MUSEUM OF NEW MEXICO

OFFICE OF ARCHAEOLOGICAL STUDIES

CORN CAMP AND LA CRESTA: SMALL DUNE SITES AND THEIR BEARING ON THE PREHISTORY OF SOUTHEASTERN NEW MEXICO

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ADMINISTRATIVE SUMMARY

From September 6 through October 13, 1994, an archaeological team from the Office of Archaeological Studies, Museum of New Mexico, excavated two prehistoric sites along U.S. 70 north of Roswell, New Mexico. The work was done at the request of the New Mexico State Highway and Transportation Department (NMSHTD). Both sites have mixed ownerships--private, BLM (minerals), and NMSHTD.

The excavation program was conducted in accordance with the approved data recovery plan (Wiseman 1993). Each site was intensively surface collected, and large areas were excavated. This document details the results of the excavations.

Corn Camp (LA 6825) was a small, multicomponent camp site with occupations dating to the prehistoric pottery period, the early historic period, and perhaps the Archaic period. The dearth of artifacts suggests all occupations were short-term, yet corn pollen indicates a function more important to our regional perspective than a simple camp. Although the ridge to the west (La Cresta) may have been used as a source of artifact materials during one or more of the occupations at Corn Camp, the low debitage frequencies indicate that Corn Camp was not solely a workshop associated with La Cresta.

La Cresta (LA 6826) is large, lithic-material collection locale or quarry that may have been used as a game lookout and perhaps also a habitation location for a short period of time on at least one occasion. Given the wide variety and quantities of knappable materials, this site almost certainly was used as a rock source during most or all of the prehistoric and early historic periods. However, a single pottery sherd provides the only dated use of the site.

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The conclusion is inescapable that all archeological sites, including small, surface, and disturbed sites, should be approached with care and treated as potentially significant sources of information until proper assessments can be made. . . . It is not acceptable to decide, independent of other facts, that small, surface, or disturbed sites should be given little or no consideration in mitigation decisions. . . . [M]ore often than not, these classes of sites are more amenable than others to satisfactory treatment.

> Valerie Talmadge and Olga Chesler, *The Importance of Small, Surface, and Disturbed Sites as Sources of Significant Archeological Data*

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INTRODUCTION

From September 6 through October 13, 1994, an archaeological team from the Office of Archaeological Studies, Museum of New Mexico, excavated archaeological sites LA 6825 and LA 6826 along U.S. 70 north of Roswell, New Mexico (Fig. 1). The work was done at the request of the New Mexico State Highway and Transportation Department (NMSHTD) as part of Project NH-070-7(21)337. Both sites have mixed ownerships--private, BLM (minerals), and NMSHTD.

The field staff consisted of R. N. Wiseman (supervisor), Peter Y. Bullock (assistant supervisor), Byron T. Hamilton (assistant supervisor replacing Bullock), and Robert L. Sparks. Labor was provided by Manuel (Larry) Lopez, Juan Carlos Zavala, and Luvin Sanchez of Roswell. Yvonne R. Oakes served as principal investigator.

Artifact analyses were performed by Wiseman and Hamilton. Specialized analyses were done by Nancy J. Akins (fauna), Richard G. Holloway (pollen), Mollie S. Toll (flora), and Beta-Analytic, Inc. (radiocarbon dating). F. E. Green (professor emeritus, Texas Tech University) and Rick Smartt (director, New Mexico Museum of Natural History) identified the shell beads.

The support staff of the OAS was comprised of Delinda Andermann (secretary), Nancy Hunter Warren (coordinator and laboratory photographer), Joyce Varela and Cameron Cunningham (financial specialists), and Theresa Romero and Susan Benevides (clerks). The report production staff included Tom Ireland (editor) and Ann Noble (graphic artist).

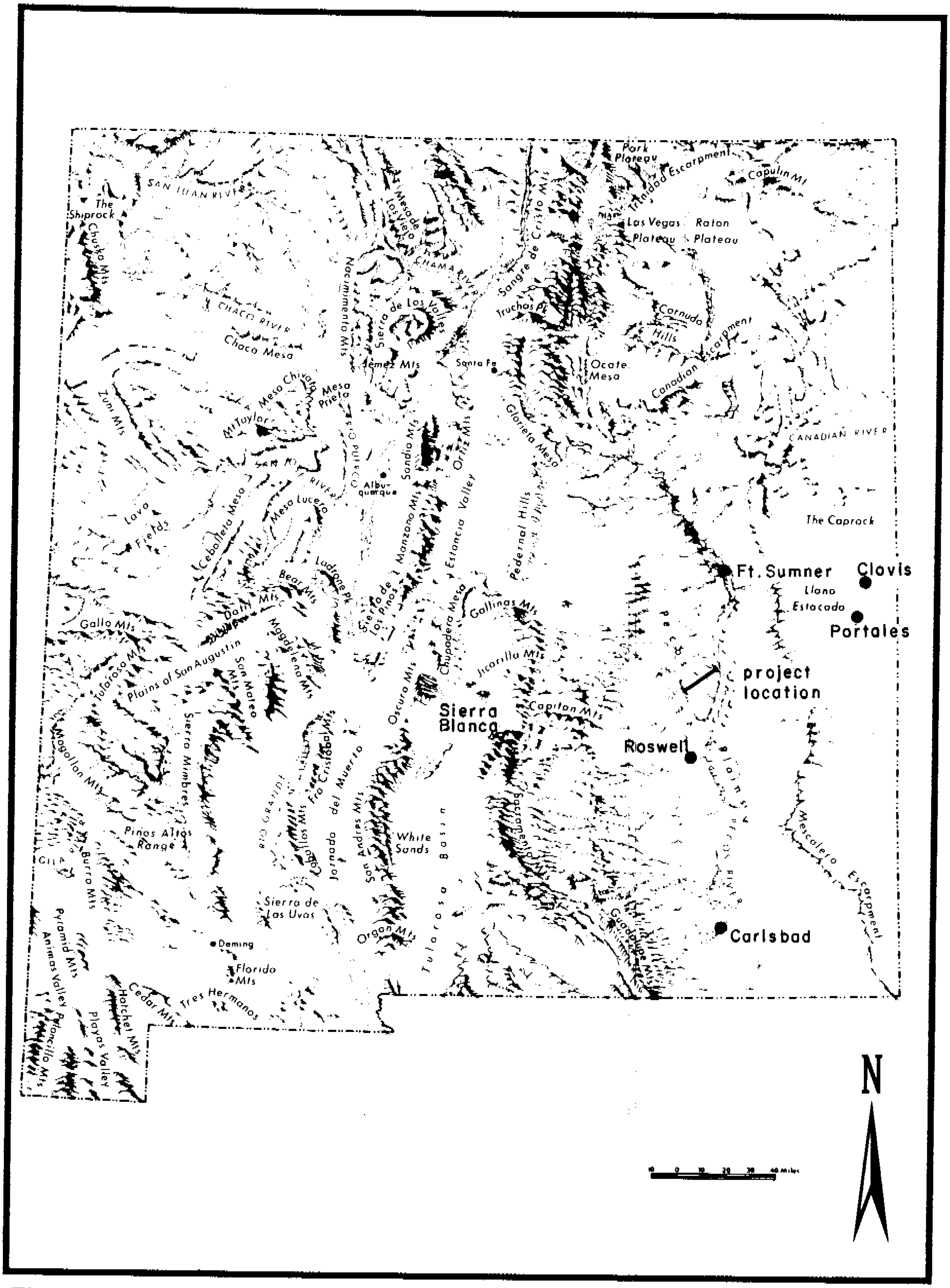

Figure 1. Project location map.

NATURAL ENVIRONMENT

LA 6826 is on top of a ridgelike isolate of the Dunnahoo Hills at an elevation of 1,106 m above sea level and 20 m above the valley floor to the east (Fig. 2). The ridge provides an excellent view of grazing lands to the north, east, and southwest. Shaw Lake, a very large wet-weather lake, is 1 km to the east.

LA 6825 is among low coppice dunes at the northeastern foot of the ridge on which LA 6826 is located. The site is 1,090 m above sea level and has a good but more restricted view of valley bottom grazing lands to the north and east.

The Dunnahoo Hills are a semiisolated remnant of undivided strata of the Artesia Group (Permian). The surface geology of the surrounding, lower-lying terrain is Quaternary alluvium of the Pecos Valley (Dane and Bachman 1965).

Soils in the vicinity of the project sites belong to the Upton-Simona association. "Although small and scattered areas of deep soils occur in this association, it is dominated by shallow soils underlain by fractured strongly cemented to indurated caliche" (Maker et al. 1971:15).

Reakor soils, a major component of this association and especially common in the vicinity of the sites, are a reddish-brown calcareous loam. Today, the vegetation of this association is used mostly for grazing because the soils are generally too shallow for irrigation. Small-plot farming of the type practiced by prehistoric peoples would have been possible, but such plots would necessarily be rather widely scattered because of the distribution of the small pockets of deeper, more arable soils characteristic of this association. Thus, gardening would have been possible in the vicinity of the sites, but serious cropping would have been much easier several kilometers further south, where larger expanses of arable land are to be found.

Before intensive agricultural development in the late 1800s, surface and underground water sources in the Roswell area were especially productive. Occupants of the project sites had permanent water available to them at the Pecos River, 5.5 km to the east. Skull Lake, 1.5 km to the west, was also a potential water source for the prehistoric peoples. Although we suspect that its water is unfit for human consumption today, it is possible that such was not the case before the twentieth century, when the freshwater component of the underground aquifer was removed by overpumping for irrigation. Prior to that time, the Bottomless Lakes, hydrologically similar to Skull Lake and 24 km to the south, had potable water lenses at the water surface (Earl King, pers. comm., 1981).

According to Kuchler (1964), the potential natural vegetation of the project area belongs to the Creosote Bush–Tarbush (*Larrea-Flourensia*) association, but the site is in a marginal part of the association. Many of the minor species of this association (e.g., yucca, agave, sotol, and some species of cactus) that would have been most useful to man either do not occur or do not occur in useful numbers this far north. Mesquite occurs on and in the vicinity of the site today, but again, the numbers of plants preclude the possibility that it was a major local resource for humans.

Dick-Peddie's map (1993) includes the area of the project sites within his Chihuahuan Desert Scrub association, an association dominated by creosotebush and tarbush. However, he notes in his discussion (1993:131ff.) that the Chihuahuan Desert in southern New Mexico has spread at the expense of Desert Grassland over the past 150 years, mainly because of grazing pressure. Because a very slight climatic shift also occurred during the past 150 years, the changes brought on by overgrazing could not be reversed to normal vegetative conditions (i.e., Desert Grassland). Although scientists cannot say for certain, it is possible that the presence of species such as soaptree yucca within Chihuahuan Desert Scrub areas may indicate these areas were formerly Desert Grassland. If this is true, then the project sites, at the time of prehistoric occupation, were probably within the grassland zone, for soaptree yuccas are quite common on the sites and in the surrounding area.

One of the natural attractions of the Roswell area was the variety and abundance of wildlife. Early pioneers describe large herds of antelope, cottontails, jackrabbits, and an abundance of fish (Shinkle 1966). The Pecos River formed the western boundary of the range of the great bison herds that frequented the southern Great Plains, though small herds and individuals moved west of the river as well. During the field project (April), antelope in groups of 5 to 30 animals were observed grazing most days in the valley north and northeast of the project sites. These animals usually entered the valley from the west in the morning. They evidently had spent the night in the vicinity of Skull Lake to the west.

The Pecos River is also a natural flyway for migratory birds. The Bitter Lakes Wildlife Refuge, a series of man-enhanced brackish-water "lakes" along the river, harbors an abundance of ducks, geese, and other species, especially during the spring and fall. The project sites are located among the various units of the refuge, which is, and presumably always was, the heart of this important resource.

Roswell's climate today is characterized by mild winters and hot summers. The normalized mean January temperature is 3.3 degrees C, that of July is 25.9 degrees C, and the yearly mean is 14.7 degrees C. The average frost-free season is in excess of 200 days (Tuan et al. 1973).

Precipitation is currently summer dominant. The mean normalized annual amount is 295 mm, and 210 mm fall in the growing season, April through September (U.S. Department of Commerce 1965).

CULTURE HISTORY

The Pecos Valley in New Mexico

The following culture history outline of southeastern New Mexico is distilled from a number of sources. Sources for the prehistoric period include Stuart and Gauthier (1981, a general study of New Mexico archaeology), Sebastian and Larralde (1989, an overview of east-central and southeastern New Mexico), Kelley (1984, a more specific study of the Sierra Blanca region west of Roswell), Jelinek (1967, the Pecos River north of Roswell), Katz and Katz (1985a, the Pecos River south of Roswell), and Leslie (1979, the region east of the Pecos River and especially the southeastern corner of New Mexico). The primary references used for the historic period are Katz and Katz (1985b) and Shinkle (1966). The reader desiring more information is referred to those volumes.

Human occupation of southeastern New Mexico began with the Llano complex ("Clovis Man") of the Paleoindian period, which dates to at least 13,000 years ago. These people and their successors of the Folsom period hunted large mammals (so-called megafauna, such as mammoths and extinct forms of bison) and maintained a nomadic or seminomadic lifestyle. Although most accounts of Paleoindians refer to them as big-game hunters, it is a virtual certainty that the people collected and consumed wild vegetal foods and small animals as well. Paleoindian occupation and use of the project area is demonstrated by Clovis, Folsom, and Eden projectile point fragments found during the Haystack Mountain Survey (Bond 1979), a tract survey conducted only 22 km northeast of the project sites.

The retreat of the Pleistocene glaciers and resultant warming of the more southerly latitudes resulted in a shift in human adaptation to what archaeologists call the Archaic period. This adaptation was more eclectic and focused on smaller animals such as deer and rabbits. The appearance of grinding tools and specialized burned-rock features suggests a greater reliance on plant foods.

The Archaic of the greater Roswell region has not been systematically studied. Archaeologists, looking at the remains from single-site excavations or limited surveys, have posited affiliations with the central Texas Archaic (Bond 1979), the Texas Panhandle Archaic (Jelinek 1967), the Oshara tradition of northwestern New Mexico (Jelinek 1967), and the Chihuahua tradition and the Cochise culture of south-central and southwestern New Mexico and adjacent Arizona (Wiseman 1996).

Further south, along the Pecos River in the Carlsbad area, an Archaic sequence (including hunter-gatherers dating to the pottery period) developed by the Katzes may pertain to the pre-pottery remains of the Roswell area (Katz and Katz 1985a). The sequence starts with the Middle Archaic, rather than the Early Archaic, suggesting an occupational hiatus between the Paleoindian period and the Avalon phase (3000-1000 B.C.). Little is known about the peoples of the Avalon phase other than that they inhabited the floodplain near the river channel during at least part of the year, camped and constructed hearths in the open, and consumed one or more species of freshwater shellfish. The subsistence orientation at these sites was clearly riverine. Projectile points are currently unknown for this phase.

Late Archaic peoples of the succeeding McMillan phase (1000 B.C. to A.D. 1) are better known in that more sites with a wider variety of remains have been documented. They built relatively small hearths (1 m diameter clusters of small rocks) and burned-rock rings. Previously named projectile point styles associated with the McMillan include the Darl and the Palmillas types of the Texas sequence. Subsistence involved exploiting both riverine and upland plant and animal species.

The terminal Archaic Brantley phase (A.D. 1 to 750) saw a continuation of the previous patterns and a greater use of burned-rock rings. Although this suggests that certain upland resources such as agave and sotol were becoming more important in the diet, the ratio of riverine to upland sites remained the same, with the emphasis still on floodplain living. Projectile point types commonly associated with the Brantley phase include the previously known San Pedro style; a newly described provisional type, the Pecos point; and several less standardized, but nevertheless familiar, styles of points commonly found in the region.

During the Globe phase (A.D. 750 to 1150), at least in the Carlsbad locale, occupation of the floodplain environment reached its zenith. Four major changes also occurred at this time. Brown ware ceramics, the bow and arrow, and a type of rock habitation structure (the stone circle or piled-rock structure) appear for the first time. In addition, the subsistence system changes from a riverine emphasis supplemented by upland foods to one that emphasized upland products supplemented by riverine foods. Projectile point styles are dominated by the corner-notched arrow tips called Scallorn. In many ways, the Globe phase appears to have been transitional between earlier and later adaptive patterns.

After A.D. 1150, occupation along the river in the Carlsbad area diminished greatly. The people who remained in the area retained their essentially Archaic, hunter-gatherer lifestyle, but continued to use pottery.

By way of contrast, late prehistoric or pottery-period occupation in the Roswell area involved villages of pithouses or pueblo-style architecture and impressive accumulations of trash (termed, at least in part, the Lincoln phase by Kelley [1984]). Corn agriculture was clearly important to the diet, but hunting, fishing, and gathering of wild plant foods were still important. This occupation ended rather abruptly some time in the fourteenth or fifteenth century, when the entire region was abandoned, at least by sedentary peoples. Just what happened to these people, and the whereabouts of their descendants, are unknown.

North of Roswell, along the Pecos River below Fort Sumner, a slightly different late prehistoric sequence has been defined (Jelinek 1967). These remains also include architecture, but the structures and the pottery, at least in part, are more directly tied to cultural events in central New Mexico. These small villages of pithouses, and later on, small pueblos of cimiento construction, were abandoned about A.D. 1250 or 1300 when, as Jelinek (1967) suggests, the people quit farming to hunt bison full-time.

While Jelinek focused his attention on sites 40 and more km north of the project area, minor surveys led him to postulate two separate, though related, phases applicable to our project area: the Crosby phase and the Roswell phase. Because the details of each phase are sketchy and discussed in a comparative manner with the equivalent phases in the north, Jelinek (1967) does not present singular, coherent descriptions. The descriptions given here are gleaned from various statements scattered throughout his report.

The Crosby phase is equivalent to the Early and Late Mesita Negra phases in the north and dates ca. A.D. 1000 to 1200. The type site for the phase, P9, is located a few kilometers east of the project sites (Jelinek 1967). It is characterized as a "concentration of several hundred flakes and/or sherds and occasional indications of permanent architecture," but elsewhere, Jelinek states that the sites "appear to represent temporary camps." It differs from Mesita Negra phase sites in that the pottery assemblage is dominated by Roswell Brown rather than Middle Pecos Micaceous Brown of Mesita Negra phase sites. The lithic assemblage is like that of Mesita Negra phase sites. The two identifiable projectile points are wide, corner- and side-notched arrow (?) points with convex blade and basal edges. The reader is left wondering about the validity of the Crosby phase, for Jelinek (1967:67) states that it is "distinct" but then questions it on ceramic grounds.

The Roswell phase is equivalent to the Early and Late McKenzie phases in the north and dates ca. A.D. 1200 to 1300. The two sites listed for this phase, P7 and P8, are characterized as "concentrations of several thousand flakes and/or sherds with little or no indication of permanent architecture." We are left to presume that "permanent architecture" refers to pithouses or pueblos, such as those excavated closer to Fort Sumner. Roswell-phase sites differ from Mesita Negra-phase sites in that the pottery assemblage is dominated by Roswell Brown, Jornada Brown, and Chupadero Black-on-white rather than the McKenzie Brown and Middle Pecos Black-on-white of McKenzie-phase sites. The lithic assemblage, including numbers of small end scrapers, is like that of Mesita Negra-phase sites. The three identifiable projectile points are wide, side-notched arrowpoints with convex blade edges and straight to convex basal edges and a triangular, multiside-notched form.

The period between the abandonment of southeastern New Mexico in the 1400s and the coming of unidentified peoples described by early Spanish explorers in the late 1500s is unknown. It is probable that nomadic use of the region continued during this time. Jelinek (1967) refers the occasional late prehistoric Rio Grande glaze sherds, increased abundance of obsidian, and a tipi-ring site to his post-McKenzie phase. These remains, plus abandoned *rancherías* described by early Spanish explorers, certainly indicate the presence of hunter-gatherers during the protohistoric and early historic periods, but the inhabitants effectively disappeared as an identifiable people before more detailed accounts and relationships could be recorded.

From Spanish contact until after the American Civil War, roaming Apache and other Plains tribes kept Spanish, Mexican, and Euroamerican settlement of southeastern New Mexico in abeyance. Following the Civil War, mass westward movement of Americans and eastward drifting of small groups of New Mexico Hispanics led to settlement of the region. Roswell was founded about 1870. Artesian water was discovered in 1891, and its development promoted widespread irrigation and a rapid influx of people. The railroad reached Roswell in 1894, setting the course for urbanization of the area. The town's economy, then as today, was based on agriculture and stockraising.

The Roswell Area

The prehistoric occupation of the Roswell area is poorly known. The problem stems from three major sources. One is that few projects other than small contract surveys have been done. Another is that the area is peripheral to two major culture areas: the Plains to the east and the Southwest to the west. Attempts at relating the Roswell area archaeological remains to one or the other often yield ambiguous results. The third reason is that artifact collecting has been a popular activity for Roswell residents over the past 50-75 years. The loss of information from this activity cannot be gauged, but it is clearly very serious if local collections and folklore are any indication. Thus, the brief culture history that follows is based on work from surrounding regions, and its applicability to the Roswell area must be viewed as tentative.

Late prehistoric (i.e., pottery-period) sites in the immediate vicinity of Roswell appear to reflect the oasis-like character of the area. That is, local natural resources are especially favorable to more intensive occupation and presumably greater population stability than in surrounding areas. It is not surprising, then, that a number of sites known to have or suspected of having architecture are present and that they have the character (substantial trash deposits, much pottery, pithouses, and pueblo-style dwellings) of sites of the more sedentary Jornada Mogollon peoples to the west. For this reason, Jane Kelley (1984) has tentatively included the Roswell area within the geographic reach of her Lincoln phase, which dates to the late thirteenth, fourteenth, and perhaps early fifteenth centuries. Somewhat earlier remains (e.g., Rocky Arroyo site, Wiseman 1985) also generally fit the Jornada Mogollon configuration and can be tentatively included with them.

Other sites with structures from the ceramic period, however, such as King Ranch (Wiseman 1981) and the Fox Place (Wiseman 1991), are enigmatic and currently unassignable to an existing culture chronology. The latter two sites are viewed with special interest with regard to the Bob Crosby Draw site (Wiseman in prep. a).

These late prehistoric remains in the vicinity of Roswell contrast with the extensive scatters of artifacts that are commonly found in the sand dune country east of the Pecos River (such as the Bob Crosby Draw site) and on the Sacramento Plain north, west, and south of Roswell (Stuart and Gauthier 1981). It is currently unclear how these scatters relate to either Jornada Mogollon or Plains manifestations. Given the geographic location of the sites, they could have been occupied by peoples from either culture area. How do we make a determination? Some progress is being made in this direction (Speth 1983; Rocek and Speth 1986), but we are far from the last word on the matter.

The Roswell locality evidently was abandoned by farmers in the A.D. 1300s or early 1400s. But because of its incredible water and faunal resources, it had to figure prominently in all subsequent hunting and gathering patterns of the region between then and the coming of the Spaniards in the late 1500s and 1600s.

PREVIOUS ARCHAEOLOGICAL WORK IN THE ROSWELL AREA

Except for a number of small-scale contract archaeological projects associated with oil and gas exploration, there have been few archaeological investigations in the Roswell area. The list below includes some of the more significant investigations.

* A sample survey of the Abo Oil Field north of Roswell (Kemrer and Kearns 1984) documented a wide range of site types, probably all of which are campsites, lithic material collection/quarry areas, and food collecting sites. No structural sites were identified with certainty.

* Testing of the Townsend site north of Roswell (Maxwell 1986) recovered hearths, artifacts, and animal bones from three time periods defined by radiocarbon dates: 490-250 B.C. (pre-pottery), A.D. 460-820 (pottery and corner-notched arrow points), and A.D. 1200-1400 (pottery and side-notched arrow points). Bison bones were associated with earliest and latest periods.

* Survey and excavation along the Middle Pecos River northeast of Roswell (Jelinek 1967) defined the culture sequence from Paleoindian to Late Prehistoric for the Fort Sumner section of the Pecos River. Excavations focused on Late Prehistoric (pottery) phases.

* Excavation of several sites in the Haystack Mountain area northeast of Roswell (Schermer 1980). Test excavations were made at several pottery-period camp sites. Dart points at several of the sites may indicate Archaic occupations as well.

* Excavation of the Garnsey Spring Campsite (pottery-period and possibly some Late Archaic remains) and the protohistoric Garnsey Bison Kill east of Roswell (Parry and Speth 1984; Speth 1983).

* Excavation at the Rocky Arroyo site south of Roswell (Wiseman 1985), a large, deep pit structure in a small village dating to the A.D. 1200s.

* Excavation at the Henderson site southwest of Roswell (Rocek and Speth 1986), surface rooms and pit structures dating to the A.D. 1200s and 1300s.

* Excavation at Bloom Mound southwest of Roswell (Kelley 1984), surface rooms and pit structure dating to the A.D. 1300s.

* Survey of the Two Rivers Reservoir southwest of Roswell (Phillips et al. 1981) documented lithic material quarries, camp sites, food collecting sites, and probable pottery-period structural sites.

* Excavation of the historic period Ontiberos Homestead west of Roswell (Oakes 1983).

* Testing of 20 lithic artifact sites west of Roswell (Hannaford 1981).

* Excavation of the Fox Place site at Roswell (Wiseman 1991), part of a large village containing numerous tiny pit structures and one large, deep ceremonial pit structure, all dating to the A.D. 1200s and early 1300s.

* Excavation of Los Molinos site (LA 68182) at Roswell (Wiseman in prep. b), a substantial midden associated with 70+ bedrock basin metates and mortars that date to A.D. 800-1350, perhaps earlier.

* Excavation at the Bob Crosby Draw site (LA 75163) northeast of Roswell (Wiseman in prep. a), a portion of a multicomponent dune site dating to A.D. 800-1350, perhaps earlier.

DATA RECOVERY PLAN

The following sections are taken from the original data recovery plan approved for the excavation project (Wiseman 1993).

Theoretical Perspective

For a number of years archaeologists have been discussing whether hunter-gatherer groups (called "Neoarchaic" by Lord and Reynolds 1985) were living proximate to Southwestern farming groups during the prehistoric pottery period, a notion that has particular relevance to southeastern New Mexico. Agreement on the matter appears to be consensual and is summarized by Sebastian and Larralde (1989:83):

> An alternative model of Ceramic period occupation in the Roswell District, then, would be that populations of both agriculturists and hunters and gatherers were to be found there. The presence of ceramics on sites created by groups of both types, it could be argued, has caused the remains of two very different settlement and subsistence systems to be lumped together into an apparently anomalous pattern. This alternative model appears to account for at least as much of the observed patterning in the Roswell District as the model that considers all Ceramic period sites to be a part of a single adaptation, and it offers several potential directions for future research.

Areas where the remains of purported pottery-period hunter-gatherers have been found include Los Esteros Reservoir on the Pecos River near Santa Rosa (Mobley 1979), the Llano Estacado along the New Mexico/Texas state line (Collins 1969), along the Pecos and lower Hondo rivers at Roswell (Wiseman 1981, 1985, 1991), east of the Pecos River near Artesia (Kauffman 1983), along the Pecos River north of Carlsbad (Katz and Katz 1985a), and in the Guadalupe Mountains (Roney 1985). In most cases, the sites believed to be those of hunter-gatherers are either open, nonstructural sites or rock shelters and caves. Two exceptions--the King Ranch site (LA 26764) and the Fox Place (LA 68188) at Roswell--have small, oval to circular pit structures (Wiseman 1981, 1985, 1991).

Various criteria have been used to suggest that a given site or group of sites are those of full-time hunter-gatherers rather than horticulturists or agriculturists. Criteria include aspects of the chipped stone technology (percentage of biface thinning flakes and material types, for instance), mano and metate types, projectile point types, artifact assemblage composition, items of exchange, subsistence patterns, and rock art. Of these, Mobley (1979) provides the most thorough treatment. The reader wishing more discussion of these matters is referred to Sebastian and Larralde (1989:82-83).

The theory of interstitial hunter-gatherers is both sensible and reasonable, but one very thorny problem remains. How do we as archaeologists, using archaeological data, make a convincing case? How do we distinguish hunting-gathering sites created by farmers from those created by full-time hunter-gatherers? Until this is accomplished, we cannot confirm the existence of Neoarchaic peoples in the region, nor can we investigate either group or their interactions in detail.

We, like Sebastian and Larralde (1989), regard Lewis Binford's (1980) subsistence-strategy concepts of foragers and collectors as a useful point of departure, especially when viewed as two ends of a continuum and not as a dichotomy. In simplest form, foragers move the people to the food, and collectors move the food to the people. Collectors do this by means of task groups that are sent out for as long as necessary to obtain specific resources and return them to the group. The primary differences are the degrees and ways in which people plan, organize, and conduct their food-quest.

The concept of foraging and collecting as a continuum has two general dimensions. The first is that, in a given year or over a series of years, the strategy of a group--depending on season, climatic regime, economic success, demography, and other factors--often combines both approaches into a "mixed" strategy (see Boyd et al. 1993). Both approaches require, or are better facilitated by, an intimate knowledge of resource distributions and detailed planning on the part of the people. But in general, forager behavior is more opportunistic, and collector behavior is more methodical.

The other dimension is that, at least in some regions of the southern Plains and the Southwest during certain time periods, a collector lifeway actually became the established strategy, and simple foraging was abandoned altogether. Boyd et al. (1993) suggests that this situation occurred on the southern Plains when bison became more abundant during the Late Archaic, Late Prehistoric, and Protohistoric periods. Jelinek (1967) posits that the lure of bison was so strong during the Late Prehistoric period that the farmers of the Middle Pecos Valley abandoned gardening in favor of bison hunting as a lifeway.

In the Southwest, further development of a collector lifeway was facilitated by the addition of cultigens, especially corn, to the hunter-gatherer diet and involved a greater degree of sedentism. But it is becoming increasingly clear that several different paths led to the adoption of cultigens and that different preconditions to the change existed in different areas. Once integrated into the diet, cultigens did not necessarily assume paramount importance over other foods. Not all peoples relied on cultigens to the same degree, nor did that degree of reliance necessarily remain the same or progressively increase throughout the history of a given people. Like the shifts back and forth in the hunter-gatherer subsistence mix, the ratios of wild versus domestic foods used by farmers may have shifted back and forth as well.

Returning for a moment to the forager lifeway, Sebastian and Larralde (1989) believe that the Roswell area Archaic peoples followed a subsistence strategy of *serial foraging,* rather than the simple foraging lifeway as defined by Binford. They define serial foraging as follows (1989:55-56):

> A strategy of serial foraging involves a small residential group that moves into the general vicinity of an abundant resource and camps there, uses the target resource and other hunted and gathered resources encountered in the general

area until the target resource is gone, or until another desired resource is known to be available, and then moves on to the next scheduled procurement area. Such a strategy could be expected to create a great deal of redundancy in the archaeological record, an endless series of small, residential camps from which daily hunting-and-gathering parties move out over the surrounding terrain, returning to process and consume the acquired foods each evening. If the resources were randomly distributed, all the sites would look generally the same. But since many of the resources appear in the same place year after year or in some other cyclical pattern, some sites tend to be reoccupied.

Reoccupied sites, then, would look like a clustering of the small sites that would have been produced by a single-event, serial-foraging site.

> The only exception to the rule of basically redundant but sometimes overlapping small campsites would be the winter camps. Given the relatively brief winters of the Roswell District, many of the sites would, on the surface, be no different in appearance from reoccupied short-term camps. Excavation of such sites might recover resources indicating a winter seasonal occupation or features indicative of storage, however. If we were able to differentiate single, large-group occupations from multiple, small-group occupations, we might find that winter sites differ from warm season camps in that they were occupied by larger groups. (Sebastian and Larralde 1989:56)

The settlement types of serial foragers should then start taking on the appearance of collectors' sites.

By way of contrast, people leading a collector lifeway usually have a primary site where they live for a certain part of the year over a series of years. In the Southwest and southern Plains, the basis for this greater sedentism is frequently the cultivation and storage of domestic plants such as corn. Other resources that have been suggested for this role include succulents like agave and sotol (Roney 1985; Sebastian and Larralde 1989) and bison (Boyd et al. 1993). This primary site is commonly referred to as a base camp or habitation site and is characterized by hearths and storage pits in the former instance and architecture and storage pits in the latter. Generally speaking, the tools and waste materials at these sites indicate that numerous and varied activities were performed and that the sites were occupied and frequently reoccupied for relatively long periods of time. Other factors such as permanence of water source, fuel supplies, and other necessities are usually implicated in the location of these sites.

Storage, usually in the form of pits, is believed to be a key factor in the existence and the identification of base camps and habitation sites, for they signal the need to preserve quantities of foodstuffs. Generally speaking, the implication is that storage signifies a location that is easily protected or otherwise secure from theft by other people. Sebastian and Larralde (1989:86) advance the interesting hypothesis that, because some resource patches are spread over the landscape and create a logistical problem for exploitation, some people may actually have cached foods in the collection areas and then moved their families from cache to cache as needed throughout the winter season.

Since a variety of wild plant and animal foods are important to the diet of collectors, work parties are sent out to gather these and other needed resources. For the most part, a specific resource is the target of these work parties, but other resources may be gathered opportunistically. These secondary sites are commonly referred to as special activity sites or locations and are generally characterized by more specialized tool kits, which may be readily identifiable with specific resources or resource zones. Hearths may or may not be present, but structures and storage pits are absent.

So, how *do* we distinguish between the hunting-gathering sites of these two groups? Of the several scholars working in eastern and southeastern New Mexico, Mobley (1979) uses a comprehensive set of criteria to look at the question. The domains of information he uses are:

* individual plant and animal species used
* biotic zones or communities exploited
* artifact assemblage composition, especially the percentages of projectile points and ground stone items
* mano and metate types
* core-flake technology, especially platform types, percentage of cortex, and material types
* biface technology, especially platform types, percentage of cortex, and material types
* exchange items, especially artifacts, lithic materials, plants, and animals
* rock art (style, subject matter, and techniques)

We propose to use the applicable criteria, in part, in analyzing the U.S. 70 project sites.

Research Questions

Data recovery at LA 6825 and LA 6826 will be directed towards answering the question posed and discussed in the preceding section. To do this, it will be necessary to focus on several related questions:

1. The primary question to be investigated is whether the sites were those of indigenous hunter-gatherers or the farmers inhabiting nearby architectural sites like Bloom Mound, Henderson Pueblo, and Rocky Arroyo.

Establishing the identity and culture history of people through their cultural remains is the essence of archaeology. Archaeologists typically equate constellations of artifacts, architecture, economic structure, and even single pottery types with a people, often on the basis of nothing more than untested assumption. This particular problem is highlighted in southeastern New Mexico. Because of the proximity of southeastern New Mexico to the Plains, scholars have debated unsuccessfully for years about the origin and cultural affiliation of the thousands of sites lying between the Pecos River and the Llano Estacado. The problem is nearly intractable because the artifacts at these sites are not greatly varied, the sites are rather simple in their content and character, and differences in artifacts and sites are not readily apparent over vast areas. Simply stated, does the presence of Southwestern pottery mean that the site occupants were Jornada-Mogollones? If not, who were they and how do we make a convincing case?

The Office of Archaeological Studies recently investigated a closely allied problem on the Picacho project, where we excavated an open-air, Late Archaic site and a series of tiny pottery-period caves and shelters (Wiseman 1996). The excavated part of the Sunset Archaic Site (LA 58971) revealed several large storage pits, three hearths, a midden, other features, manos and metates, and some animal bone, but few projectile points. Corn remains (cupule fragments and pollen) were ubiquitous in the excavated deposits. Several radiocarbon dates indicate occupation during the first four and one-half centuries A.D. No pottery or other evidence of occupation dating after the early A.D. 400s was noted.

Tintop Cave, the largest of the Sunset Shelters (LA 71167), produced stratified occupations, a few hundred sherds, lithic debitage, manos and metates, projectile points, several hearth areas and animal bone. Corn remains (cupule fragments and pollen) and beans were present but in fewer numbers than at the Sunset Archaic Site. Pottery and radiocarbon dates indicate occupation between A.D. 1000 and about 1425.

One of the key questions posed in the Picacho project was whether we could determine if the remains at the two sites were from the same or different cultures. A subsidiary question focused on whether the remains at the Sunset Shelters were those of full-time hunter-gatherers or of farmers in their seasonal, hunting-gathering mode. The results, after lengthy comparisons of the artifact assemblages and economic data, were largely inconclusive.

Because of the problems encountered on the Picacho project, our approach on the Dunnahoo Hills project is admittedly a fishing expedition. During the course of the project we hope to isolate one or more criteria by which the sites of the two lifestyles can be distinguished at the level of hunter-gatherer camps. To do this, we need to examine many more sites and carefully compare aspects of artifact assemblages, structures, thermal features, economic strategies, and any other information that might provide clues to the solution. The process will be largely subjective because of the nature of the data and because we do not anticipate a clear-cut answer. By their nature, these situations require careful weighing of the evidence and summary arguments.

2. Is LA 6825 a base camp/habitation?

Are structures, storage pits, other types of pits, and thermal features (hearths, cooking pits, etc.) present? Do the features in the site form a single cluster, suggesting a single occupation? Or are two or more clusters of features present, suggesting two or more occupations? If two or more occupations are present, were the activities or site function during each occupation the same or different?

Determining whether cultural features (structures, storage pits, thermal features, etc.) are present is critical in defining site types. Such features define base camps (or habitation sites), and their absence is generally indicative of special activity sites. Important subsidiary studies will assist in determining site type, as well as overall subsistence patterns, and include floral, faunal, and artifactual data, as discussed below.

3. What artifact assemblages are present at LA 6825 and LA 6826?

What types of tools and manufacture debris are present and in what percentages? On the basis of the artifacts, what types of activities were performed at the site? How do these assemblages compare with those from other sites in the region?

The types of artifacts at a site help define the kinds of activities that took place at each specific location. Manos and metates imply grinding plant foods, projectile points imply hunting, and scrapers imply hide dressing. Multipurpose tools such as hammerstones, awls, and drills, and manufacture debris such as chipped lithic debris, shell fragments, and some types of fragmentary artifacts imply a host of generalized activities involving the manufacture or maintenance of items associated with day-to-day living. A wide range of artifact and debris types imply a base camp/habitation situation, and fewer artifact and debris types imply special activity sites. The percentages of each category will provide a *very rough* index to the relative frequency of occurrence of each activity at the site.

Caution is required in interpreting the data in this manner because of the effects of tool use-life on artifact assemblage composition (Schlanger 1990). This line of interpretation makes several assumptions about the data and the activities they represent, and the technique greatly simplifies a number of complex variables and conditions.

With these details worked out, we can then compare the project sites with farming sites in the Roswell area. Sites to be used in this comparison include the Fox Place (LA 68188), Tintop Cave (LA 71167), Rocky Arroyo (LA 25277), and, if possible, the Henderson site (LA 1549).

4. What plants and animals were being processed or consumed at LA 6825 and LA 6826?

What biotic communities were being exploited? Were the inhabitants of the sites exploiting all available biotic communities or only selected ones? Were cultigens being grown and/or consumed? What season or seasons were the sites occupied?

Plant and animal remains recovered at archaeological sites provide first line evidence for reconstructing various aspects of the human food quest. Animal bones and the pollen and charred remnants of plants will be studied to identify the species present and the biotic zones exploited, characterize the diet and food preparation techniques, and provide insights into the effects of taphonomic processes on the archaeological record. Floral and faunal data also have the potential of providing data on the season of the year that they were collected or hunted. Although only certain plant and animal remains provide seasonal data, they are very useful in helping to define the time of the year the sites were occupied. Since it is unlikely that the data from the project sites constitute a total view of the diet throughout the year or through time, it will be necessary to compare these results with those of other projects in the region to gain a better understanding of the total subsistence system.

The presence/absence of cultigens is one aspect of the subsistence picture that may help answer the question of whether the site occupants were full-time hunter-gatherers or farmers in a hunting-gathering mode. Leslie's (1979) assessment of the structural sites in the vicinity of Hobbs in far southeastern New Mexico, though without benefit of flotation and pollen recovery techniques, suggests that corn was not being grown east of the Pecos River within New Mexico. The WIPP project (Lord and Reynolds 1985), located between Leslie's sites and the Pecos River, excavated three nonstructural sites but failed to find evidence of cultigens in flotation and pollen samples. On the other hand, corn was clearly being grown within the Pecos Valley at Roswell (Kelley 1984:Appendix 6; Rocek and Speth 1986; Wiseman 1985) and probably near Fort Sumner as well (Jelinek 1967). Further south along the Pecos at Brantley Reservoir, the Katzes (1985a) did not find evidence of farming in the several nonstructural, prehistoric sites they excavated. Thus, if cultigens are documented for LA 6825 or LA 6826, especially in quantity, the remains may help us determine whether the site occupants were farmers or full-time hunter-gatherers. The finding of small amounts of cultigens would be less clear, for hunter-gatherers could have obtained them in trade from farmers.

5. What exotic materials or items at the sites indicate exchange or mobility?

Materials and artifacts not naturally available in a region are indicative of either exchange relationships with other people or a mobility pattern that permits a group to acquire these items during their yearly round. Judging which situation is applicable to the project sites is difficult and will require careful comparison with data from the Roswell region. If we can determine whether the site occupants acquired the goods through trade or by direct access, we will gain perspective on the territory they used and therefore on the identity of the people themselves.

The absence of exotic materials is another matter entirely. In small sites and sites of short occupation, the absence of exotics can be misleading simply because such items may not have had time to find their way into the archaeological record. Or perhaps the occupants simply did not acquire exotic materials. Either way, we may never know at any specific site. But this is precisely where comparisons with other assemblages in the region and the long-term accumulation of excavation data from numerous sites, both large and small and of all types, is necessary for acquiring perspective and, eventually, resolving the problem.

6. What are the dates of the occupation(s) at LA 6825 and LA 6826?

Do the various areas of the site date to one period, or are several different time periods represented in different areas of the site?

Accurate dating of sites and components is essential for studying change and the direction of change in prehistory. The dating situation is critical in southeastern New Mexico, where dendrochronology, the most accurate and preferred dating technique, works poorly or not at all (W. Robinson, pers. comm., 1975). Few absolute dates derived by other techniques are currently available (Sebastian and Larralde 1989). Recent advances in radiocarbon dating make it the most viable technique for southeastern New Mexico at the present time. Techniques like obsidian hydration and thermoluminescence have been used in southeastern and south-central New Mexico. However, these techniques are fraught with problems that must be resolved before they will be reliable for general use.

Sites like LA 6825 and LA 6826 are notoriously difficult to date because they usually contain so few datable materials. During excavation, charcoal will be recovered from as many features and cultural situations as possible. Because of the importance of dating the project sites, we will submit both very small samples (for accelerator mass spectrometry analysis) and bulk samples (carbon-stained sands) for dating if necessary.

7. What were the biological relationships and nutritional status of the people who inhabited LA 6825 and LA 6826?

In many ways human skeletal materials can answer most of the questions about the biological and cultural relationships that archaeologists ask of archaeological data. The problem in southeast New Mexico is that human skeletal remains are not common, are not recovered in sufficient numbers for statistical reliability, and are frequently not well enough preserved for many types of studies. Thus far, analyses of human remains from southeastern New Mexico are few in number, but the results have been interesting, especially regarding the central research question (1) posed here.

The two most provocative human biology studies are the analyses of the skeletons from Henderson Pueblo (Rocek and Speth 1986) and the Robinson site (Katzenberg and Kelley 1991). For our purposes, the two most important findings of Rocek and Speth (1986:167) are as follows: "Physically, the inhabitants of the Henderson Site have resemblances to both the Pueblo populations to their west and, more markedly, to the more scattered peoples of western Texas to their east and south. However, there is no evidence that the Henderson Site was settled by recent migrants from either area; instead, the data point to some degree of stability in the local population."

Nutritional studies, particularly isotope and element analyses (carbon, strontium, etc.), will be used to estimate the relative contributions of plant and animal foods and of gathered and cultivated foods to the diet. A key aspect of these studies is the nature of the native vegetation in the region. Carbon isotope ratios, which have been used to estimate relative dependence on corn in the Midwest, are dependent on the photosynthetic pathways of the plants consumed. Since many/most Southwestern xeric plants consumed by both humans and herbivores consumed by humans use the 4-carbon pathway, the job of sorting out the information from isotope studies will be more difficult. Under these circumstance, it is advisable to study the isotope signatures of the animal bones for comparative data.

The Potential of LA 6825 and LA 6826 for Answering the Research Questions

Corn Camp, LA 6825

The potential of LA 6825 as a basecamp/habitation was confirmed through testing. The presence and preservation of subsurface features and cultural deposits indicate a strong potential for recovering many of the categories of data necessary for answering the research questions. At a minimum, we anticipate uncovering a possible structure or storage pit and two hearths. Broad-scale excavation will undoubtedly uncover more such features. If other features are found, the possibility arises that more than one component is present. Additional components will provide either redundant or different information on the use of the site through time. The fill of the one structure/storage pit contains charred materials that should be useful for dating and (probably) for obtaining subsistence data.

La Cresta, LA 6826

LA 6826 was originally thought to be a quarry and preliminary processing site for chipped stone artifacts. Testing yielded animal bone, implying consumption of food and possibly use of the site as a staging area for hunts. Charcoal indicates the presence of hearths and perhaps other thermal features and implies that the occupation may have lasted several days or more. Thus, we need to clarify the occupational status of this site by addressing questions 2 through 6. Once this procedure is completed, we will be able to address question 1.

CORN CAMP (LA 6825)

LA 6825 is a small sherd, lithic artifact, and hearth site situated among a group of small to medium-sized coppice dunes (Figs. 3 and 4) south of U.S. 70. The site was originally believed to be a single component occupation because of the few surface artifacts and evidence of two hearths and a possible structure. Excavation proved it to be a multicomponent camp. Its proximity to LA 6826 suggests the two sites may have been coeval; that is, LA 6825 may have been the habitation locus used during the exploitation of LA 6826, a lithic quarry. This notion is not strongly supported by our analysis. Prior to excavation, the overall size of LA 6825, based on surface evidence, was 25 m north-south by 20 m east-west.

The area of LA 6825, as defined by excavation, was 40 by 30 m, approximately twice the size indicated by the surface artifact scatter. (Surface artifacts are present primarily where erosion and rodent burrowing have exposed them.) Excavation demonstrated that undisturbed cultural deposits are between 10 and 40 cm below the surface in areas where erosion is minimal and surface artifacts were lacking. Subsurface features such as hearths and pits were uncovered by the excavations. Cultural materials at the site include sherds, flakes, cores, and burned rocks. No ground stone artifacts were found. Cultural materials from both phases (testing and excavation) are reported here.

The entire site, as defined by surface artifacts (Fig. 5) and excavations (Fig. 6), lies within the highway project area, including the newly acquired parcels. Because no surface artifacts were found north of U.S. 70, excavations were restricted to the project area south of the highway.

Excavation Method

Excavations proceeded in 1 m squares based on the grid established for the testing program. The existing right-of-way fence served as the grid baseline, and directions were expressed in terms of grid north (grid north is actually the direction of the town of Portales or approximately 60 degrees east of north). The grid northeast corner of each square is the designator for the square. In certain instances, it is desirable to express the relationships between two features in terms of true directions, in which case the true direction is preceded by the term "cartesian."

Excavations started in Square 6N/2E in an interdunal area. For the most part, work was confined to the reddish-tan sediments of the surface material and the immediately underlying compact unit of the same material. These reddish-tan units are underlain by a medium-gray sediment. Since stratigraphy was not readily apparent during excavation and the reddish-tan sediments were generally shallow (5 to 30 cm except where they formed dunes), arbitrary levels were not maintained until Hearths 6 and 7 were discovered. Because Hearth 7 was partly embedded in the gray sediment, the uppermost 5 to 8 cm of gray sediment in the squares adjacent to it were excavated as a separate unit and the collections segregated accordingly.

Figure 3. LA 6825 seen from LA 6826, looking northeast. The site is in mesquite-topped dunes in the center.

Figure 4. Area of subsurface features at LA 6825, looking northeast.

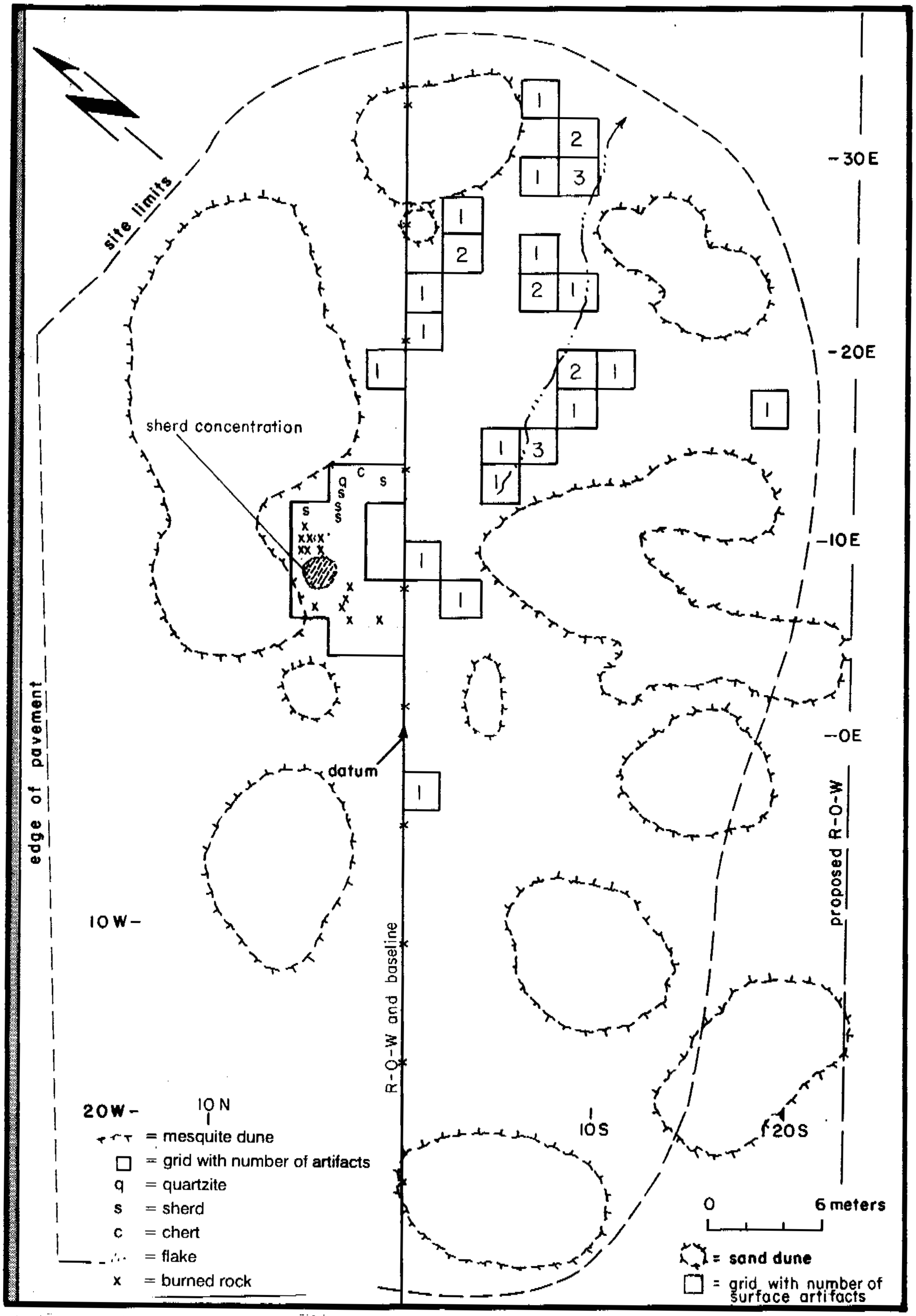

Figure 5. LA 6825, surface artifact density map.

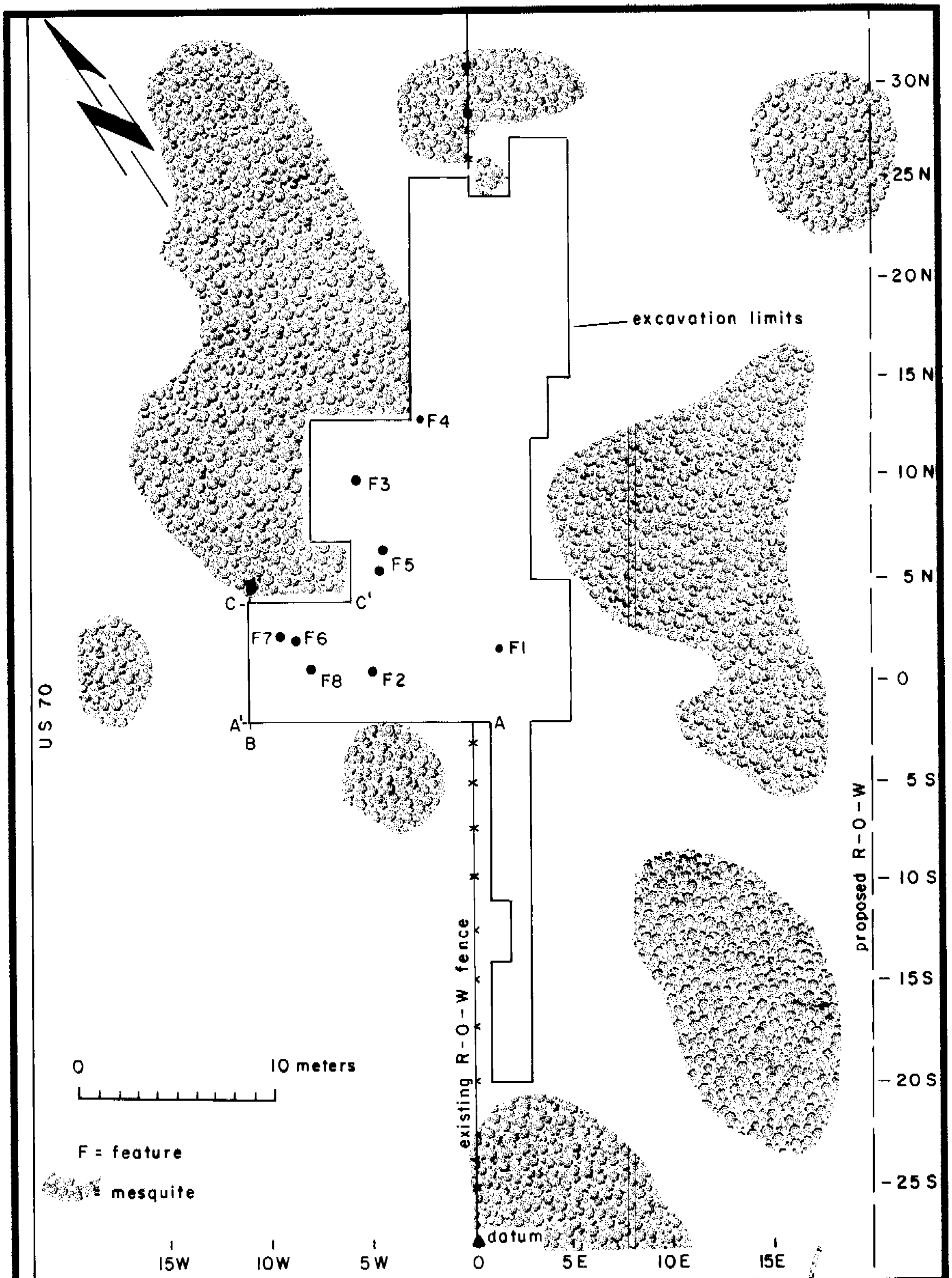

Figure 6. Map of excavations and features, LA 6825.

Pit 2) were exposed to drying and weathering, and particularly after they were swept down, subtle stratigraphic differences could be visually detected and mapped.

All fill, except the dunes, was screened through one-eighth inch (6 mm) wire mesh. The dunes were removed by hand to the level of the surrounding ground surface and the fill discarded without screening.

Figure 7. Southwestern part of LA 6825 during excavation, looking northwest.

Excavation Results

A total of 323 1 by 1 m squares was excavated (Figs. 6, 7, and 8). Nine features, including seven hearths and two small pits, were uncovered in the western and southern parts of the site, while what appears to be an aceramic artifact concentration was documented in the northeastern part of the site by means of artifact density plots. Surface and excavated artifacts, dominated by flaking debris but also including pottery and a few animal bones, numbered nearly 700 items. Datable materials and soil samples suitable for flotation recovery of small plant and animal remains were rare. No formal artifacts (projectile points, bifaces, manos, metates, etc.) were recovered from the site. Cultural by-products such as burned rocks were rare throughout the site, and charcoal staining was virtually absent, even in and around the hearths. As mentioned above, stratigraphy was documented in only the southwestern part of the site, the one part that had not been deflated or eroded.

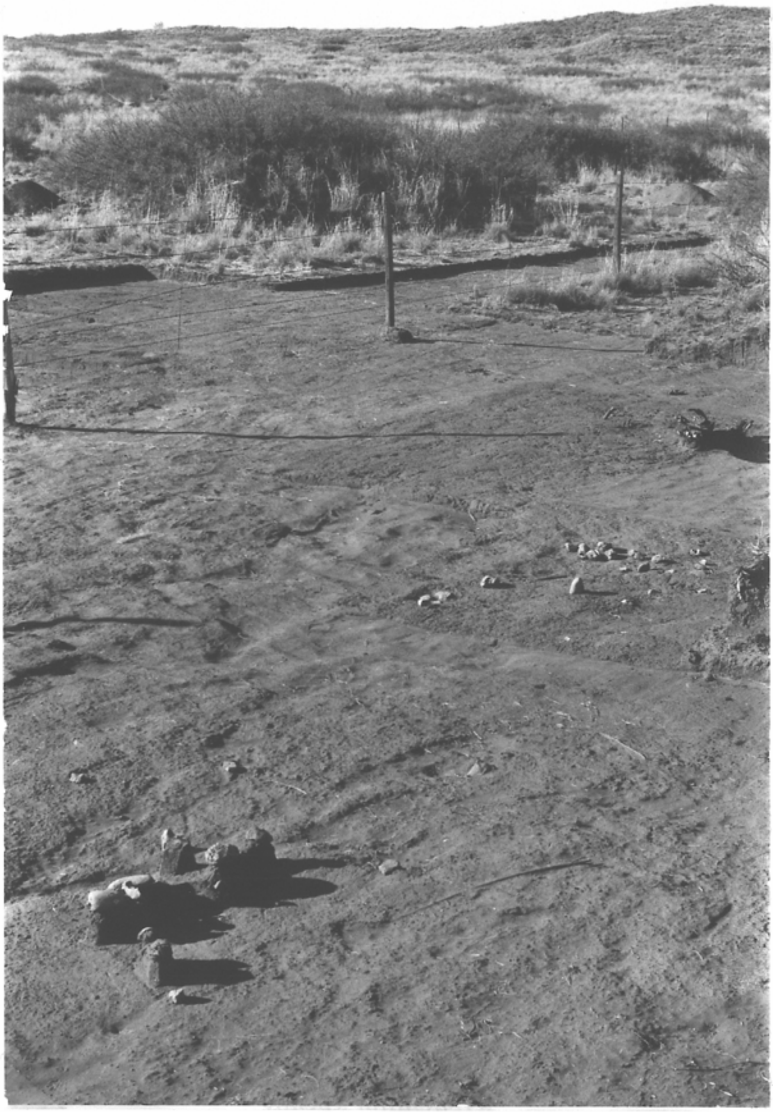

Figure 8. Southeastern part of LA 6825 after excavation, looking south. Hearth 3 is at the lower left, Hearths 5a and 5b at the right center.

Stratigraphy

Four stratigraphic units, including one with two subunits, were identified at LA 6825 (Fig. 9). All are combinations of the same basic two materials: reddish-tan clay or clay loam and medium gray clay. Sediment samples from three strata (1, 2a, and 3) were brought back to the laboratory and submitted to the jar sediment test.

Fig 9

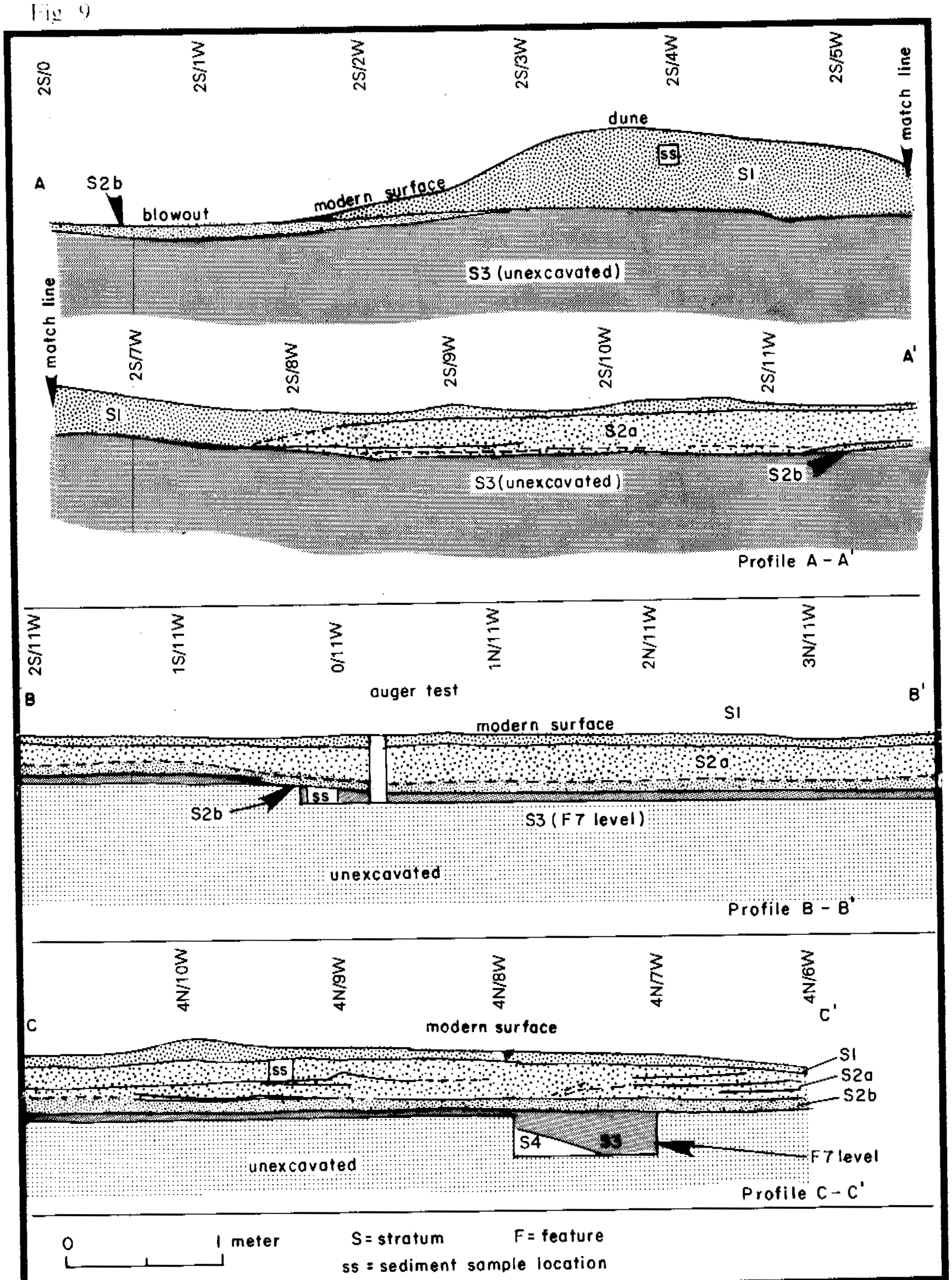

Figure 9. Profiles of fill, LA 6825.

in dunes. The rare prehistoric cultural items in this unit are probably the result of rodent activity. The jar sediment test was performed on this stratum (see results below).

Stratum 2a. Lightly compacted, eolian, reddish-tan silt clay/clay loam (same basic composition as Stratum 1) with occasional microlenses (1-3 mm thick) of medium gray clay. The thickness of the unit averages 20 to 25 cm. Artifacts were recovered from this unit. The jar sediment test was performed on this stratum (see results below).

Stratum 2b. Lightly to moderately compacted, eolian, reddish-tan silt clay or clay loam (same basic composition as Strata 1 and 2) with numerous microlenses (1-3 mm thick) of medium gray clay. In places, the microlenses were so numerous that the stratum has a grayish appearance. Its thickness averages 10 cm. Artifacts were recovered from this unit. The jar sediment test was not performed on this stratum.

Stratum 3. Compacted, medium gray clay with occasional, very thin (1-3 mm) lenses of reddish-tan clay/clay loam. Speckles of gypsum are present throughout but increase in number with depth. The range of thickness is unknown, but where tested, it varies from 10 to 30+ cm. The uppermost 5 to 8 cm of this unit contains artifacts, and in the project field journal, these 5 to 8 cm are referred to as the "Feature 7 level." The jar sediment test was performed on this stratum (see results below).

Stratum 4. Compacted light gray clay/clay loam. The range of thickness is unknown, but where tested, it is a minimum of 20 cm. The one test into this stratum was limited to ascertain whether artifacts are present. The jar sediment test was not performed on this stratum.

Jar Sediment Tests

This simple procedure involves placing a volume of sediment into a quart jar, filling the jar with enough water to saturate the sediment and cover the sediment with at least 2-3 cm of water, shaking the jar vigorously to thoroughly disaggregate the sediment, and setting the jar in a place where it will not be disturbed for several days. Over time, the sediment will settle out starting with the coarsest (heaviest) particles and ending with the finest particles. Measurement of each visible layer provides a rough estimation of the proportion of different particle sizes (sand, silt, clay, organic matter) in the sample and provides a quick visual comparison among samples for similarity/dissimilarity of composition. In the tests reported here, the particle sizes are visually judgmental and are *not* determined by hydrometer. Inferences can be made about the genesis of the sediments.

Three samples representing Strata 1, 2a, and 3 at LA 6825 were subjected to the jar test (Table 1). The three tested strata are all silty clays with a similar composition and eolian origin. Strata 2a and 3 appear to derive from the same geologic source, probably local. Stratum 1, with its slightly redder fraction, indicates a partially different source, probably local exposures of the Abo formation. As one would expect, the better-defined organic component in Stratum 1 is due to the fact that it is the surface unit at LA 6825.

Table 1. Jar sediment tests, Corn Camp

Stratum	Fraction* thickness (mm)	Munsell Value	Description
1	0 - 3 3 - 4 4 - 16 16 - 95	10 YR 7/2 2.5 Y 6/0 5 YR 3/6, extrapolated 5 YR 3/4	pale brown fine clay very light gray to gray clay (probably organic) dark red-yellow brown fine silty clay dark red-brown fine silty clay
2a	0 - 6 6 - 95	10 YR 7/2 5 YR 3/4	pale brown fine clay dark red-brown fine silty clay
3	0 - 1 1 - 4 4 - 95	10 YR 7/2 2.5 Y 6/0 5 YR 3/4	pale brown fine clay very light gray to gray clay (probably organic) dark red-brown fine silty clay

* Fractions are listed from top to bottom of test sample.

Features

Cultural features were assigned numbers in the order in which they were discovered, without regard to feature type. The designations for each feature presented in this, the final report, are a combination of feature type (hearth or pit) and the original feature number. Thus, we speak of Pit 2 and Pit 4, even though we found only two pits, not four. The hearths are Hearth 1, Hearth 3, Hearth 5a, Hearth 5b, Hearth 6, Hearth 7, and Hearth 8, even though we found only seven hearths. While perhaps a bit confusing, this method facilitates reference to the excavation notes and feature forms.

Hearths. Two types of hearths were found at LA 6825, rock-lined hearths and unlined basin hearths (Table 2). The rock hearths evidently were constructed by scooping out shallow basins and lining them with fist-size cobbles. Only Hearth 7 had rocks firmly implanted in Stratum 3 sediments. No oxidation or other discoloration of the sediments surrounding the hearths was noted, suggesting short-term use. The rock hearths, in undisturbed condition, evidently measured 35 to 50 cm in diameter and 10 to 15 cm deep. Although it is possible that the displacement of some hearth stones was caused by erosion (Hearth 3 was eroding out of the dune), we suspect that at least some were kicked apart by the site occupants upon abandoning the site.

The condition of the rock hearths varied from mostly intact to badly scattered (Figs. 10, 11, and 12). We are confident that these rock clusters, whether intact or scattered, were hearths because the rocks are burned and grouped; burned rocks outside of these clusters were rare at this site. Except for Hearth 1 (the unlined basin hearth), charcoal flecks and staining were rarely observed in and around the hearths, probably because the hearths were used only for a short time (most rocks are unbroken) and because the charcoal and ash fills of surface

Figs. 10 and 11

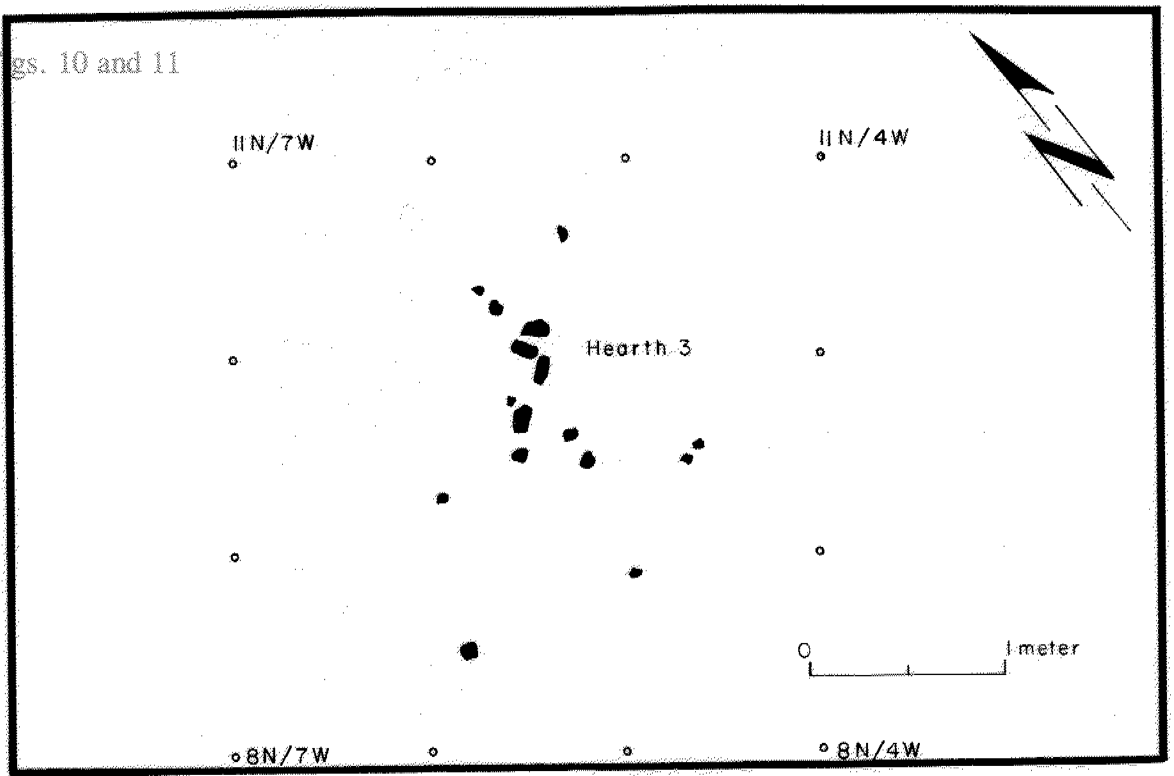

Figure 10. Plan of Rock Hearth 3, LA 6825.

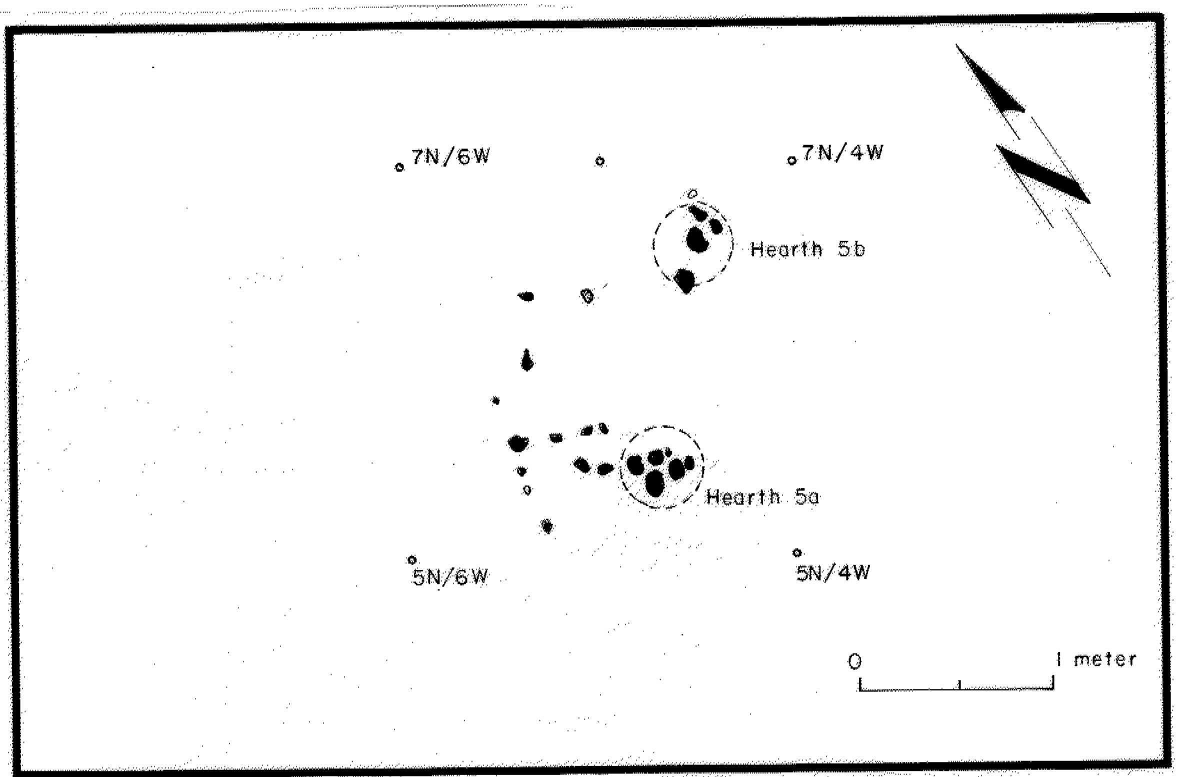

Figure 11. Plan of Rock Hearth 4, LA 6825.

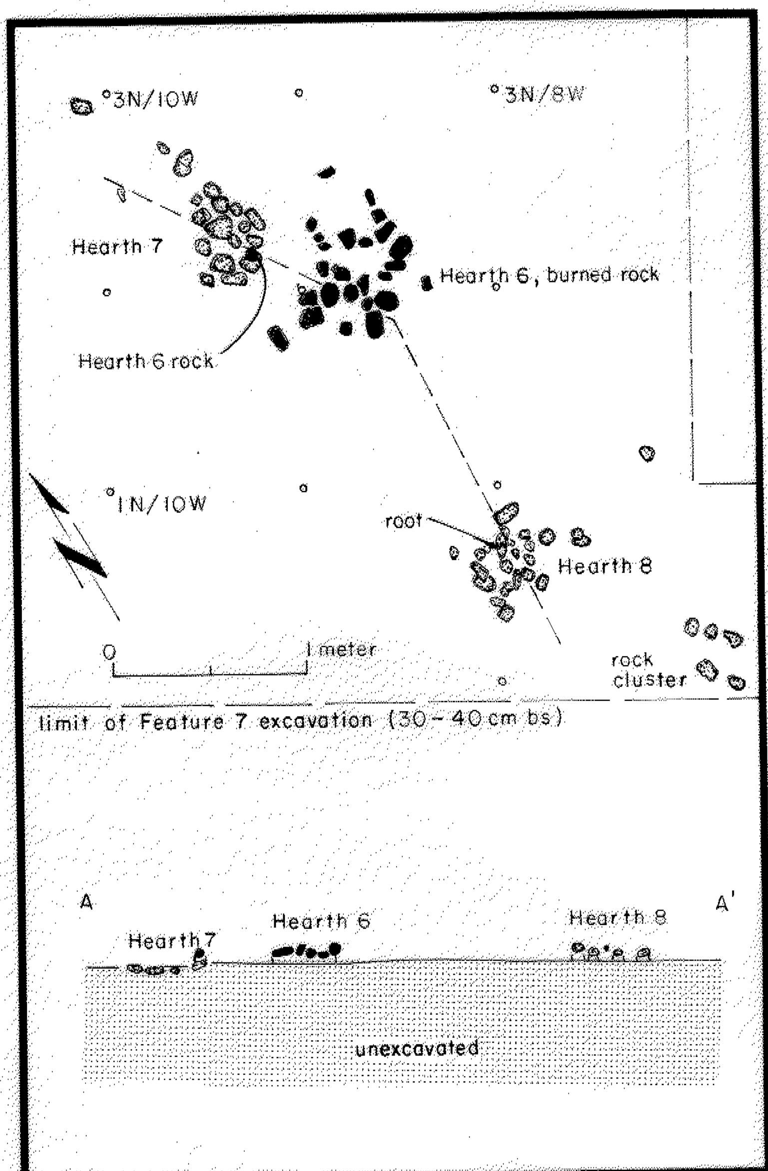

Figure 12. Plan and profile of Rock Hearths 6, 7, and 8, LA 6825.

hearths exposed to the nearly constant winds of plains environments are blown out rather quickly unless rapidly covered. The dimensions, then, do not necessarily reflect the original sizes of the hearths, except for Hearth 1; rather, they are the dimensions of the rock scatters at the time of excavation.

Table 2. Hearth dimensions, Corn Camp

Hearth	Type	Stone Dispersion	Length (cm)	Width (cm)	Depth (cm)	Figure Number
1	unlined	intact	38	35	9	11
3	rock	bad	225	135	15	8
5a	rock	moderate	35	20	10	9
5b	rock	intact	25	45	10	9
6	rock	moderate	92	82	10	10
7	rock	slight	50	45	8	10
8	rock	slight	63	50	10	10

With the exception of Hearths 6 and 7, all features were well spaced. Hearths 6 and 7, however, are so close that a burned-rock fragment from Hearth 6 overlay Hearth 7 by 3 cm (Fig. 13). We know the rock in question belonged to Hearth 6 because of its small, highly fragmented nature.

The unlined basin, Hearth 1 (Fig. 14), was a simple basin scooped out of the top of Stratum 2b. A shallow, triangular excavation on the southwest side of the basin probably represents an unintentional trough created when sediment was being scooped out to make the basin. No oxidation or other discoloration of the sides or bottom of the hearth was noted, suggesting short-term use. The charcoal-stained sediments recovered from Hearth 1 were used for radiometric dating (see section on dating below).

The stratigraphic context indicates Hearth 1 dates later than the other hearths at LA 6825. Two radiocarbon assays from fill material are nearly identical and suggest an early historic period date (see discussion in dating section).

Pits. Two small pits were excavated into Stratum 3. Pit 2 is enigmatic in that it is the size and configuration of the grinding surface of a trough metate (Fig. 14). It is unlined and measures 73 cm long, 37 cm wide, and 8 cm deep. The bottom slopes gently from both ends to the deepest point near the west end. The sides are more nearly vertical and curve abruptly to meet the bottom. Having been excavated into the top of Stratum 3 sediments, there is no way this feature could have been used for grinding. A pollen sample from bottom contact produced several economic plant species, including corn pollen (Holloway, this report). We assume from its shape, shallowness, and the presence of economic pollen (especially corn) that Pit 2 was used for food processing (dry mixing?) rather than storage. Stratigraphically, Pit 2 is at the same level as Hearths 6 and 7 and may have been contemporary with them. Its slopes gently from both ends to the deepest point near the west end. The sides are more nearly vertical and curve abruptly to meet the bottom. Having been excavated into the top of Stratum 3 sediments, there is no way this feature could have been used for grinding. A pollen sample from bottom contact produced several economic plant species, including corn pollen (Holloway, this report). We assume from its shape, shallowness, and the presence of economic pollen (especially corn) that Pit 2 was used for food processing (dry mixing?) rather than storage. Stratigraphically, Pit 2 is at the same level as Hearths 6 and 7 and may have been contemporary with them. Its relationship to Stratum 3 indicates that Pit 2 dates to about the same time as Hearths 6 and 7 a few meters to the west (cartesian northwest).

Figure 13. Hearths 6 (left) and 7 (right), LA 6825, showing a hearth stone from Hearth 6 overlying the south edge of Hearth 7.

A hole just south of the west end of Pit 2 contained a mesquite root. We suspect that the root is natural, rather than cultural, primarily because it was unburned and presumably would not last in an unburned state over a period of several hundred to a thousand years.

The other small pit, Pit 4, was a simple, unlined, oval basin measuring 55 by 36 by 8 cm (Fig. 14). Clues as to its function were lacking, in part because it contained Stratum 2 sediment at the time of excavation. We failed to secure a pollen sample from this feature.

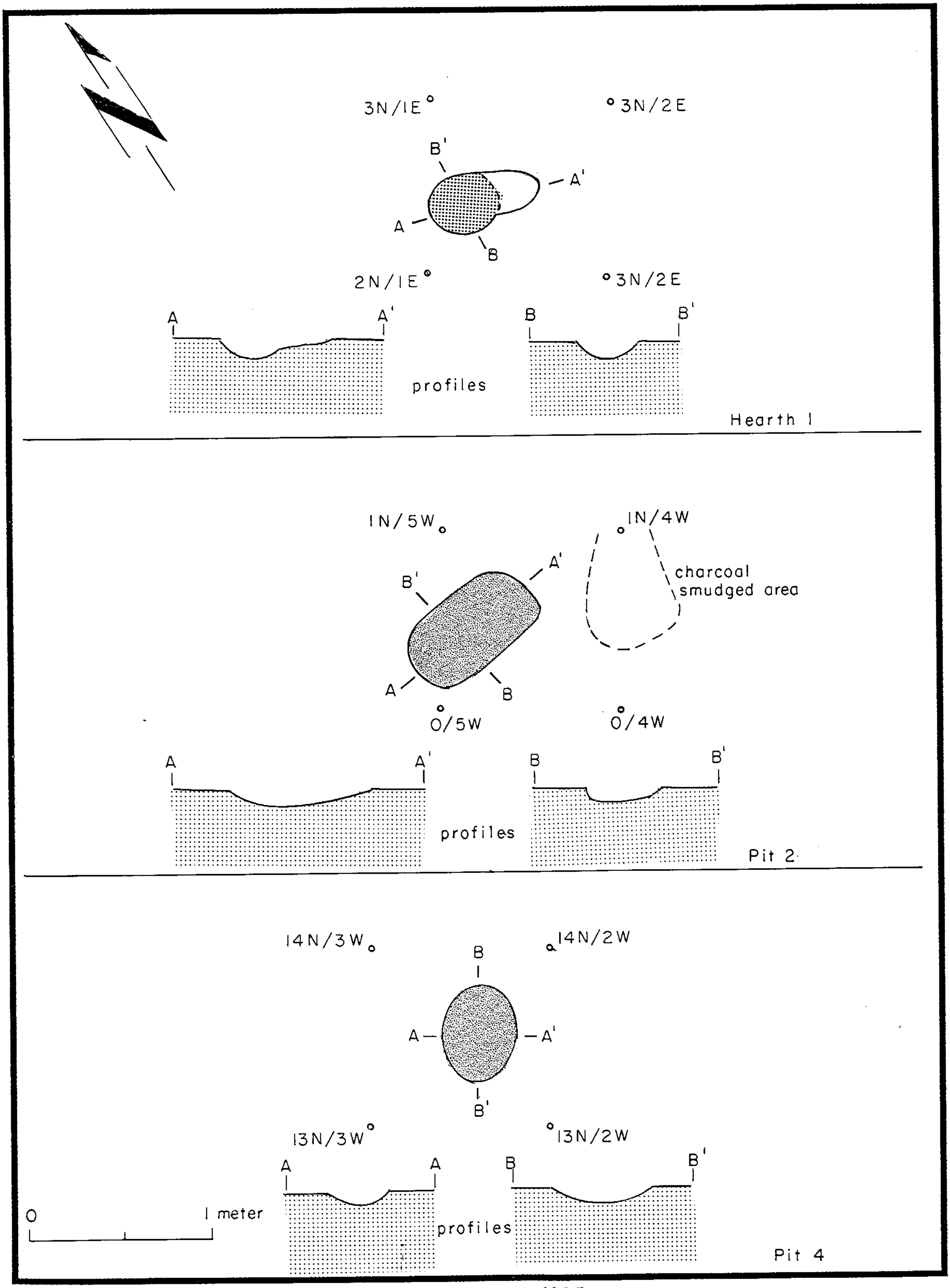

Figure 14. Hearth 1 (unlined), Pit 2, and Pit 4, LA 6825.

Prehistoric Artifacts

The artifact assemblage of LA 6825 is comprised of lithic manufacture debitage, pottery sherds, and flake tools. Formal artifacts were absent.

Flake Tools

Nine flakes have a total of 10 edges displaying informal use-wear and/or intentional retouch. All examples are unifacial (Table 3). Chert is the dominant material, though chalcedony, quartzite, and diorite porphyry are also represented. The overall incidence of informal or flake tools to lithic debris (flakes, cores, angular debris) is 3.6 percent.

Table 3. Flake tool attributes, Corn Camp

Artifact	Wear Configuration	Material	Wear Type	Retouch Length (mm)	Provenience
1	uniface, concave	dark gray-green quartzite	intentional retouch	14	24N/4E
2	uniface, concave	homogeneous gray chert	use	7	17N/2E
3	uniface, straight	off-white chalcedony with traces of red and brown inclusions	use	18	18N/4E
4	uniface, concave	porphyritic basalt	use?	4	19N/4E
5	uniface, concave	speckled white and/or light-medium gray chert	use/ intentional retouch	9	21N/2E
6	uniface, convex	off-white chalcedony with traces of red and brown inclusions	intentional retouch	12	25N/5E
7	uniface, straight	tan chert	both intentional retouch	20+ 17+	23N/2E
8	uniface, convex	light and dark mottled red-gray chert (heat treated)	intentional retouch	10	21N/3E
9	uniface, straight	light to medium gray chert	intentional retouch	9+	1N/9W

Pottery

In several ways the pottery from LA 6825 is fairly homogeneous, only in part because few vessels are involved (estimated minimum number of vessels [MNV] includes four plain brown vessels, one red-slipped brown vessel, and one painted vessel). Jornada Brown, red-slipped brown, and Chupadero Black-on-white are clearly represented, and El Paso Brown may also be present (Fig. 15; Table 4).

Table 4. Pottery, Corn Camp

Pottery Type	Number of Sherds	Number of Partial Vessels
Jornada Brown	138	4 or 5
El Paso (?) Brown	7	1?
Red-slipped Brown	0	1
Chupadero Black-on-white	1	1
Totals	146	6 or 7

Typical of dune environments and the Roswell area, sherd sizes are so small that examples larger than a quarter are exceptional. At the small end, sherds the size of a pencil eraser are also present. Though too small to permit observation of temper and surface finish, these sherds are useful from a presence/absence (ubiquity) perspective.

Although some discrimination is made in the temper constituents of the brown wares (including the red-slipped sherds), there is virtually no variability overall. The tempers of all vessels appear to be Capitan aplite from the Capitan/Jicarilla Mountains of Lincoln County, New Mexico.

Jornada Brown. All but a handful of sherds can be readily classified as Jornada Brown, though *none* are the classic variety typical of the type site, LA 2000. Temper particle sizes vary from so small that they are unidentifiable as to mineral type using 30 power magnification (though other characteristics ameliorate this problem), to sizes that are unmistakable. Most particles are roundish, and aggregates are common. In some sherds, rather large, well-formed, individual, white to off-white feldspar crystals are also present. These minerals appear to represent Capitan aplite. No gray feldspar crystals from the distinctive Sierra Blanca syenite were noted. In general, the size range and quantity of particles are within the range of Jornada.

In a couple of instances, opposite edges of some of the larger sherds were examined, with the not-too-surprising result that, had it not been known they were edges of the same sherd, it would have been assumed that two different sherds were involved. This only serves to verify the conviction that fewer, rather than greater, numbers of vessels are represented in this assemblage.

Paste colors and fracture characteristics are also compatible with Jornada. The colors

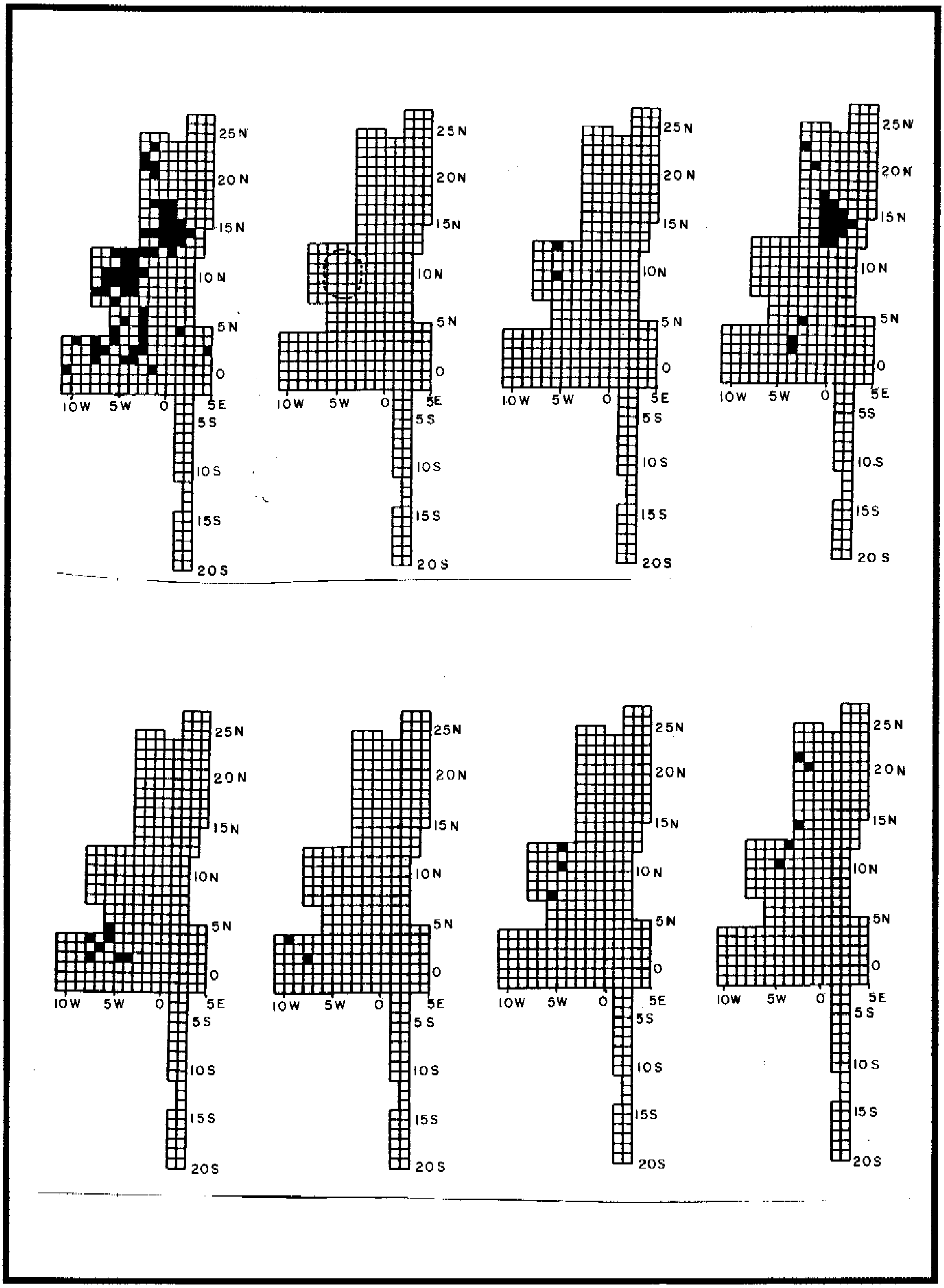

Figure 15. Distribution of sherds and partial vessels, LA 6825.

vary from light orange to medium brown to darker brown to grayish-brown. In some instances, notably Partial Vessel 4, a medium to dark gray "carbon streak" is occasionally present. The fracture, largely because of the profusion of temper, is fairly straight to curving but relatively even. Surface colors range from light orange to medium reddish-brown and grayish-brown to dark grayish-brown and brownish-gray. The darker colorations are not due to fire-clouding. Surfaces, especially exteriors, are mostly well polished. However, streaky polishing often occurs around deep scrape marks and bumps left by uneven thinning.

Uneven thinning of vessel walls is clearly the result of improperly meshing the coils. The result, presumably unintended, was a washboard exterior. Accordingly, wall thicknesses vary greatly, sometimes as much as 2 mm within a distance of 5 mm. Overall wall thickness ranges from 4 to 7 mm with a strong mode at 5.5 mm.

Sherds indicating vessel form are rare in this assemblage. The rim of Partial Vessel 4 indicates a wide-mouthed jar with a direct, rounded lip (Fig. 16). Judging by the orifice diameter (22-23 cm) and the vertical curvature, the height of this vessel was probably at least 35 cm. Another jar neck sherd is too small to determine other details.

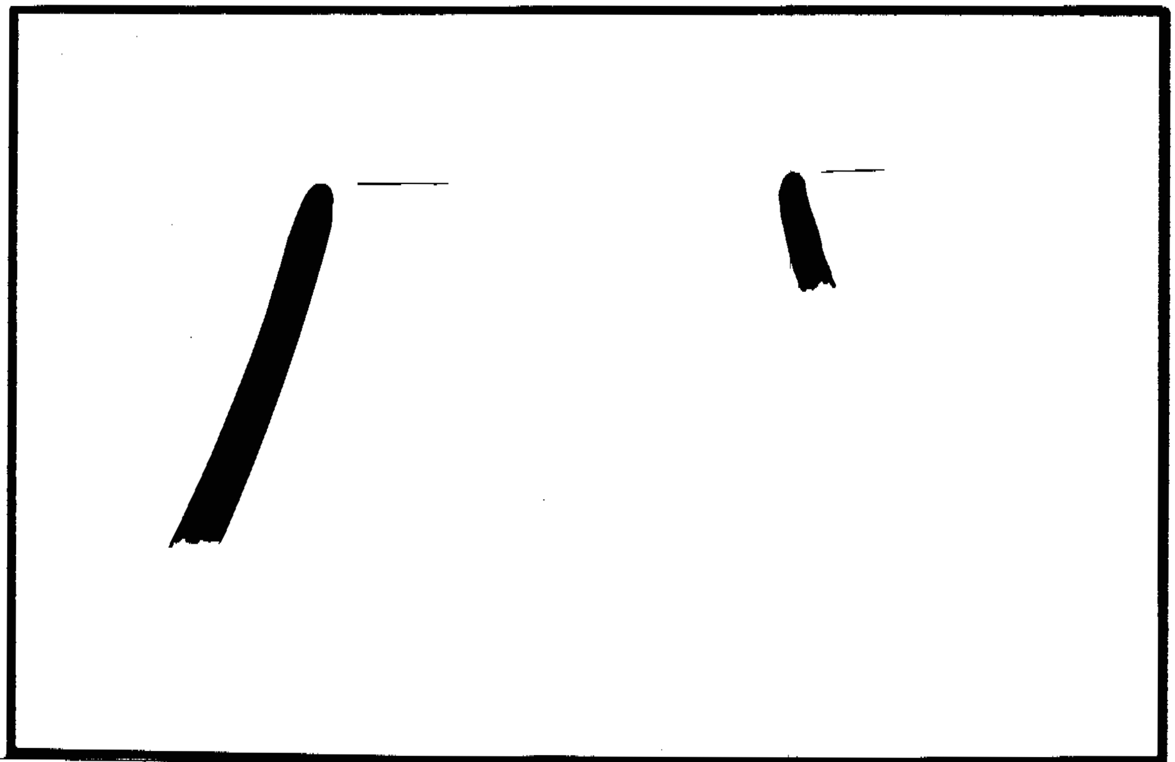

Figure 16. Pottery rim sherd profiles, LA 6825.

Examination of the assemblage quickly revealed that some sherds could be fit together, thereby permitting the identification of partial vessels. Four partial vessels, numbered one through four, were identified. It is possible, however, that two of them--1 and 2--actually belong to the same vessel. The pastes are virtually identical in appearance as well as composition, and the distributions within the site are essentially the same. The only difference is that Partial Vessel 1 has a medium brownish-gray to grayish-brown interior-surface color, and Partial Vessel 2 has a consistent light orange interior-surface color.

During the detailed examination of each sherd under a 30 power binocular microscope, sherds probably belonging to the same vessels were identified, though none fit together to confirm our suspicions. As mentioned above in the description of temper, the identification of vessels from sherds is confounded by the fact that the appearance of the paste of a sherd is not necessarily consistent throughout. Snips removed from opposite edges of a 3 cm long sherd revealed pastes that were so different in overall appearance that one would not guess that they belonged to the same vessel, much less to the same sherd.

In spite of these problems, two more vessels and a large number of sherds probably belonging to Partial Vessel 4 were identified. Thus, there is good reason to believe that the LA 6825 brown ware pottery assemblage MNV (minimum number of vessels) totals 5 or 6, depending on whether Partial Vessels 1 and 2 represent one or two vessels.

El Paso Brown (?). Seven sherds possess some characteristics of El Paso Brown. That is, they have large, light-colored temper particles that are prominent on sherd edges, and the dark core is sandwiched by lighter surface colors. However, other characteristics are shared with the Jornada Brown at the site. These include: (1) temper particle sizes within the upper end of the Jornada range; (2) large quantities of temper; (3) exterior surface finish that is well floated (particles do not protrude) and polished; and (4) a range in wall thickness of 5 to 6 mm, with most values about evenly divided between 5 and 5.5 mm. The sherds were widely scattered throughout the excavations.

Red-Slipped Brown. Four tiny sherds fit together to form one small rim sherd of a bowl that displays microscopic traces of an interior red slip. The lip form is skewed-rounded, with the rounded portion shifted towards the bowl interior surface (Fig. 16). The temper is Capitan aplite, the wall thickness is 5.5 mm, the surfaces are medium to dark reddish-brown and brownish-red, and the rim is squared. The estimated orifice diameter is 26 cm.

Chupadero Black-on-White. This jar sherd was overfired to the extent that the paint and exterior surface are reddish in color; the grayish interior surface is lightly scraped. The paste color (light brown) and temper (profuse carbonates and sparse, well-ground sherd) are very similar to sherds I have seen attributed to manufacture at or very near Gran Quivira (Pueblo de las Humanas). The design includes solid and hatched elements that appear to compose a fairly typical Chupadero layout . The absence of a slip is not unusual for the type or for examples made at Gran Quivira.

Lithic Manufacture Debris

Lithic manufacture debris--cores, flakes, shatter, and pieces of raw material--constitute the bulk of the artifacts recovered from LA 6825 (Fig. 17; Table 5). The analysis of these materials, following the standard analysis implemented in the Roswell region over the past five years, focuses on reconstructing the lithic technology. The raw materials and definitions used to classify and analyze chipped lithic debris are described in Appendix 1.

Another focal point of the lithic analyses of the Roswell region projects is an attempt to devise ways of identifying Edwards chert and other lithic materials traded into the area. In the process of this study, we also gained useful insights into the gray cherts that are presumably local to the Roswell region and which have distinct bearing on questions of socioeconomic relationships within the Roswell region. A complete description of the methods and techniques employed in this study is beyond the scope of the present report, but will be published in the Bob Crosby Draw project report (Wiseman in prep. a) in the near future. We did, however, examine Corn Camp lithic debitage using the same criteria. The results are presented in the section on local and exotic materials at the end of the discussion of lithic debitage. The colors cannot be given according to the Munsell charts because the color chips do not respond appropriately or methodically to ultraviolet light.

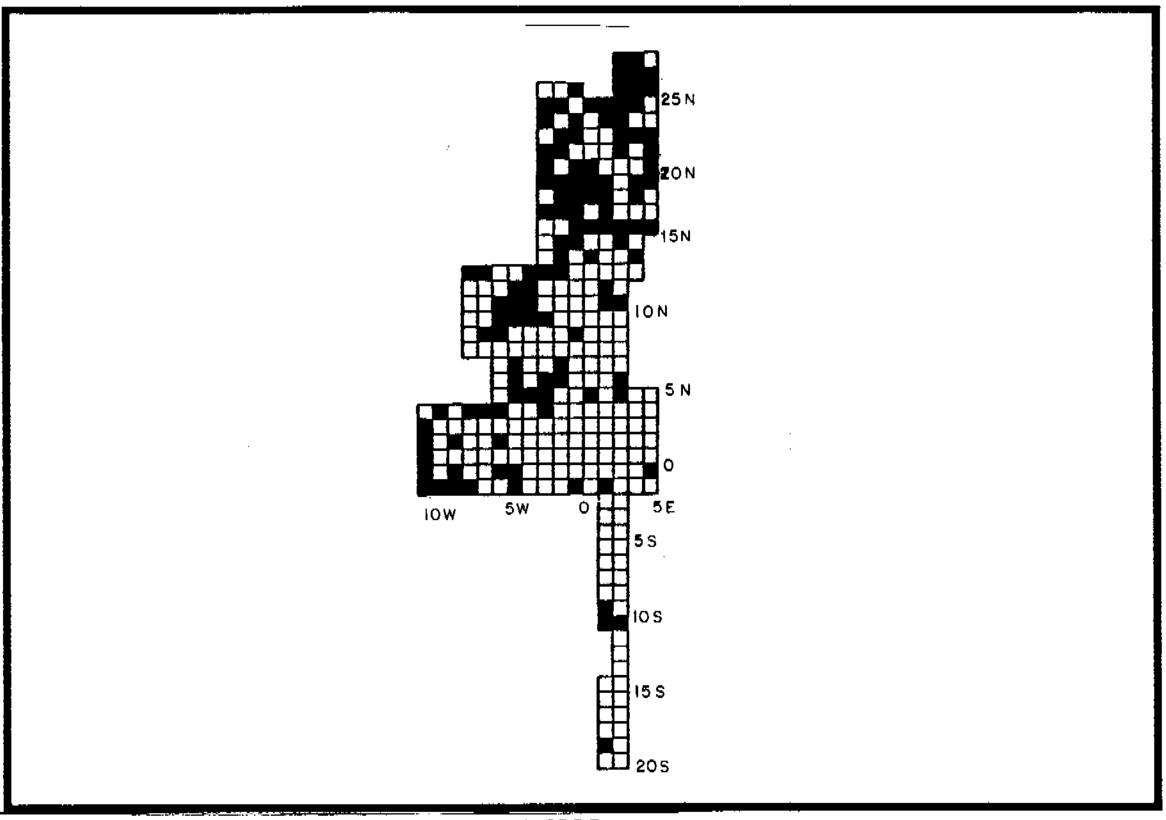

Figure 17. Distribution of all debitage, LA 6825.

The cores, core reduction flakes, biface thinning flakes, and exotic materials are described below. Pieces of debitage bearing use-wear or intentional retouch are described in the section on tools.

Cores. The eleven cores include four subtypes and one residual category (Table 5). Single-platform and two-platforms-adjacent cores are the most common. Materials are varied and are dominated by the categories siltite/quartzite and other (Table 6). The size range varies greatly (Table 7), from the smallest, measuring 22 by 18 by 15 mm (5.7 g), to the largest, measuring 75 by 58 by 48 mm (306 g). None is clearly heat-treated, though two may be.

Table 5. Lithic manufacture debris, Corn Camp

Manufacture Debris Category	Number	Percent
Cores:	11	4.4
Single platform	4	1.6
Two platforms adjacent	3	1.2
Two platforms parallel	1	0.4
Flake core	2	0.8
Indeterminate	1	0.4
Flakes:	199	79.3
Core reduction	158	62.9
Biface thinning	4	1.6
Decortication	28	11.2
Indeterminate	9	3.6
Shatter	36	13.3
Pieces of material *	5	2.0
Totals	251	100.0

* Unworked raw material units brought into the site by people.

Table 6. Selected lithic debitage classes, Corn Camp

	Cores		Flakes						Shatter and Other		Site Total	
			Core Reduction		Biface Thinning		Other					
	n	%	n	%	n	%	n	%	n	%	n	%
Materials												
Local chert	2	18	46	30			12	32	11	27	71	29
Other chert			16	10			3	8	2	5	21	8
Chalcedony	2	18	34	22	3	75	8	22	11	27	58	23
Limestone	1	10									1	<1
Siltite/Quartzite	3	27	41	26			12	32	14	34	70	28
Other	3	27	18	12	1	25	2	6	3	7	27	11
Totals	27	100	155	100	4	100	37	100	41	100	248	100
Heat Treatment												
No	9	82	132	83			31	84	37	90	209	83
Yes			4	3			1	3			5	2
Possibly			4	3							4	2
Indeterminate	2	18	18	11	4	100	5	13	4	10	33	13
Totals	11	100	158	100	4	100	37	100	41	100	251	100

Table 7. Core dimensions, Corn Camp

	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mean	53.90	45.70	30.60	115.34
Standard Deviation	15.41	15.20	12.47	110.94
Range	53.00	47.00	33.00	300.30
Number	10	10	10	10

Core Reduction Flakes. Only one-third of the 158 core reduction flakes are complete. Summary statistics indicate that, on average, they are rather small (under two cm in length and width), only slightly longer than wide, and weigh less than 5 g (Table 8). A one-tailed Pearson correlation matrix (Table 8) indicates two strong correlations--one between length and width and the other between thickness and weight.

The primary materials represented in the core reduction flakes from LA 6825, in order of importance, are local cherts, siltite/quartzite, and chalcedony (Tables 6 and 9). Heat treatment was rarely used, the total of "yes" and "possible" cases totaling only 6 percent. Single and multiple flake-scar platforms are the most common, together accounting for nearly two-thirds of the flakes. Two-thirds of the flakes have feathered distal terminations, and fully a quarter are hinged or stepped. Over three-quarters of the complete flakes lack dorsal cortex.

Table 8. Complete core reduction flakes, Corn Camp

Descriptive Statistics				
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mean	18.44	17.07	5.32	4.84
Standard Deviation	14.71	10.79	4.62	14.01
Range	4-78	4-43	1-27	0.1-97.0
Number	57	57	57	57
Correlation Matrix of Dimensions				
Length	1.00000			
Width	.94230	1.00000		
Thickness	.76395	.77773	1.00000	
Weight	.78850	.77828	.96339	1.0000

Table 9. Selected observations on core reduction flakes, Corn Camp

Attribute	Number	Percent
Platform Types		
Cortex	11	10
Single Flake Scar	44	39
Multiple Flake Scar	26	23
Pseudo-dihedral	5	4
Edge or ridge-like remnant	12	11
Destroyed during detachment	15	13
Total	113	100
Distal Termination Type		
Feathered	48	66
Modified feathered	7	10
Hinged or stepped	17	24
Total	72	100
Dorsal Cortex		
0%	44	77
1-25%	4	7
26-50%	4	7
51-75%	2	4
76-100%	3	5
Total	57	100

Biface Thinning Flakes. Only four biface thinning flakes, two of chalcedony, one of probable Edwards chert, and one of basalt, were recovered. All are large (27 by 19 by 3 mm, 2.2 g; 19 by 28 by 3 mm, 1.4 g; 19 by 20 by 3 mm, 1.0 g; and 24 by 20 by 3 mm, 1.5 g), respectively, indicating removal from large bifaces, possibly Archaic-style points.

Local Lithic Materials. As part of a larger study discussed at the beginning of the lithic manufacture debris section of this report, the presumed-local gray cherts from the Dunnahoo sites were subjected to long-wave ultraviolet light. Ninety-eight percent of the Corn Camp local gray cherts did not respond to UV light (i.e., appeared dark velvety purple-black), and less than 2% gave a slight response (dark brown color). None responded in the moderate (medium yellow-brown) or bright (orange to yellow) ranges. This contrasts sharply with the preliminary results for the Fox Place (LA 68188), where 50 percent or more of the presumably local gray cherts responded in the slight to moderate ranges.

Exotic Lithic Materials. Only one flake from Corn Camp fits most of the criteria for materials imported from Texas. The color of this biface thinning flake is light brown with light gray mottles, and it fluoresces a moderate brown-yellow under long-wave ultraviolet light. The grain of the material is fine but not exceptionally so. This complete flake measures 19 by 20 by 3 mm, weighs 1.0 g, and comes from excavations in Sq. 26N/3E.

According to the criteria developed for the material source study, this flake is considered a "probable" Edwards chert. Had it fluoresced bright yellow or orange, instead of moderate brown-orange, we would have a definite match for Edwards by study standards. But since some examples of Edwards chert from source localities also fluoresce in the moderate brown-orange range (as do some San Andres cherts from southeastern New Mexico), we cannot be certain and relegate this particular flake to the "probable" status.

Historic Artifacts

Coin

A coin recovered during the excavation of Sq. 1N/4E is a 1944, San Francisco-mint penny that had been shot and badly deformed by a small caliber weapon.

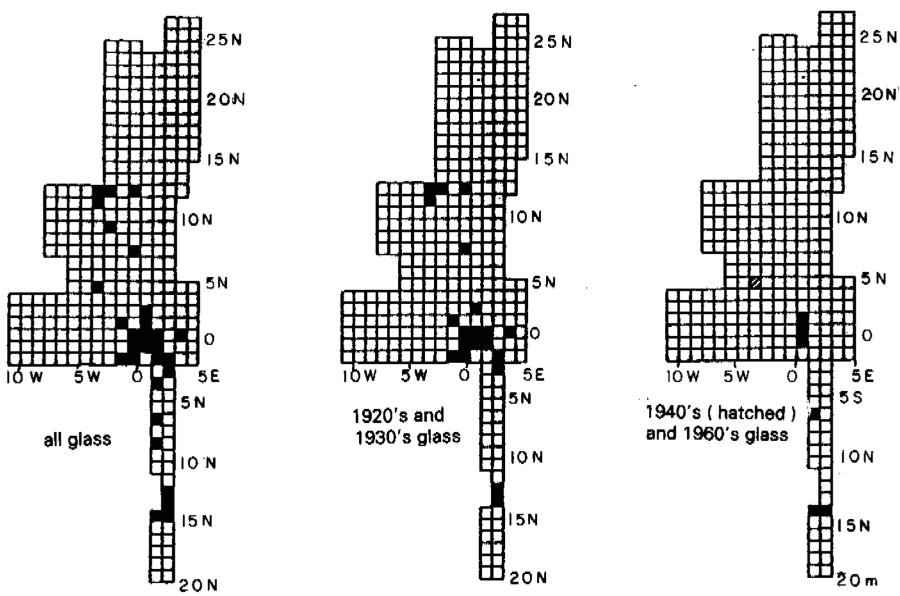

Figure 18. Distribution of glass fragments, LA 6825.

Glass

One hundred seventeen fragments of glass were recovered from the surface and excavations (Fig. 18). All but 26 are clear glass, and the remainder are brown. Although most are quite small, most represent jars and other containers; no flat glass (window panes, for instance) or other architectural fixtures are represented. The assemblage clearly constitutes roadside debris generated by travelers.

The analysis reveals that two time periods are primarily represented, both belonging to the twentieth century. The earlier one, represented by two pieces of light purple glass and a number of pieces of heavily patinated clear glass, dates to 1920-40. The other, represented by thin brown glass (no-return beer bottles) and some clear glass dates between the late 1960s and the present.

The Aceramic Lithic Debris Concentration as a Possible Archaic Component

As mentioned earlier, a 25 sq m area at the north end of the excavation appears to differ in several respects from the rest of the site. Because it is somewhat discrete spatially, has a slightly higher density of lithic artifacts than surrounding areas, and lacks pottery, the remains may represent a separate component, perhaps belonging to the Archaic period. We suspect that only part of the manifestation was excavated.

The 50 pieces of lithic debris recovered from the northeast concentration include 2 cores (1 limestone, 1 quartzite), 33 core reduction flakes (see Table 10 below), 3 biface thinning flakes (2 chalcedony, 1 basalt), 5 decortication flakes (3 chalcedony, 1 local gray chert, 1 siltite/quartzite), and 7 pieces of shatter (3 chalcedony, 3 siltite/quartzite, 1 "other" material).

To address the question of similarity/dissimilarity and the possibility that the northeast locus represents a separate, perhaps Archaic-period component, we looked at three criteria suggested by Sebastian and Larralde (1989:41-43): cortex, platform preparation, and flake size (core reduction flake, in this case). To this we added material type and flake weight.

While we lack an explicit Roswell-region baseline against which to compare these criteria, a comparison to three lithic data sets from LA 6825 is helpful in determining whether the north-area data set is the same or different. If the data sets are basically the same, then the absence of pottery in the northeast area may not be meaningful. If differences can be found, then a case for a separate component can be supported. However, because the sample sizes for all data sets are small, our results must be viewed as tentative at best. Depending on the attribute under consideration, comparisons are made in terms of either three or four data sets of the LA 6825 assemblage.

The data sets and their designations are as follows:

(1) northeast area, meaning the proveniences in the part of the site being evaluated with respect to whether or not it is/was a separate component;

(2) All Other Proveniences 2 (AOP-2), meaning all proveniences at LA 6825 exclusive of the proveniences in the Northeast Area;

(3) All Other Proveniences 1 (AOP-1), meaning the same proveniences as AOP-2, but excluding three very large flakes that are atypical of the rest of the flakes in that data set;

(4) entire assemblage, meaning all proveniences at LA 6825.

With regard to material types, the AOP-2 data set virtually duplicates the entire-assemblage data set (Table 10). The northeast-area data set also shows similarities in several categories (other gray cherts, siltite/quartzites, and other) to these two data sets. However, the percentage of local gray cherts in the northeast area is much lower, suggesting a potentially significant difference in this respect.

Table 10. Percentage comparison of three lithic data sets by material type, all debitage types (cores, flakes, shatter), Corn Camp

Data Set Material Type	Northeast Area (n = 50)	OPA-2 (n = 198)	Entire Site (n = 248)
Local gray chert	12%	33%	29%
Other gray chert	10	8	8
Chalcedony	28	22	23
Limestone	2	0	1
Siltite/Quartzite	34	27	28
Other	14	10	11
Totals	100	100	100

Comparison of core reduction flake sizes is also instructive. Generally speaking, the AOP-2 data set again compares favorably with the entire assemblage (Table 11). The northeast-area data set compares favorably with both sets for flake length, width, and thickness, but not for weight. The average northeast area flake is roughly half the weight of flakes from AOP-2 and from the entire site. The AOP-1 flakes are generally smaller in all respects than the flakes in the other three data sets. The average flake weight in the AOP-1 set is well below that of the northeast area (1.8 g versus 2.6 g).

Comparison of flake platform types among the data sets shows very little variation (Table 12). The only potential difference is the near parity between single-flake-scar and multiple-flake-scar platforms in the northeast-area data set. However, since the order of dominance--more single-flake-scar platforms than multiple-flake-scar platforms--is the same here as in the other two data sets, it is possible that the difference is not significant.

Comparison of percentage of dorsal cortex shows a similar trend in both the AOP-2 and entire-assemblage data sets. Furthermore, this trend generally agrees with the classic conception of core reduction in that the majority of flakes, representing the interior material of the cores, lack cortex, and each succeeding category contains fewer and fewer members. The majority of flakes in the northeast-area data set also lack cortex. However, a middle category, the 26-50 percent group, contains a rather high percentage of members (18 percent) and lacks members in the 1-25 percent category altogether. These deviations contrast markedly from the other LA 6825 data sets and from the classic concept just described. We believe that this difference implies either a different approach to the reduction of cores or differences in the forms of the raw material units or both (see Wiseman 1978) or different needs in flake characteristics or some combination of these possibilities.

Table 11. Percentage comparison of four data sets of complete core reduction flakes, Corn Camp

Attribute Data Set	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Northeast Area				
Mean	17.8	18.2	5.2	2.6
Standard Deviation	9.72	9.66	3.43	3.20
Range	7-42	6-38	1-14	0.1-9.1
Number	17	17	17	17
AOP-1				
Mean	15.0	14.8	4.3	1.8
Standard Deviation	9.43	9.25	3.00	2.83
Range	4-42	4-41	1-12	0.1-13.2
Number	37	37	37	37
AOP-2				
Mean	18.7	16.6	5.4	5.8
Standard Deviation	16.20	11.07	4.98	16.36
Range	4-78	4-43	1-27	0.1-97.0
Number	40	40	40	40
Entire Site				
Mean	18.4	17.1	5.3	4.8
Standard Deviation	14.71	10.8	4.62	14.01
Range	4-78	4-43	1-27	0.1-97.0
Number	57	57	57	57

Table 12. Percentage comparison of core reduction flake platform types in three lithic data sets, Corn Camp*

Data Set Platform Type	Northeast Area (n = 32)	AOP-2 (n = 81)	Entire Site (n = 113)
Cortex	9%	10%	11%
Single-flake-scar	31	41	44
Multiple-flake-scar	28	21	26
Pseudodihedral	6	4	5
Edge/Ridgelike Rem.	13	10	12
Destroyed	13	14	15
Totals	100	100	100

** Data sets used in these calculations include all complete and fragmentary core reduction flakes for which accurate observations could be made.

Table 13. Percentage comparison of core reduction flake dorsal cortex in three lithic data sets, Corn Camp*

Data Set Cortex Category (%)	Northeast Area (n = 17)	AOP-2 (n = 40)	Entire Site (n = 57)
0	76%	78%	77%
1-25	0	10	7
26-50	18	2	7
51-75	6	2	4
76-100	0	8	5
Totals	100	100	100

*Data sets used in these calculations involve only complete core reduction flakes.

As mentioned earlier, three of the four biface thinning flakes were recovered from the northeast area. The fourth flake was recovered from Sq. 16N/5E. This square is on the periphery of the northeast area, effectively indicating that it, too, may belong to the northeast-area data set. Thus, all of the biface thinning flakes recovered from LA 6825 probably belong to the activity or activities associated with the northeast area. As mentioned earlier, the three complete biface thinning flakes are all rather large, indicating removal from large bifaces.

Summary, Northeastern Area

A small concentration of lithic debitage in the northeast end of the excavations differs in several respects from other areas of the site. Fully one-fifth (20 percent) of the lithic manufacture debris recovered by our excavations came from this area, which in itself constitutes only 8 percent of the total excavated area. Even though several pottery sherds were recovered from the site, none came from the northeast area. We evaluate the proposition that this area is different from the rest of the site through a comparative study of five attributes, three (flake size, platform preparation, dorsal cortex) suggested by Sebastian and Larralde (1989) as potentially useful for discerning Archaic-period lithics, and two (flake weight, material type) selected on the basis of experience and discussions with various colleagues over the years.

Analysis of the lithic debitage revealed several potentially important differences between the northeast-area data set and the rest of the site. Because the sample sizes of all data sets used for comparison are small, the results must be regarded as tentative. The lithic debitage from the northeast area differs in several ways:

(1) Much less use of chert (12 percent versus 29-33 percent).

(2) Core reduction flakes are somewhat larger and heavier than the AOP-1 data set but somewhat smaller and lighter than the entire site data set.

(3) Many more flakes possess 26-50 percent dorsal cortex (18 percent versus 2-7 percent), suggesting differences in cultural, technological, or functional needs.

(4) All biface thinning flakes recovered from the site came from the northeastern area. These flakes came from large bifaces, perhaps during the manufacture of Archaic-style projectile points. The material type of one is probably Edwards chert from Texas.

We conclude, then, that a sufficient number of potentially important differences in the lithic manufacture debris in the northeastern area differentiate that area from the rest of the site. It appears to be a separate, though proximate component or occupation. Although it could belong to the Archaic period, we cannot be certain in the absence of diagnostic artifacts and absolute dates.

LA CRESTA (LA 6826)

LA 6826 is a large lithic material quarry/workshop on top of a high, gravel-capped ridge (Figs. 19 and 20) that extends north and south of U.S. 70. The gravel evidently is Quaternary period in origin (Kelley 1971). The site location provides an excellent view of a valley to the east and northeast that is favored today by antelope for feeding. The overall site size is 520 m north-south by 215 m east-west.

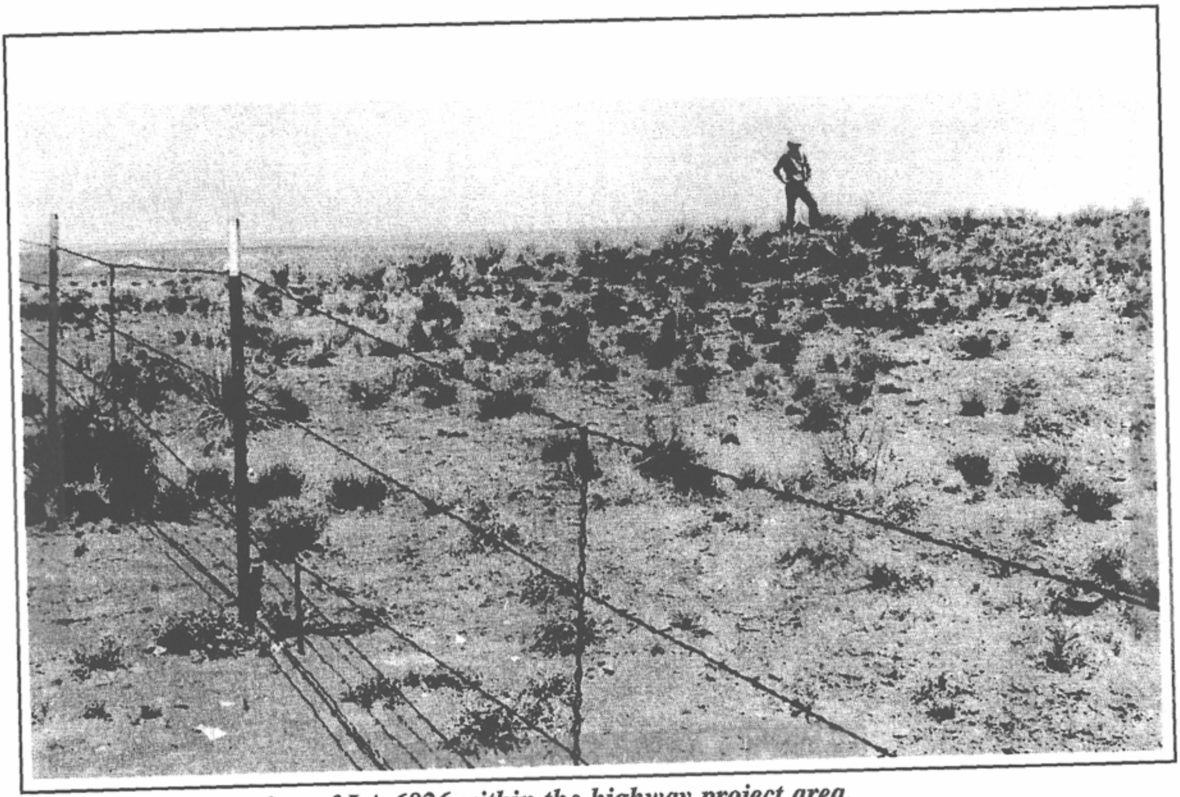

Figure 19. The portion of LA 6826 within the highway project area.

For the most part, the artifacts lie on exposed natural soils, but one part of the site within the proposed highway project area is covered by a shallow accumulation of eolian sand (Fig. 21). Augering in this sandy area indicated cultural deposits 10 to 50 cm below the surface. Judging from the depths of recovered charcoal and artifacts, subsurface features such as hearths and pits were believed to be present. Cultural materials at the site included flakes, cores, beads, and burned rocks. No pottery or ground stone artifacts were noted. The cultural materials from testing and excavation are reported here.

The proposed highway project crosses the narrowest point of the site; south of the highway the site area within the highway project measures 46 m east-west (parallel with the highway) by 26 m north-south. The part of the site lying within the project area north of the existing highway consists of a few widely scattered artifacts resting on disturbed natural soils. All excavations were restricted to the part of the site south of the existing highway.

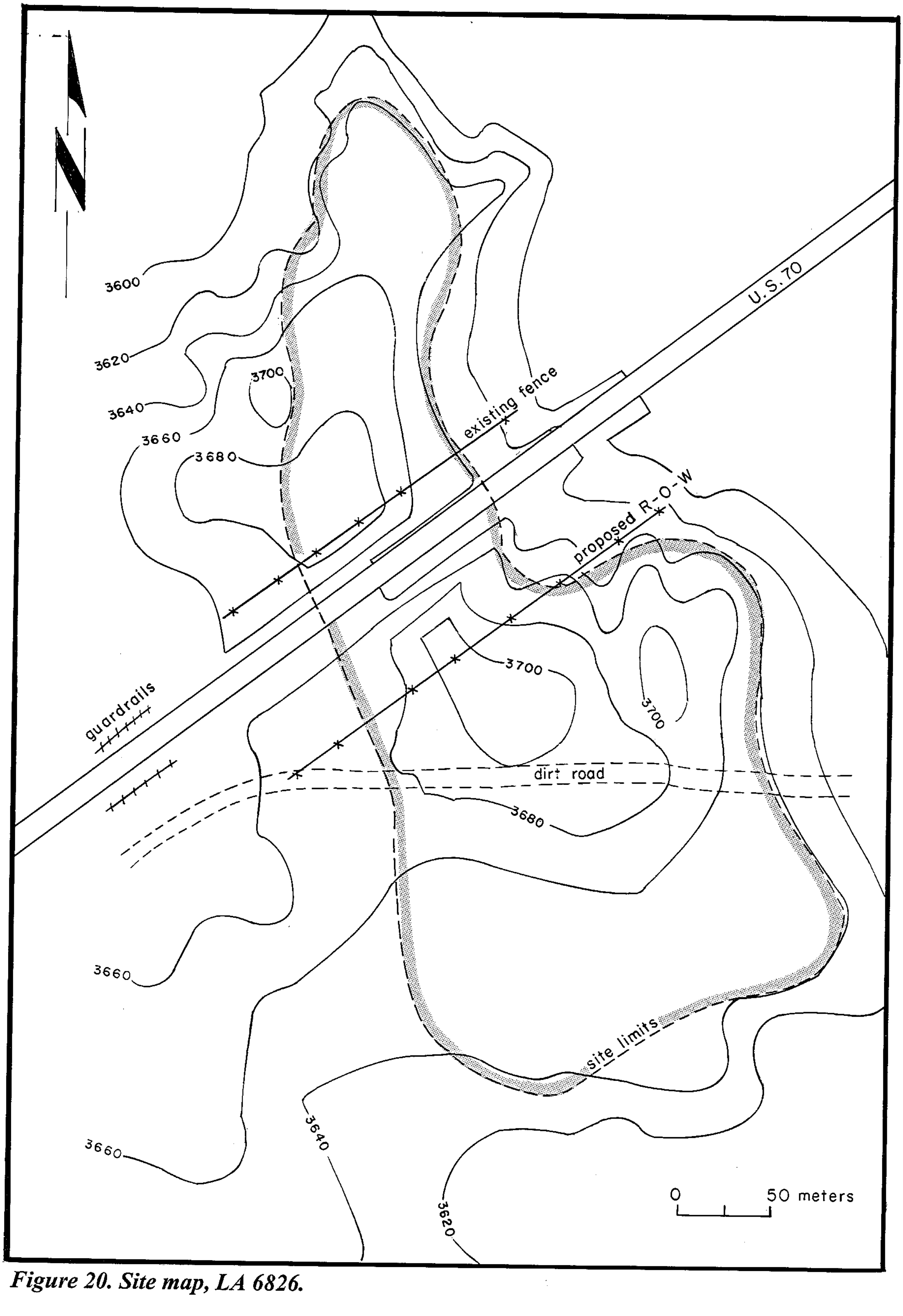

Figure 20. Site map, LA 6826.

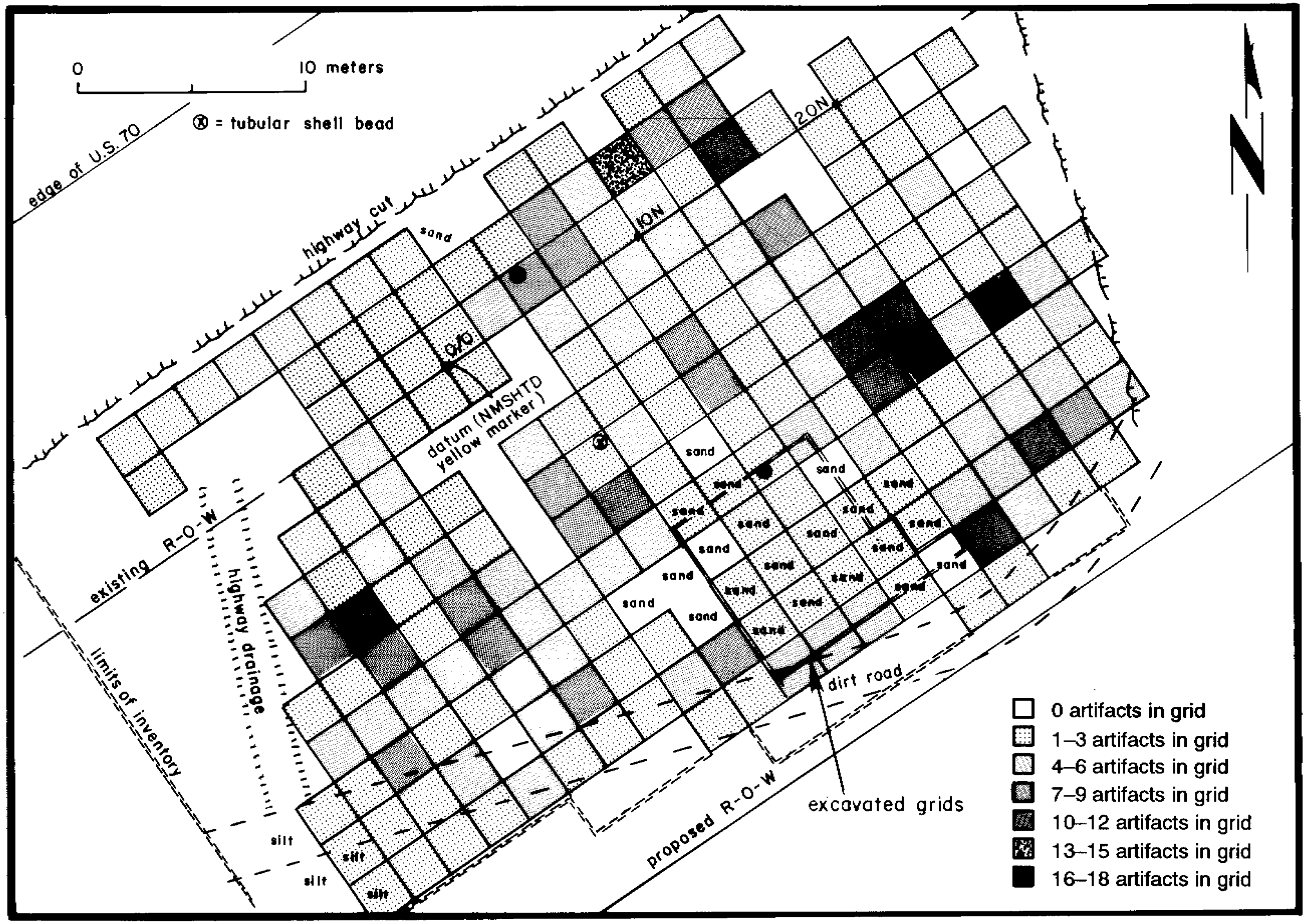

Figure 21. Surface artifact density, LA 6826.

Excavation Method

Excavations proceeded in 1 m squares based on the grid established for the testing program. The existing right-of-way fence served as the grid baseline, with directions expressed in terms of grid north (grid north is the direction of the town of Portales, approximately 60 degrees east of north). The grid northeast corner of each square is the designator for the square.

For the most part, excavations were confined to the upper stratum, the reddish-tan clay/clay loam of the low dune and the immediately underlying compact unit of the same material. The lower stratum is disintegrated, light-gray sandstone and gypsum. Since the two strata are natural in origin, excavation was limited to the upper stratum and the upper part of the lower stratum. Excavation depth varied from 5 to 30 cm; arbitrary levels were not maintained. All fill, including the dune material, was screened through one-eighth inch (6 mm) wire mesh.

Excavation Results

A total of 61 1 by 1 m squares was excavated (Figs. 22 and 23). One feature, a large pit, was uncovered. Surface and excavated artifacts, dominated by flaking debris but also including one potsherd and a few animal bones, numbered more than 1,000 items. Datable materials and soil samples suitable for flotation recovery of small plant and animal remains were rare. The only formal artifacts recovered from the site are beads, a fragment of a large biface, and an end scraper. Cultural by-products such as burned rocks were rare, and charcoal staining and ash were absent except in obvious situations of postoccupational natural burns (plant roots burned by natural fires).

Stratigraphy

Only two strata were defined in the excavations (Fig. 24).

The lower stratum consists of a disintegrating off-white to grayish sandstone with cracks filled by upper stratum material. The surface of the lower stratum was mottled with reddish areas of various sizes (see discussion under "Features"). No cultural items were recovered from this stratum, but the possible sleeping pit (see below) was excavated into it.

The upper stratum was a thin, light red, eolian surface layer of silty clay or clay loam. Although a small, duned area of this material was the focus of the excavations, a thin layer of nonduned sediment covered the site in general. All cultural materials were recovered from the surface and matrix of this stratum.

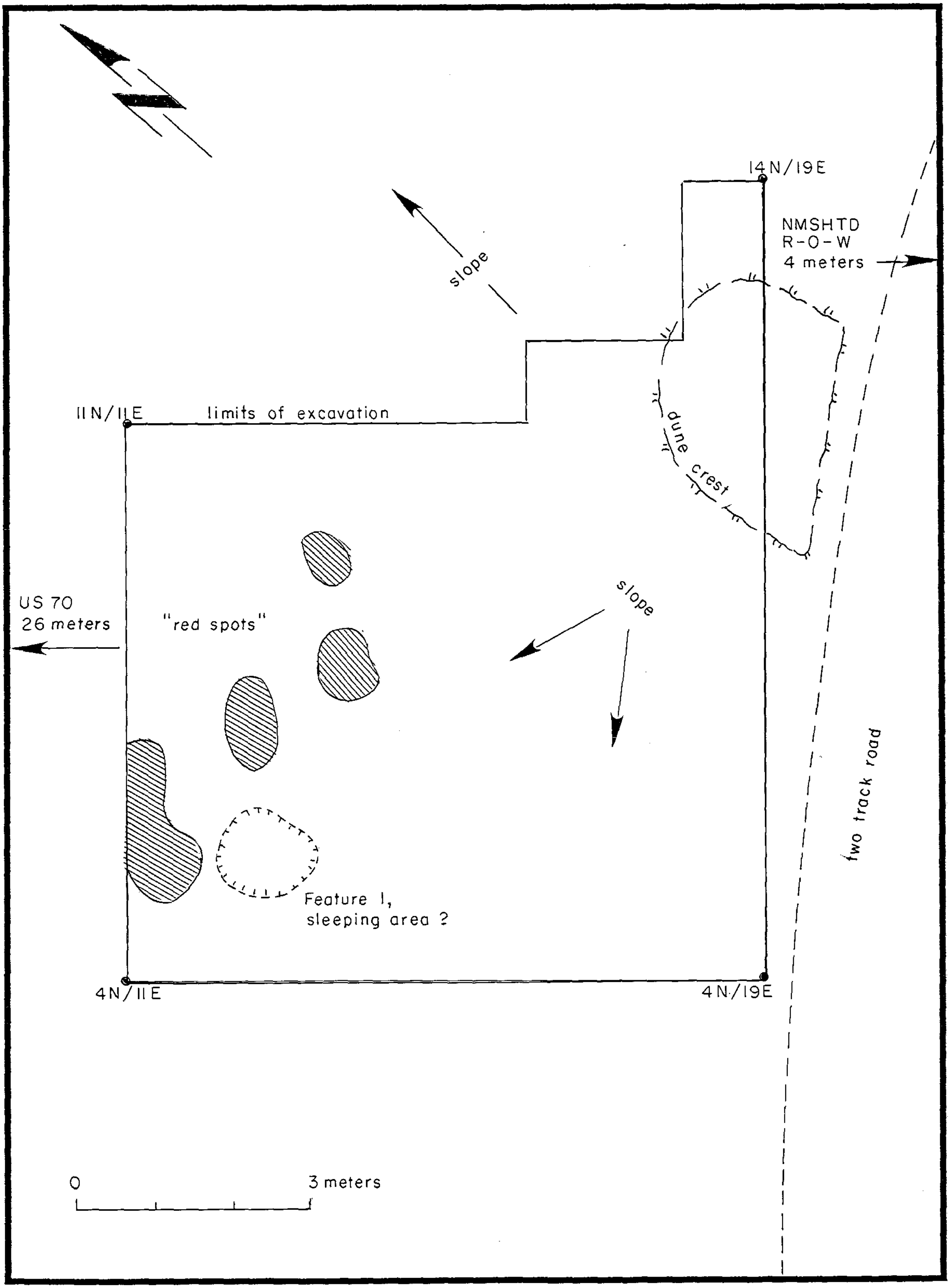

Figure 22. Plan of excavations and features, LA 6826.

Figure 23. LA 6826 during excavation, looking east.

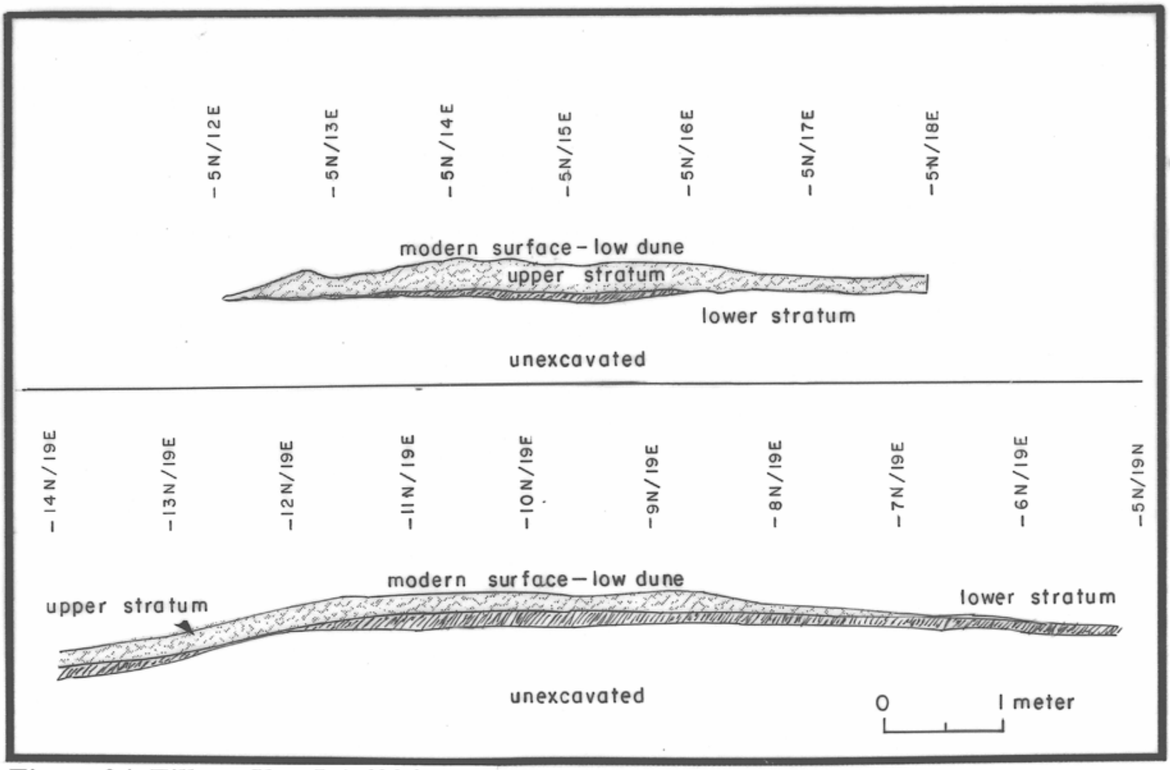

Figure 24. Fill profiles, LA 6826.

Features

Sleeping Pit (?). A large, shallow, oval pit was much larger and more regular in shape than the obviously natural depressions in the top of the lower stratum (Fig. 25). It was 140 cm long, 140 cm wide, and 13 cm deep. It is generally believed to have been too small to be a structure, but it could have been a sleeping pit for an individual curled into the fetal position for warmth. If sleeping was not the function, then the function is unknown, for it was basically too shallow to provide for effective storage, unless it was covered by a brush shelter. No evidence of anchoring holes for a brush shelter were found around the periphery, but with several centimeters of surface sediment in which to anchor the ends of brush, holes would not have been necessary.

Burn Areas (?). One of the more puzzling aspects noted during excavation was the presence of numerous reddened areas on the surface of the lower stratum. While most were comparatively small (on the order of 20 by 20 cm), several were quite large (50 by 50 cm and larger; Fig. 22). After mapping and monitoring them throughout the excavation, we concluded by the end of the fieldwork that they were mostly natural phenomena caused by any of several possibilities. The smaller spots were believed to be the result of root action, whereby plant roots brought red material up from underlying strata or dragged it down from the upper stratum. Another possibility was from burning when wild fire traveled down the roots, as was clearly the case with several yucca roots which were pure ash at the time of excavation.

The larger spots, though they too appeared to be the result of burning (the surfaces were quite hard, crusty, and crazed with numerous cross-cutting cracks), were also believed to be partly the result of upward intrusion of geologic redbed material. But now, in light of the rather high percentages of heat-treated lithic material from LA 6826, we once again wonder if the largest areas, some of which are slightly mounded (Fig. 26), might in some way have been involved in this activity. It is interesting to note that these large areas are mostly proximate to the depression believed to be a sleeping pit.

Artifacts

Beads, a large biface fragment, a stone scraper, flake tools, a pottery sherd, a shaped lump of pigment, and lithic manufacture debitage were the only cultural materials recovered from the surface and excavations at LA 6826.

Flake Tools

Five flakes display informal use-wear and/or intentional retouch on one edge. Two have unifacial wear/intentional retouch, two have bifacial wear/intentional retouch, and one has a notch (Table 14). Chert is the dominant material, though both siltite and quartzite are also represented. The overall incidence of flake tools relative to flaking debris (flakes, cores, angular debris) is 0.5 percent.

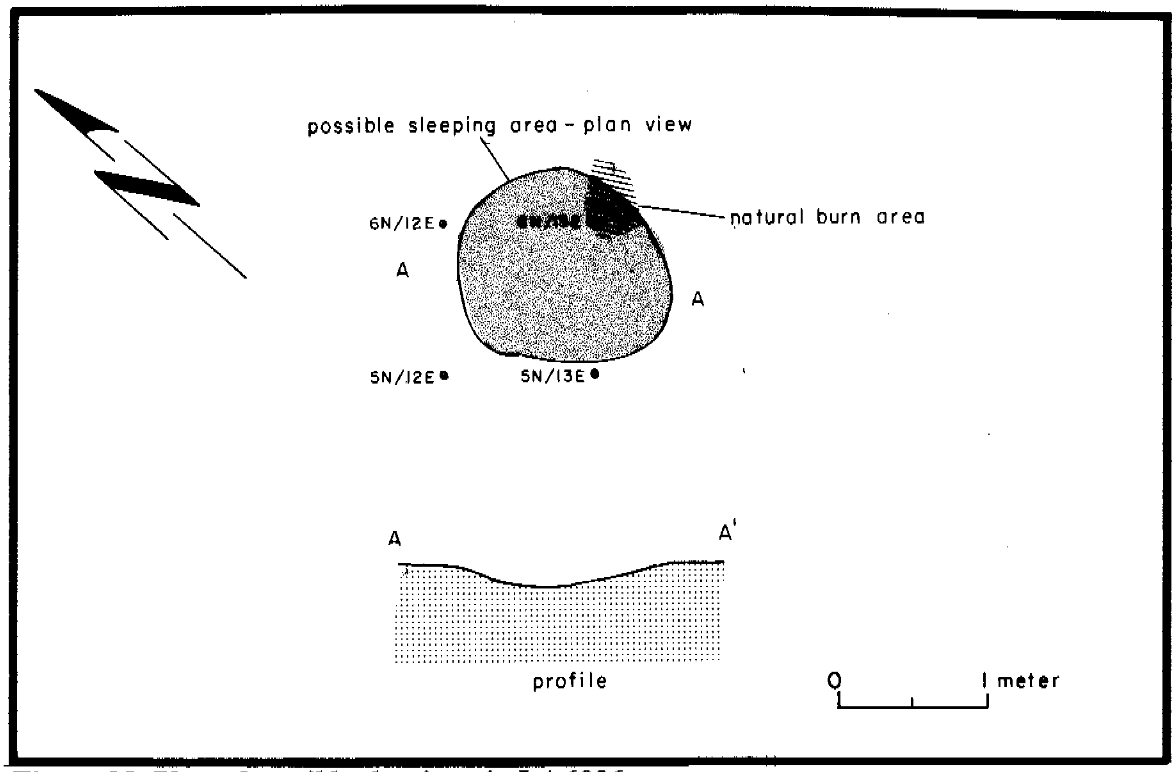

Figure 25. Plan of possible sleeping pit, LA 6826.

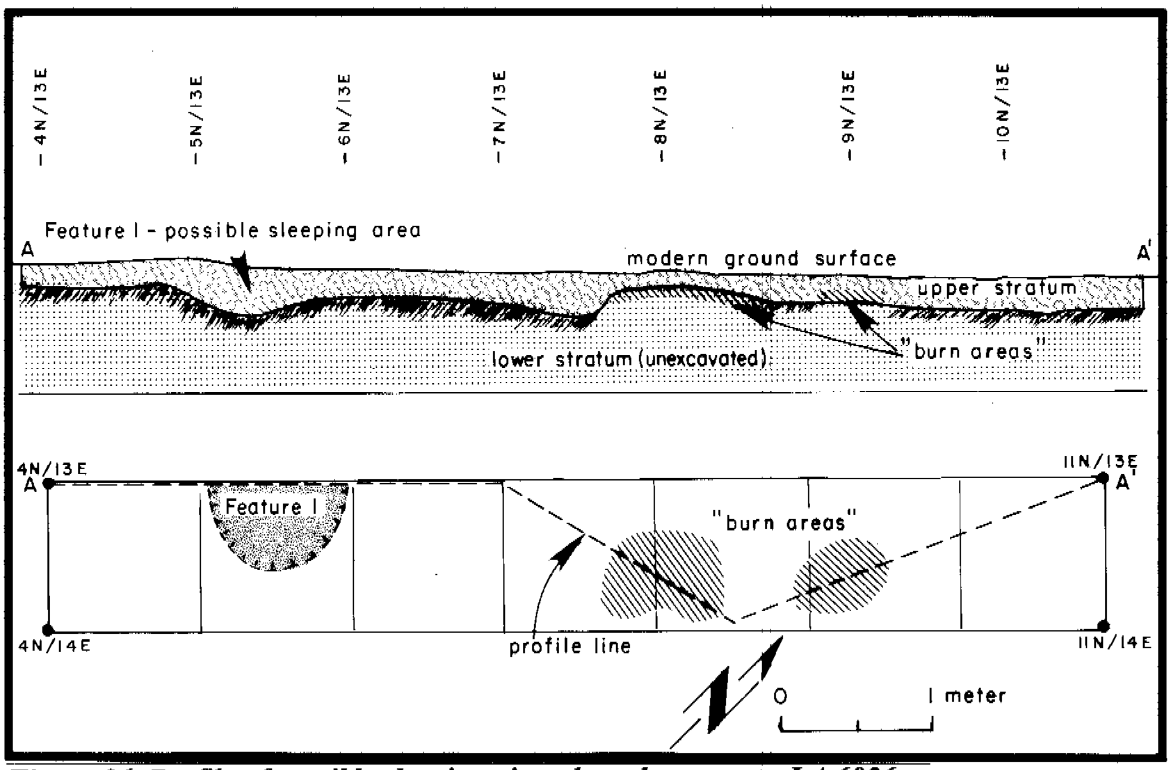

Figure 26. Profile of possible sleeping pit and two large spots, LA 6826.

Table 14. Flake-tool attributes, La Cresta

Artifact Number	Wear Configuration	Material	Wear Type	Retouch Length (mm)	Notch Depth (mm)	Provenience
1	notch	yellow-gray chert	use	4	4	10N/13E
2	uniface, concave	light-dark brown mottled chert (heat treated)	use	9	-	10N/8E
3	biface, straight	dark purple quartzite	intentional retouch	22	-	20N/12E
4	biface, convex	fine light-medium siltite	intentional retouch	32	-	18N/20E
5	uniface, convex	dark gray-black chert	intentional retouch	31	-	4N/22E

Large Biface

A partial oblong biface is made of dark grayish-brown fine cherty siltite (Fig. 27a). It measures 54 by 41 by 12 mm, weighs 31 g, and comes from the surface of Sq. 2N/18E.

Scraper

The modified flake end scraper is made of medium-brown siltite (Fig. 27b). It measures 61 by 48 by 17 mm, weighs 45 g, and comes from the surface of Sq. 8N/14E.

Beads

Tubular Beads. Three complete and one fragmentary tubular beads, all from the site surface, were made from what appears to be segments of a species of horn shell (R. Smartt, pers. comm., 1995) (Fig. 27c). Under 30 power magnification, the specimens are clearly composed of multiple concentric layers of crystalline calcium carbonate (confirmed by dilute acid). The central voids or holes are natural, not drilled or otherwise modified by man. The ends of the beads were evenly ground to an angle perpendicular to the main axis of the tubes. The exterior of one bead was ground, resulting in five facets and a pentagonal cross section. The other two have a naturally circular cross section. Bead sizes are fairly uniform: 11.5-14 mm long and 9-10 mm in outside diameter. Hole diameters are 5-6 mm. All four probably came from the same necklace even though they were found in squares 2N/7E, 2N/10E, 5N/1W, and 9N/12E.

Flat Beads. The two small flat beads are made of shell, probably freshwater mussel (Fig. 27d). One bead is circular, 7 mm in diameter by 1 mm thick, and has a central hole that is 2.5 mm across. It was found below the surface in Sq. 12N/19E. The other is roughly rectangular, 7 mm long, 6 mm wide, and 1 mm thick. It has a 2 mm diameter hole near one end. It was found below the surface in Sq. 9N/18E.

Evidence from other sites in the Roswell region suggests that at least two species of freshwater mussels (*Cyrtonaias tampicoensis* [Lea] and *Popenaias popei* [Lea]; A. Metcalf, letter in LA 68188 site file, 1990) were present during the prehistoric period. *C. tampicoensis* valves were commonly used for tools and ornaments at the nearby Fox Place (LA 68188, Wiseman in prep. c) and the Bonnell site (Kelley 1984). The valves of *P. popei* are thin, fragile, and not particularly attractive for use as ornaments. The meat of both species is presumably edible.

Pottery

The single Jornada Brown potsherd came from excavation square 7N/14E. Its characteristics, including Capitan aplite temper, are the same as those of the Jornada Brown in the LA 6825 pottery. The wall thickness is 5.5 mm.

Minerals

A small lump of faceted gypsum was probably used as a pigment source. It measures 19 by 17 by 13 mm and weighs 4.6 g (Fig. 27e). The provenience was AT (auger test) 6N/8E, 0-20 cm below the surface.

Lithic Manufacture Debris

Lithic manufacture debris--cores, flakes, shatter, and pieces of material--constitutes the bulk of the artifactual materials recovered from LA 6826 (Table 15). The analysis of these materials focuses on reconstructing the lithic technology. The raw materials and definitions used to classify and analyze chipped lithic debris are described in Appendix 1.

Another focal point of the lithic analyses of the Roswell region projects is an attempt to devise ways of identifying Edwards chert and other lithic materials traded into the area. In the process of this study, we also gained useful insights into the gray cherts that are presumably local to the Roswell region and which have distinct bearing on questions of socioeconomic relationships within the Roswell region. A complete description of the methods and techniques employed in this study is beyond the scope of the present report but will be published in the Bob Crosby Draw project report in the near future. We did, however, examine the La Cresta lithic debitage using the same criteria; the results are presented in the section on exotic materials at the end of the lithic debitage section. The colors cannot be given in terms of the Munsell charts because the color chips do not respond properly or methodically under ultraviolet light.

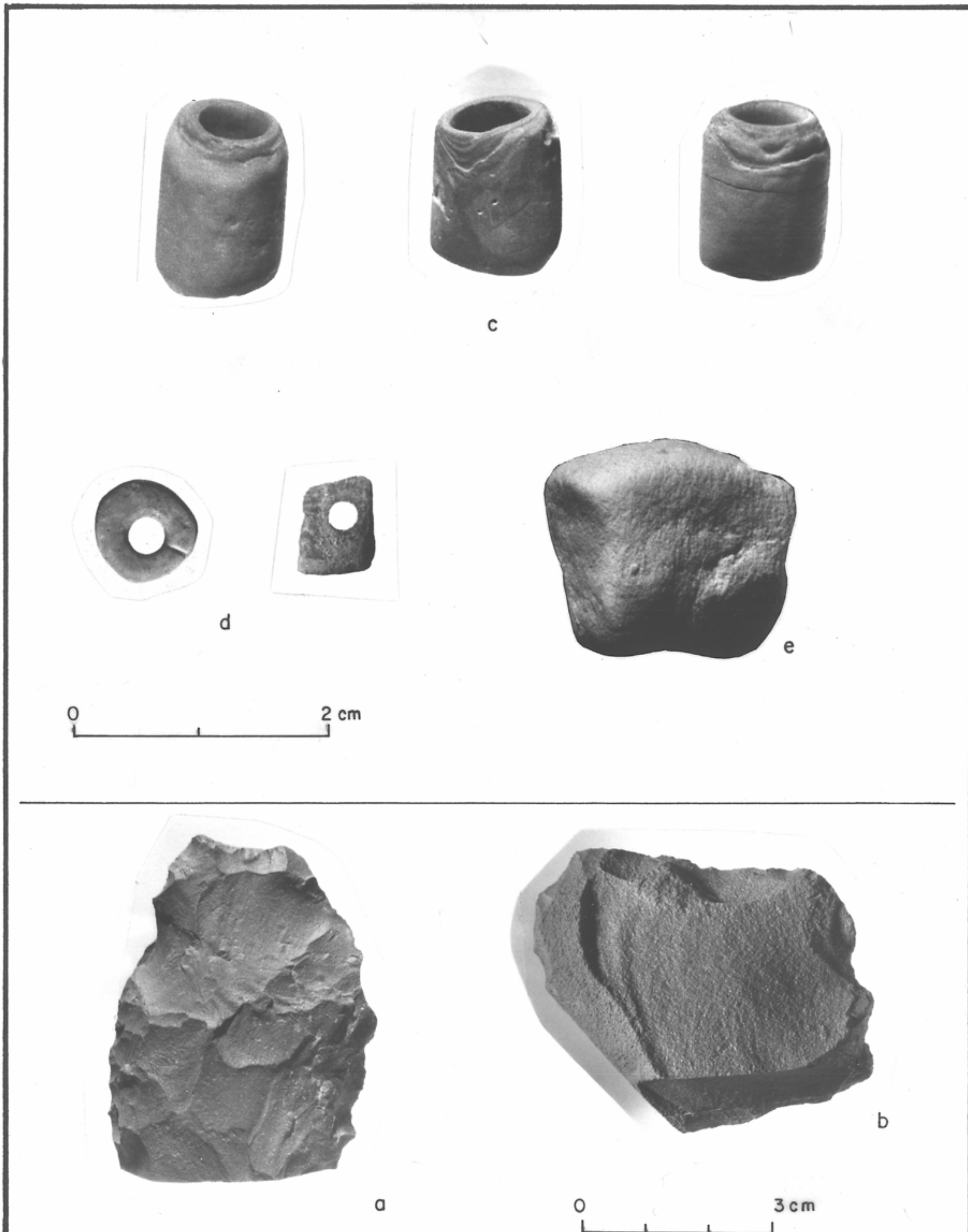

Figure 27. Artifacts, LA 6826: (a) biface; (b) scraper; (c) tubular beads; (d) flat beads; (e) lump of faceted gypsum probably used for pigment.

Table 15. Lithic manufacture debris, La Cresta

Manufacture Debris Category	Number	Percent
Cores:	87	8.6
Single-platform	36	3.5
Two-platforms-adjacent	17	1.7
Two-platforms-parallel	11	1.1
Three platforms	10	1.0
Tested cobble	5	0.5
Flake core	4	0.4
Indeterminate	4	0.4
Flakes:	850	83.7
Core reduction	678	66.8
Decortication	166	16.3
Notching	1	0.1
Indeterminate	5	0.5
Shatter	62	6.1
Pieces of material *	16	1.6
Totals	1015	100.0

* Unworked raw material units brought into the site by man

The cores, core reduction flakes, biface thinning flakes, and exotic materials are described below. Pieces of debitage bearing use-wear or intentional retouch are described in the section on tools.

Cores. The 87 cores include six subtypes and one residual category (Table 15). The single-platform core is the most common, followed by two-platforms-adjacent cores. Materials are varied but are dominated by local gray chert and siltite/quartzite (Table 16).

Sizes vary greatly. Multiplatform cores are somewhat larger than single-platform cores (Table 17). This fact negates a scenario of linear progression from large, simple cores to small, complex ones, the thesis being that the longer a core is worked, the more complex its geometry becomes until it is too small for further use. Because quartzite cobbles used as cores tend to be large, we looked at core subtypes by material, paying particular attention to those made of local cherts and siltites/quartzites because they are the most numerous. Quite surprisingly, local cherts and siltites/quartzites are perfectly evenly represented in each core subtype. We conclude that the number of platforms per core is predicated on the size of the original cobble. That is, larger cobbles have more platforms, and smaller cobbles have fewer platforms, ultimately reflecting the desire to produce flakes within certain size ranges and working the cores in a manner designed to accomplish this.

Nearly 10 percent of the cores showed evidence of intentional heat treatment, and another 4 percent may have been heat treated (Table 16). These figures are essentially twice those of the core reduction flakes and the lithic assemblage as a whole.

Table 16. Lithic debitage classes, La Cresta

	Cores		Flakes						Shatter and Other		Site Total	
			Core Reduction		Notching		Other					
	n	%	n	%	n	%	n	%	n	%	n	%
Materials												
Local chert	34	39	151	22	1	100	35	20	38	49	259	25
Other chert	8	9	38	6			9	5	2	3	57	6
Chalcedony	8	9	91	13			10	6	7	9	116	11
Limestone												
Siltite/ Quartzite	31	36	339	50			104	61	26	33	500	50
Other	6	7	59	9			13	8	5	6	83	8
Totals	87	100	678	100	1	100	171	100	78	100	1015	100
Heat Treatment												
No	60	69	564	83	1	100	157	92	59	76	841	83
Yes	8	9	27	4			1	<1	1	1	37	4
Possibly	3	4	20	3			4	2	8	10	35	3
Indeterminate	16	18	67	10			9	5	10	13	102	10
Totals	87	100	678	100	1	100	171	100	78	100	1015	100

Core Reduction Flakes. Only 229 of the 678 core reduction flakes are complete. Summary statistics (Table 18) indicate that, on average, they are somewhat longer than wide and weigh nearly 9 g. A one-tailed Pearson correlation matrix (Table 18) indicates that the flake dimensions other than length and thickness are fairly strongly correlated, suggesting some standardization of flake shapes.

Other characteristics of the core reduction flakes from LA 6826 are as follows (Tables 16 and 19). The primary materials represented are quartzite/siltite, with local cherts a distant second. Heat treatment was rarely used, the total "yes" and "possible" cases totaling only 7 percent. Single-flake-scar platforms are the most common, accounting for nearly one-third of the flakes. Over two-thirds of the flakes have feathered terminations, and nearly a quarter are hinged or stepped. Nearly one-half of the complete flakes lack dorsal cortex, but only 6 percent have 51 percent or more cortex.

Table 17. Core dimensions, La Cresta

Core Type	Length	Width	Thickness	Weight
All Cores				
Mean	57.89	43.52	29.57	127.00
Standard Deviation	20.26	17.79	14.27	148.42
Range	83.00	81.00	61.00	630.50
Number	87	87	87	87
Single-Platform				
Mean	57.51	43.51	31.74	136.39
Standard Deviation	19.94	16.68	15.30	158.36
Range	75.00	59.00	57.00	630.50
Number	35	35	35	35
Two-Plats-Adjacent				
Mean	57.12	41.47	29.71	108.55
Standard Deviation	18.03	14.65	14.01	135.57
Range	68.00	50.00	49.00	448.70
Number	17	17	17	17
Two-Plats-Parallel				
Mean	64.45	53.55	36.00	187.11
Standard Deviation	19.92	21.77	12.67	186.35
Range	66.00	77.00	43.00	621.00
Number	11	11	11	11
Three-Platforms				
Mean	68.80	51.00	29.40	151.60
Standard Deviation	24.84	21.44	14.79	150.88
Range	75.00	64.00	49.00	461.30
Number	10	10	10	10

Table 18. Complete core reduction flakes, La Cresta

Descriptive Statistics				
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mean	26.22	23.42	8.46	8.89
Standard deviation	13.31	10.81	5.19	14.90
Range	6-69	5-59	1-35	0.1-125.1
Number	229	229	229	229
Correlation Matrix of Dimensions				
Length	1.00000			
Width	.85686	1.00000		
Thickness	.73582	.82556	1.00000	
Weight	.83465	.86049	.87626	1.00000

Table 19. Selected observations on core reduction flakes, La Cresta

Attribute	Number	Percent
Platform Types		
Cortex	88	17
Single flake scar	172	34
Multiple flake scar	74	15
Pseudo-dihedral	69	14
Edge or ridge-like remnant	69	14
Destroyed during detachment	33	6
Total	505	100
Distal Termination Type		
Feathered	202	69
Modified feathered	25	9
Hinged or stepped	64	22
Total	291	100
Dorsal Cortex		
0%	105	47
1-25%	62	27
26-50%	45	20
51-75%	12	5
76-100%	2	1
Total	226	100

Biface Thinning Flakes. No biface thinning flakes were recovered from LA 6826.

Biface Notching Flakes. The one biface notching flake recovered from LA 6826 is a proximal fragment made of coarse gray or gray-brown chert and weighs 4 g. Its size indicates removal from a large, perhaps Archaic point.

Local Lithic Materials. As part of a larger study discussed at the beginning of the lithic manufacture debris section of this report, the presumably local gray cherts from the Dunnahoo sites were subjected to long-wave ultraviolet light. About 96 percent of La Cresta local gray cherts did not respond to ultraviolet light (i.e., appeared dark velvety purple-black), 3 percent gave a slight response (dark brown color), and 1 percent gave a moderate response (medium yellow-brown). None responded in the bright range (orange to yellow). This contrasts sharply with the preliminary results from the Fox Place (LA 68188), where 50 percent or more of the presumably local gray cherts responded in the slight and moderate ranges.

Exotic Lithic Materials. No materials from La Cresta fit the criteria for materials imported from northeastern New Mexico or Texas.

FAUNA

Nancy J. Akins

LA 6825

A total of 76 pieces of bone and 5 pieces of egg shell were recovered from LA 6825. Because of the nature of the deposits, the main issue addressed in the faunal analysis concerns how much of the bone is prehistoric and how much resulted from occupation of the dune areas by native species.

Specimens were identified using the OAS comparative collection. Findley et al. (1975) and Bernard and Brown (1977) were consulted for information on the taxa that currently occupy the area.

Table 20 gives the counts by taxon, the common name, and the estimated number of individuals represented (MNI). Cottontail rabbit is by far the most numerous taxon, comprising 43.9 percent of the sample. For a small sample, there is a diversity of species. The following section summarizes the information by taxon before turning to a more general discussion of environmental, animal, and potential human alteration of the bone.

Table 20. Faunal taxa, Corn Camp

Taxon	Common Name or Size	n	%	MNI
Small mammal	jackrabbit or smaller	8	9.9	
Small mammal/large bird	jackrabbit or smaller	3	3.7	
Small to medium mammal	coyote or smaller	1	1.2	
Medium to large mammal	coyote to deer	3	3.7	
Large mammal	wolf to deer	2	2.5	
Medium to large rodent	woodrat or smaller	1	1.2	
Geomyidae	pocket gophers	1	1.2	1
Geomys bursarius	plains pocket gopher	4	4.9	1
Pappogeomys castanops	yellow-faced pocket gopher	2	2.5	1
Small Sciuridae	small squirrel	2	2.5	1
Sylvilagus sp.	cottontail rabbit	36	44.4	3
Lepus sp.	jackrabbit	3	3.7	1
Medium artiodactyl	sheep to deer size	3	3.7	1
Medium bird	crow size	1	1.2	1
Medium to large bird	quail to crow size	1	1.2	

Taxon	Common Name or Size	n	%	MNI
Egg shell		5	6.2	
Testudinata	turtle	4	4.9	1
Ophidia	snake	1	1.2	1
Totals		81	100.0	12

Unknown Taxa

Elements that could not be identified to the species or genus level are categorized by the size of the animal. Most are fragments where no distinction other than size could be made. Smaller taxa outnumber larger ones, with relatively few large or artiodactyl-sized animals represented. Possible bird is relatively rare.

Pocket Gophers

Two species of pocket gopher inhabit the area. Both are represented in the sample. The plains pocket gopher (*Geomys bursarius*) occurs in the eastern plains, where it is most common in soft alluvial soils. Harder, shallower interfluvial soils are often occupied by yellow-faced pocket gophers (*Pappogeomys castanops*), especially when the plains pocket gopher is present. The two species rarely occupy the same area (Findley et al. 1975:152). The presence of both species at the site could indicate this is one of those rare areas where both species occur. It could also mean that one species was transported to the site area by carnivores, raptors, or humans. It could also mean that the geological environment changed during the deposition of material at the site. Yellow-faced pocket gophers could have inhabited the area before the dunes formed, and the more dominant plains pocket gopher could have taken over the area once dunes had accumulated.

Body parts of the plains pocket gopher are cranial (two mandible fragments, a temporal, and a maxillary fragment), and those of the yellow-faced pocket gopher are a mandible fragment and a sacrum. Two of the plains pocket gopher fragments are rounded--possibly scat.

A very immature scapula could belong to either species.

Small Squirrel

Two bones from a small squirrel (a distal humerus and a lumbar vertebra) could be from any of the species inhabiting the area. According to Findley et al. (1975:118-123) these include: *Spermophilus tridecemlineatus* (thirteen-lined ground squirrel), *Spermophilus mexicanus* (Mexican ground squirrel), and *Spermophilus spilosoma* (spotted ground squirrel).

Sylvilagus sp.

Cottontail rabbits are the most common taxon, comprising 43.9 percent of the assemblage. While the spatial distribution (Findley et al. 1975:87-90) indicates that the desert cottontail (*Sylvilagus audubonii*) should be the species represented, several of the mature elements are decidedly smaller than comparative collections at OAS (15 to 20 percent smaller). Such a size difference could indicate a stressed rabbit population. Other rabbit elements were consistent in size with the comparative specimens.

A variety of body parts represent at least three rabbits, two mature and one full-sized but not quite mature. One provenience had a portion of a left front leg (scapula, humerus, radius, and ulna), and another had much of a right hind foot (calcaneum, three metatarsals, and a first phalanx). All are complete elements. The presence of complete parts such as these suggests that some of the cottontail rabbit was deposited through some mechanism other than human discard of food remains. Just over 20 percent of the bone may be scatological, and it is possible that the parts were dragged into the site area by carnivores. No burning is found. The only probable human alteration is a portion of an ilium that appears to have been removed with a cutting implement, possibly a metal knife given the regularity of the cut.

Lepus sp.

Jackrabbit, *Lepus californicus*, given the species distribution, was represented by three elements: a partial scapula and first phalanx, and a complete astragalus. The phalanx was rounded and could be scat. All were mature individuals.

Artiodactyl

The three fragments of artiodactyl bone are consistent in size with taxa ranging from sheep to mule deer in size. Elements are all fragmentary and include two small pieces of tooth enamel and a portion of a femur shaft. The femur shaft fragment has rodent gnawing and impact fractures at both ends. Impact fractures, characterized by notching, spalling, or bone flake removal can be caused by humans smashing the bone for marrow or by carnivores fracturing the bone during consumption (e.g., Marshall 1989:20).

One other bone, recorded only as large mammal because the morphology was not identical to any of the common artiodactyls, is also similar in size and tissue characteristics. It is probably a rib, and this piece of shaft has been cut off and has small cuts just off the cut-off portion. The cut is very regular, more like one made by a metal knife or saw. No sawing action is visible under magnification, possibly because the bone table in ribs is so thin.

Bird

Bone from at least one bird and egg shell were recovered. The bird femur is from a species about the size of a crow and is rounded, suggesting it could be scatological. The egg shell is brown or white and from medium-sized to large birds. Some are large enough they could be chicken or turkey, but nesting in the dunes by other wild bird species cannot be ruled out.

Turtle

Four pieces of carapace shell from a turtle or turtles were recovered. While the only turtle that inhabits the exact area today is the ornate box turtle (*Terrapene ornata*), the painted turtle (*Chrysemys picata*), Texas slider (*Chrysemys concinna*), yellow mud turtle (*Kinosternon flavescens*), and snapping turtle (*Chelydra serpentina*) all inhabit grassland and riverine habitats not too far from the site area (Bernard and Brown 1977:100-103).

Snake

The single snake element is a complete lumbar vertebra from a medium-sized snake. A wide range of snakes inhabit the area (Bernard and Brown 1977:133-165). This specimen could be either a resident of the dunes or remains left by carnivores or raptors.

Taphonomic Observations on LA 6825

Much of the assemblage is small pieces of bone (Table 21). Taxa with appreciable numbers of whole or nearly whole bones that are likely to be inhabitants of the dune area include the small squirrel, snake, and in some cases, cottontail rabbit and pocket gopher.

Mature animals dominate the assemblage (88.2 percent), with immature individuals in the small mammal, large mammal, pocket gopher, cottontail, and turtle taxa (Table 22). Pitting or surface irregularities caused by components of the soil characterized almost a third of the sample. This may be the best indication of age and possibly of human deposits. Good proportions are found in most of the fragmentary unidentified taxa, yellow-faced pocket gophers, small squirrel, cottontail, and artiodactyl. The other form of alteration noted in a good proportion of the assemblage (21.0 percent) is a thinning or dissolving of bone that resembles attack by stomach acids. The dissolving is confined to smaller taxa, rodent to jack rabbit in size, all taxa that could be broken into small pieces and digested by carnivores, raptors, and even humans.

None of the bone was burned--generally, one of our best clues that remains are human deposits. Alteration is limited to four elements with spiral fractures, one with an impact fracture, and two with cuts. Since spiral fractures and impact fractures occur without human intervention, these are inconclusive. The cuts, however, are real and indicate definite human activity. Unfortunately, both are crisp, straight cuts, more characteristic of metal than stone tools, which could indicate historic deposition or disturbance.

Table 21. Faunal element fragmentation, Corn Camp (percent)

Taxon	n	Complete	50-99	25-50	<25
Small mammal	8				100
Small mammal/large bird	3			12.5	87.5
Small to medium mammal	1				100
Medium to large mammal	3				100
Large mammal	2				100
Medium to large rodent	1	100.0			
Geomyidae	1		100.0		
Geomys bursarius	4			25.0	75.0
Pappogeomys castanops	2				100.0
Small Sciuridae	2	50.0			50.0
Sylvilagus	36	41.7	8.4	13.9	36.1
Lepus	3	33.3		33.3	33.3
Medium artiodactyl	4				100.0
Medium bird	1			100.0	
Medium to large bird	1				100.0
Egg shell	5				100.0
Testudinata	4				100.0
Ophidia	1	100.0			
Totals	81	23.4	4.9	11.1	60.5

Table 22. Other observations, Corn Camp (percent)

Taxa	n	Mature	Pitted	Scat (?)	Altered
Small mammal	8	87.5	37.5	25.0	25.0
Small mammal/large bird	3	100.0	33.3	33.3	33.3
Small to medium mammal	1	100.0	0.0	100.0	0.0
Medium to large mammal	3	100.0	66.7	0.0	33.3
Large mammal	2	50.0	50.0	0.0	50.0
Medium to large rodent	1	100.0	0.0	0.0	0.0
Geomyidae	1	0.0	0.0	0.0	0.0
Geomys bursarius	4	100.0	0.0	50.0	0.0

Taxa	n	Mature	Pitted	Scat (?)	Altered
Pappogeomys castanops	2	100.0	50.0	0.0	0.0
Small Sciuridae	2	100.0	50.0	0.0	0.0
Sylvilagus	36	88.9	36.1	22.2	2.8
Lepus	3	100.0	0.0	33.3	0.0
Medium artiodactyl	3	100.0	100.0	0.0	33.3
Medium bird	1	100.0	0.0	100.0	0.0
Medium to large bird	1	100.0	0.0	0.0	0.0
Testudinata	4	75.0	0.0	0.0	0.0
Ophidia	1	100.0	0.0	0.0	0.0
Totals	76	88.2	32.0	21.0	9.2

Conclusions

Definite evidence of human-deposited bone at LA 6825 is limited to elements with cut marks. Probable scatological remains indicate at least a portion of the assemblage could have been deposited as scat or represent small animals that inhabited the dune area. The concentration of bone and deeply pitted elements are the best candidates for human deposition. These would include a range of small mammals, cottontail rabbit, and the artiodactyl.

LA 6826

LA 6826 produced a small sample of bone and shell or mussel (Table 23). With the exception of the shell or mussel and medium artiodactyl, all could and probably are the remains of natural inhabitants of the dunes. The single cottontail rabbit element is a checked and pitted piece of a tibia that could be prehistoric. Nothing about it would distinguish it from intrusive or naturally deposited bone. A radius shaft fragment represents a medium-sized artiodactyl and is the only large animal form found. The bird is a part of a coracoid, characteristic of stout ground-dwelling birds of the galliform family. The specimen is large and stocky for prairie chicken and has some resemblance to blue grouse. Domestic chicken provided the best match in the OAS comparative collection. Since the specimen is from a young individual who may not have achieved full size and development of the muscle attachments, a precise identification was not possible. The egg shell was from a medium to large bird that could have nested in the dune area.

Toad or frog elements (much of a femur and tibiofibula) are from a young individual and could represent a number of species. True frogs (*Rana* sp.) are an introduced species that have a wide range. Native taxa present in the area and to the east include the eastern barking frog (*Eleutherodactylus latrans*), several species of spadefoot toad (*Scapiopus bombiforns, S. couchi, S. hammondi, S. intermontanus*), the southwestern Woodhouse's toad (*Bufo woodhousei*), and the western green toad (*Bufo debilis*) (Bernard and Brown 1977:88-99).

Frogs and toads are components of both carnivore and raptor diets, and these elements could have been deposited as scat, although there was none of the rounding or dissolving characteristic of scatological remains.

Table 23. Faunal taxa, La Cresta

Taxon	Common Name or Size	n	%	MNI
Sylvilagus sp.	cottontail rabbit	1	11.1	1
Medium artiodactyl	sheep to deer size	1	11.1	1
Galliforms	gallinaceous birds	1	11.1	1
Salienta	frogs and toads	2	22.2	1
Egg shell		1	11.1	
Shell or mussel		3	33.3	
Totals		9	99.9	4

POLLEN ANALYSIS OF A SINGLE SAMPLE FROM CORN CAMP (LA 6825)

Richard G. Holloway

A single soil sample for pollen extraction and analysis was sent to Quaternary Services. This single sample was taken from a bottom-fill situation (0.5 cm to bottom) in Pit 2, a prehistoric processing facility at LA 6825.

Methods and Materials

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

From each pollen sample submitted, 25 g of soil were subsampled. Prior to chemical extraction, three tablets of concentrated *Lycopodium* spores (Batch 124961, Department of Quaternary Geology, Lund, Sweden; 12,542 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 release the *Lycopodium* spores from their matrix. After neutralizing the acid with distilled water, the samples were allowed to settle for 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 five seconds. The suspended fine fraction was decanted through 250μ 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 overnight in cold 48 percent hydrofluoric acid (HF) overnight to remove silicates. After completely neutralizing the acid with distilled water, the samples were treated with a 1 percent solution of trisodium phosphate (Na_3PO_4) and repeatedly washed 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.

Heavy density separation ensued using zinc chloride ($ZnCl_2$), with a specific gravity of 1.99-2.00, 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 and were treated with glacial acetic acid to remove any remaining water.

Acetolysis solution (acetic anhydride: concentrated sulfuric acid in 8:1 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.

The material was rinsed in methanol stained with safranin, rinsed twice with methanol, and transferred to 2-dram vials with tertiary butyl alcohol (TBA). The samples were mixed with a small quantity of silicone oil (1,000 cks) and allowed to stand overnight for evaporation of the TBA. The storage vials were capped and are permanently stored at CLES.

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 200 x or 100 x magnification under an aus-Jena Laboval 4 compound microscope. Occasionally, pollen grains were examined using either 400 x or 1,000 x 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 200 x 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 100 x 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. Because corn pollen was very common in many of these samples, corn grains were tabulated during the scans only if an unequal distribution of this taxon on the microscope slide was observed.

For 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.

The pollen concentration values of those taxa identified during the low magnification scans were adjusted to reflect the true concentration values of these taxa. If, for example, a single *Cucurbita* grain was encountered during the scan of a slide, an estimate of its concentration was made based on the number of marker grains present on that slide. This was done by averaging the number of marker grains per transect counted during the actual count and multiplying by the number of transects examined. The resultant number was substituted into the formula for computing pollen concentration values for all taxa encountered during the scan, but these data are presented in a separate table. Lowered pollen concentration values for the target taxa are the outcome, but it is believed that a more accurate assessment of the true pollen concentration values are achieved. However, because of the effect of nonrandom distribution of pollen grains on the slide (Brookes and Thomas 1967), the result sometimes is an increase of pollen concentration values for these target taxa.

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:

$$\mathbf{PC} = \frac{\mathbf{K}*\sum_{\mathbf{P}}}{\sum_{\mathbf{L}}*\mathbf{S}}$$

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 (1981), a pollen concentration value below 1,000 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 grains with spine length greater than or equal to 2.5μ, while the low spine group have spines less than 2.5μ long (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 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 (ca 80 ų), 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 1981). 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 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/gm. If the species diversity was low (generally these samples contained only pine, cheno-am, members of the Asteraceae family and indeterminate category), counting was also terminated after abbreviated microscopy even if the pollen concentration values slightly exceeded 1,000 grains/g.

Results and Discussion

The raw pollen counts and estimated pollen concentration values for this sample are presented in Table 24. This sample contained a total concentration value of 1,854 grains/g with 8.97 percent indeterminate pollen. *Pinus* pollen was present but in very low amounts (547 grains/g). The assemblage was dominated by cheno-am pollen (871 grains/g), but this was fairly low for this taxon. Traces of *Juniperus* and *Artemisia* pollen (8 grains/g each) were present. Poaceae and high and low spine Asteraceae pollen (48 grains/g each) were present but in moderate to low amounts. Small amounts of Onagraceae, *Polygonum,* Cylindropuntia, *Ephedra,* and Nyctaginaceae pollen were present in addition to economic taxa such as *Sphaeralcea* and *Zea mays*.

The pollen concentration values from this sample were somewhat surprising. Many samples from this area of the state contain fairly low overall pollen concentration values. The low *Pinus* values from this sample reflect the absence of this taxon from the native vegetation. The *Pinus* pollen present is most likely the result of long-distance transport from the higher elevations to the west containing numerous pines.

Several of the taxa present, such as Onagraceae, *Polygonum,* Cylindropuntia, and Nyctaginaceae, are indicative of naturally occurring taxa which may or may not have been utilized economically. All of these taxa are present within the area today but generally produce very little pollen. The concentration values for these taxa are generally sufficiently low as to suggest they are present naturally or via cultural behavioral patterns.

The presence of decidedly economic taxa such as *Sphaeralcea* and *Zea mays* was somewhat surprising. *Sphaeralcea* is fairly common in this area, but the presence of corn pollen was unexpected. Seeds of *Sphaeralcea* from flotation samples were thought to be indicative of contaminants, and thus the pollen of this taxon may likewise be noneconomic (M. Toll, this report).

Three corn grains were present on the slide, which indicates more than a chance occurrence. The grains were severely deteriorated, suggesting they are associated with the archaeological deposit rather than modern contamination. It is likely that the corn pollen was introduced by adhering to corn materials, such as kernels or processed corn meal, rather than inferring the presence of corn agriculture in the vicinity of the site; the corn material likely was brought into Corn Camp from some distance.

The archaeological remains likewise did not indicate a long-term occupation for this site. The temporary nature of the site in addition to the lower concentration values, suggests that the corn remains were brought in probably as a food source for a temporary activity and were not the product of local production. However, given the nature of Pit 2, it is possible that corn materials may have been processed on site, but this is not conclusively demonstrated.

The good recovery of palynological data from this type of site underscores the need to fully examine these types of features. While most often, the data recovery is minimal, the presence of such a large number of potentially economic pollen types greatly increases our knowledge of these types of sites. It is therefore critical to examine these proveniences to obtain this type of data.

Table 24. Raw pollen counts and concentration values, Corn Camp

Site	Period	Bag #	CLES	Feature #	Type	*Pinus*	*Juniperus*	**Onagraceae***	***Polygonum***	Poaceae
Raw Counts										
LA 6825	A.D. 500-1400	73	95252	2	pit	69	1	2	2	6
Concentration Values										
LA 6825	A.D. 500-1400	73	95252	2	depression	547	8	15	16	48

CLES	Cheno-am	Asteraceae, high spine	Asteraceae, low spine	***Artemisia***	Cylindropuntia	***Ephedra***	Nyctaginaceae
Raw Counts							
95252	110	6	6	1	2	3	1
Concentration Values							
95252	871	48	48	8	16	24	8

CLES	Indeterminate	***Sphaeralcea***	***Zea mays****	Sum	% Indeterminate
Raw Counts					
95252	21	2	2	234	8.97
Concentration Values					
95252	166	16	15		

CLES	Concentration	Marker	Lycopodium Added	Weight	Transects	Total Transects	Marker/slide	Estimated Maximum Potential Concentration
95252	1854	190	37626	25 g	14	22	298.5	5

* Pollen concentration values adjusted for additional grains observed in low magnification scan of the slide. A total of three grains each of Onagraceae and Zea mays were observed. Concentration values based on estimated number of marker grains present on slide.

FLOTATION SAMPLING OF TWO FEATURES AT CORN CAMP (LA 6825)

Mollie S. Toll

Botanical analyses were confined to three full-sort flotation samples from Hearth 1 and Pit 2. The three soil samples collected during excavation were processed at the Museum of New Mexico's Office of Archeological Studies by the simplified "bucket" version of flotation (see Bohrer and Adams 1977). Each sample was measured and then immersed in a bucket of water. After a 30-40 second interval (for settling out of heavy particles), the solution was poured through a fine screen (about 0.35 mm mesh) lined with a square of "chiffon" fabric, catching organic materials floating or in suspension. The fabric was lifted out and laid flat on coarse mesh screen trays, until the recovered material had dried. Each sample was sorted using a series of nested geological screens (4.0, 2.0, 1.0, 0.5 mm mesh) and then reviewed under a binocular microscope at 7-45 x.

The large samples from Feature 1 (3.5 and 6.2 l) required some subsampling in the smallest screen size (particles smaller than 0.5 mm). Seed counts in Table 1 represent an estimated number of seeds for the total sample, standardized to a seeds-per-liter basis. The tiny Feature 2 sample (0.2 l) was sorted in its entirety.

Results

Samples from Hearth 1 varied considerably in their contents, according to their position within the feature. FS 7 from upper fill contained considerable numbers of unburned, probably intrusive seeds (Table 25). All carbonized seed specimens were recovered from lower fill, FS 274, including goosefoot, purslane, hedgehog cactus, and an unknown. Goosefoot and purslane are weedy annuals common in the current landscape and in practically every prehistoric archaeobotanical assemblage in the Southwest. Hedgehog cactus, a clump cactus with particularly sweet and delicious fruits, is far less common in terms of natural occurrence and cultural contexts. There are several repetitions in probable contaminant species found in both upper and lower fill (spurge, purslane, globemallow, and panic grass).

There were no carbonized plant remains in Pit 2, an unusual depression shaped much like a trough metate. Intrusive species reiterated several taxa occurring in Hearth 1.

Discussion and Summary

The carbonized seeds in lower fill of Hearth 1 may safely be considered to relate to prehistoric utilization of this burn feature, either directly, as food products, or indirectly, as ambient plant materials that got swept into a convenient incinerator. Arguing for their role as food products, we have abundant records of utilization of goosefoot and purslane as tender spring greens and as late summer seed crops in the ethnographic present and widespread in the archeological record. Among wild plant resources, goosefoot and purslane were the two taxa found most repeatedly in a sample of seven Roswell area archaeobotanical assemblages (86 percent and 71 percent of sites, respectively; Toll 1993:Table 17). Hedgehog cactus was less common, found just at Sunset Shelters (Toll in prep.) and Abajo de la Cruz (Minnis et al. 1982).

Table 25. Flotation results (seeds per liter) from Hearth 1 and Pit 2, Corn Camp

	Hearth 1		Pit 2
	FS 7, West half Upper fill 3.5 l	FS 274 Lower fill 6.2 l	FS 73 0.2 l
Probable Economics: *Chenopodium* goosefoot		4.2	
Portulaca purslane		3.7	
Echinocereus hedgehog cactus		0.5	
Unidentifiable			
Probable Contaminants: *Amaranthus* pigweed	.3		
Chenopodium goosefoot			15.0
Euphorbia spurge	147.1	9.2	5.0
Kallstroemia caltrop			10.0
Portulaca purslane	58.6	13.4	400.0
Sphaeralcea globemallow	.3	0.5	
Panicum-type panic grass	1.4	1.9	
Sporobolus dropseed	71.4		

*Actual seed counts are adjusted to reflect subsampling of the smallest particle size (producing an estimated number of seeds in the total sample), then divided by the sample volume in liters to produce a standardized seed count per liter of soil.

DATING THE SITES

Corn Camp (LA 6825)

Four lines of evidence provide temporal information about LA 6825: stratigraphy, pottery, radiocarbon dates, and glass.

Stratigraphy

Stratigraphic information pertinent to dating is of two types: hearth superpositioning and sediment microstratigraphy. The superpositioned hearths are numbers 6 and 7, where one stone from Hearth 6 overlies Hearth 7 by a vertical distance of three cm. We are certain that this stone and all of the stones of Hearth 6 belong to a separate hearth because most possessed multiple fire-fracture facets derived from relatively long-term and/or intense use. By way of contrast, all of the rocks in Hearth 7, with the exception of a few scattered to the north (away from Hearth 6), were intact, unfractured river pebbles firmly emplaced in a shallow basin dug for the purpose. The contrast in the rocks from the two features was great, permitting confidence in the interpretation that they, including the single rock in the fill overlying the south end of Hearth 7, belonged to two different hearths.

Stratigraphic data in the form of microstratigraphy assists dating in yet another way, as described below.

Pottery

The sediment stratigraphy described earlier indicates that, except for very localized anomalies such as those created by plants like individual bunch grasses, the microlenses of sediment deposited in the vicinity of Hearths 6, 7, and 8 all lay horizontally. Over short horizontal distances, we are confident in relating artifacts to each other and to features such as hearths. With regard to Hearths 6 and 7, plain pottery sherds were found at the same levels and within horizontal distances of 1-2 m of both hearths, indicating that both hearths belong to the pottery period. However, the length of the interval between the construction and use of the two hearths cannot be ascertained. It is clear, however, that at a minimum, Hearths 6 and 7 represent two different occupations of the site. How they relate temporally to the other rock hearths at LA 6825 is more uncertain, though similarities in construction (i.e., clustering of small numbers of rocks) suggest a similar age.

Unfortunately, the most diagnostic pottery sherd, Chupadero Black-on-white, was not found in context other than the fact that it clearly belongs to LA 6825. The manufacture dates of this type cover A.D. 1050 or 1100 to about 1500 (Breternitz 1966; Wiseman 1982).

Radiocarbon Dating

Hearth 1 was a small, simple basin scooped out of the top of Stratum 2 and used without rock. Stratigraphically speaking, it was among the latest hearths, for it was dug into the top of Stratum 2 and covered only by the most recent eolian sediments. A late date is confirmed by two radiocarbon dates (Appendix 2) assayed from the fine charcoal dust recovered from its fill.

The two samples produced nearly identical uncalibrated dates: 270 +/- 50 B.P. (A.D. 1680; Beta-82889) and 240 +/- 50 B.P. (A.D. 1710; Beta-82890). Stuiver and Pearson's ATM 20 routine (1986) gives a *calibrated, weighted-average date* of 255 +/- 35.4 B.P. (A.D. 1649). This weighted average date actually has four intercepts, the strongest representing the ranges A.D. 1631-68 (one standard deviation [SD], with a relative area of 0.59 under the probability distribution) and A.D. 1617-75 (two SDs, with a relative area of 0.47 under the probability distribution). The sixteenth-century intercept is second strongest with ranges of 1526-60 (one SD, 0.27) and 1515-98 (two SDs, 0.31), while the seventeenth century intercept is third strongest with ranges of 1779-92 and 1746-99 (one SD, 0.09; and two SDs, 0.17). Thus, at both one and two standard deviations, 19 out of 20 chances are that the true date of the averaged sample falls within the sixteenth, seventeenth, or eighteenth century. The sixteenth-century range, 1617-75, is the most likely.

The fourth intercept date ranges--A.D. 1949-55 (one SD, 0.05) and A.D. 1941-55 (two SDs, 0.05)--fall between the dates represented by the glass recovered from the site. While this does not preclude these ranges from being the true date of the Hearth 1, the low area-of-distribution values of 0.05 and 0.05 make this highly unlikely.

Glass

One other concern regarding the dating of Hearth 1 needs to be addressed. The primary concentration of glass fragments was near the hearth, both on the modern ground surface and within the loose, modern, eolian sediment overlying it. The dates of the various pieces of glass indicate that virtually all belong to one of two periods: 1920 to 1940 and 1965 to present. As just discussed, these periods fall before and after the calibrated modern radiocarbon date range of A.D. 1941-55.

Thus, Hearth 1 probably does not date to the twentieth century and therefore probably is not temporally associated with the glass fragments. The proximity of the glass and the hearth probably relates to the fact that they are all within the deflation basin, a natural place for seeking shelter and concealment.

Summary of Dating, Corn Camp

In summary, at least two or three prehistoric, one early historic, and two recent historic periods of occupation are indicated for LA 6825. One occupation appears to have been aceramic and *may* have been Archaic. At least two occupations took place some time during the prehistoric pottery period, perhaps prior to the manufacture of painted pottery. In southeastern New Mexico, this would be during the second half of the first millenium A.D. (500-1000). Whether the single Chupadero sherd belongs to the same occupation as the pottery-dated hearths, thereby giving them a later date (first half of the second millenium A.D., or 1100-1400), is unclear. A third occupation of LA 6825 took place in early Historic times, probably about the middle of the seventeenth century. The fifth and sixth uses of the site occurred during the twentieth century, one to the 1920s or 1930s and the other after 1965.

La Cresta (LA 6826)

Only one piece of evidence, a single pottery sherd, can be used to date LA 6826. Although the manufacture dates of Jornada Brown are not well defined, current evidence suggests that it was made over a long period of time, perhaps starting about A.D. 450 or 500 and ending about A.D. 1350 or 1400. We have no way of knowing whether all of the cultural remains recovered from LA 6826 date to this period. However, given the size of the site and the tendency for Native American use of good lithic material sources to last for centuries, or even millennia, this seems unlikely.

DISCUSSION

Comparison of Lithic Technologies at Corn Camp and La Cresta

The lithic debitage assemblages from the two sites are discussed and compared. Table 26 summarizes the highlights.

The Assemblages

The assemblages from the standpoint of artifact types are somewhat similar in overall percentages of cores, flakes, shatter, and pieces of material (Tables 5 and 14). However, LA 6826 has nearly twice as many cores but only half as much large debris (shatter and pieces of material) as LA 6825.

Primary core types are very similar at both sites, with single-platform cores, followed by two-platforms-adjacent cores, being the most common. Flake types are also fairly similar, with core reduction flakes being the most common at both sites, followed by decortication flakes. However, decortication flakes are slightly more common at LA 6826. In terms of formal tool manufacturing debris, LA 6825 produced four biface thinning flakes, and LA 6826 produced one biface notching flake. Nonusable biproducts such as shatter and pieces of material are twice as common at LA 6825 (about 15 percent, as opposed to about 8 percent at LA 6826).

Core Technology

Sufficient numbers of cores were recovered from LA 6826 to permit comparison of attributes among most types (Table 17). In terms of average length and width, single-platform cores and two-platforms-adjacent cores are nearly identical. The fact that single-platform cores are somewhat thicker on average probably accounts for the fact that they are also somewhat heavier. Two-platforms-parallel cores and three-platform cores are both larger and heavier on average than single-platform and two-platforms-adjacent cores. This suggests that the approach to core reduction depended initially on cobble. Small cobbles were prepared with a single platform, and large ones were prepared with two or more platforms. The resulting flakes varied up to a certain size but no larger, an aspect seemingly confirmed by the size range of the core reduction flakes. By way of contrast, all cores from LA 6825 are smaller on average than any of the LA 6826 cores (Table 7).

Siltites/quartzites and other materials are the most common materials in the LA 6825 cores, followed by local cherts and chalcedony (Table 6). However, the sample size from LA 6825 is so small it is difficult to attach much meaning to these differences. At LA 6826, local cherts, followed by siltites and quartzites, are by far the most common materials among the cores (Table 16).

None of the LA 6825 cores appears to be heat-treated (Table 6), yet at least 9 percent of those from LA 6826 have been (Table 16).

Core Reduction Flakes

The dimensions of the core reduction flakes are a reflection of the cores: those from LA 6825 are decidedly smaller than those from LA 6826 (Tables 8 and 18). In terms of correlations of dimensions, the LA 6825 core reduction flakes are highly correlated for length-width and thickness-weight, suggesting good control for flake shapes and weights. By comparison, none of the dimensions of the LA 6826 core reduction flakes are as well correlated as the length-width and thickness-weight dimensions of the LA 6825 flakes. However, all but one (length-thickness) of the combinations of dimensions of the LA 6826 flakes are generally well correlated, indicating some degree of standardization in flake sizes and shapes, but not as much as in the LA 6825 assemblage.

The two assemblages share similarities in several discrete attributes (Tables 9 and 19). Both emphasize simple platforms (single-flake-scar). According to distal terminations, flake detachments were successful (feathered) about two out of every three times, and outright failures or near failures (hinges) occurred in one out of every four to five times. In contrast to the cores, both assemblages of core reduction flakes have the same incidences of heat treatment and possible heat treatment (Tables 6 and 16).

Differences between the two core reduction flake assemblages are found in percentage of dorsal cortex and lithic material type. More cortex consistently occurs on the LA 6826 flakes (Tables 9 and 19), as one would expect at a quarry where cobbles were commonly tested for knapping quality. At LA 6825, three types of materials are important in the following order: local cherts, siltites/quartzites, and chalcedonies (Tables 6 and 16). The figures for LA 6825 only vaguely match the expectations based on the material type ratios for the cores, but again, part of the discrepancy probably lies in the small sample size of the cores. At LA 6826, two material types are particularly important and constitute nearly three-quarters of the assemblage: siltites/quartzites and local cherts. These figures generally reflect the figures for material types among the cores, though the order of dominance is reversed and probably reflects relative sizes of the available cobbles.

Biface Thinning and Biface Notching Flakes

LA 6825 produced four biface thinning flakes, and LA 6826 produced one biface notching flake. Local cherts, other cherts, and other materials are the only materials represented in these items. The presence of these types of flakes is a clear indicator that formal artifact production was taking place. In the case of notching flakes, the final stage of projectile point production is also indicated.

Summary and Interpretation

To assess site function from the perspective of the lithic technology at the two sites, we highlight the differences in the assemblages (Table 26). If not specifically mentioned, the reader can assume that a given characteristic is the same or similar for both assemblages. The relative quantities given refer to percentages.

Table 26. Comparison of salient characteristics of lithic assemblages, Corn Camp and La Cresta

Site Characteristic	Corn Camp (compared to La Cresta)	La Cresta (compared to Corn Camp)
Material Types		
Siltite/quartzite	half as much	twice as much
Chalcedony	twice as much	half as much
Cores		
Number	half as many	twice as many
Size (average)	smaller	larger
Material preferences	siltite/quartzite and other materials	local cherts and siltite/quartzite
Heat treatment	none	9-13%
Core Reduction Flakes		
Size (average):	smaller	larger
Size Correlations:		
Strong	length/width width/weight	all moderately strong but less than strongest of LA 6825
Weak	all other	
Dorsal Cortex:	half as many	twice as many
Material preferences (>20%)	local cherts, siltite/quartzite, chalcedonies	siltite/quartzite and local cherts
Heat Treatment:	3-6%	4-7%
Decortication Flakes	two-thirds as many	half again as many
Large Debris (N)	twice as many	half as many
Biface Manufacture:		
Thinning Flakes	4	0
Notching Flakes	0	1
Imported Materials	1 flake of probable Edwards chert	evidently none

Interpretation: Several aspects of the lithic assemblages indicate functional differences between the sites. Corn Camp has fewer cores that are smaller and produced fewer decortication flakes and smaller core reduction flakes, but twice as much large debris. The core reduction flakes are highly standardized for length and width and for thickness and weight, indicating methodical production of flakes for specific needs. Material preferences are, in order, local cherts (29 percent), siltites/quartzites (28 percent), and chalcedony (23 percent). Thus, the primary purpose of the technology was directed at the production of tools, whether formal or informal.

La Cresta has more cores that are larger and produced more decortication flakes and larger core reduction flakes, but only half as much large debris. The core reduction flakes are moderately standardized in length, width, thickness, and weight, indicating general control of flake dimensions that was probably directed more at core conservation than at the production of specific types of flakes. Material preferences are, in order, siltites/quartzites (50 percent), local cherts (25 percent), and chalcedony (11 percent). Thus, the primary purpose of the technology was to test cobbles for suitability of cores to be used elsewhere for the most part.

Although from a lithic material standpoint LA 6826 functioned mainly as a quarry, a limited amount of artifact production also took place, indicated by a biface notching flake.

Site Typology and Function of La Cresta (LA 6826)

LA 6826, with its lithic debris, lithic source-area location, and large size (the site as a whole, that is), meets Kemrer and Kearns's (1984:72) definition of Lithic Procurement Site Type 3B. Additional evidence of a quarry function can be seen in the higher incidence of flakes with cortex (than at nearby LA 6825, for instance) and the absence of hearths, burned rock, and other overt indicators of more substantive occupations such as camps and habitation sites.

LA 6826 differs from the definition of a lithic procurement site in several ways: the possible sleeping pit, the pottery sherd, the flake tools, the scraper, the large biface fragment, and the beads. In fact, these may be clues that LA 6826, or at least this part of it, was more than a simple lithic procurement location. The high elevation of LA 6826 would have made it a good location from which to observe game in the valley to the east and north. This fact, plus the possible sleeping pit and artifacts, is reminiscent of the Mask site, an ethnographically documented game stand or "station" described by Binford (1978:330ff.; 1980:12).

The Mask site was primarily a place where "men congregate to watch for game and to plan hunting strategies after game is sighted." Since watching for game can involve long hours of waiting, the men engage in a variety of activities such as sleeping, conversing, making handicrafts, and manufacturing and repairing equipment. Consequently, a variety of materials and debris accumulate at the site, giving it an appearance that belies its primary function of watching for game. Since much of the discarded material at Mask is perishable, very little is preserved over time by which to assess the function of the site. Perhaps we should not be surprised at, or seriously concerned by, the possible sleeping pit, a potsherd, several flake tools, and the presence of nonlocal materials at LA 6826. They may represent activities undertaken incidental to primary activities such as watching for game. In fact, what appears to have been the primary activity at LA 6826, finding and testing lithic raw materials, may also have been an ancillary activity.

Corn at Corn Camp

Corn pollen recovered from Pit 2 clearly documents the presence of this plant during one of the prehistoric pottery period occupations at the site. The concentration of corn pollen is high, indicating that it is legitimately prehistoric, rather than a modern contaminant. Although the function of Pit 2 is uncertain, its form and shallow depth suggest that it was used for processing (perhaps food preparation), not storage.

Corn pollen can be transported away from fields and introduced into contexts such as Pit 2 in several ways, most or all of which require/indicate the action of man. Corn pollen grains are comparatively large, heavy, and sticky, traits that greatly restrict its natural occurrence to the plant and the immediate environs and virtually preclude its movement beyond the field in which the corn is grown (R. G. Holloway, pers. comm., 1996).

The presence of corn pollen also suggests midsummer use, the general period of tasseling and pollination, excepting, of course, when it adheres to corn cobs, kernels, or other plant parts and is transported with them (M. S. Toll, pers. comm., 1996). The conclusion that prehistoric, pottery period inhabitants of LA 6825 used corn is inescapable. The only problem is determining whether it was grown nearby or brought in from elsewhere as a foodstuff.

Prehistoric techniques for preparing corn foods for consumption during travel, whether in advance of or during the trip, are unknown. Ethnographic accounts of the Zuni, though perhaps not as applicable to prehistoric southeastern New Mexico peoples as might be desired, are nevertheless instructive in a number of ways. One is the simplicity of the cooking techniques. The other, also in the case of en route food preparation, involves the "utensils," many of which (sticks, unmodified rocks, etc.) are picked up in the vicinity of the camp and then discarded when no longer needed. Some, such as the sticks used as cooking skewers, would not long survive the elements, while the more durable items (rocks) could be easily overlooked by archaeologists. Other items, such as a cooking pot (evidently a kettle) and a bowl, were part of the travel paraphernalia. Presumably, the two vessels would have been Indian-made pottery prior to European contact. The following passages, quoted at length from Cushing's *Zuni Breadstuff* (1920:594-594), concern the Zuni farmers of northwestern New Mexico.

> From the basket-bottle some water was poured into our cooking-pot, and when it had begun to boil violently, some coarse meal was briskly stirred in. Before this had quite become mush, while still sticky and quite thin, that is, some of it was poured out on a stone, some dry meal thoroughly kneaded into it, and the whole ingeniously wrapped or plastered around the end of a long stick. This stick, like the rabbit spit, was then set up slantingly over the coals and occasionally turned until considerably swollen and browned to a nicety. Behold a fine loaf of exceedingly well-done--and as I afterward found--also exceedingly good-tasting corn-bread.
>
> The bowl of snow-water was removed from its place under the stone and into it was stirred some *tchu'-k?i-na-o-we* [sweet corn flour]--just enough to make a cream-like fluid to serve as our beverage, and on the upturned sides of our saddle-skins, in the light and warmth of our genial fire, our meal was at last spread out. The rabbit carcass, delicately cooked as ever was game at Delmonico's, the mush in the kettle it had been boiled in, the bread on the stick it had been baked around, and the one good-sized bowl of *tchu'-k?i-na-o-we* broth in our midst, we all sat down, made our sacrifices to the gods, and ate as only hungry travelers can eat.

Matilda Coxe Stevenson (1915:74) describes a Zuni wafer bread made of corn, a food prepared for use during travel:

> *He'we* is the staple article of food carried on long journeys, especially when one travels on foot. It is very light in weight and a sufficient quantity can be carried in a cloth tied around the waist to nourish a man for days. Occasionally the Zuni color *he'we* red with Amaranth, which they raise in their gardens around the village.

In summary, the corn pollen from Pit 2 at LA 6825 is probably not in its prehistoric context. But the question still remains whether it was brought to the site by travelers (that is, adhering to corn kernels, cobs, or a prepared food) or was grown in the vicinity of the site. The two Zuni accounts just given indicate that corn was taken on trips, both in a form prepared to eat and as an ingredient that would be prepared during the trip.

DATA RECOVERY QUESTIONS ADDRESSED

The data recovery questions posed in the introductory sections of this report are addressed here in sequence, starting with number 2. Question number 1, the primary focus of the investigations, is dependent upon the answers to the rest of the questions and is addressed last.

Question 2: Was LA 6825 (Corn Camp) a base camp/habitation?

No structures were found at LA 6825, as had been anticipated, but several hearths and two pits were uncovered. The hearths, lithic debris, and pottery meet Kemrer and Kearns's (1984:71) definition of a Temporary Camp Locale Type 2B. LA 6825 differs from the Type 2B definition in two ways: the presence of the two pits, and evidence that the locality had been used at least three times. A fourth component, in the form of a semi-isolated chipping debris concentration (Kemrer and Kearns's Workshop Locale Type 3C? [1984:72]), is at the far northeast end of the excavated area. However, whether or not the lithic concentration is a separate component cannot be determined with certainty. It could also be primary refuse or secondary refuse (Schiffer 1976) associated with one of the other components.

While we could not date all of the features at LA 6825, it is clear from stratigraphy, pottery, and radiocarbon assays that several different occupations are represented, indicating that the site was probably used by small groups. The hearths suggest the occupations were at least overnight and may have been as long as a few days. However, the absence of indications of severe burning in the hearths, which most likely would result in reddened sediments and accumulations of compacted ash, charcoal, and burned rock fragments, argues against longer occupations. Although it is clear that charcoal and other fuel residue were probably removed by wind and water action shortly after each abandonment, we believe that vestiges of intensive use, especially compacted ash, would have remained in spite of the natural elements.

The answer to the research question, then, is that LA 6825 served as a limited camp but not as a base-camp or habitation site because of the absence of structures such as pithouses and the limited variety of artifacts. The presence of corn pollen in Pit 2 (a dry food mixing pit?) presents two scenarios: the pollen was brought into the site from a distant location, probably an incidental inclusion with corn foods used as travel rations; or corn was grown in the site vicinity, but the occupants did not reside at Corn Camp to tend the crop during its growth. Holloway (this report) prefers the first interpretation.

Question 3: What artifact assemblages are present at LA 6825 and LA 6826?

LA 6825 (Corn Camp)

The artifact assemblage at LA 6825 was limited to chipping debris, flake tools, and pottery sherds.

The chipping debris is represented by a wide variety of materials but only 251 cores, flakes, pieces of shatter, and pieces of material. Four biface thinning flakes indicate that formal tools (perhaps projectile points) were manufactured at the site even though no complete or fragmentary formal artifacts were recovered by our investigations. Informal or flake tools were also produced at the site.

All nine flake tools are have unifacial work-edges, suggesting a predominance of scraping activities. However, the type or types of materials scraped are unknown.

Five or six pottery jars and one bowl are represented in the pottery assemblage. All were large enough to serve utilitarian purposes, rather than being small and limited in usefulness other than as curiosities. In the absence of evidence for farming, the functions of these vessels at LA 6825 are somewhat more conjectural. The preparation and serving of food is one possibility, especially concerning the bowl. Transport and temporary storage of water is a good possibility for the Chupadero jar, but recent opinions on the suitability of Jornada Brown jars for this purpose makes this use of these vessels unlikely (Wiseman n.d.). Storage of perishable materials between periods of occupation is another possibility, assuming that the same people anticipated returning on a periodic basis to the same camp. Pottery, even the less well-fired Jornada Brown, would be more suitable for such purposes than skin bags, baskets, or other containers of perishable materials. They are probably also superior to pits in the ground.

In summary, the artifact assemblage indicates several activities were performed at LA 6825--formal tool manufacture (and perhaps maintenance), informal tool manufacture and use, water storage and use, food preparation and consumption, and (possibly) storage of items/materials during periods of nonoccupancy of the site.

LA 6826 (La Cresta)

The artifact assemblage at LA 6826 was limited to chipping debris, flake tools, a pottery sherd, and several formal artifacts, including a fragment of a large biface, an end scraper, two types of beads, and a lump of pigment.

The chipping debris is represented by a wide variety of materials and a large number of cores, flakes, pieces of shatter, and pieces of material. Our investigations recovered over 1,000 items, but we excavated only a small part of a very large site. The large biface fragment and one biface notching flake indicate that formal tools (projectile points and perhaps other tool types as well) were manufactured at the site. Informal or flake tools were also produced at the site. As discussed earlier, evidence of lithic raw material examination and collection figures prominently in the lithic debris assemblage.

The five flake tools include a variety of edge-types: unifacial (n = 2), bifacial (n = 2), and a notch. Although such interpretations are arguable, we believe in general that unifacial tools indicate scraping activities and bifacial tools indicate cutting activities. Again, we are uncertain what materials were scraped and cut using the LA 6826 flake tools. The notch tool could have been used to prepare the shafts of weapons or other cylindrical items.

The single Jornada Brown sherd suggests that a vessel, probably a jar, was used at LA

6826. As discussed above, it most likely would have been used to hold nonliquid materials or even to store things between occupations of the site.

The formal artifacts present an interesting array of activities. The two types of beads surely represent items lost during the occupation(s), though the small mussel shell beads may also have been made at the site, if the presence of unmodified mussel shell fragments is any indication. The end scraper suggests more formalized scraping activities, perhaps involving animal hides. The fragment of a large biface, as discussed earlier, may represent the manufacture of other formal artifacts such as projectile points or even drills. The faceted lump of mineral suggests adornment of the human body or of utilitarian or ritual artifacts.

In summary, the artifact assemblage of LA 6826 is more varied than that of LA 6825, suggesting that a wider range of activities occurred at LA 6826. These include lithic raw material testing and selection, the manufacture and/or maintenance of more than one type of formal tools, informal tool manufacture and use, hide processing, and (possibly) the storage of items or materials during periods of nonoccupancy of the site. In offering this interpretation, we must keep in mind Schlanger's (1990) admonition that site assemblage variability is in part affected by the relationship between length of site occupation and tool use-life.

Question 4: What plants and animals were being processed or consumed at LA 6825 and LA 6826?

LA 6825 (Corn Camp)

The discovery of corn pollen grains in Pit 2 was a surprise and has been discussed in some detail earlier. The nature of the grains and their context leave no doubt about their Late Prehistoric (pottery period) authenticity. Remains of other wild plants that *may* represent Late Prehistoric food or other economic uses at Corn Camp include globemallow, buckwheat, cholla cactus, Onagraceae, and Nyctaginaceae.

Three species of plants--goosefoot, purslane, and hedgehog cactus--recovered from the fill of Hearth 1 may represent food remains dating to the seventeenth-century occupation of the site. These plants were commonly used by most, if not all, farmers and hunter-gatherers of the Southwest, the adjacent Southern Plains, and the Trans-Pecos.

Animal skeletal elements recovered from LA 6825 include a number of species and body sizes. Pocket gopher, small squirrel, cottontail, jackrabbit, artiodactyl, bird, snake, and turtle are represented. A number of elements display evidence of having passed through a digestive system, but the consumers could have been carnivores other than man.

Two excavated elements--an artiodactyl bone from 4N/3W and a cottontail bone from 16N/2W--have cut marks from butchering that can be attributed to man. The artiodactyl bone came from a location about halfway between Hearth 5a and Pit 2. The cottontail bone came from the vicinity of Pit 4. It is unclear whether these associations are culturally meaningful or fortuitous, particularly because both bones may have been cut with metal knives or saws and therefore may be modern in age.

LA 6826 (La Cresta)

No plant remains were recovered by our excavations at LA 6826.

Few animals skeletal remains were recovered from LA 6826. Freshwater mussel is the one species that is almost certainly cultural because of the distance from its nearest possible source, the Pecos River. Mussel shell tools, ornaments, and food (?) refuse are common at prehistoric sites in the Roswell region. The toad or frog, galliform (?) bird elements and egg shell, and deer/antelope (Wiseman 1993) are probably not cultural.

Question 5: What exotic materials or items at the sites indicate exchange or mobility?

The tubular beads recovered from the surface of La Cresta are enigmatic in that, insofar as we have been able to ascertain, they are unique finds for the Southern Plains and adjacent Southwest. We do not even know whether they are prehistoric or historic. We are fairly certain that they are made of shells that originated off the west coast of Mexico, possibly as far south as the tropics.

One biface thinning flake recovered at Corn Camp is probably Edwards chert from central or west-central Texas. No lithic materials attributable to Texas or northeastern New Mexico sources were recovered from La Cresta.

Question 6: What are the dates of the occupation(s) at LA 6825 and LA 6826?

LA 6825 (Corn Camp)

Stratigraphic, ceramic, and radiocarbon data clearly demonstrate that LA 6825 is a multicomponent site with at least three and possibly more occupations. Two or more occupations involving Hearths 6 and 7 took place during the pottery period, the early part perhaps dating between A.D. 500 and 1000. The one Chupadero Black-on-white sherd is uncertain, but it clearly indicates a date within the span A.D. 1050 or 1100 and 1450 to 1500, but we cannot be certain whether it represents the period of the superimposed hearths or a later occupation. Two radiocarbon dates from the fill of Hearth 1 belong to the Protohistoric or early Historic period. The seventeenth century is the most likely period of occupation. An aceramic, possibly Archaic, period may be represented by a chipping debris concentration at the north end of LA 6825. However, we have no way to date these remains or even confirm that they do not belong to one of the other components.

LA 6826 (La Cresta)

The dating of the part of LA 6826 excavated by this project relies solely on one sherd of Jornada Brown. While we do not believe that this represents the only use, or even the only period the site was used, it does indicate an occupation dating within A.D. 450 or 500 to 1350 or 1400.

Question 7: What were the biological relationships and nutritional status of the people who inhabited LA 6825 and LA 6826?

No human remains were recovered from either LA 6825 or LA 6826.

Question 1: Were the occupants of Corn Camp and La Cresta indigenous hunter-gatherers or were they farmers from nearby sites like Bloom Mound, Henderson, and Rocky Arroyo?

The corn pollen at Corn Camp presents intriguing possibilities with respect to the question of the cultural identity of the site inhabitants. The corn is a surprise at this site for several reasons:

(1) The site is a camp, not a habitation. Those familiar with Anasazi archaeology and Pueblo ethnography might point out that these groups frequently employed a village/fieldhouse farming and settlement strategy during late prehistoric and historic times (Bradfield 1971; Ward 1978). This is often believed to reflect the need to use a variety of field locations, including some that are quite distant from the village, to diversify the corn crop and thereby increase chances for crop success. Conditions that would increase chances for crop success include different storm paths favoring one area over another in a given year or set of years; timing of the growing season, especially the first and last frost dates; soil fertility; and the like. At distant fields, small structures (field "houses") of varying degrees of permanence or even the use of natural features such as rock shelters would provide temporary storage, refuge from inclement weather, and an outward sign of possession to potential intruders. The classic settlement pattern, then, would be a pueblo village possessing substantial architecture surrounded by a series of small sites that mark the locations of fields.

Was Corn Camp a field-side location belonging to one of Jelinek's villages along the Pecos River or a site like Henderson (Rocek and Speth 1986) or Bloom Mound (Kelley 1984) 20 km south in the Roswell area? We think not, for several reasons:

a. The populations of all known southeastern New Mexico villages are small by southwestern standards. Henderson, perhaps the largest known habitation site east of the Sierra Blanca Highlands, probably never had more than 100 inhabitants at any one time (our estimate).

b. Large expanses of better-watered arable land are to be found in the vicinities of all known southeastern New Mexico village sites, making it unlikely that any of the villagers had to go the great distance (up to 15 to 20 kilometers) to LA 6825 for land.

c. The peoples of southeastern New Mexico evidently relied less on corn as a staple than did contemporary people elsewhere in the Southwest. For instance, Puebloan peoples of the late prehistoric and historic periods of northern New Mexico considered corn a major food, a fact that is corroborated by a generally high dental caries rate and a relatively short stature. Although studies of prehistoric physical anthropology are in their infancy in southeastern New Mexico, results to date indicate that the prehistoric peoples of the Henderson site near Roswell had a higher component of hunted and collected foods, with a correspondingly lower dental caries rate and a somewhat taller stature (Rocek and Speth 1986). Thus, even though Rocek and Speth believe that the Henderson people ate quantities of soft foods (by implication, mostly corn), they were still less reliant on that food than other southwestern peoples.

d. The grinding equipment from other southeastern New Mexico sites also seems to reflect less reliance on corn in other parts of the Southwest. In a study currently underway, I found that the peoples of southeastern New Mexico used large-basin metates and one-hand manos, rather than the more efficient, higher-volume grinders such as trough and slab metates with two-hand manos. The term "slab" metate, as used here, refers to the large, entire-upper-surface slab metates characteristic of the Pueblo IV period in the upper Rio Grande of New Mexico (Wiseman 1970), not the Plains form, which is actually a small, oval, grinding basin on a rock slab.

(2) The short-term nature of all occupations. As discussed in an earlier section of this report, occupations appear to have been on the order of days, or a week or two at most. By way of contrast, Anasazi fieldhouses generally have greater archaeological presence in the form of structures and/or many more artifacts, indicating much more use/reuse than at Corn Camp.

(3) The situation of the site in a small, dry valley, or *rincón*, that has only marginal arable potential. We assume this to be the case because, today at least, the area lacks reliable water, and it has a very small drainage area (about 4 sq km). Thus, moisture available for dry farming would be limited, especially because of the dry climate and low annual rainfall. The soils, on the other hand, when sufficient moisture is available, are generally good for growing gardens, especially if some of the more fertile minor soils in the Upton-Simona association are present within the *rincón*. The presence of these better-quality soils in the *rincón* remains to be confirmed.

All of this does not mean that corn could not be grown in the *rincón*, for in years of good moisture, gardening should be possible. The point is, the *rincón* probably would not have had any advantages that would attract farmers from the villages on the Pecos River or in the Roswell area because of distance and poor soil moisture and water potential in most years.

This discussion, combined with that in an earlier section, leaves two options for interpreting the corn pollen at Corn Camp. The first is that it was brought into the site, either by traveling farmers or by hunter-gatherers who had obtained it from farmers; or that it was grown in the vicinity of the site by hunter-gatherers and processed and consumed there. Either way, it seems likely from the context (Pit 2) that it was probably being processed into a meal.

CONCLUSIONS

Two sites were excavated during the Dunnahoo Hills project: a multicomponent prehistoric and historic camp site called Corn Camp (LA 6825) and a lithic material procurement site called La Cresta (LA 6826). The two sites are about 200 m apart, west of a small valley or *rincón* on the south side of the Dunnahoo Hills in central Chaves County.

Corn Camp (LA 6825)

This small site of at least seven hearths, two small pits, one aceramic lithic scatter, and historic glass represents a minimum of six occupations--one possibly Archaic, two Late Prehistoric pottery period (ca. A.D. 500-1400), one Early Historic Native American, and two twentieth-century camps. Although the prehistoric and early historic occupants of LA 6825 probably collected some of their knapping material from La Cresta, lithic procurement was probably not the major reason for occupation of LA 6825. Judging by artifact numbers and the lack of heavy burning in the hearths, the length of each occupation was evidently short, perhaps only a few days or a week or two at most. The two twentieth-century uses were undoubtedly roadside stops and may not have even lasted overnight.

The aceramic occupants (if they were indeed Archaic period) and the early historic occupants were probably hunter-gatherers who used the location during their subsistence rounds. We have no information about their purpose at LA 6825 and can only speculate that they were collecting knapping materials, gathering foodstuffs from the *rincón*, camping while traveling, or some combination of these. If the material type identification of one biface thinning flake is correct, the aceramic occupants evidently had limited access to Edwards chert. Since this is only one item, it was probably obtained through trade, rather than visits to the chert sources.

We have more data on the prehistoric pottery-period occupations. The people camped long enough to build and use hearths and to process, and presumably consume, both wild plant foods and corn. For a variety of reasons involving distance from known villages and the general unsuitability of the *rincón* for farming, we believe that the pottery-period occupants of LA 6825 were not from Jelinek's villages or from Roswell area sites like Bloom Mound, Henderson, and Rocky Arroyo. We believe that the *rincón* would have been useful for small-scale gardening during moister-than-average years, especially to peoples who saw domestic plants as a culinary opportunity and not a necessity.

However, we cannot determine whether the corn at LA 6825 was grown near the site or was brought into the site as travelers' rations. If this point could be settled, and we could show that the corn was grown locally, then we are confident that the persons who grew it were hunter-gatherers "dabbling" in gardening. If it was introduced to the site as travelers' rations (as the project palynologist believes), whether prepared at some distant location or at LA 6825, we cannot reliably establish whether the travelers are hunter-gatherers or Jornada Mogollon farmers.

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n.d. Contribution to NMAC pottery volume

APPENDIX 1: DEFINITIONS OF CHIPPED STONE DEBITAGE TERMS

Material Types

Gray Cherts

A variety of gray cherts suitable for knapping are available in the Roswell region. The raw material units are commonly found as concretions or nodules up to 10 or 15 cm long, eroding out of San Andres limestone in the hill country west of Roswell (Hannaford 1981; Phillips, Bandy and Scholz 1981).

Colors include off-white, various shades of gray and brownish-gray, and black; the gray and brownish-gray shades are the most common. Individual pieces frequently possess two or more shades or colors; the transitions from one shade to the other may be gradual or they may be abrupt, as in striping or mottling. Numerous pieces of off-white and gray (or light gray and dark gray) striped material, sometimes referred to as "fingerprint" or "zebra" chert, were noted in the collections. I have seen these materials among those found eroding out of the San Andres limestone. Ten sorting varieties were tabulated during the analysis, though all were pooled for presentation here.

Variable percentages of knapping debris recovered from the project sites. Phillip Shelly recently informed me that the gray cherts showing different degrees of orange coloration indicate intentional heating, probably to improve the knapping quality of the pieces. These pieces also have a good luster, equal to or better than normally seen in untreated (e.g., strictly gray) examples.

The knapping quality of the local gray cherts varies from grainy (transitional to a siltite) to fine cryptocrystalline. Perhaps the greatest problems to knappers are the small sizes and the internal fractures and textural irregularities common to a large percentage of the nodules.

Other Cherts

This catchall category includes varieties of cherts that probably belong to the local gray category as well as some that evidently derive from other sources. The former group includes grainy cherts or silicious siltstones that embody many of the colors and color combinations of the local gray cherts described above. The grainy structure of these cherts requires greater strength and therefore imposes greater difficulty for knapping. These materials comprise the majority of the "Other Chert" category.

A few cherts of radically different colors and which do not derive from the same sources as the gray cherts include dark red and black jasper, white and brown chalcedonic chert, tan chert, medium brown chert, dark brown chert, and medium brown chert with black speckles. All of these cherts have a fine, cryptocrystalline structure that enhances their knapping utility. However, I suspect that the raw material units for these materials are generally small (i.e., 10 cm or less in maximum dimensions), and some are obviously riddled with internal fractures and other flaws that make knapping difficult. The Pecos River terrace gravels are the suspected source area for all of this group of cherts. However, a local collector once told the writer that the Cedar Hills area, 10 to 15 km north of the project area, is a possible source of tan chert.

Chalcedonies

These slightly to greatly translucent, cryptocrystalline materials include eight sorting varieties with gray and brownish-gray colors. The colors of most pieces are the same as for the local gray cherts, including a "fingerprint" variant. These materials probably derive from San Andres limestone.

Two varieties of chalcedony that probably do not derive from the local San Andres are clearish white with traces of brown and red and light gray with profuse red. The Pecos River gravels are the suspected source of these uncommon material types.

Quartzites, Fine Quartzites, and Siltites

Siltites, or silicified siltstones and shales, are a common component of the San Andres formation in the project area. Not surprisingly, flakes of this material were frequently found in the cultural assemblages as well. Grain sizes include true siltstones and mudstones. Both light gray and light brown colors are represented. A slight brownish cast was occasionally observed in these materials in the rock outcrops around the Sunset Shelters, indicating that some of the coloring is natural. However, the frequent occurrence of light brown examples among the debitage in the sites also suggests some of the specimens may have been heat treated in an attempt to make them more knappable. Clearly, a specially designed study will be necessary before the matter is resolved.

Both fine and coarse grained quartzites in several colors were recorded. The fine light gray and light brown quartzites are probably related to the siltite described above and therefore are probably of local origin. Several flakes of a fine white quartzite are probably burned examples of these materials. Varieties of quartzites that are not immediately available in the vicinity of the sites include a true off-white variety, brown and gray, a fine medium brown and dark gray (not the same as the previous brown and gray variety), dark gray-green, orange-red to orange (burned?), and dark purple. The Pecos River gravels may be the source of some or all of these materials.

Other Materials

The miscellaneous category includes a wide variety of local and exotic stones. The local ones are light gray, medium gray, and medium brown sandstones; medium gray and medium brown limestones; white to clearish-white massive quartz; and a black siltite (silicified shale). The black siltite may have originated in the Sacramento, Sierra Blanca, or Jicarilla Mountains to the west where it is common in prehistoric sites. Quarries of black siltite and silicified shale have been documented in the southern Jicarilla Mountains (Kelley 1984:253).

A flake or two of dark gray to black igneous rock may also have come from the same mountains.

Several lithic materials are easily recognized as deriving from distant sources. All examples are scarce: Alibates material (both the orange-red and the purple varieties), Tecovas or Quitaque chert (?), clear obsidian, and a calcrete composed of opalized white chert (gravels and small pebbles) cemented by caliche. The possible Tecovas examples are mostly purple with spots of red and yellow. The source of the obsidian is currently uncertain; similar material is documented in Las Cruces area Rio Grande gravels in south-central New Mexico and on the eastern side of the Jemez Mountains of north-central New Mexico. A local resident recently reported to me that obsidian was found by a relative near the top of one of the eastern peaks in the Capitan Mountains; however, this report has not been verified. The calcrete outcrops on the Caprock (Mescalero Ridge) southeast of Maljamar, Lea County, New Mexico (Rudecoff 1987:11).

Core Types

The terms for the types of cores are mostly self-explanatory, but two of them--two-platforms-adjacent and two-platforms-parallel--require a few remarks. In what follows, the word *face* refers to the surface from which flakes actually detach. Thus, the hammer strikes the platform, and the flake removes from the core face.

Two-platforms-adjacent Cores

The striking platforms of two-platforms-adjacent cores share a common edge and form an angle between them. That angle is usually about 90 degrees, but it may also be as much as 150 degrees.

Two-platforms-parallel Cores

The striking platforms of two-platforms-parallel cores do not share a common edge. The platforms are roughly parallel to one another because the opposing flat sides of a cobble or pebble are used as the platforms. However, the degree of parallelness can vary widely. Flakes struck from the two platforms may be removed from different faces or from the same faces of the core.

Flake Types

Biface Notching Flakes

These distinctive, small flakes have the U-shaped platforms characteristic of flakes removed during the notching of bifaces for hafting (Austin 1986).

Biface Thinning Flakes

Flakes classified as biface thinning flakes are probably mostly flakes produced by pressure and baton techniques. These flakes tend to be thin, are strongly curved (and frequently twisted) along the length axis, and have decidedly acute platform/ventral surface angles. These flakes also frequently have one or more flake scars on the dorsal surface at the distal end that were removed from the opposite direction.

Core Reduction Flakes

Core reduction flakes comprise the majority of any chipped stone debitage assemblage. Flakes removed to trim the core (after initial decortication), shape the core, and obtain flakes suitable for making formal artifacts, and flakes that fail to meet the requirements for making formal artifacts are all included in this category.

Decortication Flakes and Platform Preparation Flakes

Decortication flakes and platform preparation flakes are very similar in some respects. Both have large amounts of cortex on the dorsal surface. The primary difference is one of thickness: decortication flakes are relatively thick, and platform preparation flakes are very thin. While the distinction between thick and thin is judgmental and therefore of questionable value, it seems to purvey a difference in attitude. The thicker, or decortication, flakes suggest an absence of concern for conserving material. The thinner, or platform preparation, flakes suggest just the opposite: remove cortex to prepare a good striking surface, but do not remove any more material than is absolutely necessary.

Platform Types

Most of the terms for the platforms are self-explanatory, but a few remarks are appropriate.

Multiple-flake-scar Platforms

Multiple-flake-scar (MFS) platforms differ from faceted platforms in several important ways. MFS platforms simply have two or more scars of previously removed flakes on them. While the flake scars may have been the result of core platform preparation (i.e., removal of cortex to improve flake production), the procedure was to remove the cortex from the platform of the core in an expedient manner and without any intention other than to remove that cortex. To this end, the decortication flakes may have been and often were removed from any convenient direction on the core. Thus, reduction flakes from these cores can have flake scars that obviously emanated from more than one direction.

A faceted platform, as the term is used by Old World lithic technologists, involves more than simple decortication. A series of small flakes was sequentially removed from the same edge of the core, resulting in parallel flake scars and flake-scar ridges. Moreover, the flake removal is done in such a way that a convex platform, rather than a flat one, is created. This convex surface permitted easier isolation of an aiming point for flake detachment and therefore greater control over the final product. My experience with southwestern lithic assemblages, particularly those from the pottery periods, is that true faceted platforms are rarely found. However, the fact that they do exist indicates that this sophisticated technique was known to prehistoric knappers, even though it was not widely used.

Pseudodihedral Platforms

The term *pseudodihedral* is modified from the Old World concept of dihedral platforms. This method of core platform preparation involved the removal of two series of flakes, one down each side of the core. The distal ends of one row of flakes intersected those of the other row, resulting in a single tentlike ridge down the center of the core platform. This ridge was then used as an aiming point for regular flake detachment. This ridge permitted easier isolation of an aiming point for flake detachment and therefore greater control over the final product. Flakes produced from dihedral cores display two flake scars ending in a central peak on their platforms. Ideally, ripples and other landmarks show that the two flakes were removed from opposite directions, terminating in the peak.

In Southwestern assemblages, true dihedral platforms are rare, but prehistoric knappers employed a similar (or "pseudo") approach. They frequently aimed their hammers at ridges between adjacent flake scars, at edges between flake scars and cortex, or at the edge of a core platform. Such aiming points had the same effect as the dihedral ridge--limiting the place where the blow could land, thereby creating greater control over the size and shape of the new flake. The resulting flake platforms have a peak between two flake scars or between a flake scar and cortex.

Distal Termination Types

Modified-feathered Termination

Only one distal termination type, the modified-feathered, needs explanation. This type of termination occurred when the flake was so thick that a portion of the opposite side of the core was carried away with the flake, resulting in a blunt distal edge.

Shatter

Shatter is any piece of material derived from the knapping process that cannot be classified as a core or flake. In general, shatter results from uncontrolled breakage of the core, usually because of naturally occurring internal fractures or other inconsistencies in the material.

Pieces of Material

This category refers to chunks of knappable material brought into the site by the occupants. However, for reasons unknown, they were not knapped or otherwise intentionally fractured.

Use-Wear on Debitage

The unifacial and bifacial types of edge wear are found on several kinds of edge configurations that might reflect function. These configurations, as seen from either the dorsal or the ventral surfaces of the flakes, are straight, convex, concave, sinuous, irregular, and projections. The distinction between use-wear on concave edges and notches can be somewhat arbitrary in some instances. For the most part, notches have small diameters and configurations that set them apart from the remainder of the edges on which they are located.

Two basic types of use-wear are represented: marginal unifacial wear and marginal bifacial wear. Very conservative criteria were used in deciding whether edge damage is attributable to use-wear. Generally speaking, a number of contiguous scars had to be present for a given manifestation to be designated use-wear. In a number of instances, the flake scars were sufficiently long and regular in shape that they may have been the product of minute intentional retouch.

APPENDIX 2: RADIOCARBON DATES

Radiocarbon Calibrations for Hearth 1, LA 6825

Routine ATM20

BETA-82889

Radiocarbon Age BP 270.0 ± 50.0
Calibrated age(s) cal AD 1645
cal BP 305
cal AD/BC (cal BP) age ranges obtained from intercepts (Method A):
one Sigma** cal AD 1523-1566(427- 384) 1629-1660(321- 290)
two Sigma** cal AD 1480-1680(470- 270) 1747-1799(203- 151)
1942-1954(8- 0*)

Summary of above:
minimum of cal age ranges (cal ages) maximum of cal age ranges:
one sigma cal AD 1523 (1645) 1660
cal BP 427 (305) 290
two sigma cal AD 1480 (1645) 1955*
cal BP 470 (305) 0*

cal AD/BC age ranges (cal ages as above) from probability distribution (Method B):

% area enclosed	cal AD (cal BP) age ranges	relative area under probability distribution
68.3 (one sigma)	cal AD 1515-1599(435- 351)	.58
	1617-1666(333- 284)	.40
	1951-1953(0*- 0*)	.01
95.4 (two sigma)	cal AD 1479-1676(471- 274)	.85
	1746-1799(204- 151)	.12
	1941-1955*(9- 0*)	.03

BETA-82890

Radiocarbon Age BP 240.0 ± 50.0
Calibrated age(s) cal AD 1654
cal BP 296
cal AD/BC (cal BP) age ranges obtained from intercepts (Method A):
one Sigma** cal AD 1639-1669(311- 281) 1775-1793(175- 157)
1948-1953(2- 0*)
two Sigma** cal AD 1514-1600(436- 350) 1616-1686(334- 264)
1736-1808(214- 142) 1930-1954(20- 0*)

Summary of above ---
minimum of cal age ranges (cal ages) maximum of cal age ranges:
one sigma cal AD 1639 (1654) 1953
cal BP 311 (296) 0*
two sigma cal AD 1514 (1654) 1955*
cal BP 436 (296) 0*

cal AD/BC age ranges (cal ages as above) from probability distribution (Method B):

% area enclosed	cal AD (cal BP) age ranges	relative area under probability distribution
68.3 (one sigma)	cal AD 1528-1555(422- 395)	.14
	1632-1676(318- 274)	.39
	1746-1799(204- 151)	.37
	1941-1955*(9- 0*)	.10
95.4 (two sigma)	cal AD 1487-1692(463- 258)	.59
	1729-1815(221- 135)	.31
	1923-1955*(27- 0*)	.10

Weighted Average

Radiocarbon Age BP 255.0 ± 35.4
Calibrated age(s) cal AD 1649
cal BP 301
cal AD/BC (cal BP) age ranges obtained from intercepts (Method A):
one Sigma** cal AD 1639-1660(311- 290)
two Sigma** cal AD 1521-1576(429- 374) 1625-1671(325- 279)
1764-1795(186- 155) 1946-1954(4- 0*)

Summary of above:
minimum of cal age ranges (cal ages) maximum of cal age ranges:
one sigma cal AD 1639 (1649) 1660
cal BP 311 (301) 290
two sigma cal AD 1521 (1649) 1955*
cal BP 429 (301) 0*

cal AD/BC age ranges (cal ages as above) from probability distribution (Method B):

% area enclosed	cal AD (cal BP) age ranges	relative area under probability distribution
68.3 (one sigma)	cal AD 1526-1560(424- 390)	.27
	1631-1668(319- 282)	.59
	1779-1792(171- 158)	.09
	1949-1955*(1- 0*)	.05
95.4 (two sigma)	cal AD 1515-1598(435- 352)	.31
	1617-1675(333- 275)	.47
	1746-1799(204- 151)	.17
	1941-1955*(9- 0*)	.05

Comments:
†This standard deviation (error) may include a lab error multiplier.
IF SO SPECIFY!
** 1 sigma = square root of (sample std. dev.^{2} + curve std. dev.^{2})
2 sigma = 2 x square root of (sample std. dev.^{2} + curve std. dev.^{2})
0* represents a "negative" age BP
1955* denotes influence of bomb C-14

F RADIOCARBON DATING ANALYSES

FOR: Mr. Timothy D. Maxwell
Museum of New Mexico

DATE RECEIVED: Auth. June 12, 1995
DATE REPORTED: July 13, 1995

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-82887	1040 +/- 60 BP	-25.0* o/oo	1040 +/- 60* BP

SAMPLE #: LA101412 FS 182
ANALYSIS: radiometric-standard
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-82888	730 +/- 60 BP	-25.0* o/oo	730 +/- 60* BP

SAMPLE #: LA101412 FS 212
ANALYSIS: radiometric-standard
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-82889	160 +/- 50 BP	-18.3 o/oo	270 +/- 50 BP

SAMPLE #: LA6825 FS 274 Sample 1
ANALYSIS: radiometric-standard
MATERIAL/PRETREATMENT:(organic sediment): acid washes
COMMENT: low carbon sediment requiring special handling

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-82890	110 +/- 50 BP	-17.4 o/oo	240 +/- 50 BP

SAMPLE #: LA6825 FS 274 Sample 2
ANALYSIS: radiometric-standard
MATERIAL/PRETREATMENT:(organic sediment): acid washes
COMMENT: low carbon sediment requiring special handling

NOTE: It is important to read the calendar calibration information and to use the calendar calibrated results (reported separately) when interpreting these results in AD/BC terms.

NOTE: Samples LA101412 FS 183, LA101412 FS 211 and 213 were not used in the analyses and are being returned (under separate cover).

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.