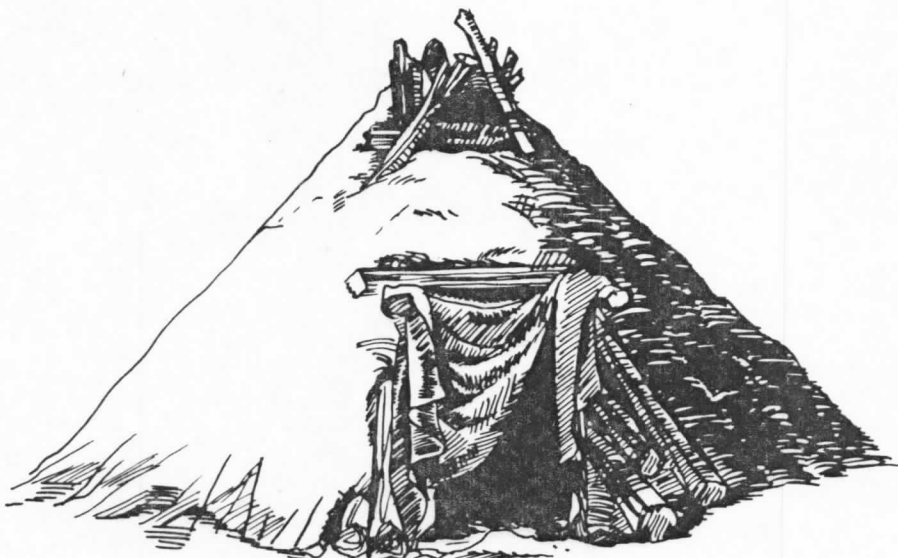


1976



# HISTORIC NAVAJO STUDIES IN NORTHEASTERN ARIZONA

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MUSEUM  
OF NORTHERN  
ARIZONA

MNA Research Paper 1  
Anthropology Research Report 1

## ABSTRACT

Archaeological excavations along the north rim of Canyon del Muerto, Canyon de Chelly National Monument, Arizona, were conducted during 1972 by the Museum of Northern Arizona. The preliminary objective was to salvage 28 archaeological sites located within the rights-of-way of Route N64, the Chinle to Tsaile Lake road, and four associated spur roads.

Research designs for the excavations are broken into historic Navajo and prehistoric Anasazi sites; this report is concerned with the former. This sample consists of 19 sites. Studies were directed toward placing the Navajo occupation in time, finding canyon-rim relationships and determining what acculturative factors have appeared.

The first section focuses on the terminology used in this report, project procedures and the historical background of the Navajo occupation in the De Chelly area. The next part encompasses the excavated sites and ancillary studies conducted in conjunction with the project. Following this, a synthesis of the data is presented with a more refined temporal framework of Navajo occupation based

on an earlier developmental sequence for this area. Also explored in the last section are settlement patterns and possible indices of acculturation.

Navajo occupation began in the De Chelly area prior to A.D. 1800 and continued almost uninterrupted for over 200 years. The early form of clustered settlement gave way to a more dispersed occupation, which at the present is becoming clustered again. Preferred areas along the rim are favored in settlement; both technological and environmental considerations appear to be responsible for this preference. Plant material associations, found at the sites and historical documents indicate rim-canyon travel occurred from the earliest Navajo occupation. This relationship is still continuing, but at the present appears to be breaking down, possibly due to acculturative factors.

Substantive contributions of this report include a more refined development of the Navajo chronology for this area, the indication of rim-canyon relationships, and the use of late historic sites on which to base inferences concerning the earlier Navajo sites.



Figure 14. Storage bin in undercut, NA9713.

#### DISCUSSION

This site was initially thought to be Hopi because of the surface pottery, but excavation revealed that Navajo wares dominated the ceramic collection. Tree-ring dates from Hogan 1 indicate a cutting date of A.D. 1813 (see Appendix I), with a series of non-cutting dates earlier than this. The original site was apparently built in 1813 or slightly thereafter. Following an unknown period of occupation, Hogan 1 burned - probably while it was inhabited, to judge from the material within the structure. After the fire, some of the slabs were scavenged from Hogan 1 and used in construction of Hogan 2. Hogan 2.

#### NAll,374 and NAll,375

NAll,374 and NAll,375 are situated at elevations of 6440 and 6432 feet, respectively, on a southwest trending ridge. Sites NAll,371 to NAll,373 are also found along this are presented together because their geographic proximity and ceramic similarity indicate that the sites may be related.

Both sites are in an open Juniper-pinyon woodland community. A few trees occur in moderate stands away from the site and on the slopes of the deeply entrenched wash .05 mile north. Other vegetation includes snakeweed, two species of rabbitbrush, broad and narrow leaf yucca, and several types of unidentified annual grasses.

At the bottom of the wash adja-

cent to site NAll,374 are two sweat houses belonging to NAll,371 and NAll,373. In the bedrock floor of the wash just above these structures is a deep pot hole that provided a perennial source of water after the turn of the century - and probably earlier in the historic period. The water hole is now dried up.

Initially, the sites' presence was revealed by a slight scatter of Navajo ceramics. Subsequent excavations using 2 meter grid squares and 1 meter by 4 meter trenches exposed a firepit at NAll,375 and a sherd scatter at NAll,374.

#### FEATURES

Firepit 1. Located at site NAll,375, this shallow ash-filled basin firepit is 90 centimeters in diameter and 7 centimeters deep. Since the firepit is located in the center of the access road and is only 2 centimeters below the Present Ground Surface, it is possible that a structure (now destroyed) once existed nearby. Sherds, an Old World style earring found near the firepit, and a very faint soil discoloration suggest an occupation surface that would support this contention. The earring, of silver, probably represents either a trade or raid acquisition from the Spanish, Mexicans, or from a Plains tribe.

Sherd Cluster. Located at site NAll,374, a scatter of ceramics occurs in an area approximately 6 meters in diameter. This material represents more than one jar and could indicate the presence of a temporary structure such as a ramada or brush shade. Archaeological evidence of such an impermanent structure would disappear rapidly through soil deflation, washing, or man-caused agents such as the several wagon roads that pass through the site.

In association with the sherds, two polygonal blue glass beads were found. The sherd cluster and beads came from an area 21 meters east of site NAll,375.

#### DISCUSSION

The ceramic collections from both of these sites include Navajo Utility, a pottery type that dates after 1800. The two beads are of a style that became popular after 1830, supporting a date of after 1800 but prior to 1863 and Fort Sumner. The

Mica. Only one small piece of mica was recovered. Kluckhohn, Hill, and Kluckhohn (1971:19) note that a piece of mica was used as a reflector.

Calcite. The function of a shaped piece of calcite from NALL,369 is unknown.

Gypsum. One elongated piece of gypsum came from NALL,362 measures 8.0 centimeters long, 2.3 centimeters wide, and .8 centimeter thick. Ground on all sides, it bears the beginnings of a hole (drilled from either side) at the center. The drilling could indicate an uncomplete ornament.

Petrified Wood. The occurrence of unmodified pieces of petrified wood (most frequent at the earlier sites) may indicate raw material destined for flaking or for use as hammerstones.

Quartzite Pebbles. The occurrence of unmodified quartzite pebbles at a protohistoric Hopi site has been noted by Woodbury (1954:97), and by Keur (1941:61) at the Navajo sites of Big Bead Mesa. Tschopik (1941:15) mentions their being stored in hogans. The exposures of Shinarump conglomerate in the area, especially between Del Muerto and the Chinle Valley, provide a readily available source of these pebbles, precluding any necessity to scavenge them from the ruins.

Concretions. Concretions, which occurred in early and late sites, have also been found at Big Bead Mesa (Keur 1941:65).

Quartz. The only piece of quartz in this sample has been flaked in several places and subjected to fire as evidenced by the fire spalls on the rock's surface. Its use is unknown.

## DISCUSSION

Pigments and minerals are restricted to the Navajo sites. The majority of the material comes from sites dating prior to 1813 and those dating after 1917. Hematite is the most plentiful and limonite is second in popularity. In all but one case, at least one other pigment occurs with the hematite.

The presence of clay at two sites is interesting. In both cases the clay is a greenish-gray color similar to that found in the lower layers of the clay quarry, NALL,675. This strongly suggests that this quarry,

or at least this clay bed, was a material source for this area. The clay at NALL,371 is problematic, as the informant for that site denied any knowledge of pottery manufacture there. Possibly the person just did not remember it being manufactured, or the clay may have been brought to the site for another reason.

Quartzite pebbles have been noted at other Navajo sites. They may have been picked up to be used later for some (unknown) purpose.

## Ornaments

This category is restricted to beads, perforated discs that can be sewn onto clothing, and material for beads and pendants that show evidence of preparation (Table 11). Pre-1900 beads of Euro-American manufacture are presented in a following section.

Beads. Beads of non Euro-American manufacture include those made from shell and turquoise. Disc-shaped shell beads are common at early sites (Fig. 48 a,c). Less modified Olivella shells (Fig. 48 i-l), and rectangular or subrectangular beads of different species of shell appear later in time (Fig. 48 f,h). The three ground pieces of shell are included in this section as they can provide a source of bead material.

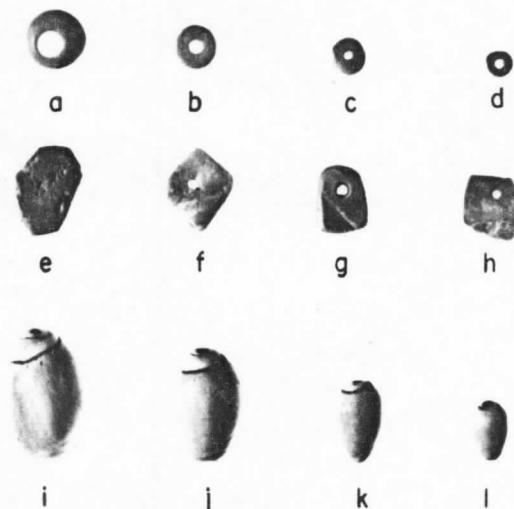


Figure 48. Amerind ornaments from project. a, i-l, Olivella biplicata beads; b-c, unidentified shell beads; d-e, turquoise bead and blank; f, Chama bead; g, Haliotis bead; h, Anodonta bead. Length of e is 2.8 cm.

Turquoise is represented by one

Table 11.  
DISTRIBUTION OF ORNAMENTS BY SITE.

1 = perforated

1 = ground

	Shell							Coral	Turquoise	Glass				Other
	Anodonta sp.	Chama sp.	Glycimeris sp.	Haliotis sp.	Mytilus sp.	Olivella sp.	Unidentified			Immit. Turquoise	Immit. Coral	Seed Bead	Costume Jewellery	
Hopi														
NA9711						1	1							
Navajo														
NA9712														1
NA11,367			1						1					
NA11,368														
NA11,372														
NA11,370														
NA9713							1							
NA11,374 &														
NA11,375														
NA11,377														
NA11,362	1													
NA11,366B														
NA9718														
NA9722														
NA9723														
NA11,373											2			
NA11,371	1		1	1		10		1	1	2	4		5	
NA11,369		1				1				3	6		2	2
NA11,361									1					
NA11,366A					1					2	2	1	4	3

circular bead (Fig. 48 d), a partially drilled specimen (Fig. 48 e), and a small rectangular piece measuring .8 centimeter long, .4 centimeter wide, and .05 centimeter thick. This piece of turquoise might have been prepared for setting.

Post-1900 beads of Euro-American manufacture include a large percentage (64%) of imitation coral and turquoise specimens. Costume jewelry is represented by a variety of bead shapes. One seed bead was recovered. Only one true coral bead is present. It has been ground into a short tube.

Other. This class is composed of a variety of ornamental objects. Included are two plastic snap-on beads, a single-hole blue glass bead made from a button, and two aluminum Cracker Jack presidential medals about the size of a quarter dollar, perforated near two opposing edges, probably for sewing onto clothing. In addition, one spatulate shaped piece of soft hematite 3.2 centimeters long, 1.6 centimeters wide, and .3 centimeter thick was recovered. It appears to have been rectangular with rounded corners and has been broken into its present shape. Striations along the broken edges indicate attempts to reshape it. The use of this item is unknown.

#### DISCUSSION

Although most or all of the above ornaments can function as items of personal adornment, they can also be used as ceremonial material. This is especially true of shell and turquoise (Franciscan Fathers 1910:56, 402). Olivella beads are mentioned as being placed on a bowstring for use in the Shootingway (Haile 1947:23). Jet, mentioned in conjunction with shell and turquoise, is absent from the sample.

The imitation turquoise beads are of two types. One is a small, circular, short-bodied bead. The other is the "Hubbell" bead that comes in two shapes, sub-oval and triangular with rounded corners. Both of these bead shapes are drilled through the thickness of the body and were imported from Czechoslovakia around 1915 (Sorensen and LeRoy 1968:40). The importation of these beads has been attributed to Lorenzo Hubbell, although Brugge (1973b: personal communication) feels that this ascription is not substantiated,

either in the Hubbell records or in light of Hubbell's strivings to better the Navajo crafts.

Imitation coral beads were also introduced onto the reservation about 1915, but were not seen by a Chinle trader until 1924 (Tanner 1950:127). It should be noted that of all the natural or imitation beads, coral lacks the ceremonial importance of other beads, although it plays an important part in the Navajo economic system (Tanner:1950:128-29). The use of both imitation coral and turquoise may be found in a statement by Tanner (1950:128), when she says, "Probably the Navaho reasons here as he does with turquoise: if he cannot afford the real material, a substitute offering the same appearance but costing less will be acceptable."

The post-1900 Olivella beads are restricted to spire-lopped specimens. Before 1900, Olivella beads are both spire- and barrel-lopped. The post-1900 Olivella beads are all Olivella biplicata shell. This species of shell was sold in the trading posts under the name "Blue Olive," and these post-1900 beads probably originate from the posts.

#### Perishable Artifacts

Artifacts that are made from wood or plant fiber are included in this category. Although bone is also a perishable, it is placed into its own category because of the relatively longer period of preservation it enjoys. The perishable nature of the material in this category should be remembered, since the items represent fortuitous preservation. Comparing the number of perishable items recovered by previous excavations with the importance perishables play in Navajo culture (Hester 1962:56), a discrepancy between importance and amount of recovered material is obvious.

Battens. A relatively thin, elongated piece of wood used in weaving to hold the shed open during the weaving process, and to compress the weft (Matthews 1884:381). Battens come in various sizes, the smaller sizes being used as weaving progresses toward the top of the loom and space decreases (Reichard 1936:49).

Three battens were recovered during excavations, two of which came from NA9723 (Fig. 49 c,d). Both of



charred as a stage in manufacture, a process that aids in preservation.

#### Human Remains

As mentioned earlier, the recovery of human remains was avoided both as part of the Museum's policy and as a term of the Museum's excavation permit. Thus, one human tooth from an ash dump at Nall,369 constitutes the total sample of human remains. The tooth, a third molar, has a partially worn occlusal surface. The enamel crown is cracked on the distal aspect. Based on the amount of wear on the occlusal surface, the tooth's age is tentatively placed at about 35 years at time of loss (Dana Hartman 1973: personal communication).

#### DISCUSSION

When the informant for Nall,369 was told that a tooth was recovered from an ash dump, he suggested that it could be his tooth, which was pulled and discarded at the ash dump. He went on to relate the process, which was to have the tooth pulled, then to throw it over the shoulder in the direction of the ash dump. No comparative information could be found regarding this procedure, but the ash dump in this area is thought to be unclean and generally would not be subject to people rooting around in it. The informant is in his late 50's. Since the site was abandoned in the early 1950's, this could be his tooth. The cracked enamel crown indicates that the tooth was pulled. The informant was asked if he wanted the tooth buried or redeposited at the site, or in any other way hidden or disposed of. Because he said "No," the tooth was studied further in the laboratory.

#### Bone

The faunal material has not been completely identified, precluding knowledge of diet and domestic animals. Tentative identification of sheep bones at the earlier sites strongly indicates at least this animal's presence.

Only one bone artifact was recovered from the excavations. From Nall,371 and classified as a bone scraper, the artifact consists of a wedge-shaped section of a long bone from a large mammal. It exhibits the saw and steel knife marks expected

at a site dating to 1917 or later. One half of the convex edge shows unifacial flaking, resulting from a scraping action. The nature of the flake scars indicates that the bone was slightly dried out when the tool was made.

#### DISCUSSION

Bone artifacts of any type are rare at Navajo sites (Keur 1941:63; Hester 1962:51, 55), and no bone scrapers have been reported in the Navajo literature. The scraper, then, which dates about 1917, represents a unique item, and may have been the result of experimentation.

#### Non-traditional Material of Native and Euro-American Manufacture

This section is concerned with items of Euro-American origin that may or may not have been modified by the Navajo. Thus, the usual tin cans, broken bottles, rubber and leather fragments belong to this category, as do things like flyswatters made from an inner tube. The material is separated into pre- and post-1900 categories.

#### Pre-1900 Material

This material is listed by sites arranged in chronological order because it represents a rare occurrence at sites prior to 1900. Both metric and English measurements are indicated for complete items.

NA9712. A triangular piece of rusted metal, 3.4 centimeters long, 1.7 centimeters wide, and .2 centimeter thick (Fig. 50 a) came from this site. It was formed by scoring, then bending the metal until it broke. One side was then ground. The tip was ground into a rounded shape and sharpened. The object bears a strong resemblance to pre-1900 metal projectile points in the Museum of Northern Arizona's ethnographic collection, except that this specimen lacks a stem, a common feature of Navajo metal arrow points.

The use of metal points is early, with Letherman (1856:293) noticing only points of this type. Kluckhohn, Hill, and Kluckhohn (1971:40) indicate that replacement of stone by metal occurred sometime between the mid-17th and 19th centuries.

Nall,367. One half of a light blue

opaque bead came from NAl1,367. The bead is a wire or mandrel wound bead (Sorenson and LeRoy 1968:39), and measures .5 centimeter (3/16 inch) in both diameter and length. The surface finish is masked by a patina. The bead resembles several of the early "Pima" or "Padre" beads that are found early in the Southwest (Sorenson and LeRoy 1968:42, beads nos. 1 and 2), although those beads are slightly more globular.

NAl1,368. Three small, roughly triangular metal fragments came from this site. Their original size, shape, or use cannot be determined.

NAl1,370. One piece of rolled copper forms a tube 2.1 centimeters long and .8 to .9 centimeters in diameter (Fig. 50 c). The ends of the tube have been beveled by grinding and the tube appears to be smoothed or polished. This item is classified as a tubular copper bead, probably made by the Navajo.



Figure 50. Pre-1900 artifacts from project. a, projectile point; b, earring; c, copper bead; d, knife blade; e, file; f, unidentified; g, sickle blade. Length of d is 10.5 cm.

NA9713. A knife blade and homemade file came from this site (Fig. 50 d,e). The knife blade is 8.0 centimeters (3 1/4 inches) long with a shank extending 1.2 centimeters (1/2 inch) and a thickness of .2 centimeter (1/16 inch). Metal knives were introduced to the Navajo early (Kluckhohn, Hill, and Kluckhohn 1971:178), and thus would be expected at this site dating about 1813.

The file is four sided, generally square in cross-section, and appears to be handmade. It is 7.5 centimeters (2 7/8 inches) long and .3 centimeter (1/4 inch) average width on each of the four sides.

NAl1,374 and NAl1,375. Three artifacts came from this combined site group. Two of the artifacts came from NAl1,374, and are cut-faceted composite cane beads (Sorenson and LeRoy 1968:39). These beads resemble No. 69 in the Sorenson and LeRoy report (1968:45), and consist of a transparent dark blue glass drawn over a light blue transparent core. Only the ends of the hexagonal beads are faceted. Woodward (1965:10) dates these beads between the 1830's and 1860's. They are referred to as "O.P." or "Russian" trade beads and are most common along the West Coast, although they occasionally occur in other areas of the west (Sorenson and LeRoy 1968:40; Woodward 1965:10). Probably used as ornaments, blue beads were also used as offerings, one ceremony calling for five blue beads to be thrown toward an ash dump to appease a ghost (Wyman 1965:62).

In addition to the beads, one silver earring was found at NAl1,375 (Fig. 50 b). The earring is oval, 3.1 centimeters (1 7/32 inches) long, 2.8 centimeters (1 3/32 inches) wide, and made from a strip of silver .1 centimeter thick and .4 centimeter (5/32 inch) wide. The oval band tapers sharply to a point starting at .85 centimeter (3/8 inch) from the ends. Fastening appears to have been achieved by bending the tapered points apart and inserting them into the ear. The earring is handmade of very pure silver and shows (Harvey Gaston 1973: personal communication) a patina, perhaps resulting from a water-glass treatment applied to the silver. The earring is an Old World style. One earring shown in Adair's work (1944: Plate 20c) resembles the specimen except for the stamping. Manufacture



by a non-Indian is indicated by the finish. If the dates indicated by the ceramics and beads are correct, this site predates Navajo silver-smithing (Adair 1944). Earrings were apparently not commonly worn by the Navajo until about 1881 (Bloom 1936: 225; Kluckhohn, Hill, and Kluckhohn 1971:302).

Thus, if the recovered earring was in fact worn by a Navajo, and if our dating for this is correct (after 1800 but before 1863), the use of earrings by the Navajo is apparently earlier than has been assumed. It has been reported that men normally wore earrings, but married women who had pierced ears did not (Franciscan Fathers 1910:464-465). Stephens (1893:356) noted that, on occasion, jealous husbands pulled out the earrings, an act that may have prompted some women to stop wearing them after marriage.

Nall,377. One small sherd of wall glass from a bottle was recovered from this site. The sherd is black (actually deep olive green), a color associated with beer, wine, and medicine bottles, because it helps prevent the deterioration of the contents by sunlight. The range of this glass is from 1815 to 1885 (Newman 1970:74), and occurs most commonly between 1860 and 1880 (Kendrick 1967:21-22). The date of this glass sherd supports that of the ceramics, indicating that the site was probably occupied first during the 1850-1860 range. As Woodward (1958:131) has pointed out, however, bottled beer is dependent on pasteurization, and since this process was not used in breweries until 1873, bottled beer probably post-dates this sherd. Accordingly, the bottle probably held some other product, such as wine.

Nall,362. Although not the latest site, this site yielded the greatest diversity and number of historic items in the sample, a fragment of opalized window glass and four pieces of metal. The glass is nondescript and little can be said about it.

One of the metal objects resembles an awl, although it has a square shank (Fig. 50 f). It measures 3.6 centimeters (1 3/8 inches) in length and .2 centimeter (3/16 inch) in width and thickness along the shank. The head is .9 centimeter (3/8 inch) wide and measures 1.7 centimeters (9/16 inch) of the total length. A

hole is in the center of the head, a small portion of which is broken off. Another metal item from the site, a 1.5 centimeter long piece of steel tube, was formed by bending the metal into a tube .65 centimeter to .75 centimeter in diameter, and beating the edge of the tube flat against the roll. The remaining of two metal items are a 3.3 centimeter length of heavy gauge wire and a small fragment of a crimped can seam.

None of the historic material from this site bears characteristics that aid in dating. However, the ceramics present and the advanced state of weathering of the hogan wood suggest that a mid-1800 date for this material is probable.

NA9723. Two small shoe fragments were the only historic items recovered from this site. One fragment is a leather heel holding three shoe nails. Shoe nails can be typed (Anderson 1968:61), but these are so badly rusted that identification is impossible. The other leather fragment is a portion of a shoe quarter, probably from the same shoe, containing oval stitch marks. It should be observed that this site, and its probable associated structure, NA9722, are nearly devoid of historic material yet are the closest sites in time to 1900.

Unknown Provenience. A broken sickle blade was found near the rim of Canyon del Muerto, just south of Nall,376, the Pueblo I site (Fig. 50 g). The blade is 26.4 centimeters (10 7/16 inches) long and 2 centimeters (13/16 inch) wide. Judging from the curvature of the blade, it is broken in half. No handle remains on the shank. The dating of this object is uncertain, although the weathering of the metal indicates that it may pre-date 1900.

#### DISCUSSION

In this sample of pre-1900 trade items, metal and beads are most common, with glass and leather poorly represented. Beads have been found at sites from the 17th and 18th centuries (Kluckhohn, Hill, and Kluckhohn 1971: 302) and metal knives are known to have been traded during this time (Hester 1962:25-26). Thus, the occurrence of these items at early sites is not unexpected, given the fortunes of preservation.

It seems that in several cases

the Navajo made their own beads, using copper and steel. They may have also made the small file, or more likely, acquired it through trade or raid. Glass does not occur at the sites until the mid-1800s, and leather appears in the sample for the first time following the return from Fort Sumner.

It should be remembered that the differential rates of disintegration have probably skewed this sample, the more perishable goods being the most affected. Another factor in artifact recovery is the degree of importance one item holds in a culture. Thus, if metal was rare or, for some other reason, valued, it would be transported from camp to camp and only accidentally lost or left behind.

Beads, on the other hand, are used not only as ornaments, but are also known to be used in ceremonies, are discarded on occasion and are easily lost.

The lower occurrence of glass may indicate its relative scarcity, or again, may be an indication of its importance. Leather, of course, is affected by weathering. Also, the use of commercially made shoes among the Navajo come later in time, after Fort Sumner, thus explaining their occurrence only at a site near 1900.

#### Post-1900 Material

Euro-American material manufactured after 1900 constitutes 99.2 percent of the total historic sample; 2,631 items of cloth, glass, leather, metal, paper, and composite materials are represented. Because of the great diversity of artifacts that can be recognized, only general class trends will be presented, for a variety of reasons: the fragmentary nature of most items; the fact that the artifacts represent post-abandonment items; and the generally good ethnographic and tree-ring dating documentation for the sites, which precludes the necessity of using this material to date the sites.

Clothing. The use of commercially manufactured clothing and home sewing items is seen in cloth remnants, buttons, hooks, eyelets, snaps, rivets, zippers, and labels. Women's foundation garments - garter clips, bra straps, and girdle material - are also in evidence.

Much of the clothing cannot be assigned to wear by one sex or the other because of its fragmentary condition, although large decorated buttons may indicate women's apparel more than men's, as is probably also true of hooks and eyelets. Pants rivets, a Lee label, and small buttons that appear to be from work shirts, may suggest male apparel.

Leather and tennis shoes are indicated by the presence of heels, soles, and other portions of the shoe. Many of the leather uppers have been cut, indicating that they served as a source of leather after the shoe had been discarded. A notation by a buyer for the Fred Harvey Company said that women generally wore a size five or five and one-half shoe, while the average size of a man's was a size seven (McNitt 1962:77). Since no complete shoes were recovered, support for this statement cannot be offered.

Descriptions of post-1900 Navajo dress are found in the Franciscan Fathers (1910:463-66), and Reichard (1928:8); contemporary dress is noted in Adams (1963:78-80, 82) and Young (1961:370). The present sample of clothing items is similar to that recorded in these references.

Military dress is also evidenced by buttons and a pea coat remnant. These items may be attributed to actual service or to clothing donated to the Navajo. Clothing donation is suggested again by a woman's dress overcoat fragment, an item not normally expected in this area in the mid-1950s.

Containers. Glass and metal containers are present at all sites dating after 1900. They indicate the use of canned and bottled goods, of which baking powder and tobacco packaged by the United States Tobacco Company are two of the more popular items. Crown bottle caps indicate the use of soda water and, based on the number of caps recovered, this type of drink was a popular item. Sardine tins appear at the more recent sites and indicate a breakdown, to some extent, on the taboo of eating fish. Tempering this remark is the notation that Navajo are known to eat sardines to induce vomiting (Newcomb 1970:25-26).

Glass, rare at the early sites, increases through time. Alcoholic