Asteraceae, *Ephedra* (617 grains/g), and *Artemisia* (3,471 grains/g) were all very high.

FS 17 was from Stratum 4 and contained only 1,009 grains/g total pollen concentration values. *Pinus* (865 grains/g) was low, with a moderate amount (35 grains/g) of *Quercus* and a trace (6 grains/g) of Caryophyllaceae pollen. Cheno-am (40 grains/g), Poaceae (6 grains/g), high spine Asteraceae (12 grains/g), and *Artemisia* (6 grains/g) were all very low.

Discussion

Overall, the pollen concentration values from Test Pit 1 are markedly lower than those from Test Pit 2 (Fig. 12), the exception being Stratum 2. This can partially be explained by the location of Test Pit 1, deeper within the cave. As pollen is carried on wind currents, the shelter overhang acts to precipitously decrease wind velocity. The lowered velocity carries a much reduced particulate load, and thus the pollen load is deposited in areas very close to the overhang. As one moves under the overhang, the pollen concentration values generally are reduced (Birks and Birks 1980; Tauber 1965). The extremely high pollen concentration values from Stratum 2 are decidedly anomalous.

The concentration values from Test Pit 2 are generally high from Strata 1 and 2 and decrease dramatically in Stratum 4. The same decrease is noted in Test Pit 1. Thus, it appears that the lowermost strata from both sampling locales have dramatically reduced pollen assemblages. It might be inferred that these lowered strata were deposited prior to the cultural exploitation of the site.

The complete dominance of *Pinus* pollen (Tables 8 and 9; Fig. 13) from these strata indicates the presence of a ponderosa pine forest environment during the Middle Archaic occupation of the site. The high values of both *Quercus* and *Juniperus* pollen are consistent with this interpretation, because both *Quercus* and *Juniperus* are is common understory components of the ponderosa pine and piñon-juniper communities in the immediate vicinity.

Several additional arboreal taxa are represented within these assemblages. *Picea* (spruce), for example, is present from single levels from both test pits and is represented by only one or two grains. The presence of *Picea* is undoubtedly the result of long-distance transport, probably from higher elevations. Elevations of over 7,200 feet are present within about 2 miles south of the site, and populations of *Picea* could have existed. A single grain of *Carya* (hickory/pecan) pollen was observed in the low magnification scan from FS 22. This presence of this taxon could be the result of modern contamination from pecan groves historically active near Hatch, New Mexico. Alternatively, this grain could represent pollen eroded from Cretaceous or Tertiary deposits from

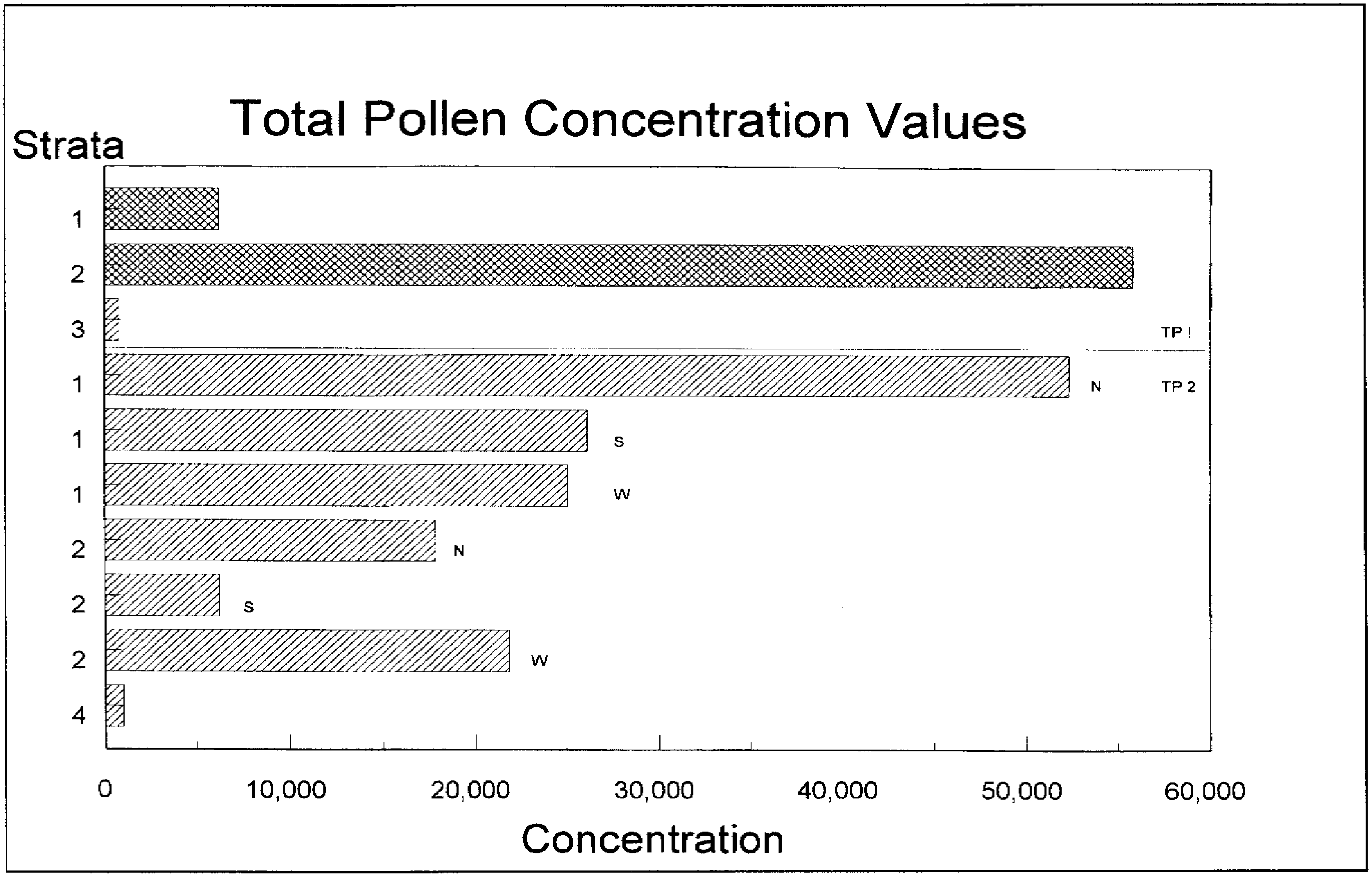

Figure 12. Total pollen concentration values.

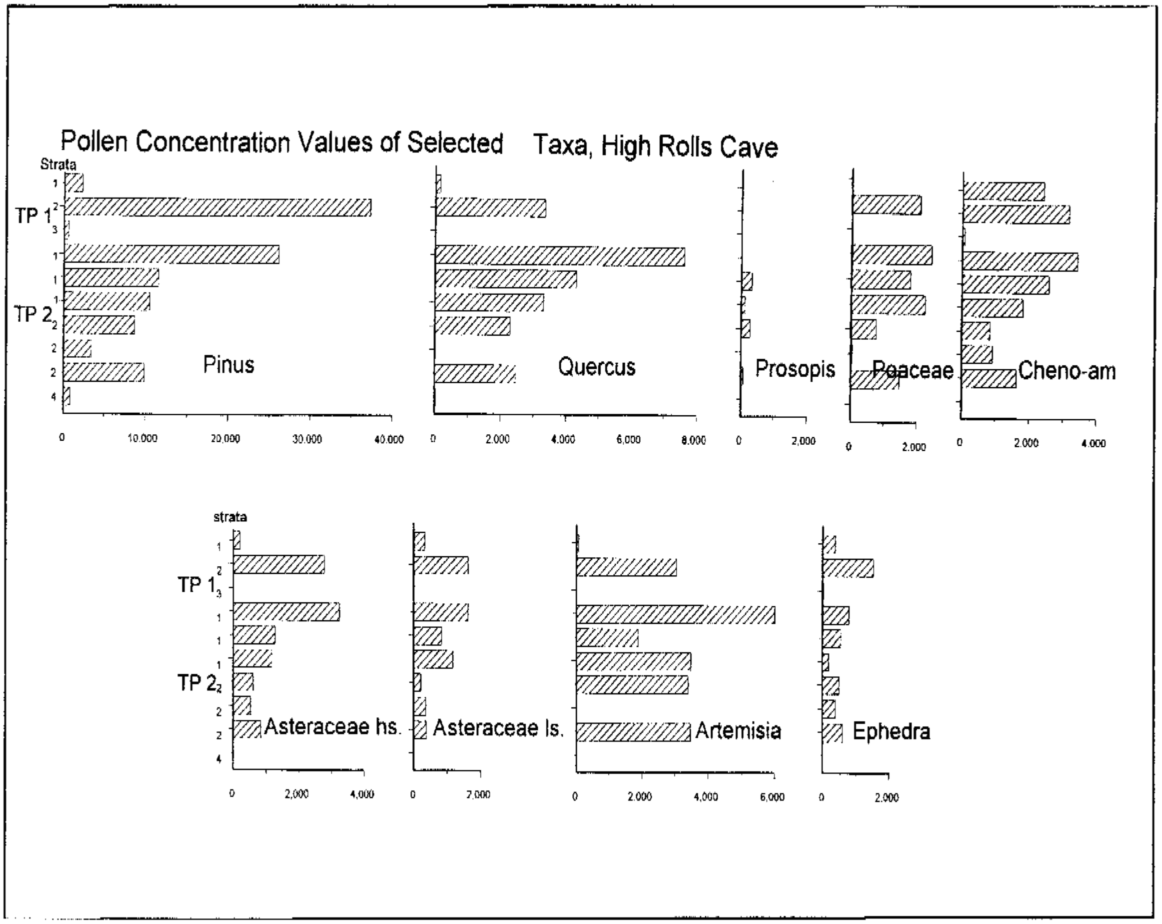

Figure 13. Pollen concentration values of selected taxa.

the area (Frederiksen 1985). *Carya* type pollen from these earlier geologic periods is essentially identical to modern *Carya* and is known to be present within these earlier deposits. Based on the presence of only a single grain, I suspect that this represents modern contamination via long-distance transport. A single grain of *Fraxinus* (ash) pollen was also present from Test Pit 2 (FS 23). *Fraxinus* is a common landscape tree, and most likely this represents long-distance transport from adjacent communities. Ulmus was present from Stratum 2 in Test Pit 1 (FS 08). This taxon was introduced historically into the state, again as a landscape plant. Very likely the single pollen grain represents long-distance transport from adjacent communities.

P*rosopis* pollen was present only in Test Pit 2, closer to the opening of the shelter. *Prosopis* is present on several talus slopes, and thus its presence is not unexpected. *Prosopis*, which is generally insect pollinated, produces much fewer pollen grains than the conifers, and thus it is not surprising that its distribution is restricted to the area closer to the opening. The consistent presence of this taxon from the assemblages indicates a continued presence within the local flora during Middle Archaic times.

Poaceae pollen was very high throughout the columns. Although Poaceae is wind pollinated, members of this family produce relatively little pollen, and generally the concentration values are low. The extremely high concentration values recovered are likely due to the presence of various flowering grasses in the fiber mass area.

Both high and low spine Asteraceae pollen is quite common throughout the assemblages. This suggests that these taxa were a common component of the vegetation, most likely present on the slopes outside the shelter.

Artemisia pollen is extremely high throughout the columns. This suggests that *Artemisia* was a dominant component of the vegetation, probably on the slopes outside of the shelter. Although *Artemisia* was undoubtedly utilized by the occupants (Moermann 1986), the similar concentration values argue for natural deposition rather than a cultural vector.

Several other taxa are present only sporadically. Solanaceae, for example, is present in both test pit areas, but in limited concentrations. These are likely naturally occurring members of the community and probably do not represent cultural use. Rosaceae pollen, on the other hand, are consistently present within the assemblages. Several members of this family, for example, *Cowania* sp., are present in the local vegetation. Given the high pollen concentration values and the consistent presence of this taxon, I suspect that much of this pollen was culturally introduced. *Eriogonum* and polygala were both present from FS 25 from Test Pit 2. Both are insect pollinated and were probably intentionally introduced into the assemblage. *Eriogonum* in particular has known economic uses and thus was likely brought into the shelter intentionally. Nyctagninaceae pollen was present only in a single sample and was observed only from the low-magnification scan of the slide. Several genera of this family are locally present, and this may reflect only the presence of this family in the vegetation. Alternatively, plants of this family may have been brought into the occupational area. Members of the Nyctaginaceae family are also reported to have been used economically.

Conclusions

The pollen assemblages analyzed from this suspected Middle Archaic occupation reflect a vegetational community quite similar to that of the well-developed ponderosa pine forest in the area today. Little vegetational change has occurred during the intervening time. Piñon-juniper, *Quercus*, and *Prosopis* were also present at the lower elevations and on the talus slopes.

The bulk of the pollen assemblages reflect the natural vegetation in the area. There is a general decrease in pollen concentration values with depth within each of the test pit areas, which is expected. Test Pit 1 showed generally lowered pollen concentration values, and this is thought to be a function of its position within the shelter and the dynamics of pollen deposition.

The extremely high pollen concentration values for Poaceae are consistent with the presence of matting materials and probably do not directly reflect a greater than normal abundance of these plants within the vegetational community. Traces of economically important taxa were present and suggest that certain plants may have been intentionally brought into the shelter, but this is inconclusive because these taxa are locally present. The high abundance of Artemisia may reflect its importance within the community but also may indicate an economic or potentially ritual usage.

ORAL HISTORY INVESTIGATION OF LA 114103

Janet Spivey

An oral history investigation was conducted at LA 114103 (High Rolls Cave) by Janet E. Spivey, OAS ethnohistorian, in September 1998. The investigation was prompted by an interview conducted in December 1996 by Linda S. Mick-O'Hara with Pete Eidenbach during the archaeological testing project. In an interview conducted by Eidenbach (1972) with Al Bassett, now deceased, Bassett stated that during the 1940s highway construction of U.S. 83 (present U.S. 82) many perishable items and human bone were picked up after the initial blasting at the cave. It was hoped that interviews with other people who lived in the area during the construction of U.S. 82 would yield information on the original size and cultural contents of the cave.

Historical Overview of High Rolls Cave Area

LA 114193 is on the north-facing cliff east of the tunnel on U.S. 82 in Fresnal Canyon and just about 1 mile west of the High Rolls–Mountain Park Post Office. The Fresnal area consists of the north, south, and middle forks of Fresnal Creek, which flows through Fresnal Canyon and continues through Box Canyon in the Sacramento Mountains of southern New Mexico.

According to Friesen (1991), some of the earliest Anglo settlers of the Fresnal area were Michael Mulchay, George W. Van Sickle, Eugene Sullivan, William Ostic, Fletcher Thompson, and James Thompson. The first ditch work was done by some people from La Luz in 1882. David M. Sutherland wrote the following in 1917: "There was no one living in Fresnal Canyon and no irrigation had ever been done. I went up on horseback in the month of September, 1882, with a friend of mine who came up here from El Paso, and we found the *cienagas* all covered with tullies and the remains of the ditch work done by the La Luz people. This ditch was destroyed in 1883 or 1884 by a herd of sheep brought down from the north. The first man to make a claim in Fresnal Canyon came from Arizona in 1883. Francisco Maes and Cipriano Tafoya from La Luz settled near Mountain Park in 1884."

The Alamogordo and Sacramento Mountain Railway (A&SMR) was built through the Fresnal area in 1898-99. The line of the railway was probably one of the most spectacular among western railroads. To lay out the route and build it, Charles B. Eddy hired Horace A. Summer, who had laid out railroads in the Colorado mountains. Starting at Alamogordo at an elevation of 4,322 feet, the A&SMR passed La Luz, High Rolls, and Tobaggan before it came to the hotel at Cloudcroft (Myrick 1970:78-81). A freight depot with a Wells Fargo office was built at High Rolls and opened for business in January 1905. The passenger depot was also built at High Rolls in 1911. Mountain Park had a large warehouse and a platform for loading and unloading the freight cars. The railway not only hauled passengers, but logs, produce, and ore from the mines. The Courtney Mine, four miles south of High Rolls, produced copper ore that was shipped to El Paso. Passenger excursion trains from El Paso brought visitors to the mountains seeking relief from the summer heat. There was a tent city at Mountain Park in 1906 that consisted of a big boarding tent where people could rent cots. Private tents were also for rent. Passenger excursions continued until 1930, and the line became a "freight only" operation in 1938. When the lumber companies switched to motor trucks, the A&SMR was abandoned in September 1947. Today several of the trestles still remain and can be viewed from U.S. 82 (Friesen 1991:45-46; Myrick 1970:78-81).

The Scenic Box Canyon Road was built in 1914 from the mouth of Dry Canyon through the Box

Canyon and on to High Rolls. The road was to be not less than fourteen feet wide with turnouts for the convenience of the travelers. V. D. Dodgen was the contractor, and the cost of the road was $18,000. V. D. Dodgen and Matt Massey built the bridge over the Fresnal in July 1912. The Scenic Box Canyon Road was very steep, and the guardrails were just fences (Friesen 1991:9-10). According to Friesen (1991), it was so steep that some of the cars could not get gas into the carburetors while going forward so they had to back up the steep grade.

On November 24, 1949, the *Alamogordo News* reported the following: 1,000 WITNESS OPENING OF COMPLETED MOUNTAIN TUNNEL ON SUNDAY, NOVEMBER 20. The opening of the 500 foot tunnel (LA 114520) was probably the most significant event in the building of the new highway from the Tularosa Basin to Cloudcroft. With completion of the entire route, the new road cost about two million dollars in federal and state funds. In 1949 it was reported to be the most difficult and costly road project ever undertaken in the state by the Public Roads Administration. Thygesen-Llewellyn Contracting Company built the road and tunnel. The new road followed the old scenic route up Dry Canyon and replaced the road that went up La Luz Canyon into Fresnal Canyon to High Rolls and Mountain Park. The greatest difficulty with the tunnel came when it was discovered there were broken formations in the rock. Because of these conditions, concrete and steel reinforcements had to be increased before the tunnel could be lined and made safe for traffic. Friesen (1991) stated that the new contract added 860 cubic yards of concrete for lining the tunnel, 23,000 pounds of reinforcing steel, 23 tons of fine aggregate for gunnite, and 32 barrels of white cement for gunnite. In all 6,200 square feet of gunnite lining and 10 linear feet of concrete tunnel lining were used. The lining of the tunnel cost $200,000.

Interviews with Area Residents

The 1972 Eidenbach interview with Al Bassett provided the basis for additional research concerning the original size and cultural contents of the cave prior to and during the construction of U.S. 83. Partial interviews were conducted by telephone with Odell Millhouse and Pete Eidenbach on September 10, 1998. At that time, appointments were made with Millhouse and Eidenbach for September 17 and 18, 1998, to conduct interviews at their residences in High Rolls, New Mexico. Unfortunately, Odell Millhouse was unable to make the scheduled appointment on September 17, 1998. However, during the telephone interview he agreed with the comments made by Al Bassett concerning bones and objects being found after the initial blasting of the cave during the highway construction.

The interview with Pete Eidenbach was conducted on September 18, 1998, at his house at High Rolls. Also present was Renetta Friesen, a local historian. Eidenbach conducted the Al Bassett interview in June 1972. Al Bassett was born at his grandmother's house in Fresnal Canyon on October 12, 1904. Bassett stated that he had worked with a "Cat" (Caterpillar backhoe) on the new Fresnal Canyon road up to the tunnel. During the 1972 interview Bassett made the statement that human bones and other items were picked up after the initial blasting of the cave. Eidenbach stated that the presence of the infant burial in the Fresnal Shelter lends credence to Bassett's story.

Renetta Friesen stated since she had not lived in the Fresnal area all her life she could not state whether or not the Bassett story was true. However, in the research for her book, *Fresnal History,* she heard many stories about the building of the road but none about bones being found after the blasting of the cave. During the interview, Eidenbach and Friesen suggested that an interview be conducted with Jim Cadwallader. The Cadwallader family had moved to the Fresnal area in the early 1900s, and Jim would be familiar with the history of the highway construction.

A telephone interview was conducted with Jim Cadwallader on September 30, 1998. The Cadwallader family came to the Fresnal area in 1903. Edgar F. Cadwallader bought the Huss homestead in 1903 and began growing fruit, vegetables, and flowers. The A&SMR went through his property, and he named the property Mountain Park. In 1907, E. F. Cadwallader and Sons had about 3,000 fruit trees and a warehouse. They shipped their apples and vegetables by the railroad to the markets. E. F. Cadwallader also supplied flowers for the lobby of the Cloudcroft Lodge. Jim Cadwallader was born in 1927 and knows the Fresnal area. As a boy he swam in the river flowing through Fresnal Canyon and explored High Rolls Cave. He stated that the cave was not very deep, and he did not notice any bones in the cave at that time. He recalled that prior to the blasting of the cave, he observed a trench that had been dug inside the cave. The trench was 6-8 feet long and about 3 feet deep. He visited the cave again after the completion of highway construction and noticed that the trench had been filled in. Jim Cadwallader does not recall hearing about any bones or artifacts being blown out of the cave during the highway construction, although there have been many stories (some of them undoubtedly exaggerated) associated with the construction of the highway and tunnel.

Summary

An oral history investigation of LA 114103 was prompted by an interview conducted by Linda Mick-O'Hara with Pete Eidenbach during the archaeological testing project in September 1996. In an interview conducted by Eidenbach in June, 1972, with Al Bassett (deceased), Bassett stated that during the 1940s highway construction of U.S. 82, many items and human bones were picked up after the initial blasting of the cave. In a telephone interview on September 10, 1998, Odell Millhouse agreed with Bassett's statement and remembered hearing at the time of the blast that human bones were thrown out of the cave along with other items.

Pete Eidenbach stated during the September 18, 1998, interview that the presence of the infant burial in Fresnal Shelter gave credence to Bassett's story. Unfortunately, the interviews with local residents did not confirm or deny that statement. Jim Cadwallader, whose family came to the Fresnal area in 1903, was familiar with the cave and the highway and tunnel construction. Although he had heard many stories about the highway construction, he did not recall hearing any stories about bones or artifacts being blown out of the cave. Renetta Friesen, a local historian, had not heard the story about bones either.

SUMMARY AND CONCLUSIONS

Limited test excavations at LA 114103, High Rolls Cave, by the Office of Archaeological Studies confirmed the existence of human occupation dating to the Archaic period. A diagnostic projectile point and radiocarbon dates place at least one occupation of this site in the San Pedro phase, between 1500 and 200 B.C. However, this is not to infer that this site only sustained a single occupation. Complex stratigraphy and the possibility of thermal features may represent systematic reoccupation and use.

Perishable items were identified in the field as matting, a possible prayer stick (paho) or root, and the portion of a possible basket (see Test Pit 2). The matting was subsequently identified as an irregular, felted fiber mass (Toll, this volume). Individual fibers and fiber bundles had been softened by some combination of pounding, scraping, or retting, producing a compacted, springy surface. This soft surface could have been used for cradleboard padding or perhaps a flexible cradle.

There remains some question as to whether the item initially identified as a prayer stick is actually a ceremonial item. The stratigraphic context from which it was recovered and associated artifacts have been dated to the San Pedro phase of the Cochise Tradition. As of this writing, few ceremonial items of this nature have been recovered from this period. Secondly, the artifact appears to be natural, probably a root. Since it may or not be cultural, this item was returned to the Mescalero Apache tribe.

The item identified as a possible basket by the excavators was generally circular. Shell and lithic artifacts were present in the fill of this item. Unfortunately, because of time constraints, only half of the artifact was removed. When conserved, it was entirely dismantled, and what remained of its integrity was lost.

Field notes suggest that there was some problem finding the floor (Mick-O'Hara 1997). However, in reviewing the data, the occupation surface may have actually been found but not identified as such. Past studies of prehistoric southwestern cave dwellings have shown that tree branches, reeds, yucca, or other plants are sometimes strewn on the cave floor to create a compatible surface. Elements may be crisscrossed to provide increased coverage. When exposed archaeologically, this surface may resemble some woven item. It is probable that the level at which the fiber mass occurred may actually have been the floor.

High Rolls invites comparison with Fresnal Shelter, a short distance across Fresnal Canyon, which has been extensively investigated (Wimberly and Eidenbach 1972, 1981). Fresnal seems to evidence broad spectrum, multiseason habitation repeatedly and over a long period of time. High Rolls Shelter, on the other hand, is smaller, poorly suited for winter use, and may carry signs of ceremonial or specialized use. Although the location of the cave suggests a summer occupation, seasonality was not established. Hearths may be present. However, hearths cannot be used as reliable indicators of cold weather occupation (Kelley and Lentz 1982). Few notable floral and palynological remains were found (M. Toll, this volume). Archaic deposits at nearby Fresnal Shelter are indicative of a specialized Archaic highland hunting pattern (Wimberly and Eidenbach 1981). Evidence of large game hunting and butchering was found at Fresnal Shelter. Most of the identified bone was mule deer, though some pronghorn, bighorn sheep, and bison bones were also found. The butchering pattern suggested that meat packages that included major long bones and attached muscle were removed and carried away, while parts that contained less meat were processed and consumed on-site (Wimberly and Eidenbach 1981:27). As Moore (this volume) suggests, this strategy may indicate a logistical pattern of meat acquisition for transport to base camps located elsewhere, with little associated consumption of meat at the butchering locus. It is quite possible that further excavation would recover evidence of a similar pattern of meat acquisition and consumption, and that future research may reveal a short-term logistical function at High Rolls Cave.

The limited testing at High Rolls Cave produced absolute dates and perishable items. Also, a limited amount of lithic and faunal artifacts were recovered. Even though the lithic artifact sample was small, it demonstrated evidence of biface reduction and contained a projectile point and a chipped stone tool. There is little evidence of biface manufacture at the site, but bifaces seem to have been used as cores, and core flakes were used as informal tools. The objects originally thought of as matting and basketry were not clearly identified as such. What is clear is that there was a fiber mass on the floor, currently exposed along the eastern profile of the cave. However, its exact composition is ambiguous. It may have been placed on the floor of the cave in a haphazard fashion, or it may have been deliberately arranged. Nonetheless, the presence of perishable items in a dry cave site is important in itself. These items are often absent in the archaeological record and, with a larger sample than the current one, can provide important information on resource use, subsistence, and other aspects of prehistoric economy.

The few artifacts recovered from High Rolls Cave may help postulate the site's function, which can be tested with more extensive data. Specifically, was the use of High Rolls similar to that of nearby Fresnal Shelter? Did both function as short-term logistical camps used while obtaining game in the highlands? Or did one sustain intermittent occupation while the other served as a more permanent habitation? Given their orientation--High Rolls facing north, Fresnal south--did one shelter sustain more prolonged use than the other? Is it possible that High Rolls cave was the location of early ceremonial activities? What is the biological relationship of the occupants of this site to surrounding groups? Several of the DNA samples obtained from Fresnal Shelter could be compared with human organic materials from High Rolls Cave, should they be encountered, to determine a possible genetic connection (Eidenbach, personal communication, September 1998).

Although High Rolls cave may have an oral history of containing human remains, none were encountered during the OAS testing program. No conclusive evidence was found to support or deny the ethnographic information concerning the human bones and artifacts reportedly found after the initial blasting at the cave. Still, it is apparent that damage has been and is being done to the cave from vandals, looters, and the vibrations from the heavy flow of traffic. The USDA Forest Service reported that the edge of the cave is eroding and that materials are sloughing off (Dan Lentz, personal communication, February 1999). All of those interviewed in 1998 wanted to see the cave protected from further damage. Broken modern glass, a modern hearth, and other contemporary refuse testify to the current use of this site, probably by vandals or picnickers. Protection of this site before further damage occurs is recommended. Continued depredations to the site and natural erosion suggest that immediate action, such as data recovery or stabilization, should be taken before further deterioration occurs. Future investigations at LA 114103 can provide important insights into the dynamics of the late Archaic settlement system of this area.

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