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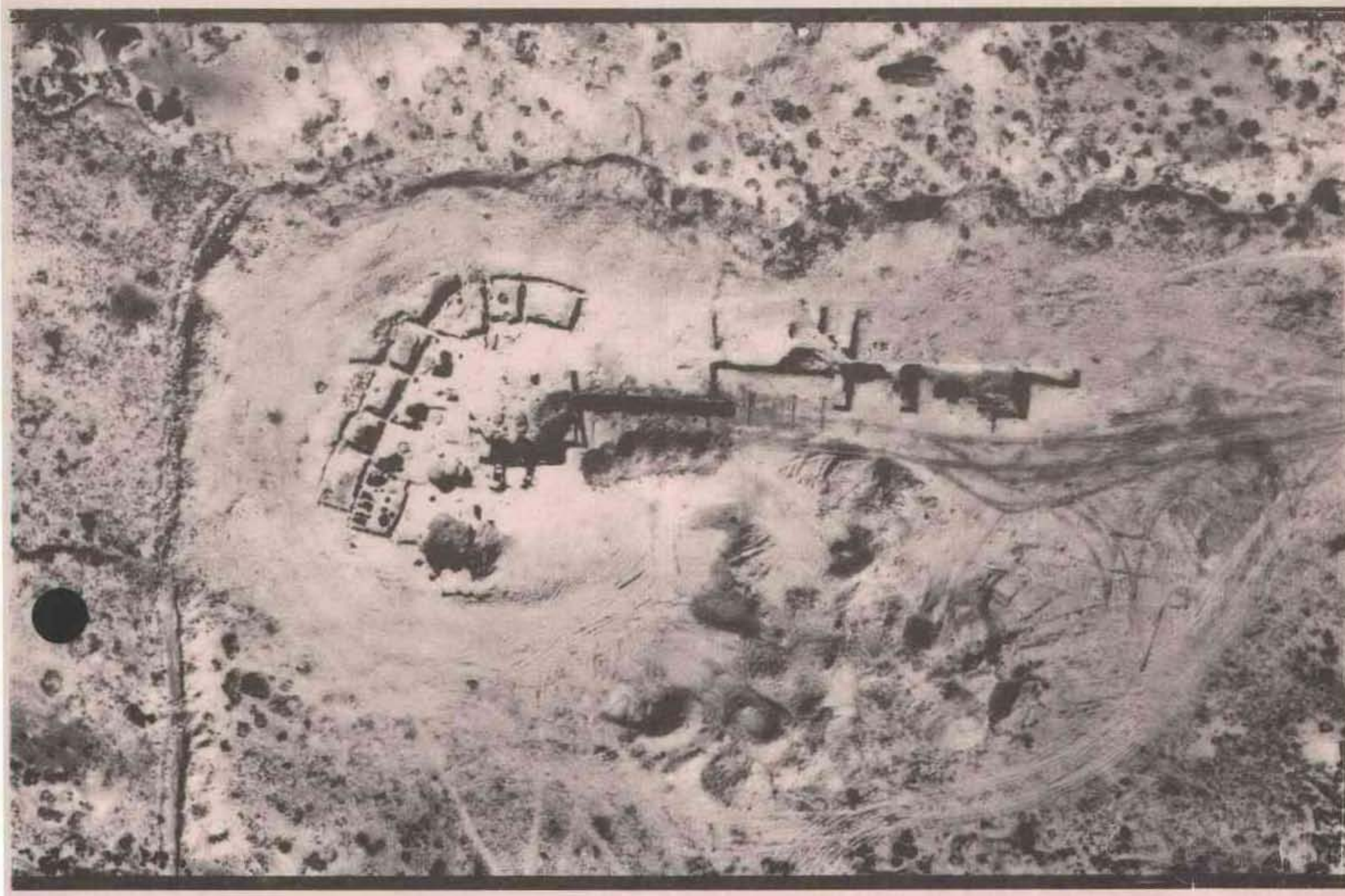

THE SPADEFOOT TOAD SITE: INVESTIGATIONS AT 29SJ 629 CHACO CANYON, NEW MEXICO

Volume II

THE SPADEFOOT TOAD SITE:

Investigations at 29SJ 629, Chaco Canyon, New Mexico:

Artifactual and Biological Analyses

Volume II

Edited by

Thomas C. Windes

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Reports of the Chaco Center

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Branch of Cultural Research

Division of Anthropology

National Park Service

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INTRODUCTION

Thomas C. Windes

Analyses of the material culture and ethnobotanical materials recovered from the excavations at the Spadefoot Toad Site (29SJ 629) are presented here (Figures I.1-I.3). The pollen results were published previously by Cully (1985); however, a recent pollen study of cultigens from potential mealing bin basins at the site is included by Dean. These analyses covered a span of many years and were interspersed with reports and field work involving other sites of the Chaco Project.

It should be noted that a bewildering number of bureaus are listed as locations for the Chaco Project manuscripts relating to analyses. In most cases, these bureaus (Chaco Center, Division of Cultural Research, Branch of Cultural Research, Division of Curation, and Chaco Collections) refer to the same library in Albuquerque, at the University of New Mexico in the Anthropology building, where the Chaco Project materials are now housed (as of 1993). Chaco manuscripts listed in Santa Fe are copies of the originals located in the National Park Service Chaco Collections, at the University of New Mexico.

Goals

A number of general goals were sought in the analysis of the 29SJ 629 materials. General questions that directed the analyses focused on sources and exchange. It was clear from the onset that Chaco Canyon lacked sources for the complete range of materials recovered from the excavations. How the Chaco inhabitants obtained these materials, from where, the mechanisms of exchange, and the distribution of material types through time and space were paramount interests, particularly in view of the exchange models proposed by Grebinger (1973) and Judge (1979). Finally, of course, we pursued more traditional avenues of analysis, including artifact function, description of typologies, and artifact distribution through time and space at the site.

Materials from 29SJ 629 and other small excavated sites were used to test for hierarchial differences in resource acquisition between the large sites and small sites in Chaco Canyon and to examine the models of social ranking between sites in the canyon (Altschul 1978; Grebinger 1973; Schelberg 1982, 1984). Artifact analysis for 29SJ 629, however, was completed before analysis of the Pueblo Alto greathouse materials was conducted. Therefore, the 29SJ 629 reports incorporate little comparison with Pueblo Alto because they were not rewritten when the new data became available. Conversely, the site comprised one of the major sites for comparison during analyses of the Pueblo Alto materials (Mathien and Windes 1987).

The relative scarcity of materials in floor contact at the site, however, was not conducive to intensive examination for tool kits and assemblages associated with specific task-oriented activities; these activity areas are synthesized in Volume I. Instead, primary

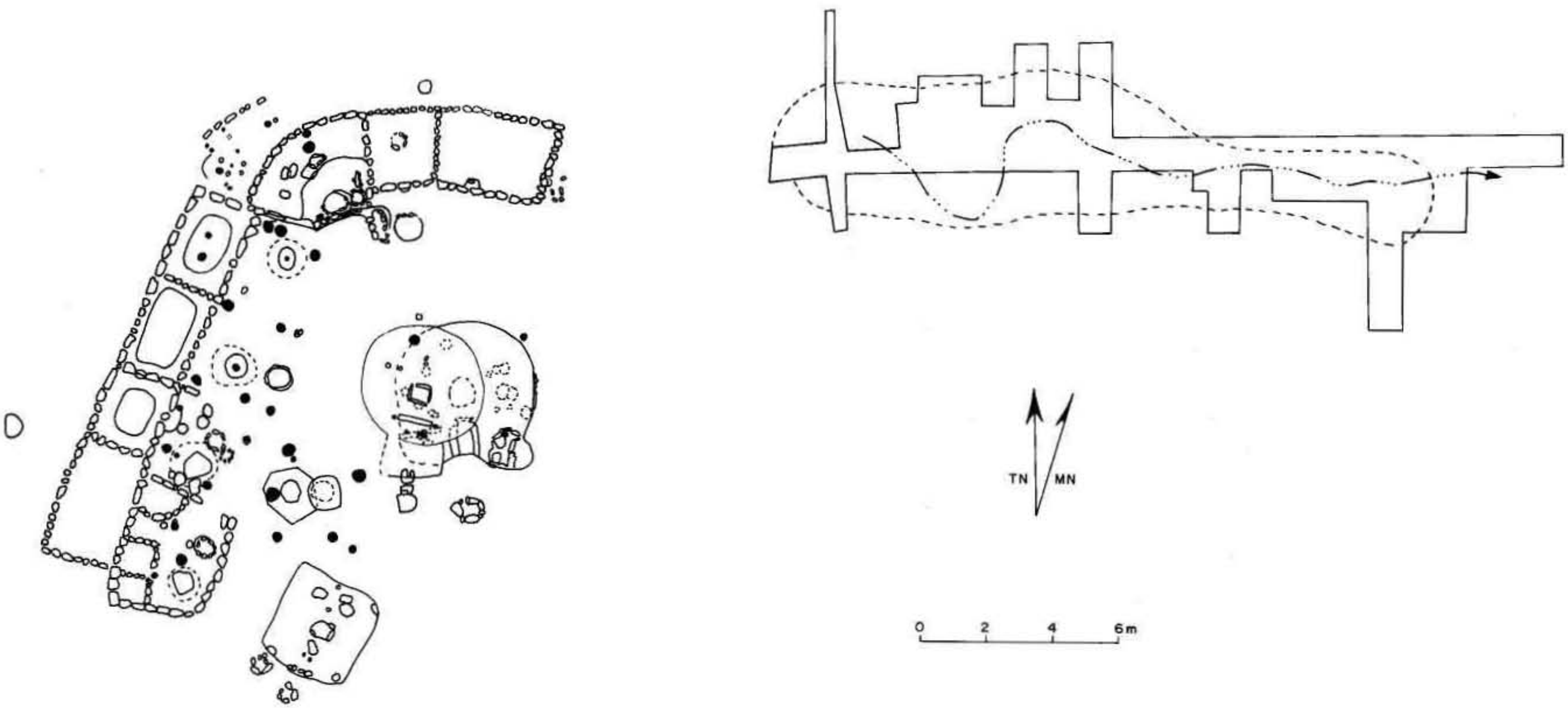


Figure I.1. Plan view of 29SJ 629 (NPS 310/82835 A).

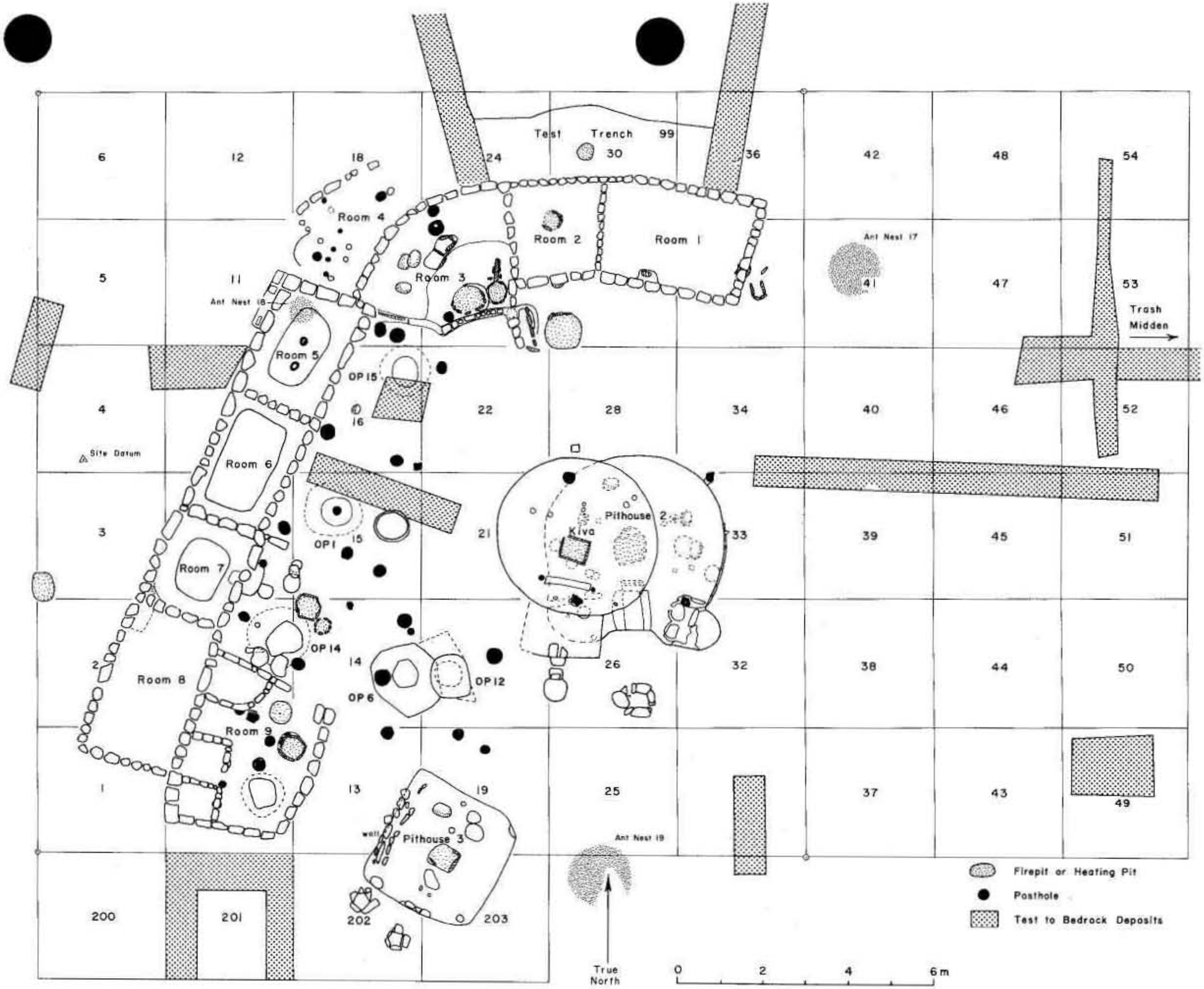


Figure I.2. Plan view of 29SJ 629 and its grid system (NPS 310/82196 E).

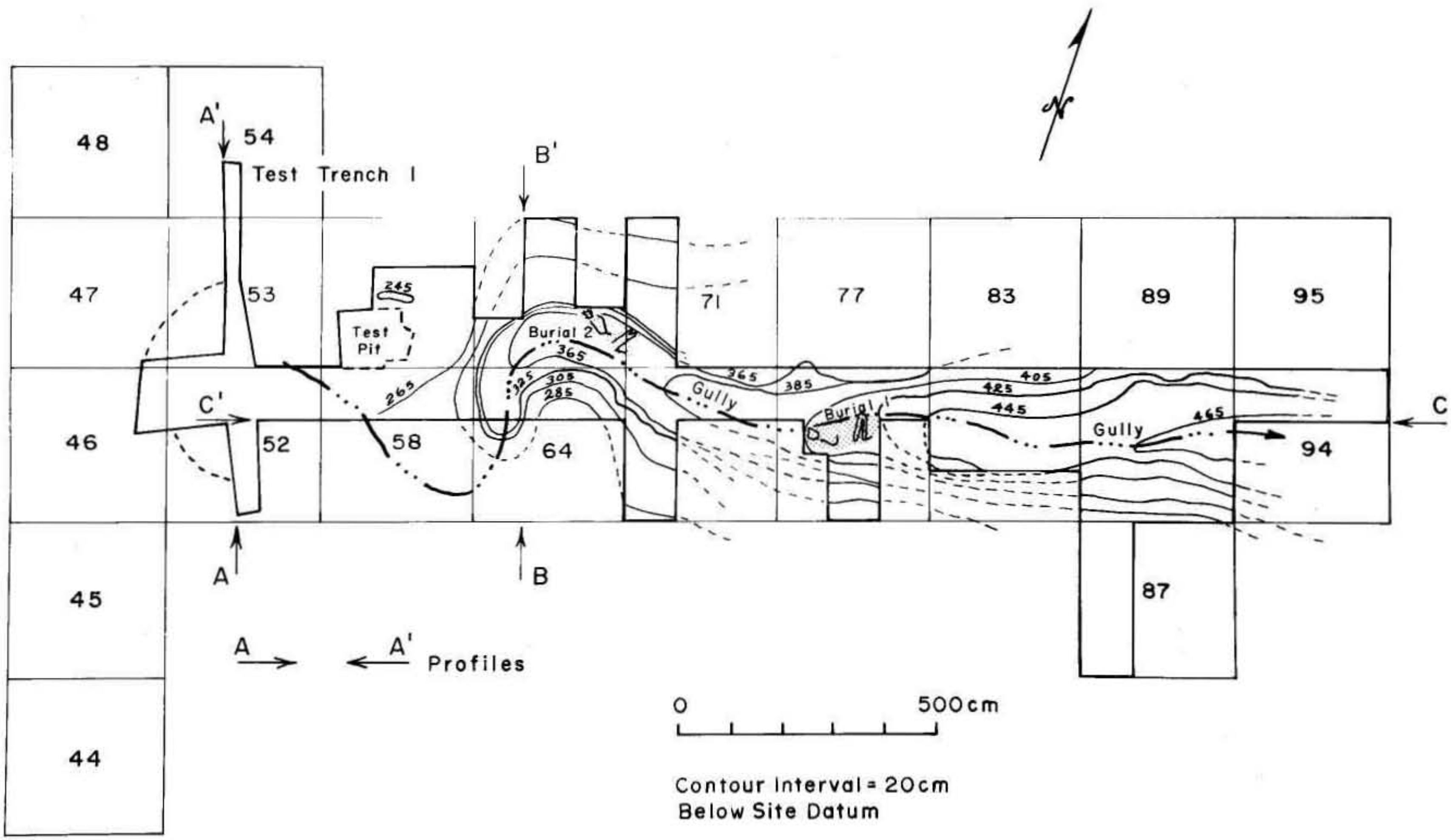


Figure I.3. *The 29SJ 629 Trash Midden, plan of excavations and the main gully channel (NPS 310/82267 C).*

focus rested with large lots of artifacts recovered from the site, primarily in the trash deposits.

Analytical Strategies and Problems

The analysis of bulk artifact classes (e.g., ceramic, lithic, and faunal artifacts) was emphasized at the expense of finished tools because of high artifact numbers and their brief descriptions in prior reports. The enormous amount of unexamined material from earlier site excavations in Chaco Canyon, compared to the total site inventories, meant that most of the cultural materials remain unreported and undescribed. In the past, only a few paragraphs covered the huge piles of fragmented items recovered. Of those sites excavated in the past near 29SJ 629 in the Fajada Gap Community, no reports on the cultural material, except for ceramics, were generated from work at the 3-C Site, Bc 236, Kin Nahasbas, and Una Vida. The resulting lack of comparative data from bulk artifacts recovered in Chaco Canyon made analyses a priority for those items recovered during the Chaco Project. Unfortunately, because of the lack of description from earlier work and the loss of these materials, it was not generally possible to compare the materials at other Chacoan small-house sites and greathouses (excavated prior to 1970) with those at 29SJ 629.

A flurry of analyses immediately followed the last field season at 29SJ 629. Reports on the axes and mauls (Breternitz 1976), manos (Cameron 1977, 1985), hammerstones (Wills 1977), other shaped stones (Powers 1976), and projectile points (VerEecke 1977) covered all small sites excavated by the Chaco Center and the materials recovered from the first season at Pueblo Alto (primarily from wall clearing). Although there was a more extensive report on projectile points later (Lekson 1980), site-specific reports for ground stones, hammerstones, cores, and projectile points from 29SJ 629 were not written. Instead, reports focused on project-level goals rather than site specific ones.

Some ambiguous treatment of cultural materials occasionally surfaced during the analyses. Warren's (1979) lithic material classifications used throughout the Chaco Project analyses, for instance, are not mutually exclusive and can be interpreted differently. The seemingly important split between the predominant categories of silicified wood (materials 1109-1110 and 1112-1113), for instance, depends on a subjective determination of the fracturing and refractory qualities of the stones--difficult to make in a consistent manner given the nature of the petrified wood. Variations within major classes, however, were lumped for the lithic analysis (Cameron, this volume), which gave greater meaning to interpretation. Site specific analyses of finished tools were given less precedence than debitage because they were scarce, although they were important components of lithic technology.

Overlap among some categories was not resolved, so that small hammerstone fragments, for instance, may have been analyzed only as chipped stone debris. Quartzite pebbles, in particular, were an analytical problem because it was difficult to distinguish primary use, if any, among them. These may have been field classified as manuports, polishing stones, or hammerstones (often very minor battering was evident along one end), or a combination for those battered and polished.

Ground stone artifacts comprised an enormous variety of subclasses that would have required much analytical time to define and verify before inter- and intrasite comparisons could be made. Given the magnitude of the ground stone problem and the limited available staff, the material was divided among several analysts with other analytical duties rather than one analyst. Therefore, ground stone suffered the most from taxonomic splits. Finally, some of the ground stone metric data has been compromised because of the lack of rigorous standards applying to fragments, and primary versus secondary use.

While it is true that the data can be culled to exclude fragmentary specimens, for instance, many artifact classes lack sufficient numbers of whole specimens to define and present the dimensional variability of specific types. Intact dimensions on fragmentary tools could help to enlarge sample means, but there is no way of knowing from printouts which dimensions are partial on the metate fragments (before 1975), the abraders, and the other shaped stones.

A complete inventory was made for each artifact class, and analyses were structured, in part, according to the distribution. Classes with large numbers of items were sampled (ceramics, pollen, and flotation), but the sampling strategy varied depending on contexts. Generally, emphasis was placed on floor contact materials and trash deposits. Pollen and flotation analyses concentrated on selected floor contact and pit samples, particularly those that could be best compared to similar samples from nearby 29SJ 627, although a wealth of samples remained for future examination.

Cultural materials went through three levels of processing, each of which may have generated discrepancies in the frequency of materials listed for each artifact category. In all cases, the archeologist in charge of each area of excavation was responsible for identifying and counting the materials recovered for the initial field inventory (although volunteers and laborers may have done the actual counting and listing). The field laboratory personnel checked these materials as they arrived, cleaned them, listed the appropriate provenience and material culture information on computer sheets for keypunching and eventual computer listing, and boxed the materials for shipment.

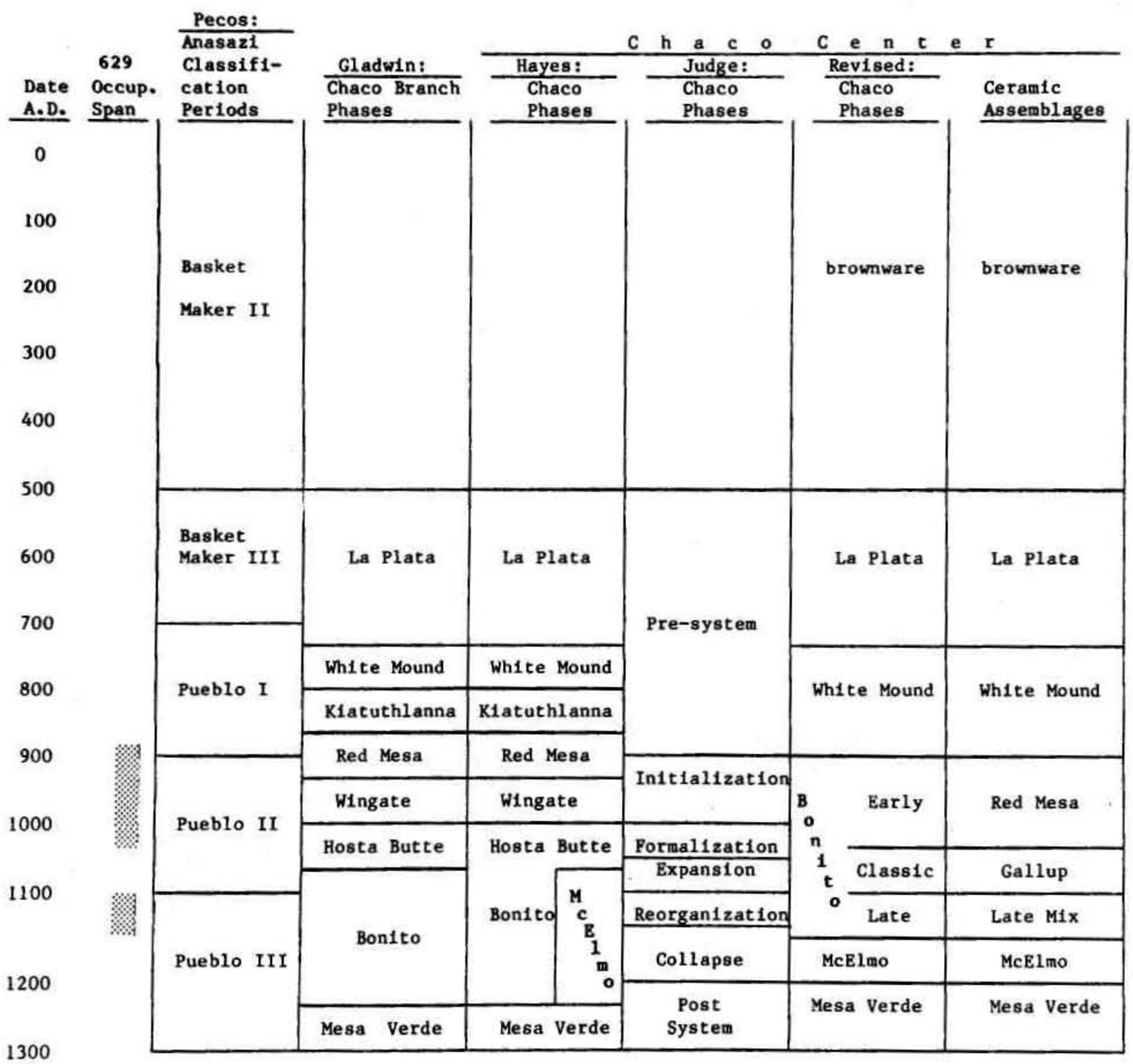
At these two levels (field and laboratory), a number of factors contributed to changes in artifact counts. Foremost among these was a lack of concise definition of some artifacts by staff members. Additionally, some adjustments were made in the laboratory counts after the artifacts were cleaned and could be more precisely identified. Invariably, large numbers of artifacts from a single provenience produced a few materials bagged with the wrong materials. Discrepancies were also inevitable because of the problem of counting small fragments in the bulk categories (e.g., sherds, debitage, and bones).

Typically, the laboratory personnel inventoried artifacts by following the typology listed on the archeologists' field bags. Artifacts were coded just once at the inventory stage without regard to secondary use. Finally, during the cataloging and final curation documentation of the artifacts in the 1980s and early 1990s, materials were recounted and reclassified by a different set of personnel. Thus, without considerable effort, it is not possible to be certain of the exact artifact frequency for some categories or even of their identification. Nevertheless, artifact frequencies are probably close to their real numbers.

At the final level of artifact identification (discounting later curatorial processing) were the analysts, who have produced the final artifact frequencies listed herein. Frequencies varied somewhat from the field tabulations (Table I.1), as they do for any project. In most cases, the discrepancies between the field and final inventories are minor annoyances. The primary differences in frequencies arise between abraders and other types of ground stones, and hammerstones. Some of these may have been analyzed twice by different analysts, based on the perceived primary and secondary uses, or stones with multiple uses may not have been seen by all the analysts in question. Many metate and mano fragments, for instance, were reused as abraders. Some mano fragments and some whole manos, at least, were analyzed as abraders but were not analyzed as manos, and vice versa. Probably in some cases, tools ground during the manufacturing process also were given abrader status.

On the other hand, many of the field-classified hammerstones were analyzed as polishers (McKenna 1984:241) or hammerstone/abraders. Hammerstone fragments, particularly of splintery petrified wood, often could not be identified as being hammerstone fragments, but those that were, failed to be analyzed. Thus, dividing the ground stones among several analysts may have been logistically sound at the time, but it created problems that are now difficult to rectify. Perhaps 5-10 percent of the artifacts in some stone tool categories were affected in this manner. This problem affects the overall analyses, but probably is not a critical deficiency in the 29SJ 629 reports.

Because of the long period of time over which these analyses were generated, a number of different phase terms and dates referring to identical temporal periods arose before the final version of this document was written (Figure I.4). Generally, the authors broke the 29SJ 629 occupation into similar blocks of time for analyses, although not all spans were identical. Probably some older versions slipped by the editing process or were published in earlier reports, but cross-references have been provided to help alleviate this problem (Table I.2). Finally, many aspects of the research at 29SJ 629 have been referenced prior to this report, including earlier versions. To assist the reader, a cross-reference list of these are provided in Table I.3.



[a]Modified from Windes 1987a:Figure 1.5.

Figure I.4. *Various temporal classificatory schemes for the Chacoan Anasazi culture and 29SJ 629's place within them.*

Table I.1. Inventory of materials recovered from 29SJ 629.

Type	Frequency
Bones	
Faunal remains	2,823
Worked bones	54
Human burials	2
Miscellaneous human parts	47
Ceramic sherds	32,724
Whole and restorable vessels	40
Ground stones	
Abraders	247
Manos and mano fragments	177
Metates and metate fragments	115
Potlids	14
Hafted tools	3
Slab covers	30
Other shaped stones	221
Chipped stones	
Debitage	6,832
Projectile points	39
Drills	26
Other tools	10
Cores	115
Hammerstones	324
Ornaments and scrap/fragments	
Argilite	6
Jet/lignite	10
Shale	7
Shell	18
Turquoise beads (and bead blanks)	65+
Turquoise pendants	17
Turquoise scraps	2,260
Turquoise micro-chips	500,000+
Minerals	
Azurite (includes 4 modified)	14
Galena (none modified)	21
Hematite (includes 4 modified)	25
Limonite (includes 15 modified)	51
Malachite (unmodified)	1
Selenite (includes 13 modified)	563
Others (includes 14 modified)	20

Type	Frequency
Eggshells	1,470
Soil samples	
Flotation	408
Pollen	450
Pollen/Flotation	33
Density	45
Conservation	73
Boxes from Plaza OP 1 with turpuoise impregnated fill	5(ca.0.30 m^3 each)
Others	28
Roofing impressions	121+
Chronometric samples	172
Total without turquoise microchips	49,723

Table I.2. Ceramic typological time in Chaco Canyon: A.D. 900-1300.

Ceramic Time For Artifact Analyses	Ceramic Spans Revised	Phase/Ceramic Period	Dominant Painted Ceramic Type(s)
A.D. 920-1020	A.D. 900-1040/1050	Early Bonito phase A.D. 900-975± (Early Red Mesa)	Red Mesa Black-on-white
--------	--------	Early Bonito phase A.D. 975±-1040/1050 (Red Mesa)	Red Mesa Black-on-white
A.D. 1020-1040	AD 1040/1050	--------	Red Mesa Black-on-white & Gallup Black-on-white
A.D. 1020-1120	A.D. 1040/1050-1100	Classic Bonito phase (Gallup)	Gallup Black-on-white
A.D. 1120-1220	A.D. 1100-1140	Late Bonito phase (Late Mix)	Gallup Black-on-white Puerco Black-on-white Chaco-McElmo Black-on-white McElmo Black-on-white (Local varieties)
--------	A.D. 1140-1200?[a]	McElmo phase (McElmo)	McElmo Black-on-white (San Juan variety)
A.D. 1220-1320	A.D. 1200-1300	Mesa Verde phase (Mesa Verde)	Mesa Verde Black-on-white (San Juan and local varieties)

[a] Span is poorly known.

Table I.3. Cross references for reports on cultural material analyzed from 29SJ 629.

Material	Author	Initial Report[a]	Revision	Publication	Computer File Name
Bone tools	J. Miles	1983	1988	Volume II	BONETL2
Human bones	N. Akins	1986[b]	-	Windes, Volume II	None?
Unworked bones	W. Gillespie	1981	1988	Volume II	None
Chipped stones	C. Cameron	1982[b]	new 1989	Volume II	LITHRS, CORE
Chipped stone tools	S. Lekson	1980[b]	new 1989	Volume II	ARROW, CSDETAIL
Projectile points	C. VerEecke	1977	-	Lekson, Volume II	POINTS
Hammerstones	W. Wills	1977[b]	-	Windes, Volume II	HAMSTONE
Abraders	N. Akins	1980[b]	new 1985	Windes, Volume II	ABRADER
Axes & Mauls	C. Breternitz	1976[b]	-	Windes, Volume II	None
Manos	C. Cameron	1977[b]	1985[b]	Windes, Volume II	MANOTS, MAN02
Metates	J. Schelberg	1987[b]	-	Windes, Volume II	METATE
Ceramics	W. Toll & P. McKenna	1981	-	Volume II	CERAMRS1, FACERAM
Ornaments & Minerals	F. Mathien	1985	-	Volume II	ORNAMENT
Eggshell	T. Windes	1977[b]	1992	Volume II	None
Flotation	M. Struever Toll	1981	1992	1985[b]; Volume II	None
Pollen	A. Cully	1983	1985	1985[b]	None
Pollen	G. Dean	1992	-	Volume II	None
Site inventory	--------	-	-	--------	INVENTOR

[a] Report is not listed in the references if the title is the same as that published in this volume.
Results from the 29SJ 629 analyses were often incorporated in summary articles (see Judge and Schelberg [1984]).
[b] Report incorporates analyses of materials from several sites, including 29SJ 629.

Statistical tests and symbols will be encountered throughout the report. For those unfamiliar with these tests, brief descriptions were covered by Toll (1987) in the Pueblo Alto report.

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1

THE TESTIMONY OF THE SPADEFOOT CERAMICS

H. Wolcott Toll and Peter J. McKenna

Introduction

The two primary goals of this report are to comprehensively present the ceramics from the Spadefoot Toad Site (29SJ 629), and to use analysis of ceramic attributes to contribute to the evaluation of the site's place in Chaco Canyon and the region. Using traditional type groups for chronological control, variation in attributes such as temper, paint type, and design is examined for evidence of different production areas. Written in 1981, the central theoretical questions motivating research were Judge's (1979) ecological model which posits that the Chaco system acted through redistribution to buffer the unpredictability and marginality of crop production in the San Juan Basin, and the question of status differentiation within Chaco. Much work has been done since this report was written, but the questions remain unanswered, and the data, of course, remain important.

Background--The Site

From the outset the reader should be aware of certain constraints on the analysis and interpretation of the site. There is only one assemblage of ceramic materials left where they were used: the floor of Pitstructure 2, and even that floor was partially removed by the construction of the Kiva. The remaining deposits consist of alluvium and structural decomposition, or of trash redeposited during construction and other site modifications. This collection is not, then, useful for studies such as those by Hill (1970) and Longacre (1970). Further, much of the extramural trash was placed in an arroyo, which led to considerable dispersion and reworking; only the fill of Pitstructure 3 and some of the peripheral Trash Midden are undisturbed "secondary" trash deposits (sensu Schiffer 1976).

Red Mesa Black-on-white is by far the predominant specific decorated type at 29SJ 629 (Table 1.1). Other excavated Chaco sites of similar age, size, and duration of use are the nearby Three-C Site (29SJ 625, Vivian 1965) and 29SJ 1360 at the base of Fajada Butte (McKenna 1984). 29SJ 627 (Truell 1992), Bc 59 (McKenna 1981), Bc 51 (Kluckhohn and Reiter 1939), and Pueblo Alto (Toll and McKenna 1987) have evidence of occupation contemporary with 29SJ 629, but these sites are all more difficult to interpret because of large quantities of later ceramics and/or the nature of excavation and interpretation.

The complete typological distribution of ceramics by provenience at 29SJ 629 is found in Volume I (Chapters 4-6). These tables provide the raw sherd counts by provenience for the ceramic collection from which the detailed analysis sample is drawn. General typological patterns of major architectural features as seen in the raw counts are as follows:

Table 1.1 Ceramic sample comparison at 29SJ 629.

Rough Sort Type	Rough Sort Count	RS %	Detailed Count	Detailed %	Temper Count	Temper %	Rim Count	Rim %
Plain Gray	11,896	36.4	88	5.2	88	5.3	20	1.8
Lino Gray	104	0.3	33	1.9	33	2.0	31	2.7
Lino Fugitive	41	0.1	3	0.2	3	0.2	3	0.3
Polished Tan	20	0.1	-	0	-	0	-	0
Wide Neckbanded	685	2.1	28	1.6	28	1.7	27	2.4
Narrow Neckbanded	3,187	9.7	64	3.7	62	3.7	52	4.6
Early PII Corrugated	216	0.7	45	2.6	45	2.7	27	2.4
PII Corrugated	141	0.4	21	1.2	21	1.3	20	1.8
PII-III Corrugated	7	0.0	6	0.4	6	0.4	5	0.4
PIII Corrugated	3	0.0	2	0.1	2	0.1	2	0.2
Unidentified Corrugated	4,061	12.4	35	2.1	34	2.0	25	2.2
GRAYWARE TOTALS	20,361	62.2	325	19.0	322	19.2	212	18.7
BMIII-PI Polished M/w	191	0.6	144	8.4	143	8.5	85	7.5
BMIII-PI Unpolished M/w	101	0.3	43	2.5	43	2.6	17	1.5
Early Red Mesa B/w	1,094	3.3	96	5.6	94	5.6	68	6.0
Late Red Mesa B/w	3,449	10.5	418	24.5	414	24.7	287	25.4
Escavada B/w	11	0.0	3	0.2	2	0.1	2	0.2
Puerco B/w	36	0.1	11	0.6	11	0.7	5	0.4
Gallup B/w	256	0.8	22	1.3	22	1.3	15	1.3
Chaco B/w	19	0.1	-	0	-	0	-	0
Exotic M/w	7	0.0	29	1.7	28	1.7	18	1.6
PII-III M/w	2,342	7.2	381	22.3	374	22.4	270	23.9
MINERAL-ON-WHITE TOTALS	7,506	22.9	1,147	67.2	1,131	67.6	767	67.8

Table 1.1. (continued)

Rough Sort Type	Rough Sort Count	RS %	Detailed Count	Detailed %	Temper Count	Temper %	Rim Count	Rim %
BMIII-PI Polished C/w	191	0.3	30	1.8	29	1.7	13	1.1
BMIII-PI Unpolished C/w	13	0.0	5	0.3	5	0.3	4	0.4
PII-III C/w	149	0.5	12	0.7	11	0.7	9	0.8
Mesa Verde B/w	2	0.0	2	0.1	1	0.1	2	0.2
Chaco-McElmo B/w	-	0	7	0.4	7	0.4	5	0.4
Chuska B/w	-	0	3	0.2	3	0.2	3	0.3
Chuska Whiteware	-	0	5	0.3	4	0.2	3	0.3
Red Mesa Design Chuska	-	0	8	0.5	8	0.5	3	0.3
CARBON-ON-WHITE TOTALS	265	0.8	72	4.2	68	4.1	42	3.7
Unidentified Whiteware	4,315	13.2	101	5.9	99	5.9	65	5.7
WHITEWARE TOTALS	12,086	36.9	1,320	77.3	1,298	77.6	871	77.0
Plain Red	-	-	7	0.4	5	0.3	5	0.4
Decorated Red	181	0.6	34	2.0	31	1.9	23	2.0
REDWARE TOTALS	181	0.6	41	2.4	36	2.2	28	2.5
Polished Smudged	96	0.3	20	1.2	16	1.0	17	1.5
Brownware	-	-	1	0.1	1	0.1	-	-
GRAND TOTALS	32,724	100.0	1,707	100.0	1,673	100.1	1,131	99.9
% Rough Sort			5.2		5.1		3.5	
% of Detailed Analysis					98.0		66.3	

Rooms: All rooms are dominated by a Red Mesa Black-on-white and neckbanded or neck corrugated assemblage. Slight increases of Gallup Black-on-white and related types occur in Rooms 1-3, 5, and 9. Redeposited trash accounts for the increased frequency of later types in Rooms 2, 3, and 9.

Pithouses: Pithouse 2 (upper fill and floor) has an assemblage similar to trash fill of Room 2 and 9, i.e., a Red Mesa-Gallup mix. Pithouse 3 is filled with trash exhibiting higher levels of early Red Mesa Black-on-white and narrow neckbanded than Pithouse 2. Both pithouses are also dominated by Red Mesa Black-on-white.

Kiva: This structure is the latest provenience and contains late corrugated and carbon-on-white types. The alluvial fill is again mostly Red Mesa Black-on-white ceramics.

Trash Midden: Earliest ceramic proveniences are nearest the site's structures and include Lino Gray, wide neckbanded, and La Plata and White Mound Black-on-whites. Higher frequencies of Red Mesa Black-on-white and corrugated culinary occur at the eastern side of the midden.

Appendix E in Volume I also displays the wide-spread locations of sherds contributing to reconstructed vessels. Matching of such sherds from throughout the site has contributed significantly to the interpretation of the deposits and subsequent evaluation of the discreteness and contemporaneity of major site proveniences.

Procedures

The collection has been subjected to two levels of analysis: a traditional typological or "rough sort" classification and a more detailed analysis based on types and attributes.

The rough sort, more fully treated elsewhere (Toll and McKenna 1987), is a temporally oriented classification based primarily on surface attributes. All of the ceramics recovered at each site excavated by the Chaco Project were processed through the rough sort, providing a ceramic inventory for each site. Decorative motifs are key elements in the assessment and recognition of ceramic temporal change. Inasmuch as the rough sort fails to systematically recognize the wide array of types used in more traditional Southwestern typology (i.e., Colton and Hargrave 1937), it cannot be completely compared with classifications founded on that system. Nevertheless, the pragmatic nature of the rough sort has allowed the structuring of the collection into categories we feel to be very similar to, if in some cases broader than, traditional classifications. Rough sort classification provides the general temporal structure of the collection as well as generating base-line groups for more detailed analysis and examination. The rough sort classification provides type identifications that are as specific as traditional typology for those decorated wares that are most abundant--the Cibola series. Types traditionally considered non-local, such as the San Juan and Tusayan series, fall into broad, indistinct rough sort groups. Separate tabulation of these types (Tables 1.2-1.3), partially corrects this failing, but these more refined types are not entered as variables in the detailed analysis.

The detailed analysis was performed on a sample drawn from the total collection. The sample is intended to minimize multiple inclusions of single vessels; this is accomplished by matching sherds (as above) and by concentrating on rim sherds, though substantial numbers of non-rim sherds are included in the detailed analysis. Because a sherd by itself has little meaning in terms of the actual vessels in use, the vessel-oriented detailed analysis sample is the focus of the ensuing discussion; we feel that the sample is more representative of the ceramic assemblage at 29SJ 629 than is the bulk count of the rough sort.

Two phases of recording were used in the detailed analysis: a macroscopic examination of the surface attributes for design, paint and finish, and a microscopic examination of the paste for temper, texture, and clay color. Surface attributes are primarily nominal in level, but do contain some metric variables such as rim fillet width on culinary specimens and orifice diameter for all items sufficiently large to make the projected measurement. Paste attributes focus on distinctive tempering material as an indicator of manufacturing source. Chaco Canyon and its environs are constituted largely of fine-to-medium-grained sandstone formations, principally of the Mesaverde Group (Dane and Bachman 1965). These sandstones are difficult to

Table 1.2. Refined types of redwares and carbon-painted wares from 29SJ 629.[a]

REDWARES AND SMUDGED WARES	San Juan			Chuska	White Mountain		Arizona		Smudged	
Provenience/No.	Bluff B/r	Deadmans B/r	Unident. San Juan	Sanostee R/o	Puerco B/r	Wingate B/r	Deadmans B/r	Woodruff Red	Forestdale	Showlow
Rooms n=10	-	-	2	2	-	-	-	-	6	-
Kiva n=13	-	1	1	-	-	-	-	-	5	6
Pithouses n=12	3	3	2	1	-	-	-	-	3	-
Plaza n=25	5	3	5	-	-	1	-	-	11	-
Trash n=100	14	10	38	26	1	-	1	-	10	-
Misc. n=45	3	1	11	5	1	2		1	18	3
TOTALS n=205	25	18	59	34	2	3	1	1	53	9
FORMS										
Bowls	19	14	32	25	2	3	1	1	53	9
Jars	6	4	25	9	-	-	-	-	-	-
Other forms	-	-	2	-	-	-	-	-	-	-

[a] Raw counts are from the rough sort tabulations.

Table 1.2. (continued)

CARBON PAINTED WARES	Chuska							Tusayan			MV	Cibola	General
Provenience/Number	Theodore B/g	Pena B/w	Tunicha B/w	Newcomb B/w	Burnham B/w	Chuska B/w	Unident. Chuska	Lino B/g	Kana'a B/w	Sosi-Black Mesa B/w	McElmo B/w	Chaco-McElmo B/w	Unident. C/w
Rooms n=6	-	-	-	-	-	1	3	-	1	-	-	-	1
Kiva n=12[b]	-	-	-	-	-	2	-	-	1	-	3	2	3
Pithouses n=14	-	-	1	4	1	1	1	-	2	1	1	-	2
Plaza n=27[b]	-	-	8	3	-	-	8	2	1	1	-	-	3
Trash n=87	1	10	10	6	4	1	25	5	10	1	4	1	9
Misc. n=66[b]	1	2	6	5	2	2	26	3	3	1	4	4	6
TOTALS n=212	2	12	25	18	7	7	63	10	18	4	12	7	24
FORMS													
Bowls	-	6	3	9	3	7	15	6	6	1	1	4	10
Jars	2	6	22	9	4	-	48	2	12	3	11	3	11
Other forms	-	-	-	-	-	-	-	2	-	-	-	-	3

[b] Includes the following isolated occurrences not shown in the column.
Holbrook B/w bowl sherd in the Kiva (Little Colorado Series).
Nava B/w bowl sherd in the plaza.
Mesa Verde B/w sherd from the miscellaneous group.

Table 1.3. Refined typological assignments for items coded as "exotic mineral" at 29SJ 629.

Provenience	Piedra[a]	Cortez[a]	Cortancos[b]	Mancos[a]	Drolet[c]	Socorro[d]	Kiatuthlanna[e]
SURFACE							
Grid 7	-	canteen	-	-	-	-	-
Grid 32	-	-	-	-	-	B	-
Grid 26	-	B	-	-	-	-	-
Trash Grid 71	-	-	-	-	B	-	-
Trash Grid 82	-	B	-	-	-	-	-
Test Trench 98	-	B	-	-	-	-	-
TEST TRENCHES							
Test Trench 21 Level 2	-	-	-	J	-	-	-
Test Trench 3 Level 4	-	B	-	-	-	-	-
Test Trench 26 Level 3	-	-	-	B	-	-	-
Test Trench 11 Level 1 (Test Trench 1)	-	-	-	L	-	-	-
Test Trench 99 Fill[f]	-	-	-	-	B	-	-
TRASH MIDDEN							
Grid 65 Level 4	-	B	-	-	-	-	-
Grid 65 Level 5	-	B	-	-	-	-	-
Grid 70 Level 1	-	B,J	B	-	-	-	-
Grid 71 Level 2	B	-	-	-	-	-	-
Grid 82 Level 2	-	B	-	-	-	-	-
Grid 88 Layer 1, Level 1	-	B	-	-	-	-	-
Grid 88 Layer 1, Level 2	-	B	-	-	-	-	-
PLAZA							
Grid 41 Level 1	-	-	J	-	-	-	-
Other Pit 14	-	B	-	olla	-	-	B
ROOMS							
Room 3 Level 3	-	J	-	-	-	-	-

Table 1.3. (continued)

Provenience		Piedra[a]	Cortez[a]	Cortancos[b]	Mancos[a]	Drolet[c]	Socorro[d]	Kiatuthlanna[e]
PITHOUSES								
Pithouse 3 Level 9		B	-	-	-	-	-	-
Totals								
	19 bowls	2 bowls	11 bowls	1 bowl	1 bowl	2 bowls	1 bowl	1 bowl
	4 jars	-	2 jars	1 jar	1 jar	-	-	-
	1 ladle	-	-	-	1 ladle	-	-	-
	1 canteen	-	1 canteen	-	-	-	-	-
	1 olla	-	-	-	1 olla	-	-	-
	26	2	14	2	4	2	1	1
Temper	16 sandstone	1	9	2	3	-	-	1
	4 San Juan	1	3	-	-	-	-	-
	2 trachyte	-	-	-	-	2	-	-
	3 unident. igneous	-	2	-	1	-	-	-
	1 Socorro igneous	-	-	-	-	-	1	-
	26	2	14	2	4	2	1	1

Key:
B = bowl.
J = jar.
L = ladle.

[a] Breternitz et al. 1974; Hayes and Lancaster 1975.
[b] Hayes and Lancaster 1975.
[c] Windes 1977.
[d] Sundt 1980.
[e] Roberts 1931
[f] + 1 unclassified bowl (San Juan temper).

distinguish when reduced to ceramic temper (Warren 1976, 1977); the substantial proportion of ceramics found in Chaco Canyon that are tempered with these sandstones is recorded in this analysis as "undifferentiated." Nevertheless, the use of distinctive igneous materials, distinguishable chalcedonic cemented sandstone, and grain size differentiation in sandstones allow documentation (albeit of varying specificity) of geological sources for several San Juan Basin tempering elements.

In contrast to surface attribute analysis, systems of core composition attribute recording are not well established, especially for large collections. Warren (1967, 1976, 1977) has done work on temper identification in the Chaco area and the temper and paste recording systems used in detailed analysis rely on her work for a base. Warren's recording system (1977), being personalized and not computer-oriented, was modified and the resulting system was subsequently modified two more times. The recording system used for 29SJ 629 is that of the final modification also used for Pueblo Alto, 29SJ 627, 29SJ 423, and 29SJ 299 (BMIII occupation). The system records selected specific temper types identifiable at 30-45 power with a dissecting microscope, as well as the more general tempers noted, a rating of temper grain size to the nearest 0.25 or 0.5 mm (depending on coarseness), an estimate of temper density, placement in a visual clay-temper category if appropriate, an estimate of the quantity of sherd temper relative to other temper, and a visual assessment of degree of vitrification. Though this system comes nowhere near to recording all the observable variability in tempers and clays, much of that variability presently has little geological meaning to us. The virtue of the system is its ability to process quantities of sherds and provide at least some distributional information.

A term which recurs in this report for which we are responsible as far as we know (e.g.,Toll 1981, 1984), is "typological time." It has been found to be very useful, but its meaning and limitations need definition. "Typological time" is based on the fact that many types do have chronological limits, and that types appeared more or less in a serial fashion as shown for this report in Figures 1.1-1.2 and Plates 1.1-1.12. Characteristics of typological time that bear on the understanding of our use of the concept as an ordering principle are:

1) While points along the typological time line have the appearance of intervals, they are ordinal at best; certainly typological time cannot be thought of as consisting of equal-sized units, though it can be given a rough correspondence to years.

2) The ordinal nature of typological time is also not perfect--that is, rather than types ending and beginning at precise points, there is temporal overlap between them (Figures 1.1-1.2; or Breternitz et al. 1974:Table 1). The concept, therefore, relies on the probability of a type coming from a certain point in time as suggested by the classic "battleship curve" (Deetz 1967).

Thus, typological time deals strictly in trends and tendencies, relying on one type being overall later than another, and should be regarded in that light rather than as an absolute chronology or perfect series. As such, its use allows the definition of trends in changes in attributes such as decoration, temper, vessel size, and use. This is nothing more than the well-established use of ceramics for chronological placement of deposits, with an attempt both to use that chronological information and to recognize its limitations.

Background--Principal Types

A detailed description of Cibola types, as found in Chaco Canyon, is provided elsewhere (McKenna and Toll 1984; Toll and McKenna 1987; Windes 1984), but a general discussion of primary types and problems in their identification is relevant here. Briefly, Red Mesa Black-on-white may be recognized by several principal attributes. A white slip, often thin and streaky in appearance, was applied in a variety of manners: interior only, both surfaces (bowls), and with some "slip-slop" over the rim onto a generally unslipped surface from a slipped surface (bowls and jars). Bowl rims are direct (unflared) and frequently tapered, but enclosed forms often display a more rounded lip. Rims are almost invariably painted with a solid line which frequently exhibits a short gap or "Broken Life Line" (Gladwin 1945:56-57). Paint is mineral and designs are most often expressed in bands, the number and location usually depending on the vessel form. Common elements are interlocking scrolls, opposed solid elements, checkerboards, ticked or scalloped triangles, and squiggled and straight line hachured motifs with

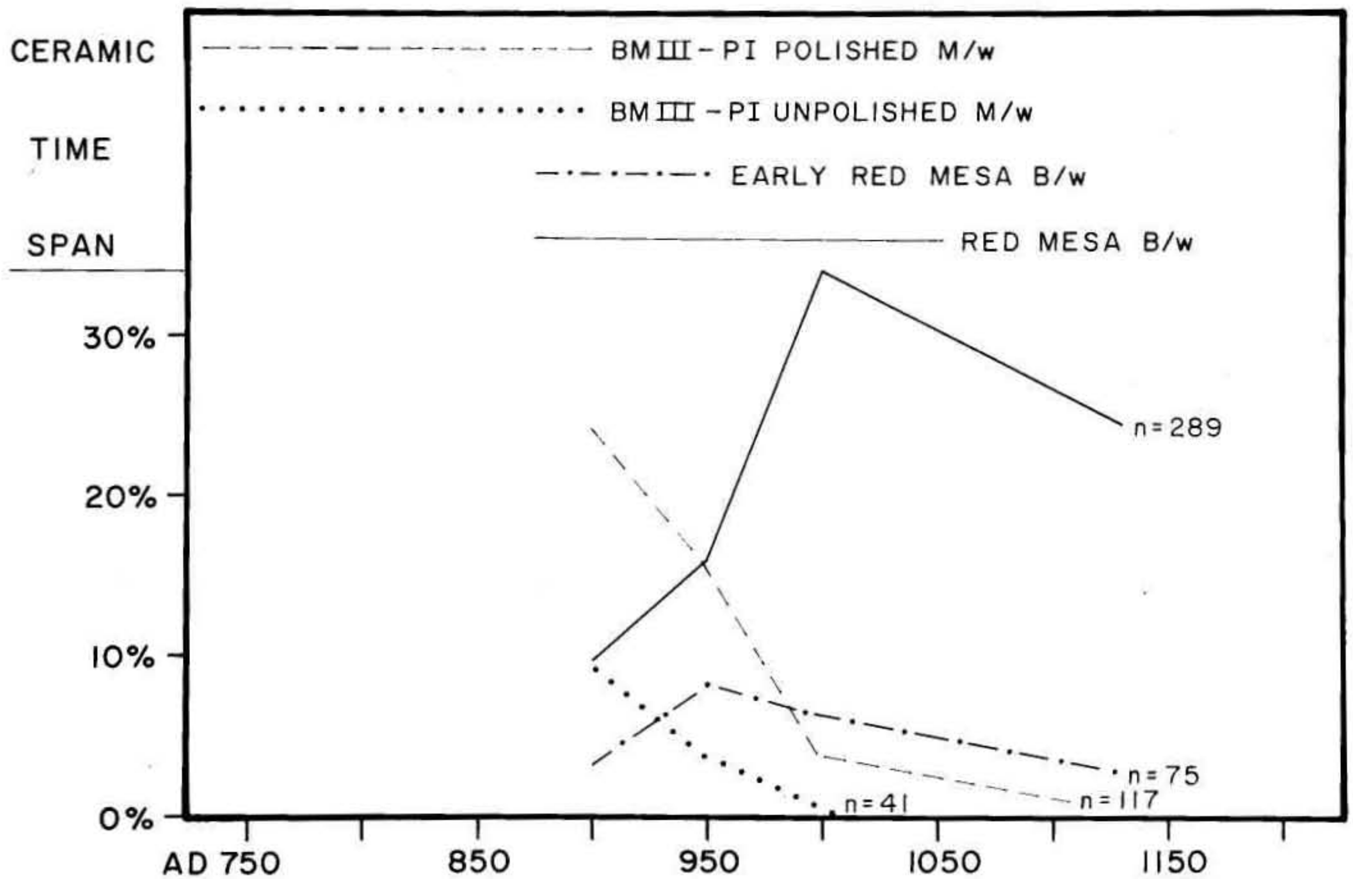

Figure 1.1. *Whiteware chronology. The four most abundant whiteware types of 29SJ 629 are shown; these types are those chosen for detailed description. The horizontal lines at the top of the figure show the time spans of each type as applied by the Chaco Project (the BMIII-PI types extend back to ca. A.D. 500). The frequency plots lower on the chart show the occurrence of each type in proveniences assigned time spans by Windes, expressed as the percent of each segment's total collection. (NPS 310/82811 B).*

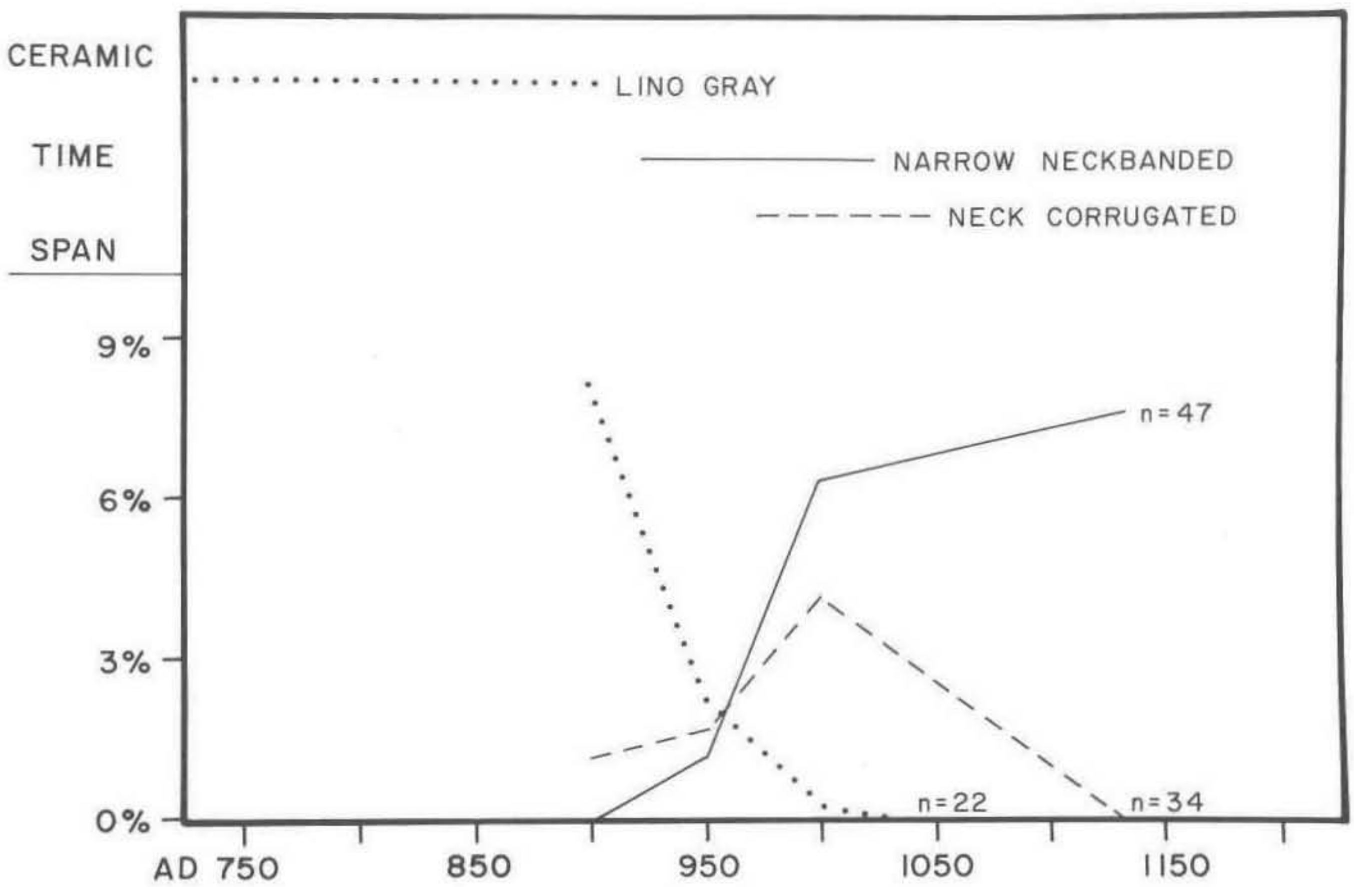

Figure 1.2. *Grayware chronology. The three most abundant grayware types at 29SJ 629 are shown. Arranged as in Figure 1.1; in this case Lino Gray extends back to ca. A.D. 500. (NPS 310/82812 B).*

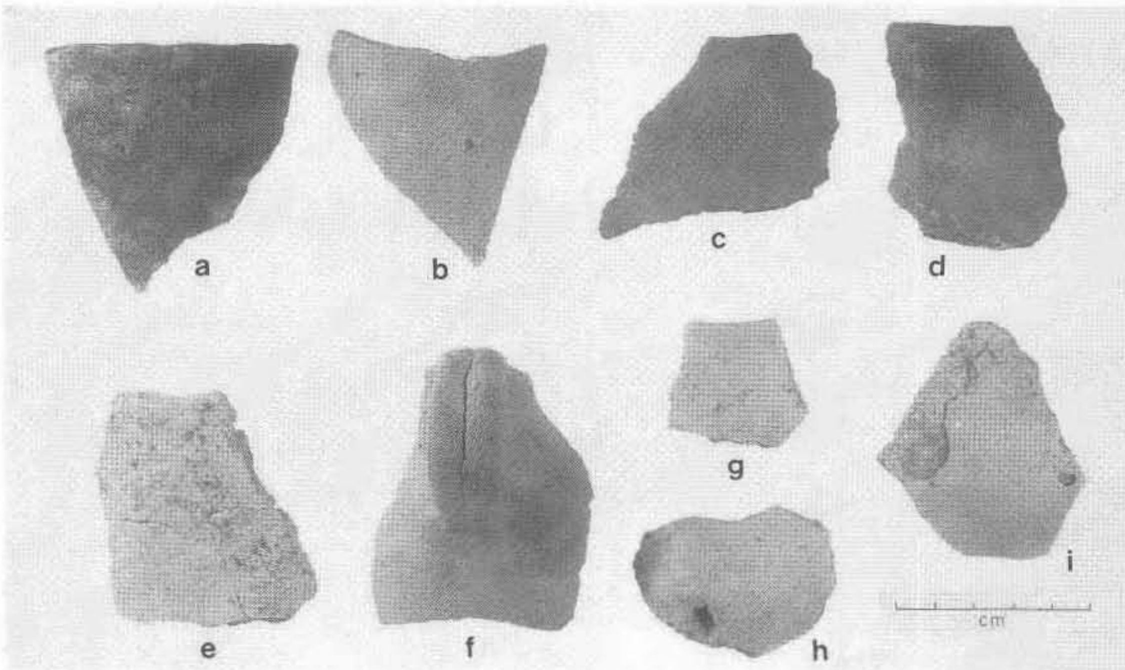

Plate 1.1. *Examples of Lino Gray. a-d with sandstone temper; e), Fugitive Red jar with sandstone temper; f), short pitcher with sandstone temper; i), trachyte temper (Bennett Gray) (NPS 31965).*

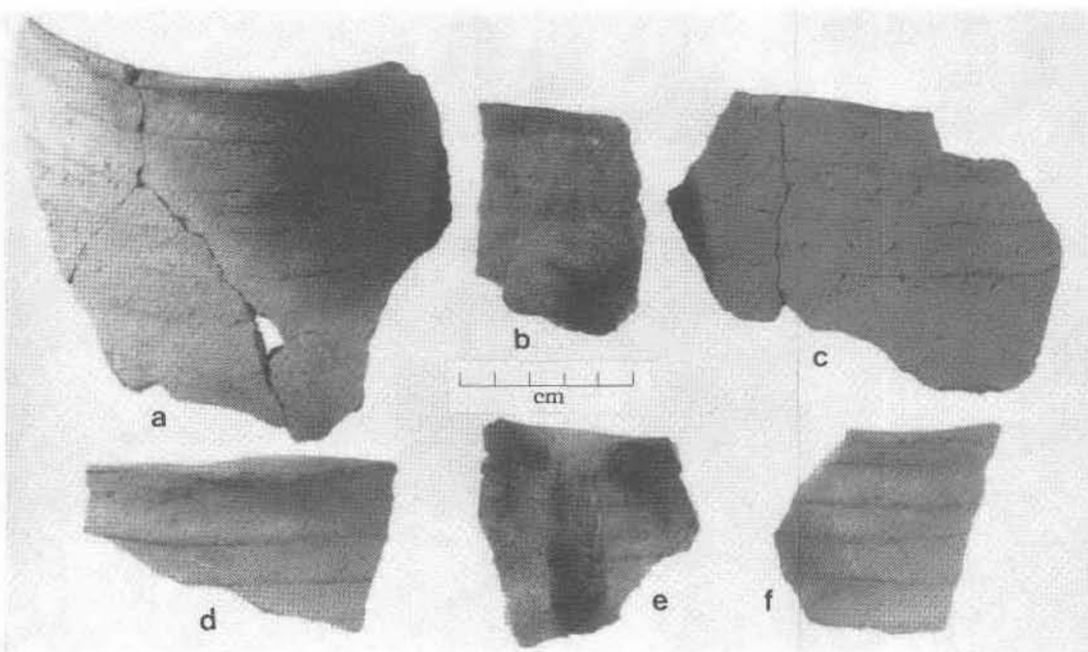

Plate 1.2. *Examples of Wide Neckbanded. b) has a "nubbin lug;" d) an extended lip handle; e) is a short pitcher form; a), b), d), and e) are tempered with coarse to a very coarse sandstone; c) and f) are tempered with trachyte (NPS 31964).*

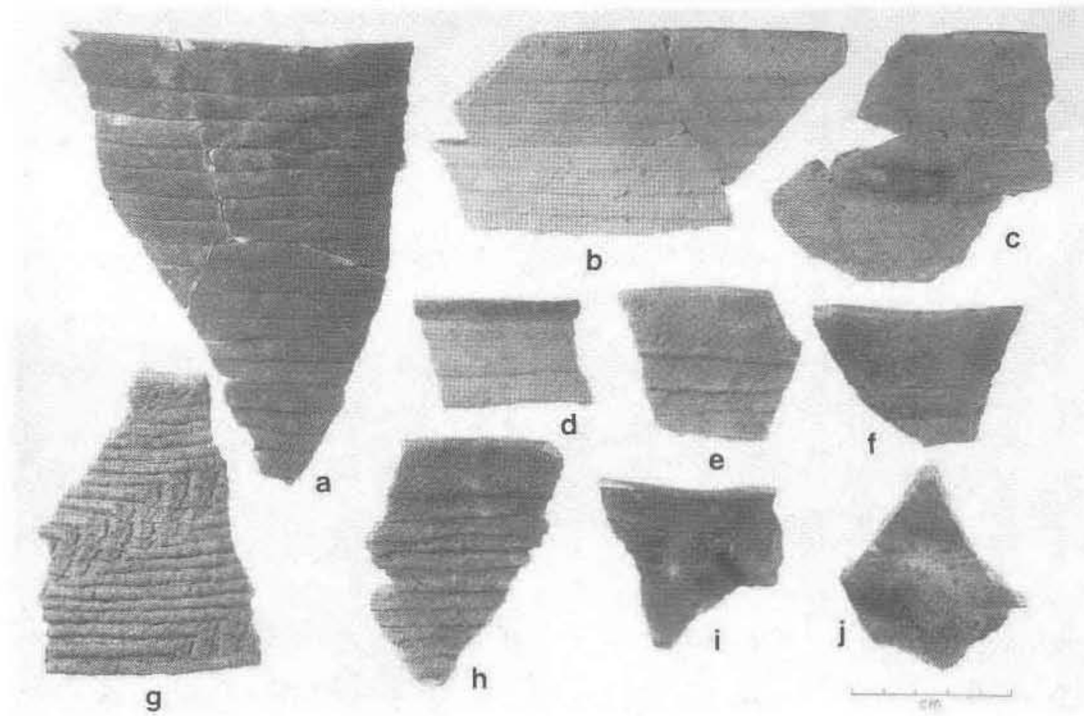

Plate 1.3. *Narrow Neckbanded sherds, primarily clapboard. c) has a tabular lug and incisions between coils; g) has patterned corrugation and banded style--it is tempered with trachyte; i) and j) have "nubbin lugs;" a-f), h), i) all have coarse to very coarse, undifferentiated, sandstone temper; j) with magnetitic sandstone (NPS 31961).*

framing and hatching lines of equal width. Parallel lines, either straight or squiggled, are frequently used as framers adjacent to banded patterns or as panel dividers within the bands. Temper is principally of sand or sherd and combinations thereof.

The temporal span of 29SJ 629 encompasses at least two periods of ceramic typological uncertainty in Chaco Canyon. These periods occur at either end of Red Mesa Black-on-white's recognized period of production (ca. A.D. 875-1040). It is possible on the basis of design to separate sherds thought to be from the early end of the manufacture of Red Mesa; these are herein separated into a group termed early Red Mesa Black-on-white. This separation was intended not as a new type but more as a mode of examining a visually distinct, probably early subset of the larger class Red Mesa Black-on-white. The early Red Mesa group is distinguished from Red Mesa largely on the basis of design layout, line quality, and slipping. Criteria for separation are summarized in Table 1.4. Design elements in early Red Mesa and Red Mesa are similar, but there is more frequent use of multiple parallel line framers in early Red Mesa Black-on-white and hachured elements are infrequent in early Red Mesa Black-on-white.

In earlier studies the equivalent to our "Early Red Mesa" has been discussed as Kiatuthlanna Black-on-white or subsumed under Red Mesa Black-on-white (Vivian 1965; Bradley 1971:43-44). Gordon Vivian (1965:31-35) noted the problems of separating Kiatuthlanna Black-on-white from Red Mesa Black-on-white. Kiatuthlanna Black-on-white is regarded in this analysis as a type produced to the south and west of Chaco Canyon (Roberts 1931) and itself rare in the canyon (Windes 1984:106). Early Red Mesa Black-on-white is roughly contemporaneous with Kiatuthlanna Black-on-white and is in several regards similar in appearance. The segment of Kiatuthlanna

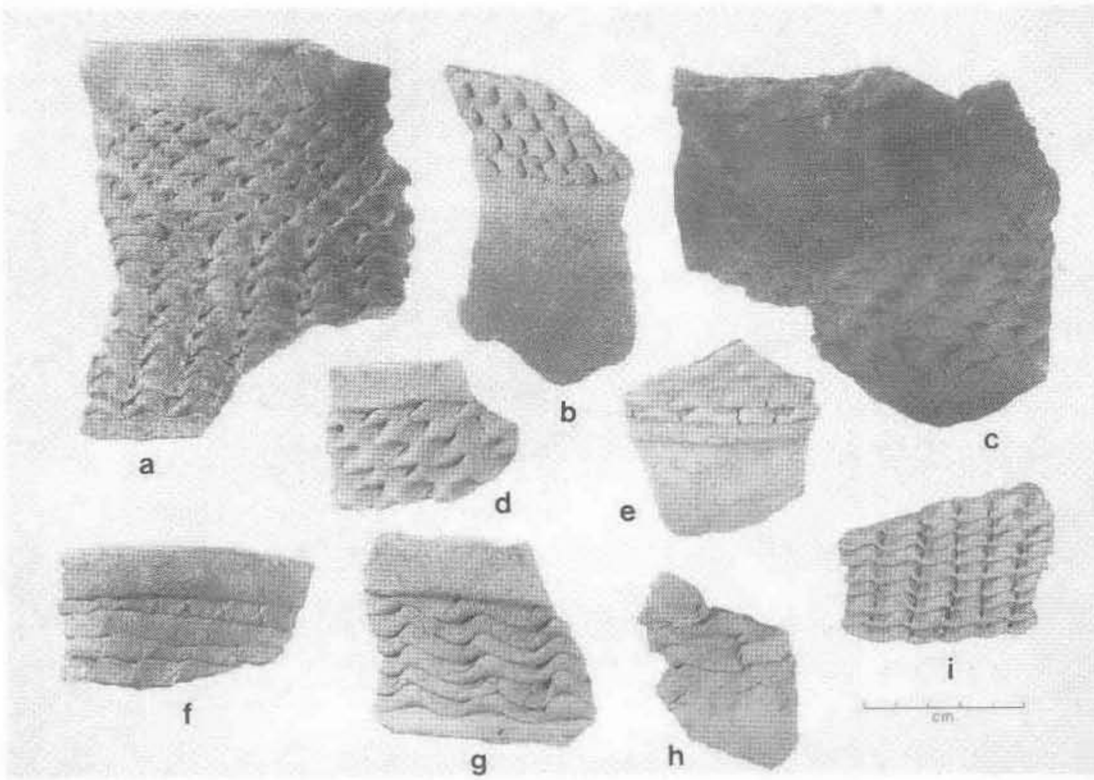

Plate 1.4. *Examples of Neck-Indented Corrugated. b), c), and e) show the juncture of the corrugated neck with the plain lower body; a) has magnetitic sandstone temper; b), c), and e) contain medium sandstone temper; f), h), i) are tempered with coarse to very coarse sandstone; g) contains chalcedonic cement sandstone temper, and d) contains trachyte (NPS 31963).*

Black-on-white most similar to early Red Mesa Black-on-white is recognized by Roberts (1931:135-36) as late. Roberts' late Kiatuthlanna Black-on-white and our early Red Mesa Black-on-white have in common design layouts with narrow lines, multiple parallel lines in nested chevrons adjacent to solid elements enclosed in parallel framers. Features distinguishing Kiatuthlanna Black-on-white from Early Red Mesa Black-on-white are listed in Table 1.5.

The differences between these two "types" are in large part subjectively defined; it is thought that there is some material reality to them, but we are poorly equipped to explore them, lacking adequate comparative materials. Gladwin's apparently rigorous definition of Kiatuthlanna Black-on-white does not agree with the definition used here; Windes (personal communication, 1981) attributes this discrepancy to the likelihood that Gladwin was using ceramics that are more nearly our early Red Mesa Black-on-white. Ceramics from the type site for Kiatuthlanna Black-on-white are thought to differ as indicated in Table 1.5. Sherds decorated similarly to the less restricted full range of Kiatuthlanna Black-on white are present in the BMIII-PI Mineral paint-on-white group (Plate 1.6b, l, p), suggesting that both the assignment of Kiatuthlanna Black-on-white to a chronological position overlapping BMIII-PI groups and Red Mesa Black-on-white is realistic and that the problems generated by these types are those of dividing continuous variation into discrete categories.

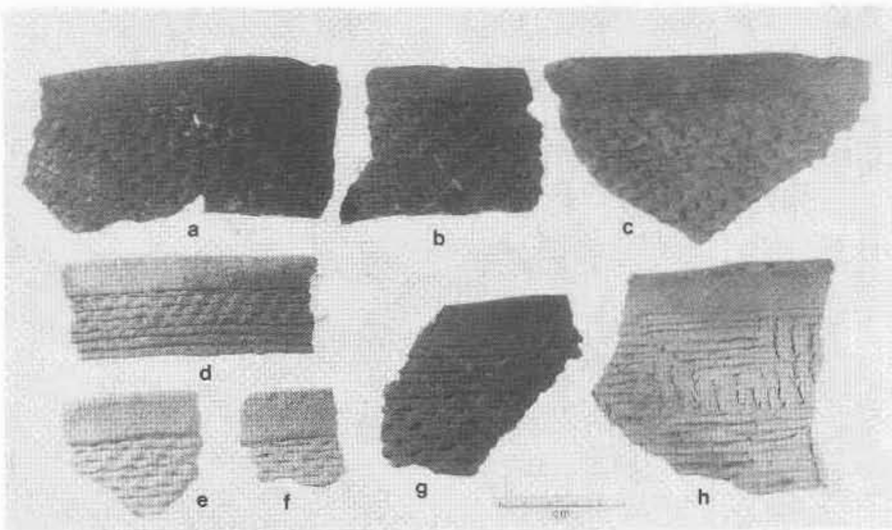

Plate 1.5. *Pueblo II and Pueblo II-III corrugated sherds. h) has patterned corrugation similar to g)-Plate 1.3, but the rim and complete corrugation of this vessel place this in a later type. a) is tempered with sandstone-trachyte mix with sandstone dominant; b) contains chalcedonic sandstone; c-f), and h) are tempered with trachyte and g) with trachyte-sandstone mix (NPS 25674).*

The transition period from Red Mesa Black-on-white to Gallup Black-on-white is likewise marked by considerable argument and confusion. Pottery produced in the early to mid-eleventh century has vexed typologists in Chaco Canyon for decades, as illustrated by terms such as "Red Mesa-Gallup," in part, "Escavada Black-on-white" (Hawley 1934) and "Degenerate Transitional" (Roberts 1927). Gallup Black-on-white is recognized in this analysis by the presence of rectilinear hachured motifs. Execution of these motifs procedes through time from widely-spaced lines of even-valued framer and hachure to increasingly bold framers and closer spacing of hachure (Plates 1.11d, 1.12h, c). A similar progression is apparent in motifs with squiggled hachure lines. Gallup Black-on-white produced in this transitional period frequently has hachure motifs executed within a banded layout similar to Red Mesa Black-on-white (Plates 1.11a, 1.12a; Volume I: Plates 8.10c-8.10d) and corners are often painted solid (Plate 1.12c). Plate 1.11 presents examples of early hachured motifs. It should be noted that designs in which the framers and the hachure are of equal width are typed as Red Mesa Black-on-white while others are typed as Gallup Black-on-white; the difference rests primarily in how the design is laid out, with Gallup Black-on-white ceramics tending toward more complete filling of the design field and less band-oriented layout.

Graywares commonly associated with Red Mesa Black-on-white are neck-decorated types (Plates 1.2-1.4), Tohatchi and Gray Hills Banded, and Captain Tom and Newcomb Corrugated (Windes 1977). Neckbanding usually is narrower in this period than it is earlier (Plate 1.3). Near the end of Red Mesa Black-on-white's period of production, ca. A.D. 1030, this neck decorating is extended to tooling and corrugations (Plate 1.4). The use of neck-decorated culinary accounts for the high counts of plain gray at sites of this period. By the end of Red Mesa Black-on-white's period of production fully corrugated types such as Chaco Corrugated were being produced (until recently, these early overall indented corrugated vessels were designated as Coolidge Corrugated; Windes and McKenna 1989). Rounding out the core assemblage at 29SJ 629 is a redware, Deadmans Black-on-red (Plate 1.14), quite certainly from

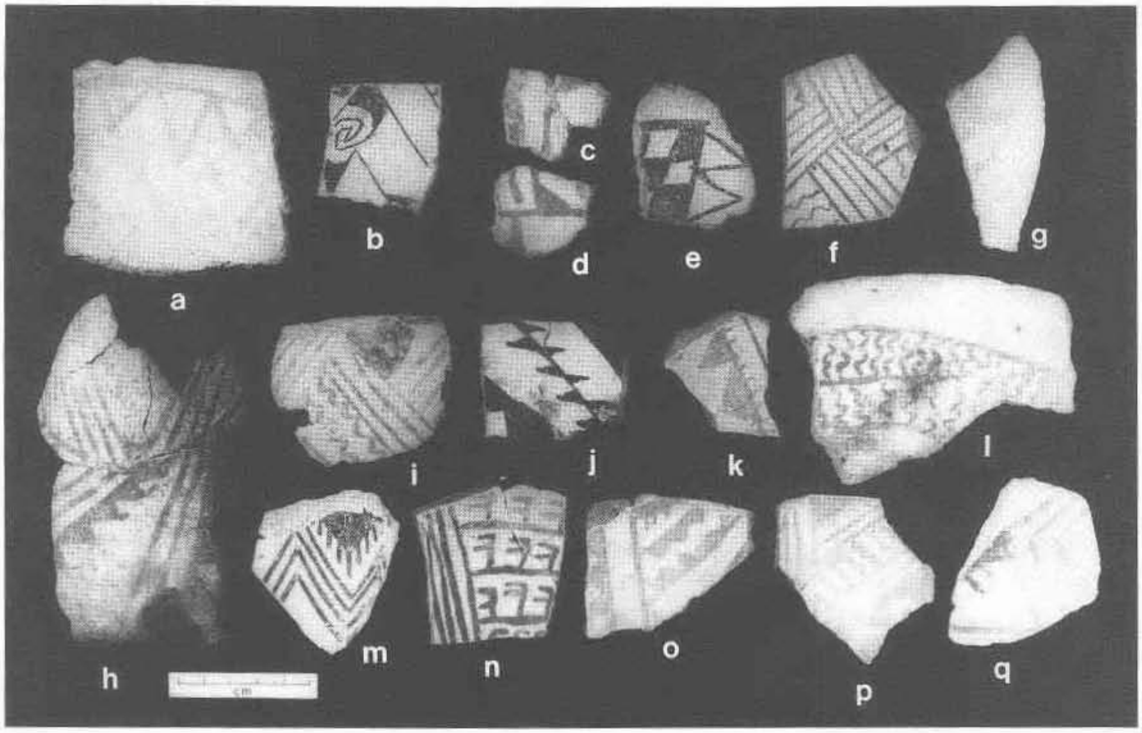

Plate 1.6. *Basketmaker III-Pueblo I mineral-on-white sherds. a), c)-g), and i) are unpolished; g), h), i), and q) are jars. a-d), e), g), i-k), and o-p) are tempered with coarse to very coarse sandstone; f), l), and m) contain fine-to-medium sandstone; d) is tempered with sandstone containing rounded iron oxide; n) with chalcedonic sandstone; h) contains trachyte, and q) with San Juan igneous temper (NPS 31957).*

Southeastern Utah (Lucius and Breternitz 1981). Carbon-decorated vessel fragments (Plate 1.13) and other redwares (Plate 1.14) are scattered throughout the entire assemblage.

Organization and Contents

As ceramic reports from other sites were written subsequent to this one, the comparative aspect of this report is limited, but the descriptive format and questions addressed are similar to the other reports. What follows covers five basic topics. There is a brief discussion and presentation of the sample with which the majority of this chapter is concerned and upon which interpretations of this ceramic record are largely based. Next, a general descriptive section concerning selected types is presented. Third, discussion, description, and verifications of observed patterns in principal attribute groups derived from the selected types described in the previous section are presented in an effort to evaluate increasingly refined segments of the ceramic data. Functional interpretations based on types, vessel forms, and selected proveniences follow. Within-type chronological change is briefly examined by means of provenience groups thought to be temporally discrete. Finally, an overview and broader interpretations are presented. Throughout, attention is paid to the temporal changes apparent typologically.

The 29SJ 629 Sample

Table 1.1 shows counts and percentages for the rough sort at 29SJ 629 and three aspects of the

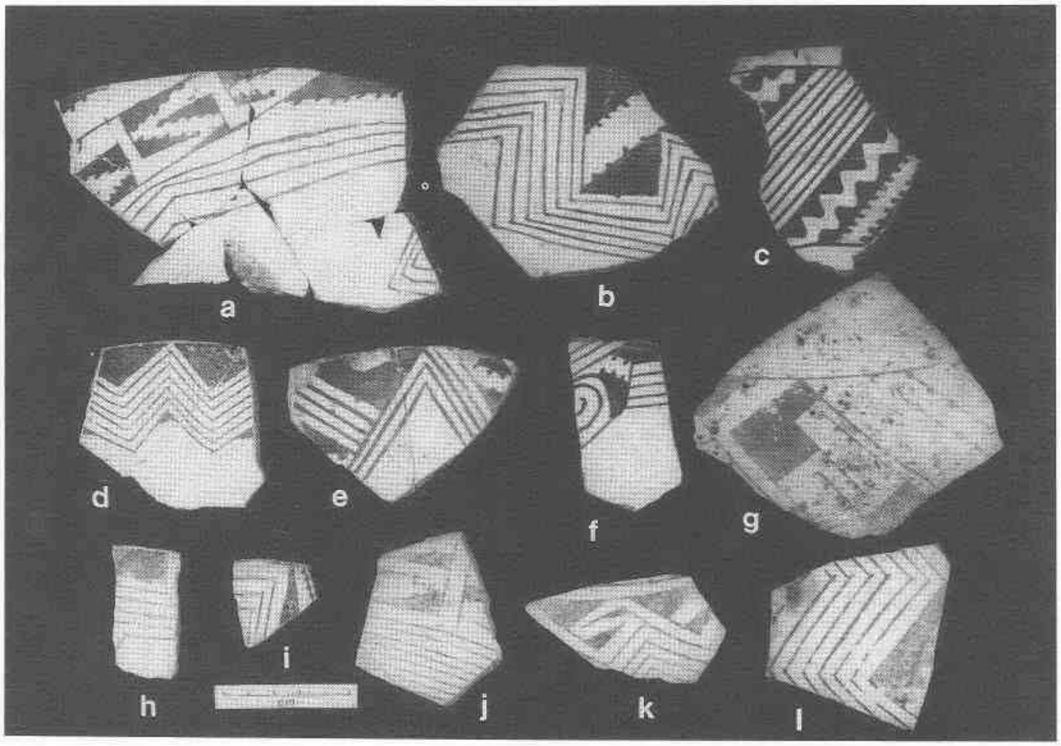

Plate 1.7. *Examples of Early Red Mesa Black-on-white. g), k), and l) are jars; j) is recorded in Table 1.3 as Kiatuthlanna B//w. All examples are tempered with fine-to-medium undifferentiated sandstone, except g) and l) which contain chalcedonic sandstone (NPS 31966).*

detailed analysis sample. There is no question that the detailed analysis sample is quite different in composition from the gross counts. Significant chi-square values ($p < .001$) were obtained for all of the following comparisons:

rough sort--detailed analysis, excluding unidentified plain gray and unidentified whiteware, comparing distribution of wares $\chi^2=745.49$, df=4, n=18,050.

rough sort--detailed analysis ware comparison excluding all unidentified corrugated $\chi^2=312.26$, df=4, n=13,934.

rough sort--rim sample ware comparison, plain gray, unidentified corrugated and whiteware excluded, $\chi^2=169.80$, df=4, n=13,473.

rough sort--detailed analysis comparison of gray types excluding unidentified gray and corrugated, $\chi^2=348.13$, df=5, n=4,586.

rough sort--detailed analysis comparison of mineral painted types, $\chi^2=494.10$, df=8, n=8,634.

The differences between the samples are readily seen in comparison of percentages in Table 1.1; relative quantities of gray and whiteware are virtually reversed in the two samples, the difference being 43-44 percent between the two. A good deal of the difference is in the high plain gray count, but, as can be seen in the above chi-squares, the samples are significantly different even when the large unidentifiable groups are removed. In part, this appears to be a function of rim survival and the

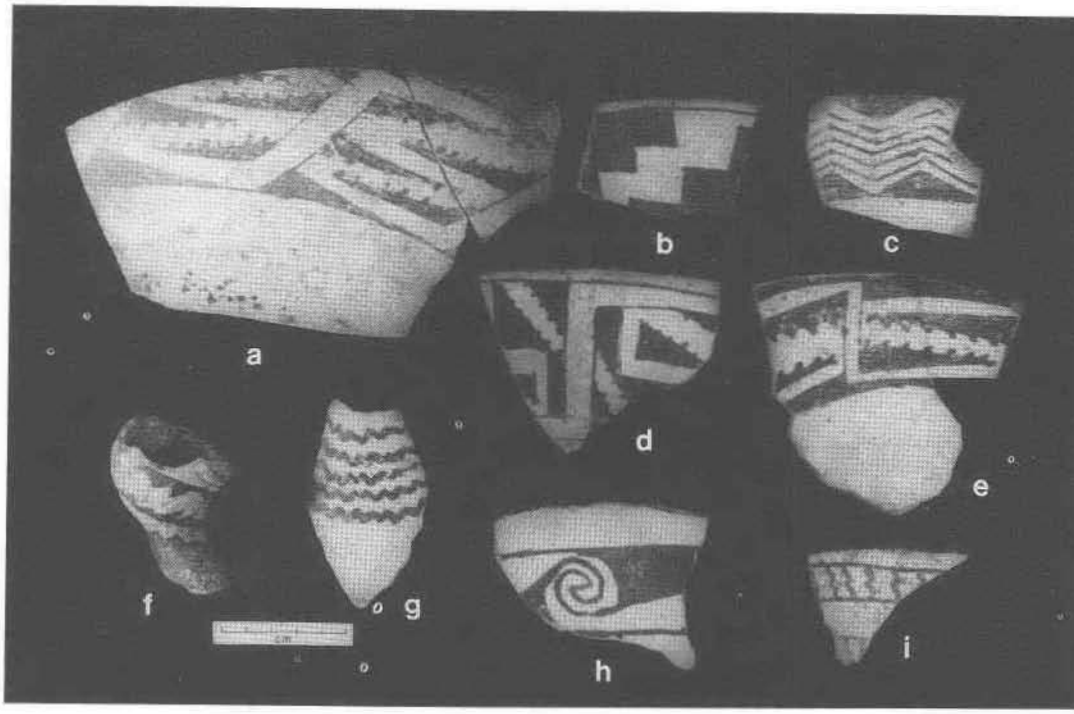

Plate 1.8. *Examples of Red Mesa Black-on-white with brown paint. a) and g) are jars and f) is an effigy leg. c) is similar to Plate 1.7d, but vessel thickness and boldness of design execution are reasons for placing it in this group. All sherds are tempered with fine-to-medium undifferentiated sandstone, except for f) and g) which contain coarse sandstone (NPS 31959).*

transition of pots into sherds. Though rims constitute only 66.3 percent of the detailed analysis sample, the composition of the overall detailed sample is very close to that of the pure rim sample. Thus, if the idea behind the rim sample, i.e., to study vessels rather than sherds is valid, then the detailed sample approximates very closely the distribution of vessels at the site, largely by including all the rims recovered. The question remains, are grayware pots sufficiently larger than vessels of other wares as to generate such a disproportionately greater number of body than rim sherds? In part this can be seen to be intuitively true by looking at relative sizes of pots and sherds of different wares: that is larger grayware vessels break into smaller sherds. Still, the disproportion is great enough to make one worry about underrepresentation of graywares. Having recognized this potential skewing, it can only be noted that the same bias is likely to operate at other sites, making between-site comparisons best done in terms of strict rim samples, and then forge ahead.

The temper assemblage at 29SJ 629 (Table 1.6) is overwhelmingly undifferentiated sandstone (73.6 percent). Later sections deal with the subdivision of this large group by grain size, which contributes limited information about source, since coarse-grained sandstones are less likely to have come from Chaco Canyon proper (Warren 1976, 1977). While some tempers are low in overall occurrence, it will be seen below that some temper groups are more frequent in some types and wares than in others. San Juan igneous temper, for example, is 3.2 percent overall but 10.6 percent of BMIII-PI polished mineral-on-white and 61.1 percent of redwares. Trachyte temper associates with graywares and carbon-painted ceramics, while chalcedonic-cemented sandstone temper associates with graywares and mineral-painted wares. Table 1.6 presents the entire temper sample by lumped temper group and rough

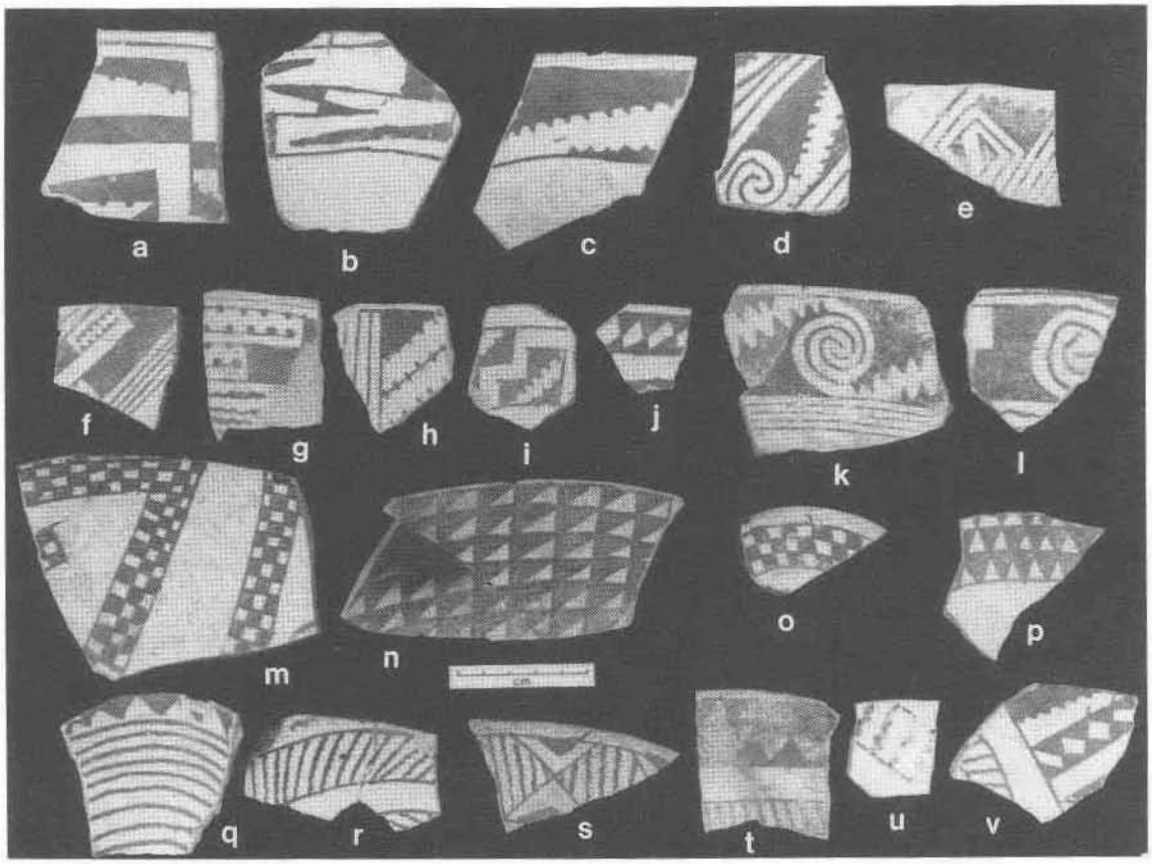

Plate 1.9. *Red Mesa Black-on-white bowl sherds with black paint. r-t) with rectilinear and fine squiggle-line hachure in a band design might be considered early Gallup Black-on-white, but the use of similar hachure is evident on other sherds that are clearly Red Mesa (Plate 1.10b). All examples are tempered with fine- to medium-grained undifferentiated sandstone, except b) which is coarse and f), k), n), q), and v) which contain chalcedonic sandstone (NPS 31950).*

sort type. The discussions of various attribute combinations involving temper that follow are drawn from this sample.

Type Descriptions and Attribute Groups

Seven types were selected for detailed description. The primary criteria of selection for detailed description are abundance and discreteness of type. The abundance aspect is satisfied by selecting types which compose 2.5 percent or more of the total detailed analysis sample (Table 1.1). The discreteness aspect is fulfilled by excluding rough sort types which are gross lumps, such as plain gray or unidentified whitewares. The types meeting these criteria at 29SJ 629 are: Lino Gray (Plate 1.1), narrow neckbanded (Plate 1.3), neck corrugated (Plate 1.4), polished and unpolished BMIII-PI mineral black-on-whites (Plate 1.6) (treated separately), Early Red Mesa Black-on-white (Plate 1.7), and Red Mesa Black-on-white (Plates 1.8-1.10). These types are treated in some detail, giving occurrence of decorative and compositional attributes within each (Tables 1.7-1.14).

Figures 1.1 and 1.2 show the time spans assigned the gray and whiteware types discussed in detail here,

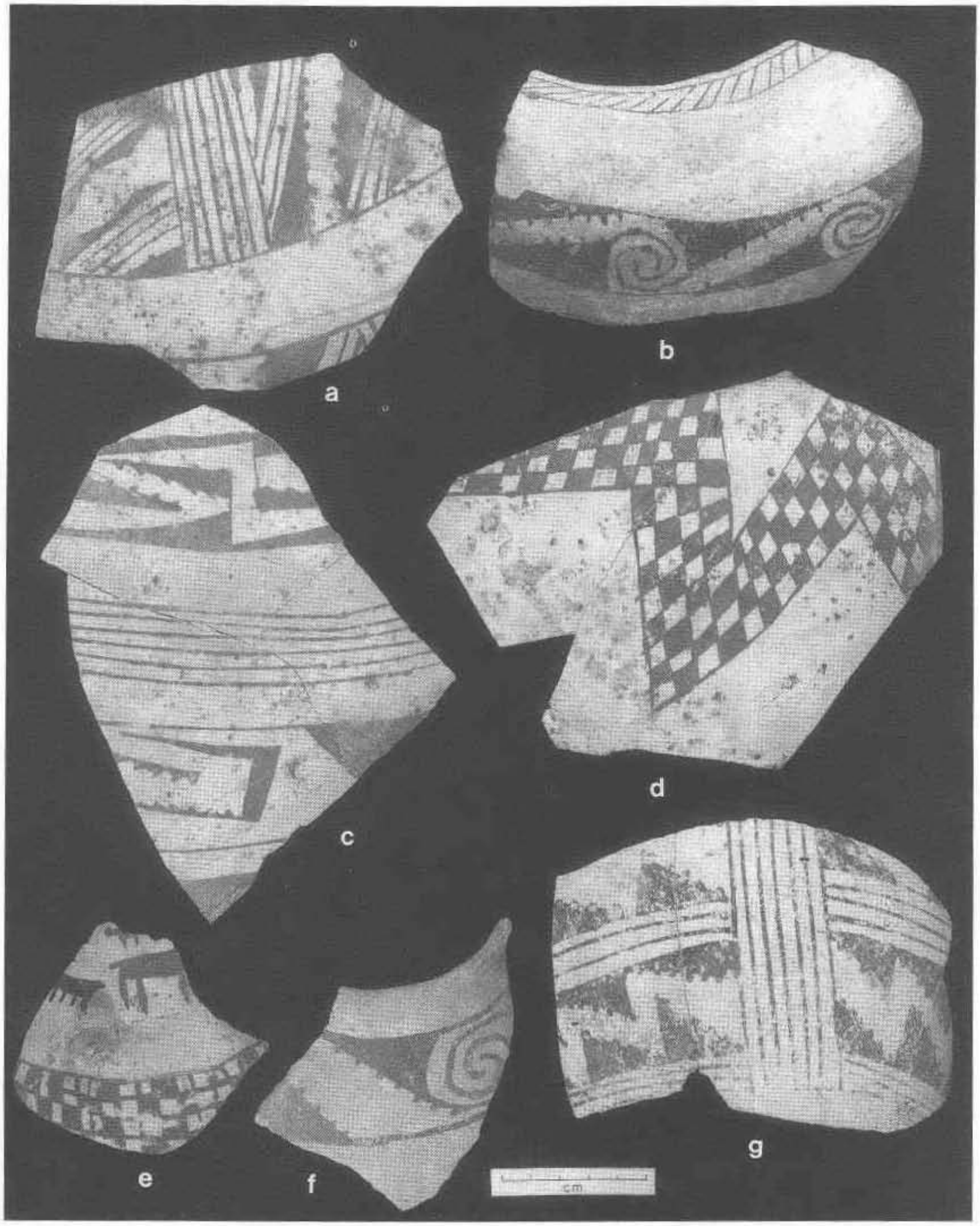

Plate 1.10. *Red Mesa Black-on-white jar sherds with black paint. The paint on e) is partly glazed mineral paint on a gourd jar form; b) is a seed jar. All items contain medium sandstone except b) which contains coarse sandstone (NPS 31956).*

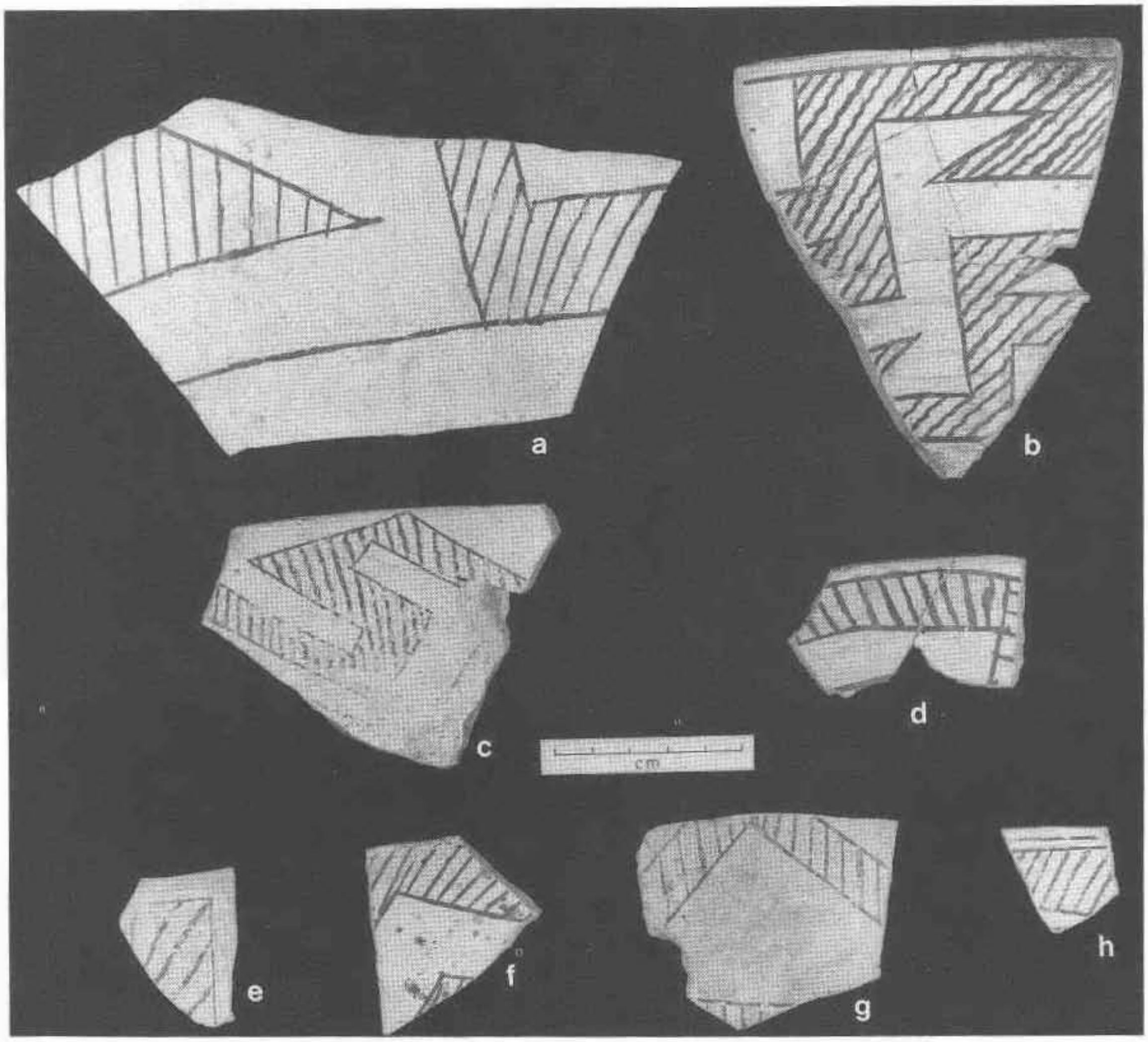

Plate 1.11. *Examples of sherds that are transitional between Red Mesa and Gallup Black-on-white (NPS 31952).*

as compared to the relative frequencies of these types in proveniences thought to have chronological discreteness. The time spans are based on a number of factors and adjusted for Chaco Canyon by Windes and McKenna. These factors include dates published for other areas (Breternitz 1966; Breternitz et al. 1974), chronometric dates obtained in Chaco Canyon, and associated ceramics. Figures 1.1 and 1.2 illustrate several points. In terms of relative dating, the types can be seen to follow fairly well the times assigned them, the most marked exception being narrow neckbanded. In terms of absolute time, however, considerable lag is evident. This lag may be attributed to three primary factors which should be considered caveats when employing ceramic dating:

1) Curation--the time of a pot's production and its deposition may be widely spaced.

2) Taphonomy--even though the proveniences used in these figures (and in the chronology section) are relatively tight and clean, clearly some mixing is implied.

3) Taxonomy--both classification and chronological assignment (whether of type or provenience) are clearly subject to some error.

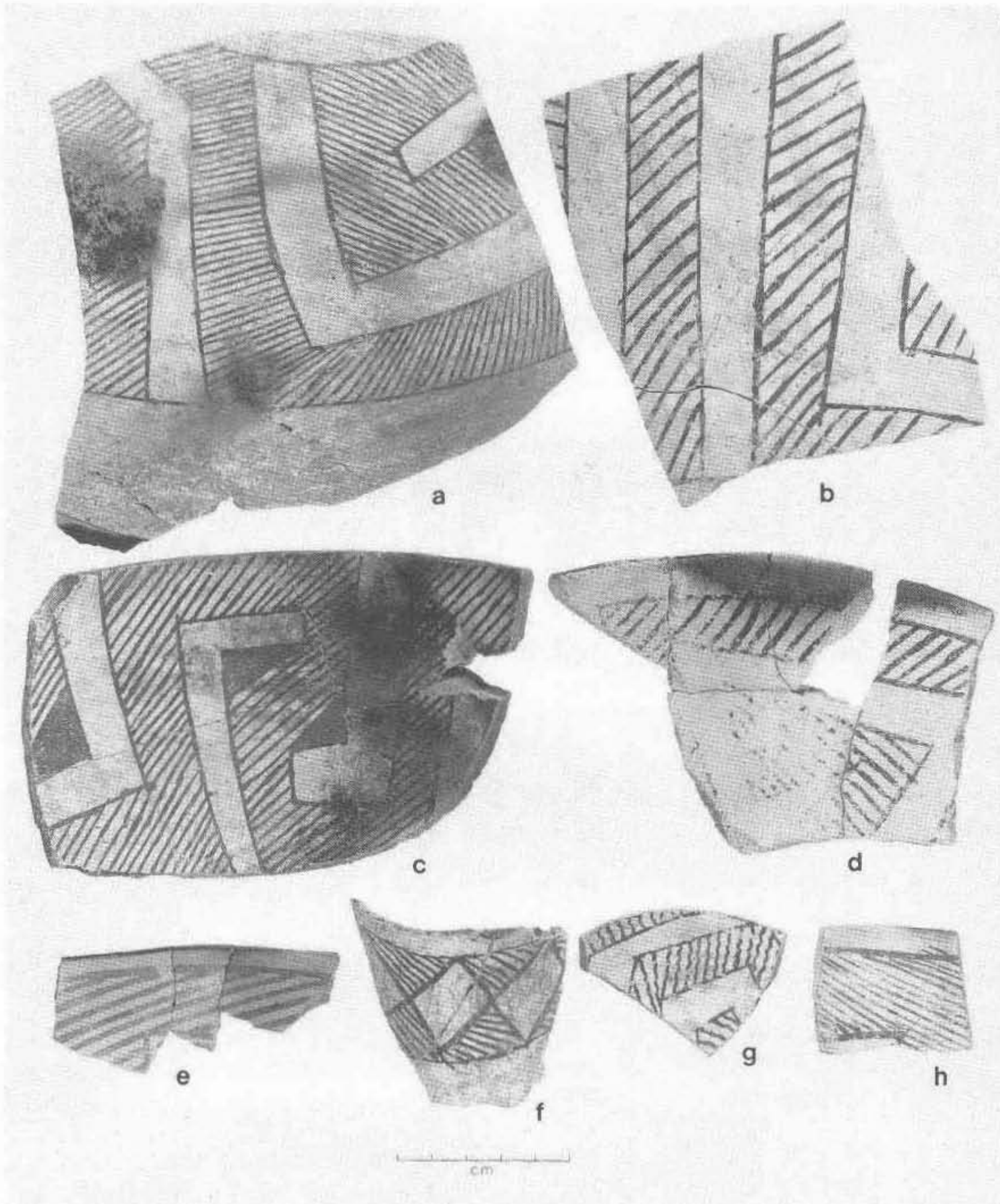

Plate 1.12. Gallup Black-on-white sherds (NPS 31954).

Table 1.4. Designs on Early Red Mesa Black-on-white and Red Mesa Black-on-white ceramics.

	Early Red Mesa B/w (Plate 1.7)	Red Mesa B/w (Plates 1.8-1.10)
Design layout:	Elements widely spaced leaving empty areas.	Less empty area.
	Bowl designs occasionally intersect rim at an angle (less band-oriented).	More completely band-oriented.
	Continuous parallel lines.	Parallel lines abutted or cribbed, not continuous.
Line execution:	Fine.	Tendency to be wider.
Slip and polish:	White, highly polished.	Thinner slip, more variable polish.
Vessel walls:	More regular, perhaps thinner.	

In an effort to partially recombine attributes and perhaps isolate clusters that may relate to either specialized or at least areal production, these selected types were also broken down into combined groups of attributes (see below). Although not suspenseful reading, the following sections do distill a great deal of information on these primary types at 29SJ 629.

Throughout the following descriptions and comparisons heavy use is made of several statistics which perhaps need some explanation. Chi-square speaks for itself; the coefficient of contingency (symbolized as C) included largely because it is generated by our mini-computer chi-square program, warrants brief examination. Siegel (1956:201) writes quite favorably about this statistic as one that indicates strength relationships based on chi-square's value and hence its level of significance. In so doing, C also controls in part for sample size. It should be noted that the maximum value of C varies with the size of the contingency table--for chi-square tables, C ranges from .707 (2 by 2 tables) and approaches a limit of one (Siegel 1956). Rigorously speaking, then, C values from tables of different dimensions cannot be directly compared; they can, however, be regarded as an ordinal rating of strength of association. The Shannon Weaver Diversity Index (H') and evenness index (J) (Lasker 1976) are also used as comparative statistics. Sample size can also influence these indices (Tramer 1969) but again they are used more to establish ordinal trends than to make fine distinctions. With the diversity index, increased diversity (H') is indicated by a higher value: the maximum value is determined by the number of categories present. Evenness (J) is the percent the observed H' is of its maximum value. Because the number of categories present is crucial to the understanding of H' and J, it is always presented (symbolized by s, originally for species, preserving its ecological source).

Whitewares--Surface Treatment (Tables 1.8-1.11)

Through time a reduction of within-type variability is apparent in the whitewares. Keeping in mind that sample size affects diversity and evenness indices, it can be seen that motif diversity among the four decorated types is fairly equal, with BMIII-PI motif diversity slightly higher than the others. The measure of evenness (J) of motif use shows a steady decline through Red Mesa Black-on-white (Table 1.15), indicating an increase in the repetition of certain motifs (Table 1.13). Red Mesa Black-on-

Table 1.5. Features of Early Red Mesa Black-on-white and Kiatuthlanna Black-on-white.

	Early Red Mesa B/w	Kiatuthlanna B/w
Design:	Little hachure.	Squiggle hachure; Design pendant from rim (Gladwin 1945:41; Roberts 1931:131-142).
Lines:	Fine.	Broader.
Paint:	Tends to black.	Tends to brown (as opposed to Gladwin).
Paste:		Softer?
Slip:	White, intermediate thickness to Kiatuthlanna and Red Mesa.	Thicker; off-white, cream, buff.

white has the highest number of motifs recorded (35), but fewer of these account for more items than in the other types. The number of multi-motif sherds also increases throughout Red Mesa production (Table 1.15: design distribution), and motif composition (or number of motifs per sherd) has become more even as compared with the earlier types.

A common pool of designs recurs throughout the four types described in detail here, but differential expression is given to selected motifs through typological time. The most apparent between-type difference is the use of single unit, isolated motifs in the BMIII-PI group versus the heavy use of continuous band designs using solid elements in Red Mesa Black-on-white. Small hook or flag motifs and the highest representation of hachured motifs (10.5 percent) are found in the BMIII-PI group among the types described here (if Gallup Black-on-white was included, then this relative frequency would be different). Early Red Mesa Black-on-white exhibits a high number of parallel framing lines next to ticked and unticked solid elements (30.3 percent). Dotted elements in any context are highest in Early Red Mesa Black-on-white (34.5 percent). One major temporal change is the reduction in use of parallel lines. Parallel lines occur in earlier ceramics with hooks and as part of nested chevron framer constructions which decline with the increase in band designs in Red Mesa Black-on-white. Recording of complete motifs and components, such as checkerboards, sawteeth, and triangles, associable with Red Mesa Black-on-white band designs further demonstrates the increased use of solid elements. Although relative frequency of hatched motifs is highest in the BMIII-PI polished types, hachure variability is greater in Red Mesa Black-on-white. The greatest difference in use of design is between unpolished and polished BMIII-PI mineral-painted ceramics and Red Mesa Black-on-white. Early Red Mesa Black-on-white's design distributions reflect its typological position between BMIII-PI ceramics and Red Mesa Black-on-white. BMIII-PI polished vessels with mineral paint display a greater variety of motifs than do unpolished ones, though the layout of designs are similar. Inasmuch as unpolished BMIII-PI ceramics may represent a more confined production area, this reduced motif selection may be the result of spatial variation not at odds with the temporal pattern.

The design recording system allowed three designs to be recorded for each item. Occasionally items have sufficiently complex designs that three is not enough, but because the sample is mostly sherds, three is usually sufficient. There are, of course, many instances with less than three identifiable designs. Throughout the recording, the first design variable was always used, then the second, and finally the third; thus the first design variable has the

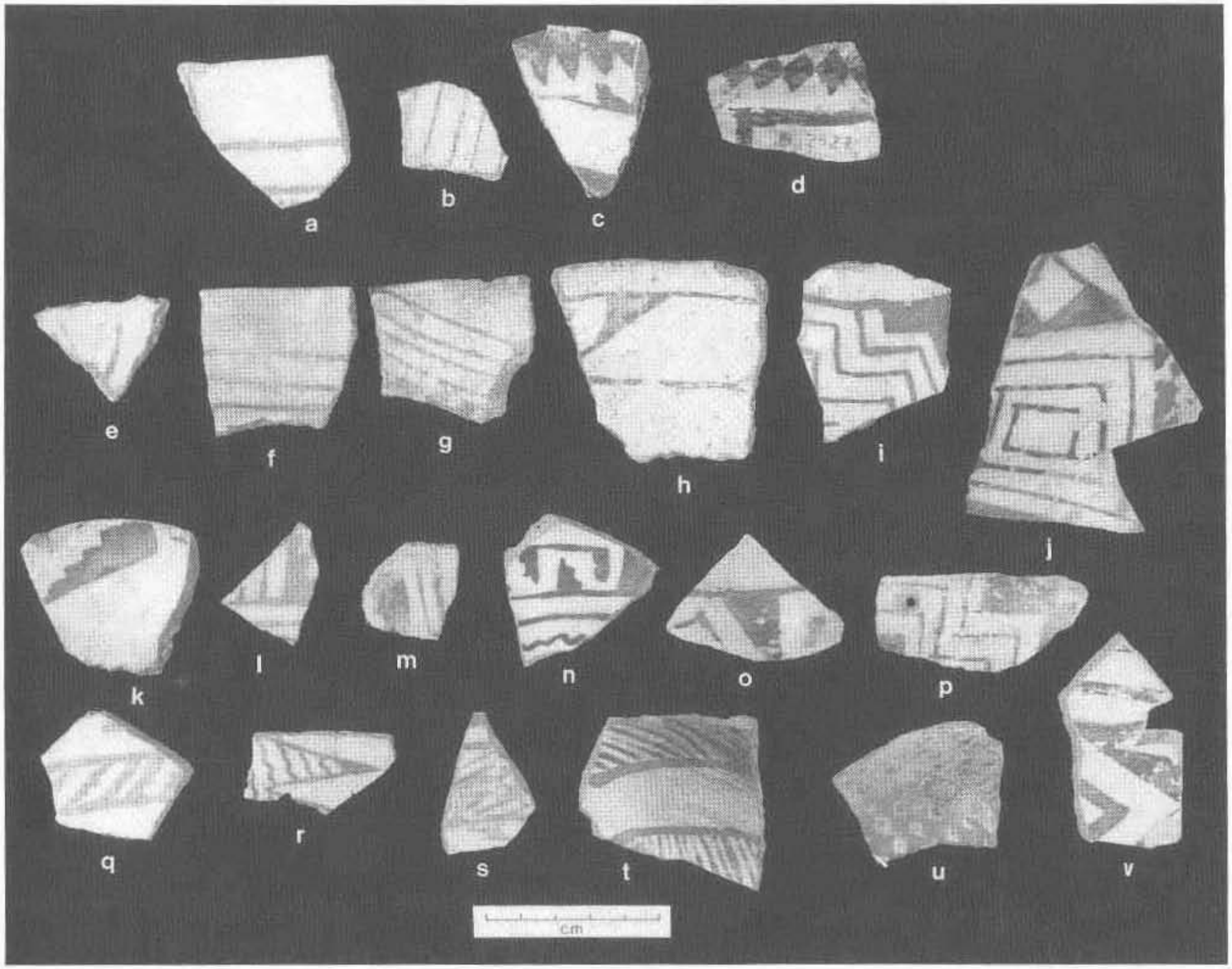

Plate 1.13. *Carbon-on-white sherds. a) Lino Black-on-gray containing sandstone with rounded iron oxide temper; b) and c) are Kana'a Black-on-white containing coarse-grained sandstone; d) is Black Mesa Black-on-white with sandstone temper (not in the detailed analysis); e-u) are Chuska Whiteware sherds with trachyte temper: e), Pena Black-on-white, f-j) Tunicha Black-on-white, k-p), Newcomb Black-on-white, q-r), Burnham Black-on-white, s-t) Chuska Black-on-white, u) Toadlena Black-on-white; v) is Holbrook Black-on-white (not in the detailed analysis) (NPS 31958).*

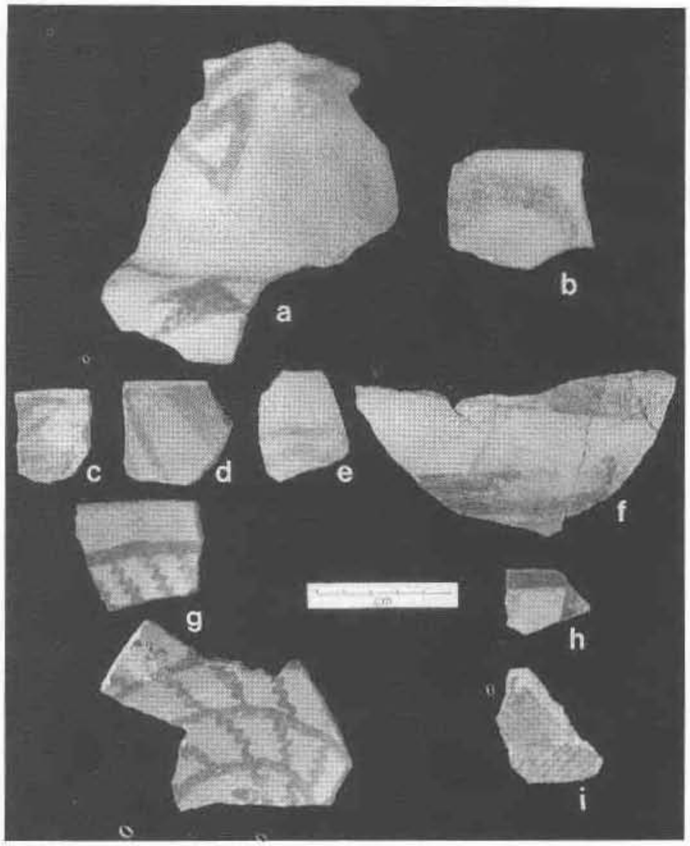

Plate 1.14. *Redwares. a-b) are Sanostee Red-on-orange; c-h) are San Juan Redwares with San Juan igneous temper; g) is a Deadmans Black-on-red; h) is Bluff Black-on-red; i) is Wingate Black-on-red (NPS 31960).*

highest counts, as can be seen in part A of Tables 1.8 through 1.11. Although it was not an explicit practice from the outset, the first variable was usually the design considered to be the primary or most important design on the sherd. Comparisons here, then, use only the first design recorded. The reader should be aware, however, that a decision did not determine which design to record as the first variable, and that this probably has some affect on the comparability of the design information.

After subdivision by both designs and vessel form, all types but Red Mesa Black-on-white contained too few items to test variation of design on vessel forms at the site level (Table 1.7). The problem is exacerbated by the fact that lumping of vessel forms and, more so, designs is suspect. For the types polished and unpolished BMIII-PI mineral and early Red Mesa Black-on-white, it can be observed that some designs do not conform to expected chi-square values (though the test itself cannot be performed). This suggestion is strengthened by performing chi-square tests on the Red Mesa Black-on-white designs that occur in sufficient frequencies. Comparing only bowls and jars on the ten most frequent primary designs on those two forms shows a significant difference: the two largest contributors are parallel lines around ticked and unticked solids (Table 1.7C). Though there are two and a half times as many bowls as jars, both of these designs occur 2-4 times more often in jars. While coding order between forms may influence these design occurrences somewhat, it is unlikely to account for the size of apparent difference. Introduction of ladles to the test requires that the number of designs be reduced to three (Table 1.7). This test shows a chi-square significance at .10 (higher than the alpha normally used here), with ladles varying from expected more than jars or bowls.

Although based on small samples, these associations of certain designs with particular vessel forms have implications for type-based comparisons of sites or proveniences. That is, assemblages of similar age but different function may have different design distributions strictly because of different

Table 1.6. Temper types tabulated by rough sort types at 29SJ 629.[a]

Rough Sort Type	Sand-stone	Chal-cedonic SS	Iron Oxide SS	Mag-nesium SS	San Juan Igneous	Trachyte	SS+ Trachyte	Socorro Igneous	Unident-ified Igneous
Plain gray	53	7	1	3	3	21	0	0	0
Lino Gray	23	0	4	1	0	4	1	0	0
Lino Fugitive Red	3	0	0	0	0	0	0	0	0
Wide Neckbanded	21	0	1	1	0	5	0	0	0
Narrow Neckbanded	37	12	2	3	0	8	0	0	0
Neck Corrugated	23	14	0	2	0	6	0	0	0
PII Corrugated	4	4	0	0	0	13	0	0	0
PII-III Corrugated	0	0	0	0	0	5	1	0	0
PIII Corrugated	0	0	0	0	1	1	0	0	0
Unidentified corrugated	11	10	0	0	0	13	0	0	0
GRAYWARE TOTALS	175	47	8	10	4	76	2	0	0
Polished BMIII-PI	101	10	1	4	15	10	1	0	0
Unpolished BMIII-PI	27	4	5	2	2	3	0	0	0
Early Red Mesa B/w	75	11	0	0	0	0	3	2	1
Red Mesa B/w	357	35	0	0	0	5	3	0	4
Escavada B/w	2	0	0	0	0	0	0	0	0
Puerco B/w	9	1	0	0	0	0	0	0	1
Gallup B/w	18	2	0	1	0	1	0	0	0
Exotic M/w	18	0	0	0	5	1	1	1	2
PII-III M/w	319	28	0	2	5	5	5	1	4
MINERAL-ON-WHITE TOTALS	926	91	6	9	27	25	13	4	12
BMIII-PI polished C/w	8	0	0	0	1	20	0	0	0
BMIIII-PI unpolished C/w	2	0	1	0	0	2	0	0	0
Chuska, Red Mesa design	0	0	0	0	0	8	0	0	0
Chuska B/w	0	0	0	0	0	3	0	0	0
Chuska C/w	0	0	0	0	0	4	0	0	0
Chaco McElmo B/w	4	0	0	0	0	0	3	0	0
PII-III C/w	9	0	0	0	1	1	0	0	0
Mesa Verde B/w	0	0	0	0	1	0	0	0	0
CARBON-ON-WHITE TOTALS	23	0	1	0	3	38	3	0	0

Table 1.6. (continued)[b]

Rough Sort Type	Sand-stone	Chal-cedonic SS	Iron Oxide SS	Mag-nesium SS	San Juan Igneous	Trachyte	SS+ Trachyte	Socorro Igneous	Unident-ified Igneous
Unidentified whiteware	89	2	0	1	0	3	2	1	4
WHITEWARE TOTALS	1,038	93	7	10	30	66	18	5	16
Decorated redware	6	0	0	0	18	7	0	0	0
Plain red	0	0	0	0	4	1	0	0	0
REDWARE TOTALS	6	0	0	0	22	8	0	0	0
Polished smudged	12	0	0	0	0	0	0	0	4
GRAND TOTALS[b]	1,231	140	15	20	56	150	20	5	20
Percents	73.6	8.4	0.9	1.2	3.3	9.0	1.2	0.3	1.2

[a] Tempers have been lumped and only items with observable temper have been included. SS = sandstone temper.
[b] TOTAL: n = 1,673; Not observable: 20 (1.2%).

Table 1.7. Red Mesa Black-on-white primary design by vessel form at 29SJ 629.

A. DESIGN BY VESSEL FORM

Design	Bowl	Jar	Ladle	N
Parallel lines	10	6	1	17
Scrolls	6	1	3	10
Checkerboards	30	4	2	36
Sawteeth	14	8	2	24
Solid band design	98	23	29	150
Hachure A-1	18	4	3	25
Squiggled lines	18	1	8	27
Totals	194	47	48	289

Chi-square Comparisons:

$\chi^2=25.352$	Uses all designs with
df=12, p=.025	at least 1 per form.
C=.273	10 cells <5

B. THREE MOST FREQUENT DESIGNS

Design	Bowl	Jar	Ladle	N
Checkerboard	30	4	2	36
Solid band design	98	23	29	150
Squiggled lines	18	1	8	27
Totals	146	28	39	213

Chi-square comparisons:

$\chi^2=9.06$	Contributors:
df=4, p=.06	Bowls high in checkerboard, jars high in solid
3 cells <5, C=.202	band, and ladles high in squiggle lines.

C. TEN MOST FREQUENT BOWL AND JAR DESIGNS

Design	Bowl	Jar	N
Parallel lines	10	6	16
Framers with unticked solids	2	9	11
Framers with ticked solids	5	13	18
*Scrolls	6	1	7
Checkerboards	30	4	34
Sawteeth	14	8	22
Solid band design	98	23	121
Hachure A-1	18	4	22
Solid ticked triangles	11	10	21
*Interlocking ticking	4	3	7
Totals	198	81	279

Chi-square comparisons:

Whole Table	Less * Rows	Contributors
$\chi^2=49.291$	$\chi^2=47.879$	Jars high in framed solids,
df=9, p=.000	df=7, p=.000	bowls high in checkerboards,
C=.387, 6 cells <5	C=.391, 2 cells <5	solids, and hachure A-1.

Table 1.8. BMIII-PI polished Mineral-on-white description at 29SJ 629.

A. SURFACE TREATMENT

1. Decoration:

	Motif Number				
Designs	1	2	3	N	%
No design	13	-	-	13	6.2
Hooks, fangs	12	8	1	21	10.0
Nested isolates	4	-	2	6	2.8
Parallel lines	33	7	-	40	19.0
Cribbed parallel lines	2	1	-	3	1.4
Pendant parallel lines	4	-	-	4	1.9
Framers with unticked solids	9	-	-	9	4.3
Framers with ticked solids	4	-	-	4	1.9
Irregular wide lines	1	-	-	1	0.5
Ticking	-	12	3	15	7.1
Corner triangles	1	6	1	8	3.8
Scrolls	3	1	1	5	2.4
Framed slashes	2	-	-	2	1.0
Dots	1	-	-	1	0.5
Dotted lines	7	3	1	11	5.2
Checkerboard	2	-	-	2	1.0
Sawteeth	11	-	1	12	5.7
Solid band design	2	-	-	2	1.0
General solids	5	8	2	15	7.1
Hachure A-1	15	4	1	20	9.5
Hachure A-2	1	-	-	1	0.5
Hachure A-3	1	-	-	1	0.5
Squiggle lines	4	1	-	5	2.4
Anthro- or zoomorphic	1	-	-	1	0.5
Unknown	-	1	-	1	0.5
Plainware, unpolished	1	-	-	1	0.5
Banded, undifferentiated	-	1	-	1	0.5
Others, solid	1	-	-	1	0.5
Narrow Sosi style	4	-	-	4	1.9
Totals	144	53	13	210	100.1
Number with 1, 2, 3 designs	91	40	13	144	-
% of 1, 2, 3 designs	63.2	27.8	9.0	-	100.0

Type Design Diversity H' = 2.826
s = 29 J = 0.839
Design Distribution Diversity H' = 0.863
s = 3 J = 0.785

Table 1.8. (continued)

Paint		N	%
Mineral:	Red	13	9.0
	Brown	68	47.2
	Black	60	41.7
	Green	2	1.4
Unknown		1	0.7
Totals		144	100.0

Rim Decoration	N	%
Unpainted	19	13.2
Solid line	60	41.7
Eroded	1	0.7
Ground	1	0.7
Unknown	63	43.7
Totals	144	100.0

2. Surface Attributes:

Polish	N	%
None	12	8.3
Streaky	5	3.5
Moderate	30	20.8
Total	58	40.3
Streaky int/ext	2	1.4
Moderate int/ext	1	0.7
Total int/ext	19	13.2
Differential	14	9.7
Unknown	3	2.1
Totals	144	100.0

Slip	N	%
None	76	52.8
Interior	28	19.4
Exterior	7	4.9
Slipslop	1	0.7
Both surfaces	24	16.7
Unknown	8	5.5
Totals	144	100.0

Handle	N	%
Solid coil	3	50.0
Trough	2	33.3
Perforated nubbin	1	16.7
Totals	6	100.0

3. FORMS AND METRICS:

			Orifice Diameters (mm)				
Forms	N	%	n	Range	$\bar{x}$	s.d.	cv%
Bowl	107	74.3	69	80-255	160.2	39.037	24.2
Ladle	5	3.5	3	60-85	73.3	12.583	17.2
Tecomate	2	1.4	2	70-80	75.0	7.071	9.4
Gourd jar	1	0.7	-	-	-	-	-
Jar	29	20.1	1	90	-	-	-
Totals	144	99.9	75				

Diversity of Forms H' = 1.293

s = 10 J = 0.562

Table 1.8. (continued)

B. PASTE

1. Temper Composition:

Temper	N	% of total	% of observed
Undifferentiated sandstone	101	70.6	71.6
Pink chalcedonic sandstone	1	0.7	0.7
White chalcedonic sandstone	9	6.3	6.4
"Buffalo Springs" sandstone	1	0.7	0.7
Magnetitic sandstone	4	2.8	2.8
Trachyte only	10	7.0	7.1
sandstone dominant in mix	1	0.7	0.7
San Juan igneous with hornblende	4	2.8	2.8
with sandstone	3	2.1	2.1
San Juan igneous, no hornblende	5	3.5	3.5
with sandstone	1	0.7	0.7
Not observable	2	1.4	-
Totals	143	99.3	(141)

2. Texture Attributes:

Grain Size	N	%
Fine	8	5.6
Medium	65	45.8
Coarse	61	43.0
Very coarse	8	5.6
Totals	142	100.0

Density	N	%
5%	20	14.1
10%	71	50.0
20%	51	35.9
30%	-	-
40%+	-	-
Totals	142	100.0

Sherd Temper	N	%
None	68	47.9
0-50%	34	23.9
50-95%	39	27.5
100%	1	0.7
Totals	142	100.0

Texture Index	N	%
Very fine (0-2)	9	6.3
Fine (2.1-4	27	19.0
Fine-Medium (4.1-7)	33	23.2
Medium (7.1-10)	24	16.9
Medium-coarse (10.1-13)	12	8.5
Coarse (13.1-16)	27	19.0
Very coarse	10	7.0
Totals	142	99.9

3. Clay Attributes:

Clay-temper types	N	%
No type assigned	64	45.1
Black clay, white sherd	4	2.8
Gray clay, black sherd	5	3.5
Black and white sherd	7	4.9
Chuska gray	2	1.4
Gray clay, white sherd	13	9.2
Tan to brown clay	21	14.8
Black clay	7	4.9
White clay	19	13.4
Totals	142	100.0

Vitrification	N	%
Absent	19	13.4
Present	117	82.4
Marked	6	4.2
Totals	142	100.0

Table 1.9. BMIII-PI unpolished Mineral-on-white description at 29SJ 629.

A. SURFACE TREATMENT

1. Decoration:

	Motif Number				
Designs	1	2	3	N	%
No Design	1	-	-	1	1.7
Single elements	1	-	-	1	1.7
Hooks, flags	4	-	-	4	6.7
Nonoverlapping steps	1	-	-	1	1.7
Parallel lines	8	3	2	13	21.7
Cribbed parallel lines	2	-	-	2	3.3
Ticking	3	-	-	3	5.0
Corner triangles	1	3	1	5	8.3
Scrolls	5	-	-	5	8.3
Dotted lines	1	1	-	2	3.3
Dots	1	-	-	1	1.7
Checkerboard	3	-	-	3	5.0
Sawteeth	1	-	-	1	1.7
Solid band design	4	-	-	4	6.7
General solids	1	1	1	3	5.0
Hachure A-1	2	2	-	4	6.7
Squiggle lines	1	1	-	2	3.3
Interlocked frets	1	1	-	2	3.3
Exterior bowl motif	-	-	1	1	1.7
Jar neck motif	1	-	-	1	1.7
Other, hatched	1	-	-	1	1.7
Totals	43	12	5	60	100.2
Number with 1, 2, 3 designs	31	7	5	43	-
% of 1, 2, 3 designs	72.1	16.3	11.6	-	100.0

Type Design Diversity H' = 2.736
s = 21 J = 0.899
Design Distribution Diversity H' = 0.782
s = 3 J = 0.711

Paint		N	%
Mineral:	red	10	23.3
	brown	17	39.5
	black	15	34.9
Carbon		1	2.3
Totals		43	100.0

Rim Decoration	N	%
Unpainted	6	14.0
Solid line	9	20.3
Eroded	1	2.3
Unknown	27	62.3
Totals	43	100.0

Table 1.9. (continued)

2. Surface Attributes:

Polish	N	%
None	38	88.4
Moderate	4	9.3
Moderate in/ex	1	2.3
Totals	43	100.0

Slip	N	%
None	40	93.0
Interior	1	2.3
Exterior	1	2.3
Both surfaces	1	2.3
Totals	43	99.9

Handles	N	%
Strap	2	100.0

Forms and Metrics:

			Orifice Diameters (mm)				
Form	N	%	n	Range	x̄	s.d.	cv%
Bowl	27	62.8	69	100-230	185.3	38.009	20.5
Duck pot	1	2.3	-	-	-	-	-
Tecomate	1	2.3	1	60	-	-	-
Jar	14	32.6	2	40-120	80.0	-	-
Totals	43	100.0	72				

Diversity of Forms H' = 0.832
s = 4 J = 0.601

Table 1.9. (continued)

B. PASTE

1. Temper Composition:

Temper	N	% of Total
Undifferentiated sandstone	27	62.8
White chalcedonic sandstone	4	9.3
"Buffalo Springs" sandstone	5	11.6
Magnetitic sandstone	2	4.7
Trachyte only	3	7.0
San Juan igneous, no hornblende	2	4.7
Totals	43	100.1

2. Texture Attributes:

Grain Size	N	%
Fine	1	2.3
Medium	7	16.3
Coarse	27	62.8
Very coarse	8	18.6
Totals	43	100.0

Density	N	%
5%	10	23.1
10%	26	60.5
20%	7	16.3
30%	-	-
40%+	-	-
Totals	43	100.00

Sherd Temper	N	%
None	39	90.7
0-50%	2	4.7
50-95%	2	4.7
100%	-	-
Totals	43	100.1

Texture Index	N	%
Very fine (0-2)	1	2.3
Fine-medium (4.1-7)	5	11.6
Medium (7.1-10)	8	18.6
Medium-coarse (10.1-13)	5	11.6
Coarse (13.1-16)	15	34.9
Very coarse (16.1+)	9	20.9
Totals	43	99.9

3. Clay Attributes

Clay-temper types	N	%
No type assigned	22	51.2
Gray clay, black sherd	1	2.3
Gray clay, white sherd	1	2.3
Tan to brown clay	3	7.0
Black clay	6	14.0
White clay	10	23.3
Totals	43	100.1

Vitrification	N	%
Absent	11	25.6
Present	24	55.8
Marked	8	18.6
Totals	43	100.0

Table 1.10. Early Red Mesa Black-on-white description at 29SJ 629.

A. SURFACE TREATMENT

1. Decoration:

Designs	Motif Number 1	2	3	N	%
Hooks, flags	2	2	-	4	2.8
Nested isolates	1	-	-	1	0.7
Nonoverlapping steps	1	-	-	1	0.7
Parallel lines	27	5	1	33	23.2
Cribbed parallel lines	2	-	1	3	2.1
Pendant parallel lines	1	2	1	4	2.8
Framers with unticked solids	17	2	-	19	13.4
Framers with ticked solids	24	-	-	24	16.9
Corner triangles	-	2	-	2	1.4
Scrolls	1	6	1	8	5.6
Framing dots	-	1	1	2	1.4
Dotted lines	3	6	1	10	7.0
Checkerboard	1	1	-	2	1.4
Sawteeth	4	-	-	4	2.8
Wide Sosi style	-	1	-	1	0.7
Solid band design	8	-	-	8	5.6
General solids	-	1	-	1	0.7
Hachure A-1	2	3	-	5	3.5
Squiggle lines	-	1	-	1	0.7
Solid ticked triangles	1	3	1	5	3.5
Narrow Sosi style	1	-	-	1	0.7
Interlocked ticking	-	3	-	3	2.1
Totals	96	39	7	142	99.7
Number with 1, 2, 3 designs	57	32	7	96	-
% of 1, 2, 3 designs	59.4	33.3	7.3	-	100.0

Type Design Diversity H' = 2.509
s = 22 J = 0.812
Design Distribution Diversity H' = 0.867
s = 3 J = 0.789

Paint		N	%
Mineral:	Red	6	6.3
	Brown	36	37.5
	Black	54	56.2
Totals		96	100.0

Rim Decoration	N	%
Unpainted	7	7.3
Solid line	58	60.4
Eroded	3	3.1
Ground	1	1.0
Unknown	27	28.1
Totals	96	99.9

Table 1.10. (continued)

2. Surface Attributes

Polish	N	%
None	4	4.2
Streaky	3	3.1
Moderate	4	4.2
Total	44	45.8
Streaky interior/ exterior	1	1.0
Total interior/ exterior	12	12.5
Differential	25	26.0
Unknown	3	3.1
Totals	96	99.9

Slip	N	%
None	5	5.2
Interior	13	13.5
Exterior	24	25.0
Slip-slop	3	3.1
Both surfaces	49	51.0
Unknown	2	2.1
Totals	96	99.9

Handles	N	%
Trough	2	50.0
Strap lug	1	25.0
Perforated nubbin	1	25.0
Totals	4	100.0

3. Forms and Metrics:

			Orifice Diameters (mm)				
Forms	N	%	n	Range	$\bar{x}$	s.d.	cv %
Bowl	66	68.8	60	100-330	182.1	49.995	27.4
Canteen	1	1.0	-	-	-	-	-
Ladle	3	3.1	1	135	-	-	-
Pitcher	1	1.0	-	-	-	-	-
Olla	2	2.1	1	60	-	-	-
Gourd jar	2	2.1	2	20-40	30.0	14.142	47.1
Jar	21	21.9	1	135	-	-	-
Totals	96	100.0	65				

Diversity of Forms H' = 0.955
s = 7 J = 0.491

Table 1.10. (continued)

B. PASTE

1. Temper Composition:

Temper	N	% of total	% of observed
Undifferentiated sandstone	75	79.8	81.5
Pink chalcedonic sandstone	2	2.1	2.2
White chalcedonic sandstone	9	9.6	9.8
Trachyte only	0	-	-
sandstone dominant in mix	3	3.2	3.3
"Socorro" igneous	2	2.1	2.2
Unidentified igneous, sandstone dominant	1	1.1	1.1
Not observable	2	2.1	-
Totals	94	100.0	(92)

2. Texture Attributes:

Grain Size	N	%
Fine	22	23.9
Medium	59	64.1
Coarse	11	12.0
Very coarse	-	-
Totals	92	100.0

Density	N	%
5%	12	13.0
10%	33	35.9
20%	35	38.0
30%	12	13.0
40%+	-	-
Totals	92	99.9

Sherd Temper	N	%
None	9	9.8
0-50%	24	26.1
50-95%	56	60.9
100%	3	3.2
Totals	92	100.0

Texture Index	N	%
Very fine (0-2)	23	25.0
Fine (2.1-4)	42	45.6
Fine-medium (4.1-7)	17	18.5
Medium (7.1-10)	3	3.3
Medium-coarse (10.1-13)	4	4.3
Coarse (13.1-16)	2	2.2
Very coarse (16.1+)	1	1.1
Totals	92	100.0

Table 1.10. (continued)

3. Clay Attributes:

Clay-temper types	N	%
No type assigned	29	31.5
Black clay, white sherd	16	17.4
Gray clay, black sherd	6	6.5
Black and white sherd	11	12.0
Gray clay, white sherd	21	22.8
Tan to brown clay	1	1.1
Black clay	3	3.3
White clay	5	5.4
Totals	92	100.0

Vitrification	N	%
Absent	11	12.0
Present	66	71.7
Marked	15	16.3
Totals	92	100.0

Table 1.11. Red Mesa Black-on-white description at 29SJ 629.

A. SURFACE TREATMENT

1. Decoration:

Designs	Motif Number 1	2	3	N	%
No design	1	-	-	1	0.2
Hooks, flags	1	1	1	3	0.5
Nested isolates	1	2	-	3	0.5
Parallel lines	17	26	7	50	7.7
Cribbed parallel lines	8	5	2	15	2.3
Pendant parallel lines	6	9	2	17	2.6
Framers with unticked solids	11	1	-	12	1.8
Framers with ticked solids	18	2	1	21	3.2
Ticking	-	2	-	2	0.3
Corner triangles	-	2	2	4	0.6
Scrolls	10	56	4	70	10.7
Framing dots	-	4	1	5	0.8
Dotted lines	6	12	4	22	3.4
Thick wavy lines	1	1	-	2	0.3
Checkerboard	37	1	1	39	6.0
Eyed solids	2	1	2	5	0.8
Sawteeth	25	4	5	34	5.2
Flagstaff style	1	-	-	1	0.2
Judd's solid	-	1	-	1	0.2
Heavy curvilinear lines	-	1	-	1	0.2
Solid band design	170	4	2	176	27.0
Banded hatched motif	-	1	-	1	0.2
General solids	7	8	1	16	2.5
Hachure A-1	26	4	2	32	4.9
Hachure B/C	1	-	-	1	0.2
Hachure A-2	3	-	1	4	0.6
Hachure B-2	2	-	1	3	0.5
Hatched checkerboards	1	-	-	1	0.2
Squiggle lines	29	5	4	38	5.8
Anthro- or zoomorphic	-	1	-	1	0.2
Solid ticked triangles	25	17	4	46	7.0
Exterior bowl motif	-	1	3	4	0.6
Jar neck motif	-	2	-	2	0.3
Interlocked ticking	8	9	2	19	2.9
Others, solid	1	-	-	1	0.2
Totals	418	183	52	653	99.6
Number with 1, 2, 3 designs	235	131	52	418	-
% of 1, 2, 3 designs	56.2	31.3	12.4	-	100.0

Type Design Diversity H' = 2.670
s = 35 J = 0.751
Design Distribution Diversity H' = 0.947
s = 3 J = 0.862

Table 1.11. (continued)

Paint		N	%
None		1	0.2
Mineral:	Red	7	1.7
	Brown	80	19.1
	Black	326	78.0
	Green	2	0.5
Glaze		2	0.5
Totals		418	100.0

Rim Decoration	N	%
Unpainted	17	4.1
Solid line	267	63.9
Dotted	1	0.2
Eroded	12	2.9
Ground	20	4.8
Unknown	101	24.2
Totals	418	100.1

2. Surface Attributes:

Polish	N	%
None	14	3.3
Streaky	6	1.4
Moderate	31	7.4
Total	209	50.0
Moderate interior/ exterior	9	2.1
Total interior/ exterior	66	15.8
Differential	71	17.0
Unknown	12	2.9
Totals	418	99.9

Slip	N	%
None	18	4.3
Interior	55	13.2
Exterior	113	27.0
Slip-slop	16	3.8
Both surfaces	208	49.8
Unknown	8	1.9
Totals	418	100.0

Handles	N	%
Solid coil	2	4.0
Multiple coil	1	2.0
Strap	6	12.0
Perforated tube	1	2.0
Trough	32	64.0
Cupped	1	2.0
Strap lug	1	2.0
Tabular lug	2	4.0
Perforated nubbin	4	8.0
Totals	50	100.0

Table 1.11. (continued)

3. Forms and Metrics:

Forms	N	%	Orifice Diameters (mm) n	Range	x̄	s.d.	cv %
Bowl	235	56.2	199	60-350	179.8	54.446	30.3
Canteen	4	1.0	2	30	30.0	-	-
Ladle	47	11.2	16	65-140	97.5	22.211	22.8
Pitcher	12	2.9	12	60-100	78.5	11.559	14.7
Seed jar	3	0.7	3	90-140	115.0	25.000	21.7
Tecomate	3	0.7	3	45-130	85.0	42.720	50.3
Olla	13	3.1	2	70-80	75.0	7.071	9.4
Miniature	3	0.7	2	25-40	32.5	10.607	32.6
Jar	95	22.7	18	30-235	84.4	40.616	48.1
Effigy	2	0.5	2	85-90	87.5	3.536	4.0
Unknown	1	0.2	-	-	-	-	-
Totals	418	99.9	259	-	-	-	-

Diveristy of Forms H' = 1.293
s = 10 J = 0.562

B. PASTE

1. Temper Composition:

Temper	N	% of Total	% of observed
Undifferentiated sandstone	357	86.2	88.4
Pink chalcedonic sandstone	6	1.4	1.5
White chalcedonic sandstone	29	7.0	7.2
Trachyte only	1	0.2	0.2
with sandstone	4	1.0	1.0
sandstone dominant in mix	3	0.7	0.7
Unidentified igneous, sandstone dominant	4	1.0	1.0
Not observable	10	2.4	-
Totals	414	99.9	(404)

2. Texture Attributes:

Grain Size	N	%
Fine	91	22.5
Medium	255	63.1
Coarse	57	14.1
Very coarse	1	0.2
Totals	404	99.9

Density	N	%
5%	42	10.4
10%	175	43.3
20%	143	35.4
30%	32	7.9
40%+	12	3.0
Totals	404	100.0

Sherd Temper	N	%
None	29	7.2
0-50%	114	28.2
50-95%	252	62.4
100%	9	2.2
Totals	404	100.0

Table 1.11. (continued)

Texture Index	N	%
Very fine (0-2)	68	16.8
Fine (2.1-4)	205	50.7
Fine-medium (4.1-7)	108	26.7
Medium (7.1-10)	16	4.0
Medium-coarse (10.1-13)	6	1.5
Coarse (13.1-16)	1	0.2
Very coarse (16.1+)	-	-
Totals	404	99.9

3. Clay Attributes:

Clay-temper types	N	%
No type assigned	101	25.0
Black clay, white sherd	51	12.6
Gray clay, black sherd	29	7.2
Black and white sherd	59	14.6
Gray clay, white sherd	120	29.7
Tan to brown clay	12	3.0
Black clay	8	2.0
White clay	24	5.9
Totals	404	100.0

Vitrification	N	%
Absent	35	8.7
Present	276	68.3
Marked	93	23.0
Totals	404	100.0

Table 1.12. Lino Gray (33) and Lino Fugitive Red (3) description at 29SJ 629.

A. SURFACE TREATMENT

1. Decoration:

Designs	Motif Number 1	2	3	N	%
Plainware, unpolished	34	-	-	34	94.4
Plainware, polished	2	-	-	2	5.6
Totals	36	-	-	36	100.0

Type Design Diversity H' = 0.215
s = 2 J = 0.306

Polish	N	%
None	34	94.4
Moderate	2	5.6
Totals	36	100.0

Surface Alterations	N	%
Sooted	8	22.2
Not sooted	23	63.9
Fugitive red	5	13.9
Totals	36	100.0

Handles	N	%
Strap	1	33.3
Multiple coils	1	33.3
Perforated nubbin	1	33.3
Totals	3	99.9

2. Forms and Metrics:

Forms	N	%
Bowl	2	5.5
Jar	25	69.4
Olla	1	2.8
Pitcher	2	5.5
Unknown	1	2.8
Totals	36	99.9

Mouth/Rim	n	range	$\bar{x}$	s.d.	cv%
Orifice diameter	26	25-230mm	110.6	47.986	43.4
Rim fillet	1	15mm	-	-	-
Rim flare	0	-	-	-	-
(includes 1 bowl orifice diameter 115 mm)					

Diversity of Forms H' = 0.947
s = 5 J = 0.588

Table 1.12. (continued)

B. PASTE

1. Temper Composition:

Temper	N	% of Total
Undifferentiated sandstone	26	72.2
Sandstone with rounded iron	4	11.1
Magnetitic sandstone	1	2.8
Trachyte only	3	8.3
with sandstone	1	2.8
sandstone dominant in mix	1	2.8
Totals	36	100.0

2. Texture Attributes:

Grain Size	N	%
Medium	4	11.1
Coarse	19	52.8
Very coarse	13	36.1
Totals	36	100.0

Density	N	%
5%	9	25.0
10%	22	61.1
20%	5	13.9
Totals	36	100.0

Sherd Temper	N	%
None	34	94.4
<50%	1	2.8
>50%	1	2.8
Totals	36	100.0

Texture Index	N	%
Fine (2.1-4)	1	2.8
Fine-medium (4.1-7)	1	2.8
Medium (7.1-10)	8	22.2
Medium-coarse (10.1-13)	3	8.3
Coarse (13.1-16)	11	30.6
Very coarse (16.1+)	12	33.3
Totals	36	100.0

3. Clay Attributes:

Clay-temper types	N	%
No type assigned	13	36.1
Tan to brown clay	13	36.1
Black clay	5	13.9
White clay	5	13.9
Totals	36	100.0

Vitrification	N	%
Absent	10	27.8
Present	22	61.1
Marked	4	11.1
Totals	36	100.0

Table 1.13. Narrow Neckbanded description at 29SJ 629.

A. SURFACE TREATMENT

1. Decoration:

Designs	Motif Number 1	2	3	N	%
Neckbanded, undifferentiated	13	-	-	13	17.3
Neckbanded, narrow	5	-	-	5	6.7
Neckbanded, wide	6	-	-	6	8.0
Clapboard, narrow	19	-	-	19	25.3
Clapboard, wide	13	2	-	15	20.0
Corrugated, wide	1	-	-	1	1.3
Corrugated, undifferentiated	-	1	-	1	1.3
Patterned, narrow	5	-	-	5	6.7
Vertical incisions	1	-	-	1	1.3
Horizontal incisions	1	4	-	5	6.7
Punctate	-	2	-	2	2.7
Fingernail punctate	-	1	-	1	1.3
Applique scrolls	-	1	-	1	1.3
Totals	64	11	-	75	99.9
Number with 1, 2, 3 designs	53	11	-	64	-
% of 1, 2, 3 designs	82.8	17.2	-	-	100.0

Type Design Diversity H' = 2.102
s = 14 J = 0.819
Design Distribution Diversity H' = 0.621
s = 2 J = 0.896

2. Surface Attributes:

Surface Alterations	N	%
Sooted	20	31.3
Unsooted	44	68.7
Totals	64	100.0

Handles	N	%
Multiple coil	1	5.0
Strap	1	5.0
Extended lip	2	10.0
Nubbin	7	35.0
Dual nubbin	5	25.0
Tabular lug	2	10.0
Cupule lug	1	5.0
Sagging nubbin	1	5.0
Totals	20	100.0

Table 1.13. (continued)

3. Forms and Metrics:

Forms	N	%
Jars	63	98.4
Pitchers	1	1.6
Totals	64	100.0

Mouth/Rim	n	Range	x̄	s.d.	cv %
Orifice Diameter	47	55-295mm	191.9	54.189	28.2
Rim fillet	52	7-24mm	15.5	3.760	24.2
Rim flare	28	4-42°	13.9°	8.632°	62.0

B. PASTE

1. Temper Composition:

Temper	N	% of Total
Undifferentiated sandstone	37	59.7
Pink chalcedonic sandstone	4	6.5
White chalcedonic sandstone	8	12.9
Sandstone with rounded iron	2	3.2
Magnetitic sandstone	3	4.8
Trachyte only	8	12.9
Totals	62	100.0

2. Texture Attributes:

Grain Size	N	%
Medium	2	3.2
Coarse	35	56.5
Very coarse	25	40.3
Totals	62	100.0

Density	N	%
5%	18	29.0
10%	38	61.3
20%	6	9.7
Totals	62	100.0

Sherd Temper	N	%
None	62	100.0
Totals	62	100.0

Texture Index	N	%
Medium (7.1-10)	10	16.1
Medium-coarse (10.1-13)	10	16.1
Coarse (13.1-16)	21	33.9
Very coarse (16.1+)	21	33.9
Totals	62	100.0

Table 1.13. (continued)

3. Clay Attributes:

Clay-temper types	N	%
No type assigned	35	56.5
Chuska gray homogeneous	4	6.5
Tan to brown clay	13	21.0
Black clay	10	16.1
Totals	62	100.1

Vitrification	N	%
Absent	9	14.5
Present	39	62.9
Marked	14	22.6
Totals	62	100.0

Table 1.14. Neck Corrugated description at 29SJ 629.

A. SURFACE TREATMENT

1. Decoration:

Designs	Motif Number 1	2	3	N	%
Neckbanded, wide	1	-	-	1	1.9
Clapboard, narrow	2	-	-	2	3.8
Clapboard, wide	1	2	-	3	5.7
Corrugated, narrow	4	-	-	4	7.6
Corrugated, wide	26	1	-	27	51.0
Moenkopi style	-	1	-	1	1.9
Corrugated, undifferentiated	1	-	-	1	1.9
Festoon corrugated	7	1	-	8	15.1
Oblique corrugated	-	1	-	1	1.9
Patterned, narrow	2	-	-	2	3.8
Patterned, wide	1	-	-	1	1.9
Punctate	-	1	-	1	1.9
Fingernail punctate	-	1	-	1	1.9
Totals	45	8	-	53	100.0
Number with 1, 2, 3 designs	37	8	-	45	-
% of 1, 2, 3 designs	82.2	17.8	-	-	100.0

Type Design Diversity H' = 1.758
s = 14 J = 0.686
Design Distribution Diversity H' = 0.681
s = 2 J = 0.982

2. Surface Attributes:

Surface Alterations	N	%
Sooted	7	15.6
Unsooted	38	84.4
Totals	45	100.0

Handles	N	%
Nubbin	3	100.0
Totals	3	100.0

3. Forms and Metrics:

Form	N	%
Jars	45	100.0
Totals	45	100.0

Mouth/Rim	N	Range	$\bar{x}$	s.d.	cv%
Orifice Diameter	27	120-350mm	196.5	51.835	26.4
Rim fillet	27	10-22mm	15.1	3.505	23.1
Rim flare	22	6-27°	12.0°	5.924°	49.6

Table 1.14. (continued)

B. PASTE

1. Temper Composition:

Temper	N	% of Total
Undifferentiated sandstone	23	51.1
Pink chalcedonic sandstone	4	8.9
White chalcedonic sandstone	10	22.2
Magnetitic sandstone	2	4.4
Trachyte only	5	11.1
with sandstone	1	2.2
Totals	45	99.9

2. Texture Attributes:

Grain Size	N	%
Medium	7	15.6
Coarse	23	51.1
Very coarse	15	33.3
Totals	45	100.0

Density	N	%
5%	9	20.0
10%	28	62.2
20%	8	17.8
Totals	45	100.0

Sherd Temper	N	%
None	42	93.3
<50%	1	2.2
>50%	2	4.4
Totals	45	99.9

Texture Index	N	%
Very fine (0-2)	1	2.2
Fine-medium (4.1-7)	2	4.4
Medium (7.1-10)	4	8.9
Medium-coarse (10.1-13)	9	20.0
Coarse (13.1-16)	16	35.6
Very coarse (16.1+)	13	28.9
Totals	45	100.0

3. Clay Attributes:

Clay-temper types	N	%
No type assigned	18	40.0
Black clay, white sherd	1	2.2
Black and white sherd	1	2.2
Chuska gray homogeneous	4	8.9
Tan to brown clay	13	28.9
Black clay	6	13.3
White clay	2	4.4
Totals	45	99.9

Vitrification	N	%
Absent	6	13.3
Present	35	77.8
Marked	4	8.9
Totals	45	100.0

Table 1.15a. Comparative diversity indices for surface treatments at 29SJ 629.

Rough Sort Type	N	Design Diversity s	Design Diversity H'/J	Design[a] Distribution s	Design[a] Distribution H'/J	Form Diversity s	Form Diversity H'/J	Polish Diversity s	Polish Diversity H'/J
Lino Gray	36	2	0.215	-	-	5	0.947	-	-
			0.306	-	-	-	0.588	-	-
Narrow Neckbanded	64	14	2.217	2	0.621	-	-	-	-
			0.840	-	0.896	-	-	-	-
Neck Corrugated	45	14	1.915	2	0.681	-	-	-	-
			0.726	-	0.982	-	-	-	-
BMIII-PI unpolished M/w	43	21	2.736	3	0.782	4	0.832	8[b]	1.657
			0.899	-	0.711	-	0.601	-	0.797
BMIII-PI polished M/w	144	29	2.826	3	0.863	5	0.754	-	-
			0.839	-	0.785	-	0.468	-	-
Early Red Mesa B/w	96	22	2.509	3	0.867	7	0.955	7	1.402
			0.812	-	0.789	-	0.491	-	0.720
Red Mesa B/w	418	35	2.670	3	0.947	10	1.293	7	1.401
			0.751	-	0.862	-	0.562	-	0.720

[a] Distribution of designs 1, 2, 3.
[b] Index for polished and unpolished groups.

Table 1.15b. *Summary of paste attributes for types selected for detailed description at 29SJ 629.*

Type	N	s	Temper diversity/ evenness	s	Texture diversity/ evenness	s	Clay diversity/ evenness
Lino Gray	36	6	.985 .550	6	1.469 .820	3	.986 .897
Narrow Neckbanded	62	6	1.271 .709	4	1.322 .954	3	1.003 .913
Neck Corrugated	45	6	1.360 .759	6	1.486 .830	6	1.406 .785
BMIII-PI polished M/w	143	11	1.146 .478	7	1.841 .946	8	1.851 .890
BMIII-PI unpolished M/w	43	6	1.234 .689	6	1.595 .890	5	1.279 .795
Early Red Mesa B/w	92	6	.721 .402	7	1.397 .718	7	1.655 .850
Red Mesa B/w	404	7	.504 .259	6	1.202 .671	7	1.635 .840

complements of vessel form rather than any other cause (see also Plog 1980). The small sample sizes here, however, do not permit us to take vessel form into account in design comparisons.

Paint shows a distinct trend from red and brown to black-colored mineral from early to late. A chi-square test of paint types by rough sort types shows a significant change in paint color took place through typological time ($\chi^2=110.45$, df=8, p=.000, C=.363). The test included lumps of Gallup and Puerco Black-on-whites to strengthen the temporal depth for testing. Expected values on this chi-square test indicate polished and unpolished BMIII-PI mineral-on-white and Early Red Mesa Black-on-white are higher than expected for red and brown paints while the two latest groups are lower than expected. Within BMIII-PI mineral-on-white, red paint is more frequent on unpolished specimens although brown paint is the predominant color for both. Glazed or vitrified black mineral paint first appears in Red Mesa Black-on-white in trace quantities. Rim decorations trend toward complete solid lines by Red Mesa Black-on-white, with a higher representation of unpainted rims earlier. A single specimen with a dotted rim was recorded in Red Mesa.

The amount of polish also increases through typological time. BMIII-PI mineral-on-white types exhibit the greatest variation in amount of polishing after which total polishing (on surfaces polished) exceeds 80 percent. This is reflected in the almost identical diversity indices for early and later Red Mesa Black-on-whites. The slipping of vessels also increases with time. Unpolished BMIII-PI ceramic wares are slipped even less than polished types, both of which exhibit slip less than 50 percent of the time. Although the majority of both early and later Red Mesa Black-on-white vessels are slipped, a suggestion of slip conservation for both types is implied by slipping on the interior only on about 25 percent of the bowls. In contrast to the permanent white slip, BMIII-PI bowls tended to be treated with fugitive red ochre on the exterior.

Fire blackening around the exterior rim on bowls was presumed to be a secondary feature associated with reuse. Polished BMIII-PI ceramic types exhibited more blackening than any other type, which may reflect their recycling as scoops or firedogs with the advent of Red Mesa Black-on-white. Mineral encrustations, assumed to be residues from evaporation, were noted only in Red Mesa Black-on-white pitchers.

Bowls, by far the most numerous form, have approximately the same mean orifice diameter for all types. The largest difference is between polished and unpolished BMIII-PI types which exhibit the smallest and largest means respectively. There is a trend toward greater variation in orifice diameter as revealed by the coefficient of variation. Although the variation itself is small--about 1 cm--an examination of the ranges suggest more, larger-sized bowls accounts for the change. Likewise, ladle bowls show a slight increase in size through time. The remarkable overall sameness of orifice diameters between types can be seen in Figure 1.3. Although the variation decreases through time, the general class--whiteware jars--displays the largest range of orifice openings. The remainder of the enclosed forms occur too infrequently for comparison.

The diversity index for forms suggests that although the form inventory becomes richer through time the relative distribution of the population (evenness) remains about the same. This suggests a diversification of forms from generalized to specific functions. Possibly a reflection of this proliferation of specific vessel forms is a similar increase of handle and lug types by Red Mesa Black-on-white times. The increase in sample size may also contribute to the apparent increased variety of forms and handle types, although there is no major difference in the number of handles represented on types earlier than Red Mesa Black-on-white when compared with the Red Mesa Black-on-white sample (χ^2_c=3.455, df=1, p=.063).

Whitewares--Pastes (Tables 1.8-1.11)

As is the case in surface attributes, BMIII-PI polished and unpolished ceramics show some distinct differences in paste characteristics. Unpolished ceramics tend to be coarser and have a higher relative frequency of iron-bearing sandstone, tempers thought possibly to be local. The polished group has a total of 9.1 percent San Juan igneous tempers, over twice the occurrence in the unpolished group, while trachyte tempers occur in very similar percentages (ca. 7 percent), as does chalcedonic sandstone temper in the two types (7-9 percent). In accordance with the observation that the polished variety blends stylistically with Early Red Mesa Black-on-white, sherd temper is far more abundant in polished than in unpolished items and the relative frequency of coarse-grained tempers is intermediate to unpolished BMIII-PI mineral-on-white and Early Red Mesa Black-on-white in polished BMIII-PI mineral. White and tan clays combined make up about 30 percent of both types, with unpolished tending to be white, and polished to be tan.

Compared to the BMIII-PI groups, early Red Mesa Black-on-white shows a decline in igneous tempers and a very moderate increase in chalcedonic sandstone temper. San Juan tempers were not noted and trachyte temper is less frequent than in BMIII-PI types. A single "exotic mineral-on-white" classed as Piedra Black-on-white and three as Cortez Black-on-white contain San Juan igneous tempers. These two types are stylistically similar to the BMIII-PI to Red Mesa time range considered here. Even if these San Juan tempered items are considered to be coeval with Early Red Mesa Black-on-white and Red Mesa Black-on-white, the relative quantity of San Juan temper has markedly declined from the BMIII-PI occurrence. Similarly, two "exotic mineral-on-white" are technically Drolet Black-on-white, a Chuskan mineral type, by virtue of containing trachyte temper. Again, considering these items plus those with sandstone temper dominant in a mix with trachyte temper raises the overall percentage to about 5 percent. Even with such manipulations, a decline in trachyte temper occurrence in mineral painted wares can be seen.

Use of sherd temper is very much more marked, and paste combinations involving clay and sherd temper are thus more abundant. The most frequent combination is white sherd temper in a "normal" gray clay (Munsell N5-7, mostly N6-7), a combination that is very common in later types as well.

The texture index was devised to try to combine the effects of temper grain size and quantity, and quantity of sherd temper. We observed that sherd temper seems to contribute less to coarseness and friability of paste than do geologic tempers, especially sand grains. The index was calculated by multiplying the ordinal grains size estimate for the geological

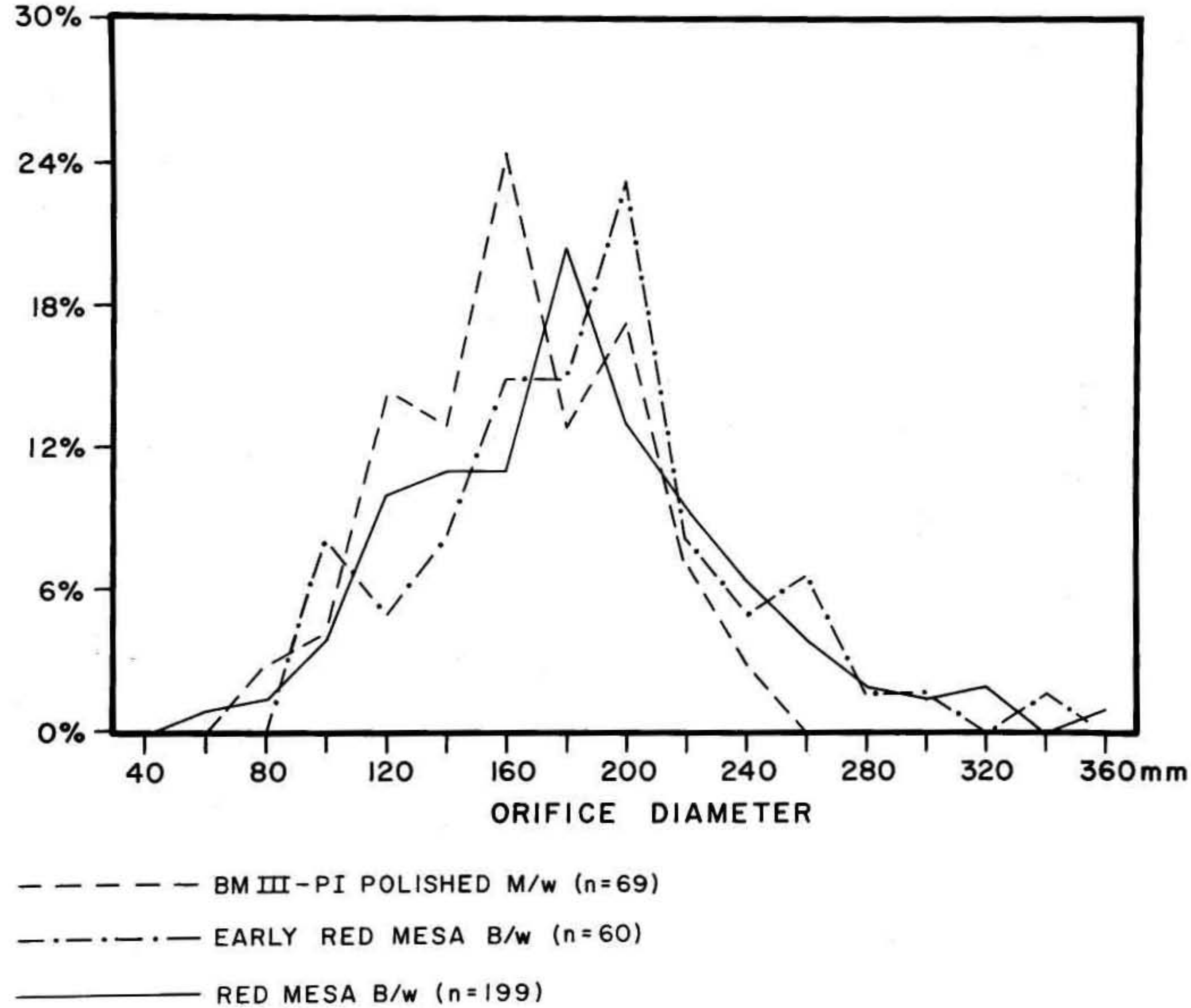

Figure 1.3. *Whiteware bowl estimated orifice diameter. Shown are the three most abundant whiteware types (BMIII-PI unpolished is not shown). The attribute was measured to the nearest 5 mm; entries are made at intervals of 20 mm, lumping in the following way: 110-125 entered at 120, 130-145 entered at 140, etc. The points graph the percent of each type occurring in each orifice lump. (NPS 310/82813 B).*

temper by the density estimate code and then dividing by the relative quantity of sherd temper. The drawbacks to this index are that the grain size is for sand if it is present, no matter what its quantity, and that it involves the multiplication of ordinal variables. It does, however, provide an ordinal measure of paste texture that is based on empirical observation of ceramics.

$$\textit{texture index} = \frac{\textit{grain size} \cdot \textit{temper density}}{(\textit{sherd temper}) + 1}$$

Possible values for variables:
grain size: 1, 3, 5, 6
temper density: 1, 2, 3, 4, 5
sherd temper: 0, 1, 2, 3

A progression to finer-textured paste is also evident. Fourteen percent unpolished, 48.6 percent polished, 89.1 percent Early Red Mesa Black-on-white, and 94.3 percent Red Mesa Black-on-white are less than "medium" on the texture index. This is a function of fine sand temper and the greater abundance of sherd temper, especially in the polished specimens. Around one-fourth of both polished and unpolished BMIII-PI types are coarse or very coarse sandstone tempered.

Red Mesa Black-on-white shows a moderate reduction in occurrence of chalcedonic sandstone temper from Early Red Mesa Black-on-white to 8.4 percent and is comparable to early Red Mesa Black-on-white in the low relative frequency of trachyte temper in any combination (1.0 percent). San Juan igneous temper and iron-bearing sandstones tempers are absent, as they are in Early Red Mesa Black-on-white. The distribution of sherd temper is also very close between the two types. The decreasing diversity values visible in whiteware tempers are a manifestation of the reduction in relative frequencies of tempers other than undifferentiated sandstone.

Graywares--Surface Treatment

Lino Gray, narrow neckbanded, and neck-indented or Early PII corrugated each constituted 2 percent or more of the detailed analysis sample and were selected for in-depth description (Tables 1.1, 1.12-1.14). The surface treatment basis for these types is reflected in the distribution of "design styles" of the types. Lino Gray is clearly plain grayware which only very occasionally shows some polish. The two subsequent types have a much greater variety of surface treatments which are, not surprisingly, dominated by the treatment their names imply: 90.6 percent of narrow neckbanded specimens have some form of neckbanding, and 86.7 percent of the neck corrugated shows some form of corrugation. The cases not falling into one of the obvious types of surface treatment are actually further variations on the main styles of manipulation. Comparison of the diversity indices for narrow neckbanded and neck corrugated shows that there is a greater variety of surface treatment in narrow neckbanded.

The production spans of narrow neckbanded and neck corrugated overlap, with neckbanded beginning earlier and neck corrugated lasting slightly later. Based on occurrence in the Chaco samples, far more narrow neckbanded was produced than neck corrugated, although some neck corrugated probably gets subsumed under unidentified corrugated or PII corrugated during identification. Differences in production span may help to explain why neck corrugated vessels seem less variable in surface treatment. Insofar as size reflects function, the two types appear to have filled very similar needs, as the rim diameter distributions are nearly the same (Figure 1.4). Further similarities are also apparent in the rim fillet widths and the amount of rim flare (Figures 1.5-1.6).

Soot on the vessel exterior was slightly more frequent on narrow neckbanded and lowest on neck corrugated. The slightly lower coefficient of variation for orifice diameters, rim fillet width, and rim flare on neck corrugated suggest either reduction in source availability, increased routinization of production, or a temporally restricted sample biasing the observed data. The higher percentage of sooting may be one indicator of this broader use of narrow neckbanded.

There is a marked difference between neckbanded and neck corrugated ceramics in occurrence and variety of handle forms--while about a third of the narrow neckbanded items have one of eight types of lug, only one in fifteen neck corrugated items display handles, and these are all the same type. While this difference is difficult to account for, it is in accordance with the smaller variability apparent in

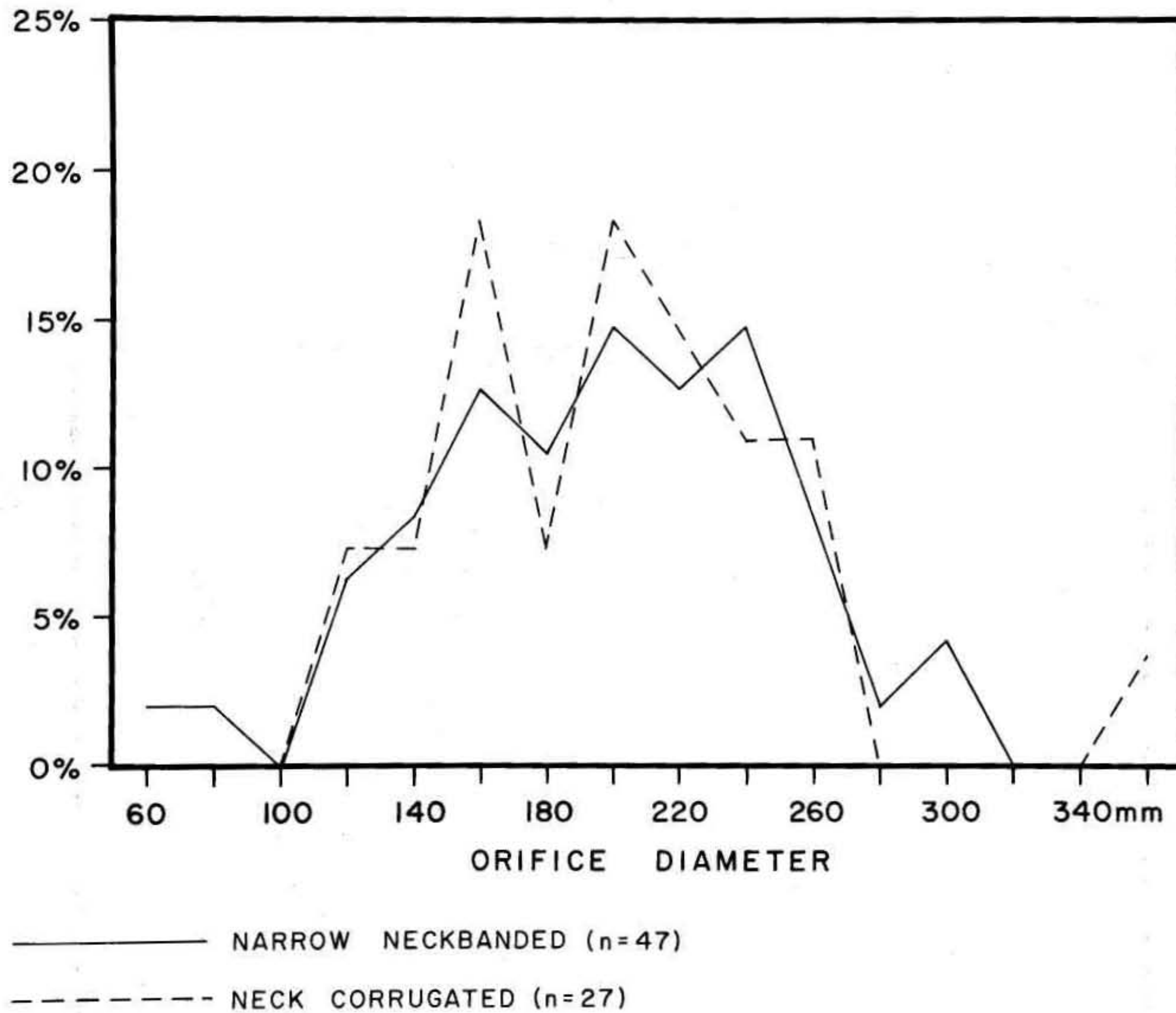

Figure 1.4. *Grayware jar diameters. Neck indented corrugated and narrow neckbanded are shown, using the same lumping method as in Figure 1.3. (NPS 310/82814 B).*

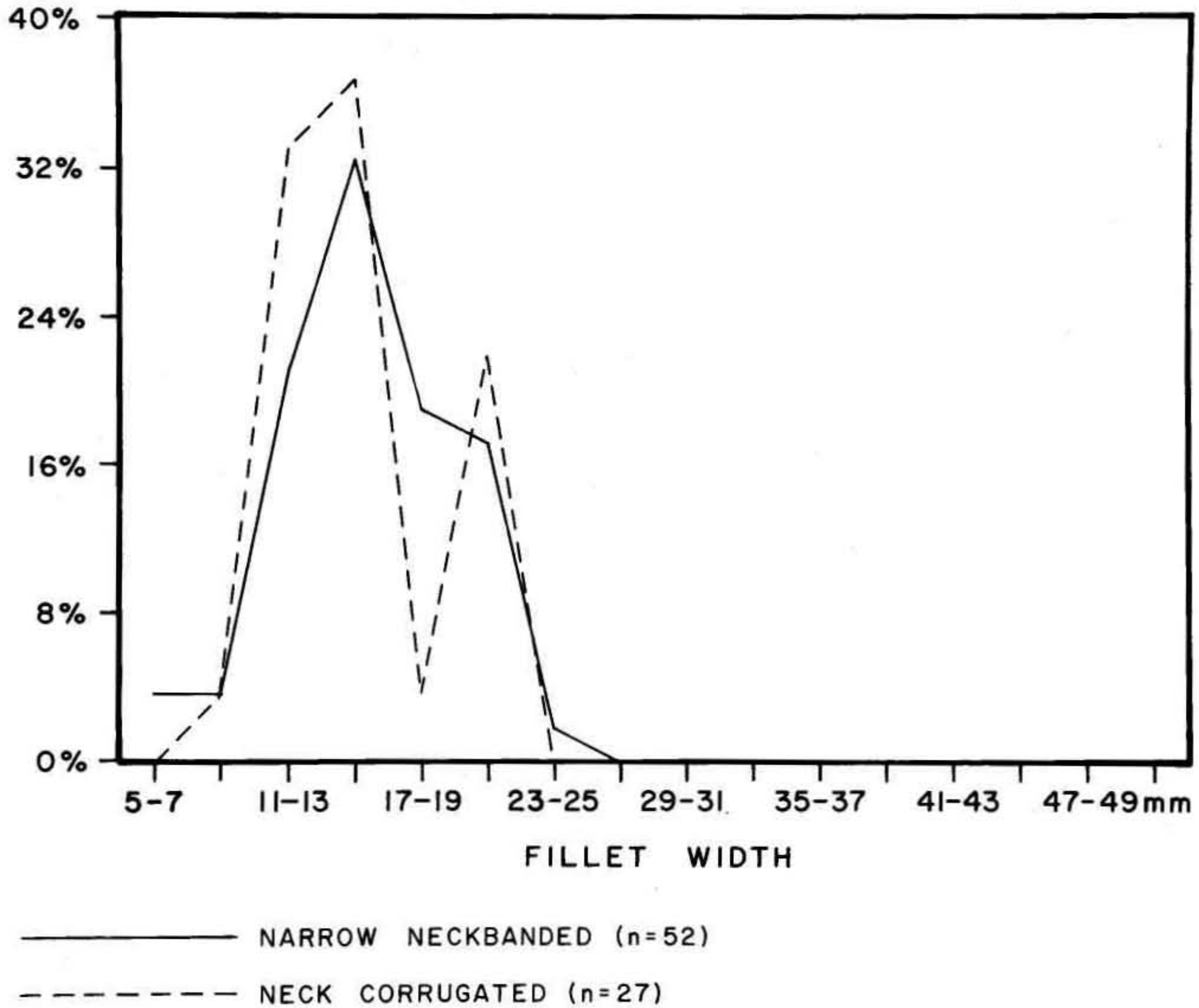

Figure 1.5. *Grayware rim fillet widths. Rim fillets are measured to the nearest mm and are graphed here in lumps of 3 mm by percent occurrence within lumps in neck corrugated and narrow neckbanded. (NPS 310/82815 B).*

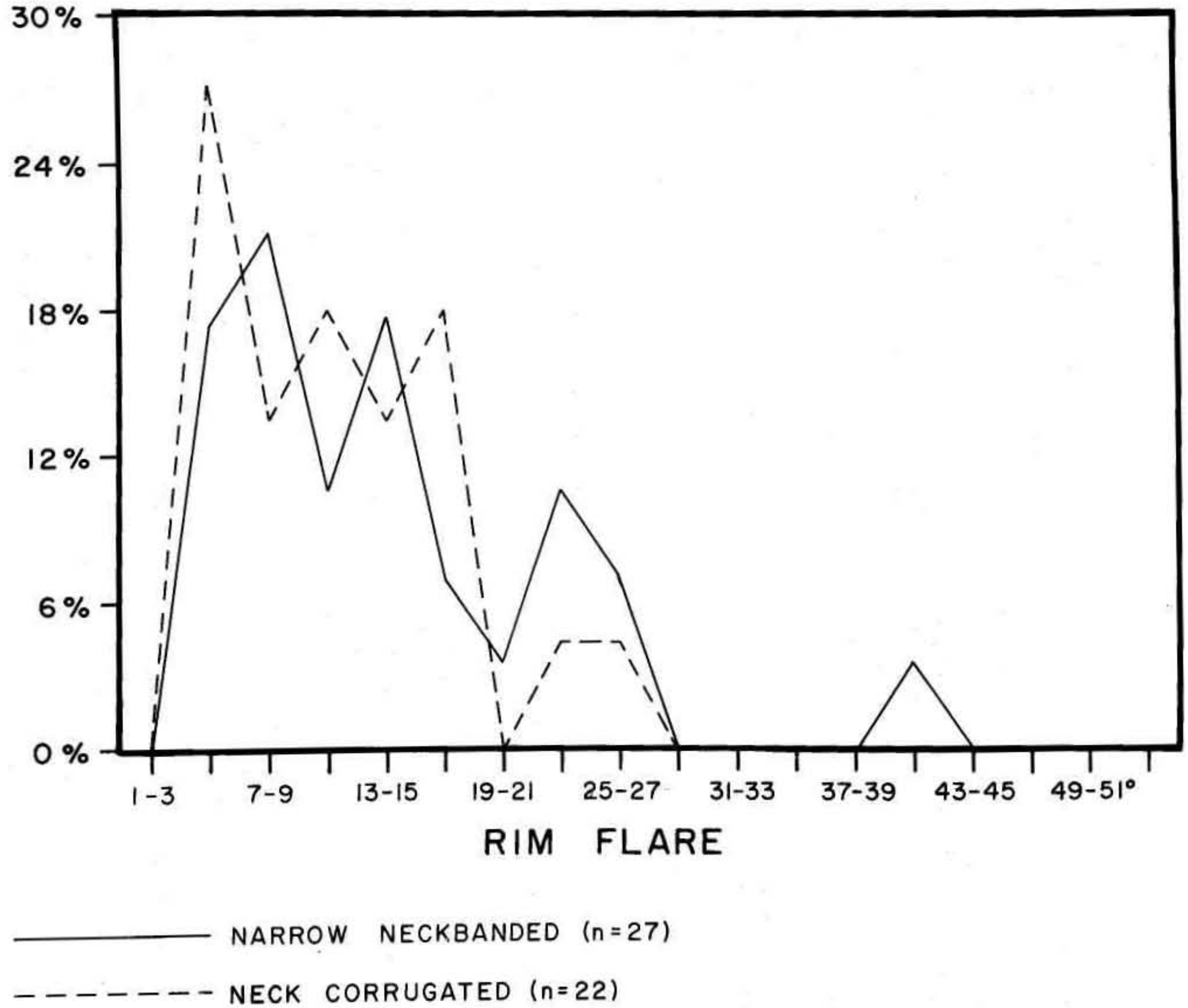

Figure 1.6. *Grayware rim flare. Rim flare is calculated to the nearest degree and graphed here in 3 degree lumps; occurrence within lumps in narrow neckbanded and neck corrugated are shown. (NPS 310/82816 B).*

neck corrugated, and perhaps with the speculation that the range of tasks for which it was used was less.

Graywares--Pastes

In the three grayware types occurring in sufficient frequency to be described in detail (Tables 1.12-1.14), the typological ordering can be seen to be corroborated by trends in the temper composition. In all three types undifferentiated medium to very coarse sandstone comprises over half of the temper. Through typological time the relative occurrence of this lumped category decreases. Both Lino Gray and narrow neckbanded types exhibit the rounded iron bearing sandstone temper which is similar to deposits observed in Chaco Canyon, the relative frequency being higher in Lino Gray. Magnetitic cement sandstone temper bears some visual similarity to the rounded iron variety, but the geological relationship between the two tempers is unknown. It occurs in similar low levels in Lino Gray, narrow neckbanded, and neck corrugated.

The narrow neckbanded and neck corrugated types from 29SJ 629 are quite similar in their trachyte temper occurrence, both being considerably higher than Lino Gray. The most dramatic trend observed is in the occurrence of chalcedonic cement sandstone temper--it is absent in Lino Gray, approaches 20 percent in narrow neckbanded, and surpasses 30 percent in neck corrugated. Based on experience with later types (Pueblo II corrugated) it can be said that this particular point in typological time is that of the highest frequencies of chalcedonic tempers. The diversity index results for temper show increasing diversity and evenness in composition through the types (Table 1.15), although the number of different tempers is the same for each (Table 1.16). This suggests an increase in dependence on a variety of ceramic sources. The texture and clay attributes are, on the whole, remarkably similar from type to type.

The opposition in diversity trends between tempers and surface treatments presents something of a dilemma. The most obvious interpretation is that a greater number of production areas are more evenly represented in the ceramics but, perhaps due to greater regional interaction, the acceptable range of decoration declined.

Refiring

A series of 59 sherds from 8 overlapping temper and type categories were refired to 950°C to look for clay groupings or anomalies within groups (Table 1.17, techniques and assumptions described in Shepard 1939 and Windes 1977:290-293; the firing and color identifications were done by Steve Ferrell). As was also found at 29SJ 628, the great majority of sherds oxidized to very light colors (Toll 1980). This lightness is especially marked in earlier types--four of seven sherds falling into the more pronounced reddish yellow to red color groups (Windes Groups 5-7) are some form of indented corrugated.

Again, as at 29SJ 628 (Toll 1980), San Juan igneous tempered sherds nearly all have very light oxidation colors. All but one of the San Juan sherds are early mineral-on-white wares. The exception is a Mesa Verde Black-on-white sherd which also fired light (Group 2), a common color for this type at 29SJ 633, as well (Toll et al. 1980:110).

Some of the trachyte-tempered items do show the well established tendency to refire toward the red end of the spectrum, but, as McKenna (1980) has noted, earlier trachyte-tempered types also tend to refire light. The three "red" (Groups 5-6) items are narrow neckbanded, PII-III corrugated, and unidentified corrugated.

The chalcedonic sandstone temper group appears to contain relatively more iron than does either the fine-to-medium or the coarser sandstone group. Perhaps the most noteworthy single oxidizing result is a red (Group 7) chalcedonic sandstone-tempered neck corrugated sherd.

The three largest typological groups tested: BMIII-PI mineral-on-white (polished and unpolished sherds were lumped), early Red Mesa Black-on-white, and Red Mesa Black-on-white all show considerable dispersion of oxidation colors, although the concentration is in the light colors in each type. Some very subtle difference in clays may perhaps be seen in the fact that all the light BMIII-PI sherds (mostly San Juan temper) register white rather than very lightly colored, while seven of eight early Red Mesa Black-on-white sherds have some hue (which places them in Group 1 as opposed to white in this use of the system). There is very little chance that

Table 1.16. Within-type attribute cluster breakdown at 29SJ 629.

Type	N	Number of Attribute Groups	Mean Number of Sherds Per Group	s.d.	Range of Items Per Group	Group Makeup: Members per Group				
						1	2-10	11-20	21-39	>40
Lino Gray[a]	33	7	4.71	7.27	1-21	3	3	0	1	0
Narrow Neckbanded	62	24	2.58	2.67	1-9	14	10	0	0	0
Neck Corrugated	45	19	2.37	2.65	1-12	9	9	1	0	0
BMIII-PI polished Mineral-on-white	142	21	6.76	12.73	1-49	8	9	2	1	1
BMIII-PI unpolished Mineral-on-white	43	13	3.31	3.95	1-13	5	6	2	0	0
Early Red Mesa Black-on-white	92	12	7.67	13.22	1-42	6	4	1	0	1
Red Mesa Black-on-white	404	19	21.26	64.19	1-278	8	7	0	2	2

	Diversity (H')	Evenness (J)
Lino Gray	1.249	.641
Narrow Neckbanded	2.780	.874
Neck Corrugated	2.566	.872
BMIII-PI polished M/w	2.090	.687
BMIII-PI unpolished M/w	2.090	.815
Early Red Mesa B/w	1.546	.622
Red Mesa B/w	1.356	.386

[a] Lino Fugitive not included.

Table 1.17. Summary of refiring data: color group by rough sort type and temper group at 29SJ 629.[a]

Type	White	Whitish to Reddish Windes' Color Groups 1	2	3	4	5	6	7	Totals
Lino Gray	1	1	-	-	1	-	-	-	3
Wide Neckbanded	-	-	1	-	-	-	-	-	1
Narrow Neckbanded	1	-	1	-	1	-	1	-	4
Neck Corrugated	1	-	1	-	-	-	-	1	3
Other corrugated	-	-	1	-	-	1	1	-	3
Plain gray	-	-	1	-	-	-	-	-	1
BMIII-PI M/w	8	-	3	-	1	1	-	-	13
BMIII-PI C/w	1	-	-	-	-	-	-	-	1
Early Red Mesa B/w	1	7	1	1	2	1	-	-	13
Red Mesa B/w	2	2	2	1	-	-	-	-	7
PII-III M/w	-	-	1	-	1	1	-	-	3
Mesa Verde B/w	-	-	1	-	-	-	-	-	1
Totals	15	10	13	2	6	4	2	1	53

Type	White	Windes' Color Groups 1	2	3	4	5	6	7	Totals
Fine-medium SS	-	6	1	-	1	1	-	-	9
Coarse-very coarse SS	2	2	6	-	2	-	-	-	12
Chalcedonic SS	2	-	1	1	2	1	-	1	8
Iron Oxide SS	1	1	-	-	-	1	-	-	3
Trachyte	2	1	2	1	-	1	2	-	9
San Juan igneous	5	-	3	-	1	-	-	-	9
Socorro igneous	1	-	-	-	-	-	-	-	1
Sherd	2	-	-	-	-	-	-	-	2
Totals	15	10	13	2	6	4	2	1	53

[a] Six sherds had no assignment (they were vitrified gray).

there is analyst bias here since Ferrell did not know the types or tempers.

Attribute Groups

The attribute groups chosen for detailed treatment were selected from the types which were selected for detailed description. Attribute groups were also selected on the basis of groupings containing sufficient numbers of items to make their manipulation worthwhile. Groups were isolated by sorting the data on three variables. For whitewares, the variables were rough sort type, temper type, and paint type; for graywares, rough sort type, temper type, and primary surface manipulation were used. Groups containing 20 or more sherds were further analyzed; in those cases in which all groups contained less than 20 sherds the largest group within a rough sort type was treated. Grayware clusters consisting of catch-alls such as "undifferentiated banding" were not included. A breakdown of the range of attribute clusters per type is presented in Table 1.16.

The groups isolated and further analyzed are:

Lino Gray with undifferentiated sandstone temper and unpolished surface (n=21).

Narrow neckbanded with undifferentiated sandstone temper and clapboard 5 mm or wider (n=8).

Neck corrugated with undifferentiated sandstone temper and Tusayan style corrugations 5 mm or wider (n=12).

BMIII-PI polished mineral-on-white with undifferentiated sandstone temper and brown paint (n=49); with black paint (n=39).

BMIII-PI unpolished mineral-on-white with undifferentiated sandstone temper and brown paint (n=13).

Early Red Mesa Black-on-white with undifferentiated sandstone and brown paint (n=28); with black paint (n=42).

Red Mesa Black-on-white with undifferentiated sandstone temper and brown paint (n=69); with black paint (n=278).

Red Mesa Black-on-white with white chalcedonic sandstone temper and black paint (n=25).

Whiteware Attribute Groups

To further examine the diversity within the selected types, intra-type clusters based on two major attributes, temper and paint, were generated. Only clusters based on sandstone-tempered ceramics were of sufficient number for further examination. These groups accounted for the majority of each selected decorated type.

Contingency tables testing the independence of principal design elements within each and between the polished and unpolished early types suggested no significant difference in the use of design. While not significant, one trend might be noted between the black-and brown-painted specimens of Red Mesa Black-on-white for a respective differential use of solid band designs (χ^2_c=3.629, df=1, p=.057). As established in the previous discussion of the selected types, brown paint and framed solids are earlier attributes and this difference may represent a continuum of designs within the brown-painted tradition. Table 1.18 presents the motifs and elements upon which tests were made.

There are no significant differences in vessel forms represented between the intra-type attribute groups. Through typological time and with increased sample size, the diversity and proportional representation of vessel forms apparently increases among the whitewares (Table 1.19A). Specifically, Red Mesa Black-on-white is represented by the greatest diversity of forms with the most even distribution. If proximity of manufacture is reflected in the richness of form, then brown-painted vessels of this type may represent the most "locally" produced ceramic. Considering all the groups only bowls occurred in sufficient quantity to examine for intra-form variation, and here some significant differences can be found. Except for Early Red Mesa Black-on-white, brown-painted bowls are slightly larger and exhibit a lower coefficient of variation than black-painted specimens, although the mean size ranges are not that great. However, a t-test comparing Red Mesa Black-on-white and BMIII-PI bowls indicates the Red Mesa Black-on-white group to be significantly larger in orifice diameter (Table 1.19B).

Table 1.18. Total occurrence of design elements in whiteware attribute groups at 29SJ 629.

Ceramic Type:	BMIII-PI Minerals						Early Red Mesa B/w				Red Mesa B/w					
Surface Treatment:	Polished				Unpolished											
Temper:	Undifferentiated Sandstone														Chal. SS	
Paint Color:	Brown		Black		Brown		Brown		Black		Brown		Black		Black	
Design Elements	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Hooks	8	12.3	5	9.8	3	12.0	1	2.5	2	2.9	1	1.0	1	0.2	-	-
Nested isolates	1	1.5	3	5.9	-	-	1	2.5	-	-	-	-	3	0.7	-	-
Nonoverlapping steps	-	-	-	-	-	-	1	2.5	-	-	-	-	-	-	-	-
Parallel lines	13	20.0	11	21.6	11	44.0	11	27.5	16	23.2	10	9.7	34	7.7	1	2.9
Parallel lines	1	1.5	-	-	1	4.0	-	-	3	4.4	1	1.0	10	2.2	-	-
Pendant parallel lines	1	1.5	2	3.9	-	-	1	2.5	2	2.9	1	1.0	13	2.9	1	2.9
Framers with unticked solids	4	6.2	2	3.9	-	-	5	12.5	9	13.0	1	1.0	8	1.8	-	-
Framers with ticked solids	1	1.5	3	5.9	-	-	10	25.0	6	8.7	9	8.7	9	2.0	2	5.7
Ticking	4	6.2	3	5.9	1	4.0	-	-	-	-	1	1.0	1	0.2	-	-
Corner triangle	2	3.1	4	7.8	2	8.0	-	-	3	4.4	-	-	4	0.9	-	-
Scrolls	3	4.6	1	2.0	1	4.0	3	7.5	4	5.8	12	11.7	54	12.1	-	-
Framed slashes	1	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dots	1	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Framing dots	-	-	-	-	-	-	1	2.5	1	1.4	-	-	-	-	-	-
Dotted lines	1	1.5	4	7.8	1	4.0	1	2.5	5	7.3	2	1.9	15	3.4	3	8.6
Thick wavy lines	-	-	-	-	-	-	-	-	-	-	1	1.0	1	0.2	-	-
Checkerboard	1	1.5	-	-	-	-	-	-	1	1.4	3	2.9	28	6.3	4	11.4
Eyed solids	-	-	-	-	-	-	-	-	-	-	-	-	4	0.9	-	-
Sawteeth	1	1.5	1	2.0	2	8.0	1	2.5	2	2.9	4	3.9	26	5.8	2	5.7
Flagstaff style	-	-	-	-	-	-	-	-	-	-	-	-	1	0.2	-	-
Heavy curved lines	-	-	-	-	-	-	-	-	-	-	1	1.0	-	-	-	-
Solid band design	1	1.5	1	2.0	1	4.0	1	2.5	5	7.3	28	27.2	123	27.6	8	22.6
Hatched band design	-	-	-	-	-	-	-	-	-	-	-	-	1	0.2	-	-
General solids	6	9.2	5	9.8	-	-	-	-	1	1.4	1	1.0	12	2.7	2	5.7
Hachure A-1	9	13.8	4	7.8	-	-	2	5.0	3	4.4	6	5.8	22	4.9	2	5.7
Hachure A-2	1	1.5	-	-	-	-	-	-	-	-	1	1.0	2	0.4	1	2.9

Table 1.18. (continued)

Ceramic Type:	BMIII-PI Minerals						Early Red Mesa B/w				Red Mesa B/w					
Surface Treatment:	Polished				Unpolished											
Temper:	Undifferentiated Sandstone														Chal. SS	
Paint Color:	Brown		Black		Brown		Brown		Black		Brown		Black		Black	
Design Elements	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Hachure B-2	-	-	-	-	-	-	-	-	-	-	-	-	2	0.4	-	-
Hatched checkerboard	-	-	-	-	-	-	-	-	-	-	-	-	1	0.2	-	-
Squiggle lines	3	4.6	1	2.0	1	4.0	-	-	-	-	6	5.8	23	5.6	4	11.4
Anthro/zoomorphs	-	-	-	-	-	-	-	-	-	-	-	-	1	0.2	-	-
Ticked triangles	-	-	-	-	-	-	1	2.5	4	5.8	7	6.8	32	7.2	3	8.6
Exterior bowl motif	-	-	-	-	-	-	-	-	-	-	1	1.0	1	0.2	-	-
Jar neck motif	-	-	-	-	-	-	-	-	-	-	-	-	2	0.4	-	-
Narrow Sosi style	1	1.5	-	-	-	-	-	-	1	1.4	-	-	-	-	-	-
Interlocking ticking	-	-	-	-	-	-	-	-	1	1.4	6	5.8	8	1.8	1	2.9
Others, solid	1	1.5	-	-	-	-	-	-	-	-	-	-	-	-	1	2.9
Unknown (miscode)	-	-	1	2.0	-	-	-	-	-	-	-	-	-	-	-	-
Totals	65	99.5	51	100.1	25	100.0	40	100.0	69	100.0	103	100.2	446	100.4	35	99.9
H' =	2.640		2.477		1.921		2.136		2.550		2.479		2.602		2.416	
J =	0.859		0.914		0.801		0.809		0.883		0.814		0.765		0.916	
s =	22		15		11		14		18		21		30		14	

Table 1.19. Forms, metrics, surface attributes, and paste attributes of whiteware attribute clusters at 29SJ 629.

A. Vessel Form

	BMIII-PI Mineral			Early Red Mesa B/w		Red Mesa B/w		
	Polished		Unpolished			Sandstone		Chal. SS
Form	Brown	Black	Brown	Brown	Black	Brown	Black	Black
Bowl	34	31	9	17	33	35	158	18
Seed jar	-	-	-	-	-	1	1	1
Tecomate	1	-	-	-	-	1	2	-
Pitcher	-	-	-	-	1	1	2	-
Jar	12	6	4	10	6	24	55	4
Gourd jar	-	-	-	-	1	-	-	-
Olla	-	-	-	-	-	2	10	-
Miniature	-	-	-	-	-	1	2	-
Canteen	-	-	-	-	-	-	4	-
Ladles	2	2	-	1	1	5	33	2
Totals	49	39	13	28	42	69	276	25
Diversity	.752	.623	-	.790	.734	1.246	1.211	.861
Evenness	.543	.567	-	.719	.456	.599	.511	.621
No. of forms	4	3	2	3	5	8	9	4

B. Bowl Diameters (mm)

Number	24	20	4	16	29	30	133	18
Mean	161.9	154.8	177.5	180.6	184.0	197.0	175.0	165.0
Standard deviation	37.266	42.873	15.000	70.990	39.873	39.991	56.774	27.303
Minimum	90	85	160	100	125	140	60	120
Maximum	255	250	190	330	270	295	350	220
c.v. %	23.0	27.7	8.5	39.3	21.7	20.3	32.4	16.5

Table 1.19. (continued)

t Comparisons	t	variance	d.f.	P
Red Mesa brown-black	2.503	unequal	58.7	.015
Red Mesa brown-chalcedonic black	2.029	equal	48	.048
Red Mesa black-chalcedonic black	.130	equal	151	.900
All Red Mesa-all BMIII-PI, Bowls n = 199 + 81, $\bar{x}$ = 179.9 + 164.0	-2.701	unequal	201.5	.008

C. Bowl rim painting

	BMIII-PI Mineral			Early Red Mesa B/w		Red Mesa B/w		
	Polished		Unpolished			Sandstone		Chal. SS
Rim Paint	Brown	Black	Brown	Brown	Black	Brown	Black	Black
Unpainted	9	2	1	3	3	4	4	-
Solid line	15	20	4	13	26	31	144	18
Unknown	10	8	4	-	3	-	4	-
Other	-	1	-	1	1	-	6	-
Totals	34	31	9	17	33	35	158	18

D. Texture

Very fine	2	5	-	10	9	15	50	1
Fine	8	12	-	10	24	34	142	11
Fine-Medium	15	9	2	5	6	20	71	7
Medium	7	8	3	2	1	-	11	3
Medium-coarse	6	-	3	-	2	-	3	3
Coarse	6	3	2	1	-	-	-	-
Very coarse	5	2	3	-	-	-	-	-
Totals	49	39	13	28	42	69	278	25

Table 1.19. (continued)

	BMIII-PI Mineral			Early Red Mesa B/w		Red Mesa B/w		
	Polished		Unpolished			Sandstone		Chal. SS
Rim Paint	Brown	Black	Brown	Brown	Black	Brown	Black	Black
E. Paste Combinations								
Black clay, white sherd	3	1	-	9	4	13	36	1
Gray clay, black sherd	3	2	-	1	5	7	20	-
Black and white sherd	3	3	-	1	7	14	39	1
Gray clay, white sherd	8	3	-	7	11	22	79	9
Tan clay	4	6	2	-	-	-	7	4
Black clay	5	-	3	2	-	-	8	-
White clay	4	8	2	2	3	1	19	1
Totals	30	23	7	22	30	57	208	16
F. Sherd Temper								
None	21	13	12	2	2	1	20	6
<50%	12	8	1	7	11	13	82	8
>50%	15	18	-	19	27	52	170	11
Ca. 100%	1	-	-	-	2	3	6	-
Totals	49	39	13	28	42	69	278	25

When Red Mesa Black-on-white bowls with brown paint and sandstone temper are compared to black-painted Red Mesa Black-on-white bowls in terms of rim diameter, they also prove to be significantly different (Table 1.19B). This is of some interest because black-painted, chalcedonic sandstone tempered bowls, presumably from a limited geographic area, are very similar as a group to black painted general sandstone-tempered bowls.

Consideration of rim treatments between the brown- and black-painted groups through typological time suggests a distinct difference in treatment between the two: brown-painted ceramics exhibit less painting of the rim (χ^2_c=18.890, df=1, p=.000). Reducing Table 1.19C to a series of intra-type contingency tables to test the painting of rims by deleting the unknown and other categories suggests less distinct differences within each group. Although not statistically significant, there is a trend for distinct rim treatments for the earliest polished types (χ^2_c=3.650, df=1, p=.056) and Red Mesa Black-on-white (χ^2_c=3.279, df=1, p=.070), indicating that the inclusion of the early brown-painted unpolished sample is a major contributor to the overall comparison.

Slip and polish variables were examined by collapsing the range of observations into three mutually compatible categories (see lower two categories of Table 1.20). To eliminate interference of treatment related to vessel form, closed forms were not considered in the following comparisons.

Both Roberts (1929:108) and Shepard (1956:169-171) point out that variation in paint color can be accounted for by materials and firing practices. Even though identification of specific mineral constituency in paint is not possible without chemical analysis, the color itself suggests a difference whether it be in treatment or in raw materials used. Black and brown mineral paints on general sandstone-tempered specimens constituted the main groups within the selected types.

Through typological time the patterning of brown-painted pottery varies both internally and in comparison with the black-painted group (Figures 1.7-1.8). The majority of the early brown-painted specimens are unslipped, subsequently the majority of both surfaces are slipped in early Red Mesa Black-on-white with a decline in complete slipping of Red Mesa Black-on-white. In contrast, black-painted pottery does not display this typological fluctuation in slip application. Early black-painted examples also tend to be unslipped, but the subsequent change to complete slipping is comparable among the type groups.

Investment in polishing also differs. The pattern of brown-painted pottery through typological time displays an increase in the amount of total polish, at the expense of partial treatments. In general, the reverse is true for the black-painted group. In the earliest group, BMIII-PI, black-painted sherds exhibit the highest investment in complete, high polish. Early Red Mesa Black-on-white ceramics exhibit a decline in this treatment. Although the largest group, Red Mesa Black-on-white with general sandstone temper is nearly equal in frequency of completely polished vessels to the BMIII-PI types, the variety tempered with chalcedonic sandstone exhibits the lowest frequency of completely polished vessels. The amount of completely polished specimens in the chalcedonic-tempered Red Mesa Black-on-white variety is almost comparable to the brown-painted BMIII-PI material. Black-painted pottery exhibits a higher percentage of differentially polished bowls through typological time.

Figures 1.9-1.11 present paint and slip comparisons for each attribute group. BMIII-PI polished mineral-painted ceramics may be characterized by two patterns; a brown-painted, infrequently slipped variety with a wider range of polishing treatment than the black-painted group. Black-painted BMIII-PI types are more often slipped, and have a greater percentage of completely polished vessels. Early Red Mesa Black-on-white trends are not as distinct, but appear to be a continuation from the earlier group; all black-painted specimens are slipped and the majority of both groups are completely polished. Finally, Red Mesa Black-on-white brown and black-paint groups are contrasted by the difference in slipping practice, in that brown-paint vessels are not slipped as often on both sides. The chalcedonic sandstone tempered group is distinguished from other black-painted items by the low relative frequency of completely polished items in favor of bowls finished by only partially polished exteriors.

Table 1.20. Surface treatments in major whiteware types with sandstone temper at 29SJ 629.[a]

Type:	Polished BMIII-PI				Early Red Mesa B/w				Red Mesa B/w					
Paint Color	Brown		Black		Brown		Black		Brown		Black		Chal. Temp.	
A. All Form	n	%	n	%	n	%	n	%	n	%	n	%	n	%
SLIP														
Open form														
None	20	41.7	11	30.6	2	7.4	-	-	1	1.5	5	1.8	-	-
Interior	7	14.6	10	27.8	1	3.7	8	19.5	13	19.7	37	13.5	2	8.0
Slip-slop	-	-	-	-	1	3.7	1	2.4	1	1.5	3	1.1	2	8.0
Int./exterior	8	16.7	10	27.8	14	51.9	24	58.5	22	33.3	144	52.4	16	64.0
Closed form														
None	10	20.8	3	8.3	1	3.7	-	-	2	3.0	7	2.5	-	-
Ext.-jar	3	6.3	2	5.6	8	29.6	8	19.5	25	37.9	69	25.1	5	20.0
Slip-slop	-	-	-	-	-	-	-	-	2	3.0	10	3.6	-	-
Totals	48	100.1	36	100.1	27	100.0	41	99.9	66	99.9	275	100.1	25	100.0
POLISH														
Closed form														
None	-	-	1	2.6	-	-	-	-	-	-	5	1.8	-	-
Streaky	1	2.1	-	-	2	7.7	-	-	1	1.6	4	1.5	-	-
Moderate	5	10.4	2	5.1	-	-	2	4.9	2	3.1	12	4.4	-	-
Totals	7	14.6	2	5.1	6	23.1	6	14.6	23	35.9	72	26.4	5	20.0
Open form														
None	3	6.3	1	2.6	2	7.7	-	-	-	-	4	1.5	-	-
Streaky	-	-	-	-	-	-	1	2.4	-	-	1	0.4	-	-
Moderate	9	18.8	4	10.3	1	3.8	-	-	4	6.3	10	3.7	2	8.0
Totals	10	20.8	16	41.0	6	23.1	11	26.8	17	26.6	66	24.2	6	24.0
Streaky int/ext	1	2.1	1	2.6	-	-	1	2.4	-	-	-	-	-	-
Mod. int/ext	1	2.1	-	-	-	-	-	-	3	4.7	4	1.5	2	8.0
Total int/ext	6	12.5	9	23.1	3	11.5	6	14.6	8	12.5	47	17.2	1	4.0
Differential	5	-	3	7.7	6	23.1	14	34.1	6	9.4	48	17.6	9	36.0
Totals	48	100.1	39	100.1	26	100.0	41	99.8	64	100.1	273	100.2	25	100.0

Table 1.20. (continued)

Type:	Polished BMIII-PI				Early Red Mesa B/w				Red Mesa B/w					
Paint Color	Brown		Black		Brown		Black		Brown		Black		Chal. Temp.	
B. Bowls only	n	%	n	%	n	%	n	%	n	%	n	%	n	%
SLIP														
Open form														
None	20	57.1	11	35.5	2	11.1	-	-	1	2.7	5	2.6	-	-
One side	7	20.0	10	32.3	2	11.1	9	27.3	14	37.8	40	21.1	4	20.0
Both sides	8	22.9	10	32.3	14	77.8	24	72.7	22	56.1	144	76.2	16	80.0
Totals	35	100.0	31	100.1	18	100.0	33	100.0	37	100.0	189	100.0	20	100.0
POLISH														
Open form														
Other	14	40.0	6	18.2	2	10.5	2	6.1	7	18.9	12	6.7	4	20.0
Total	16	45.7	24	72.7	11	57.9	17	51.5	24	64.9	118	66.3	7	35.0
Differential	5	14.3	3	9.1	6	31.6	14	42.4	6	16.2	48	27.0	9	45.0
Totals	35	100.0	33	100.0	19	100.0	33	100.0	37	100.0	178	100.0	20	100.0

* Percentage points plotted on Figures 1.7-1.11

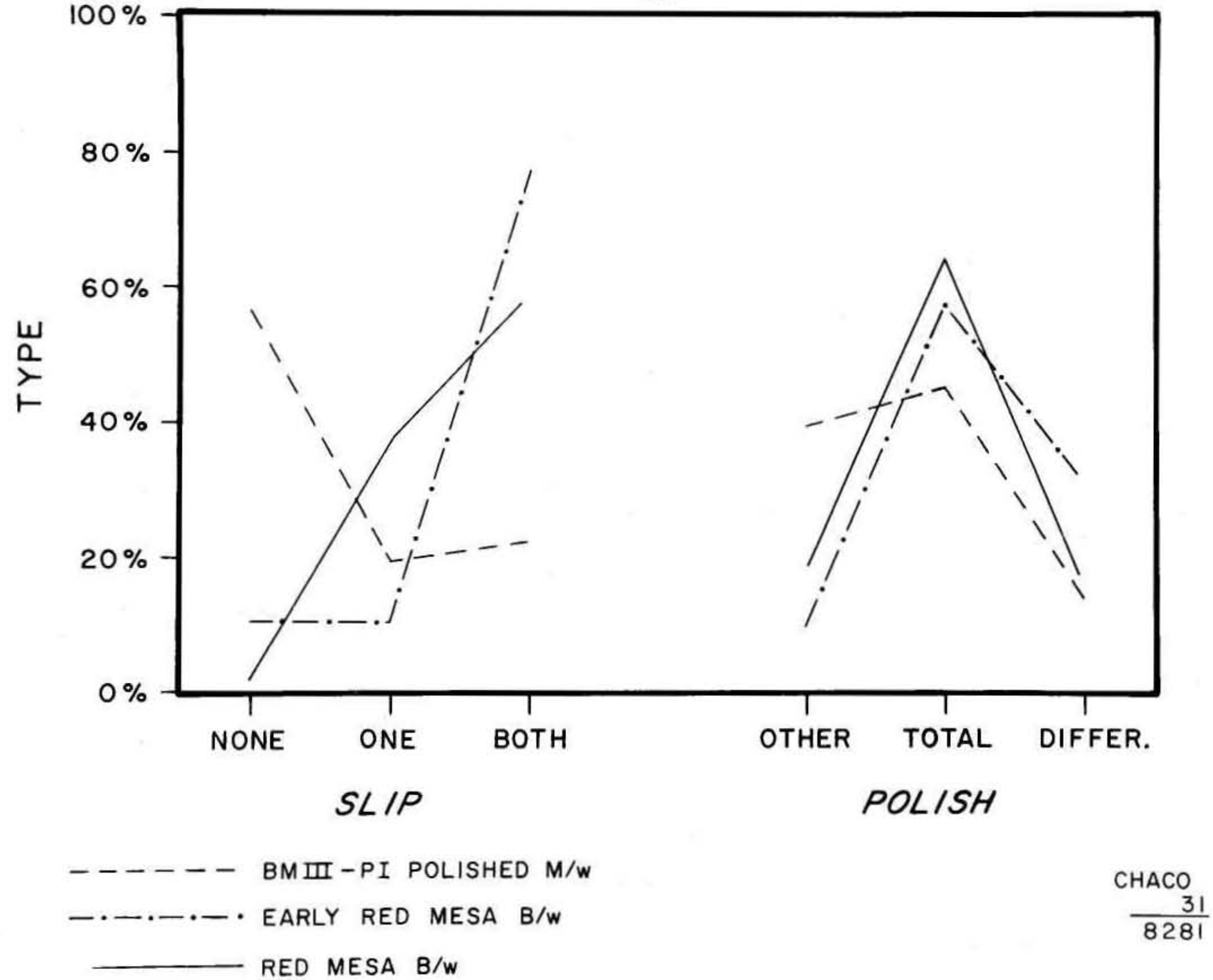

Figure 1.7. *Surface treatments in brown-painted, sandstone-tempered bowls. The chart shows two separate attributes. On the left within-type percentages of unslipped bowls, bowls slipped on one and on two sides are shown. On the right within-type percents of slipping are shown; "other" signifies complete polish on interior and exterior; "differential" means complete polish on the interior and moderate or streaky polish on the exterior. (NPS 310/82817 B).*

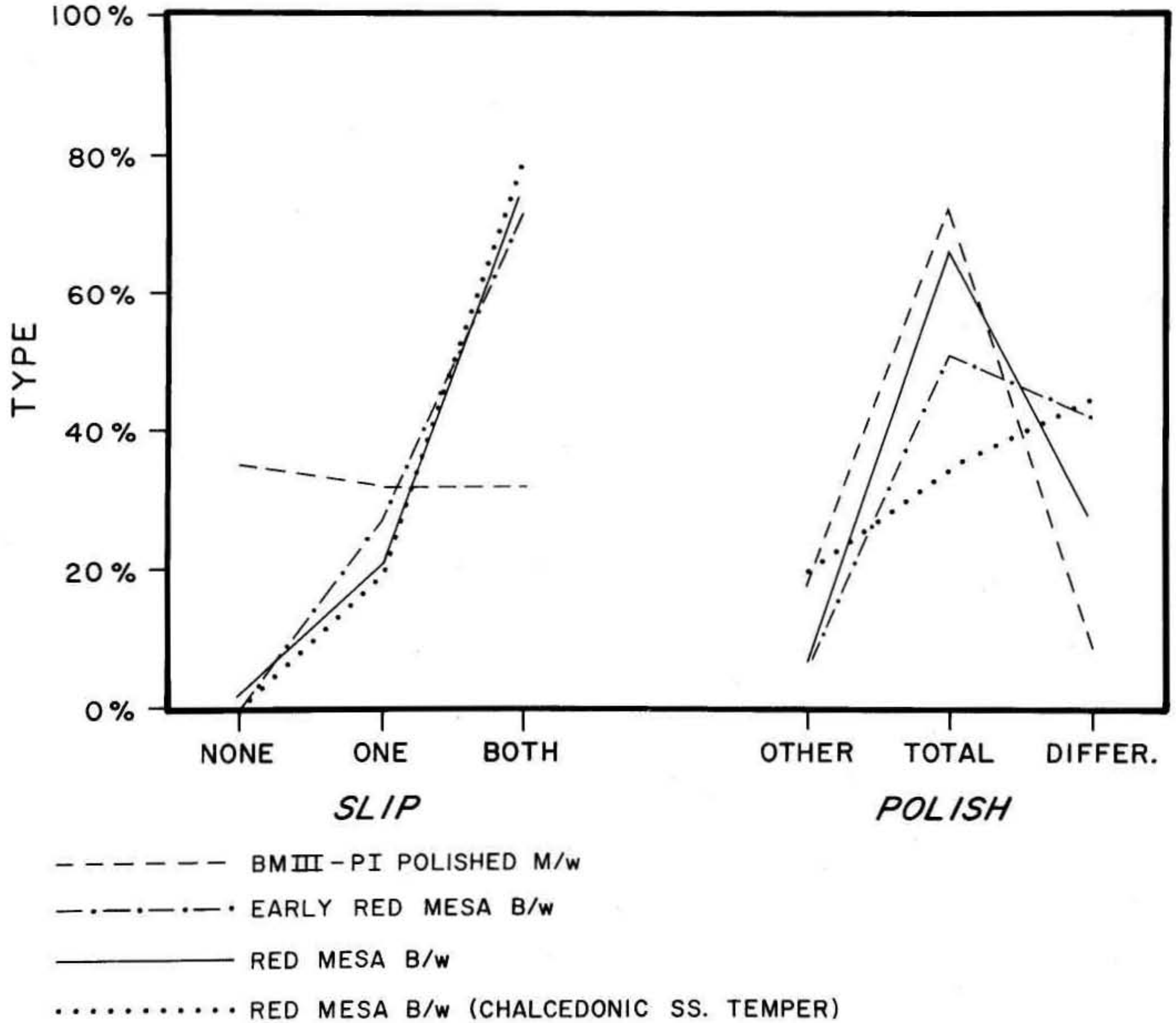

Figure 1.8. Surface treatments on black-painted, sandstone tempered bowls. (NPS 310/82818 B).

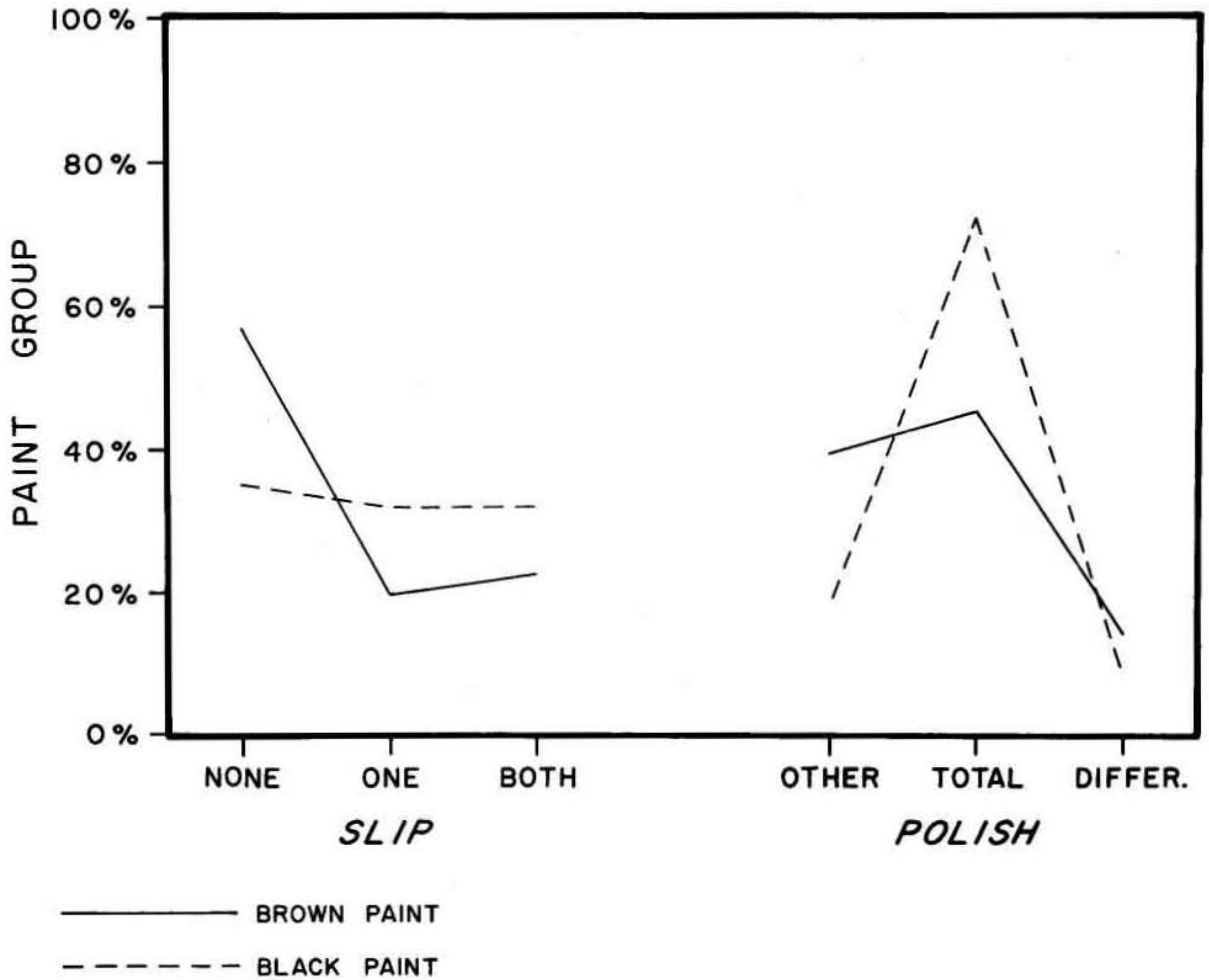

Figure 1.9. *Comparison of slip and polish on brown- and black-painted, sandstone-tempered polished BMIII-PI bowls (NPS 310/82819 B).*

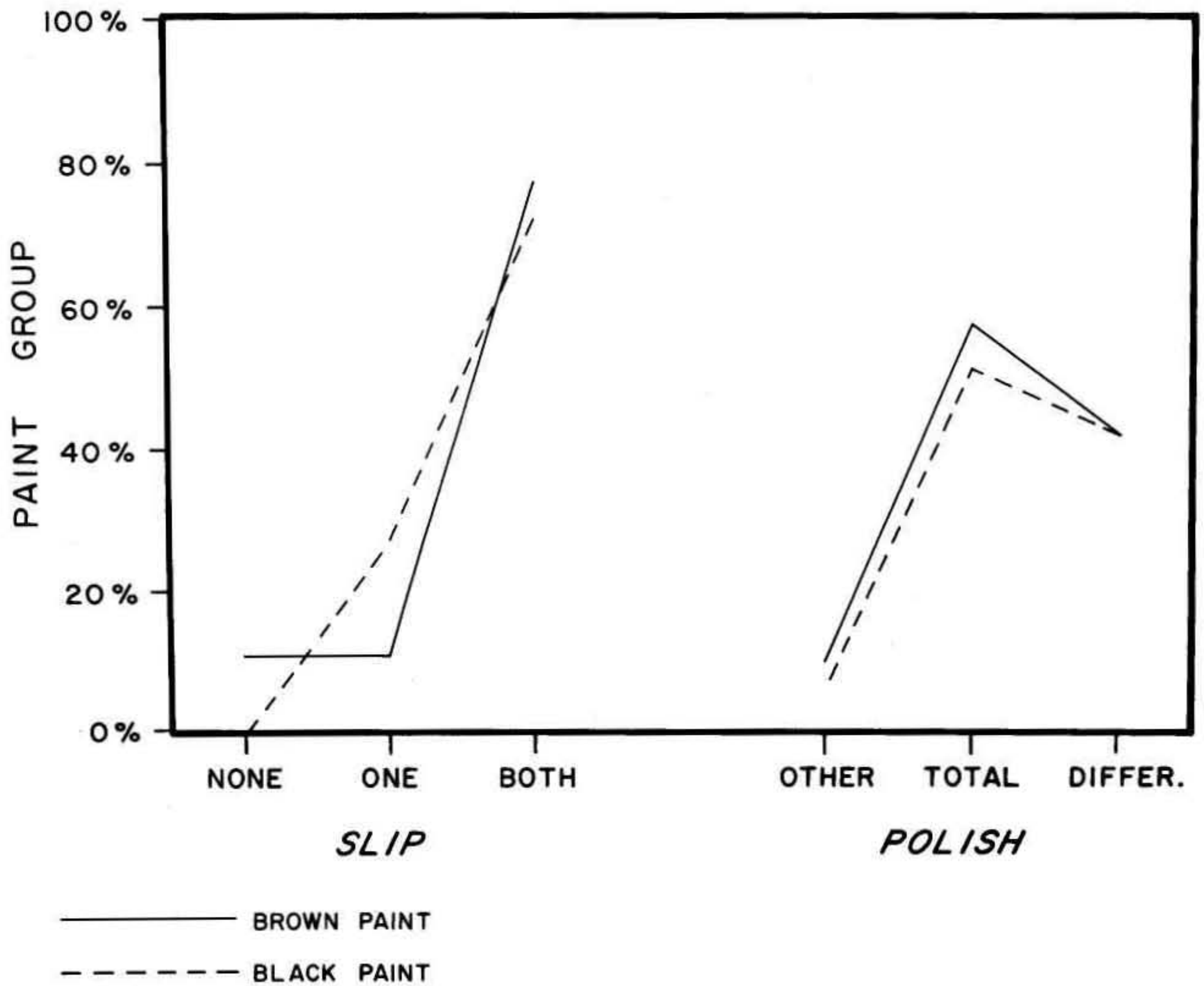

Figure 1.10. *Comparison of slip and polish on brown- and black-painted, sandstone-tempered, Early Red Mesa bowls. (NPS 310/82821 B).*

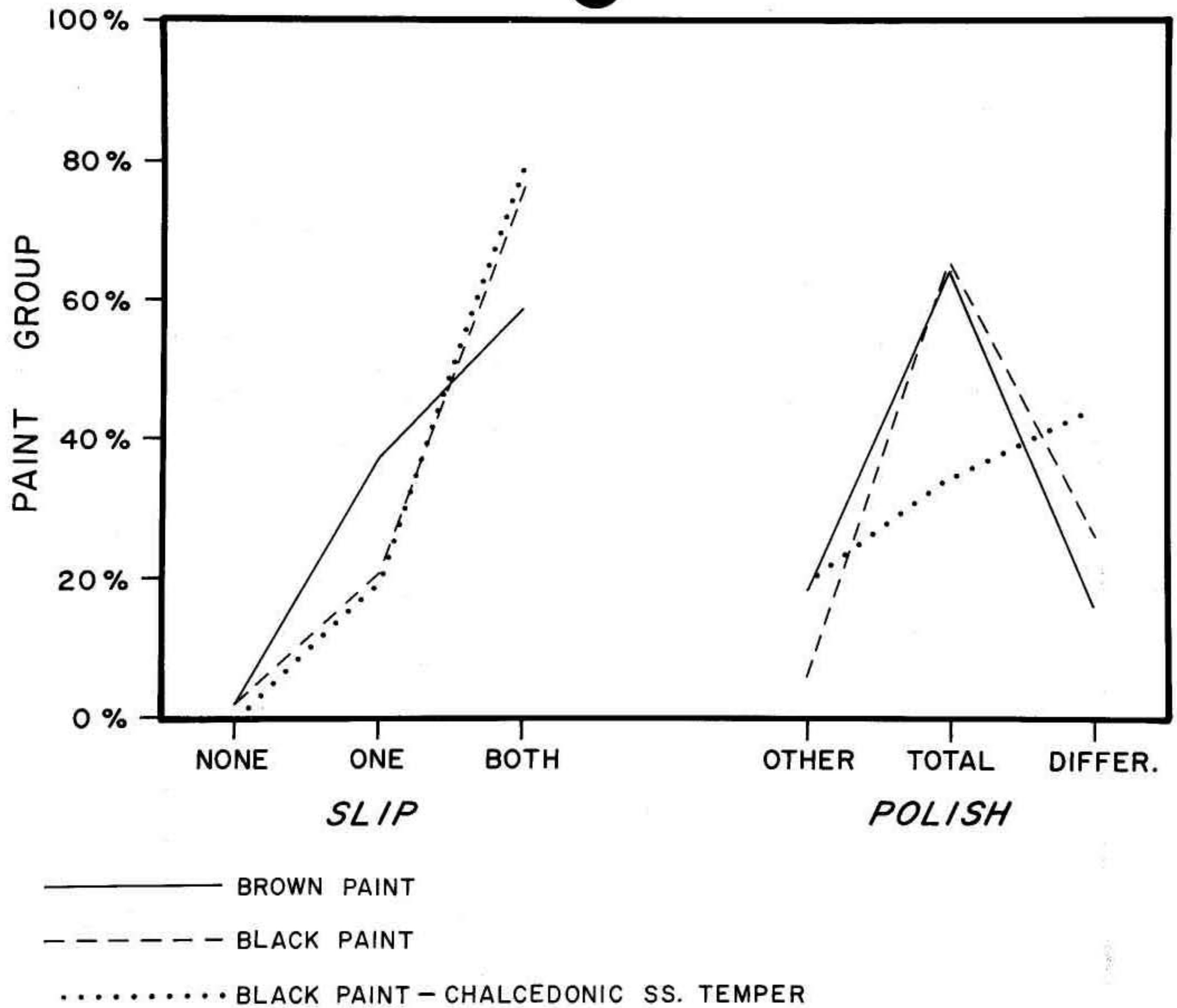

Figure 1.11. Comparison of slip and polish on brown- and black-painted, sandstone-tempered, Red Mesa bowls. (NPS 310/82821 B).

Though execution suggests that some difference in production between paint groups is reasonable to expect, paste attributes are remarkably similar between paint groups within type-temper groups. In 10 chi-square tests between paint groups involving vessel form (3) and paste attributes (3 texture and sherd temper and 1 paste categories--Table 1.19D-F) the only comparison showing a significant difference was in the amount of sherd temper when comparing Red Mesa Black-on-white/undifferentiated sandstone/black paint with Red Mesa Black-on white/chalcedonic sandstone/black paint. Other differences in paste combinations are suggested by inspection but the differences are not great and the cell sizes prohibit testing. The overall similarity invites several interpretations:

1) that paint differences are, afterall, only a firing artifact with minimal production area meaning (as also suggested by bowl diameter t-tests),

2) that "undifferentiated sandstone" masks subareal variability through averaging due to inclusiveness,

3) that these paste attributes are not effective areal monitors, and

4) that, much as (3), regional potting preparation was fairly standard.

It is unlikely that only one of the above is "correct"; probably all are contributing factors. Because differences do show when other attributes are compared, it is likely that paint color has some significance, but the paste results warn against treating the paint groups as fully discrete.

Grayware Attribute Groups

The three utility ware types selected fall into a relatively large number of attribute combinations when sorted on a rough sort type, temper, and primary style of surface treatment basis. As can be seen from Table 1.17 the utility wares are more highly fractionated than are the decorated wares. Because of this dispersion only one attribute cluster was analyzed for each type, and the neck corrugated and narrow neckbanded groups are small (12 and 8, respectively). The small numbers make generalizations spurious, but the data are presented in Table 1.21.

The most informative aspect of the attribute group examination for the utility wares at 29SJ 629 is precisely this dispersion. The main implication is that there is a wide variety in these types using this combination of attributes.

Paste-Surface Attribute Co-occurrence

In an effort to assess the degree of variability within temper groups, this section explores further the co-occurrence of surface treatments with technological attributes (Tables 1.22-1.25).

Paint Type

The association of carbon paint and trachyte temper is a well-established one and shows up here (Table 1.22). Of perhaps more interest is the variability within mineral-painted ceramics. Comparison of the three most abundant tempers (undifferentiated sandstone, chalcedonic sandstone, and trachyte) shows no difference in paint type frequencies. When iron-bearing sandstone tempers are included as a lump, however, a significant difference is present. This difference rests largely in the presence of larger-than-expected numbers of red and brown mineral paints in this temper category, and conversely smaller numbers with black mineral paint. Several factors may be responsible for this association:

1) a relationship with iron-bearing temper,

2) a firing process in the area that produces this temper, and

3) the fact that these tempers are most abundant in earlier ceramics which, in turn, have the highest relative frequencies of brown and/or red paints.

Clay Color

Some of the associations of temper with clay color are exclusive enough to obviate testing; such as "Chuska gray" clay with trachyte temper. This is largely a function of the presence of this distinctive gray clay in the Chuska area, though presence of

Table 1.21. Grayware attribute group data at 29SJ 629.

A. METRIC ATTRIBUTES

ATTRIBUTE GROUP/ Form, Measurement	N	Mean	s.d.	c.v. %	Range
LINO GRAY, SANDSTONE TEMPER UNPOLISHED SURFACE					
Bowl diameter(mm)	1	115.0	-	-	-
Tecomate diameter(mm)	1	70.0	-	-	-
Pitcher diameter(mm)	1	55.0	-	-	-
Jar diameter(mm)	11	125.0	53.15	45.52	60-230
NARROW NECKBANDED, SANDSTONE TEMPER, 5 mm+ CLAPBOARD					
Orifice diameter(mm)	5	185.0	37.08	20.04	140-240
Rim fillet width(mm)	5	17.6	3.51	19.93	13-22
Rim flare(°)	4	13.8	6.85	49.82	6-22
NECK CORRUGATED, SANDSTONE TEMPER, TUSAYAN CORRUGATION STYLE					
Orifice diameter(mm)	7	185.7	51.11	27.52	130-250
Rim fillet width(mm)	7	14.6	2.88	19.75	11-20
Rim flare(°)	6	18.5	5.61	30.34	13-27

B. NOMINAL ATTRIBUTES

ATTRIBUTE GROUP/ Paste Attribute	State	N	H'	J
LINO GRAY, SANDSTONE TEMPER UNPOLISHED		21		
Temper grain size	Medium	3		
	Coarse	8	.999	.909
	Very Coarse			
		10		
Clay/temper	Tan	5		
	Black	5	1.073	.977
	White	3		
Texture	Fine	1		
	Medium	6		
	Medium	2	1.368	.850
	Coarse	3		
	Coarse	9		
	Very Coarse			

Table 1.21. (continued)

ATTRIBUTE GROUP/ Paste Attribute	State	N	H'	J
NARROW NECKBANDED, SANDSTONE TEMPER, 5 mm+ CLAPBOARD		8		
	Coarse	2		
Temper grain size	Very Coarse	6		
Clay/temper	Black	2		
	White	1		
Texture	Medium	2		
	Coarse	2		
	Coarse	4		
	Very Coarse			
NECK CORRUGATED, SANDSTONE TEMPER, TUSAYAN CORRUGATION STYLE		12		
Temper grain size	Medium	2		
	Coarse	8	.868	.790
	Very Coarse	2		
Clay/temper	Tan	3		
	Black	4		
Texture	Medium	1		
	Medium	2		
	Coarse	6	1.199	.865
	Coarse	3		
	Very Coarse			

Table 1.22. Paint by temper at 29SJ 629.

Temper	Mineral Paint Color: Red	Brown	Black	Green	Glaze	Mineral Carbon	Carbon	Totals
Sandstones								
Undifferentiated (SS)	34	259	635	3	10	6	23	970
Chalcedonic (ChSS)	3	21	68	-	-	-	-	92
Iron-Oxide (FeSS)	5	7	3	-	-	-	2	17
Trachyte (Tr)	3	8	13	2	-	6	37	69
Sandstone/trachyte (SST)	1	3	10	-	-	-	3	17
San Juan igneous (SJ)	-	8	13	1	-	19	2	43
Totals	46	306	742	6	10	31	67	1,208

Chi-square comparisons:

A. Mineral:

SS, ChSS, FeSS, Tr
n=1,059
χ^2=43.929
df=6, p=.000
C=.200, 4 cells <5

B. Mineral:

SS, ChSS, Tr
n=1,044
χ^2=7.043
df=4, p=.134
C=.081, 2 cells <5

Contributors:

Red and brown higher than expected.

C. Brown, black mineral/carbon:

SS, ChSS, T, SJ
n = 1,087
χ^2=389.523
df=6, p=.000
C=.514, 2 cells <5

Trachyte and carbon higher than expected. Sandstone lower, with carbon a contributor.

Table 1.23. Paste combinations cross-tabulated with temper types at 29SJ 629.

Paste	SS	Chal-cedonic SS	FeO_3 SS	Magne-titic SS	San Juan	Trach	SS Trach	Total
No type	358	75	5	10	37	51	9	545
Black clay, white sherd	154	3	0	0	1	1	1	160
Gray clay, black sherd	70	4	0	0	0	0	1	75
Black and white sherd	143	9	0	0	0	1	1	154
Dark gray clay, white sherd "Little Colorado"	4	0	0	0	0	0	0	4
"Chuska gray" clay	1	0	0	0	0	43	1	45
Gray clay, white sherd	253	22	0	1	0	9	2	287
Tan clay	77	17	6	7	2	32	2	143
Black clay	83	6	0	0	0	2	1	92
White clay	88	4	4	2	12	10	2	122
Totals	1,231	140	15	20	52	149	20	1,627
Diversity[a]	1.865	1.696				1.352		
Evenness[a]	.849	.872				.695		
Number of Types	9	7				7		

Chi-square comparison:

Sandstone by chalcedonic sandstone
Types 1-3, 6-9

$\chi^2=52.852$ n=1,366
d.f.=7 p=.000
C=.193

[a] Identified types only.

Table 1.24. Sherd temper proportions at 29SJ 629.

Geologic Temper	Absent	Sherd Temper <50%	Sherd Temper >50%	Sherd Temper 100%	N
Undifferentiated SS	312	259	625	35	1,231
Chalcedonic SS	71	30	38	1	140
Iron-bearing SS	29	5	1	0	35
San Juan igneous	45	5	2	0	52
Trachyte	135	4	10	0	149
SS/trachyte mix	7	8	5	0	20
Totals	599	311	681	36	1,627

Chi-square comparisons:	Contributors:
n=1,591 (less 100% col.) χ^2=355.296 df=10, p=.000 C=.427, 1 cell <5	Sherd and sand combinations higher than expected. All others, especially trachyte, lower.

trachyte temper probably contributes to the distinctive appearance. Only 28.9 percent of trachyte-tempered sherds have this distinctive gray paste. It is likely that this gray clay has a tan variant. Tan and gray clays account for just over half of all trachyte-tempered sherds, and over 75 percent of all such sherds given paste color assignment. Table 1.23 also shows that the iron-bearing sandstones tend to be found in tan and white clays, that San Juan tempers associate with white clay (also found at 29SJ 628), and that chalcedonic sandstones tempers have a mild association with tan clays. For comparing these clay colors between temper groups, it is necessary to remember that certain tempers are more often associated with sherd temper than others (see below). Thus, several of the paste types are less likely to be found with those tempers. The dispersed nature of the sandstone-trachyte temper mix is perhaps informative. That this temper group should be so heterogeneous suggests that the trachyte present is an incidental introduction in many cases (the sample is small, however). The likelihood of such an interpretation is enhanced by the fact that the distribution in sherds in which trachyte temper is dominant composes the least diverse group.

Sherd Temper

Different geological tempering agents show a fairly strong association with the presence and abundance of sherd temper (Table 1.24). Undifferentiated sandstone temper is far more often associated with sherd temper. Partly, this results from the prevalence of sand temper in later painted ware at 29SJ 629. Partly, perhaps, it relates to superior binding quality of sherd temper as shown by Shepard (1956:27, 132). Additionally, it is possible that sherd temper's superior binding quality made a sufficient improvement in product to warrant its addition to sand-tempered ceramics but not an appreciable improvement in other tempers such as trachyte, but also chalcedonic sandstone, which al- has an angular fracture pattern.

Table 1.25. *Paste vitrification by temper at 29SJ 629.*

Temper	Vitrification: Absent	Present	Marked	N
Undifferentiated SS	135	864	231	1,230
Chalcedonic SS	8	99	33	140
Iron-bearing SS	13	20	2	35
San Juan igneous	6	30	2	38
Trachyte	28	108	13	149
SS/trachyte mix	5	12	3	20
Totals	195	1,133	284	1,612

Chi-square comparisons:	Contributors:
A. $\chi^2=51.152$ (whole table) df=10, p=.000 C=.175, 5 cells <5	Trachyte high absence, low marked. Chalcedonic SS high marked, low absent, iron-bearing high on absent.
B. SS, Tr, ChSS n=1,519 $\chi^2=21.294$ df=4, p=.000 C=.118	SS as expected, ChSS higher than expected, on vitrified trachyte markedly lower than expected.

Vitrification

Assessment of degree of vitrification is somewhat subjective and is also probably influenced by paste color. Nonetheless, cases coded as markedly vitrified and as vitrification absent can be considered extremes on a continuum, with "present" as a wide middle range. The overall distribution of these categories (Table 1.25) reflects this by its nearly normal shape. Deviations from the expected occur mainly in trachyte and chalcedonic sandstone temper categories. Trachyte tempered sherds show relatively low frequencies of marked vitrification and higher frequencies of its absence. San Juan igneous and iron-bearing sandstone tempers are similar; vitrification is less likely to be present (or at least observed) in white clays, which associate with these two temper types (see above). The one temper that shows a tendency to associate with marked vitrification is chalcedonic sandstone.

Vitrification was initially included in the analysis because it was possibly thought to be indicative of firing temperatures and thus fuel supplies. It is, of course, relevant to firing temperature but also to numerous clay attributes. The main item of interest here, then, is that the clays associated with chalcedonic temper tend toward either low maturation temperature or that ceramics from the chalcedonic cement source area (located to the south?) tend to be high fired. It should also be noted that, contrary to Windes' (1977:294) prediction that trachyte may act as a flux, there is a negative association with marked vitrification.

Grain Size

Wares show a distinct association with grain size, based in part on intended vessel function. Whitewares are significantly finer-grained than are graywares (Tables 1.26-1.27). Within whitewares,

Table 1.26. Grain size by temper at 29SJ 629.

Temper	Grain Size: Fine	Medium	Coarse	Very Coarse	Totals
Undifferentiated SS	224	634	293	80	1,231
Chalcedonic SS	7	67	47	19	140
Iron-bearing SS	2	5	23	5	35
Trachyte	6	27	64	25	122
SS/trachyte mix	14	25	8	0	47
Totals	253	758	435	129	1,575

Chi-square comparisons:	Contributors:
Whole Table	
χ^2=153.136 df=12, p=.000 C=.258, 2 cells <5	Trachyte high on coarse and very coarse. SS high on fine.
All Sandstone	
χ^2=72.755, n=1,453 df=.9, p=.000 C=.218, 2 cells <5	ChSS low on fine, high on very coarse SS & trachyte. High in fine, low on very coarse. Iron-bearing SS high on coarse and very coarse, low on medium.
Trachyte, ChSS	
χ^2=19.375, n=262 df=3, p=.000 C=.262	Trachyte tends to coarse.

Table 1.27. Temper grain size by vessel form at 29SJ 629.

Form	Fine	Medium	Coarse	Very Coarse	Totals
All bowls	165	434	166	24	789
Ladle	21	70	11	1	103
Whiteware jar	58	178	72	4	312
Olla	11	20	13	0	44
Pitcher	3	14	4	0	21
Other white closed[a]	5	18	14	0	37
Grayware jars	2	36	152	96	286
Totals	265	770	432	125	1,592

Chi-square comparisons:

All whitewares excluding very coarse

χ^2=18.346, n=1,277
df=10, p=.049
C=.119
2 cells <5

Contributors:

Ladles low coarse, other white closed high coarse.

Bowls by white jars; all grain sizes:

χ^2=3.916, n=1,101
df=3, p=.271
C=.060

[a] Canteen, seed jar, tecomate, and gourd jar.

there seems to be little differentiation in grain size between forms: no statistical difference is present between bowls and jars, the two largest whiteware groups. This sample does show ladles as being low in coarse-grained temper and closed forms (tecomates, gourd jars, seed jars, canteens) as being higher than expected in coarse-grained tempers.

Following the association of coarse-grained temper with graywares, there is also a distinct association of trachyte temper with coarse and very coarse temper (Tables 1.26-1.27). Somewhat arbitrarily comparing only coarse and very coarse trachyte and sandstone grain sizes (assuming that the great majority of the coarse and very coarse sandstone temper is in grayware vessels), it can be seen that sandstone and trachyte grain sizes are very similarly distributed. Comparing only sandstones shows that in overall distribution, chalcedonic and iron-bearing sandstones tend to be coarser than the undifferentiated class (Table 1.26). In part, this is probably a result of the difficulty of identification of fine-grained chalcedonic sandstone, but a more direct cause is again the association of chalcedonic sandstone temper with graywares. The sandstone and trachyte temper mixes are tabled separately here because the grain size recorded for these tempers is the sandstone. The sand grains mixed with trachyte are concentrated in the fine- to medium-range. It is suspected that some such grains are clay inclusions rather than temper additions. Others, especially when there is more sand than trachyte, are probable temper additions. A prime reason that they are finer is that such mixes are rare in graywares. Shepard (1939, 1956) was quite sure that in many such mixes the trachyte was an accessory introduced through sherd temper.

Function

Vessel Form and Temper

It has been noted by Rye (1976) and S. Plog (1980) that tempers have properties that are functionally useful, particularly in cooking vessels. The examination of both surface alteration and vessel form within temper groups is relevant both to possible vessel use and reasons for importation. The composition of trachyte, in particular, is very close to the mineralogical composition shown by Rye (1976) to have very good resistance to thermal shock.

Two chi-square comparisons of vessel form by temper were conducted to examine somewhat different temper and form combinations (Table 1.28). On both tests the largest contribution was from trachyte-tempered gray jars. Higher-than-expected observed values also occur in chalcedonic sandstone tempered gray jars. Both chalcedonic sandstone and trachyte tempers are correspondingly low in bowls. Other than being lower than statistically expected for gray jars, San Juan temper distributes similarly to the overall vessel forms in which it occurs (note, however, that it does not occur in ladles, and that in the test that includes San Juan igneous temper, red and whitewares have been combined). Sandstones, having temper most likely to be partly local, are high on bowls and low on gray jars, once again casting doubt upon the idea that bowls are "better" trade items than jars (Plog 1980; Whittlesey 1974).

The contingency table (Table 1.28 lower) that excludes San Juan and includes more vessel forms shows that large white jars (ollas) are closest to the values expected from the distribution of the three primary tempers. Undifferentiated sandstone temper is higher than expected in all forms, except for gray jars. Trachyte temper is the mirror distribution to sandstone, and chalcedonic sandstone-tempered vessels are intermediate between the other two tempers. Trachyte and chalcedonic sandstone-tempered gray jars are both large contributors (as in the first test) to the significant chi-square value, trachyte being the larger of the two.

Even in this fairly early, small-site assemblage, trachyte-tempered vessels are predominantly grayware jars. The question arises whether this predominance results from a preference for such jars as cooking vessels because of the thermal shock properties noted. Examination of sooting of gray jars by temper, however, reveals no significant association between temper and soot although both chalcedonic sandstone and trachyte-tempered ceramics were higher than expected for sooting. Perhaps then, vessels so tempered are recognized for their thermal shock quality but this was apparently not the sole reason for which the vessels were brought in.

Comparison with later sites (29SJ 627, 29SJ 633) shows 29SJ 629 to have significantly less sooting (Toll 1984). Pueblo Alto differs markedly from all of these small sites, but most from 29SJ 629, in that

Table 1.28. Occurrence of major temper types in major vessel forms at 29SJ 629.

Forms	Sandstone	Chalcedonic Sandstone	San Juan Igneous	Trachyte	Total
All bowls	615	54	37	42	748
White and red jars	256	19	14	21	310
Grayware jars	155	45	3	67	270
Totals	1,026	118	54	130	1,328

Chi-square comparisons:	Contributors:
$\chi^2=126.518$ df=6, p=.000 C=.295	White and red jars nearly as expected; gray jars high in trachyte.

Forms	Sandstone	Chalcedonic Sandstone	Trachyte	Totals
All bowls	615	54	42	711
Ladles	86	9	6	101
Whiteware jars	256	19	20	295
Ollas	35	5	4	44
Other closed white[a]	48	6	2	56
Grayware jars	155	45	67	267
Totals	1,195	138	141	1,474

Chi-square comparisons:	Contributors:
$\chi^2=126.119$ df=10, p=.000 C=.281 2 cells <5	Gray jars are again the major contributor.

[a] Includes seeds jars (5), tecomates (10), canteens (14), gourd jars (4), pitchers (20), mug (1), and duckpots (2).

at Pueblo Alto there are more sooted than unsooted grayware vessels.

Therefore, it appears more likely that co-variation in vessel form and temper is a result of areal production rather than a distinctive functional advantage to any particular temper type. That particular areas do seem to have produced more of particular forms may well indicate a functional advantage to that area's materials and techniques, but demonstration of that advantage, without extensive tests, is not possible.

Grayware Sooting

As mentioned, there does not seem to be an association of temper with grayware sooting (Table 1.29). There are, however, distinct associations between sooting and provenience, some of which probably have implications for understanding the overall sooting distribution at the site. Simple inspection of Table 1.30 shows that sooting occurs in remarkably different relative frequencies in different parts of the site. Sooted and unsooted items are nearly in balance in the habitation units--rooms, pithouses, plaza, and kiva--with unsooted only slightly outweighing sooted items. In trash contexts, however, unsooted vessels compose the great bulk of grayware items. There is probably some functional relationship here, but the greater factor seems likely to be a question of post-depositional weathering (N-transforms, if you will). The location of the site's trash midden in an arroyo bed must have meant that considerable washing of sherds took place. The sherds from the surface support the suggestion that sooting probably disappears with time when exposed. Sherds deposited inside structures were probably spared such weathering and may be a truer indicator of the proportions of sooted and unsooted vessels. Note that while there is a significant association of sooting with provenience overall, the proveniences likely to have protected sherds (pitstructures, rooms, plaza pits) show no difference when compared to one another, nor do the "exposed" proveniences (Trash Midden, surface, test trenches) show any significant difference from one another.

Vessel Size

The utility of examining vessel capacities in relation to population size and to related aspects of cooking and serving patterns has been outlined by Turner and Lofgren (1966). Their study of ceramics from Northeastern Arizona revealed a bimodal distribution of culinary vessel sizes. Jar size itself also increased through time, as did the relative frequency of larger jars. Serving bowls remained relatively constant in volume. Turner and Lofgren (1966:127) suggest the increased cooking jar size is related to both increased household size and to restructuring of cooking activities for larger supra-household groups such as kiva-based societies or clans. Household needs, then, would be satisfied by the smaller range of cooking vessels and large, extended groups by the larger, communal, cooking pots. Insofar as diameter correlates with volume (see below), bowls at 29SJ 629 also remain close to the same size through time (Figure 1.1, Tables 1.8-1.11).

Data from 29SJ 629 are presented in the following tables and figures. Because of the small number of measurable whole vessels at 29SJ 629 (Table 1.31), comparable typological data from 29SJ 1360 are incorporated into the regression analysis (Figures 1.12 and 1.13). Volumes of restored vessels were measured by completely filling them with vermiculite, then refilling a graduated cylinder. Large fragments of bowls were included by using their dimension for calculation of the volume of a hemisphere [$v=.5h(r^2)+.17h^3$]. The level of vessel filling and the measuring material used are different from those of Turner and Lofgren (1966), which partially accounts for differences in observed data. But, the patterning of the data is similar: culinary vessels exhibit a bimodal distribution and bowls exhibit a unimodal distribution weighted heavily toward the smaller capacity vessels (Figures 1.14-1.15). Figure 1.12 shows the correlation between orifice diameters and volume in culinary vessels ($r=.903$). The bimodality suggested by Figure 1.14 breaks around 11,000 cc. Turner and Lofgren (1966:126) suggest a break between large and small gray vessels at around 8,000 cc, which is very close to this sample's median of 8,170 cc, but this sample suggests that "large" should have a higher break-off point. Those vessels larger than 16,000 cc are two standard deviations above the mean, and 16,000 cc is the base value for the second mode. This suggests that this larger figure should be used as a separation point; whole jars with a volume of 16,000 cc or more have orifice diameters of over 220 mm (Figure 1.12). Table 1.31 presents data on orifice diameters, conforming to Turner and Lofgren's (1966)

***Table 1.29.** Occurrence of sooting on graywares by temper at 29SJ 629.*

	Sand-stone	Chal. SS	Iron-bearing SS	San Juan Igneous	Trachyte	Totals
Sooted	32	13	6	1	20	72
Unsooted	137	34	12	3	56	242
Totals	169	47	18	4	76	314

Chi-square comparisons:

Whole table less San Juan

χ^2=3.720, n=292
df=3, p=.293
C=.109
1 cell <5

SS, Chalcedonic SS, Trachyte

χ^2=2.594, n=292
df=2, p=.273
C=.094

Table 1.30. Occurrence of sooting on graywares by provenience at 29SJ 629.

	Kiva	Pithouses	Rooms	Plaza	Test Trench	Trash Midden	Surface
Sooted	4	23	11	19	3	10	1
Unsooted	6	38	11	20	36	103	28
Totals	10	61	22	39	39	113	29

Sooted: 71

Unsooted: 242

Chi-square comparisons:	Contributors:
Whole table	
χ^2=57.436, n=313 df=6, p=.000 C=3.94 2 cells <5	Trash Midden low sooted, high unsooted; rooms and plaza high sooted.
Rooms, plaza, pithouse	
χ^2=1.644, n=122 df=2, p=.440 C=.115	
Test trench, Trash Midden, surface	
χ^2=.943, n=181 df=2, p=.624 C=.072 2 cells <5	

Table 1.31. *Whole vessels at 29SJ 629 and 29SJ 1360.*

			Sandstones							
			Iron				Orifice			
CULINARY	Undif.		Oxide	Chal.		Soot	Diameter	Volume		Volume I[a]
	c	vc	c	vc	Trachyte	(x)	mm	cc	RV#	Plate
29SJ 629:										
Wide Neckbanded										
Trash Midden Grid 65	-	x	-	-	-	-	160	-	46	8.3b
Grid 65	-	x	-	-	-	x	170	-	49	8.3a
Pithouse 2 fill	x	-	-	-	-	x	170	5,240	19	8.3o
Plaza OP 1	-	-	x	-	-	x	180	6,330	22	8.3e
Narrow Neckbanded										
Pithouse 2 Level 7	-	-	-	x	-	x	210	6,640	30	8.7c
Wing wall area	-	x	-	-	-	-	-	-	-	-
Floor fill	-	-	-	x	-	x	150	4,500	31	8.3c
Pithouse 3 Level 7	-	-	-	-	x	x	170	3,870	25	8.9a
Levels 3-6	-	x	-	-	-	-	210	-	23	8.7b
Room 5 fill	-	-	-	-	x	-	-	350	18	8.3f
Room 2 fill	x	-	-	-	-	x	250	19,130	1	8.7a
Neck Corrugated										
Pithouse 2 fill	-	-	-	x	-	x	-	-	41	8.8d
Wing wall area	-	-	-	x	-	x	200	8,170	15	8.8a
Room 2 Layer 1	x	-	-	-	-	-	-	-	-	-
Layer 2	x	-	-	-	-	x	250	19,480	21	8.8b
Room 3 Layer 2	x	-	-	-	-	-	190	-	40	8.8c
Plaza Grid 22	-	-	-	-	x	-	-	1,100	24	8.9b
P-II Corrugated										
Pithouse 2 floor	-	-	-	-	x	x	260	16,850	27	8.9c
Vent and fill	x	-	-	-	-	-	220	-	12	8.11a
P-III Corrugated										
Kiva floor	-	-	-	-	x	-	180	-	29	8.9d

Table 1.31. (continued)

GRAYWARES	Undif.		Sandstones Iron Oxide	Chal.			Orifice Diameter	Volume		Volume I[a]
	c	vc	c	vc	Trachyte	Soot (x)	mm	cc	RV#	Plate
29SJ 1360:[b]										
Wide Neckbanded	-	-	-	-	-	-	200	14,580	-	-
Narrow Neckbanded	-	-	-	-	-	-	190	8,820	-	-
	-	-	-	-	-	-	220	16,000	-	-
Neck Corrugated	-	-	-	-	-	-	170	3,520	-	-
	-	-	-	-	-	-	145	3,120	-	-
	-	-	-	-	-	-	240	1,7250	-	-
	-	-	-	-	-	-	240	17,720	-	-
	-	-	-	-	-	-	243	17,520	-	-
P-II Corrugated	-	-	-	-	-	-	120	1,330	-	-
	-	-	-	-	-	-	120	1,330	-	-
	-	-	-	-	-	-	235	10,500	-	-
	-	-	-	-	-	-	220	8,870	-	-
	-	-	-	-	-	-	230	14,940	-	-

[a] Restorable vessels illustrated in Chapter 8, Volume I. Some differences in typological assignment may exist.
[b] See McKenna (1984:Appendix 2, Table 18).

Table 1.31. (continued)[a]

WHITEWARES	Sandstones: Undifferentiated				Sandstones: Chalcedonic				Trachyte		Orifice	Volume		Vol. I[b]
Texture:	fine-med.		coarse-vc		fine-med.		coarse-vc		mix		Diameter			
50% sherd:	<	>	<	>	<	>	<	>	<	>	mm	cc	RV#	Plate
29SJ 629:														
Polished BMIII-PI M/w														
Pithouse 2 fill (b)	-	x	-	-	-	-	-	-	-	-	200	-	-	8.2c?
La Plata B/w														
Trash Midden Grid 70 (b)	-	-	x	-	-	-	-	-	-	-	190	1,797	-	8.2a
Kana'a B/w														
Trash Midden Grid 65 (b)	-	-	x	-	-	-	-	-	-	-	210	2,095	-	8.2b
Early Red Mesa B/w														
Pithouse 2 Layer 6 (b)	-	x	-	-	-	-	-	-	-	-	220	1,510	-	-
Pithouse 3 Level 7 (b)	-	-	-	-	-	-	-	-	x	-	200	-	-	8.4f
Level 12 (b)	-	x	-	-	-	-	-	-	-	-	210	-	-	8.2d?
Plaza OP 14 (b)	-	-	-	-	x	-	-	-	-	-	230	2,252	7	8.4c
Red Mesa B/w														
Pithouse 2 Layer 6 (b)	-	x	-	-	-	-	-	-	-	-	180	-	-	8.4e
Layer 6 (b)	-	-	-	x	-	-	-	-	-	-	250	4,820	-	-
Wing wall area (sj)	-	-	-	x	-	-	-	-	-	-	115	-	8	8.6a
Pithouse 3 Level 1-3 (L)	-	x	-	-	-	-	-	-	-	-	-	-	56[a]	8.6c$_5$
Level 1-3 (p)	-	-	-	x	-	-	-	-	-	-	80	2,540	10	8.5b
Level 3-6 (j)	x	-	-	-	-	-	-	-	-	-	-	-	-	-
Level 3-6 (L)	-	-	x	-	-	-	-	-	-	-	-	-	54	8.6c$_3$
Level 7 (b)	-	-	-	-	-	-	-	-	x	-	210	-	-	8.4h
Level 6 (b)	-	-	-	-	-	-	-	x	-	-	170	-	-	8.4g
fill (p)	x	-	-	-	-	-	-	-	-	-	80	-	-	8.5d
Floor (b)	-	-	x	-	-	-	-	-	-	-	235	3,006	16	8.10a
Room 9 Level 2 (b)	-	-	-	-	-	-	-	x	-	-	240	2,920	-	-
Level 3 (L)	x	-	-	-	-	-	-	-	-	-	-	-	55	8.6c$_2$?
Floor (p)	-	x	-	-	-	-	-	-	-	-	100	-	2	8.5a
Room 7 fill (L)	-	-	-	-	x	-	-	-	-	-	120	-	51/52	8.6b
fill (L)	-	-	-	-	-	-	-	-	-	x	130	-	51/52	8.6b
Room 2 fill (o)	-	x	-	-	-	-	-	-	-	-	80	-	-	-
fill (b)	-	-	-	-	-	x	-	-	-	-	205	-	5	8.4a
Plaza OP 14 fill (b)	-	x	-	-	-	-	-	-	-	-	170	1,073	4	8.4b
OP 14 fill (L)	x	-	-	-	-	-	-	-	-	-	-	-	50	8.6c$_4$
OP 6 fill (L)	-	-	-	x	-	-	-	-	-	-	-	-	53	8.6c$_1$

Table 1.31. (continued)

WHITEWARES	Sandstones													
	Undifferentiated				Chalcedonic				Trachyte		Orifice			
Texture:	fine-med.		coarse-vc		fine-med.		coarse-vc		mix		Diameter	Volume		Vol.[1]
50% sherd:	<	>	<	>	<	>	<	>	<	>	mm	cc	RV#	Plate
Escavada/Puerco B/w														
Pithouse 3 Level 3-6 (cup)	-	-	-	-	x	-	-	-	-	-	80	200	6	8.5f
Gallup B/w														
Room 2 fill (c)	-	x	-	-	-	-	-	-	-	-	40	-	48	8.10b
Room 9 Level 3 (o)	-	x	-	-	-	-	-	-	-	-	-	-	-	-
Pithouse 3 Level 3 (c)	-	-	-	-	-	x	-	-	-	-	40	-	56b	8.10d
29SJ 1360:[c]														
Red Mesa B/w (b)	-	-	-	-	-	-	-	-	-	-	230	2,088	-	-
	-	-	-	-	-	-	-	-	-	-	200	1,500	-	-
	-	-	-	-	-	-	-	-	-	-	130	397	-	-
	-	-	-	-	-	-	-	-	-	-	110	270	-	-
	-	-	-	-	-	-	-	-	-	-	110	538	-	-
	-	-	-	-	-	-	-	-	-	-	120	329	-	-
	-	-	-	-	-	-	-	-	-	-	170	1,198	-	-
	-	-	-	-	-	-	-	-	-	-	180	1,502	-	-
	-	-	-	-	-	-	-	-	-	-	180	1,741	-	-
	-	-	-	-	-	-	-	-	-	-	120	348	-	-
	-	-	-	-	-	-	-	-	-		250	2,408	-	-
	-	-	-	-	-	-	-	-	-	-	200	1,657	-	-
	-	-	-	-	-	-	-	-	-	-	250	2,153	-	-
	-	-	-	-	-	-	-	-	-	-	200	1,280	-	-
	-	-	-	-	-	-	-	-	-	-	170	1,264	-	-
	-	-	-	-	-	-	-	-	-	-	200	1,280		
	-	-	-	-	-	-	-	-	-	-	100	212	-	-
	-	-	-	-	-	-	-	-	-	-	160	975	-	-
	-	-	-	-	-	-	-	-	-	-	115	373	-	-
	-	-	-	-	-	-	-	-	-	-	210	2,257	-	-
	-	-	-	-	-	-	-	-	-	-	210	2,570	-	-
	-	-	-	-	-	-	-	-	-	-	230	2,602	-	-
	-	-	-	-	-	-	-	-	-	-	195	2,000	-	-
	-	-	-	-	-	-	-	-	-	-	60	310	-	-
	-	-	-	-	-	-	-	-	-	-	210	1,709	-	-
	-	-	-	-	-	-	-	-	-	-	260	2,248	-	-
	-	-	-	-	-	-	-	-	-	-	240	3,186	-	-
	-	-	-	-	-	-	-	-	-	-	150	673	-	-
	-	-	-	-	-	-	-	-	-	-	220	2,270	-	
	-	-	-	-	-	-	-	-	-	-	220	2,531	-	-
	-	-	-	-	-	-	-	-	-	-	200	1,657		

[a] Vessel form codes in parentheses: (b)=bowl, (c)=canteen, (cup)=cup, (j)=jar, (L)=Ladle, (o)=olla, (p)=pitcher and (sj)=seed jar.
[b] Restorable vessels illustrated in Chapter 8, Volume 1. Some differences in typological assignment may exist.
[c] See McKenna (1984:Appendix 2, Table 18).

Table 1.31. (continued)

B. METRICS

Culinary Volumes

N=23
x̄=9,112.61 cc
s.d.=6,498.95 cc
range=350-1,9480 cc
C=71.318

Red Mesa Bowl Volumes

N=35
x̄=1,654.91 cc
s.d.=1,017.53 cc
range=212-4,820 cc
C=61.485

Orifices of Culinary Jars

Types	< 200 mm n	< 200 mm %	> 200 mm n	> 200 mm %	N	%
Lino Gray	24	96.0	1	4.0	25	16.7
Wide Neckbanded	18	72.0	7	28.0	25	16.7
Narrow Neckbanded	25	53.2	22	46.8	47	31.3
Neck Corrugated	14	51.9	13	48.1	27	18.0
P-II+ Corrugated	9	34.6	17	65.4	26	17.3
Totals	90	60.0	60	40.0	150	100.0

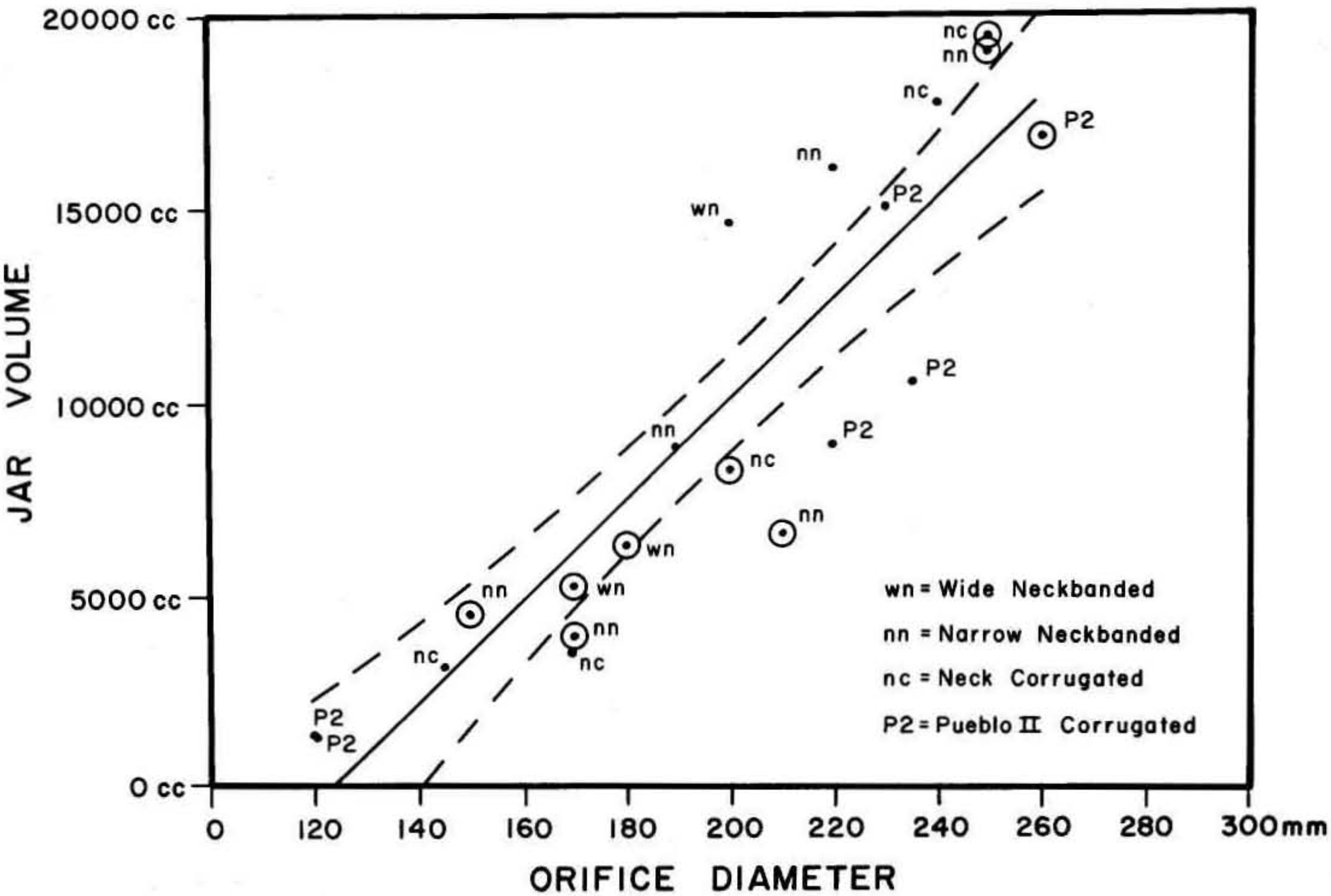

Figure 1.12. *Regression of whole culinary jar volumes (y) on orifice diameter (x). Vessels from both 29SJ 629 and 29SJ 1360 are shown, with the vessels from 29SJ 629 designated by circles. Y=A + BX equation is shown with 95% confidence bands;* $r^2=.815$, *n=20. (NPS 310/82822 B).*

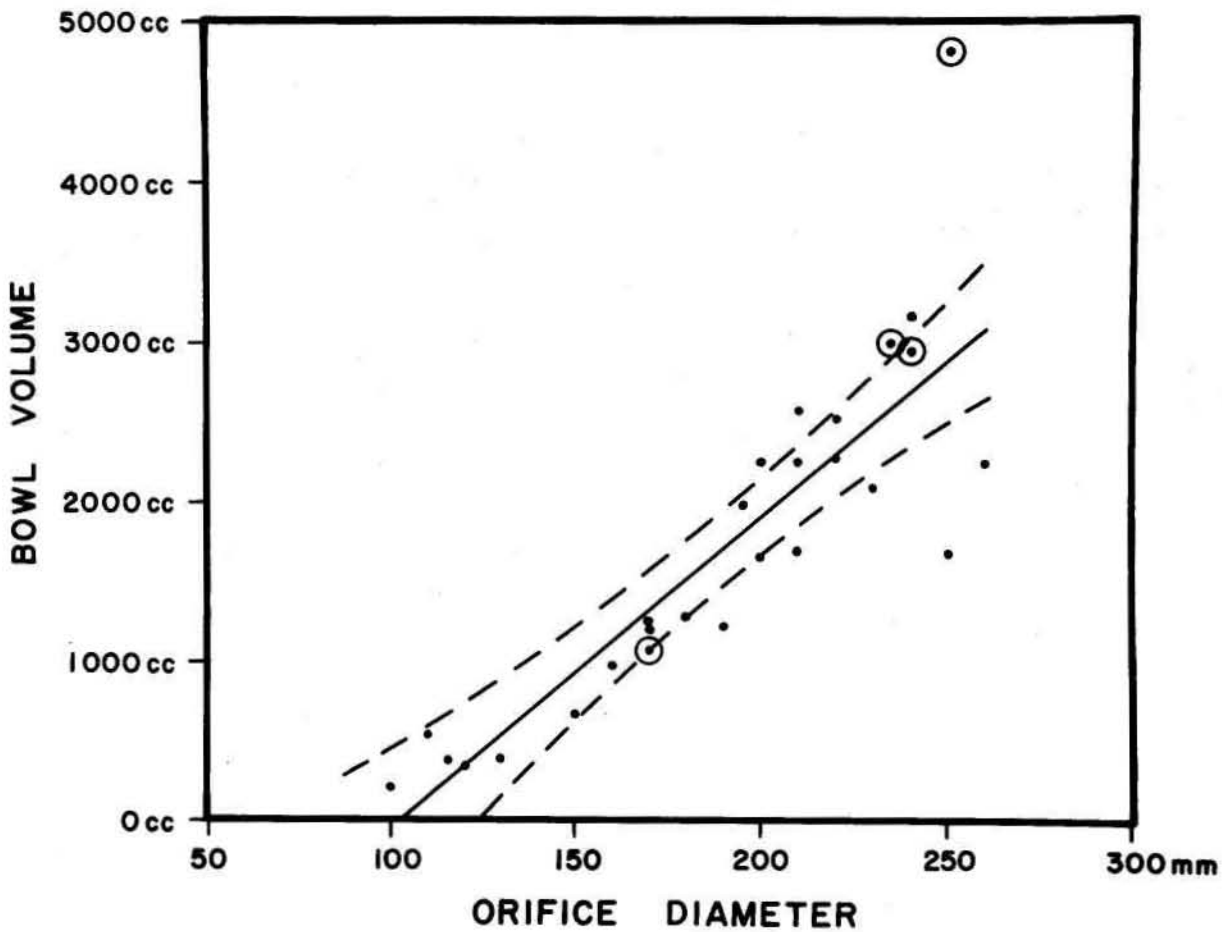

Figure 1.13. Regression of whole Red Mesa bowl volumes (y) on orifice diameter (x). Vessels from both 29SJ 629 and 29SJ 1360 are shown, with circles representing the 29SJ 629 bowls. Equation is Y=A + BX with 95% confidence bands; r^2=.729, n=27. (NPS 310/82823 (B).

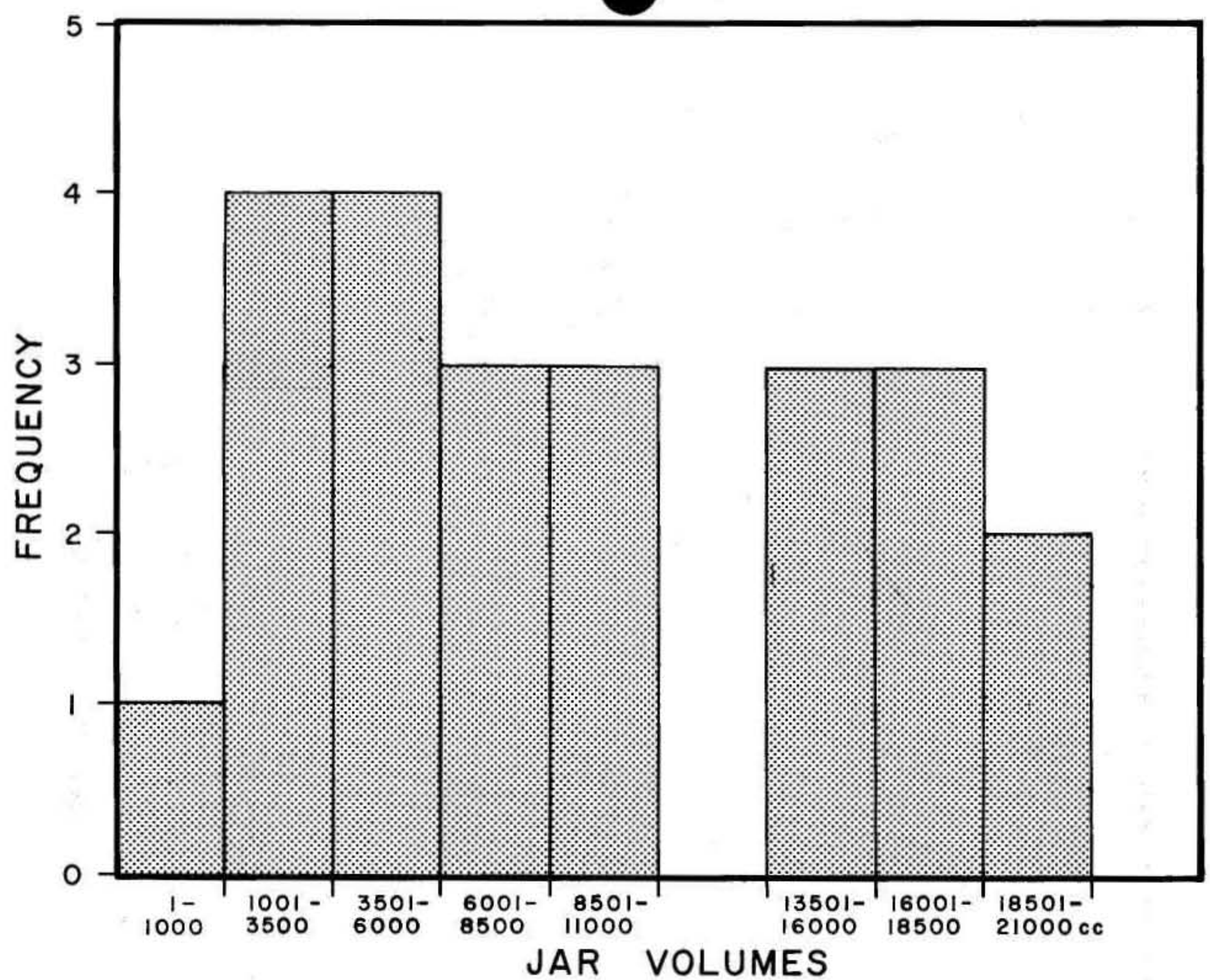

Figure 1.14. *Histogram of whole culinary jar volumes, n=23 ($\bar{x}$=9113cc, sd=6499cc). Note the bimodal nature of the distribution; the jars with volumes greater than 16,000 cc are more than two standard deviations away from the mean. Vessels from both 29SJ 629 and 29SJ 1360 are included. (NPS 310/82824 B).*

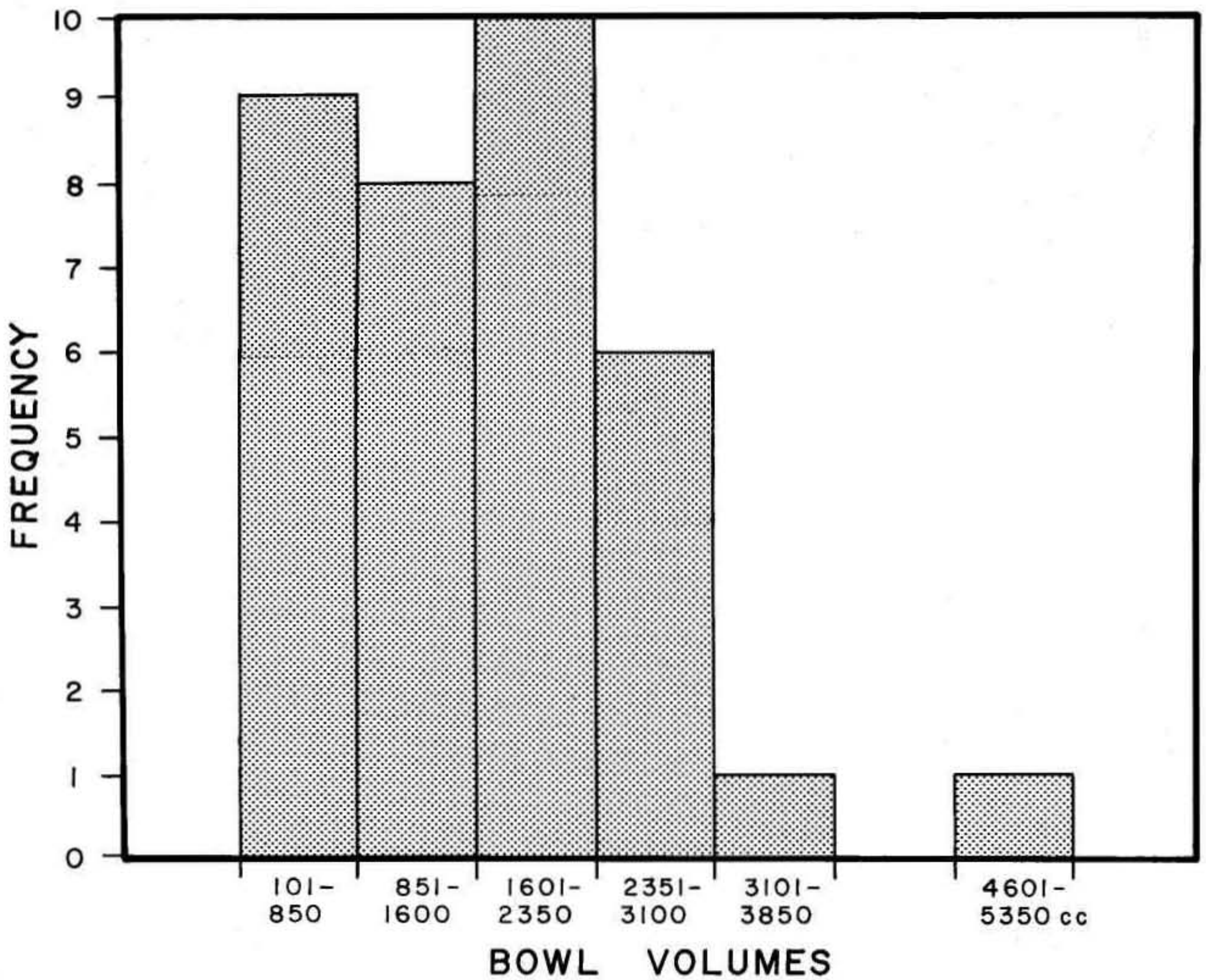

Figure 1.15. *Histogram of whole Red Mesa bowl volumes, n=35 ($\bar{x}$=1655cc, sd=1018cc). This distribution seems to be unimodal; vessels from both 29SJ 629 and 29SJ 1360 are included. (NPS 310/82825 B).*

observation of increased capacity of culinary jars through typological time and based on projected capacities from orifice diameters.

Only capacities for Red Mesa Black-on-white bowls were examined. Volumes and orifice are correlated with orifice diameter in Red Mesa Black-on-white (r=.854, Figure 1.13). Although it has been shown (Tables 1.8-1.11, 1.19) that overall, there is a tendency for increased bowl diameter through typological time, bowls are still remarkably similar in their size distribution from type to type (Figure 1.3), as predicted by Turner and Lofgren (1966). In using diameters to represent volume, it should be remembered that bowl depth may also vary and cannot be controlled here. This may thus introduce some error, although the measured cases do show a strong correlation between diameter and volume.

Orifice diameter/volumes do not show significant differences between proveniences. Vessels in Pithouse 2 are not significantly different in the range of capacities projected for earlier deposits. Typological and attribute patterning are different, however, and if Turner and Lofgren's suggestions were mechanically applied, an argument could be constructed for increased communal cooking and serving of smaller portions. Attribute group analysis has indicated brown-painted bowls are the largest and these associate with the Trash Midden and Pithouse 3. Only the black-painted, usually smaller, bowls occur in the last occupied proveniences of Pithouse 2 and Rooms 2, 3 and 9. Functions other than those related to coping with population increase and cooking schedules, however, may also influence vessel capacities. In bowls, this may represent a reduction in the range of tasks normally carried out, such as parching, drying, dying, mealing catchments, or even a restriction on dishes served. Change in cooking schedules is a strong argument for change in vessel size, but, as previously noted, sooting is not always associated with those vessels technologically best suited for cooking. Increased grayware size may not only reflect a greater dependence on stored agricultural products in an unpredictable environment in which wild plant food niches have been depleted, but also may reflect food preparation for large groups or larger households. We would hesitate to view increased culinary jar capacities at 29SJ 629 as a necessary correlate of population growth.

Windes (this report) has suggested that the final domiciliary occupation of 29SJ 629 (excluding the Kiva) saw specialization in turquoise ornament production. Because no significant difference exists among proveniences in terms of Red Mesa Black-on white and culinary vessel diameters in the attribute groups, specialized activity is not clearly supported by the ceramic evidence. Despite the evidence of locational vessel size uniformity in the attribute group sherds, the majority of large volume, restored culinary vessels and the largest whole bowl in this site's collection (Figure 1.15, Table 1.31) were located in Pithouse 2. This bowl (Volume 1:Plate 8.10a) contained a white substance believed to be burned selenite--perhaps for bead lapping or wall plaster--which suggests some non-food-related use.

Pithouse 2 was possibly a communal structure in which craft specialized activities, among others, may have taken place. Comparisons with suspected living Rooms 3 and 9 are not possible, however, because of the possible redepostion of Pithouse 2 material in these proveniences during construction of the intrusive Kiva. Rooms 3 and 9 contain vessels that are in the large end of the diameter range, which is contrary to the expectation that a living room would contain smaller vessels than a specialized, communal structure's vessels. Because of the redeposition, it cannot be stated with certainty whether these larger vessels represent room use or pithouse use.

Provenience Distributions

Because of intensive trash filling at 29SJ 629, functional relationships between particular proveniences and the sherds associated with those proveniences are tenuous, at best. For what it may be worth, broad distributions of sooting, vessel forms, and tempers are presented, combining major provenience types and fill types within those proveniences (Tables 1.30, 1.32-1.33). These comparisons did reveal that there is differential distribution of both vessels and tempers. Gray jars were found to be less frequent than expected in the Trash Midden and more than expected in pithouses, with bowls being the converse. The larger-than-expected number of ladles in rooms makes a substantial contribution to the chi-square value as well.

Table 1.32. Occurrence of primary vessel forms in provenience types at 29SJ 629.[a]

Forms	Pithouses 2-3	Kiva	Rooms	Plaza	Trash	Totals
All bowls	105	22	45	97	390	659
Ladles	22	2	11	10	42	87
Whiteware jars	56	4	19	30	178	287
Whiteware pitchers	5	0	2	4	8	19
Grayware jars	59	10	19	39	92	219
Totals	247	38	96	180	710	1,271

Chi-square comparisons:	Contributors:
Excluding only white pitchers.	
$\chi^2=37.924$, $n=1,252$ $df=12$, $p=.000$ $C=.171$ 1 cell <5	Gray jar high in pithouses, low in trash; bowls low in pithouses; ladles high in rooms.
Rooms by pithouses, including white pitchers.	
$\chi^2=1.54$, $n=336$ $df=3$, $p=.67$ $C=.068$	
Trash by pithouses, including white pitchers.	
$\chi^2=23.306$, $n=957$ $df=4$, $p=.000$ $C=.154$ 1 cell <5	Gray jar high in pithouses, low in trash; bowls low in pithouses, high in trash.

[a] Excludes test trenches including TT 99, which is a trash provenience.

Table 1.33. Occurrence of major temper in provenience types at 29SJ 629.

Temper	Pithouse[a]	Rooms	Plaza	Trash	Totals
Undifferentiated sandstone	240	73	147	571	1,031
Chalcedonic sandstone	44	14	14	38	110
San Juan igneous	3	2	3	39	47
Trachyte dominant	25	9	17	67	118
Totals	312	98	181	715	1,306

Chi-square comparisons:	Contributors:
Whole table	
$\chi^2=40.760$, n=1,306 df=9, p=.000 C=.174 1 cell <5	San Juan higher than expected in trash and lower in pithouses; chalcedonic ss the reverse.
San Juan excluded	
$\chi^2=24.518$, n=1,259 df=6, p=.0004 C=.138	Chalcedonic sandstone is non-conformist.

[a] Includes the Kiva in this tabulation.

An association of temper and provenience type also exists with chalcedonic sandstone tempered sherds deviating most from the expected, being higher than expected in pitstructures and lower in the trash. This is perhaps due to the ware distributions (favoring graywares in pithouses), though trachyte tempered sherds closely follow the expected.

Three proveniences have attracted special attention in other analyses: the floor of Pithouse 2 and large Other Pits 1 and 14 in the plaza. In these proveniences, evidence of localized task performance has been identified. As an adjunct to these other analyses, the ceramic contents of these proveniences were analyzed.

The floor contact and floor fill of Pithouse 2 contains what may have been a floor-associated pithouse assemblage (Plate 1.15) though Windes (Volume I, Chapter 5) believes that they are not all pithouse related. The ceramic collection includes ten restorable vessels (Table 1.31 and Volume I, Chapter 8):

- 2 bowls--1 Red Mesa Black-on-white, 1 early Red Mesa Black-on-white,
- 1 seed jar--Red Mesa Black-on-white,
- 1 olla--Early Gallup Black-on-white,
- 3 narrow neckbanded jars,
- 1 neck corrugated jar, and
- 2 PII corrugated jars.

While the whitewares in this collection could go with the structure, Windes holds that the PII indented corrugated vessels are typologically late. Be that as it may, it should be remembered that many of these items were found resting directly on the floor. Especially in view of the overall predominance of unsooted items, it is noteworthy that six of the eight graywares found in this provenience are sooted. Windes also adduces this as evidence that the vessels are not related to the pithouse, contending that it was not a domestic structure upon abandonment. These interpretations hinge on two, not-necessarily-warranted assumptions: 1) that the structure was not used for habitation, and 2) that the structure was too early to contain the type of corrugated jar found on the floor. The contextual evidence suggests that a reasonable alternative is that this collection of vessels was instead a pithouse-related assemblage, especially since there are also indications that the structure burned. If these vessels are part of an in-use assemblage, the following observations may be made:

The tempers of these vessels follow those of the overall sherd sample--something over half sandstone, 20-30 percent chalcedonic sandstone, and 10-20 percent trachyte.

The occurrence of sooting is the reverse of the trend for the rest of the site (Table 1.30), which suggests differential preservation of sooting and/or an indication that some grayware vessels may not have been used over the fire. The latter is supported by the association on this floor of sooted and unsooted vessels.

Also contrary to the overall ceramic assemblage, as seen in the sample, is the occurrence of more graywares than whitewares. Perhaps this is again a question of differential distribution of activity of the site, or perhaps even within the structure itself. It must be remembered that a portion of the structure and floor was removed by the construction of the Kiva.

Finally, although unrelated, a similar assemblage in a contemporary habitation pitstructure at 29SJ 1360 has been attributed to in-use contexts, despite the wide range of types present (McKenna 1984).

Other Pit 1, noted for the presence of abundant turquoise debris, contained representatives of only three vessels: a wide, neckbanded jar, a Red Mesa Black-on-white bowl, and a PII-III mineral-on-white jar. The neckbanded jar (FS 2145-1) is a sooted whole vessel with rounded iron-oxide bearing temper.

Other Pit 14, on the other hand, has 74 members in the sample. The typological, temper, and vessel form breakdowns are presented in Table 1.34. It can be seen that none of these attributes varies markedly from the bulk of the site assemblage. Because no whole vessels are present and because the ceramic assemblage is not out of the ordinary in terms of the overall sample, the ceramics in this pit suggest little more than trash fill. The paucity of ceramics, the presence of a whole vessel, and the specialized content of Other Pit 1 give a different impression,

Plate 1.15. *Pithouse 2, Floor 1 assemblage. Culinary wares: Narrow Neckbanded a), c), d), and f); Neck Corrugated b); Chaco Corrugated j). Service wares: Early Red Mesa Black-on-white e) and l); Red Mesa Black-on-white e), h), i), and k); and Early Gallup Black-on-white g). f) came from Pithouse 3. See individual illustrations in Volume I, Chapter 8. (NPS 31951).*

Table 1.34. Ceramic contents of Plaza Other Pit 14 at 29SJ 629.

A. Ceramic Types	N	%
Plain gray	3	4.0
Wide Neckbanded	2	2.7
Narrow Neckbanded	5	6.7
Neck Corrugated	2	2.7
Unidentified corrugated	1	1.4
BMIII-PI polished M/w	5	6.7
Early Red Mesa B/w	7	9.4
Red Mesa B/w	26	35.1
Cortez B/w	1	1.4
Kiatuthlanna B/w	1	1.4
Mancos B/w	1	1.4
PII-III mineral/white	11	14.9
BMIII-PI carbon/white	1	1.4
Chuska, Red Mesa design	1	1.4
Unidentified whiteware	4	5.4
Decorated redware	1	1.4
Polished smudged	2	2.7
Totals	74	100.1

B. Form by Temper

Form	SS	Ch.SS	Trachyte	San Juan	Other[a]	Total
Bowl	31	5	0	2	2	40
Ladle	6	0	1	0	0	7
Pitcher	1	0	0	0	0	1
Seed jar	1	0	0	0	0	1
Olla	3	0	1	0	0	4
Whiteware jar	4	0	1	0	1	5
Miniature	1	0	0	0	0	1
Grayware jar	9	1	2	0	1	13
Unknown	1	0	0	0	0	1
Totals	57	6	5	2	4	74
Percent	77.0	8.1	6.8	2.7	5.4	100.0

C. Grayware Sooting

Temper	Sooted	Unsooted
Undifferentiated sandstone	5	4
Chalcedonic sandstone	1	0
Magnetitic sandstone	1	0
Trachyte	1	1
Totals	8	5

[a] Includes 1 magnetitic sandstone, 1 unidentified igneous, 2 unobservable.

although the ceramics give little clue as to what the pit's function may have been.

Temporal Variation

Chronological treatment of deposits is subject to the same consideration that provenience examination is: mixing and redeposition of trash are present. A further consideration is that chronological placement is largely ceramic, so some patterning has been predetermined. The difference between the functional versus chronological divisions is that a trash deposit can have chronological significance but is less likely to have a functional significance. Windes provided a list of proveniences that he had assigned to a series of time periods, based on ceramics, architecture, and absolute dates (Volume I, Chapter 8). The relationship of these proveniences to primary types found at the site may be seen in Figures 1.1-1.2. The proveniences and dates assigned are listed in Table 1.35.

Clearly some of these time groups overlap (reading dates literally, the fill could predate the floor of Pithouse 2), but they do provide a rough sequence of deposition. As Windes points out, the three "later" groups can be lumped to provide an equivalent time segment (although the n in this lump is large relative to the other segments). Although the segments are, in part, based on ceramic sequence, they can be used to look for within-type change through time and to examine overall temper and vessel assemblage through time.

Motifs by Time Segment

Among the selected rough sort types only Red Mesa Black-on-white was adequately represented by motifs for testing of temporal associations. From Red Mesa Black-on-white description, the 14 most frequently occurring motifs were selected for testing (Table 1.36). Table 1.36 suffers from inadequate frequencies but serves to point up the major contributors. These contributors were further compared after collapsing the relatively fine-grained time groups C-E and deleting F (Table 1.35).

Throughout the time groups, relatively few substantial changes are apparent in the use of motifs in Red Mesa Black-on-white. As previously mentioned, parallel framers around solid elements do occur more than expected in the earlier A.D. 950 period. There is a significant difference in temporal association between these solid-motifs-with-framers and solid band designs. The corresponding association of parallel lines with earlier periods is therefore not surprising. Solid band designs are made up of such items as scrolls, checkerboards, sawteeth, and triangles; no significant difference is evident between the distribution of these solid motif items and band designs. Checkerboards are associated with the "later" period, A.D. 975-1050 (Table 1.35:C, D, E) and are significantly different in temporal distribution from sawteeth. The sawteeth motif is the only solid motif which is significantly associated with the A.D. 900-950 period and, although not significantly different from other solid motifs in relation to solid band designs, its association with the earlier period suggests later Red Mesa Black-on-white designs are more likely to be represented by interlocked-scrolls and ticked-lines-from-solid-stepped-elements, triangles, and checker-board patterns.

Temper Assemblage by Time Segment

A test for association of all tempers with all time groups is not possible because of small numbers in some time segments (Table 1.37). A comparison of only the two most frequent tempers (undifferentiated sandstone and trachyte) shows no significant association of time segment with temper (χ^2=2.55, df=5, p=.770). This similar proportional distribution of sandstone and trachyte temper, of course, holds when other groups are added to the test; however, significant chi-square values are produced when chalcedonic sandstone temper is added and when the latest time group (F) is deleted and the "later" segments (C, D, and E) are lumped and include San Juan igneous temper.

Both chalcedonic sandstone and San Juan igneous tempers are absent in the A.D. 1100-1150 proveniences. Chalcedonic sandstone temper decreases slightly in the subdivisions of the "later" segment, but as a lumped group it is a large contributor to the chi-square value by virtue of being higher than statistically predicted. The suggestion is that frequency of this temper reaches a peak ca. A.D. 1000, a result which is supported by type-based sequences at this and other sites. San Juan igneous temper is higher than expected in the earlier time

Table 1.35. Proveniences and dates assigned to the trash at 29SJ 629.

A. "Early--A.D. 875-925"

Trash mound Grids
1, 58, 59, all
64 fill
65 Levels 4-7
71 Levels 3-4
76 Level 3
82 Layer 2 (Level 2)

Test Trench 99, all (a trash mound provenience).

B. "Middle--A.D. 925-1025"

Trash mound grids 64 surface
65 Levels 1-3
70 all
71 Level 2
76 surface, Levels 1-2
82 Layer 1 (Level 2), Layer 2 (Level 1)
87 fill
88 Levels 3-5, Layer 2 (Level 1).

C. "Later--A.D. 975-1025"
Pithouse 3, all.

D. "Later--A.D. 975-1050"
Pithouse 2, fill
Plaza grid 14
Trash mound grid
82 Layer 1 (Level 1)
88 Level 1-2, Layer 1
94 fill.

E. "Later--A.D. 1000-1050"
Rooms 2-3, 5-8
Pithouse 2 floor, floor fill.

F. "Latest--A.D. 1100-1150"
Kiva 1 all (coded as Pithouse 1).

Table 1.36. Occurrence of major motifs in Red Mesa Black-on-white in time segments at 29SJ 629.

	A.D.						
Motifs	900 (A)	950 (B)	1000 (C)	1010 (D)	1020 (E)	1130 (F)	Totals
Parallel lines	4	6	8	8	4	-	30
Cribbed lines	-	2	3	2	2	1	10
Pendant lines	1	4	4	2	-	-	11
Framers w/unticked solids	1	3	1	2	1	-	8
Framers w/ticked solids	3	5	4	2	3	-	17
Scrolls	3	10	18	11	9	1	52
Ticked lines	1	3	1	3	-	-	8
Checkerboard	-	1	11	7	4	-	23
Sawteeth	2	9	3	6	3	-	23
Solid band design	3	17	46	27	20	3	116
Hachure (all)	3	5	7	9	4	1	29
Squiggle lines	1	4	2	12	5	-	24
Ticked triangles	4	8	8	7	3	2	32
Interlocked ticks	-	-	6	5	1	-	12
Totals	26	77	122	103	59	8	395

Chi-square comparisons:	Contributors:
Whole Table	
χ^2=72.777, n=395 df=65, p=.237 C=.394, 59 cells <5 17 cells <1	Main contributor is solid band design. Interlocked ticks high in C-D.
Sawteeth-checkerboard	
χ^2=11.341, n=46 df=2, p=.003 C=445,2 cells <5	Sawteeth high in B, low in C. Checkerboards high in C-E, low in A, B.
Framers with solids-solid band design	
χ^2=12.883, n=135 df=2, p=.002 C=.198, 2 cells <5	Solid band design low in A, B, high in C. Framers with solid elements are high in B, low in C-E.
Parallel lines (all)-solid band design	
χ^2=8.160, n=218 df=2, p=.017 C=.218, 1 cell <5	

Table 1.37. Occurrence of major temper groups within time segments at 29SJ 629.

	A.D.						
	900	950	1000	1010	1020	1130	
Temper	(A)	(B)	(C)	(D)	(E)	(F)	Totals
Undifferentiated sandstone	125	257	181	196	65	27	851
Chalcedonic sandstone	9	14	31	28	16	0	98
Trachyte	15	36	17	23	9	5	105
San Juan	8	17	0	6	2	2	35
Totals	157	324	229	253	92	34	1,089

Chi-square comparisons:	Contributors:
Undifferentiated SS and Trachyte	
χ^2=2.55, n=956 df=5, p=.770 C=.052	
Excluding San Juan	
χ^2=29.676, n=1,054 df=10, p=.001 C=.165 2 cells <5	Main contributor is chalcedonic sandstone.
Excluding A.D. 1130, lumping 1000-1020	
χ^2=33.321, n=1,055 df=6, p=.000 C=.175	San Juan lower than expected in 1000's; chalcedonic SS largest contributor--> expected in 1000's.

segments but then its relative frequency drops substantially by ca. A.D. 1000.

Summary and Observations

The primary goals set for this analysis of the 29SJ 629 ceramics were in-depth description and, based thereon, cultural interpretation. The descriptive phase is considered covered by the foregoing tables and their explication. Interpretations are present in the explication, but need to be regrouped and put into relation with one another, and the whole needs summarization.

The sample from 29SJ 629 has several aspects that should be kept in mind when interpreting the evidence:

1) It is primarily a rim sample, drawn from the bulk collection which has been examined for matches, so that duplication of vessels should be minimal. While not every vessel of which some portion was recovered is represented, the 1,700 items examined approximate that number of different vessels and should constitute a majority of the vessels used during the site's occupation. In short, we think this is a reliable sample of the ceramics and that we can speak in terms of vessels rather than sherds.

2) While the sample of the overall ceramic assemblage is good, most of the depositional contexts at 29SJ 629 are such that some phases of examination must be conducted with considerable caution. Thus, functional or social interpretations, based on the provenience of ceramics, is largely impractical because of redeposition and trash filling. Chronological interpretations are possible but they are largely based on typological ordering.

3) Types are used here as organizing principles. This practice exposes the results to the usual pitfalls of typology: unclear border areas between types (less-than-perfect replicability) and obliteration of variability. These failings we attempt to correct by searching for the variability within the more or less logical groups created by the typology.

The question probably most frequently asked of Chaco Project analyses is, "Where-did-it-come-from?" In the ceramic analysis, the attribute used most heavily to answer this question is temper. Temper falls into two major epistemological categories in Chaco Canyon: the confidently non-local and the unknown. Each of these, of course, has subcategories that vary as to their epistemological certainty. The question of source is, of course, most easily discussed in terms of identifiably non-local tempers which fall into three main categories at 29SJ 629: trachyte, attributed to the Chuska Valley and Mountains; San Juan andesite/diorite, attributed to the San Juan River to Mesa Verde area; and chalcedonic cement sandstone, attributed more tentatively to the Red Mesa Valley (Warren 1977:37, 85) and perhaps to the Puerco River of the East in the Guadalupe area (Winston Hurst, personal communication 1981). Through "typological time," trends in graywares and whitewares are similar in areas represented, but different in the magnitude of representation of the areas. The span covered by the types found at 29SJ 629 is from BMIII-PI whiteware types and Lino Gray to Red Mesa Black-on-white and narrow neckbanded and neck corrugated or PII (the whole span is roughly A.D. 875-1050). Ceramics from later periods are present, but their numbers are small.

Table 1.38 summarizes the distribution of identifiable imports through several sorts of time. Since the table's derivation and assumptions are somewhat convoluted, they will be briefly described. Most of the sherds entered in the table are placed by means of typological time (see above)--that is, a sherd assigned a type that carries temporal meaning was placed directly into a time group, irrespective of the sherd's provenience. The type assignments for "exotic mineral-on-white" (Table 1.3) were incorporated in Table 1.38 by means of typological time. The rough sort groups–plain gray, unidentified corrugated, unidentified whiteware, and plain redware--are not typologically assignable to a time group; other groups including polished smudged, PII-III carbon-on-white, Chuska whiteware, and decorated redware are, at least in part, typologically divisible, but this information is not available as the data are now recorded. To include these types, several of which are assumed to have been all imported (redwares, polished smudged wares, and non-Cibola carbon-on-white), each of these non-time-specific types was divided into time segment/temper cells. These cells could then be distributed among the typological time periods for a more complete overview of materials being imported. One type, "PII-III mineral-on-white" was omitted from this

Table 1.38. Summary of identifiable ceramic imports through time at 29SJ 629, calculated using types and time segments.

TIME/	Grayware		Whiteware		Redware		Smudged		Overall	
Identification	n	% import	n	% import	n	% import	n	% import	n	% import
Pre-800/										
Trachyte	2	10.0	32	19.4	-	-	-	-	34	18.4
Chalcedonic SS	-	-	12	7.3	-	-	-	-	12	6.5
San Juan	-	-	13	7.9	-	-	-	-	13	7.0
Total import	2	10.0	57	34.5	-	-	-	-	59	31.9
Total n	20	-	165	-	2	-	-	-	185	-
ware % of import	-	3.4	-	96.6	2	-	-	-	-	-
ware % of total	-	10.8	-	89.2	-	-	-	-	-	-
800-920/										
Trachyte	11	19.6	4	4.2	1	-	-	-	16	10.3
Chalcedonic SS	-	-	5	5.3	-	-	-	-	5	3.2
San Juan	1	1.8	7	7.4	1	-	-	-	9	5.8
Typological	-	-	3	3.2	1	-	-	-	4	2.6
Total import	12	21.4	19	20.0	3	-	0	-	34	21.8
Total n	56	-	95	-	3	-	2	-	156	-
ware % of import	-	35.3	-	55.9	-	8.8	-	5.9	-	-
ware % of total	-	35.9	-	60.9	-	1.9	-	1.3	-	-
Pre-920										
Trachyte	13	17.1	36	13.8	1	-	-	-	50	14.7
Chalcedonic SS	-	-	17	6.5	-	-	-	-	17	5.0
San Juan	1	1.3	20	7.7	1	-	-	-	22	6.5
Typological	-	-	3	1.2	1	-	-	-	4	1.2
Total import	14	18.4	76	29.2	3	-	0	-	93	27.3
Total n	76	-	260	-	3	-	2	-	341	-
ware % of import	-	15.1	-	81.7	-	3.2	-	-	-	-
ware % of total	-	22.3	-	76.2	-	0.9	-	0.6	-	-

Table 1.38. (continued)

TIME/ Identification	Grayware n	Grayware % import	Whiteware n	Whiteware % import	Redware n	Redware % import	Smudged n	Smudged % import	Overall n	Overall % import
920-1040										
Trachyte	41	21.9	23	2.9	5	26.3	-	-	69	6.8
Chalcedonic SS	43	23.0	65	8.5	-	-	-	-	110	10.9
San Juan	1	0.5	0.5	0.6	13	68.1	-	-	19	1.9
Socorro	-	-	3	0.4	-	-	-	-	1	0.1
Little Colorado	-	-	2	0.3	-	-	-	-	2	0.2
Typological	-	-	9	1.1	1	5.3	8	-	18	1.8
Total import	85	45.5	107	13.5	19	100.0	8	-	219	21.6
Total n	187	-	794	-	19	-	8	-	1,008	-
ware % of import	-	39.0	-	49.1	-	8.7	-	3.7	-	-
ware % of total	-	18.6	-	78.8	-	1.9	-	0.8	-	-
1040-1200/										
Trachyte	7	63.6	4	10.8	-	-	-	-	11	22.9
Chalcedonic SS	1	9.1	-	-	-	-	-	-	1	2.1
Little Colorado	-	-	1	2.7	-	-	-	-	1	2.1
San Juan	1	9.1	1	2.7	-	-	-	-	2	4.2
Total import	9	81.8	6	16.2	-	-	-	-	15	31.3
Total n	11	-	37	-	-	-	-	-	48	-
ware % of import	-	60.0	-	40.0	-	-	-	-	-	-
ware % of total	-	22.9	-	77.1	-	-	-	-	-	-
Unplaced Items/										
Trachyte	14	28.6	5	2.7	2	14.3	-	-	21	8.2
Chalcedonic SS	3	6.1	11	5.9	-	-	-	-	14	5.4
San Juan	1	2.0	2	1.1	-	-	-	-	11	4.3
Typological	1	2.0	9	4.8	4	28.6	6	-	20	7.8
Total import	19	38.8	27	14.4	14	100	6	-	66	25.7
Total n	49	-	188	-	14	-	6	-	257	-
ware % of import	-	28.8	-	40.9	-	21.2	-	9.1	-	-
ware % of total	-	19.1	-	73.2	-	5.4	-	2.3	-	-
GRAND TOTALS										
Total import	127	-	216	-	36	-	14	-	393	-
Total n	323	-	1,279	-	36	-	16	-	1,654	-
% import	-	39.3	-	16.9	-	100.0	-	87.5	-	23.8
ware % of import	-	32.3	-	55.0	-	9.2	-	3.6	-	-
ware % of total	-	19.5	-	77.3	-	2.2	-	1.0	-	-

procedure; presumably it is reflected in the dominant whiteware types and would not greatly influence percentages of import. For "identification" in Table 1.38, if temper and type indicated that the vessel was an import, it was entered under the temper category; if the temper was not distinctive the item was entered under "typological" as a less informative default. We acknowledge that this kind of time assignment is prone to error, probably in the form of skewing by giving earlier sherds later dates; certainly the "exotic mineral-on-white" types were by no means all found in the "correct" time segment proveniences. Nonetheless, this method provides the best overall control available. The tabulation is conservative insofar as sandstone-trachyte temper mixes with sandstone dominant and unidentified igneous tempered items have not been included as imports. The middle time group in this scheme is by far the weakest assignment in that no grayware type is assigned to this group and Early Red Mesa Black-on-white overlaps considerably with Red Mesa Black-on-white (Figure 1.1).

Several trends may be seen in Table 1.38. Most interestingly, while the emphasis is on source changes and percentage of identifiably imported within-ware group changes, the overall percentage of imports remains remarkably similar, constituting between a fifth and a fourth of all ceramics. The percentage of whitewares known to be imported declines steadily but the percentage of imported graywares more than doubles. The conformance of the Late PI-Early PII division is attributable, in large part, to a disproportionate occurrence of redwares in that group. While not illogical in terms of the general temporal occurrence of San Juan redwares, the large number in this group is more likely a function of the peculiar nature of the group. This apparent early trend away from whiteware import toward grayware import can be suggested to fit into the ceramic ecology argument that holds that reduction in fuel availability led to vessel import increase (Toll 1981, 1984; Warren 1977). The larger size of grayware vessels would have required more fuel per vessel for firing than would the generally smaller whitewares.

Within the imports present in each time group a substantial amount of geographical shifting is evident. Trachyte temper shows a steady importance in the graywares and a declining frequency with time in the whitewares. Chalcedonic sandstone tempered pottery becomes the dominant import in the Red Mesa ceramic period, rising from virtual absence in BMIII-PI ceramic types and increasing most dramatically in the graywares. Ceramics from the San Juan area are primarily whitewares and redwares, with a smattering of graywares (two items from the entire sample). The whiteware representation is substantial in the earliest period, subsequently dropping to less than a percentage point by the Red Mesa ceramic period. Redwares are predominantly San Juan throughout the site's occupation, with a lesser Chuskan contribution earlier. The polished smudged wares (mostly Forestdale Smudged) increase in relative frequency; the evidence is strictly typological, but these items are likely to have come from east central Arizona. Treating "typological identification" (Table 1.38) as one source, the diversities of imports in the BMIII-PI group and the PII group are very similar; the typological group is relatively much larger in the later group and contains a wider variety of items. The overall impression is that the number of external sources increased though the quantity of import in the BMIII-PI is roughly the same as it is in PII.

It is crucial to remember that the numbers discussed above form a baseline for the quantity of ceramics brought from outside Chaco Canyon to 29SJ 629. Warren (1976, 1977) used sand grain size in sandstones as a method of discriminating possibly local products from non-local products on the premise that no coarse-grained sandstones had been found in Chaco Canyon. We have some reservations about treating this grain size dichotomy as an absolute because of later discovery of coarse-grained deposits and because of the availability of coarse-grained sandstones within a radius of 15 km from the canyon sites (Warren 1977:56; Arnold 1980--distances travelled for ceramic material acquisition). Table 1.39 presents the grain size of undifferentiated sandstones in graywares and mineral-painted whitewares to add another dimension to the picture of possible imports to 29SJ 629. As will be noted both in Table 1.39 and Tables 1.8-1.14, there is a significant tendency for earlier decorated types to have coarser temper than later ones, and this trend very much includes undifferentiated sandstone. Reading these data with the simple equation of "coarse = import" in mind gives the impression that decreasing quantities of ceramics were imported to 29SJ 629, since the percentage of coarse and very coarse sandstone in whitewares drops from 81

Table 1.39. Grain size of unidentified sandstone through time at 29SJ 629, and maximum import totals assuming coarse sandstone is not local.

TIME/ SS grain size	Grayware n	Grayware %	Whiteware n	Whiteware %	Smudged n	Smudged %	Total Time n	Overall Maximum Percent
Pre-A.D. 920								
	-	-	10	9.8	-	-	10	
Fine								
Medium	7	12.5	78	76.5	-	-	85	
Coarse	26	46.4	73	71.6	2	-	101	
Very Coarse	23	41.1	14	13.7	-	-	37	
Total	56	-	102	-	2	-	233	
Total C+VC	49	87.5	87	85.3	2	-	138	
Total import from Table 1.38	14		76		0		93	
Maximum import estimate	63	82.9	163	62.7	2	-	231	67.7
Total n	76	-	260	-	2	-	341	
A.D. 920-1040								
Fine	-	-	156	23.4	3	-	159	
Medium	8	8.1	408	61.1	2	-	418	
Coarse	56	56.6	102	15.3	-	-	158	
Very Coarse	35	35.4	2	0.3	-	-	37	
Total	99	-	668	-	5	-	767	
Total C+VC	91	91.9	104	15.6	0	-	195	
Total import from Table 1.38	85		107		8		219	
Maximum import estimate	176	94.1	211	26.6	8	-	414	41.1
Total n	187	-	794	-	8	-	1,008	
A.D. 1040-1200								
Fine	-	-	10	38.5	-	-	10	
Medium	-	-	10	38.5	-	-	10	
Coarse	-	-	6	23.1	-	-	6	
Total	-	-	26	-	-	-	26	
Total C+VC	-	-	6	23.1	-	-	6	
Total import from Table 1.38	9		6				15	
Maximum import estimate	9	81.8	12	32.4	-	-	21	43.8
Total n	11	-	37	-	-	-	48	

Total time n column adds redwares to both total and import rows.
Column percents are within-ware within-time percentages of sand temper.
"Maximum percent" is the sum of all coarse to very coarse sand tempers and all identifiable imports from Table 1.38 divided by the total n of ware or time period.

percent to 14 percent. As noted, this simple equation should not be indiscriminately applied; however, as coarse sandstones are not common in the Canyon, some proportion of these vessels probably was also imported. The undifferentiated sandstone temper in the graywares is a minimum of 82 percent coarse-very coarse. Coarse temper is functional in cooking wares; therefore, it might be suggested that some extra effort was invested in obtaining such temper; complementarily, it can also be proposed that, in view of later quantities of positively identifiable imported graywares, this coarse sandstone represents some quantity of imported graywares through time.

At the least secure level of source identification are the fine- to medium-grained, undifferentiated, sandstone tempers in sherds that fall typologically within the Cibola series. This temper being available within the canyon, the conservative interpretation of such items is that they are local products. Again, a simple equation is unrealistic. Clearly, the pattern of ceramic import exists, and this form of temper could come from almost anywhere in the Chaco region. Furthermore, there are other reasons to think that import may have continued in whitewares. The period of relevance to 29SJ 629 saw a pan-Anasazi trend of finer-textured whitewares, so that the change observable in Chaco Canyon in that direction need not mean that local production increased. Tools and materials for ceramic production are rare in the 29SJ 629 collection--no raw clay and no pottery scrapers were recovered. Four polishing stones were identified (Akins 1980), but these items are severely battered and the confirmation of their use as tools for ceramic production is therefore tentative. Nor is there evidence for ceramic firing, but firing evidence seems to be chronically inconclusive in the Anasazi area during this time period. The gist of this argument is that a precise figure for the percentage of ceramic imports at 29SJ 629 is not possible. It can be said that at least a fourth of the ceramics were non-local products; it can be further said that coarse sandstone tempers suggest that graywares may have been at least 80 percent non-local or at least non-local material and 50 percent (earlier) to 25 percent (later) of whitewares, conservatively, are in a similar epistemological category. The remainder may well have been locally made using local materials but it is reasonable to suspect that some may have come from somewhere in the San Juan Basin other than Chaco Canyon.

The direction of temporal changes reflected in such ceramic attributes as design, paint color, polish, slip, and paste characteristics, as seen in the types analyzed in detail here, indicates a gradual sophistication in production through standardization of product components. A decrease in ceramic diversity is apparent through typological time as each subsequent type's surface treatments and paste preparations belong to fewer, larger groups. Inventories of design at 29SJ 629 show a wide, almost equal variety of motifs being used from type to type, but that increasingly smaller portions from the inventory were used. Paint colors have their most even representation in the earliest periods and later, to be dominated by black during the production of Red Mesa Black-on-white. Complete polishing of a surface and the consistency with which slips were applied also increase in frequency through time.

Further patterns occur in the culinary types selected for detailed analysis. Lino Gray, generally devoid of surface modifications, has the greatest diversity of forms among the grayware. This variability is subsequently absent in the other graywares examined. Based on the remaining types, narrow neckbanded and neck corrugated, a shift toward a more formalized or specialized culinary vessel is indicated for the latter types. This is based on a greater consistency in selected metric attributes and uniformity in decorative treatment. On the whole, rim diameter, rim fillet width, and rim flare have remarkably close distributions between narrow neckbanded and neck corrugated types (Figures 1.4-1.6), lending credence to the idea that they overlapped in time and probably function. Narrow neckbanded's more generalized appearance probably results in part from greater time span as well as the suggested refinement in definition of function.

Through time the proliferation of forms in decorated wares counters reduction in grayware forms. Designs, like the grayware modifications, display a tendency to occur in slightly more restricted combinations but in combinations more evenly distributed throughout type samples. Polished BMIII-PI and early Red Mesa Black-on-white are comparatively the closest decorated types under discussion, yet they reflect slight shifts in decorative treatment noted through typological time. Their closeness, in part, is probably a function of typological uncertainty between the Red

Mesa/BMIII-PI ceramic boundary. The polished BMIII-PI and early Red Mesa Black-on-white types might be considered two typological groups intermediate to unpolished BMIII-PI and Red Mesa Black-on-white. The types on the extremes are discrete from one another, but the series of unpolished BMIII-PI, polished BMIII-PI, Early Red Mesa Black-on-white, and Red Mesa Black-on-white may be considered continuous.

Partly because of greater within-type sample sizes, a somewhat different picture emerges for the whiteware attribute groups. Because sample sizes are larger, identified temper variability and diversity are less in the whitewares, and because the third attribute–paint type–is also less variable, some much larger groups were generated. The largest of these all involve the temper "type," undifferentiated sandstone. Again, this temper inevitably masks some variability. Ideally, further subdivision of the large groups would have been pursued. For practical reasons, however, we have confined ourselves to examining whether the groups defined on the basis of paint vary significantly from one another. Potential differentiation of this large body of sandstone-tempered ceramics would seem to lie with recognition of different patterns of surface attributes.

Not many discretely co-varying patterns of surface treatment are apparent. Generally, design lacks sensitivity between decorated intra-type groups. Although this suggests that design per se was not a dominant criterion in the selective processes governing ceramic mobility or as a marker of production locus, there may have been subtle differences in style which are not apparent by means of the attributes recorded. Comparison of Plate 1.8 with Plate 1.9, for example, suggests that brown-painted Red Mesa Black-on-white ceramics are decorated with bolder designs. Boldness of design may have some relationship with vessel size, but large ollas in black paint still appear to be more consistently decorated with finer line work, and with more individual lines, dots, and smaller solid-painted elements than their brown-painted counterparts in this period (compare Plate 1.10 with 1.8a and Volume I:Plates 8.5e, 8.10f).

Other attributes of surface finish and material use suggest that attribute groups may reflect use of differentially available raw material and differing manufacturing options. Recognition of differing surface treatments in brown and black-painted ceramics through typological time is one indication of possible areal production (Table 1.40). These trends may be summarized as follows: Significant differences in bowl sizes and the greater diversity of brown-painted vessels has suggested this group may represent local production, but because of paste similarity, a "local" contribution to the black-painted group cannot be discounted. Difference in production may be a contributor to the patterning observed in slipping and polishing. One use of slip may be to mask a dark paste color (Shepard 1939:277); however, refiring data show that clays at 29SJ 629 are uniformly light, suggesting that differences in slip are not attributable to necessary cosmetics in this case (Table 1.20). Several reasons can be offered for not slipping; foremost among them is a lack of suitable clays. Arnold (1980) has found that slips are more likely to be transported than other materials; however, that the amount of slip applied can be correlated with specific production areas is shown by the higher association of fully-slipped bowls with chalcedonic sandstone tempers. In a very circumstantial way, this finding corroborates the contention that this temper is of southern origin: later ceramics of areas south of the Red Mesa Valley (e.g., Cebolleta Black-on-white) are noted for their slips and perhaps the slip occurrence in chalcedonic cement sandstone-tempered vessels indicates a fall-off from a slipping clay source.

Paint color is probably, in some part, an artifact of firing but does serve to structure other elements of apparent analytical and interpretive value. Table 1.19 shows the temporal decrease in relative frequency of brown paint and also presents specific changes, by vessel form, which indicates a significant difference between bowl and jar colors ($\chi^2_c=14.984$, df=1, p=.000). Brown paint is a major contributor to jar paint color and large bowls. Red Mesa jar and bowl paint color is also significantly different ($\chi^2_c=4.253$, df=1, p=.039), but the addition of ollas (a large form) to the test changes the expected values and renders an alpha above that used here ($\chi^2_c=3.399$, df=1, p=.065). Thus, there is some indication that larger vessel forms presented greater difficulty for firing control; therefore, they occur more frequently in the brown-painted group, a result of incomplete reduction during firing. Pursuing the brown paint and local production concept one step further, if

Table 1.40. Trends in surface treatment.

	Brown-painted		Black-painted	
	Polish	Slip	Polish	Slip
BMIII-PI polished M/w	-	-	+	+
Early Red Mesa B/w	+	-	-	+
Red Mesa B/w	+	-	-	+

brown paint tends to be local and if fuel was a chronic problem in Chaco Canyon, then perhaps brown paint in local products was a result of firing problems due to fuel shortage. The introduction of predominantly black-painted ollas implies at least two alternatives:

1) Generally higher levels of firing skill were attained throughout the San Juan Basin, with the increased diversification of whiteware forms.

2) Increasingly localized areas of production evolved as a result of ecological conditions favoring ceramic specialization and the attendant technological skills.

These possibilities are not at odds with the ecological model previously mentioned (Judge 1979; Toll 1981). Specialized production of decorated vessels may also have gravitated to those margins of the San Juan Basin where firing fuels were more plentiful than in the center. Again, fine-grained sandstones are widely available and empirically can be seen to have been found suitable for fine-textured whitewares. Such whiteware production areas may have developed outside the trachyte and chalcedonic sandstone source areas, which seem to have increasingly "cornered" the production of culinary wares.

In the examination of vessel form at 29SJ 629 the following findings are worthy of reiteration:

1) Grayware jars seem to have been a specialty of the trachyte and chalcedonic sandstone production areas. On an overall basis neither appears to associate significantly with sooting (Tables 1.29-1.30).

2) There is also an association of graywares with pithouse contexts. Functional interpretation of such associations must be guarded because of the few primary, vessel-structure deposits present; however, the one possible, partial vessel assemblage from Pithouse 2, Floor 1, consisted of five grayware jars, three white bowls, and a white seed jar (Table 1.31). Ladles were found more frequently than expected in rooms, and bowls, the most numerous form, show an association with the trash midden (Table 1.32). The high frequency of bowls in the midden and in general is probably a reflection of relative breakage rates. The Anasazi seem to have gone through vessels at a rather high rate--if 29SJ 629 was inhabited for 150 years and the incomplete sample contains 1700+ vessels, the breakage rate for this small site was 11.3 vessels per year, half of which were bowls. It is likely that bowls were the most commonly handled; thus, most often broken, thereby finding their way to the trash more often than other forms.

3) Graywares have a strong tendency to have coarse temper, which was quite surely functional; whitewares, initially as coarse as graywares, were much finer in texture by the end of the main 29SJ 629 occupation, at which time grayware and whiteware forms and functions had differentiated considerably.

4) Aside from the collection being a conventional one (Toll 1984), little can be said from the vessel form assemblage about unusual activities at 29SJ 629. The two areas thought to evidence turquoise working--Pithouse 2 and Plaza Other Pit 1--contain little ceramic evidence thereof (if there be such thing as ceramic evidence for turquoise working). The collection's largest bowl (Volume I:Plate 8.10a) was

found on the floor of Pithouse 2 and contained burned selenite, which may have been related to bead working (though this is only peripherally ceramic evidence). Other Pit 1 contained representatives of only three vessels, one a restorable gray jar. This is quite different from its neighbor and morphological twin, Other Pit 14, which contributed 74 items to the detailed sample.

In summary, 29SJ 629's ceramic assemblage reflects an active import of ceramics from the earliest types. While the San Juan area, the Red Mesa Valley (?), the Chuska Valley, and to a lesser extent the Mogollon area are all represented through time, the relative frequencies vary through time and within ware groups. The most marked trends are for decrease in San Juan whitewares and increases in Chuska and southern (?) graywares. Within type and temper variability can be identified, but its full extent remains untapped, although the examinations performed show the variability on a micro scale to be considerable. In emphasizing variability in attempting to isolate production areas, the truly remarkable consistency of measurements, designs, and forms across subgroups should not be obscured. Clearly, it is impossible to discuss redistribution on the basis of one site's ceramics, but the following are relevant to such considerations on a larger scale:

1) Vessel forms associate with temper types, suggesting incipient specialization and complementarity of production.

2) A variety of ceramics are imported even early in the occupation of 29SJ 629, again suggesting the basis for a more complex exchange system of some sort. The goods used in exchange and the locus of the exchange are not directly accessible, but the wide spatial separation of sources make it rather certain that some method of obtaining vessels from potters in other areas existed.

3) Finally, the assemblage strongly suggests that a large number of potters were conforming to a set of widely shared decoration, composition, and form specifications. This in turn suggests that communication within the site's ceramic supply area was quite good, fulfilling another prerequisite of the Judge model.

This study raises many questions and points up many needs for analytical refinement. It also essentially attempts a multivariate analysis by three dimensional (at most) hands and minds, thus, leaving many combinations unexplored and many relationships unclear. At the same time, we feel that it has pushed the results of our analytical system toward their useful limits. It offers large amounts of data in combinations we thought useful for archeological questions as we now see them, and experiments with combinations and methods we thought potentially useful.

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2

CHIPPED STONE FROM 29SJ 629

Catherine M. Cameron

Introduction

A total of 7,022 chipped stone artifacts was recovered during excavations at Spadefoot Toad Site (29SJ 629). The site was excavated in 1975 and 1976, and the chipped stone material was analyzed in 1978. A report on these artifacts was prepared in June 1980. What follows is a revised version of that report, prepared in 1989. It represents raw data, data organized for easy comparison to other sites in Chaco Canyon, and a discussion of patterns of chipped stone use at 29SJ 629. Access to computer files was not available for the updated version, limiting both the analysis and the verification of some data tables.

29SJ 629 was a small habitation site occupied primarily during the late tenth and early eleventh centuries. This period immediately precedes the intensification of the regional Chacoan System, when most of the large pueblos in Chaco Canyon were constructed and large quantities of goods--including ceramics and chipped stone material--were imported into Chaco Canyon from the surrounding region. Chipped stone from site 29SJ 629 can provide information on activities and the importation of raw material at the small sites in Chaco Canyon just before the florescence of the Chaco System, which contributes to our understanding of how the Chacoan System developed. For example, Judge (1989) has suggested that the Chacoan System may have developed, in part, because of the central role the canyon played in the processing and distribution of turquoise ornaments. Chipped stone data presented here support the suggestion that 29SJ 629 may have been the locus of turquoise jewelry manufacture, at least during part of its occupation (Mathien 1984, this volume).

Methods

Analysis of chipped stone material from sites in Chaco Canyon examined regional resource exploitation through the identification of sources of raw material (Cameron 1982--analytic procedures). Functional variation in the use of chipped stone materials was also examined. Material type categories used were those developed by Warren (1979). In this report, Warren's types are combined into the eleven major groups (five non-local and six local) used in other Chaco Canyon chipped stone analyses (Cameron 1982, 1984, 1987). More detailed morphological and technological analyses were made of all formal tools (Lekson 1979, 1987, this volume) and cores (Cameron 1982) and wear pattern analysis was performed on a small sample of the chipped stone artifacts, mostly utilized and retouched flakes (Cameron 1982). In this report, Lekson's tool type designations are used, but specific core type designations are not used and wear pattern analysis for 29SJ 629 chipped stone is not discussed. Obsidian recovered from Chacoan sites was identified by source using trace element analysis (Cameron and Sappington 1984).

Sources of local materials used in chipped stone manufacture at 29SJ 629 occur within 10 km of the canyon and are primarily silicified woods and pebble cherts (Figure 2.1 and Table 2.1). Silicified wood, the most common local material, is found in the Kirtland Formation, the Fruitland Formation, and the Ojo Alamo Sandstone. The Ojo Alamo and Quaternary gravel terraces produce pebble cherts and some reworked silicified wood. Most of the locally available material occurs to the north of the canyon.

Non-local materials had sources more than 50 km from Chaco Canyon (Figure 2.2). Five types of non-local materials have been identified in the chipped stone collection from 29SJ 629, but some of these may come from more than one source (Figure 2.2). Usable outcrops of Morrison Formation material have been reported only in the Four Corners area (Phil Shelley, personal communication 1982), but the Morrison Formation does outcrop at many other locations around the San Juan Basin. Occurrences of yellow-brown spotted chert have only been reported in the Zuni Mountains, but other outcrops are possible. The source of Washington Pass chert is known to be restricted to a small area in the Chuska Mountains. Zuni wood may originate in the Chinle Formation of east-central Arizona. It is found only infrequently at sites in Chaco Canyon. Obsidian recovered at 29SJ 629 was from five different sources located in New Mexico, Arizona, and Utah.

Chipped stone was analyzed using a 10-power stereoscopic microscope to identify artifact type. Artifact types included formal tools, retouched flakes, utilized flakes, unutilized whole flakes, angular debris, cores and unmodified raw material (Table 2.2). Table 2.3 lists material type by artifact type for each piece of chipped stone. In much of the discussion that follows, unutilized whole flakes, angular debris, and unmodified raw material are combined as "debitage."

Material Selection and Temporal Variation in Materials

Local materials are most common at site 29SJ 629 (Table 2.1, Table 2.4). Less than 2 percent of the total assemblage was non-local material. The most common local materials are silicified woods (especially cherty and chalcedonic silicified woods), comprising almost 80 percent of the assemblage. Chipped stone from 29SJ 629 (except that from surface collection) can be assigned to one of four temporal periods (Table 2.5): 1) A.D. 875-925, 2) A.D. 925-1000, 3) A.D. 1000-1050, and 4) A.D. 1100-1150. Materials selected for chipped stone use are remarkably similar across time periods. Period 3 has the highest relative frequency of Washington Pass chert, a material type that was imported in large quantities to greathouses in Chaco Canyon during the late eleventh and early twelfth centuries (Cameron 1982, 1984, 1987), however, even during this time period, Washington Pass chert at 29SJ 629 is low in frequency (less than 2 percent).

Chipped stone materials at 29SJ 629 can be compared through time with those at a nearby small house (29SJ 627) and with Pueblo Alto, a greathouse site (Table 2.6). The earliest period at 29SJ 629 is not represented at the other two sites. During the period from A.D. 925 to 1000, material frequencies at 29SJ 629 and 29SJ 627 are remarkably similar (this time period is not represented at Pueblo Alto). Silicified wood comprises about 75 percent of the assemblage at both sites. 29SJ 627 has slightly higher frequencies of most non-local materials, but non-local materials at both sites are still low in frequency (1.3 percent at 29SJ 629 and 4.0 percent at 29SJ 627).

During the period from A.D. 1000-1050, some differences in material frequencies are apparent at the three sites. Silicified wood still comprises over 75 percent of the assemblage at 29SJ 629, but is only

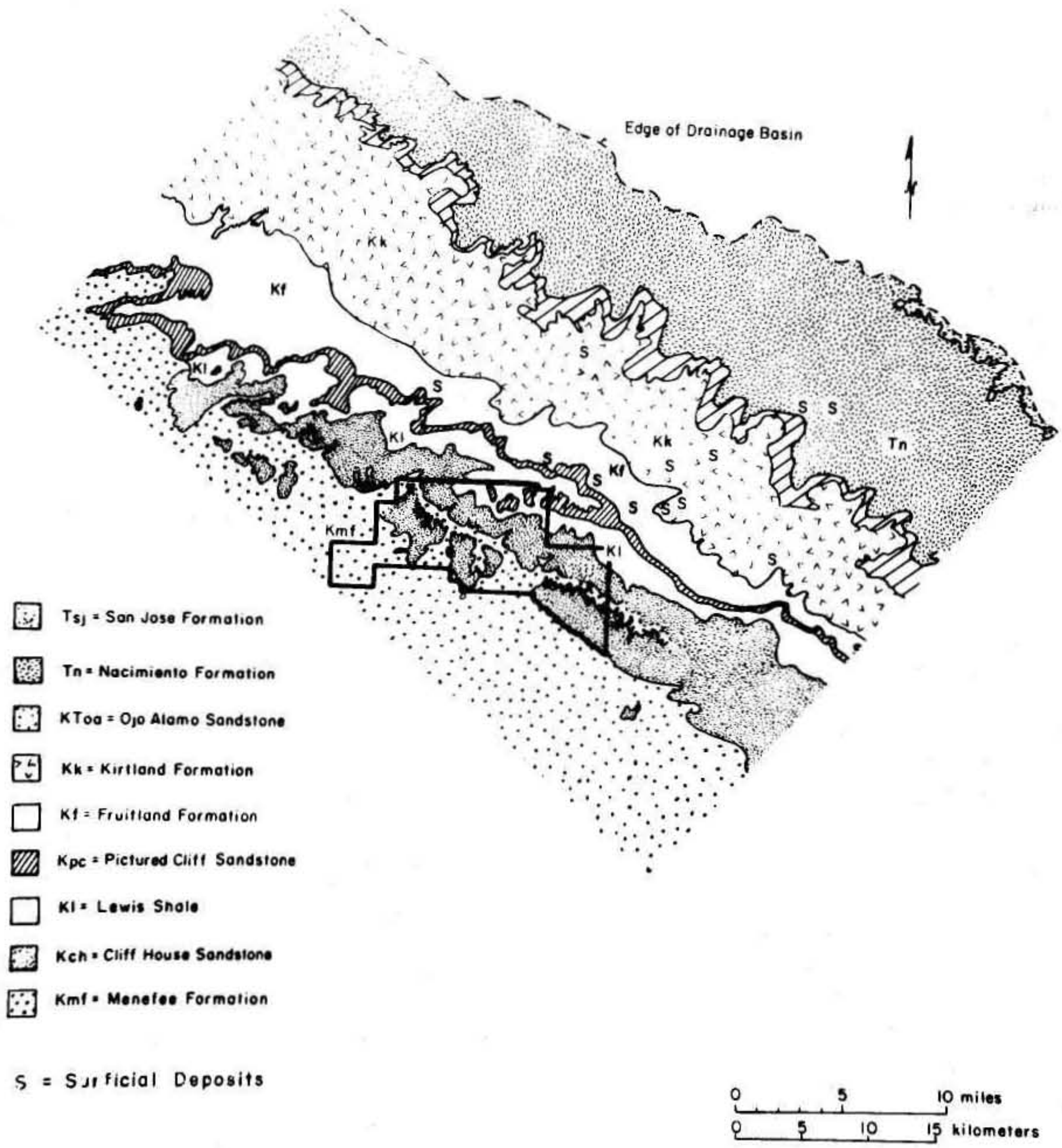

Figure 2.1. Local sources of chipped stone material (NPS 929/82127 C).

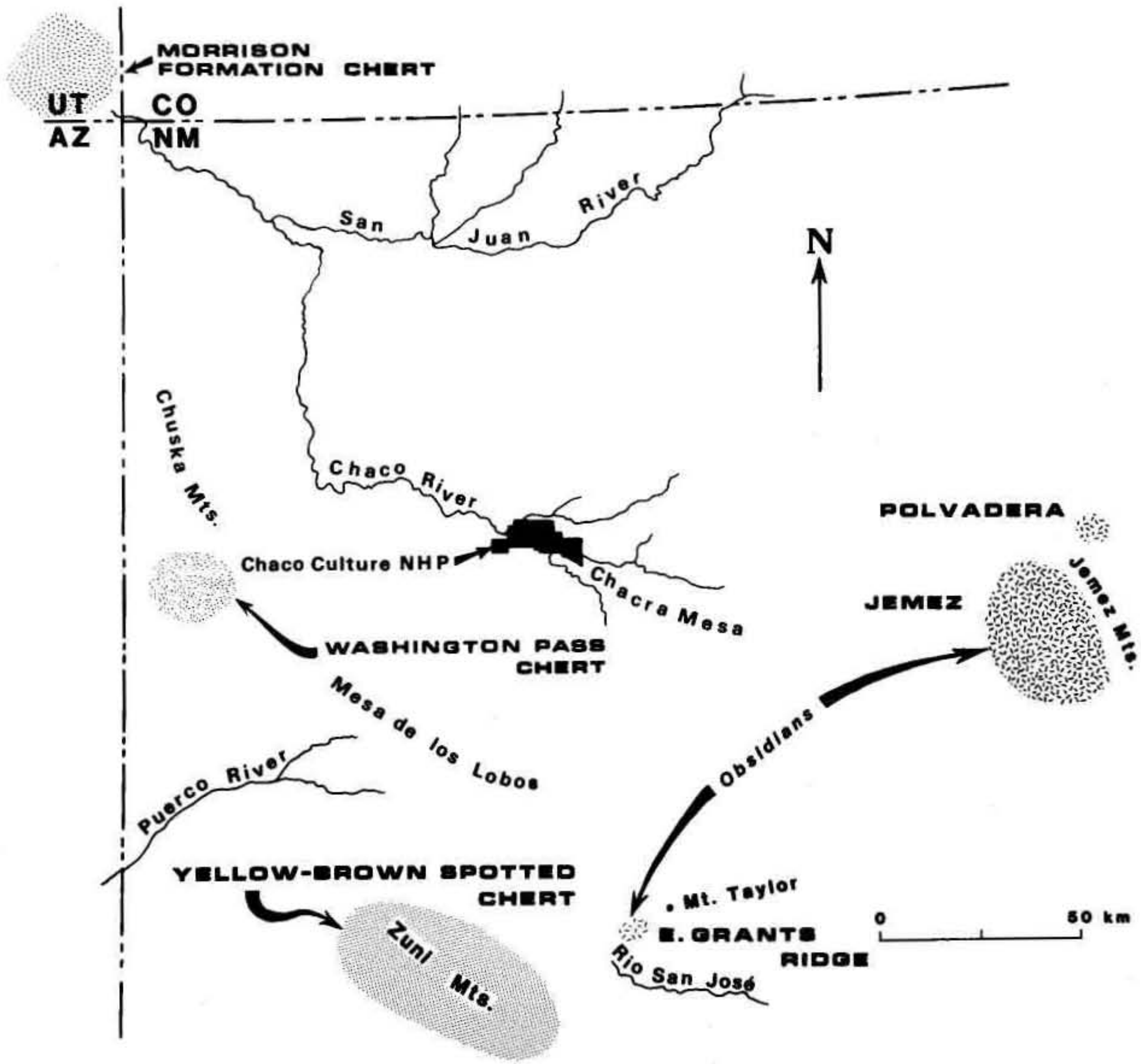

Figure 2.2. *Sources of exotic chipped stone (NPS 310/83089 B).*

Table 2.1. Material type groups at 29SJ 629.

Material	Warren's Lithic Codes	Total	%
Non-Local			
Morrison Formation	1020, 1022, 1040, 2201, 2205	18	0.3
Yellow-brown spotted chert	1072	18	0.3
Washington Pass chert	1080-1081	57	0.8
Zuni silicified wood	1160-1161	2	0.0
Obsidian	3500-3640	39	0.6
Local			
High surface chert	1050-1054	605	8.7
Cherty silicified wood	1112-1113	2,335	33.4
Splintery silicified wood	1109-1110	571	8.2
Chalcedonic silicified wood	1140-1145	2,515	36.0
Quartzite	4000-4005	206	2.9
Other materials	All other numbers[a]	619	8.9
Totals		6,985[b]	100.1

[a] See listing in Table 2.3.
[b] Excludes 37 pieces of sandstone (material type 2000).

Table 2.2. Description of the chipped stone artifact types.[a]

Attribute Type No.	Description
202	Stemmed projectile point with a narrow distal end for hafting without notches.
203	Corner-notched projectile point. Bifacially flaked piece with a point at the proximal end. Distal end consists of haft with notches emanating from the base.
204	Side-notched projectile point. Same as 203 except notches emanate from the side.
205	Triangular point. Bifacially flaked with triangular shape and no visible hafting element.
209	Small non-hafted blade. Bifacially flaked piece without visible hafting elements.
210	Large non-hafted blade. Large bifacially flaked piece without visible hafting elements.
211	Side scraper. Steep unifacial retouch along the long axis of the piece. Retouch may extend over one face.
213	Small non-hafted blade. Small bifacially flaked piece without visible hafting elements.
214	Asymmetrical bifacially flaked piece. Asymmetrical distal end consists of side notches for hafting. Point or drill.
221	Knife. Bifacially flaked piece with bifacial retouch or bifacial edge damage along one or more edges.
231	Formal drill. Manufactured projection exhibiting retouch on tip or sides of projection.
234	Informal or fortuitous perforator. Natural projection exhibiting retouch on tip or sides of projection.
241	Utilized flake. Any piece that exhibits evidence of edge damage due to use: step flakes, feathered flakes, nibbling, polish, rounding. Distinguished from fortuitous damage related to processing or bag wear by regularity and extent of damage.
242	Retouched flake. A piece that exhibits intentional retouch on one or more edges or faces but cannot fit easily into one of the total categories. Distinguished from edge damage by large regularly spaced feathered flakes emanating from the edge.
243	Whole flake. A piece exhibiting a platform, bulb of percussion, and full distal end.
249	Angular debris. A piece exhibiting no positive or negative bulb of percussion but with the remains of flake production evidence. These include parts of flake-scars, ripple marks, etc.
251	Core. A piece exhibiting no bulb of percussion, but from which 2 or more flakes 2 cm or more in length have been removed.
299	Other chipped stone. Any retouched piece not fitting the above two categories.
770	Raw material. Pieces of siliceous stone material that do not exhibit any signs of use or manufacture. This category is <u>not</u> included in the chapter discussion or tabulations.
Material	Material types follow the system established by Warren 1979.
Cortex	Recorded for pieces exhibiting any cortical material.
Freq.	The number of pieces of the same material and artifact subtype were recorded by provenience.
Weight	Each piece was weighed to the nearest tenth of a gram using a Sartorius 1103 read-out scale.

[a] Metric placement of these tools is described and discussed by Lekson (1979).

Table 2.3. Material types by artifact types at 29SJ 629.[a]

Material Type	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage: Whole 243	Debitage: Angular 249	Cores 251	Totals	%	Weight (g)	%
1010	-	15	3	30	31	3	82	1.2	750.0	2.0
1011	1	-	1	4	-	-	6	0.1	32.9	0.1
1014	-	-	-	-	2	-	2	0.0	3.0	0.0
1020	-	-	-	3	-	-	3	0.0	26.0	0.1
1021	-	2	-	13	6	1	22	0.3	155.4	0.4
1024	-	-	-	1	-	-	1	0.0	3.7	0.0
1030	-	-	1	2	3	-	6	0.1	28.8	0.1
1040	1	2	-	5	7	-	15	0.2	207.2	0.6
1042	1	1	-	-	-	-	2	0.0	0.3	0.0
1044	-	1	-	-	-	-	1	0.0	1.5	0.0
1050	1	10	-	11	7	-	29	0.4	50.6	0.1
1052	6	29	4	53	58	1	151	2.1	563.1	1.5
1053	2	61	1	144	153	9	370	5.3	2,212.4	5.9
1054	-	7	-	22	25	1	55	0.8	260.7	0.7
1055	-	1	-	-	-	-	1	0.0	3.3	0.0
1060	-	5	2	18	7	-	32	0.5	144.3	0.4
1070	-	6	-	10	6	1	23	0.3	117.8	0.3
1072	-	6	3	8	1	-	18	0.3	95.3	0.3
1080	2	19	6	14	13	3	57	0.8	257.1	0.7
1100	-	-	-	1	-	-	1	0.0	1.0	0.9
1110	-	34	1	43	491	2	571	8.1	4,617.0	12.3
1112	4	377	17	484	27.6	36	1,731	24.7	10,379. 1	27.6

Table 2.3. (continued)

Material Type	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage: Whole 243	Debitage: Angular 249	Cores 251	Totals	%	Weight (g)	%
1113	7	246	24	132	6.0	9	604	8.6	2,248.8	6.0
1114	-	1	-	-	-	-	1	0.0	0.2	0.0
1120	1	10	-	8	16	1	36	0.5	319.0	0.8
1130	-	6	-	10	10	2	28	0.4	200.8	0.5
1140	20	481	30	320	895	19	1,765	25.1	6,221.4	16.5
1141	-	47	6	21	33	1	108	1.5	437.4	1.2
1142	2	88	4	112	144	3	353	5.0	1,192.7	3.2
1143	-	-	-	7	-	-	7	0.1	4.5	0.0
1144	-	3	-	-	-	-	3	0.0	7.5	0.0
1145	-	51	4	119	105	-	279	4.0	777.1	2.1
1150	-	20	1	28	27	5	81	1.2	451.4	1.2
1153	-	-	-	1	-	-	1	0.0	2.6	0.0
1160	-	1	-	-	1	-	2	0.0	3.4	0.0
1170	-	1	-	-	-	-	1	0.0	13.9	0.0
1201	-	1	-	1	-	-	2	0.0	2.2	0.0
1211	-	-	-	1	-	-	1	0.0	0.1	0.0
1220	-	-	-	2	-	-	2	0.0	1.5	0.0
1221	1	2	-	9	-	-	12	0.2	65.9	0.2
1230	-	-	-	1	-	-	1	0.0	5.3	0.0
1231	3	-	1	1	-	-	5	0.1	20.2	0.1
1232	-	-	-	2	-	-	2	0.0	0.8	0.0

Table 2.3. (continued)

Material Type	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage: Whole 243	Debitage: Angular 249	Cores 251	Totals	%	Weight (g)	%
1234	-	-	-	-	2	-	2	0.0	1.4	0.0
1310	-	3	-	-	1	-	4	0.1	10.2	0.0
1320	-	2	-	2	-	-	4	0.1	3.6	0.0
1340	-	-	-	1	1	-	2	0.0	7.8	0.0
1400	-	2	-	3	1	-	6	0.1	24.0	0.1
1550	-	-	1	-	-	-	1	0.0	5.0	0.0
1600	1	3	-	4	2	-	10	0.1	42.0	0.1
1610	1	1	-	1	-	-	3	0.0	23.7	0.1
1620	-	-	-	1	-	-	1	0.0	3.6	0.0
1660	-	1	-	4	7	-	12	0.2	49.8	0.1
1661	-	-	-	1	-	-	1	0.0	4.8	0.0
2000	-	-	-	12	25	-	37	0.5	523.9	1.4
2200	1	-	-	4	4	-	9	0.1	34.0	0.1
2202	1	35	5	83	50	4	178	2.5	1,748.3	4.6
2221	-	-	-	4	2	4	10	0.1	960.1	2.5
2250	-	-	-	-	1	-	1	0.0	4.5	0.0
2551	-	-	-	-	1	-	1	0.0	0.1	0.0
2650	-	-	-	-	3	-	3	0.0	1.2	0.0
2700	-	-	-	1	1	1	3	0.0	247.5	0.7
3300	-	-	-	-	2	-	2	0.0	59.1	0.2
3410	-	-	-	-	1	-	1	0.0	12.0	0.0
3500	-	2	1	-	-	-	3	0.0	1.8	0.0
3510	-	1	-	-	-	-	1	0.0	1.1	0.0
3520	10	3	2	1	-	-	16	0.2	23.2	0.1

Table 2.3. (continued)

Material Type	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage: Whole 243	Debitage: Angular 249	Cores 251	Totals	%	Weight (g)	%
3530	3	-	2	-	-	-	5	0.1	8.4	0.0
3550	4	6	2	1	1	-	14	0.2	11.9	0.0
3700	2	-	-	-	-	-	2	0.0	1.7	0.0
4000	-	15	1	65	74	1	156	2.2	803.2	2.1
4005	-	10	3	22	15	-	50	0.7	1,000.9	2.7
4010	-	-	-	-	1	-	1	0.0	10.0	0.0
4250	-	-	-	-	1	-	1	0.0	3.7	0.0
4351	-	1	-	1	-	-	2	0.0	5.8	0.0
4375	-	1	1	2	-	-	4	0.1	125.0	0.3
5002	-	-	-	-	2	-	2	0.0	0.9	0.0
5010	-	-	-	-	1	-	1	0.0	1.8	0.0
Totals	75	1,620	127	1,854	3,239	107[b]	7,022	99.1	37,653.2	100.0
%	1	23	2	26	46	2	100			

[a] Material types after Warren 1979.
[b] Eight unanalyzed cores not tabulated (see Table 2.8).

Table 2.4. Grouped material types by artifact types at 29SJ 629.[a]

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Cores 251	Totals	%	Weight (gm)	%
Non-Local									
Morrison Formation	1	2	-	15	-	18	0.3	233.2	0.6
Yellow-brown spotted chert	-	6	3	9	-	18	0.3	95.3	0.3
Washington Pass chert	2	19	6	27	3	57	0.8	257.1	0.7
Zuni silicified wood	-	1	-	1	-	2	0.0	3.4	0.0
Obsidian	17	12	7	3	-	39	0.6	46.4	0.1
Local									
High surface chert	9	107	5	473	11	605	8.7	3,086.8	8.3
Cherty silicified wood	11	623	41	1,615	45	2,335	33.4	12,628.1	34.0
Splintery silicified wood	-	34	1	534	2	571	8.2	4,617.0	12.4
Chalcedonic silicified wood	22	670	44	1,756	23	2,515	36.0	8,640.6	23.3
Quartzite	-	25	4	176	1	206	2.9	1,814.1	4.9
Other	13	121	16	447	22	619	8.8	5,707.3	15.4
Totals	75	1,620	127	5,056	107	6,985	100.0	37,129.3	100.0
%	1.1	23.2	1.8	72.4	1.5	100.0	-	-	-

[a] Totals do not include 37 pieces of sandstone debitage (material code 2000), weighing 5,239 g, and 8 cores.

RATIOS:

Non-local tools = 77	Local tools = 1,746
Non-local debitage = 58	Local debitage = 5,105
Debitage/tools = 0.75:1	Debitage/tools = 2.93:1

Table 2.5. Grouped material types by time period (excluding the site surface materials) at 29SJ 629.[a]

Material	A.D. 875-925 Period 1	A.D. 925-1000 Period 2	A.D. 1000-1050 Period 3	A.D. 1100-1150 Period 4	Totals	%
Morrison Formation	2	9	4	-	15	0.2
%	0.3	0.3	0.1	-		
Yellow-brown spotted chert	2	4	8	3	17	0.3
%	0.3	0.1	0.3	4.1		
Washington Pass chert	-	19	35	-	54	0.8
%	-	0.6	1.2	-		
Zuni silicified wood	1	-	1	-	2	0.0
%	0.2	-	0.0	-		
Obsidian	3	10	21	1	35	0.5
%	0.5	0.3	0.7	1.4		
High surface chert	68	267	219	2	556	8.4
%	10.3	9.0	7.6	2.7		
Cherty silicified wood	298	879	968	37	2,182	33.1
%	45.3	29.6	33.6	50.7		
Splintery silicified wood	34	345	186	-	565	8.1
%	5.2	11.6	6.4	-		
Chalcedonic silicified wood	184	1,063	1,093	25	2,365	35.9
%	28.0	35.7	37.9	34.2		
Quartzite	17	131	54	-	202	3.1
%	2.6	4.4	1.9	-		
Other	49	247	295	5	596	9.0
%	7.4	8.3	10.2	6.8		
Totals	658	2,974	2,884	73	6,589	99.9
%	100.1	99.9	99.9	100.1	-	-

[a] Data in Periods 1 through 4 are listed by number for each category, with the percentages listed below.

Table 2.6. Grouped material types by time period for small houses and greathouses.[a]

	A. D. 925-1000			A.D. 1000-1050			A.D. 1100-1150		
Material	629	627	G. House	629	627	Pueblo Alto	629	627	Pueblo Alto
Morrison Formation	9	11	8	4	9	20	-	-	102
%	0.3	0.4	0.6	0.1	0.5	1.3	-	-	2.5
Yellow-brown spotted chert	4	16	1	8	29	0	3	-	96
%	0.1	0.5	0.1	0.3	1.7	-	4.1	-	2.3
Washington Pass chert	19	54	95	35	73	142	-	-	669
%	0.6	1.8	6.8	1.2	4.3	9.1	-	-	16.1
Zuni silicified wood	-	5	8	1	1	11	-	-	54
%	-	0.1	0.6	0.0	0.0	0.7	-	-	1.3
Obsidian	10	35	12	21	21	10	1	-	286
%	0.3	1.2	0.9	0.7	1.2	0.6	1.4	-	6.9
High surface chert	267	269	127	219	180	133	2	-	380
%	9.0	9.2	9.2	7.6	10.6	8.5	2.7	-	9.1
Cherty silicified wood	879	1,135	284	968	672	330	37	-	572
%	29.6	38.7	20.5	33.6	39.5	21.1	50.7	-	13.8
Splintery silicified wood	345	194	40	186	119	61	-	-	552
%	11.6	6.6	2.9	6.4	7.0	3.9	-	-	13.3
Chalcedonic silicified wood	1,063	866	488	1,093	373	455	25	-	547
%	35.7	29.5	35.2	37.9	21.9	29.1	34.2	-	13.2
Quartzite	131	59	64	54	34	97	-	-	184
%	4.4	2.0	4.6	1.9	2.0	6.2	-	-	4.4
Other	247	289	260	295	192	304	5	-	716
%	8.3	9.9	18.7	10.2	11.3	19.4	6.8	-	17.2
Totals	2,974	2,933	1,387	2,884	1,703	1,563	73	-	4,158
%	99.9	99.9	100.1	99.9	100.0	99.9	99.9		100.1

[a] Data in Periods 1 through 3 are listed by number for each category, with the percentages listed below.

68 percent of the assemblage at 29SJ 627 and only 54 percent at Pueblo Alto. 29SJ 629 still has a very low frequency of non-local materials (2.3 percent) while non-local materials at 29SJ 627 have increased to almost 8 percent of the assemblage. At Pueblo Alto, non-local materials are more than 11 percent of the assemblage. At all three sites, Washington Pass chert is the most common non-local material. Differences in relative frequencies of non-local material are not large enough to suggest that greathouses had greater access to non-local material than small house sites during this time period.

During the final period (A.D. 1100-1150), major differences in selection of chipped stone material are apparent between 29SJ 629 and Pueblo Alto (site 29SJ 627 had no material dating to this period). Local silicified wood is still more than 75 percent of the assemblage at 29SJ 629, but has dropped to only 40 percent at Pueblo Alto. Non-local material, especially Washington Pass chert has increased slightly in frequency at 29SJ 629 to almost 6 percent, but comprises almost 30 percent of the assemblage at Pueblo Alto. This suggests that differential access to non-local material at greathouses and small houses in Chaco Canyon may have developed after A.D. 1050.

Sources of Obsidian

Only 39 pieces of obsidian were recovered from 29SJ 629, comprising less than 1 percent of the chipped stone assemblage. Trace element analysis indicated that the obsidian had been obtained from at least five different sources in New Mexico, Arizona, and Utah (Table 2.7; Cameron and Sappington 1984). (Four pieces could not be relocated for trace element analysis and retain their unverified field designation). More than 40 percent of the obsidian recovered from the site was in the form of formal tools (Table 2.4), which contrasts markedly with the very low percentage of formal tools found in the assemblage as a whole (1.1 percent). Obsidian debitage was rare, suggesting that obsidian tools were manufactured elsewhere and brought to the site.

More than 40 percent of the obsidian from 29SJ 629 was from the Jemez Mountains and another 11 percent from the nearby Polvedera Peak source (Table 2.7; however, see Volume I, Chapter 8). Both are located about 90 km east of Chaco. Jemez obsidian is the most common type of obsidian found at sites in Chaco Canyon after A.D. 920 (Cameron and Sappington 1984). Another 30 percent of the obsidian at 29SJ 629 is from the Red Hill source located more than 200 km south of Chaco. Red Hill is a type that is most common at sites in Chaco Canyon before A.D. 700 (cf., Volume I, Chapter 8). Other sources are infrequent.

Artifact Types

As discussed above, five basic artifact categories were recognized in the 29SJ 629 chipped stone collection: formal tools, utilized flakes, retouched flakes, debitage (including whole flakes, angular debris and unmodified raw material), and cores (Table 2.4). As at other sites in Chaco Canyon, tool production at 29SJ 629 was primarily expedient. Formal tools were rare (only 1 percent of the total chipped stone assemblage), and utilized and retouched flakes (informal tools) were far more common (25 percent of the assemblage).

Although the low frequency of cores (1.5 percent) could indicate that chipped stone reduction processes occurred away from the site, it is more likely that the informal nature of the chipped stone technology infrequently resulted in recognizable cores (Table 2.8). As expected, most of the 107 cores at the site were made of the same local materials as the flakes and tools (Tables 2.4 and 2.8). Local materials were most common, especially cherty (43%) and chalcedonic (21%) silicified woods, high surface chert (9%), and other local materials (20%). Although flakes of splintery silicified wood were fairly common at the site, only 2 cores of this material were recovered. The primary use of splintery silicified wood was probably for hammerstones (see Chapter 4, hammerstone section) and flakes of this material found at 29SJ 629 may be incidental to hammerstone use. Cores of exotic material comprised only 4% of the assemblage and these tended to be small, as at other sites in Chaco Canyon (Table 2.8).

As at other Chaco Canyon sites, cores of exotic material and cores of chalcedonic silicified wood both exhibited little cortex compared with cores of other

Table 2.7. Sources of obsidian at 29SJ 629.[a]

Source	Number	Percent
Jemez, New Mexico	15	42.9
Polvadera Peak, New Mexico	4	11.4
Red Hill, New Mexico	11	31.4
Sitgreaves Peak, Arizona	2	5.7
Mineral Mountains, Utah	1	2.9
Unknown	2	5.7
Totals	35	100.0

[a] After Cameron and Sappington 1984:Table 1.
Four other pieces not examined by Sappington.

local materials (Table 2.8). Cores of exotic materials may have undergone initial processing at their sources. Chalcedonic silicified wood is found in log form at some distance from Chaco Canyon and cortex was either not part of the naturally occurring material or was removed at the source.

Local and non-local materials differed in the frequency with which they were used for formal or informal tools at 29SJ 629 (Table 2.4). A ratio of debitage to tools (including formal and informal tools) was low for non-local materials (0.75:1), indicating few pieces of debitage per tool, and high for local materials (2.93:1). The lower proportion of debitage for non-local materials may indicate both that formal tools of non-local materials were manufactured away from the site and that flakes of non-local materials were preferentially selected for use as informal tools.

Some differences were apparent in the ways in which individual material types were used. As noted above, obsidian frequently occurred as formal tools but it also frequently occurred as informal tools. Other non-local materials did not have high frequencies of formal tools, but did have higher frequencies of informal tools than local materials. For example, almost 45 percent of the Washington Pass chert flakes had been either utilized or retouched. This again suggests that non-local materials were preferred for use as informal tools.

Of the local materials, splintery silicified wood and quartzite were rarely used as formal or informal tools and occurred most frequently as debitage. This may be partly because of the difficulty of seeing use-wear on these two very coarse materials. However, both materials are commonly used as hammerstones at sites in Chaco Canyon (Cameron 1984, Wills 1977) which may result in flakes that show very little use-wear.

Some temporal differences are apparent in the way in which materials were used at 29SJ 629 (Table 2.9). The ratio of debitage-to-tools fluctuates through time for both local and non-local materials, indicating changes in the location of chipped stone manufacture or change in techniques of manufacture. During all time periods, however, the ratio of debitage-to-tools is much lower for non-local materials than for local materials, again suggesting that formal tools of non-local materials were manufactured away from the site and that non-local material was preferentially selected for use as informal tools.

Formal Tools

Formal tools included all items identified as facially flaked points, knives, or drills, all pieces with retouch covering more than one third of the

Table 2.8. Distribution of cores at 29SJ 629.[a]

Provenience	Weight (grams)	Material	Cortex: Present/ Absent	Field Specimen Number
Room 1, Layer 1	14.9	1113	P	148
Room 1, Layer 1	77.4	1142	P	148
Room 2, Layer 1	20.2	1112	P	476
Room 2, Floor 1	433.5	1021	P	330
Room 3, Floor 1	614.8	1021	P	824
Room 3, Floor 1, Firepit 1 fill	28.2	1112	P	2131
Room 7, Layer 1	14.2	1112	P	703
Room 9, Level 1	68.0	1140	P	479
Room 9, Feature 2 (Level 1)	243.7	1072	?	601
Room 9, Feature 3 (Level 2)	?	1021	A	602
Kiva 1, Floor 1	67.0	1053	P	2041
Pithouse 2, Layer 1	20.3	1112	A	2822
Pithouse 2, Layer 1	36.3	1053	P	3508
Pithouse 2, Layer 1	56.1	1142	P	3507
Pithouse 2, Layer 5	21.3	1142	A	2937
Pithouse 2, Layer 6	56.4	1140	P	2883
Pithouse 2, Floor 1	40.0	1053	P	3168
Pithouse 2, Floor 1	133.9	1112	P	3168
Pithouse 2, Floor 1	177.7	1120	P	3168
Pithouse 2, ventilator shaft (0-100 cm)	38.2	1112	P	274
Pithouse 3, Level 5	107.7	2202	P	2194
Pithouse 3, Level 7	67.9	1021	P	2263
Pithouse 3, Layer 2 (2 specimens)	50.0	1113	P	2513
Pithouse 3, Layer 2 (2 specimens)	91.9	1112	P	2513
Pithouse 3, Layer 3	15.5	1140	A	2605
Pithouse 3, Layer 3 (2 specimens)	28.0	1113	P	2605
Pithouse 3, Layer 3	72.9	1053	P	2605
Pithouse 3, Floor 1	36.1	1112	P	3052
Pithouse 3, Floor 1, OP 2	70.9	1112	P	2718
Pithouse 3, Floor 1, Wall Niche 2	43.7	1112	P	3077
Pithouse 3, Ventilator 3 shaft (Level 1)	30.9	1112	P	1701
Grid 12, surface	22.7	1112	P	31
Grid 21, Level 1	80.4	1112	P	135
Grid 21, Level 1	134.6	1110	P	135
Grid 22, Level 2	43.9	1080	P	2310
Grid 22, Level 3	70.0	1010	P	2578
Grid 23, surface	46.1	1112	P	15
Grid 26, Level 1	11.5	1113	A	223
Grid 28, Level 1	13.7	1140	P	143
Grid 28, Level 1	31.4	1142	P	143
Grid 39, surface	5.8	1080	A	201
Grid 40/46, surface	75.9	1021	P	202
Grid 104, surface	7.9	1113	A	1204

Table 2.8. (continued)

Provenience	Weight (grams)	Material	Cortex: Present/ Absent	Field Specimen Number
Grid 104, surface	33.5	2202	A	1204
Grid 104, Level 1	11.0	1112	P	1404
Grid 202, Level 1	38.7	1140	P	1575
Grid 202, Level 2	15.7	1113	A	1607
Grid 201, Level 1	25.5	1112	P	2164
Plaza Grid 8/14, Level 1	109.7	1112	P	2443
Plaza Grid 9, Level 3	19.2	1141	P	1275
Plaza Grid 14, Level 1	13.9	1113	P	1002
Plaza Grid 15, Level 1 (2 specimens)	61.0	1140	P	1190
Plaza Grid 16, Level 1	30.0	1112	P	1965
Plaza Grid 16, Level 1	65.2	1110	P	1965
Plaza Grid 35, surface	147.6	1020	P	1770
Plaza Grid 35, Level 1	16.3	1142	P	1764
Plaza Other Pit 1 (Level 10)	73.5	1080	P	1988
Plaza Other Pit 1 (Level 11)	28.2	1053	P	1982
Plaza Other Pit 1 (Level 12)	7.1	1113	?	2143
Plaza Other Pit 1 (Level 12)	7.1	1142	P	2143
Plaza Other Pit 1 (Level 12)	9.8	1140	P	2143
Plaza Other Pit 1 (Level 12)	10.8	1112	A	2143
Plaza Other Pit 1 (Level 12)	14.0	1140	P	2143
Plaza Other Pit 1 (Level 12)	15.2	1142	?	2143
Plaza Other Pit 1 (Level 12)	15.8	1112	P	2143
Plaza Other Pit 1 (Level 12)	17.3	1151	A	2143
Plaza Other Pit 1 (Level 12)	19.4	1113	P	2143
Plaza Other Pit 1 (Level 12)	27.6	1053	?	2143
Plaza Other Pit 1 (Level 12)	29.6	1150	P	2143
Plaza Other Pit 1 (Level 12)	57.3	1151	A	2143
Plaza Other Pit 1 (Level 12)	63.6	1112	P	2143
Plaza Other Pit 6 (Level 2)	53.4	1142	P	1996
Plaza Other Pit 6 (Level 3)	45.3	1053	P	2217
Plaza Other Pit 14 (Layer 4)	9.5	1112	A	2762
Plaza Other Pit 14 (Layer 4)	36.7	1140	P	2762
Plaza Other Pit 14 (Layer 4)	50.0	1112	A	2762
Plaza Other Pit 14 (Layer 6)	43.6	1610	P	2787
Plaza Other Pit 14 (Layer 6)	84.5	1112	P	2787
Trash Midden, Grid 49, Level 1	20.5	1112	P	219
Trash Midden, Grid 49, Level 1	87.9	1112	P	219
Trash Midden, Grid 49, Level 1	120.2	1110	P	219
Trash Midden, Grid 52/53, Level 1	29.1	1053	P	285
Trash Midden, Grid 58, Level 4	83.8	1053	P	424
Trash Midden, Grid 58, Level 4	110.6	1112	P	424
Trash Midden, Grid 64, surface	33.6	1112	P	425
Trash Midden, Grid 64, surface	91.8	1053	P	425

Table 2.8. (continued)

Provenience	Weight (grams)	Material	Cortex: Present/ Absent	Field Specimen Number
Trash Midden, Grid 64, Level 3	46.1	1112	P	503
Trash Midden, Grid 64, Level 4	30.6	1113	A	1825
Trash Midden, Grid 65, Level 1	71.9	1112	P	1302
Trash Midden, Grid 65, Level 4	89.6	1021	A	1831
Trash Midden, Grid 65, Level 4	81.9	1112	P	1831
Trash Midden, Grid 65, Level 6	24.1	2202	P	1846
Trash Midden, Grid 65, Level 6	35.8	1140	P	1846
Trash Midden, Grid 70, Level 1	44.3	1053	A	617
Trash Midden, Grid 71, Level 1	14.2	1112	P	516
Trash Midden, Grid 71, Level 1	83.6	1110	P	515
Trash Midden, Grid 71, Level 1	88.4	4000	?	515
Trash Midden, Grid 71, Level 2	17.4	1140	A	543
Trash Midden, Grid 76, Level 1 (TT 1)	12.7	1140	A	1197
Trash Midden, Grid 76, Level 2	22.0	1112	P	1308
Trash Midden, Grid 76, Level 1	28.9	1112	P	862
Trash Midden, Grid 76, Level 3 (TT 1)	22.5	1112	P	1318
Trash Midden, Grid 76, Level 5	26.3	1140	P	1174
Trash Midden, Grid 76, Level 5	48.7	1112	P	1526
Trash Midden, Grid 82, surface	8.3	1070	A	1538
Trash Midden, Grid 87, surface	12.2	1140	P	1327
Trash Midden, Grid 88, Level 2	32.6	1130	P	1041
Trash Midden, Grid 88, Level 2	46.8	4005	P	1047

[a] Eight cores listed here were not analyzed.

face, and all drill facets (Cameron 1982; Lekson 1979, 1987, this volume). A total of 75 formal tools were identified at 29SJ 629 (Table 2.10). More than half of the formal tools were projectile points (n=40), another third (n=25) were drills, and the remainder were miscellaneous, mostly indeterminate tools.

The relative frequency of projectile points in the formal tool assemblage at 29SJ 629 is similar to that at other sites in Chaco Canyon (Cameron 1982). The projectile points included stemmed, corner-notched, and side-notched types, although half were corner-notched. Projectile points were made primarily of obsidian and material placed in the "other" category, presumably unusual types. Only seven projectile points were made of silicified wood, the material most commonly found as debitage and informal tools at 29SJ 629. This suggests that projectile points of non-local or unusual material were preferred and were probably imported to the site as finished artifacts.

29SJ 629 has far more drills than most other sites in Chaco Canyon. Most of the drills were "fortuitous perforators," described by Lekson (Chapter 3) as "small pieces of angular debris selected for an existing extremely acute projection." Drills were overwhelmingly made of silicified wood, especially chalcedonic silicified wood. There were no drills of non-local material. As discussed below, many of these drills were recovered from proveniences that have been associated with turquoise-working activities. Local silicified wood appears to have been

Table 2.9. Grouped material types, by grouped artifact type, by time period at 29SJ 629.

A.D. 875-925
(Time Period 1)

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Cores 251	Totals	%
Non-Local							
Morrison Formation	-	-	-	2	-	2	0.3
Yellow-brown spotted chert	-	1	-	1	-	2	0.3
Washington Pass chert	-	-	-	-	-	-	-
Zuni silicified wood	-	-	-	1	-	1	0.2
Obsidian	1	2	-	-	-	3	0.5
Local							
High surface chert	-	12	-	54	2	68	10.3
Cherty silicified wood	2	77	4	210	5	298	45.3
Splintery silicified wood	-	-	-	34	-	34	5.2
Chalcedonic silicified wood	2	46	1	133	2	184	28.0
Quartzite	-	2	2	13	-	17	2.6
Other	-	11	-	36	2	49	7.4
Totals	5	151	7	484	11	658	100.1
%	0.8	22.9	1.1	73.6	1.7	100.1	-

Non-local: Tools (4); Debitage (4)
Debitage-to-tools ratio: 1.0:1

Local: Tools (159); Debitage (491)
Debitage-to-tools ratio: 3.1:1

Table 2.9. (continued)

A.D. 925-1000
(Time Period 2)

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Cores 251	Totals	%
Non-Local							
Morrison Formation	-	-	-	9	-	9	0.3
Yellow-brown spotted chert	-	-	-	4	-	4	0.1
Washington Pass chert	1	5	1	11	1	19	0.6
Zuni silicified wood	-	-	-	-	-	-	-
Obsidian	5	1	3	1	-	10	0.3
Local							
High surface chert	3	49	-	210	5	267	9.0
Cherty silicified wood	6	207	12	642	12	879	29.6
Splintery silicified wood	-	19	1	324	1	345	11.6
Chalcedonic silicified wood	8	264	21	763	7	1,063	35.7
Quartzite	-	18	-	113	-	131	4.4
Other	1	35	8	197	6	247	8.3
Totals	24	598	46	2,274	32	2,974	99.9
%	0.8	20.1	1.5	76.5	1.1	100.1	-

Non-local: Tools (16); Debitage (26)
Debitage-to-tools ratio: 1.6:1

Local: Tools (652); Debitage (2,280)
Debitage-to-tools ratio: 3.5:1

Table 2.9. (continued)

A.D. 1000-1050
(Time Period 3)

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Cores 251	Totals	%
Non-Local							
Morrison Formation	1	-	-	3	-	4	0.1
Yellow-brown spotted chert	-	4	2	2	-	8	0.3
Washington Pass chert	1	14	5	14	1	35	1.2
Zuni silicified wood	-	1	-	-	-	1	0.0
Obsidian	8	8	4	1	-	21	0.7
Local							
High surface chert	6	43	3	164	3	219	7.6
Cherty silicified wood	2	298	20	622	26	968	33.6
Splintery silicified wood	-	15	-	170	1	186	6.4
Chalcedonic silicified wood	11	316	20	732	14	1,093	37.9
Quartzite	-	5	1	47	1	54	1.9
Other	11	71	7	193	13	295	10.2
Totals	40	775	62	1,948	59	2,884	99.9
%	1.4	26.9	2.1	67.5	2.0	99.9	-

Non Local: Tools (48); Debitage (21)
Debitage-to-tools ratio: 0.4:1

Local: Tools (829); Debitage (1,986)
Debitage-to-tools ratio: 2.4:1

Table 2.9. (continued)

	A.D. 1100-1150 (Time Period 4)						
		Flakes					
Material	Formal Tools	Utilized 241	Retouched 242	Debitage 243/249	Cores 251	Totals	%
Non-Local							
Morrison Formation	-	-	-	-	-	-	-
Yellow-brown spotted chert	-	1	-	2	-	3	4.1
Washington Pass chert	-	-	-	-	-	-	-
Zuni silicified wood	-	-	-	-	-	-	-
Obsidian	-	1	-	-	-	1	1.4
Local							
High surface chert	-	-	-	1	1	2	2.7
Cherty silicified wood	-	5	-	32	-	37	50.7
Splintery silicified wood	-	-	-	-	-	-	-
Chalcedonic silicified wood	-	4	-	21	-	25	34.2
Quartzite	-	-	-	-	-	-	-
Other	1	2	-	2	-	5	6.8
Totals	1	13	-	58	1	73	99.9
%	1.4	17.8	-	79.5	1.4	100.1	-

Non-local: Tools (2); Debitage (2)
Debitage-to-tools ratio: 1.0:1

Local: Tools (12); Debitage (57)
Debitage-to-tools ratio: 4.8:1

Table 2.10. Formal tools by grouped material type at 29SJ 629.[a]

Material	Projectile Points: Stem. 202	Projectile Points: Corner-notched 203,206	Projectile Points: Side-notched 204,207	Projectile Points: Large Corner-notched 215	Projectile Points: Large side-notched 219	Projectile Points: Misc. 214	Blades: Misc. blade 209	Blades: Small Non-hafted blade 213	Blades: Knife 221	Drills: Formal drill 231	Drills: Fortuitous perforator 234	Drills: Projection on flake 235	Totals	%
Non-Local														
Morrison Formation	-	1	-	-	-	-	-	-	-	-	-	-	1	1.3
Washington Pass chert	-	-	-	-	-	-	1	-	1	-	-	-	2	2.7
Obsidian	1	8	5	-	-	-	-	2	1	-	-	-	17	22.7
Local														
High surface chert	1	2	2	-	-	1	-	-	-	1	1	1	9	12.0
Cherty silicified wood	-	-	-	-	-	-	1	-	2	1	5	2	11	14.7
Chalcedonic silicified wood	1	4	1	-	-	1	1	-	-	-	13	1	22	29.3
Other	1	5	3	1	1	1	-	-	1	-	-	-	13	17.3
Totals	4	20	11	1	1	3	3	2	5	2	19	4	75	100.0
%	5.3	26.7	14.7	1.3	1.3	3.9	3.9	2.7	6.7	2.7	25.3	5.3	99.8	-

[a] See Lekson, Chapter 3: Tables 3.1 and 3.2. Obsidian retouched flakes illustrated in Plate 3.5 #5 not listed here.

preferred for activities associated with turquoise manufacture. Fortuitous perforators may have been used for turquoise bead manufacture.

Patterns of Chipped Stone Use

Tables 2.11 to 2.31 provide artifact and material type data for chipped stone from specific proveniences at 29SJ 629 (see Table 2.32 for list of provenience groups). Certain proveniences show unusual distributions of chipped stone artifacts, especially two of the bell-shaped pits (Other Pits 1 and 14) found in the plaza area during the period from A.D. 975 to 1000. Other Pit 1 contained large quantities of small turquoise debris and a large number of lapidary abraders. Over 75 percent of the chipped stone material from the pit was chalcedonic silicified wood, including three fortuitous perforators of this material (Table 2.18). The pit was apparently the repository for debris from turquoise manufacturing activities and shows a clear association of the use of chalcedonic silicified wood and fortuitous perforators with these activities.

Other Pit 14 was another bell-shaped pit near Other Pit 1 (Table 2.21). Other Pit 14 contained large quantities of ground stone (including manos, metate fragments, and abraders) and many hammerstones. Almost 30 percent of the chipped stone from this pit was splintery silicified wood, a coarse-grained material that comprises less than 10 percent of the total chipped-stone assemblage at 29SJ 629. Many of the hammerstones recovered from sites in Chaco Canyon are made of this material (Wills 1977; Windes, Volume II, Chapter 4). Hammerstones may have been used to manufacture and resharpen ground stone implements. Other Pit 14 appears to have been the repository for debris from ground stone manufacture and maintenance and splintery silicified wood is associated with these activities. The presence of two fortuitous perforators of chalcedonic silicified wood and a large number of flakes of this same material in Other Pit 14 suggest that ground stone manufacture and maintenance may not be the only activities represented here.

Chipped stone and other artifacts suggest that Other Pits 1 and 14 may have been the repository for two different sets of activities. Interestingly, other associated bell-shaped pits (Other Pits 12 and 15: Tables 2.20, 2.22) contained very few pieces of chipped stone. Another plaza pit (Other Pit 6; Table 2.19) was tub-shaped and did contain a number of pieces of chipped stone, but relative frequencies of material types in this pit were similar to those found for the 29SJ 629 assemblage as a whole and did not seem to represent specialized activities. A single unusual projectile point of locally available material was recovered from Other Pit 6.

Chipped stone from Rooms 1, 5, 6, 7, and 8 (dating A.D. 1000 to 1050) were grouped for analysis, but most of the material is from Room 5 (Table 2.23). Almost half of the chipped stone from these rooms was chalcedonic silicified wood, including three fortuitous perforators of this material (two from Room 5, one from Room 8). Other artifacts found in Room 5 included abraders and turquoise. Chalcedonic silicified wood and fortuitous perforators in Room 5 may indicate turquoise-working activities, although, as most of the chipped stone and other artifacts were found in room fill, this room may not be the locus of these activities.

Two other proveniences deserve mention: plaza deposits dating from A.D. 1000 to 1050 and the fill of the Kiva (Pithouse 1). Nine projectile points were recovered from plaza deposits dating from A.D. 1000 to 1050 (Table 2.16); four were obsidian and only three were a common local material (chalcedonic silicified wood). While over 50 percent of the assemblage from this provenience was chalcedonic silicified wood, no fortuitous perforators or other drills were found. The large number of projectile points recovered from this provenience suggest specialized activities, but not necessarily turquoise manufacture.

The fill of the Kiva (Pithouse 1) is mixed with the latest site deposits (A.D. 1100 to 1150) and contained unusually high quantities of non-local materials, primarily Washington Pass chert (Table 2.26). Most of the non-local material was informal tools. Two projectile points (one obsidian and one "other" material) were also found in this provenience. Washington Pass chert is more common at sites in

Table 2.11. Chipped stone from the site surface (no temporal assignment) at 29SJ 629.[a]

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Cores 251	Totals	%
Non-Local							
Morrison Formation	-	2	-	1	-	3	0.8
Yellow-brown spotted chert	-	-	1	-	-	1	0.2
Washington Pass chert	-	-	-	2	1	3	0.8
Obsidian	3	-	-	1	-	4	1.0
Local							
High surface chert	-	3	2	44	-	49	12.4
Cherty silicified wood	1	36	5	109	2	153	38.6
Splintery silicified wood	-	-	-	6	-	6	1.5
Chalcedonic silicified wood	1	40	2	107	-	150	37.9
Quartzite	-	-	1	3	-	4	1.0
Other Materials	-	2	1	19	1	23	5.8
Totals	5	83	12	292	4	396	100.0
%	1.3	21.0	3.0	73.7	1.0	100.0	-

[a] Includes an obsidian projectile point from the 1972 inventory survey.

Table 2.12. Chipped stone from the Trash Midden deposits dating A.D. 1000-1050 at 29SJ 629.

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Cores 251	Totals	%
Non-Local							
Morrison Formation	-	-	1	-	-	1	0.1
Yellow-brown spotted chert	-	-	1	-	-	1	0.1
Washington Pass chert	-	2	-	-	-	2	0.2
Obsidian	1	2	1	-	-	4	0.5
Local							
High surface chert	2	6	1	72	-	81	9.4
Cherty silicified wood	-	73	1	241	3	318	37.0
Splintery silicified wood	-	5	5	56	-	66	7.7
Chalcedonic silicified Wood	-	62	37	164	-	263	30.6
Quartzite	-	2	-	20	1	23	2.7
Other Materials	4	11	10	72	4	101	11.7
Totals	7	163	57	625	8	860	100.0
%	0.8	19.0	6.6	72.7	0.9	100.0	-

Table 2.13. Chipped stone from the earliest Trash Midden deposits, dating to about A.D. 875-925 at 29SJ 629.

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Cores 251	Totals	%
Non-Local							
Morrison Formation	-	-	-	2	-	2	0.4
Yellow-brown spotted chert	-	-	-	1	-	1	0.2
Zuni silicified wood	-	-	-	1	-	1	0.2
Obsidian	1	2	-	-	-	3	0.6
Local							
High surface chert	-	9	-	37	2	48	9.5
Cherty silicified wood	2	60	2	158	5	227	45.1
Splintery silicified wood	-	-	-	29	-	29	5.8
Chalcedonic silicified wood	2	34	1	101	2	140	27.8
Quartzite	-	2	1	12	-	15	3.0
Other Materials	-	7	-	28	2	37	7.4
Totals	5	114	4	369	11	503	100.0
%	1.0	22.7	0.8	73.4	2.2	100.1	-

Table 2.14. *Chipped stone from the earliest site deposits under and behind the roomblock dating to about A.D. 875-925 at 29SJ 629.*

Material	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Totals	%
Yellow-brown spotted chert	1	-	-	1	0.6
High surface chert	3	-	17	20	12.9
Cherty silicified wood	17	2	52	71	45.8
Splintery silicified wood	-	-	5	5	3.2
Chalcedonic silicified wood	12	-	32	44	28.4
Quartzite	-	1	1	2	1.3
Other materials	4	-	8	12	7.7
Totals	37	3	115	155	99.9
%	23.9	1.9	74.2	100.0	-

Table 2.15. Chipped stone from the Trash Midden deposits dating A.D. 925-1000 at 29SJ 629.

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Cores 251	Totals	%
Non-Local							
Yellow-brown spotted chert	-	-	-	2	-	2	0.1
Washington Pass chert	2	3	1	2	-	8	0.5
Obsidian	5	1	3	1	-	10	0.7
Local							
High surface chert	1	40	-	172	2	215	14.1
Cherty silicified wood	5	135	6	410	6	562	36.8
Splintery silified wood	-	5	-	74	1	80	5.2
Chalcedonic silicified wood	2	92	9	379	3	485	31.7
Quartzite	-	4	-	34	-	38	2.5
Other materials	1	28	6	93	1	129	8.4
Totals	16	308	25	1,167	13	1,529	100.1
%	1.0	20.1	1.6	76.3	0.9	100.1	-

Table 2.16. Chipped stone from general plaza deposits dating A.D. 1000-1050 (excludes Plaza Other Pits) at 29SJ 629.

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Cores 251	Totals	%
Non-Local							
Morrison Formation	1	-	-	-	-	1	0.3
Yellow-brown spotted chert	-	-	-	1	-	1	0.3
Washington Pass chert	-	1	1	-	-	2	0.6
Obsidian	4	2	-	-	-	6	1.8
Local							
High surface chert	1	7	-	16	-	24	7.2
Cherty silicified wood	-	25	-	42	2	69	20.6
Splintery silicified wood	-	-	-	26	-	26	7.8
Chalcedonic silicified wood	2	48	2	116	5	173	51.6
Quartzite	-	-	-	9	-	9	2.7
Other materials	1	7	1	15	-	24	7.2
Totals	9	90	4	225	7	335	100.1
%	2.7	26.9	1.2	67.2	2.1	100.1	-

Table 2.17. Chipped stone from the general plaza deposits dating A.D. 925-1000 at 29SJ 629.

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Cores 251	Totals	%
Non-Local							
Washington Pass chert	-	-	-	2	-	2	1.4
Local							
High surface chert	-	2	-	1	-	3	2.2
Cherty silicified wood	1	10	-	32	-	43	31.2
Splintery silicified wood	-	-	-	26	-	26	18.8
Chalcedonic silicified wood	-	12	-	39	1	52	37.7
Quartzite	-	-	-	2	-	2	1.4
Other materials	-	3	1	6	-	10	7.2
Totals	1	27	1	108	1	138	99.9
%	0.7	19.6	0.7	78.3	0.7	100.0	-

Table 2.18. Chipped stone from Plaza Other Pit 1, dating to about A.D. 975-1000 at 29SJ 629.

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Cores 251	Totals	%
Non-Local							
Washington Pass chert	-	1	-	3	1	5	1.2
High surface chert	-	1	-	1	2	4	0.9
Local							
Cherty silicified wood	-	29	5	14	3	51	12.0
Splintery silicified wood	-	2	1	27	-	30	7.1
Chalcedonic silicified wood	3	114	9	194	1	321	75.7
Other	-	1	-	8	4	13	3.1
Totals	3	148	15	247	11	424	100.0
%	0.7	34.9	3.5	58.3	2.6	100.0	-

Table 2.19. Chipped stone from Plaza Other Pit 6, dating to about A.D. 975-1000 at 29SJ 629.

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Cores 251	Totals	%
Non-Local							
Yellow-brown spotted chert	-	-	-	1	-	1	0.5
Washington Pass chert	-	1	-	3	-	4	1.9
Local							
High surface chert	1	1	-	5	1	8	3.8
Cherty silicified wood	-	16	1	65	-	82	39.2
Splintery silicified wood	-	-	-	21	-	21	10.0
Chalcedonic silicified wood	-	19	2	59	1	81	38.8
Quartzite	-	1	-	6	-	7	3.3
Other materials	-	-	-	5	-	5	2.4
Totals	1	38	3	165	2	209	99.9
	0.5	18.2	1.4	78.9	1.0	100.0	-

Table 2.20. *Chipped stone from Plaza Other Pit 12, dating to about A.D. 975-1000 at 29SJ 629.*

Material	Utilized Flakes 241	Debitage 243	Totals	%
Cherty silicified wood	-	1	1	33.3
Chalcedonic silicified wood	1	1	2	66.6
Totals	1	2	3	100.0
%	33.3	66.6	100.0	-

Table 2.21. Chipped stone from Plaza Other Pit 14, dating to about A.D. 975-1000 at 29SJ 629.[a]

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Cores 251	Totals	%
Non-Local							
Morrison Formation	-	-	-	9	-	9	1.4
Yellow-brown spotted chert	-	-	-	1	-	1	0.2
Washington Pass chert	-	-	-	1	-	1	0.2
Local							
High surface cherts	-	5	-	30	-	35	5.5
Cherty silicified wood	-	16	-	115	3	134	21.0
Splintery silicified wood	-	10	-	172	-	182	28.5
Chalcedonic silicified wood	2	19	1	83	1	106	16.6
Quartzite	-	13	-	71	-	84	13.2
Other materials	-	-	-	85	1	86	13.5
Totals	2	63	1	567	5	638	100.1
%	0.3	9.9	0.2	88.9	0.8	100.1	-

[a] Totals do not include 32 pieces of sandstone debitage (material code 2000) recovered from the pit.

Table 2.22. Chipped stone from Plaza Other Pit 15, dating to about A.D. 975-1000 at 29SJ 629.

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Totals	%
Cherty silicified wood	-	1	-	4	5	23.8
Splintery silicified wood	-	2	-	3	5	23.8
Chalcedonic silicified wood	-	3	-	4	7	33.3
Other materials	1	2	1	-	4	19.0
Totals	1	8	1	11	21	99.9
%	4.8	38.1	4.8	52.4	100.1	-

Table 2.23. Chipped stone from storage Rooms 1, 5, 6, 7, and 8, dating primarily to the A.D. 1000-1050 period at 29SJ 629.[a]

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Cores 251	Totals	%
Non-Local							
Yellow-brown spotted chert	-	-	-	1	-	1	1.0
Washington Pass chert	-	-	-	1	-	1	1.0
Obsidian	-	1	1[b]	1	-	3	3.1
Local							
High surface chert	1	3	-	5	-	9	9.3
Cherty silicified wood	-	5	-	17	2	24	24.7
Splintery silicified wood	-	-	-	5	-	5	5.2
Chalcedonic silicified wood	4	7	-	35	1	47	48.5
Other materials	-	2	-	5	-	7	7.2
Totals	5	18	1	70	3	97	100.0
%	5.2	18.6	1.0	72.2	3.1	100.1	-

[a] Total artifacts from each room: Room 1 = 15, Room 5 = 38, Room 6 =24, Room 7 = 3, and Room 8 = 7 pieces.
[b] Listed as a formal tool in Table 3.2.

Table 2.24. Chipped stone from a habitation suite, Rooms 2 and 3, dating to about A.D. 1025-1050 at 29SJ 629.

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Cores 251	Totals	%
Non-Local							
Morrison Formation	-	-	-	1	-	1	1.2
Obsidian	1	-	1	-	-	2	2.4
Local							
High surface chert	1	-	2	8	-	11	12.9
Cherty silicified wood	-	6	-	20	3	29	34.1
Splintery silicified wood	-	-	-	10	-	10	11.8
Chalcedonic silicified wood	-	5	-	14	-	19	22.4
Quartzite	-	1	-	1	-	2	2.4
Other materials	1	1	-	7	2	11	12.9
Totals	3	13	3	61	5	85	100.1
%	3.5	15.3	3.5	71.8	5.9	100.0	-

Table 2.25. Chipped stone from a habitation room, Room 9, dating primarily to the A.D. 1000-1050 period at 29SJ 629.

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Cores 251	Totals	%
Non-Local							
Morrison Formation	-	-	-	1	-	1	2.4
Local							
Washington Pass chert	-	2	-	1	-	3	7.1
High Surface chert	1	-	-	-	-	1	2.4
Cherty silicified wood	-	4	1	9	-	14	33.3
Splintery silicified wood	-	-	-	2	-	2	4.8
Chalcedonic silicified wood	-	5	-	8	1	14	33.3
Other materials	-	2	1	2	2	7	16.7
Totals	1	13	2	23	3	42	100.0
	2.4	31.0	4.8	54.8	7.1	100.1	-

Table 2.26. Chipped stone from the Kiva (Pithouse 1) fill with mixed deposits, dating between about A.D. 1000 and A.D. 1150 at 29SJ 629.

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Cores 251	Totals	%
Non-Local							
Yellow-brown spotted chert	-	3	-	-	-	3	0.9
Washington Pass chert	-	7	2	5	-	14	4.0
Obsidian	1	1	1	-	-	3	0.9
Local							
High surface chert	-	4	-	13	-	17	4.9
Cherty silicified wood	-	47	4	69	2	122	35.3
Splintery silicified wood	-	-	-	20	-	20	5.8
Chalcedonic silicified wood	-	47	3	86	1	137	39.6
Quartzite	-	1	-	4	-	5	1.4
Other materials	1	10	2	12	-	25	7.2
Totals	2	120	12	209	3	346	100.0
%	0.6	34.7	3.5	60.4	0.9	100.1	-

Table 2.27. Chipped stone from Kiva (Pithouse 1) floor fill and floor, dating to about A.D. 1100-1150 at 29SJ 629.[a]

Material	Formal Tools	Utilized Flakes 241	Debitage 243/249	Cores 251	Totals	%
Non-Local						
Yellow-brown spotted chert	-	1	2	-	3	4.1
Obsidian	-	1	-	-	1	1.4
Local						
High surface chert	-	-	1	1	2	2.7
Cherty silicified wood	-	5	32	-	37	50.7
Chalcedonic silicified wood	-	4	21	-	25	34.2
Other materials	1	2	2	-	5	6.8
Totals	1	13	58	1	73	99.9
%	1.4	17.8	79.5	1.4	100.1	-

[a] No retouched flakes recorded.

Table 2.28. Chipped stone from the Pithouse 2 fill, primarily from A.D. 1000-1050 at 29SJ 629.

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Cores 251	Totals	%
Non-Local							
Yellow-brown spotted chert	-	1	1	-	-	2	0.8
Washington Pass chert	-	1	-	4	-	5	2.0
Local							
High surface cherts	2	7	-	11	2	22	9.0
Cherty silicified wood	-	45	5	40	3	93	38.1
Splintery silicified wood	-	-	-	5	-	5	2.0
Chalcedonic silicified wood	-	21	4	47	3	75	30.7
Quartzite	-	-	-	8	-	8	3.3
Other materials	-	8	2	23	1	34	13.9
Totals	2	83	12	138	9	244	99.8
%	0.8	34.0	4.9	56.6	3.7	100.0	-

Table 2.29. Chipped stone from Pithouse 2, Layer 6 (floor fill), containing turquoise workshop debris dating to about A.D. 1025-1050 at 29SJ 629.

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Cores 251	Total	%
High surface chert	-	3	-	1	-	4	5.7
Cherty silicified wood	-	7	2	6	-	15	21.4
Splintery silicified wood	-	5	-	3	-	8	11.4
Chalcedonic silicified wood	1	24	4	8	1	38	54.3
Other materials	-	2	-	3	-	5	7.1
Totals	1	41	6	21	1	70	99.9
%	1.4	58.5	8.6	30.0	1.4	99.9	-

Table 2.30. Chipped stone from under Pithouse 2, Floor 2, dating to about A.D. 925-1000 at 29SJ 629.

Material	Utilized Flakes 241	Debitage 243/249	Totals	%
High surface chert	-	1	1	8.3
Cherty silicified wood	-	1	1	8.3
Splintery silicified wood	-	1	1	8.3
Chalcedonic silicified wood	4	4	8	66.7
Other materials	1	-	1	8.3
Totals	5	7	12	99.9
%	41.7	58.3	100.0	-

Table 2.31. Chipped stone from trash deposits in Pithouse 3, dating to A.D. 1000-1050 at 29SJ 629.

Material	Formal Tools	Flakes: Utilized 241	Flakes: Retouched 242	Debitage 243/249	Cores 251	Total	%
Non-Local							
Morrison Formation	-	-	-	1	-	1	0.2
Washington Pass chert	-	1	-	3	-	4	0.8
Obsidian	-	2	1	-	-	3	0.6
Local							
High surface cherts	-	7	-	17	1	25	4.8
Cherty silicified wood	-	58	1	119	10	188	36.2
Splintery silicified wood	-	4	-	21	1	26	5.0
Chalcedonic silicified wood	1	68	2	146	2	219	42.1
Quartzite	-	1	-	3	-	4	0.8
Other materials	2	13	-	33	2	50	9.6
Totals	3	154	4	343	16	520	100.1
%	0.6	29.6	0.8	66.0	3.1	100.1	-

Table 2.32. Provenience groups used in the chipped stone analysis at 29SJ 629.[a]

Provenience No.	Time Period	Area	Field Specimen Number
1	-	Surface	5, 9, 14-15, 18-19, 20, 22, 27, 30-31, 39, 41, 46-47, 51-52, 75, 102, 108, 114, 201-202, 683
2	3	Trash Mound	89, 92, 216, 219, 221
3	1	Trash Mound	285, 290
4	1	Trash Mound	42, 167, 1786, 2183, 2349, 2352, 2500
5	1	Trash Mound	955, 996, 1060
6	3	Trash Mound	58, 1593
7	1	Trash Mound	62, 63, 1668, 1669
8	2	Trash Mound	1879, 1880
9	3	Trash Mound	1204, 1332, 1404, 1560, 1876
10	2	Trash Mound	1048, 1157, 1599, 1656
11	1	Trash Mound	418, 423, 424, 433
12	1	Trash Mound	327-328, 392, 397, 399, 403, 415
13	3	Trash Mound	429-430
14	2	Trash Mound	425
15	1	Trash Mound	465, 499, 502-503, 1825
16	2	Trash Mound	1302-1303, 1379, 1413, 1676, 1714-1715, 1719, 1853
17	1	Trash Mound	1512, 1518, 1533, 1598, 1831-1833, 1838, 1846, 1849, 1920
18	2	Trash Mound	547-548, 557, 616-617, 619-621, 623, 870, 915, 920
19	4	Trash Mound	428
20	2	Trash Mound	509, 513-516, 542-543, 546
21	1	Trash Mound	549, 556, 1929-1930

Table 2.32. (continued)

Provenience No.	Time Period	Area	Field Specimen Number
22	2	Trash Mound	853, 862, 961-962, 1152, 1154, 1197, 1201, 1308-1309, 1535
23	1	Trash Mound	1204, 1055, 1174, 1318, 1526, 1549
24	3	Trash Mound	921, 1031, 1538-1542
25	1	Trash Mound	1315, 1720
26	2	Trash Mound	1326-1328
27	3	Trash Mound	1034, 1036-1037, 1039, 1041-1043, 1047, 1553, 1660
28	2	Trash Mound	1067, 1159, 1161-1162, 1166
29	3	Trash Mound	1072, 1167, 1176, 1331, 1585
30	3	Trash Mound	205
31	3	General Plaza	35, 56, 1002, 1009, 1087-1088, 1143, 1179, 1186-1187, 1190, 1195, 1504, 1506, 1779-1780, 1275, 1340, 1339, 1417, 1959, 1964-1965, 2176, 2436, 2442-2443, 2571, 2582, 3560
32	4	General Plaza	6, 10, 36, 67-68, 78, 82, 107, 109-111, 277-278, 969, 1692, 1769-1770, 1802, 2164, 2167-2168, 2180, 2309-2310, 2578, 3534
33	2	General Plaza	1146, 1268, 1275, 1383, 1406, 1449, 1582, 1764, 1889, 1896, 2452, 2566, 2570, 2656
34	2	Plaza OP 1	1578, 1686, 1901, 1948, 1981-1983, 1988-1989, 2143-2144, 2155, 2148
35	2	Plaza OP 6	1706, 1949, 1996, 2216-2220, 2226-2227, 2231, 2312, 2317, 2323, 3086
36	2	Plaza OP 14	2663-2664, 2697-2698, 2700, 2760, 2762, 2780, 2785-2787, 2790, 3086, 3102
37	2	Plaza OP 15	3275-3277, 3525
38	2	Plaza OP 12	2424
39	4	Room 1 fill	148, 156

Table 2.32. (continued)

Provenience No.	Time Period	Area	Field Specimen Number
40	3	Rooms 5-8	163, 269-270, 354, 434, 597, 703, 708, 712, 716, 718, 758, 932, 940, 1013-1014, 1150, 1372, 1374, 1794, 2245, 2328, 2583, 2590, 3251-3252, 3254-3255
41	3	Rooms 2-3	242, 256, 330, 368, 372, 377-378, 458, 476, 576, 578, 587, 590, 723, 769, 815, 817, 820, 824, 928, 1094-1095, 1101, 1282, 1285, 1294, 1295, 1299, 2127, 2131, 2462, 2686
42	3	Room 9	321, 384, 479, 567, 569, 601-602, 606, 626, 695, 732, 739, 754, 836, 839, 2329, 2333, 2441, 3292, 3298
43	4	Kiva Fill	83, 93, 95-97, 115-116, 135, 143, 154, 193, 223, 263, 293, 324, 411, 466, 664-665, 676, 845, 849, 972, 1006, 1077-1078, 1083, 1147, 1205, 1280, 1643, 1649, 1677, 2159, 2579
44	4	Pithouse 2 fill	87-88, 98, 101, 130-131
45	3	Pithouse 2 fill	152, 212, 272, 274, 858, 876, 880, 883, 2816, 2822, 2836, 2840, 2861-2863, 2919, 2937, 2940-2941, 2967-2968, 2971, 2993-2994, 3020, 3025-3026, 3148, 3157, 3168, 3177, 3194, 3206, 3369-3370, 3381, 3386, 3390, 3507-3508
46	4	Kiva floor/fill & floor	1414, 2012, 2041-2042, 2112, 2121, 2331, 2738, 2746, 3563, 3567
47	3	Pithouse 2, Layer 6	2874-2881, 2883-2886, 2966
48	2	Pithouse 2 fill	3474, 3397-3399
49	3	Pithouse 3 fill	1701, 1776, 1911, 1936, 1938, 2188, 2194, 2211, 2262-2263, 2341, 2406, 2419, 2495, 2513, 2521, 2605-2606, 2612, 2640
50	2	Pithouse 3 fill	2710, 2718, 2722, 2730, 2734-2735, 3047, 3052, 3077
51	-	-	none
52	4	Pithouse 3 fill	1571, 1574-1575, 1607-1608, 1785

* Time Periods: 1 = A.D. 875-925; 2 = A.D. 925-1000; 3 = 1000-1050; 4 = A.D. 1100-1150

Chaco Canyon after A.D. 1050, and this may account for its presence in this late provenience at 29SJ 629.

Chipped stone from other proveniences at 29SJ 629 were unremarkable. Most contained relative frequencies of material types that were similar to those found at the site as a whole and there were few formal tools.

Conclusions

Chipped stone recovered from 29SJ 629 was primarily of material that had been procured locally, as was the case at other small house sites in Chaco Canyon. Non-local material was found infrequently at the site, although the frequency of non-local materials, especially Washington Pass chert increased slightly through time. Chipped stone technology emphasized the production of informal tools (utilized and retouched flakes), and formal tools were rare. Projectile points were most commonly of non-local material (especially obsidian) or unusual "other" materials. 29SJ 629 had a large number of drills, most often made of chalcedonic silicified wood, a local material type. These tools appear to have been used in turquoise-manufacturing activities at several proveniences of 29SJ 629. Flakes of coarse-grained, splintery silicified wood found in a plaza pit were associated with the use of hammerstones in the manufacture and maintenance of ground stone.

Comparison of chipped stone material at 29SJ 629 with that at Pueblo Alto suggests that during the latest time period represented at 29SJ 629 (A.D. 1100 to 1150) access to non-local chipped stone material in Chaco Canyon may have been largely restricted to greathouses. Occupation at 29SJ 629 during this period, however, was limited and may not accurately represent relationships between greathouses and small sites for the canyon as a whole.

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3

POINTS AND DRILLS OF 29SJ 629

Stephen H. Lekson

Seventy-five items were classified as formal tools, including 26 drills, 40 arrow points and arrow point fragments, and 11 other tools. The drills from the Spadefoot Toad Site (629SJ 629) are somewhat unusual when compared to the larger population of Chaco Canyon chipped stone tools (Lekson 1985); points and large bifaces from the site are not exceptional.

Twenty-five tools were classified as drills (Table 3.1). Most (16) were minimally retouched perforators: small pieces of angular debris of flakes selected for an existing extremely acute projection, with minimal retouch on that projection (Plates 3.1-3.4). Four other drills were minimally retouched projections on much broader flakes or unmodified chunks; one of these (Plate 3.4, No. 1) had a scraper on the opposite end of the flake and is listed with the other tool forms (Table 3.2; FS 1929). Of the remaining five drills, two (Plate 3.1, Nos. 1-2) were very small, fully retouched drills (of about the same size as the 20 minimally retouched perforators), two were sections of large drills (Plate 3.2, No. 1; other not illustrated), and one (Plate 3.5, No. 1) was a minimally retouched projection, considerably larger than the other small drills. With only four exceptions, all drills were made of silicified wood, and many of these (13; 52 percent) of chalcedonic silicified wood (material type 1140) and cherty silicified wood (8; 31 percent).

The drills from 29SJ 629, as a group, were remarkably small. Excluding the two large drills (Plates 3.1, No. 1; 3.5, No. 1), mean blade length and width of the 29SJ 629 drills were significantly smaller (at the .01 level) than those measured in the large collection of Chaco Canyon tools (Lekson 1985), but similar to those from contemporary nearby sites (Table 3.3). That is, 21 minimally retouched (informal) perforators and two small fully retouched drills have significantly shorter and thinner bits than the populations of drills in the larger Chaco Canyon collection.

Forty-nine tools (Table 3.2) were classified as arrow points (i.e., hafted projectile points with a minimum stem diameter of ten mm or less) (Plates 3.6-3.11). Twenty-three arrow points were reasonably complete, and ten additional pieces were blade fragments. Three of the complete points were stemmed, ten were corner-notched, eight were side-notched, and three were irregular in form (Plate 3.6

Table 3.1. Formal drills and fortuitous (informal) perforators at 29SJ 629.[a]

Provenience	Artifact Type	Condi-tion	Material	Weight (g)	L x W (mm)	FS No.	Plate No.
Room 5, Level 4	234	2	1140	0.03	8x4	1013.01	3.1 #1
Room 5, Level 4	234	2	1140	0.04	8x5	1013.02	3.1 #2
Room 8, Layer 1, Floor	234	2	1140	0.98	17x10	354	3.2 #5
Room 9, Level 2	231	2	1050	0.30	?	567	none
Pithouse 2, Layer 6	234	2	1140	0.15	12x5	2875	3.3 #1
Pithouse 3, Layer 3	234	2	1140	1.09	34x7	2612	3.3 #1
Plaza Grid 19, Surface	234	2	1140	0.59	23x8	109	none
Plaza Grid 22, Surface	235	2	1113	2.02	23x20	82	3.2 #8
Grid 35, Subfloor 1, Layer 1	234	2	1113	1.22	29x8	1889.02	3.4 #4
Plaza, OP 1 (Level 11)	234	2	1140	0.52	31x7	1983.01	3.4 #5
Plaza, OP 1 (Level 11)	234	2	1140	0.52	22x8	1983.02	3.3 #5
Plaza, OP 1 (Level 12)	234	2	1140	9.26	41x15	2144	3.2 #6
Plaza, OP 14 (Layer 5)	234	2	1142	0.24	14x4	2785.01	3.3 #2
Plaza, OP 14 (Layer 6)	234	2	1140	0.57	21x7	2790	3.3 #4
Trash Midden 65, Level 1	234	2	1053	0.94	15x15	1302	3.2 #3
Trash Midden 65, Level 4	234	2	1140	0.45	16x11	1512.01	3.3 #6
Trash Midden 65, Level 4	231	1	1113	3.62+	20x14	1832	3.2 #1
Trash Midden 71, Level 1	234	2	1140	0.73	17x11	516.01	3.2 #2
Trash Midden 71, Level 1	234	2	1112	0.73	27x10	516.02	3.4 #2
Trash Midden 71, Level 1	235	2	1113	2.12	23x16	516.03	3.2 #7
Trash Midden 71, Level 1	235	2	1080	0.87	16x12	862.02	3.5 #1
Trash Midden 76, Level 1	234	2	1113	0.43	20x8	862	3.2 #4
Trash Midden 76, Level 2	234	2	1113	1.20	26x17	961	3.3 #7
Trash Midden 76, Level 2, TT 1	234	2	1112	1.49	37x9	1308	3.4 #3
Trash Midden 82, Surface	235	1	1053	?	?	921	none
Mean for whole 234 drills without FS 2144 (n=18)				0.66 g			
s.d.				0.42			
CV %				63.8 %			

[a] Artifact types: 231 = formal drill; 234 = fortuitous (informal) perforator; 235 = projection on a flake.
Condition: 1 = broken; 2 = whole.

Table 3.2. Chipped stone tools except for drills at 29SJ 629.[a]

Provenience	Artifact Type	Condition	Material	Weight (g)	Max. Length (mm)	FS No.	Plate No.
Surface	204	2	3530	0.99	28	46[b]	none
Room 1, Layer 2	242	1	3530	0.3	?	156	3.5 #5
Room 2, Firepit 1	221	2	1112?	1.52	29	378	none
Room 3, Floor 2 near Posthole 1	204	2	1052	0.74	26	2686	3.9 #1
Room 3, Layer 2	203	1	3550	0.38+	13	1095	3.8 #1
Room 3, Level 1	202	2	1011	0.90	32	578	3.6 #4
Room 5, Level 4	203	3	1142	0.68+	20	716	3.10 #2
Room 6, Layer 3	203	2	1052	0.63	27	3252	3.7 #4
Pithouse 2, Layer 4	204	3	1052	0.71	20	2840	3.9 #3
Kiva, Floor	210/221	1	2200	16.24+	52	2336	3.13 #3
Grid 2, Surface	203	1	3530	0.60+	15	39	3.8 #4
Grid 8, Level 1	204?	3	3520	0.87+	27	1179	3.11 #2
Grid 8, Level 1	203	2	1040	0.84	29	1340	3.7 #1
Grid 8, Level 2	202	2	3520	1.02	29	1339	3.6 #6
Grid 9, Level 1, south of Wall 3	202	2	1140	0.35	16	1142.02	3.6 #5
Grid 9, Level 1, south of Wall 3	202	1	1052	2.74+	25	1142.01	3.12 #1
Grid 14, Level 1	204	1	3520	0.25+	8	1186	3.11 #4
Grid 14, Level 1	204	3	3550	0.40+	16	1187	3.11 #1
Grid 16, Level 1	203	1	1140	0.33+	10	1964	3.7 #2
Grid 17, Surface	203	1	1140	0.95+	29	20	3.10 #1

Table 3.2. (continued)

Provenience	Artifact Type	Condi-tion	Material	Weight (g)	Max. Length (mm)	FS No.	Plate No.
Grid 19, Surface	203	1	3550	0.84+	12	107	3.8 #5
Grid 23, Surface	213	2	3520	1.18	24	22	3.5 #3
Grid 26, Surface	203	3	3520	0.32+	18	116	3.10 #4
Grid 27, Surface	214	2	1600	0.68	28	97	3.6 #2
Grid 31, Surface	221	2	1112	5.3	?	102	none
Grid 34, Surface	203	1	1052	0.55+	15	87	3.7 #3
Grid 97, Fill	203	2	3520	0.68	24	1879	3.8 #2
Grid 104, Surface	209	1	1042	10.64+	29	1204.02	3.13 #1
Grid 104, Level 1	203	1	1610	0.26+	9	1332	3.8 #3
Grid 201, Level 2	204	3	1140	0.77	20	2167	3.9 #2
Grid 202, Level 1	203	2	3700	0.89	25	1574	3.8 #7
Grid 202, Level 2	203	1	3700	1.30+	13	1608	3.10 #6
Plaza, Posthole 28 (Layer 1)	204	2	1231	0.81	26	2571	3.9 #4
Plaza, OP 6 (Level 4)	214	2	1052	0.25	11	2220	3.6 #3
Plaza, OP 14 (Layers 1 & 2)	203	1	1140	0.49+	25	2664	3.7 #5
Plaza, OP 15 fill	203	2	2202	43.5	?	3275	none
Trash Midden 58, Layer 3	209	1	1113	3.82+	43	403	3.13 #2
Trash Midden 65, Level 1	209	1	1140	1.27+	21	1303	3.5 #2
Trash Midden 65, Level 2	203	2	1120	0.87	26	1715	3.8 #6
Trash Midden 65, Level 4	203[c]	2	3530	4.30	39	1512.03	3.12 #3
Trash Midden 70, Level 1	202/221	1	1080	4.05+	25	621	3.12 #2
Trash Midden 71, Level 1	203	1	3520	0.99+	30	514	3.10 #7

Table 3.2. (continued)

Provenience	Artifact Type	Condition	Material	Weight (g)	Max. Length (mm)	FS No.	Plate No.
Trash Midden 71, Level 5	211[d]	2	1140	3.16	18	1929	3.4 #1
Trash Midden 76, Surface	203	1	3520	0.37+	21	1535	3.10 #3
Trash Midden 76, Level 2	204	1	3520	1.08+	22	962	3.11 #3
Trash Midden 76, Level 2, Test Trench 1	213	2	3550	0.96	24	1309	3.5 #4
Trash Midden 82, Surface	221	?	3520	3.9	?	1538	none
Trash Midden 82, Layer 1, Level 1	214	1	1140	0.55+	25	1541.02	3.6 #1
Trash Midden 82, Layer 1, Level 1	204	1	1231	0.83+	21	1541.01	3.11 #5
Trash Midden 88, Level 2	204	2	1231	0.52	19	1042	3.9 #5
Trash Midden 88, Level 2	203	3	1221	1.63+	30	1043	3.10 #5

[a] Artifact types: 202 = stemmed point; 203 = corner-notched point; 204 = side-notched point; 209 = blade; 211 = scraper; 213 = blade/preform; 214 = asymmetrical point; 221 = knife; 242 = retouched flake.
Condition: 1 = broken; 2 = whole; 3 = minor damage (e.g., tang, tip, or stem missing).
[b] Specimen is from the 1972 inventory survey. FS number is a survey number.
[c] Archaic point (Pinto Basin style).
[d] Scraper with small projection. Listed as a drill in Plate 3.4 #1.

Table 3.3. Formal drills and fortuitous (informal) perforators from contemporary excavated small-houses in Fajada Gap.[a]

Provenience	Artifact Type	Condition	Material	Weight (g)	L x W (mm)	FS No.[b]
29SJ 625/3-C Site:						
Kiva 2, Bench top (north side)	234	2	1140	0.14	15x5	108/C1587
Kiva 2, Bench top	234	2	1140	1.81	25x16	122/C1601
Kiva 2, Bench top	234	2	1140	0.19	16x4.5	123/C1602
Kiva 2, Bench top	234	2	1140	0.21	16x4	124/C1603
Kiva 2, Bench top	234	2	1140	0.27	20x6	125/C1604
Kiva 2, Bench top	234	2	1140	0.25	14x6	126/C1605
29SJ 626 (East):						
Grid 3, Level 1	234	2	1112	0.24	18x7	66
Grid 264/Pitstructure 1, road cut	234	1	1112	1.26+	21x12+	201
Pitstructure 1, Layer 2	234	1	1052	0.05+	7+x5+	231
Pitstructure 1, Layer 2	234	1	1140	0.37+	18+x8	231.68
Pitstructure 1, Layer 6A	234	3	1140	0.32	15+x8	223.28
Pitstructure 3, Layer 1B	234	2	1140	0.14	12x5	320
Pitstructure 3, Layer 2	234	2	1140	0.06	7x4	321
Pitstructure 3, Layer 3	234	2	1140	0.55	27x4	303.23
Pitstructure 3, Grid 4, Layer 4	234	2	1140	0.16	18x4	353
Trash Midden, Grid 157, Level 1	231	1	1050	0.37+	12+x9	630.13
Trash Midden, Grid 386, Level 1	234	2	1140	0.41	16x6	841.36
Trash Midden, Grid 432, Level 1	234	1?	1112	0.64+	16+x12	828.102

Table 3.3. (continued)

Provenience	Artifact Type	Condition	Material	Weight (g)	L x W (mm)	FS No.[b]
29SJ 627:						
Room 3, Level 2	234	3	1140	0.71	22x10	2592
Room 5, Subfloor 1, Level 1	234	3	1140	0.19	18x4	2872.1
Room 5, Subfloor 1, Level 1	234	2	1140	0.18	14.5	2872.2
Room 5, Subfloor 1, Level 1	234	2	1140	0.16	14x4	2872.3
Room 5, Subfloor 1, Level 1	234	2	1140	0.09	12x4	2872.4
Room 5, Subfloor 1, Level 1	234	1	1140	0.04+	6x2.5	2872.5
Room 5, Subfloor 1, Level 1	234	1	1140	0.10+	11x4	2872.6
Room 5, Subfloor 1, Level 1	234	1	1140	0.06+	8x3	2872.7
Room 15, Level 2	231	2	1140	1.15	27x10	992
Room 22, Floor 1	234	2	3510	0.40	16.12	7012
Kiva C, Balk 3, Layer A	234	2	1140	2.35	31x17	5079a
Kiva C, Balk 3, Layer A	231	2	1112	3.05	45x15	5079b
Kiva C, Balk 1, Layer B	235	2	1054	11.70	33x30	2793.3
Kiva C, Layer F	231	2	1112	3.51	57x10	4088
Kiva E, Layer 3A	235	2	1150	1.62	30x13	4477.1
Kiva E, Layer 3A	235?	2	1113	1.94	35x12	4477.2
Kiva E, Layer 5	234	2	1053	2.30	32x11	5741.1
Kiva E, Layer 5	234	2	1150	0.40	33x13	5741.2

Table 3.3. (continued)

Provenience	Artifact Type	Condition	Material	Weight (g)	L x W (mm)	FS No.[b]
29SJ 627 (cont'd)						
Kiva E, Layer 5	235	2	1112	2.74	29x10	5741.3
Plaza, Feature 1, Level 1	235	2	1140	5.20	51x14	1939
Plaza near Room 12 & Pithouse A	235	2	3520	1.70	23x19	4467
Trash Midden, Grid KL 1, Level 4	235	2	1112	5.27	32x19	2322
Trash Midden, Grid EL 2, Level 2	234	2	1140	0.34	14x7	2352
29SJ 1360:						
Room 3, backdirt fill	234	2	1140	0.34	12x9	966
House I, Area 3 fill	234?	2	1140	3.74	24x15	39
House I, Area 1 surface	231	2	1140	0.91	29x15	728A.2
Trash Midden, Grid BX fill	234	2	1140	0.79	22x8	5
Mean for all whole Type 234 drills (n=27)c				0.90 g		
s.d.				1.30		
CV %				144.1		

[a] Artifact types: 231 = formal drill; 234 = fortuitous (informal) perforator; 235 = projection on a flake.
Condition: 1=broken; 2=whole.

[b] C numbers designate permanent catalog numbers in the Chaco Center collections.

[c] Whole 234 drills from 29SJ 625, 29SJ 626 (East), and 29SJ 627 (Room 5) = mean: 0.32g, s.d.=0.40, CV%=127.5%, n=17.

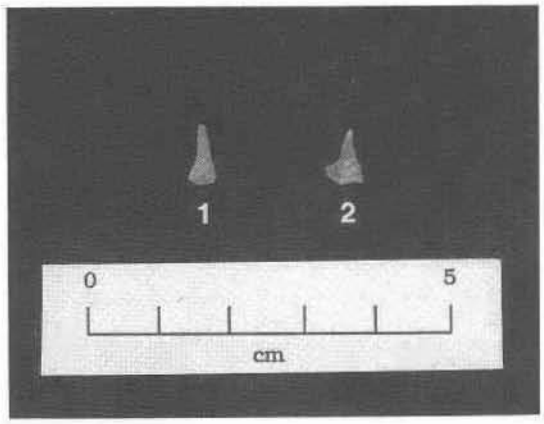


Plate 3.1. *Small drills (fortuitous [informal] perforators) from 29SJ 629. Artifact provenieces listed under Table 3.1 (NPS 31423).*

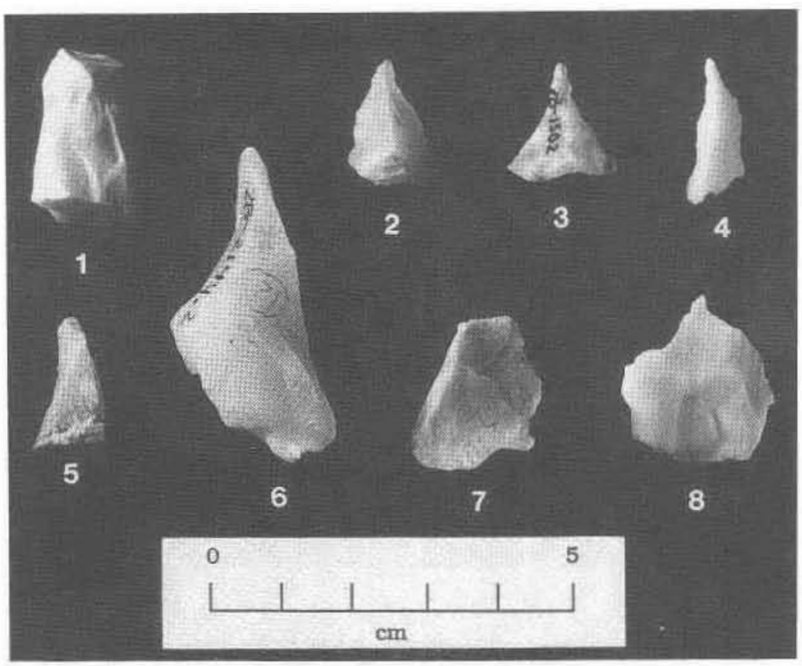


Plate 3.2. *Small drills (fortuitous [informal] perforators) and a large drill fragment (No. 1) from 29SJ 629. Artifact proveniences listed under Table 3.1 (NPS 31424).*

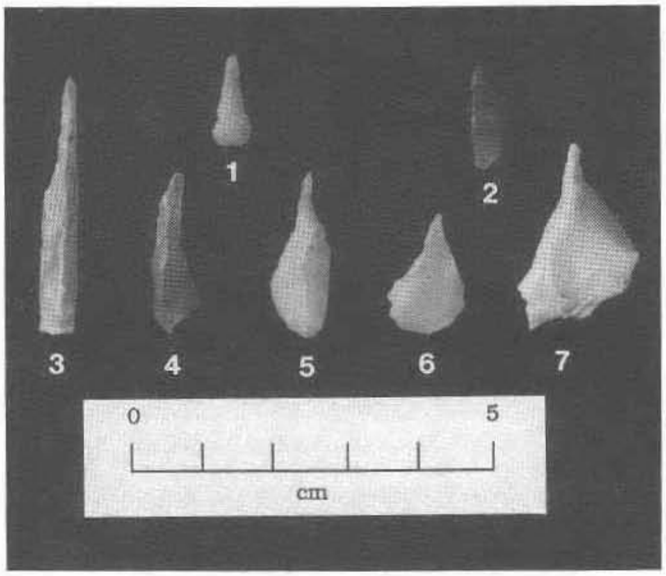


Plate 3.3. *Small drills (fortuitous [informal] perforators) from 29SJ 629. Artifact proveniences listed under Table 3.1 (NPS 31425).*

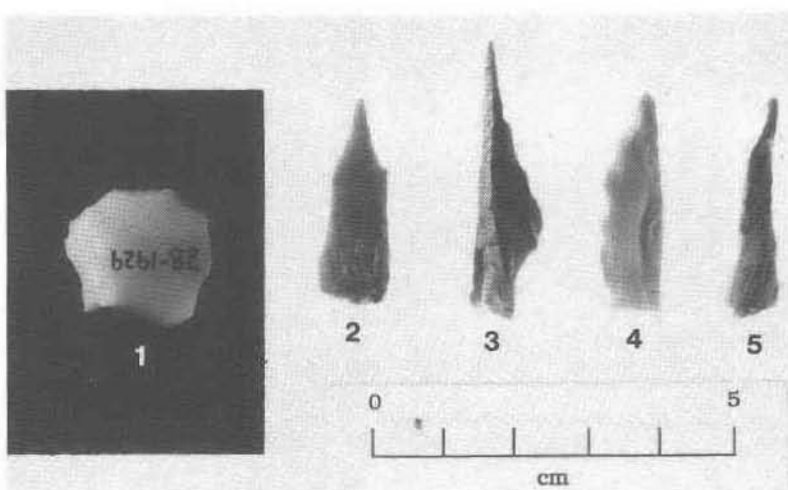


Plate 3.4. *Small drills (fortuitous [informal] perforators) from 29SJ 629. Artifact proveniences listed under Table 3.1 (NPS 31426).*

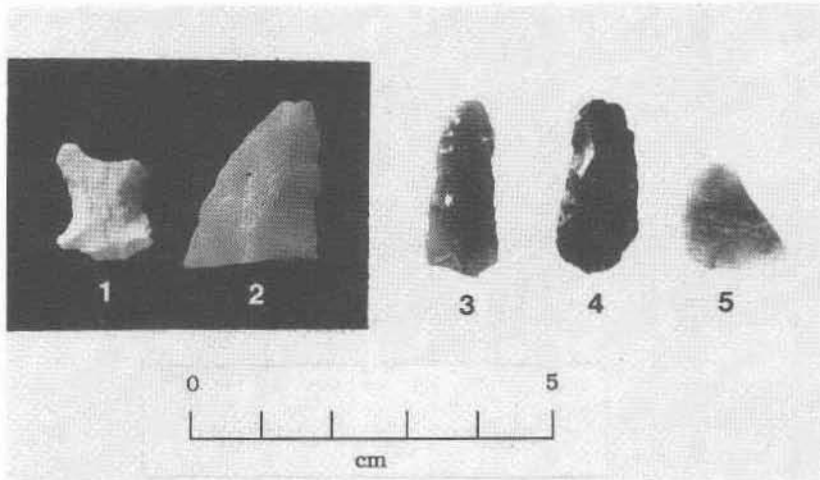


Plate 3.5. *Miscellaneous tools from 29SJ 629. 1) Large drill fragment, 2) Blade fragment, 3-4) Possible preforms, and 5) Blade fragment. Artifact proveniences listed under Table 3.1 (NPS 31421).*

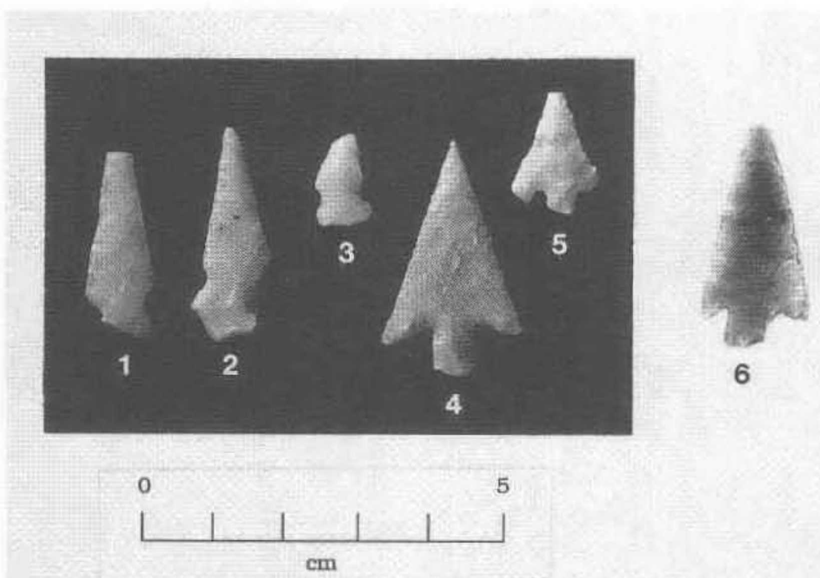


Plate 3.6. *Irregular (1-3) and stemmed points (4-6) from 29SJ 629 (Table 3.1--proveniences) (NPS 31419).*

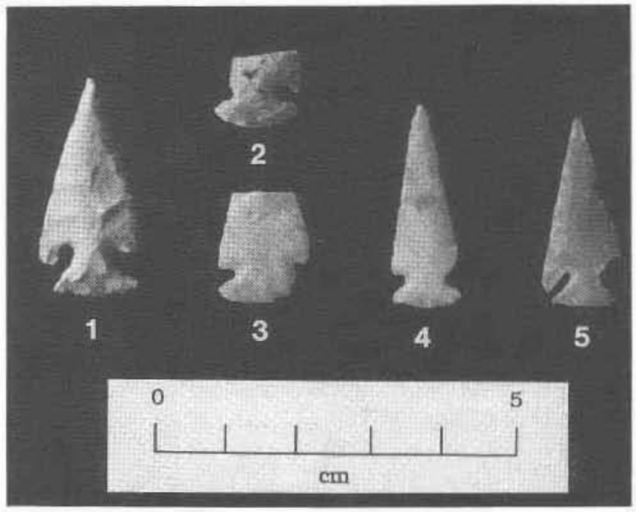


Plate 3.7. *Corner-notched points from 29SJ 629 (Table 3.1--proveniences) (NPS 31427).*

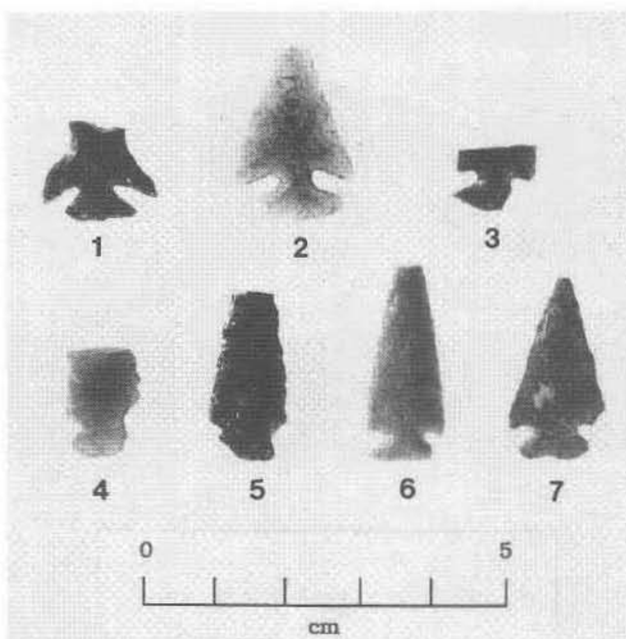


Plate 3.8. *Corner-notched points from 29SJ 629 (Table 3.1--proveniences) (NPS 31428).*

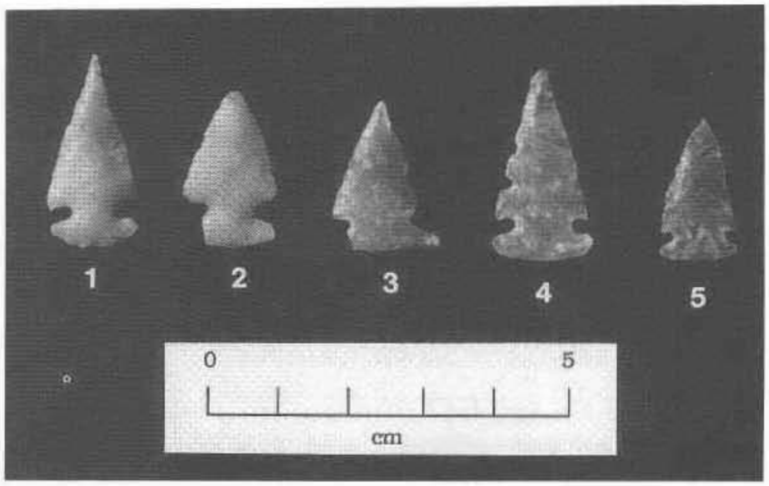


Plate 3.9. *Side-notched points from 29SJ 629 (Table 3.1--proveniences) (NPS 31422).*

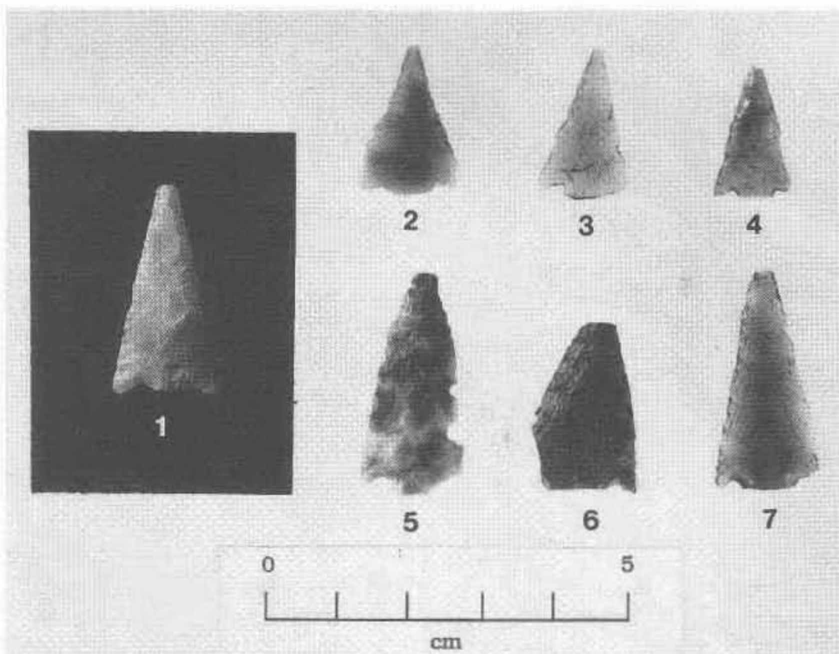


Plate 3.10. *Arrow point blade fragments from 29SJ 629 (Table 3.1--proveniences) (NPS 31429).*

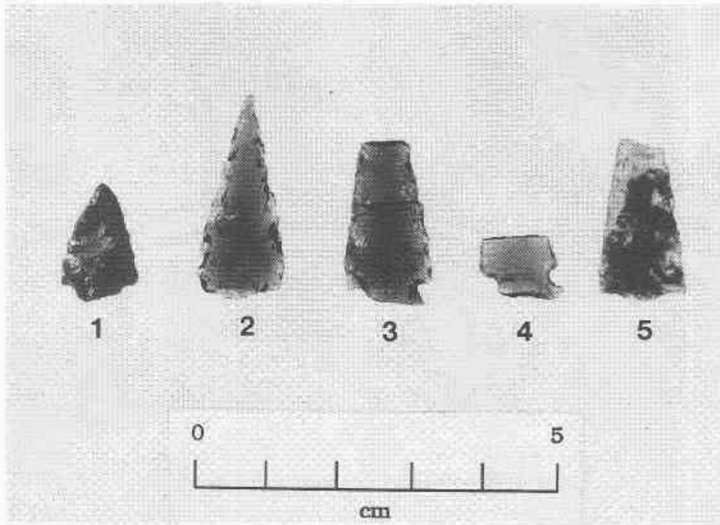


Plate 3.11. *Arrow point blade fragments--all obsidian--from 29SJ 629 (Table 3.1--proveniences). (NPS 31430).*

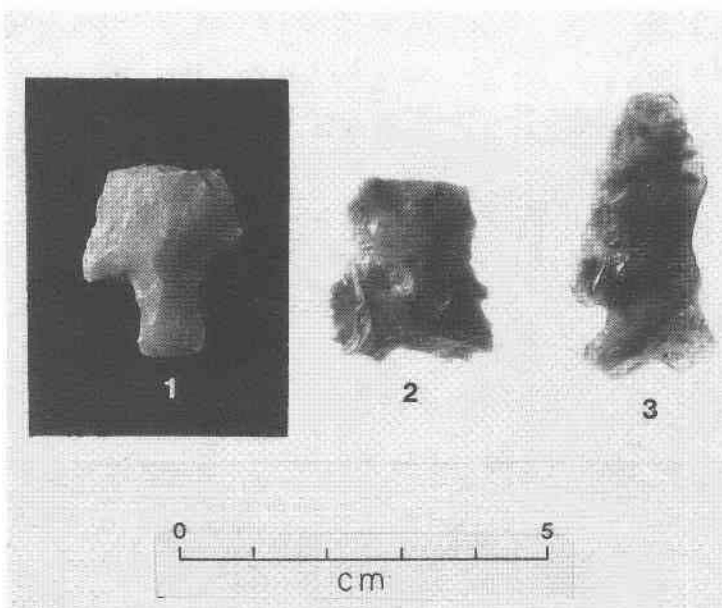


Plate 3.12. *Large stemmed points (No. 2 is upside down) and a large corner-notched point (3). Artifact proveniences listed under Table 3.1 (NPS 31431).*

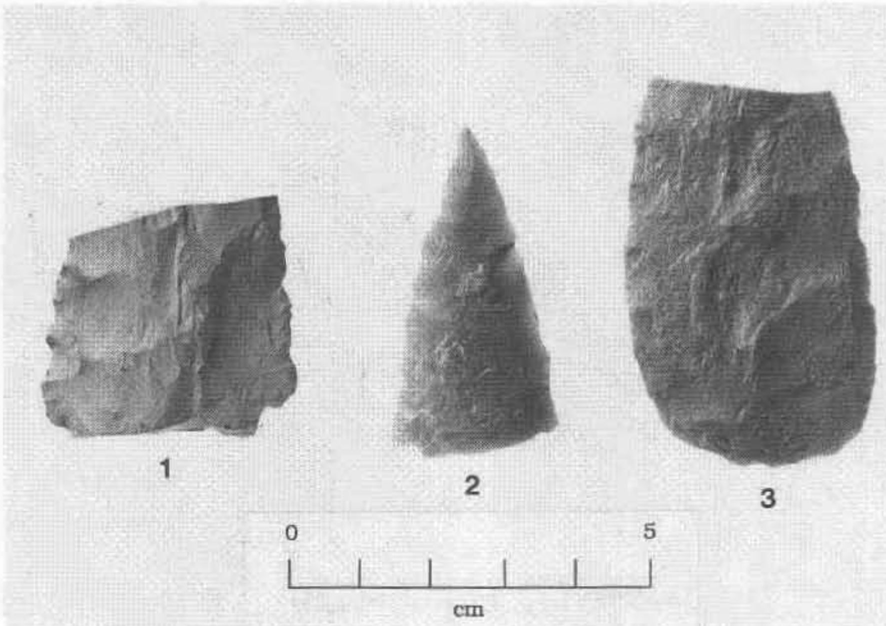


Plate 3.13. *Large hafted biface blade fragments (Nos. 1-2) and a large unhafted blade fragment (No. 3). Artifact proveniences listed under Table 3.1 (NPS 31420).*

Nos. 1-3). Two small,unnotched bifaces (Plate 3.5, Nos. 3-4) probably also represent incomplete arrow points or preforms.

Six larger points or point fragments represent a variety of forms (Table 3.2). Two large stemmed points (Plate 3.12, Nos. 1-2) and a single large corner-notched point (Plate 3.12, No. 3) may be late Archaic period forms. Two large point blade fragments (Plate 3.13, Nos. 1-2) and a large unhafted blade (Plate 3.13, No. 3) may also be Archaic points or blades.

Points and blades were made on a wide variety of materials: 18 were various obsidians and vitrophyres (35 percent) and most of the remaining points were made on local materials. Non-local materials are generally represented by only one or two points per material type; i.e., there is no clearly disproportionate representation of non-local materials other than obsidians.

References

Lekson, Stephen H.

1985 Points, Knives, and Drills of Chaco Canyon. Ms. prepared for the Chaco Artifact Volume. Ms. on file, National Park Service Chaco Collections, University of New Mexico, Albuquerque.

4

GROUND STONE, CHOPPING, AND PERCUSSION TOOLS FROM 29SJ 629

Thomas C. Windes

Introduction

As with most Pueblo II and III houses in Chaco Canyon, there were scores of ground stones recovered during excavations at the Spadefoot Toad Site (29SJ 629). The bulk of these comprise the familiar forms well-known to Southwestern archeologists: metates (115) and manos (177), and their fragments, the ubiquitous abraders (247), including 40 lapidary abraders, 4 lapidary files, 27 anvils, 33 polishing stones, and 5 paintstones. Small numbers of potlids (16), door covers (1-3), and hafted tools (3) were also recovered. Additionally, 221 artifacts of sandstone that did not fit the primary categories above were lumped under the category of "Other-Shaped Stones." The latter included a number of noteworthy items which occurred too infrequently to enable a detailed study of their range of morphology or potential use. Unfortunately, many of these rare items were found in great numbers at the greathouses but received no more than cursory notice (Judd 1954; Pepper 1920). Judd (1954:290) explained the lack of detailed study of these items "as the sore thumbs of an archeological collection. There is no taxonomic pocket into which they can be dropped conveniently." Finally, percussion tools--primarily the 324 hammerstones--are also examined here because of their functional association with some classes of ground stone and because individual project site reports are lacking. Hammerstones and ground stones have greater potential for understanding a larger range of activities at sites than previously recognized. The majority of these discussed here were associated with two primary activities at the site, food processing and turquoise jewelry manufacturing. These pursuits were probably primary activities at many, if not most, of the Fajada Gap Community sites (Volume I, Chapter 9) in the Pueblo II period.

McKenna (1984) has provided an excellent comparative base for the ground stones recovered at 29SJ 1360, which is nearby and contemporary with 29SJ 629, from both a descriptive and contextual basis. Artifacts from 29SJ 1360 and those in Marcia's Rincon (29SJ 626 East, 29SJ 627, and 29SJ 629) help form the range of variation and contextual understanding for ground stone and hammerstone use at small houses in Chaco Canyon during the A.D. 900s and early A.D. 1000s. The results are supported by the germane project analysts' reports by Akins (1980), Cameron (1985), and, in part, by Powers (1976) and Schelberg (1987). Other relevant reports include the Pueblo Alto analyses (Akins 1987; Windes 1987).

Although a Chaco Project artifact volume is planned, which, in part, will examine artifact change through time, it will not be sensitive at the intrasite level. This report affords an opportunity to bring together some observations and basic attribute data on ground stones among the small sites excavated in the Fajada Gap area by the Chaco Project, particularly at 29SJ 629. Care must be taken with any ground stone analysis, however, because of the widespread reuse and scavenging of tools that has occurred through time. The complex sequence of use and displacement of ground stones suggests that contexts and frequencies of all categories must be viewed critically (Schiffer 1972, 1976). Analytical overlap of some tool categories also affects the interpretive picture (see Introduction, this volume).

Other-Shaped Stones

Other-Shaped Stones (OSS) was a classifactory category for 1) rare objects, often showing little use, and 2) sandstone objects of artifactual uncertainty. In short, all sandstone artifacts not classified as manos, metates, abraders, hammerstones, or hammers found their way into the OSS category (Powers 1976). In classificatory parlance, OSS were the artifact equivalent of Other Pit features (e.g., Volume I, Chapter 7). Although the vast majority of the objects revealed some sort of abrasion, many also revealed edge-chipping, sometimes as the only modification. Many OSS were discarded after the initial examination if they showed only little wear, little use, were marginally shaped, or were small fragments. We are sure that many, particularly at Pueblo Alto, were ground or chipped sandstones used in construction rather than as tools. Because of poor contexts, many others seemed aberrant with little information to be gained from them.

Shaped and ground stones, however, were common in firepit construction. The high number of OSS pieces burned and smoke-blackened (54 of 109 "slabs") suggested that many of these thin miscellaneous artifacts derived from firepit construction and use. One slab, 45 by 44 by 3 cm, identified during analysis as a fireplace cover (because of the firepit outline burned on one side), actually was the base stone for Firepit 1 in Room 3. A number of small pieces identified as griddle fragments may also have been fireplace fragments, although a few were highly burnished and blackened like those griddles and pikistones described from historic pueblos.

Door sills, door jambs, and steps, among others, revealed considerable abrasion from use but once they became disassociated from their original context they became rare objects that were seldom analyzed systematically. The two upright slabs used as room steps at the site in Rooms 2 and 3 revealed heavy wear on the top edge, presumably from foot traffic, but these were left in place and could not be analyzed for this study. Of the 221 OSS artifacts examined, at least 80 were discarded and the remainder wait for additional analyses.

Covers

Stones used for covers were often found in sites and may include a variety of forms and workmanship (Table 4.1). The majority of possible covers identified at 29SJ 629 were classified as "slab covers" (n=30) and could not be assigned to a particular artifact class because of fragmentary condition. Bifacially-chipped edges and abraded faces were characteristics of this class of thin, oval- or rectangular-shaped artifacts. The larger sizes matched door openings recorded in other sites in Chaco Canyon (no doors were left intact at 29SJ 629), while smaller covers presumably were used for a variety of closures: ventilator openings, floor pits, storage jars, etc. At 29SJ 629, none were found in contexts that supported their inferred function.

Potlids

Although small, circular sandstone discs are commonly identified as potlids in Chaco Canyon, few have actually been found in a functional context. A rare exception, however, provided ample evidence of their use when 78 of the small chipped and ground discs were recovered where they had fallen off the tops of cylinder jars in Room 28 at Pueblo Bonito (Judd 1954:22; Pepper 1920:122, 125, Figure 42). Additionally, Judd (1954:127) found several instances at Pueblo Bonito where the stone covers slid off

Table 4.1. Metric data for some rare, shaped ground or hafted tools at 29SJ 629.

Tool Type	Provenience	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)	Field Specimen Number	Plate No.
Axe fragment	Room 9, surface	7.4	5.5	3.3	237	320	-
Hafted Hammer	Pithouse 3, fill	7.8	6.0	5.4	351	3327	4.4C
Maul	Kiva, Level 14	28.8	13.0	7.7	4,462	1509	-
File fragment	Plaza Grid 9, Level 4	1.6+	0.5+	0.5+	0.9+	1383	4.13B
File fragment	Pithouse 2, Layer 4	?	2.0	1.0	?	2831	4.13D
File	Pithouse 2, Layer 6 (floor fill)	9.0	2.0	1.0	37	2887	4.13C
File	Pithouse 2, Floor 1 (under Layer 6)	6.0	1.0	1.0	6	3021	4.13A
Lapidary Lapstone	Room 3, Level 3	23.0	16.0	2.0	2,000	727	4.12C
Lapidary Lapstone	Pithouse 2, Layer 6 (floor fill)	23.5	13.0	1.3	849[a]	2888, 2894	4.12A-4.12B
Lapidary Lapstone fragment[b]	Pithouse 2, Floor 1, West Wing Wall area	12.0+	15.7	1.1	469+	3217	-
Lapidary Lapstone	Pithouse 3, Firepit 1, liner?	21.0	12.0	3.0	1,393	3079	-
Lapidary Lapstone?	Plaza, Other Pit 14, Layer 6	19.0	12.0	4.0	1,642	2794-2	-
Lapidary Lapstone	Backdirt	23.5	17.2	1.0	741	3328	4.11C
Cover	Room 2, Layer 1	36.0	31.5	2.5	13,200	332	-
Door cover	Pithouse 3, Level 5	51.0	34.0	3.0	13,000	2196	-
Door cover/ Burial 1 slab	Trash Midden 76, Level 3	65.0	48.0	3.0	77,000	1323	4.2A
Cover	Trash Midden 88, Level 4	26.5	19.5	2.8	2,162	1160	4.2B
Cover	Room 9, Bin 1, floor	82.0	75.0	6.0	?	?	-

[a] Weight estimated (1/4 of piece missing).
[b] Burned.

pitchers placed as burial offerings. Judd (1954:127-128; 1959:139) found that most of his lids were less than 13 cm in diameter, but ranged between 6.5 and 20.5 cm in diameter--a size that readily matches jar orifices reconstructed in the 29SJ 629 assemblage (Toll and McKenna, this volume) and at 29SJ 1360 (McKenna and Toll 1984). Others of similar size came from Bc 51 (Woodbury 1939:62), a small-house site across from Pueblo Bonito.

Fourteen potlids were identified at 29SJ 629, but these were not analyzed as a specific artifact group. Generally, potlids were crudely and bifacially edge-chipped into circular shapes or ground into discs that were suitable for covering the mouths of ceramic jars. Two classes of potlids, based on diameter, seem possible (Powers 1976): those less than 6.5 cm in diameter, and those more than 8 cm. Those collected from 29SJ 627, 29SJ 629, and 29SJ 1360 (Table 4.2), however, suggest weak bimodality between about 12 cm in diameter, with means of 8.1 cm and 15.6 cm for the two groups. If the split is real, the size differences might reflect use for different classes of vessels--the smaller size (Plate 4.1) for whiteware pitchers and the larger ones for grayware jars (Toll and McKenna, this volume: Tables 1.8-1.14).

The smaller class is similar in size and shape to the 5-cm-diameter covers made to protect offerings in greathouse kiva log pilasters (Judd 1954:127-128; 1964:181), but pilasters are absent in the small sites like 29SJ 629. Three 29SJ 629 lids that had been ground were analyzed as abraders, although the grinding was probably related to manufacture or secondary use. Potlids sometimes were used as paint palettes (Judd 1954:127, 285), but none revealed this use at 29SJ 629. Two potlids came from "Room" 4, while three others came off the Kiva floor. The location of Room 4 behind the high wall of Room 3 would have provided an ideal shaded area for water jars but the covers in the Kiva are more ambiguous. Only one came from the Trash Midden. The vast majority from the other local, excavated small-house sites were recovered from the fill, except for several from floor contexts at 29SJ 1360 (Pithouse B), which also yielded several pitchers and ollas (McKenna 1984). A more widespread study of potlids might provide promising clues to the type and loci for some small-volume storage facilities at sites.

Door Covers

Large, bifacially chipped slabs were commonly found scattered across middens at vandalized sites in Chaco Canyon, where burials presumably were retrieved. Because burial slabs and door covers were of similar shape and size, it was assumed that many door slabs were reused as burial slabs. There is little information on the number of door coverlike fragments found at 29SJ 629, but whole ones were rare (3). One very large, slightly oval slab with ground and chipped edges probably fit a door opening based on its size (65 by 48 by 3 cm; Table 4.1, Plate 4.2a). Neither face was modified from its natural state. It was recovered from Trash Midden Grid 76, Level 3, just above Burial 1, where it had probably been deliberately placed over the burial pit at interment. Another very rectangular slab (52 by 34 by 2.5 cm; Table 4.1) revealed careful edge-shaping (one was nicely ground straight, one was natural, and two were chipped and ground). Both faces were abraded smooth. It came from the trash fill in Pithouse 3 and is similar to the one illustrated by Judd (1954:Plate 26B). A smaller specimen also came from the Trash Midden (Plate 4.2b), but its size suggests use as a ventilator or pit cover. In general, the small numbers and fragmentary condition of the majority of covers has precluded any in-depth functional and anthropological assessment.

Paintstones

Judd's excavations at Pueblo del Arroyo and Pueblo Bonito indicated that preparing paint pigments required little formal equipment. Almost any piece of stone or sherd sufficed (Judd 1954:285)--a finding paralleled by our work in the small sites (Plate 4.3a-b). Typically, paintstones were an expedient use of some discarded tool, often ground stone, and not actually a formalized tool. It was the residue from painting that marks a paintstone, although the original tool was probably used for entirely different purposes.

Although some manos and metates from Judd's work revealed pigment from paint preparation, these situations appeared absent from the small sites of 29SJ 626 East, 29SJ 627, and 29SJ 1360. We know that a few very finely made, polished, and stylized

Table 4.2. *Potlids at 29SJ 627, 29SJ 629, and 29SJ 1360.*[a]

Provenience	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)	Frag. Cond.	Field Specimen Number
<u>29SJ 627</u>						
Room 5, Level 1	5.5	4.0	2.7	60	X	2206
Room 5, Level 2	6.0	5.5+	1.1	81	X	420
Room 5, Level 3	14.5	8.5+	1.7	277	X	371
Room 5, Level 3	19.5	8.0+	1.2	188	X	389
Room 6, clearing	11.0	10.5	3.0	368	-	1886
Room 7, Floor 2, Pit 1	20.0	11.0+	0.6	312	X	4122
Room 7, Floor 2, Pit 3	6.0	6.0	0.5	34	X	5827
Room 8, Floor 2	15.0	14.5	1.5	701	-	5865.
Room 8, Floor 3, Pit 5	20.5	20.0	1.4	970	-	6319.
Room 9, subfloor 3, Level 6	16.5	13.5	2.0	663	-	5045.
Room 11, Level 2	16.5	15.5	2.0	983	-	605.
Room 23, Level 1	18.0	10.7+	3.5	950	X	6216.
Room 25, Level 1	14.5+	9.0+	2.5	391	X	6929.
Kiva C, Level 6	10.3+	9.4+	1.0	105	X	2044.
Kiva C, Balk 1, Layer F	11.0	9.0	0.5	141	-	5896.
Kiva C, Balk 3, Layer C	7.0	6.0	0.8	71	-	5470
Kiva C, north of wall, Level 4	7.0	7.0	2.0	112	-	1842.
Kiva D, Floor 1	13.5	7.0+	1.1	149	X	4975
Kiva E, Balk 1, Layer 3	6.5+	5.0+	0.6	340	X	5918.
Kiva E, Layer 3A	22.5	18.0+	3.1	1,661	X	4893.
Kiva E, Layer 3B	15.5	8.7+	0.6	175	X	4717.
Pithouse A, Test Trench 25, Level 1	12.0	5.5+	0.6	70	X	2401
Pithouse A, Level 1	15.5	7.0+	0.7	158	X	1600
Pithouse A, Level 6	10.0	9.5	1.0	162	-	2888.
Trash Midden, Test Trench 1, Level 1	9.5	6.0+	1.1	108	X	30
Trash Midden Grid KL1, Level 4	8.5	8.0	0.9	119	-	2322
Trash Midden Grid KL1, Level 4	8.0	4.3+	0.9	61	X	2322C.
Trash Midden GL2, Level 3	9.0	8.5	1.2	157	X	2306
Trash Midden KX, Layer 1	9.5	5.0+	0.7	56	X	3007
Plaza, clearing north of Kiva D & Pithouse A	8.0+	6.0+	1.2	70	X	7044.

Table 4.2. (continued)

Provenience	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)	Frag. Cond.	Estimated Size	No. of Ground Faces	Edge Manufacture	Other	Field Specimen Number
<u>29SJ 629</u>										
Room 1, Layer 1	?	?	?	?	-	-	?	?	-	147
Room 2, Layer 1	?	?	?	?	-	-	?	?	-	332
Room 4, Floor ?	6.4	6.0	?	?	-	-	2?	Ground	-	168
Room 4, Level 1	9.0+	5.0+	?	?	X	11 cm dia.	2?	Ground	-	680
Room 7 (corner), Top of NE wall	9.5	9.5	1.5	27.7	-	-	2?	Ground	-	838
Room 9, Level	?	?	?	?	-	-	?	?	-	497
Kiva, Floor 1	15.0+	14.0+	0.9	341.7+	X	20 x 18 cm	0	Chipped	Yel. paint	2031
Kiva, Floor 1 (F.A.23)	?	?	?	?	-	-	?	?	-	2028
Pithouse 2, Floor 1, west wing wall area	15.0	15.0	0.7	232.6	-	-	0	Chipped	-	3187
Pithouse 2, Layer 4	17.0	13.5	1.1	403.7+	X	Est. wt=450g	1[b]	Chipped	-	2838
Pithouse 3, Level 8	6.4	6.0	0.7	49.4	-	-	2[b]	Chipped	-	2339-2
Pithouse 3, Vent. 2 construction	15.4+	6.2+	1.2	197.4+	X	16 cm dia.	1[b]	Chipped	Burned	3242
Trash Midden 88, Level 3	11.5+	7.3+	0.8	102.3	X	13 cm dia.	0	Ground	-	1069
Trash Midden 88, Level 3	4.7+	4.0+	0.7	18.2	X	12-15 cm dia.	0	Chipped	-	1069
Means (<12.0 cm)	8.1	7.6	1.5	124.2	-	-	-	-	-	-
sd	1.6	1.9	1.7	124.2	-	-	-	-	-	-
CV %	20.3	25.2	113.5	100.0	-	-	-	-	-	-
Range	5.5-11.0	4.0-10.5	0.4-7.5	34-450	-	-	-	-	-	-
Sample Frequency	20	13	17	10	-	-	-	-	-	-
Means (>12.0 cm)	15.6	14.4	1.2	589.0	-	-	-	-	-	-
sd	2.2	1.1	0.7	293.5	-	-	-	-	-	-
CV %	14.0	8.0	57.0	49.8	-	-	-	-	-	-
Range	13.5-20.0	13.5-16.0	0.5-2.7	223-1,119	-	-	-	-	-	-
Sample Frequency	19	11	25	11	-	-	-	-	-	-

[a] The identity of which dimension(s) are fragmentary (+) is uncertain for the majority of the above specimens. Those with a decimal point following the Field Specimen Number have been verified.
[b] Also analyzed as abraders.

Table 4.2. *(continued)*

Provenience	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)	Frag. Cond.	Field Specimen Number
29SJ 1360						
House I, Area 1, fill	14.5	14.5	2.0	693	-	191
House II, Room 2, fill	9.0	9.0	7.5	450	-	316
Kiva A, fill	18.5	16.0	1.8	1,119	-	324
Pithouse B, Floor, northwest side	15.5	14.0	0.6	336	-	688
Pithouse B, Floor, north side	16.0	15.5	1.1	686	-	691
Pithouse B, Burial 5	16.0	14.0	0.8	474	-	683
Pithouse B, Level 2	13.0	6.0+	0.5	81	X	560
Pithouse B, fill	8.0	5.0+	0.5	46	X	486
Pithouse B, north bench top	14.0	12.0	0.5	223	-	660
Pithouse B, fill	9.5	7.5+	0.8	88	X	563
Trash Midden, Test Trench 1, Feature B	10.0	6.0+	0.4	55	X	249

[a] The identity of which dimension(s) are fragmentary (+) is uncertain for the majority of the above specimens. Those with a decimal point following the Field Specimen Number have been verified.

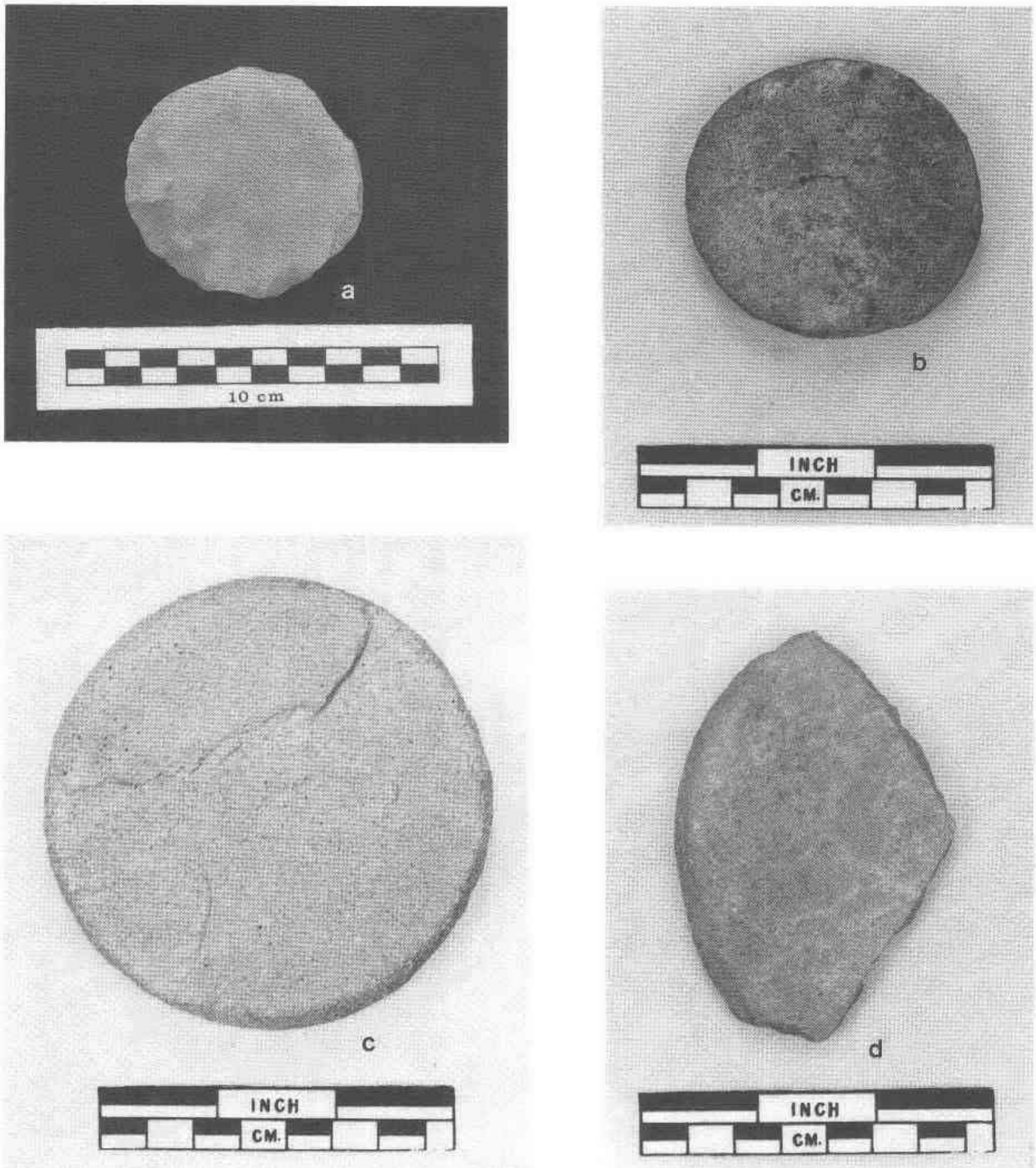


Plate 4.1. *Potlids from 29SJ 629. 7 or 10-cm scales. a) Pithouse 3, Level 8 (NPS 25695). b) Room 4, floor (NPS 24192A). c) Room 7, top of the NE corner wall (NPS 14190). d) Room 4, Level 1 (NPS 29188).*

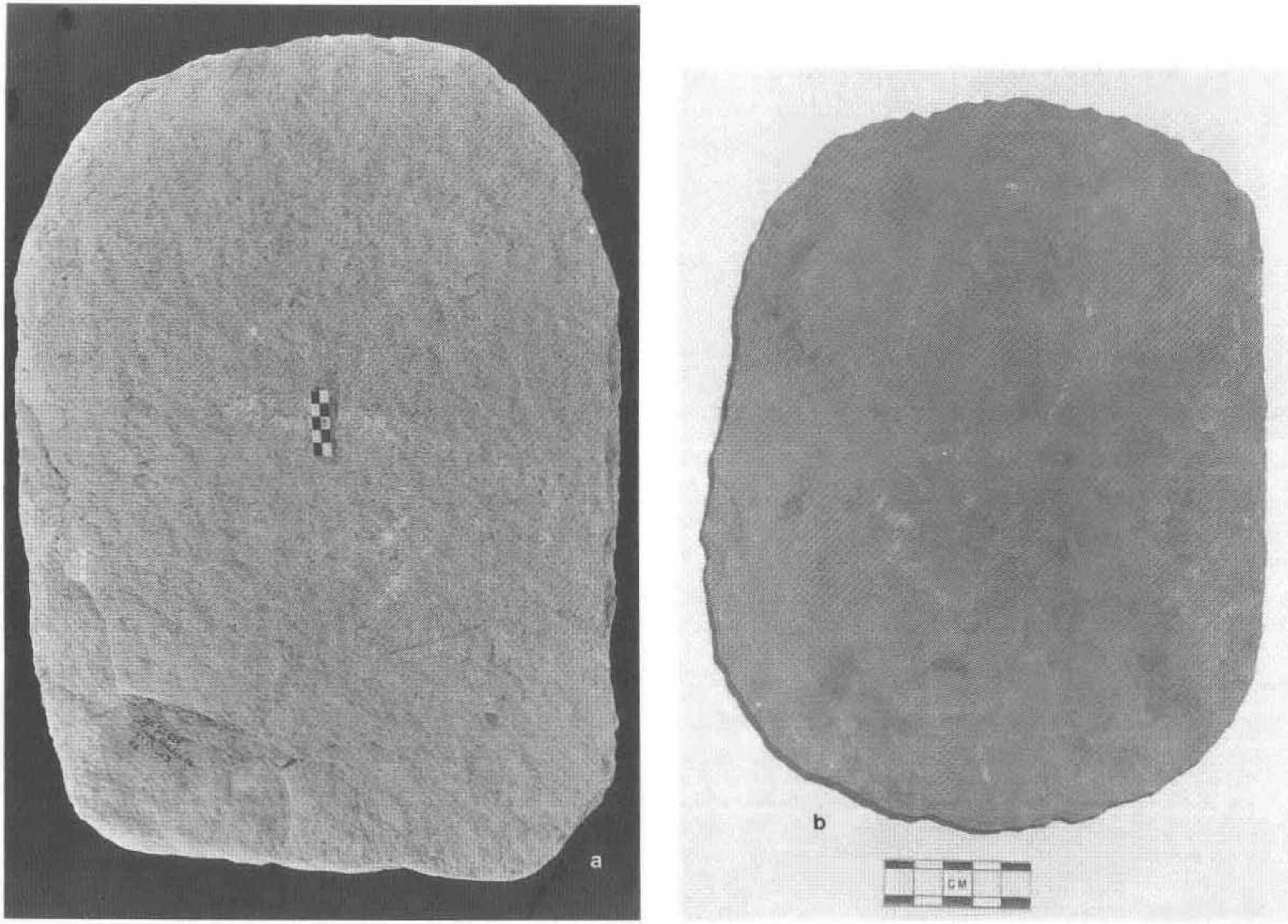


Plate 4.2. *Stone covers from 29SJ 629. 5-cm scales. a) Door/burial slab from Trash Midden Grid 76 (NPS 14063). b) Ventilator or cist cover from Trash Midden Grid 88 (NPS 15930).*

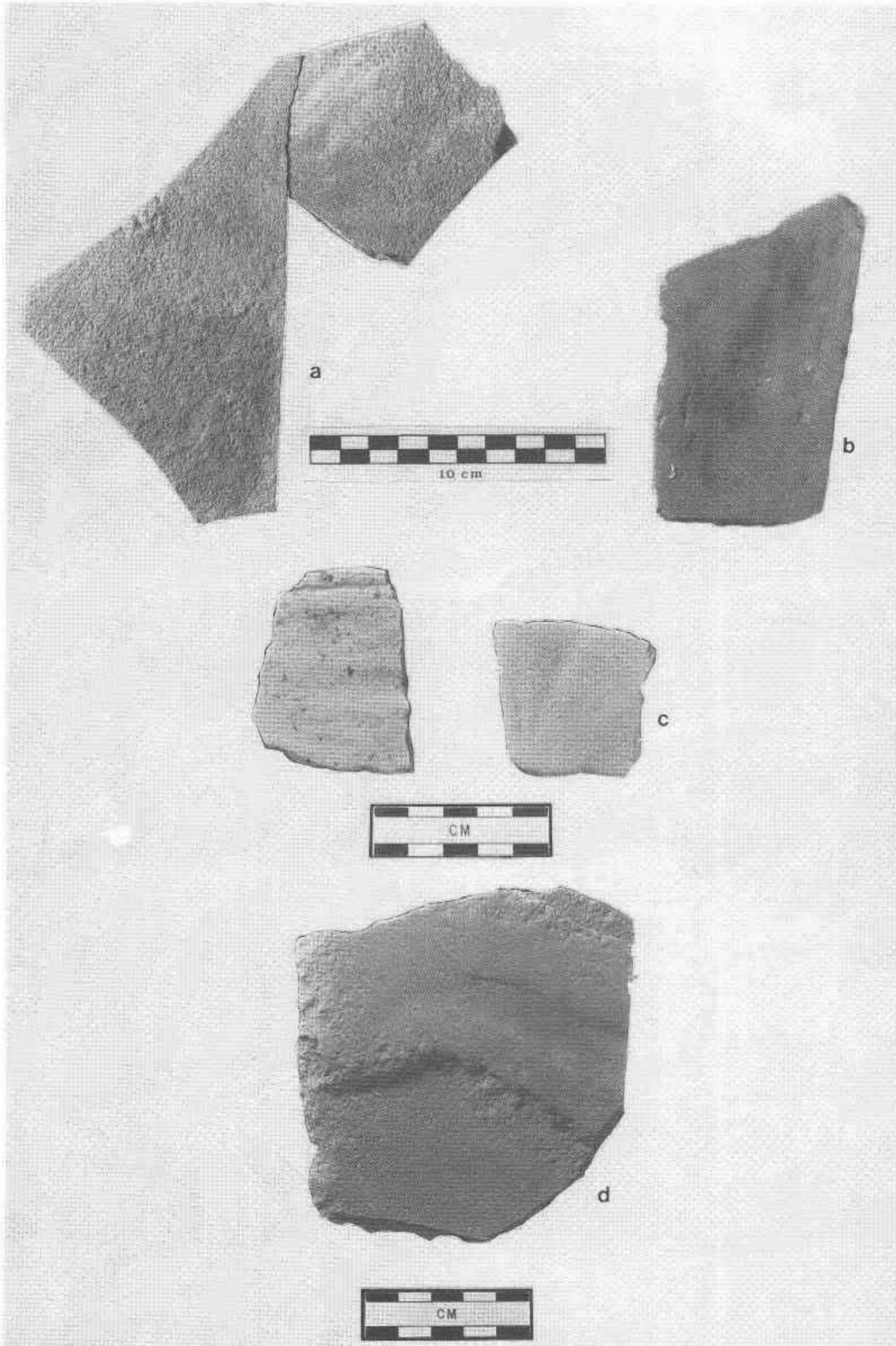


Plate 4.3. *Miscellaneous abraders from 29SJ 629. Paintstones in a) and b) from Pithouse 3, Layers 2 and 3; and the Kiva floor (Floor Artifact 13), respectively. 10-cm scale (NPS 25683B). c) Lapidary abrader from Pithouse 3, Layer 9. 5-cm scale (NPS 141335B). d) Lapidary abrader from Plaza Other Pit 15 fill. 5-cm scale (NPS 14186).*

mortars, manos, and metates, showing abundant pigment, suggested that, in some instances, the preparation of paint may have been highly formalized for special occasions (Judd 1954:Plate 26A; 1959:Plate 41:i-k; Pepper 1920:Figure 18). Judd recovered three manos from Pueblo del Arroyo, which yielded pigments of red, green, and blue, while others from Pueblo Bonito had red paint (e.g., Pepper 1920:61).

Soft paint compounds with hues of brown, buff, yellow, and red occurred in 1-m-thick deposits 3.2 km southwest of 29SJ 629 at Hill 6664' (on the U.S.G.S. map). Natural pigments of yellow and red iron ores were also common throughout Chaco Canyon in the form of concretions, but the vast majority revealed no modification from grinding. The exception was 29SJ 626 East, which yielded numerous small hematite and limonite nodules that were faceted from grinding. The wear on many was subtle, so that similar ones could have been easily missed in the other excavations, particularly when encrusted with dirt.

Paint was found on a diversity of stones at 29SJ 629. Only a single mano from 29SJ 629 yielded traces of red paint, although five stones were identified as palettes (Akins 1980:125-138). No specific loci for paint preparation at 29SJ 629, however, was identified. Although concretions were common locally, their use for paint cups or mortars was not common at the A.D. 900s-1000s small sites. Pueblo Alto, on the other hand, yielded several concretions as did the Basketmaker III and Pueblo I sites we excavated. The late Basketmaker III-Pueblo I site (29SJ 628) between 29SJ 627 and 29SJ 629 yielded numerous paint-covered objects, but the widespread use of paint seemed to have diminished later. We know that vessel exteriors covered with fugitive red paint was popular during the Basketmaker period (Errickson 1988), which might have accounted for the numerous artifacts covered with paint, but the red paint usage sharply decreased by the A.D. 700s or A.D. 800s.

With increased evidence of ceremonialism at Chaco Canyon in the A.D. 900s and 1000s, we might have expected more formal paintstones at sites. This did not seem true at the small-house sites, although the presence of iron and copper ores suitable for paint was common. The primary use of paints may have been for ritual, when it was utilized for "drawing symbolic designs both on participants and on their paraphernalia" (Judd 1954:115). Blue and green pigments, derived from azurite and malachite, were used on baskets, gourd vessels, and wood at Pueblo Bonito (Judd 1954:285), and were the dominant colors used on the Chetro Ketl painted wood (Vivian et al. 1978). Both azurite and malachite were recovered from 29SJ 629 (Mathien, this volume) and in the other excavated small-houses nearby but in low quantities that did not suggest the preparation of painted ritual objects at the site. In contrast, these pigments were common at Pueblo Alto (Mathien 1987:418) and Pueblo Bonito (Judd 1954), which suggested greater emphasis upon ritual at the greathouses. Red and yellow pigments were far more prevalent at all sites, and it was these colors, during Judd's (1954:115, 284) day, that were coveted for everyday use by the Navajo and Zuni for facial designs and sun protection.

Hafted Tools

Hafted hammers and other tools are relatively rare in Chacoan collections. Unlike sites in the northern San Juan region, axes are particularly rare in Chaco Canyon, probably because local timber resources were always sparse and wood cutting was done at some distance (Breternitz 1976; Windes 1987). Although hafted picks, choppers, mauls, and hammers have been recovered, they typically were made from unshaped stone, showing little investment in the initial form or they were converted from worn-out axes. Often, these tools were made from sandstone that indicated a short, expedient use. Well-shaped hammers and mauls, common in northern Pueblo III and Pueblo IV sites, were unusual. Nevertheless, a single, full-grooved hammer was recovered from 29SJ 629 from the Pithouse 3 fill (Table 4.1; Plate 4.4c). Because it was made of relatively soft sandstone, its use must have been for pounding soft objects; otherwise, it would have been easily broken. Both ends revealed battering. A similar one came from 29SJ 627, but they were rare; most hafted hammers were worn-out axes (Breternitz 1976). At 29SJ 629, a large, soft sandstone maul had a notch pecked into each edge of its triangular-shaped form. It came from the rockfall in the kiva fill and measured 28.8 by 13.0 by 7.7 cm, and weighed 4.5 kg.

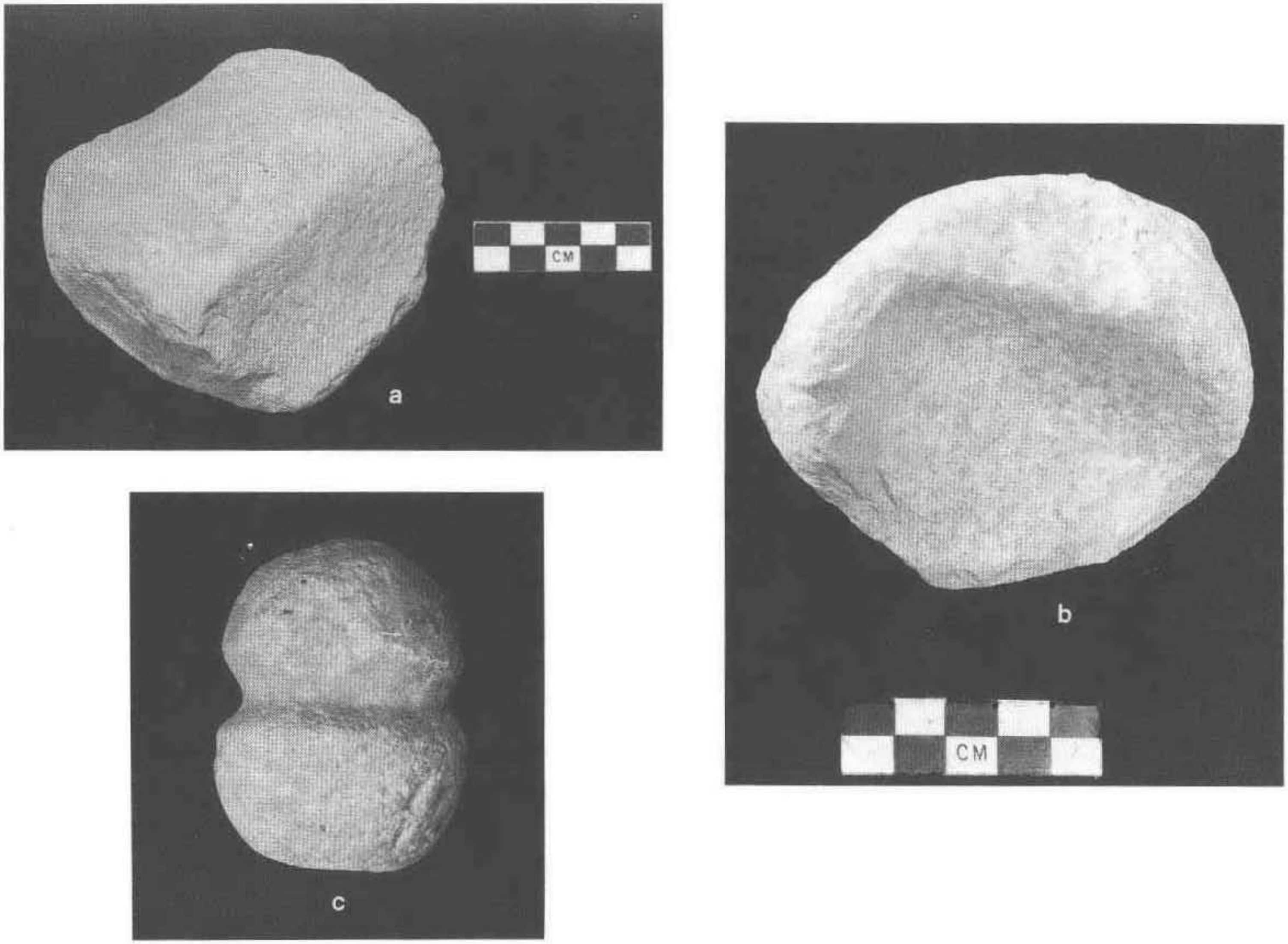


Plate 4.4. *Percussion tools of sandstone. a and b) Metate fragments from the plaza reused as hammerstones (NPS 16028, 16021). c) A rare hafted maul recovered from the fill of Pithouse 3 (NPS 31650A).*

Part of an axe, with the bit missing and made from a greenstone river cobble, was recovered from the surface refuse of Room 9 (Table 4.1). Two other greenstone axes were recovered from nearby 29SJ 628, temporally earlier (A.D. 700s) than 29SJ 629, while 29SJ 627 yielded four axes and nine mauls of non-greenstone materials. 29SJ 625 and 29SJ 626 East yielded no hafted tools and 29SJ 1360 had only two axes and a maul (McKenna 1984:251-254). The quantities recovered from 29SJ 627 set it apart from the other contemporary excavated sites and suggest that wood and stone processing was more common there, probably due in part to its lengthy occupation.

Abraders

Aside from the ground stone abraders comprising the toolkits for food processing (e.g., manos and metates), numerous other abraded stones of a bewildering number of sizes and shapes were found on the small sites and greathouses after A.D. 900. For the most part, these seemed to reflect a number of functionally unrelated activities (Akins 1980, 1987). In contrast to manos and metates, the vast host of these stones, or abraders, were not formalized tools, therefore, suggesting use for a multitude of non-specialized activities. Because some were found in association with mealing loci and tools, however, they were probably used in metates for non-food reduction. The common reuse of other tools for abraders suggested that use was often incidental and expedient (Plate 4.5). Nevertheless, at 29SJ 629, and perhaps many other contemporary sites, a large percentage of abraders were associated with a single specialized activity: turquoise jewelry manufacture. Separating those stones with use abrasion from those ground during manufacture (see Other-Shaped Stones), from secondary use, or worn from non-tool use (e.g., door sills and landings) was difficult and contributed to blurring the definition of subclasses.

29SJ 629 differs from all other excavated Pueblo II small-house sites in the numbers of recovered passive lapidary abraders (Akins 1980:110), with 70 percent of the entire Chaco Project collection recovered from this site (Table 4.3). The term, "passive," however, may be misleading, as it refers to stationary tools that are worked upon (e.g., Judd 1954:121)--usually visioned as large stones whose weight and size are such that it precludes easy use in the hand. The classic examples of passive versus active abraders are metates (passive) and manos (active). We know that at 29SJ 629 the two terms are difficult to apply consistently because fragments of the same lapidary stones were sometimes given both passive and active designations during analysis. This problem arose because the passive 29SJ 629 examples were typically small (under 200 grams compared to 1200 grams for the average 29SJ 629 mano, for example) and clearly hand-held but used to shape small jewelry objects (beads and pendants). Technically, they might be considered stationary (hand-held) tools with the object rubbed on them as opposed to rubbing the tools across the object. Given the apparent multi-purpose use of abraders, it is likely that the same tool could have been used at different times in both roles, thus creating analytical difficulties when culling the tools by assumed active and passive roles. For this discussion, passive and active abraders have been treated as a single group split into finer categories based on context, morphology, and wear.

The majority of the abraders analyzed concentrated in just a few places at 29SJ 629 (Table 4.3): Pithouse 2, Pithouse 3, and the plaza. Most of the 27 recovered from Pithouse 2 (11 percent of the total) came from floor and near-floor deposits, including five from the floor deposit (Layer 6) containing turquoise debris. Pithouse 3 yielded quantities of ground stones, including 48 abraders (19 percent). The greatest numbers came from the plaza and its pits, which comprised 40 percent of the site total. Plaza Other Pits 1 and 14 yielded two very different tool assemblages, with OP 14 yielding the bulk of the tools associated with corn reduction at the site. By association, many of the OP 14 abraders may also have been related to food processing. OP 1, on the other hand, was filled with turquoise debris and almost no tools from food processing. Akins (1980) classified 34 of the 38 abraders from OP 1 as passive lapidary abraders, although they exhibited a number of morphologically different specimens. A mere 16 abraders (7 percent of the site total) were recovered from the Trash Midden.

Lapidary Abraders

For this analysis, all the abraders were reexamined if they exhibited wear characteristics similar to those recovered in context with turquoise jewelry manufacturing debris, both at the site and at

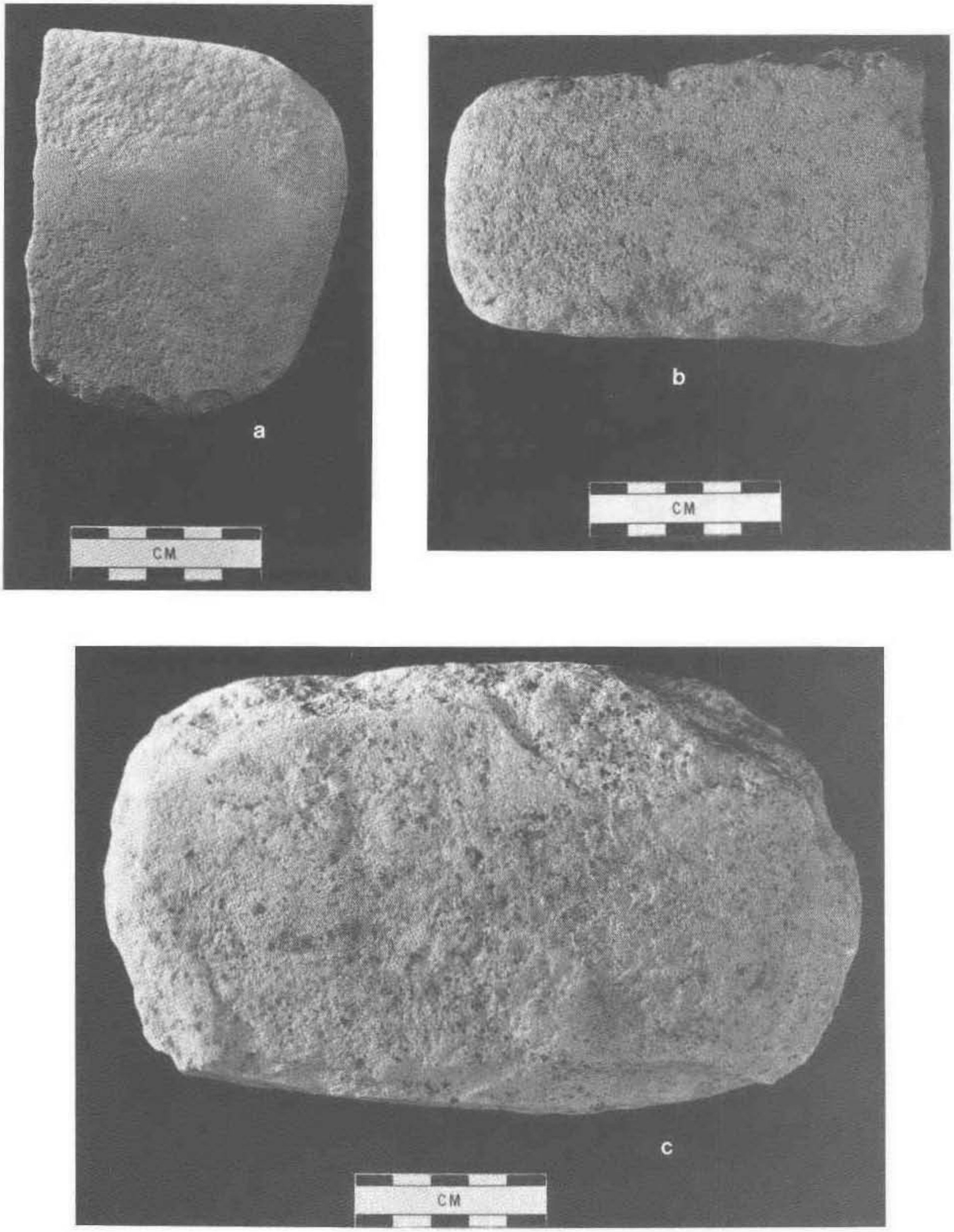


Plate 4.5. *Ground stone recovered from Plaza Other Pit 14. a and b) manos analyzed as active abraders (NPS 14192A, 14194A). c) A possible mano blank reused as an anvil (NPS 14193A). None were analyzed as manos.*

Table 4.3. Distribution of manos, metates, and abraders (analyzed specimens) at 29SJ 629.

	Manos[a]				Abraders[b]					
	Whole Manos X-Section Types	Mano Fragments X-Section Types	Metates		Active	Passive	Grooved	Polishers	Anvils	
Provenience	1 2 3 4 5/6 7	1 2 3 4 6 7 ?	Whole	Fragment	1 2 3 4	1 2 3 4	X	1 2 3	1	2
Room 1 fill	1 - - - - 1	- - - - 1 - 1	-	3	- - - -	- - 1 -	-	- - -	-	-
Room 1 const.	- - - - - -	- - - - - - -	-	4	- - - -	- - - -	-	- - -	-	-
Room 2 fill	2 - 1 - - -	2 - 1 - - 1 1	-	4	2 - - -	- 1 - 1	-	3 - 1	2	-
Room 3 fill	- - - - - -	1 - 1 - - - 1	-	9	1 - - -	- - - -	1	1 - -	-	-
Room 3 floor	1 1 1 1 - 1	- - 1 - - - -	-	-	- - - -	- - 2 -	-	- - -	-	-
OP1 const.	- - 2 - - 2	- - - - - - -	-	-	- - - -	- - - -	-	- - -	-	-
Room 5 fill	- - - - - 1	- - - - - - 1	-	1	- - - -	- - 2 -	-	- - -	-	-
Room 5 floor	- - - - - -	- - - - - - -	-	-	- - - -	- - 1 -	-	- - -	-	-
PH2 bottom	- - - - - -	- - - - - - -	-	-	- - - -	- - 1 -	-	- - -	-	-
Room 6 fill	- - - - - 2	1 - - - - - 1	-	4	- - - -	- - 2 -	-	- - -	-	-
Room 6 floor	- - - - - -	- - - - - - -	-	1	- - - -	- - 3 -	-	- - -	-	-
Room 6 const.	- - - - - -	- - - - - - -	-	2	- - - -	- - - -	-	- - -	-	-
Room 7 fill	2 - - - - -	- - - - - - -	1	1	- - - -	- - - -	-	- - -	1	-
Room 7 const.	- - - - - -	- - - - - - -	-	-	- - - -	- - - -	-	- - 1	-	-
Room 8 fill	- - - - - -	- - - - - - 1	-	1	1 - - -	- - - -	-	- - -	-	-
Room 8 const.	- - - - - -	- - - - - - -	-	1	- - - -	- - - -	-	- - -	-	-
Room 9 fill	3 1 1 4 - 3	1 - 2 - - - -	2	4	- - 1 -	1 - - -	-	1 - -	-	-
Room 9 floor	- - - - - -	- - - - - - -	1	-	- - - -	1 - - -	-	- - -	1	-
Room 9 const.	2 - - - - -	1 - - 1 - - -	-	2	- - 1 -	- - - -	-	- - -	2	-
Gen. rooms area	- - - - - -	- - - - - - -	-	2	- - - -	- - - -	-	- - -	-	-
Plaza										
Grid 5 fill	1 - - - - -	- - - - - - -	-	-	- - - -	- - - -	-	- - -	-	-
Grid 8 fill	- - - - - -	1 1 1 - - 1 -	-	-	- - 1 -	1 - 1 -	-	- - -	1	-
Grid 9 fill	1 1 - - - 2	- - - - - - -	-	2	- - - -	1 - - -	-	- - -	-	-
Grid 13 fill	- - - - - -	- - - 1 - - -	-	-	- - - -	- - - -	-	- - -	-	-
Grid 14 fill	1 1 2 1 - 1	- - - - - - 1	1	-	2 - - -	- 1 - -	-	- - -	-	-
Grid 15 fill	- - - - - -	- - - - - - -	-	-	- - 1 -	- - 4 -	-	1 - -	-	-
Grid 16 fill	- - 1 - - -	- - - - - - -	-	-	- - 1 -	1 - 3 -	-	- - -	1	-
Grid 22 fill	- - 1 - - -	- - - - - - 1	-	-	- - - -	- - - -	-	- - -	-	1
Grid 23 fill	- - - - - -	- - - - - - -	-	-	- - - -	- - - -	-	- 1 -	-	-
Grid 35 fill	- - 1 - - -	- - - - - - -	-	-	- - - -	- - - -	-	- - -	-	-
Grid 35 floor	- - - - 1 -	- - - - - - 1	-	1	1 - - -	1 - - -	-	- 1 -	1	-
Above Kiva/Pithouse 2	- - - - - -	- - 1 - - 1 -	-	7	- - 1 -	1 - - -	-	- - -	-	-

Table 4.3. *(continued)*

	Manos[a]		Metates		Abraders[b]				Anvils	
	Whole Manos X-Section Types	Mano Fragments X-Section Types			Active	Passive	Grooved	Polishers		
Provenience	1 2 3 4 5/6 7	1 2 3 4 6 7 ?	Whole	Fragment	1 2 3 4	1 2 3 4	X	1 2 3	1	2
Misc. grids	- - - - - -	- - - - - - 2	-	2	- - - -	- - - -	-	- - -	-	1
Plaza Features										
FP 2 const.	- - 1 2 - 2	- - - - - - -	-	1	- - - -	- 1 - -	-	- - -	-	-
FP 5 const.	- - - - - -	- - - - - - -	1[c]	-	- - - -	- - - -	-	- - -	-	-
OP1 fill	- - 1 - - -	- - - - - - -	-	1	- - - 1	2 - 34 -	-	- - -	1	-
OP4 const.	- 2 - - - -	- - - - - - -	-	-	- - - -	- - - -	-	- - -	-	-
OP6 fill	- - - - - 1	- - - - - - -	-	-	1 - - -	- - - -	-	- - -	-	-
OP7 fill	- - - - - -	- - - - - - 1	-	1	- - - -	- - - -	-	- - -	-	-
OP9 fill	- - - - - -	- - - - - - -	-	1	- - - -	- - - -	-	- - -	-	-
OP11 const.	- 1 - - - -	- - - - - - -	-	-	- - - -	- - - -	-	- - -	-	-
OP14 fill	9 1 4 - - 5	- - 1 - 1 - 1	1	3	8 - - 2	1 1 1 -	-	3 1 -	3	1
OP14 floor	2 - - - - 3	- - - - - - -	-	-	2 - - -	1 - - -	-	- - -	-	-
OP15 fill	- - - - - -	- - - - - - -	-	1	- - - 1	2 - 4 -	-	- - -	1	-
PH fill	- - 1 - - -	- - - - - - 1	-	-	- - - -	- - - -	-	- - -	-	-
PH const.	- - 1 - - 2	- - - - - - -	-	-	- - - -	1 - - -	-	- - -	-	-
Wall 1 & 2 const.	- - - 1 - 2	- - - - - - -	-	-	1 - - -	- - - -	-	- - -	-	-
Bin 1 floor	- - - - - 1	- - - - - - -	-	-	- - - -	- - - -	-	- - -	-	-
Kiva fill	- - 2 - - 1	- - - - - - -	-	10	1 1 - -	1 - 2 -	-	1 - -	2	-
Kiva vent const.	- - - - - -	- - 1 1 - - -	-	2	- - - -	1 1 - -	-	- - -	-	-
Kiva floor	- - - - - -	- - - - - - -	-	-	- - 1 -	- 1 2 -	-	1 - -	-	-
Kiva FP fill	- - - - - -	- - - - - - -	-	-	- - 1 -	- - - -	-	- - -	-	-
Pithouse 2										
General fill	- - - - - -	- - - - - - -	-	2	- - - -	- - - -	-	- - -	-	-
Layer 1	- - - - - -	- - 1 - - - -	-	4	- - - -	2 - - -	-	- - -	-	-
Layer 2	- - - - - -	- - - - - - -	-	-	- - - -	- - - -	-	- - -	-	-
Layer 4	- - - 1 1 -	- - - - - - 2	2[c]	2	- 1 - -	1 1 2 -	-	- - -	-	-
Layer 5	- - - - - -	- - - - - - -	-	1	- - - -	- - - -	-	- - -	-	-
Layer 6	1 - - - - -	- - - - - - -	-	-	- 1 - -	1 - 2 1	-	1 - -	-	-
Floor 1	- - - - - 1	- - - 1 - - -	-	-	- 1 - -	- - 1 -	-	- - 1	1	-
MB fill	- - - - - -	- - - - - - -	-	-	2 - - -	- - - -	-	- - -	2	-

Table 4.3. *(continued)*

	Manos[a]													Metates		Abraders[b]														
	Whole Manos X-Section Types						Mano Fragments X-Section Types									Active				Passive				Grooved	Polishers			Anvils	
Provenience	1	2	3	4	5/6	7	1	2	3	4	6	7	?	Whole	Fragment	1	2	3	4	1	2	3	4	X	1	2	3	1	2
MB const.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent fill	-	-	1	3	-	-	1	-	-	-	-	1	-	-	9	1	-	-	-	1	1	2	-	-	-	-	-	1	-
Pithouse 3																													
Levels 3-6	-	1	2	1	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	1	-	-	-	-	2	-	-	2	-
Levels 7-9	3	-	-	-	-	1	-	-	2	1	-	-	1	1	1	2	-	-	-	-	-	4	-	-	1	1	-	2	-
Layer 1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	1	-	-	-	-	-	-	-
Layer 2	-	-	-	-	-	-	-	-	1	-	-	3	-	-	4	3	-	-	-	1	-	5	-	-	1	-	-	-	-
Layer 2/3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	2	-	-	-	-	-	-
Layer 3	-	-	-	-	-	3	1	-	-	-	-	1	1	-	-	3	-	-	-	2	-	1	-	-	3	-	-	-	-
Floor 1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1	-	1	-	-	-	-	-	-	-
FP1 const.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Vent fill	-	-	-	-	-	-	-	-	-	-	-	-	1	-	3	-	-	-	-	-	-	-	1	-	1	-	-	-	-
Vent const.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Trash Midden																													
Grid 64 fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Grid 65 fill	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	4	-	-	-	-
Grid 70 fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Grid 71 fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-
Grid 76 fill	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	1
Grid 82 fill	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Grid 88 fill	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	2	-	-	-	1	-	-	-	-	-	-	-	-	-
Totals	20	9	23	14	2	36	10	1	15	5	2	9	22	10	105	39	5	8	5	30	8	83	5	3	26	4	3	24	4

[a] Types: 1 = rectangular; 2 = trapezoid; 3 = wedge; 4 = triangular; 5 = other; 6 = bi-triangular (square); 7 = tabular (discoid). After Cameron (1985).

[b] Abrader codes:
Active: 1 = undifferentiated; 2 = lapidary; 3 = anvil/abrader; 4 = other
Passive: 1 = undifferentiated; 2 = anvil/abrader; 3 = lapidary; 4 = palette
Polishers: 1 = undifferentiated; 2 = pot polishers; 3 = floor polishers
Anvils: 1 = undifferentiated; 2 = anvil/abrader

[c] Slab metate present.

29SJ 1360 (McKenna 1984:271). This left forty possible lapidary abraders, compared to the 88 originally analyzed (Table 4.4). The overriding attribute that marked these tools from many others was the selection for very thin and hard, well-indurated, gray sandstone. Mean thickness for these tools was a mere 8 mm (sd=3) and none exceeded 16 mm (one example). The seven passive lapidary ones from 29SJ 1360 averaged 12 mm in thickness (McKenna 1984:Table 4.21).

Table 4.4. Metric data for lapidary abraders at 29SJ 629.

All Abraders[a]	No.	Mean	sd	CV %	Range
Length (cm)	20	9.0	2.7	30.3	5.2- 14.4
Width (cm)	20	6.1	1.3	21.2	4.2- 8.7
Thickness (cm)	40	0.8	0.3	36.1	0.4- 1.6
Surface area (cm^2)	20	42.3	20.5	48.5	13.0- 88.0
Grinding area A (cm^2)	19	37.2	20.8	56.1	13.0- 88.0
Grinding area B (cm^2)	9	25.1	13.1	52.1	12.0- 50.0
Weight (g)	20	91.7	61.4	66.9	22.5-246.6
Whole OP 1 Abraders					
Length (cm)	13	8.5	2.9	33.8	5.2- 14.4
Width (cm)	13	5.8	1.3	21.9	4.2- 8.2
Thickness (cm)	20	0.7	0.3	49.3	0.4- 1.6
Surface area (cm^2)	13	39.5	17.9	45.3	13.0- 70.0
Grinding Area A (cm^2)	12	34.3	18.4	53.6	13.0- 70.0
Grinding Area B (cm^2)	6	22.5	14.3	63.7	12.0- 50.0
Weight (g)	13	87.5	69.4	79.4	22.5-246.6
Lapidary Lapstones					
Length (cm)	5	22.0	2.0	8.9	19.0- 23.5
Width (cm)	6	14.3	2.3	15.8	12.0- 17.2
Thickness (cm)	6	2.1	1.2	58.4	1.0- 4.0
Weight (g)	5	1,325.0	531.1	40.1	741.0-2,000.0

[a] Excludes the 6 lapstones, which are much larger than the others and shaped.

Nevertheless, because 45 percent of the tools appeared fragmentary, they suffered from identity confusion with other thin, fragmentary abraded stones, such as firepit slabs, palettes, various kinds of stone covers, and the worn trough areas of metates. Despite the number of fragments, the majority of these could not be matched to others from the same artifact. Many of the 29SJ 629 specimens were fragments, but the slightly abraded broken edges or sides indicated use of the majority after breakage. Given the nature of the wear and physical characteristics of the artifacts, selection of thin stones for lapidary use appeared to have been from local materials. Few of the lapidary abraders seemed to be reuse of some prior tool; instead, they were made from a flat, thin, unmodified piece of sandstone crudely broken without subsequent shaping or edge modification (Plates 4.3c-d, 4.6-4.11).

A histogram of the weights of whole lapidary abraders (22) suggests that three or four subtypes might have formed the lapidary kits for processing turquoise jewelry. Six thin, flat, well-shaped items comprised the heaviest group (Table 4.1). Their size suggested tools suitable for lap use to smooth the

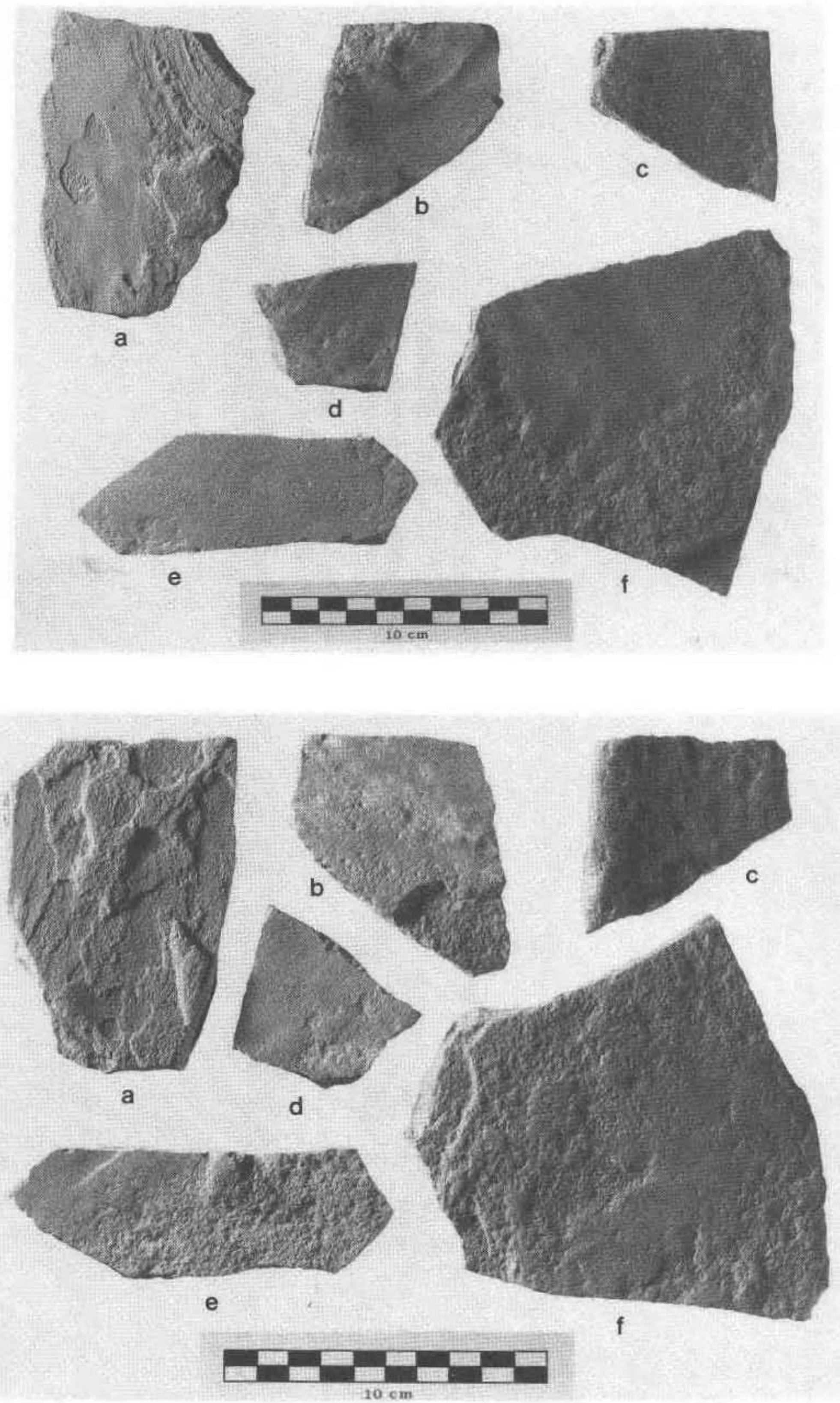


Plate 4.6. *Small lapidary abraders used for working turquoise ornaments (both sides illustrated; NPS 25691A, 25690C). a and c) From Room 6, Floor 1. b and d) From Room 5, Level 3. e) From Room 5, Posthole 2. f) From Room 5, top of the bench. 10-cm scales.*

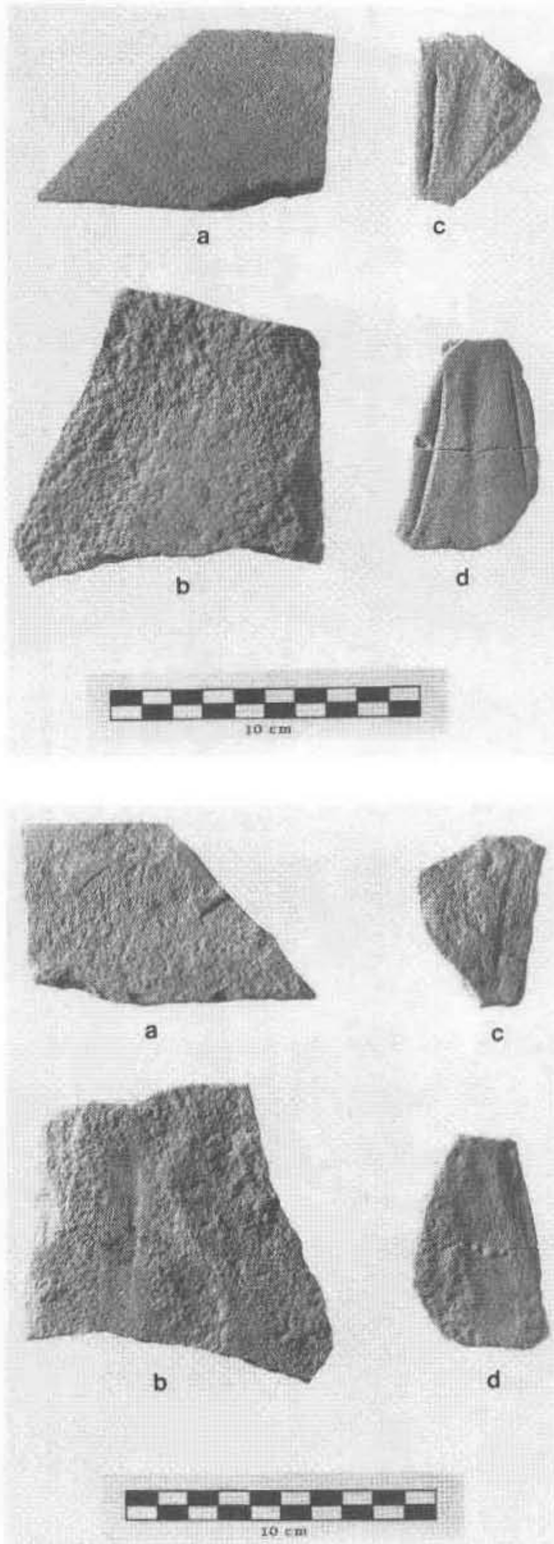


Plate 4.7. *Small lapidary abraders used for working turquoise ornaments (both sides illustrated: NPS 25693A, 25694B). a) From the Kiva, Floor 1 (Volume I, Table 5.3, FS 2034). b) From Pithouse 3, Level 7. c and d) From the posthole fill in Plaza Other Pit 1. 10-cm scale.*

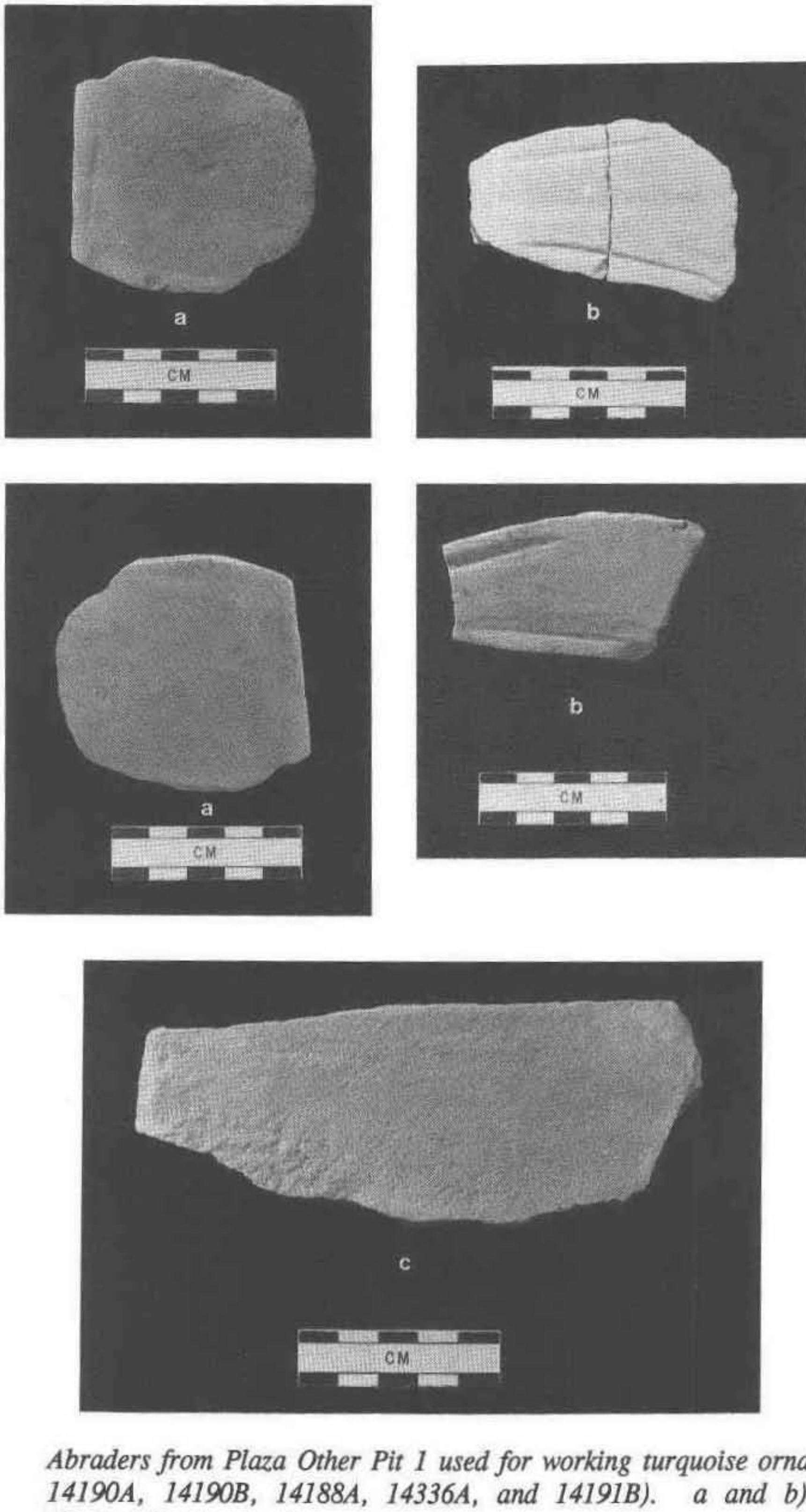


Plate 4.8. *Abraders from Plaza Other Pit 1 used for working turquoise ornaments (NPS 14190A, 14190B, 14188A, 14336A, and 14191B). a and b) Two sides illustrated. 5-cm scales.*

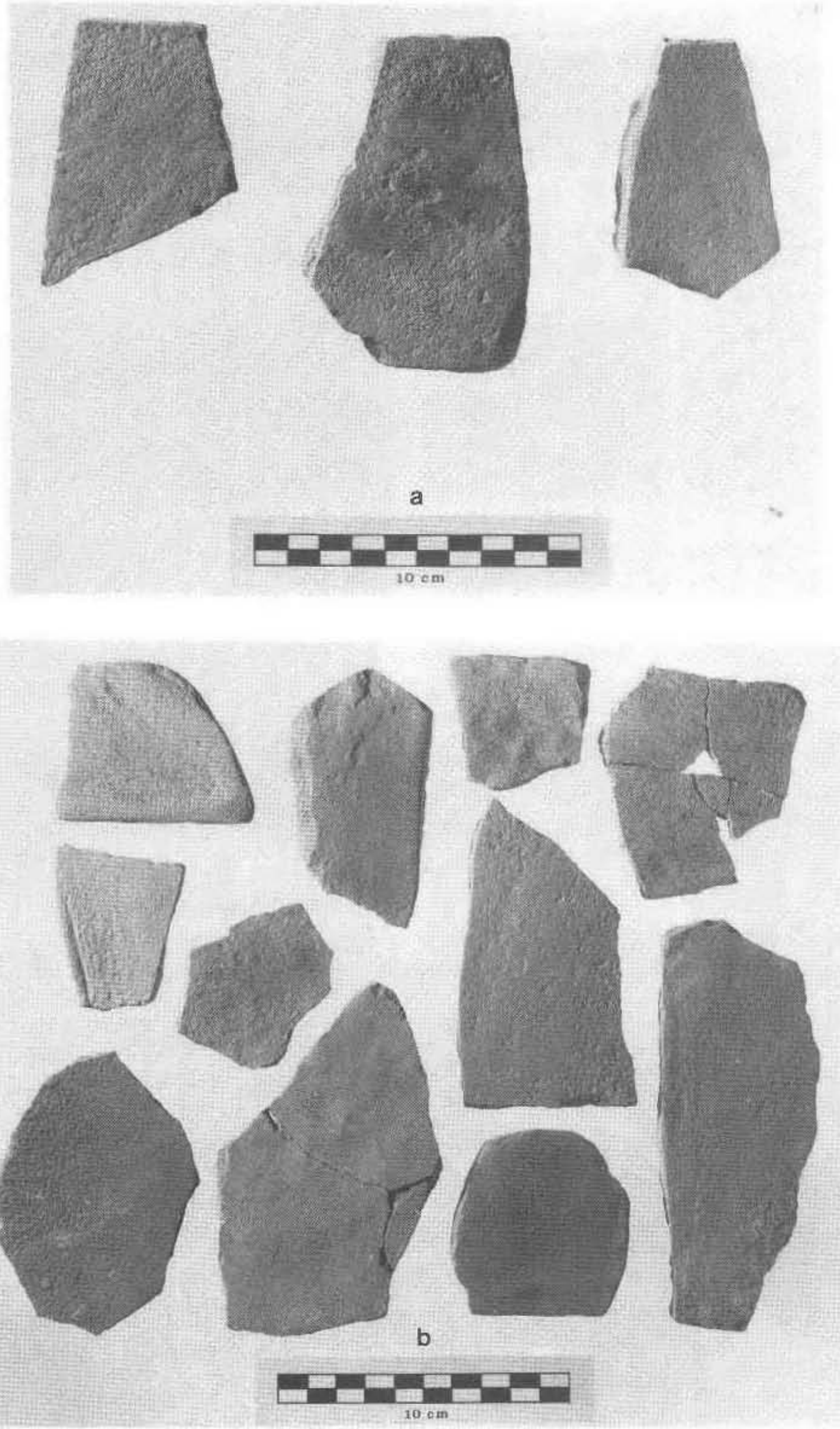


Plate 4.9. *Small abraders used for working turquoise ornaments. a) Recovered from Plaza Other Pit 14 fill and Plaza Grid 16, Level 2 (far right) (NPS 25692A). b) Recovered from Plaza Other Pit 1, Levels 9, 11, and 12 (NPS 25685B). 10-cm scales.*

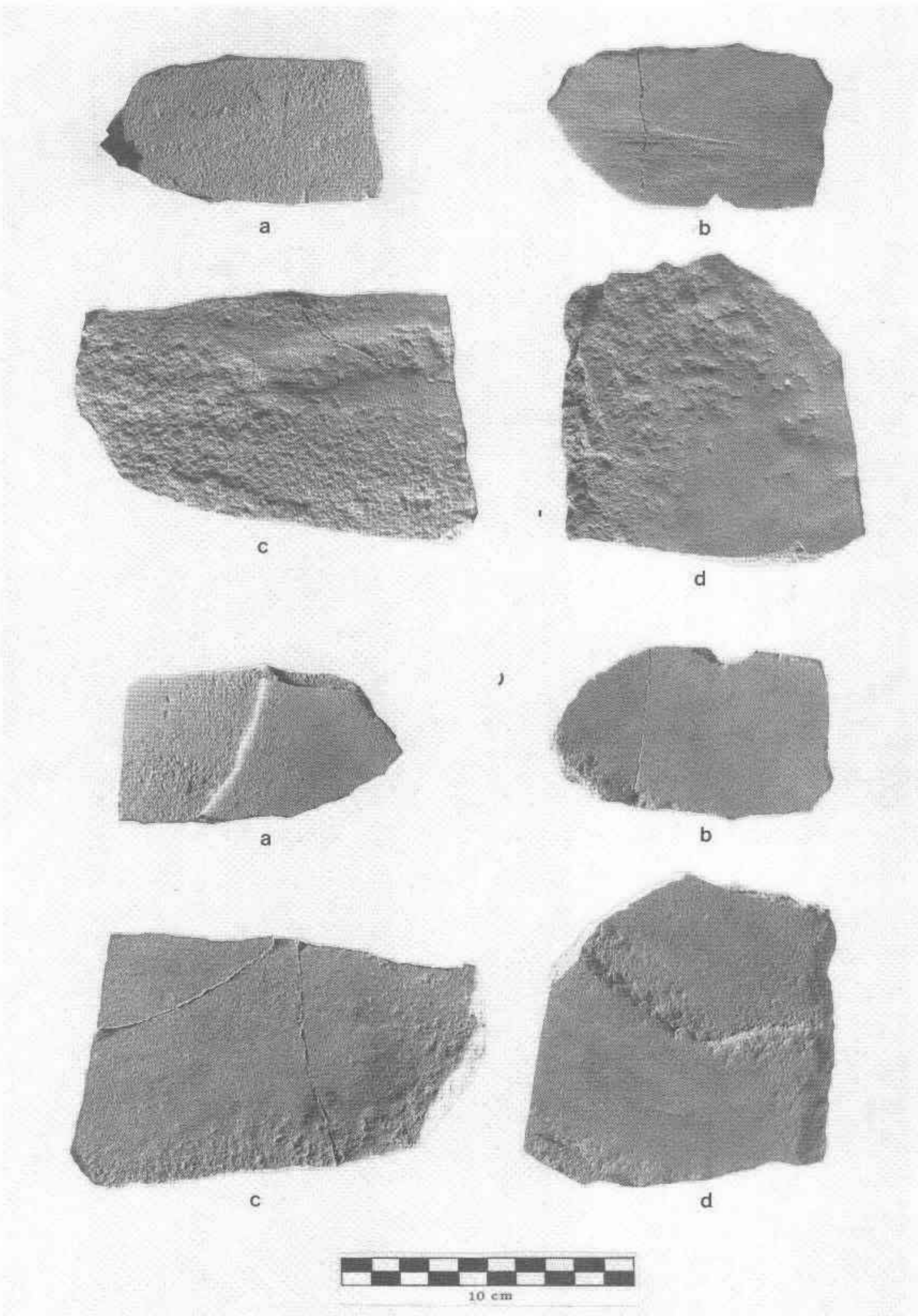


Plate 4.10. *Small lapidary abraders used for working turquoise recovered from the fill of Plaza Other Pit 15 (both sides illustrated: NPS 25687D, 25686A). 10-cm scales.*

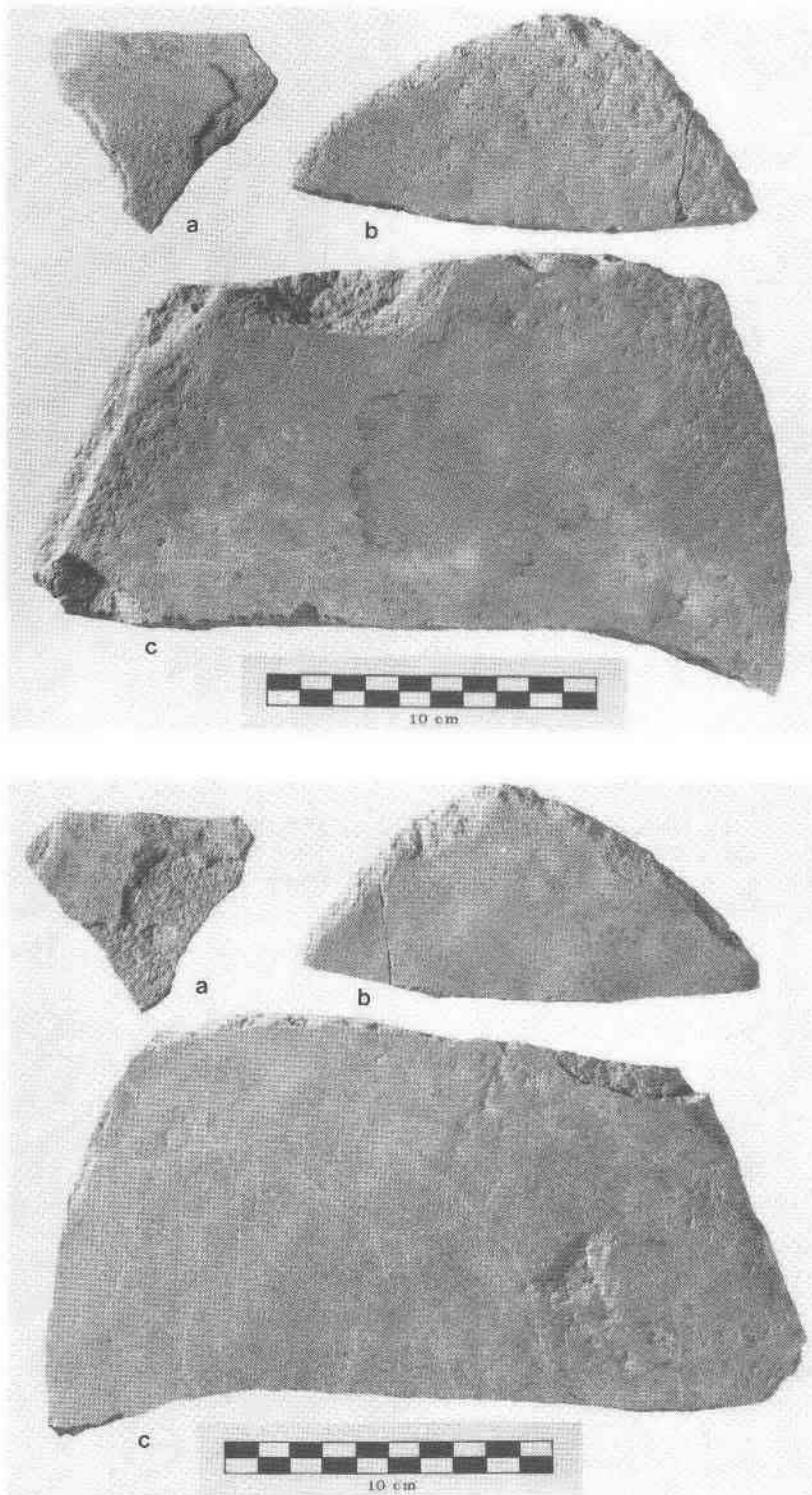


Plate 4.11. *Lapidary abraders from 29SJ 629 (both sides illustrated: NPS 25682A, 25681A). a) From Pithouse 2, Ventilator fill. b) From Pithouse 2, Layer 4 (Volume I, Table 5.5, FS 2838). c) Lapstone lapidary abrader from the backdirt. 10-cm scales.*

turquoise and other small jewelry items. Overall, they measured 22 by 14 by 2 cm and weighed on the average 1325 g. One of these (Plate 4.12a-b) was found in Layer 6 on the Pithouse 2 floor, which was filled with turquoise debris and other small tools thought to be associated with jewelry manufacturing. Another came from the backdirt (Plate 4.11c) and the others came from fill or had been reused in construction (e.g., Plate 4.12c).

It seemed no mere coincidence that three similar stones were found on a pithouse floor at 29SJ 1360, also in association with turquoise, although McKenna (1984:271, 275, 279, Figures 4.30-32) believed they served for multiple tasks, including use as head rests. Seven of these stones were eventually recovered at 29SJ 1360, weighed an average of 852 g, and measured 20 by 15 by 1.2 cm. The consistent size, shape, and workmanship of these lapstones indicated tools made for specialized and lengthy use. Judd (1954:Plate 27a-d) illustrated similar tablets from Pueblo Bonito of like size, shape, and wear, suggesting use as lapidary abraders. Three of the four came from Room 326 (one with a burial) in association with numerous pieces of turquoise, vessels, and other grave goods from the A.D. 1000s (Judd 1954:326-328). Another seven of these possible items came from Pueblo del Arroyo and five were from a collapsed upper floor in Room 23 (Judd 1959:19-20, Plate 42), but none were associated with jewelry debris.

The remaining 29SJ 629 tools weighed less than 300 g and could be divided into groups of those over 100 g, those between 100 and 60 g, and those less than 60 g. Generally, these were morphologically indistinct and seldom shaped in a consistent manner.

Except for lapstone lapidary abraders, the range of types were represented by the 28 lapidary abraders recovered from the plaza, 21 from Other Pit 1 (Plates 4.7-4.9). Both the plaza surface and OP 1 yielded dense concentrations of turquoise debris, unique to excavated sites in Chaco Canyon but probably a common occurrence in Pueblo II sites. At least one stone appeared to have minute specks of turquoise embedded in the ground surface that seemed to confirm its functional use.

A range of specific manufacturing uses may be reflected by the various abrader groups. The wear on some revealed ground, undulating surfaces caused by adjoining shallow grooves seemingly worn by strings of beads or individual pendants. These grooves, when measurable, range from 1 to 15 mm wide, with clusters between 1-4 mm (17), 6-9 mm (7), and 12-15 mm (3) on 16 stones. The values fit the 29SJ 629 bead and pendant sizes described by Mathien (this volume). The extreme narrow range (1-1.5 mm), however, was ill-suited for the ornaments recovered from the site, and suggested tool sharpening of small awls or drills. In some cases, the small stones, less than 10 by 10 cm, revealed a narrow band of use oriented along the longitudinal axis, which indicated bi-directional (back-and-forth) smoothing of small objects.

The quality of workmanship varied among the tools. Lapstones, both at 29SJ 629 and 29SJ 1360, revealed similar forms that suggested a shared ideal among craftsmen. These tools were all rectangular, thin, and similar in size, shaped by chipping and final edge grinding. It is expected that this form was widespread among the community sites and indicative of jewelry production. Smaller abraders, apparently held in the hand, were irregular in shape but varied in the amount of edge modification. Many were left unmodified, but the majority from the plaza and Other Pit 1 were ground on the edges (25 of 28 and 20 of 21, respectively).

The majority of the lapidary abraders concentrated in just a few places at 29SJ 629. Most came from Other Pit 1 and the surrounding plaza surfaces, where prolific turquoise debris attested to the probability of workshop activities. A smaller number of abraders (Plate 4.6) came from the storage rooms (5 and 6) directly behind Other Pit 1, where activities related to the plaza work may have taken place. Despite the amount of turquoise in Layer 6 on the floor of Pithouse 2, few abraders were recovered. Instead, numerous chipped stones in association with the turquoise (see Cameron's Table 2.29, this volume) suggest that ore reduction took place in the pithouse, along with some finishing work, but that primary shaping and smoothing of ornaments took place in the plaza. During the manufacturing process, different work areas may reflect practical concerns related to better lighting conditions or simply activities that spanned the warm and cold seasons. On the other hand, the different colored turquoise from the pithouse and plaza suggests that

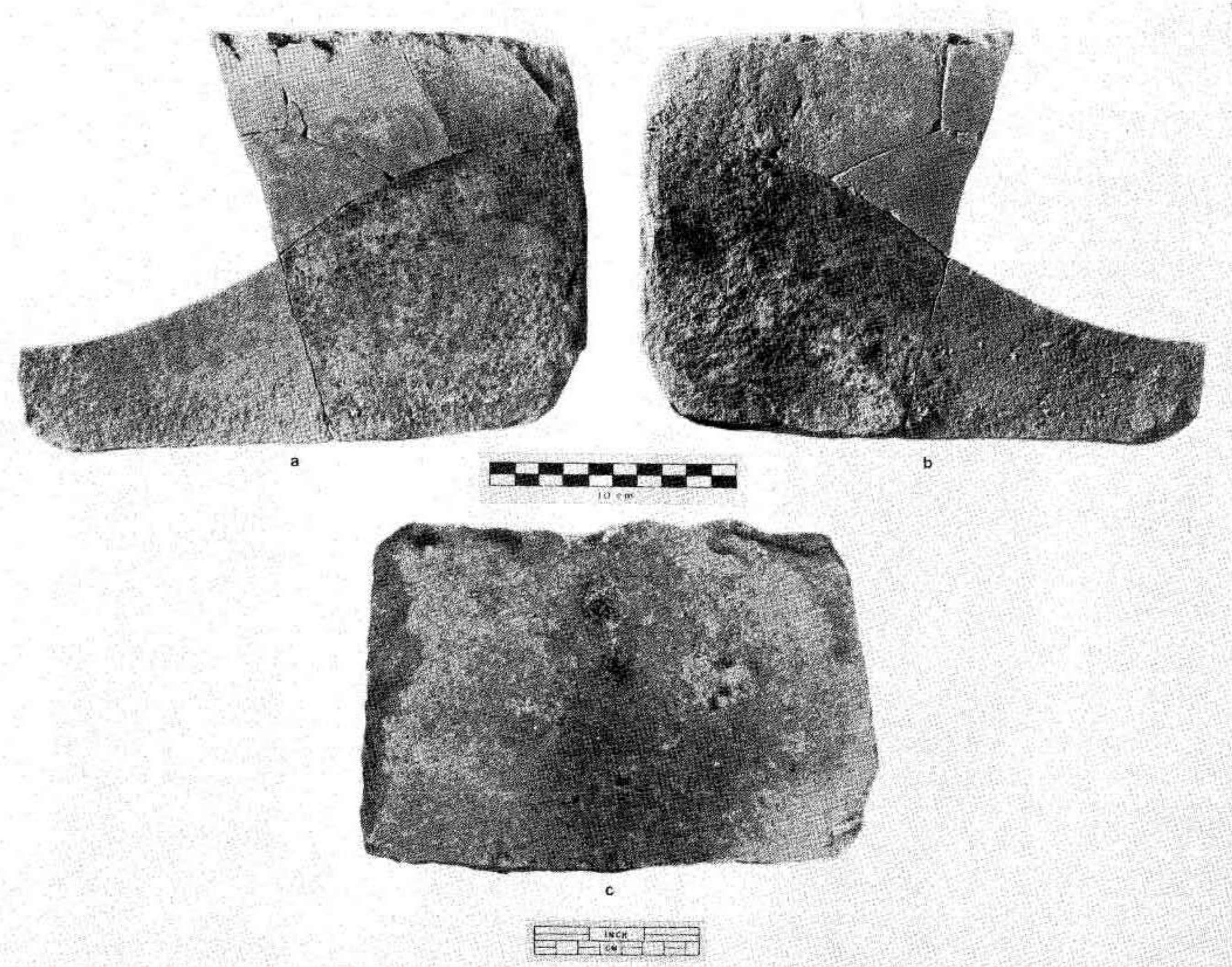


Plate 4.12. *Lapidary lapstones used for smoothing and working turquoise ornaments. a and b) Pithouse 2, Layer 6 (two views; 10-cm scales) (NPS 25679a, 25680b). c) Room 3, Level 3 (7.5 cm scale) (NPS 24174).*

the two areas may have been used for processing different batches of jewelry.

Files

Only four filelike abraders were found at the site (Table 4.1; Plate 4.13). Three of these came from Pithouse 2, with two occurring on the floor in association with turquoise workshop debris (Layer 6) and one in the Layer 4 fill. The broken tip of a fourth one came from Plaza Grid 9. A few similar tools also occurred in Pueblo Bonito and Pueblo del Arroyo (Judd 1954: Figure 34, Plate 25a-e). Judd (1954:87, 123-124) was skeptical of their use for working turquoise beads, despite the demonstration by one of his Zuni workmen skilled in lapidary work. The context of those at 29SJ 629 would seem to validate the workman's statements that these tools were lapidary files used for bead-making. Others were recovered from Bc 50 (Chaco Collections, C1715-1716), and 14 were found in Pueblo del Arroyo, Room 141 (C1647-1660) during stabilization in 1950.

Anvils

Worked stones revealing ground surfaces damaged by cuts, gouges, and hammer pits were classified as anvils (Akins 1980, 1987:372-374). As such, they appear to be an all-purpose stone workbench for pounding and cutting tasks, but the class reflected considerable metric variation suggesting multiple subcategories and overlap with other abrader classes. Twenty-seven were analyzed from 29SJ 629, but they were far more common from 29SJ 627 (78) and Pueblo Alto (91).

Many anvils reflected secondary or incidental use of some prior artifact, with little formal remodification. Eleven manos at the site revealed some use as anvils. The largest anvil from 29SJ 629 was a whole trough metate recovered from OP 14 that revealed secondary use, although it was never analyzed as a metate. The stone set in the Kiva floor near the firepit, however, best illustrated the use of a formal anvil. Formal anvils, prepared specifically for grinding and pounding tasks, however, were rare at Chacoan sites.

Polishing Stones

Highly polished stones not made of sandstone were classified as polishers. At least two subcategories exist: small stones that may have been used for polishing pottery (McKenna 1984:271), and larger cobbles probably used for smoothing adobe walls and floors. Many of the 33 from 29SJ 629, however, were pebble hammerstones or water-polished manuports without abraded facets. Only 9 of the 33 may have been pot or floor polishers, while 12 of the 22 polishing stones at 29SJ 1360 were assigned these categories (McKenna 1984:Table 4.21) where there was other evidence for pottery production. Nearby 29SJ 627 yielded numerous polishing stones (113), while they were scarce at Pueblo Alto (19). The discrepancy in numbers among the sites may have been related to differential retrieval by the field crews rather than to different emphases on specific tasks.

Lapidary Tool Kits

29SJ 629 yielded good evidence for turquoise jewelry manufacture and the associated tools used in production. A small set, perhaps individually owned, of specialized lapstones for polishing turquoise were found at the site, as they were at 29SJ 1360. Numerous other expedient abraders, however, were also used during the manufacturing process, although their particular function was not known. A few files and other small, shaped sandstones were also involved in the process. The small drills of chalcedonic silicified wood (1140 series) presumably were used to make the holes in the beads and pendants--these were common at 29SJ 629 and other Fajada Gap Community sites (Tables 3.1, 3.3). Associated scrap of the same and other materials suggested other kinds of work with the ores, perhaps in its initial reduction.

Because of the production of jewelry, very fine polishing agents were expected to have been used at the site, like the rouge used in present-day work. Locally available selenite made an excellent polishing agent when it was ground and heated to powder. A Gallup Black-on-white bowl fragment (Restorable Vessel 16: Volume I, Plate 8.10a) from the Pithouse

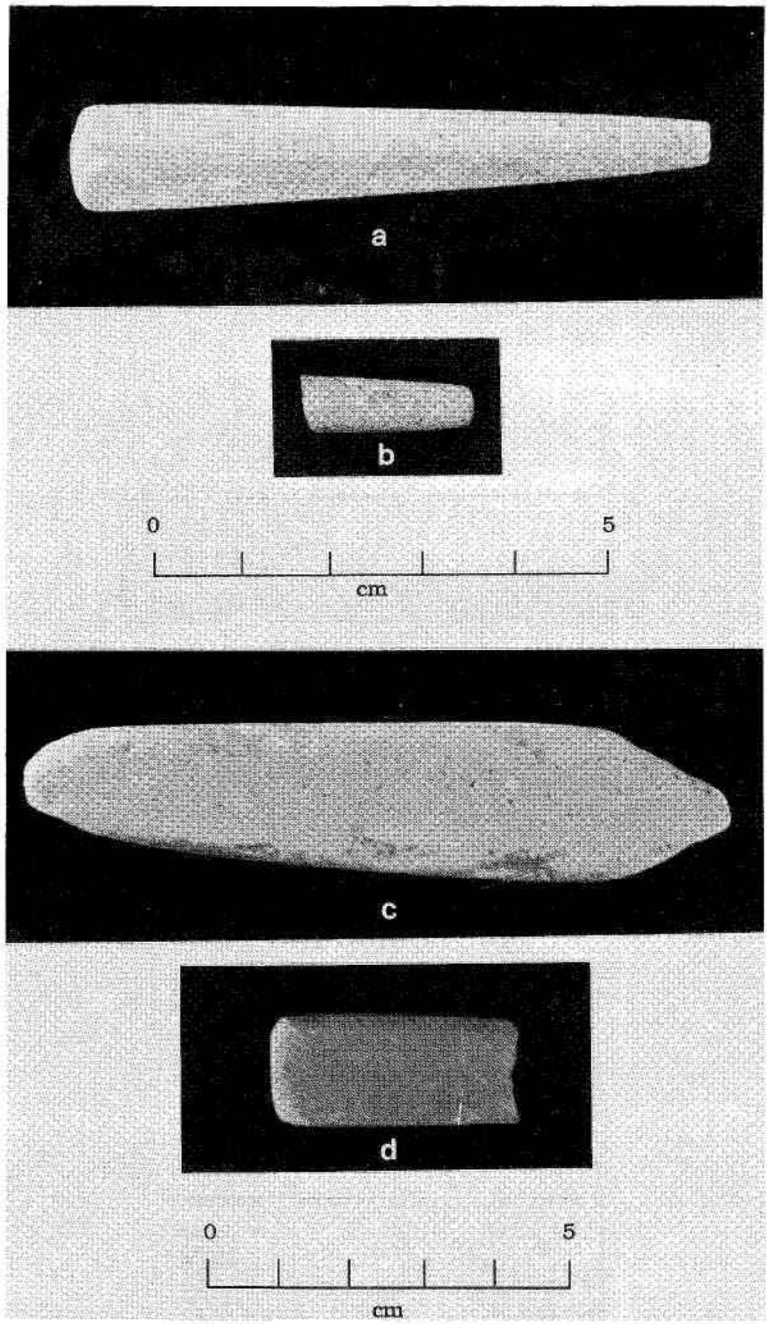


Plate 4.13. *Sandstone files used for working turquoise beads. 5-cm scales. a) Pithouse 2, Floor 1 (Floor Artifact 8; NPS 14189). b) Plaza Grid 9, North of Wall 3, Level 4 (NPS 25698). c) Pithouse 2, Layer 6 (Artifact 1; NPS 14179B). d) Pithouse 2, Layer 4 (NPS 14181B).*

2 floor fill (Layer 7) and associated with turquoise debris contained some of this powder, but otherwise it was not found in quantities in the areas laden with the turquoise waste debris and lapidary abraders. Instead, the highest concentration of selenite from the site came from Plaza Other Pit 14, the location of much mealing equipment. Selenite was also common in the Trash Midden and in Plaza Other Pit 6, but it occurred naturally throughout the site area and was only haphazardly collected during excavation. Nevertheless, the high selenite concentration in Other Pit 14, but not in Other Pit 1, was unlikely to have been fortuitous. Its association with mealing equipment may suggest reduction was done on metates prior to lapidary use.

Mealing Equipment

Manos

General Information

Manos were one of the key items recovered from sites, which attested to the heavy investment of time and labor for food preparation. These tools were used in conjunction with metates (the platform in which grains were crushed and processed) and hammerstones (used to sharpen the manos and metates). Mealing loci at 29SJ 629 were marked by mealing bins (in Pithouse 2) and pairs of catchment basins in the living room and plaza areas (Volume 1, Chapter 7).

Cameron's (1977, 1985) study revealed that all 177 manos from 29SJ 629, except for four biscuit (1-hand) manos, were for two-hand use in trough metates (Plates 4.14-4.16) and that few (n=27, 15 percent) revealed multifacial use, although secondary wear was common. The slight grinding noted on one side of 27 specimens, opposite the most heavily worn side, probably resulted from occasional use, or, more likely, from efforts to smooth a rough surface for the gripping hands (McKenna 1984:261). Unlike the sample from Pueblo Alto, the majority of the 29SJ 629 manos were unbroken (112 of 177; 63 percent), although heavily worn (68 percent overall). All manos were made of sandstone derived from local sources. The preferred material was a locally abundant, medium to very hard (86 percent), fine-grained (95 percent) sandstone. Many manos revealed no pecking marks (21 percent) from manufacturing or sharpening (roughening) blows made by concussional tools because the marks had been obliterated by grinding. Few of the analyzed 29SJ 629 manos revealed secondary battering (5) or chipping (2).

Few of the sample (29; 16 percent) revealed other tool use, but this number would be slightly higher if manos analyzed as other functional forms (and not as manos) were added. Secondary tool use and manufacture were not common attributes to the mano sample, although sometimes manos with major secondary usage escaped mano analysis, for instance, thirteen of the abraders. Six others with abrader use, however, were analyzed as manos but not as abraders. The most preferred secondary use of manos was for anvils (11; 6 percent). Four manos were made from discarded metate fragments but most apparently were not made from other tools.

Only a single mano exhibited paint that suggested use for grinding pigment or as a paint palette. Manos with finger grips comprised 26 of 177 (15 percent) of the overall sample, a figure that varies considerably among sites (29SJ 626 East = 5 percent; 29SJ 627 = 10 percent; Pueblo Alto = 6 percent; but 29SJ 1360 = 27 percent). At 29SJ 629, 8 of the 26 came from plaza OP 14; otherwise they did not occur in clusters that would suggest that the grips were a particular trait of a specific working group. Nearby 29SJ 627 had such totals from a number of different contexts, as did 29SJ 1360, although 7 of the 9 tools with double-finger indentations from 29SJ 1360 were scattered in the plaza mealing work area. In the Dolores River Valley, Colorado, finger grips were suggested as indicative of increased corn processing efficiency, possiby related to organization variables (Phagan 1988:195), but we see no evidence for this in the Chaco Canyon data.

Gradations in mano and metate hardness and material have historically reflected different stages of the grinding process (e.g., Bartlett 1933; Roberts 1958). These stages usually involved a trio of metates of different coarseness on which meal was ground. The common use of three bins or multiples of three bins found at A.D. 1000s sites (e.g., 29SJ 627, 29SJ 1360, and Pueblo Alto) was not replicated at 29SJ 629. Bins or catch basins at 29SJ 629

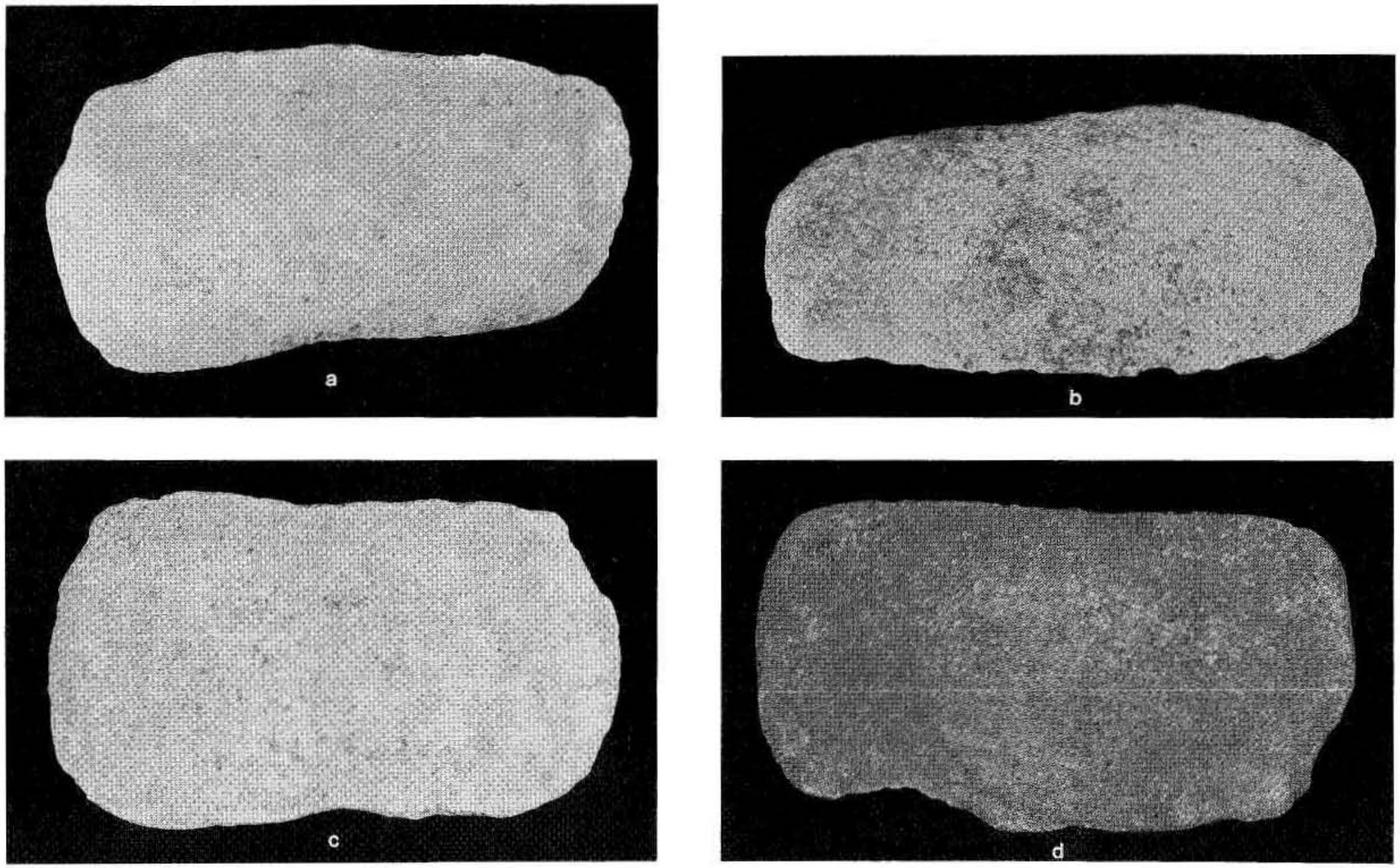


Plate 4.14. *Manos used for lining Other Pit 1 in Room 3 (NPS 16007, 16005B, 16006, and 16008). These are shown as Floor Artifact 12 in Volume 1 (Figure 4.7, Table 4.4). a-d are manos 1-4 respectively.*

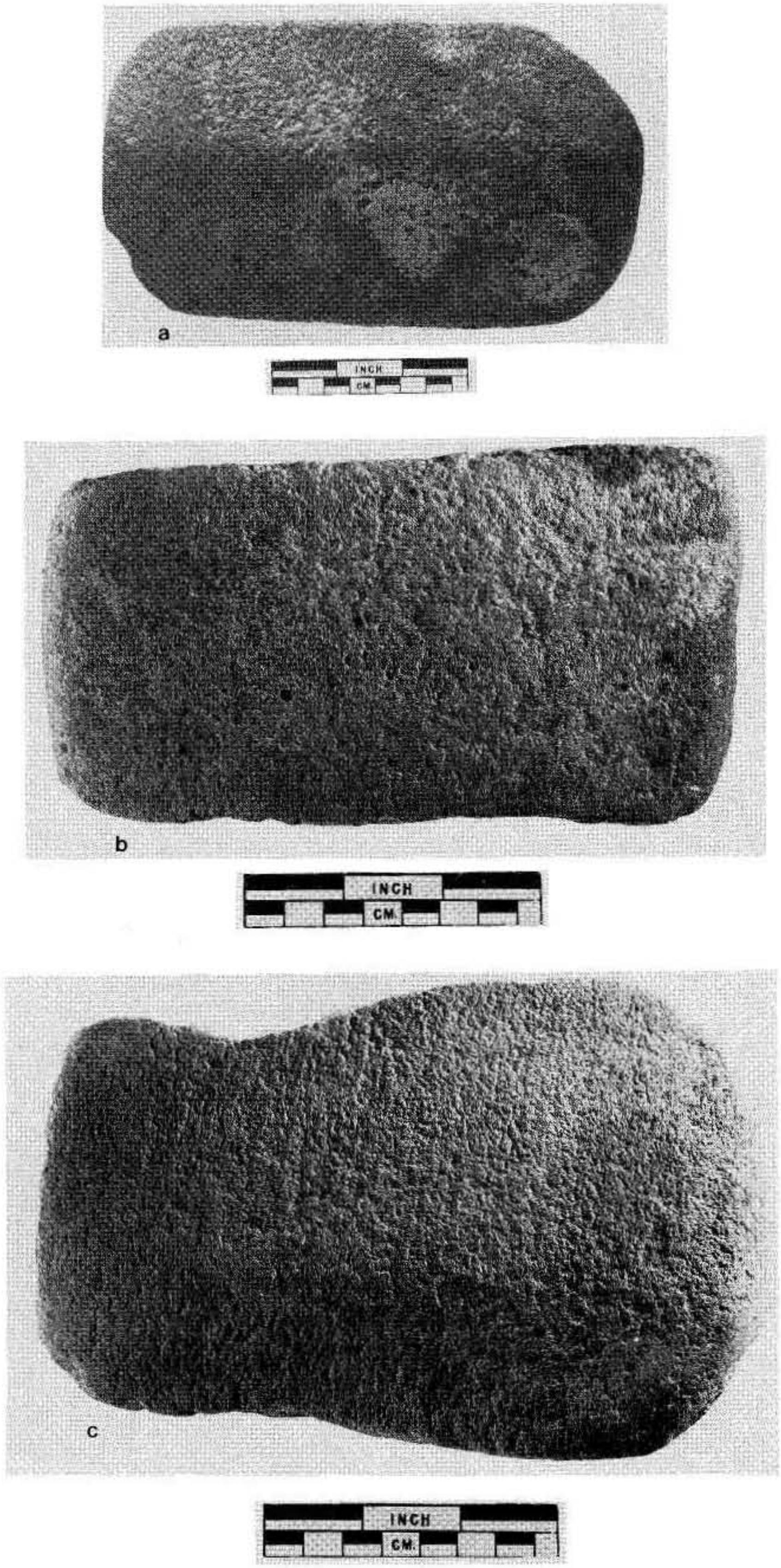


Plate 4.15. Manos recovered from the fill of Room 9 (NPS 14149, 14105A, and 14127).

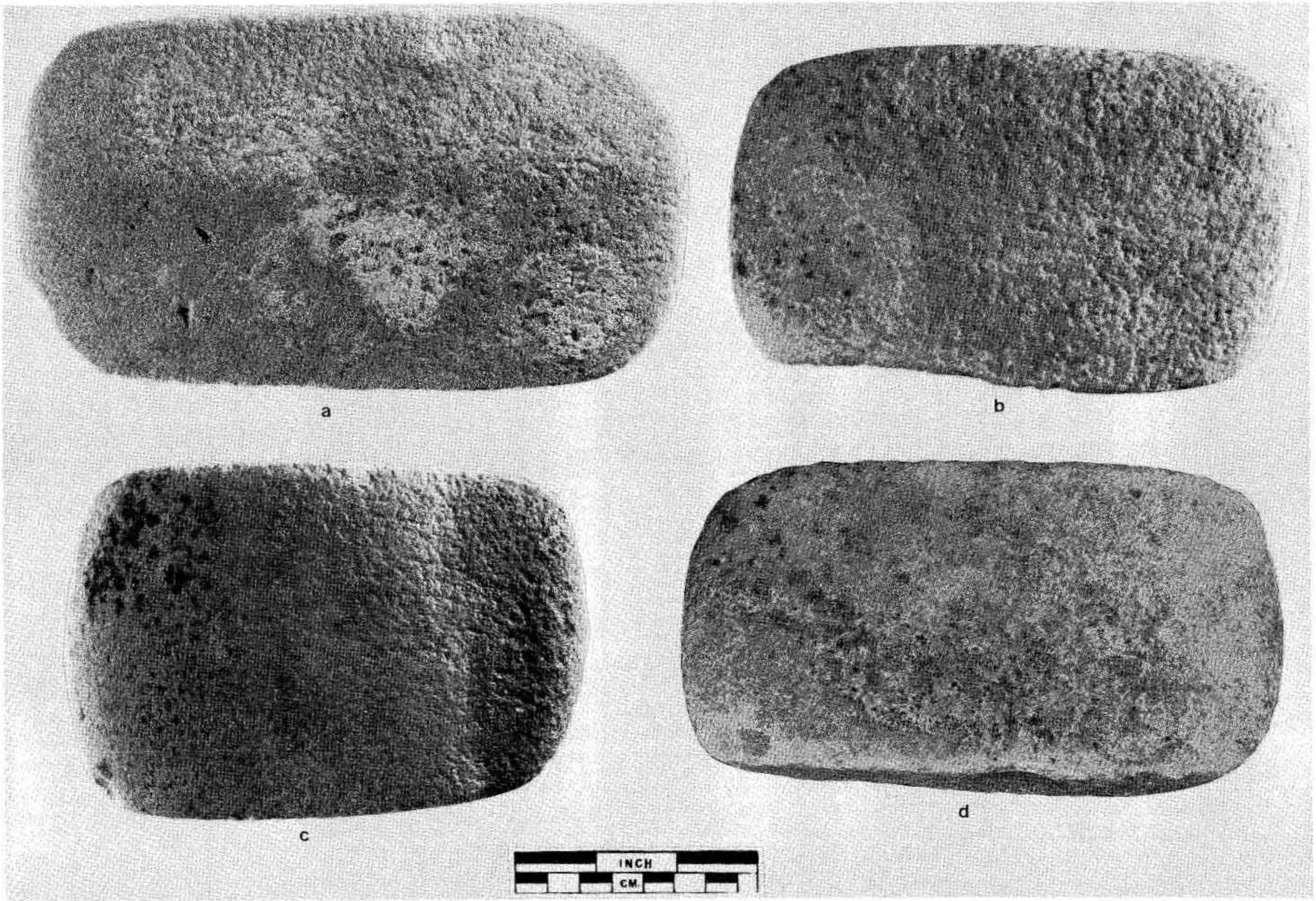


Plate 4.16. *Manos recovered from the surface of Room 9 (a-c) and from the floor of Pithouse 3 (d) as Floor Artifact 23 (NPS 14102, 14148, 14126, and 16047).*

commonly were paired, although distinctions in coarseness among metates and manos at the sites have not been identified. Natural grades of material coarseness were not well represented in Chaco Canyon, so that different levels of sharpening (or roughening) the tools could have provided varying coarseness distinctions that analytically would be hard to separate from normal sharpening behavior.

Secondary use by polishing was rare for the 29SJ 629 manos (2 percent). The "manolike abraders" defined by Akins (1980:54, 1987:362) were present at 29SJ 629 and 29SJ 627, although their paucity prevented early recognition as a possible separate ground stone category until large numbers were found at Pueblo Alto (Akins 1987). These "manos" revealed a high polish from use that was distinct from other manos; therefore, they were included under undifferentiated abraders at 29SJ 627 and 29SJ 629 (Akins 1980:54). Experimental work by Jenny Adams (1989; personal communication 1990) suggested that these tools could have been used for hide processing or reducing oily plants like sunflowers, although microscopic analysis would be necessary to better establish these possibilities.

Shape and Weight

Because of the motor action involved in grinding, shape was an important variable for mano analysis. It could be informative of motor habits and, perhaps, provide clues as to temporal and spatial differences as well as possible changes in food preparation (e.g. Windes 1987). For instance, Hard (1986) argued that over time, mano length reflected the increased role of cultigens in society, with the 29SJ 629 manos contributing to this research (Hard 1986:Table 13). Significant reduction in the mano size (by weight and thickness), however, occurred from extensive use and contributed to the variability reflected in the mean statistics for whole manos (Table 4.5). Nevertheless, there was little change when the total was culled, leaving those with the best functional and contextual reliability.

The type of platform on which the mano was used (i.e., the metate) also can be determined by the end wear of the mano as it became beveled or "lipped" through wear against the sides of the metate trough. Those used on flat or slab metates did not become beveled, although none were identified at 29SJ 629.

Based on cross-section, Cameron (1977, 1985) defined a number of different shapes (illustrated in Table 4.5) caused by increased wear and varying motor habits related to grinding (e.g., Bartlett 933:Figure 7; Reinhart 1965). Generally, manos began as a rectangular block that was slowly modified through use to another form. Type 1 manos comprised the highest number of mano blanks, the least worn, and the heaviest (Table 4.6). Trapezoid- (Type 2), wedge- (Type 3), and triangular- (Type 4) shaped manos increased in relative frequency with greater wear and lesser weight, whereas the blocky Type 1 (rectangular) manos decreased, thereby suggesting that Types 2-4 were derived from Type 1 manos. Cameron (1985:16) noted that the triangular and beveled shapes only became prominent in her Chaco Canyon sample after A.D. 920. She attributed this possible change in shapes to the shift from portable to enclosed (bin) metates.

At Pueblo Alto (Windes 1987:330), Type 7 (discoid) manos were the thinnest category (Table 4.7), but not the lightest. At 29SJ 629, Type 7 manos comprised the second heaviest group, following the Type 1 manos. Type 7 manos appeared to have retained their shape throughout their use life, suggesting that two forms of new manos--blocky and tabular--were made for use. At Pueblo Alto they were found together in the same bins, suggesting that they comprised a set for different stages in food reduction, different materials being processed, or for different metate types. Both types were common in Other Pit 14 at 29SJ 629, as well as the mealing areas at 29SJ 627 and 29SJ 1360. Type 3 (wedge-shaped) manos were also common to these areas and generally weighed less than the other two types, undoubtedly because they were heavily worn Type 1 manos.

Despite the thinness of Type 7 manos, they were not broken more frequently than Type 1 manos (39 and 40 percent, respectively, were whole). Contrary to expectations that as Type 1 manos were worn to other shapes, they became increasingly likely to be broken because of greater sharpening episodes and increased thinness, this was not true of the small frequencies of Type 2 (n = 23) and Type 4 (n = 14) manos, where 61 and 93 percent, respectively, were

Table 4.5. Mano cross-section type. Variability between contemporary small-house sites and Pueblo Alto.

	Mano cross-section type[a]								
Site[b,c]	1	2	3	4	5	6	7	Total	Unknown
29SJ 626 East[d]	9	0	28	0	0	3	64	104	0
%	9	-	27	-	-	3	62	101	-
29SJ 627	61	24	141	14	4	0	88	332	22
%	18	7	43	4	1	-	27	100	-
29SJ 629[e]	35	16	36	18	4	1	44	154	23
%	23	10	23	12	3	1	29	101	-
29SJ 1360	20	1	59	2	1	1	8	92	3
%	22	1	64	2	1	1	9	100	-
Pueblo Alto	39	72	126	38	1	0	61	337	41
%	12	21	37	11	T[f]	-	18	99	-

[a] Types: 1 = rectangular; 2 = trapezoid; 3 = wedge; 4 = triangular; 5 = other; 6 = bi-triangular (square); 7 = tabular (discoid). After Cameron (1985).
[b] 29SJ 627, 29SJ 629, and 29SJ 1360 from Cameron (1977).
[c] Sample size of site total (29SJ 626 East = 100%; 29SJ 627 = 56%; 29SJ 629 = 100%; 29SJ 1360 = 41%; Pueblo Alto = 100%).
[d] Types 1 and 7 from 29SJ 626 East may differ from other sites because of different analysts.
[e] Totals corrected from Windes (1987b:Table 4.10).
[f] T = trace (less than 0.5%).

Table 4.6. Summary statistics for whole manos, Types 1-4 and 7 at 29SJ 629.

Provenience	No.	Mean	sd	CV %	Range
TYPE 1					
Weight (g)	24	1,965.1	572.8	29.1	927.6 - 2,993.7
Length (cm)	24	20.0	1.4	7.1	17.4 - 23.3
Width (cm)	24	11.9	1.1	9.4	9.4 - 13.0
Thickness (cm)	24	4.0	1.1	27.8	2.2 - 6.6
Grinding Area A (cm^2)	24	182.7	28.0	15.3	120.0 - 235.0
Grinding Area B (cm^2)	4	175.8	47.5	27.0	105.0 - 204.0
TYPE 2					
Weight (g)	14	882.7	191.6	21.7	624.0 - 1,373.0
Length (cm)	14	18.6	1.2	6.5	16.0 - 20.2
Width (cm)	14	11.2	1.0	8.9	9.5 - 12.6
Thickness (cm)	14	2.5	0.5	19.4	1.5 - 3.3
Grinding Area A (cm^2)	14	177.9	18.8	10.6	137.0 - 205.0
Grinding Area B (cm^2)	3	163.7	27.6	16.9	132.0 - 183.0
TYPE 3					
Weight (g)	22	1,012.6	304.0	30.0	498.0 - 1,480.0
Length (cm)	22	18.4	2.4	13.3	14.2 - 23.0
Width (cm)	22	10.9	1.1	9.8	8.0 - 13.0
Thickness (cm)	22	3.0	0.9	30.5	1.2 - 4.6
Grinding Area A (cm^2)	22	166.5	30.5	18.3	114.0 - 230.0
Grinding Area B (cm^2)	1	185.0	-	-	- -
TYPE 4					
Weight (g)	13	910.2	284.9	31.3	531.0 - 1,423.4
Length (cm)	13	19.1	2.0	10.2	14.5 - 21.0
Width (cm)	13	11.6	0.8	6.9	10.0 - 12.8
Thickness (cm)	13	2.1	0.8	39.6	0.7 - 3.7
Grinding Area A (cm^2)	13	174.9	34.3	19.6	108.0 - 230.0
Grinding Area B (cm^2)	5	137.6	52.2	38.0	95.0 - 197.0
TYPE 7					
Weight (g)	36	1,098.9	308.6	28.1	342.7 - 1,927.8
Length (cm)	36	18.4	1.8	10.0	15.1 - 22.8
Width (cm)	36	12.0	0.7	5.6	10.4 - 13.0
Thickness (cm)	36	2.4	0.6	24.7	0.9 - 3.5
Grinding Area A (cm^2)	35	187.2	27.1	14.5	109.0 - 240.0
Grinding Area B (cm^2)	4	188.0	36.9	19.6	165.0 - 243.0

Table 4.7. *Summary statistics for whole manos from selected proveniences at 29SJ 629, 29SJ 627, 29SJ 1360, and Pueblo Alto.*[a]

Provenience	No.	Mean	sd	CV %	Range
29SJ 629:					
Pithouse 2 trash fill					
Weight (g)	8	994.6	464.5	46.7	531.0 -1,814.4
Length (cm)	8	18.7	3.5	19.0	10.5 - 22.5
Width (cm)	8	11.3	1.2	10.8	9.0 - 12.5
Thickness (cm)	8	2.4	1.3	53.8	0.7 - 4.3
Grinding Area A (cm^2)	8	173.4	47.4	27.4	58.0 - 201.0
Grinding Area B (cm^2)	3	144.7	86.4	59.7	45.0 - 197.0
Used in Construction					
Weight (g)	22	1,048.0	509.8	48.6	509.8 -2,993.7
Length (cm)	22	19.3	2.2	11.3	14.2 - 22.8
Width (cm)	22	11.4	0.9	8.0	10.0 - 13.0
Thickness (cm)	22	2.3	0.8	36.6	1.5 - 5.3
Grinding Area A (cm^2)	22	190.0	26.0	13.7	134.0 - 240.0
Grinding Area B (cm^2)	2	179.5	4.9	2.8	176.0 - 183.0
Pithouse 3 trash fill					
Weight (g)	13	1,332.3	663.6	49.8	642.0 -2,494.8
Length (cm)	13	18.0	2.3	12.9	15.2 - 21.3
Width (cm)	13	11.9	1.1	8.9	9.3 - 13.0
Thickness (cm)	13	3.0	1.1	35.9	1.3 - 5.0
Grinding Area A (cm^2)	13	169.2	28.8	17.0	124.0 - 231.0
Plaza Other Pit 14					
Weight (g)	24	1,390.6	558.4	40.2	704.0 -2,835.0
Length (cm)	24	18.8	1.6	8.4	16.0 - 23.3
Width (cm)	24	11.8	0.9	7.3	10.0 - 13.0
Thickness (cm)	24	3.4	1.3	37.5	1.8 - 6.6
Grinding Area A (cm^2)	24	184.8	23.3	12.6	120.0 - 235.0
Grinding Area B (cm^2)	4	179.0	11.4	6.4	165.0 - 191.0

Table 4.7. (continued)

Provenience	No.	Mean	sd	CV %	Range
29SJ 627:					
Mealing Bin Rooms 17/18 and 19					
Weight (g)	23	1,424.3	562.9	39.5	775.0 -3,265.9
Length (cm)	23	19.5	1.3	6.6	16.6 - 21.7
Width (cm)	23	11.6	0.9	7.9	9.5 - 13.2
Thickness (cm)	23	3.4	0.9	25.8	1.7 - 5.5
Grinding Area A (cm^2)	23	188.0	26.6	14.2	129.0 - 261.0
Grinding Area B (cm^2)	2	126.5	116.7	92.2	44.0 - 209.0
29SJ 1360:					
Plaza Work Area					
Weight (g)	36	1,235.9	553.6	44.8	4,602.0 -2,313.0
Length (cm)	36	18.4	2.1	21.1	14.1 - 22.5
Width (cm)	36	11.4	0.7	6.3	9.9 - 13.0
Thickness (cm)	36	3.4	1.0	29.5	1.6 - 6.4
Grinding Area A (cm^2)	36	184.9	43.5	23.5	113.0 - 342.0
Grinding Area A (cm^2)	2	101.5	13.4	13.2	92.0 - 111.0
Pueblo Alto:					
Room 110, Mealing Bin Area, Floor 1					
Weight (g)	19	975.4	485.6	49.8	352.0 -2,313.5
Length (cm)	19	19.9	2.4	12.2	16.7 - 24.0
Width (cm)	19	10.2	1.4	13.5	6.8 - 12.5
Thickness (cm)	19	2.5	0.7	28.0	1.4 - 4.2
Grinding Area A (cm^2)	19	173.1	41.8	24.2	105.0 - 262.0

[a] Analysis from data generated by Cameron.

recovered unbroken. The numerous Type 3 manos (n = 142), however, were seldom found whole (15 percent). In general, heavy manos were seldom broken (7 of 69, 10 percent), whereas those weighing less than 1,000 g were often broken (58 of 108, 54 percent), as might be expected.

Weight should allow greater efficiency in crushing grains and other materials with a mano, although different materials to be ground may require different manos. The distribution of light and heavy mano types that dichomotized the Pueblo Alto sample (Windes 1987:331, Figure 4.2) was also apparent in the 29SJ 629 sample (Figure 4.1) where there was a sharp break in manos weighing approximately 1000 g, even when worn-out ones were eliminated from the sample. A noticeable absence of manos in the 1,600-1,800 g range at 29SJ 629 coincided with a similar gap between 1,600 and 1,750 or 1,900 g in the Pueblo Alto sample. 29SJ 627 manos revealed a sharp break at about 1,300 g. These similarities suggest the possibility that two or three distinct mano types, identified in part by weight, comprised the grinding equipment.

The lack of manos directly associated with mealing areas at 29SJ 629 did not permit attempts at correlating the three types with steps in the reduction process. The mass of whole manos found in contemporary mealing bin rooms at 29SJ 627 were mostly heavy specimens exceeding 1,000 g (23 of the 29 floor specimens or 36 of the 45 fill and floor specimens: both 80 percent of the total). Smaller manos might have been heavily worn and kept for related purposes (Windes 1987). On the other hand, the mass of whole manos associated with the plaza mealing area at 29SJ 1360 revealed numerous light and heavy manos. A bare majority of these latter specimens weighed more than 1,000 g (21 of 39; 54 percent), suggesting that both light and heavy manos were commonly used together for food reduction.

Assemblages and Contexts

Aside from basic mano attributes, mano contexts (Table 4.3) often marked specific food preparation or other kinds of work areas and tool storage areas to be identified, as well as offering insights into recycling and site abandonment processes. Manos at 29SJ 629 were particularly suited to examining abandonment behavior. Although 112 of the 177 manos recovered from 29SJ 629 were unbroken, not all of those could be considered usable tools. Conversely, even broken manos may have continued to be utilized during the food reduction process, although not for grinding (i.e., Windes 1987:350, 352). But many manos were clearly discarded whole and reused for other purposes. We must consider these manos as wornout tools, unsuitable for the purposes for which they were originally made. Thus, any analysis of manos must distinguish between usable and unusable forms to properly understand context and tool function. Can the different uses for whole manos be distinguished?

At 29SJ 629, 22 whole manos (and six fragments) left no doubt that their primary use life had ended. These had been used in construction around the site, eliminating them as functional tools. The whole ones had been built into masonry walls (eight), used as posthole shims or base stones (five), or had lined pits (nine). Five had been used as liners for Plaza Firepit 2 and four others (plus an abrader) were used for the lining of Other Pit 1 in Room 3 (Plate 4.14). No whole manos came from the Trash Midden, where ground stone was rare.

What attributes do these 22 manos share that contrast them with usable manos? Intuitively, manos became unusable when they were broken or worn too thin to hold. Probably there is a direct relationship between thinness and breakage--greater fragility (thinness) results in higher breakage rates during the sharpening process, use, or from being dropped (see above). Broken or discarded manos, however, often continued to be used for food preparation as pounders, crushers, or hammers but not as grinding tools. Specific grinding areas at 29SJ 629 associated with grinding tools did not exist, although the mealing bins and tools at Pueblo Alto (Windes 1987:Table 4.12) provide a case of comparison (Table 4.7). A stockpile of mealing equipment recovered from 29SJ 629's Plaza Other Pit 14, in association with numerous hammerstones and clumps of corn pollen, probably represented a batch of usable mealing equipment left for future use. The pit yielded 27 manos, 24 of them whole. Many of those in OP 14 were recovered in batches and exhibited finger facets along a longitudial face for, presumably, a better grip that suggests an individual set(s).

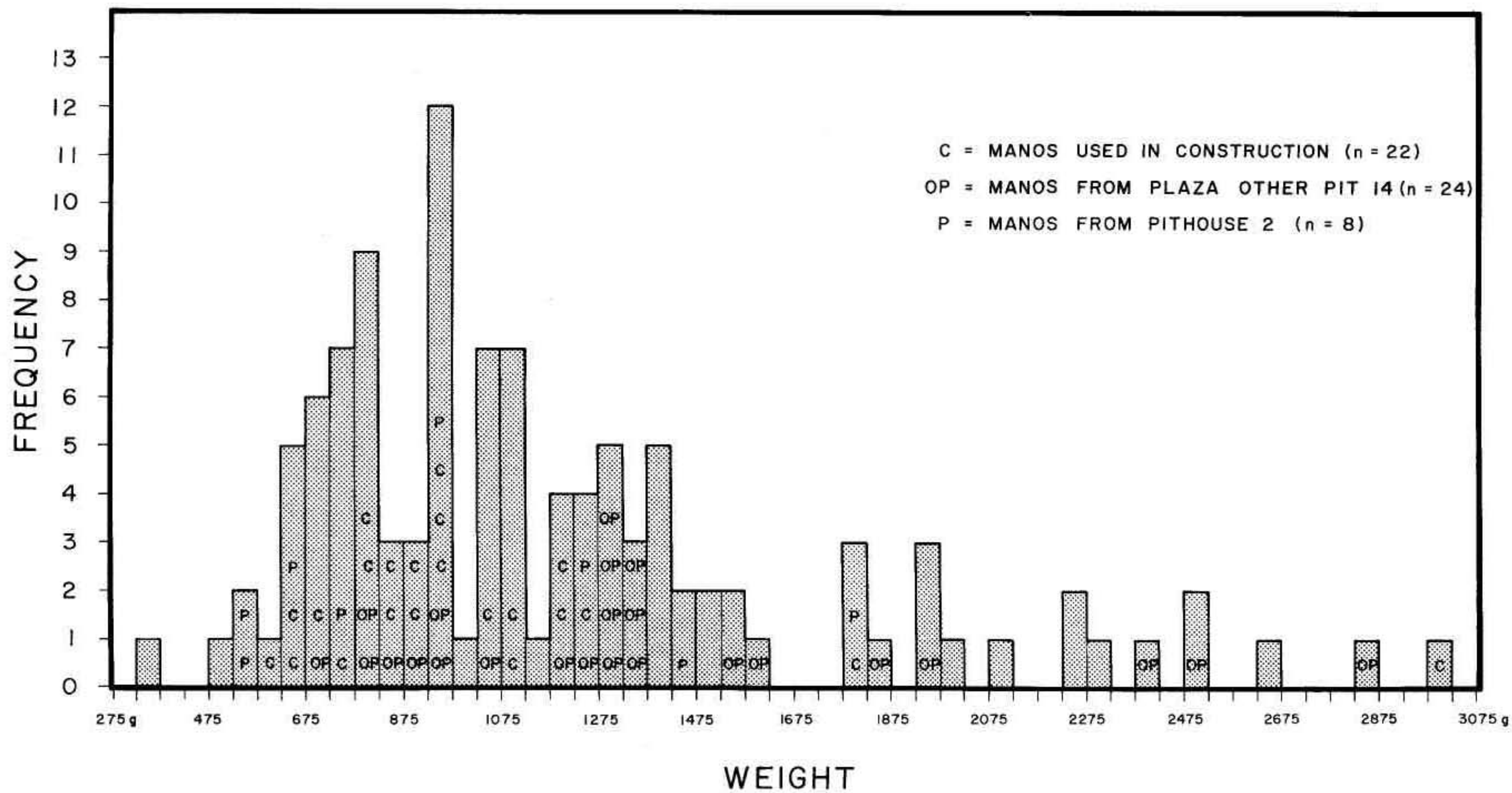


Figure 4.1. *Weight distribution for the 112 whole manos from 29SJ 629. Note weight distribution of mano clusters listed. Weight increments are 50 grams. (NPS 310/82826 A).*

Overall, 15 percent of the site manos exhibited finger facets, but 31 percent of those in the pit had them.

When these 24 tools were contrasted with the sample used in construction (n=22), nearly twice as many from construction exhibited heavy wear compared to OP 14 (Table 4.7), as expected. More importantly, two-sample t-tests for thickness and weight, respectively, confirmed that the OP 14 sample was significantly different from the reused sample (t=3.44, df=44, p=0.001 and t=2.17, df=44, p=0.036, respectively). The primary attribute that suggested that a mano reached or was close to the end of its use life as a mano was, therefore, thickness (also correlated with weight). Probably, thin manos were too thin to adequately grasp and use without causing finger lesions. There was also a large difference in mano forms between the two samples of those attributed to initial or early use: Forms 1 and 2. Half of the whole sample from OP 14 came from this category, while only 27 percent were in the reuse category. The latter percentage, nevertheless, revealed that reuse did not preclude the selection of new, relatively unworn manos for uses other than grinding.

Less success in determining usable manos was found when the OP 14 sample was compared with the whole manos associated with the mealing bins at Pueblo Alto (Windes 1987:Table 4.12). Paired t-tests confirmed the differences in weight and thickness observed between the OP 14 and Pueblo Alto samples (t=2.56, df=41, p=0.014 and t=2.64, df=41, p=0.011, respectively). Instead, the Pueblo Alto group was similar to the reused ones at 29SJ 629. The smaller, lighter Pueblo Alto manos may have reflected the use of thin trough metates or changes in the mode of food reduction that was not practiced at 29SJ 629.

A thickness of 3.0 cm to divide usable from unusable manos at 29SJ 629 left only 38 "good" manos at site abandonment, excluding the 36 thin Type 7 manos. Even within the sample used for construction were manos that were thick enough to have been useful for grinding. Despite the reduction of usable manos culled from the 112 whole manos, it still appeared that manos were an expendable item that was easily replaced.

Few other proveniences at 29SJ 629 provided large samples in which to compare use. Those in Pithouse 2, where mealing facilities were found, were similar to the reused sample. A larger group of manos from the trash deposits in Pithouse 3, however, were like those from OP 14, suggesting that they could also be considered usable equipment. T-tests of the various attributes (length, width, thickness, and weight) revealed no significant differences. Ties between OP 14 and the Pithouse 3 refuse were further strengthened by their proximity, similar age of deposits, and the numerous sherd matches among nine individual vessels found in both contexts. Furthermore, the highest corn pollen from the site, much of it clumped, came from the two locations (Cully 1985:171, 174, 208). Coeval deposition of manos and other material, therefore, was presumed for the two locations from the nearby mealing areas.

Summary

Overall, manos may be seen as ubiquitous and similar across time and space in Chaco Canyon (Table 4.8 and Cameron 1977:28-29). There were some differences among contemporary or nearly contemporary sites, however, in mano shape, size, and wear. Among the contemporary small-house sites in the Fajada Gap Community, assemblages associated with mealing activity areas were similar when the numerous worn-out specimens were culled. The numbers of large, whole manos left in association with mealing areas suggested that they were of little value to the inhabitants at abandonment, despite being functional tools. Except for the pile left in OP 14 at 29SJ 629, perhaps, the inhabitants apparently did not anticipate returning to the sites, which, otherwise, should have prompted caching behavior affording little energy investment. When the decisions were made to abandon these sites, return seemed unlikely at the time.

Compared to the small-house manos, Pueblo Alto yielded much smaller functional manos and greater numbers of highly polished forms that were used for unknown functions. Although a shift to very thin trough metates at Pueblo Alto in the A.D. 1000s might explain the differences in manos, a similar dichotomy of thick and thin metates was also found

Table 4.8. Summary statistics for whole manos from sites in the Fajada Gap Community, A.D. 900s and 1000s.

Provenience	No.	Mean	sd	CV%	Range
29SJ 626 East:					
Weight (g)	39	1,471.1	633.8	43.1	261.0 - 2,680.0
Length (cm)	39	19.5	1.9	9.8	15.4 - 23.0
Width (cm)	39	11.6	1.1	9.8	9.0 - 13.0
Thickness (cm)	39	3.9	1.1	27.8	2.1 - 6.6
Grinding Area A (cm^2)	39	154.7	39.5	25.5	78.0 - 255.0
Grinding Area B (cm^2)	6	127.7	45.4	35.6	78.0 - 188.0
29SJ 627:					
Weight (g)	200	1,198.0	501.5	41.9	363.0 - 3,265.9
Length (cm)	200	18.6	2.4	12.8	9.2 - 24.0
Width (cm)	200	11.1	1.2	10.8	7.6 - 14.1
Thickness (cm)	200	3.2	0.9	28.9	1.0 - 5.7
Grinding Area A (cm^2)	200	169.5	38.5	22.7	35.0 - 261.0
Grinding Area B (cm^2)	27	138.4	59.4	42.9	32.0 - 228.0
29SJ 629:					
Weight (g)	112	1,213.3	547.8	45.1	342.7 - 2,993.7
Length (cm)	112	18.7	2.2	11.9	10.5 - 23.6
Width (cm)	112	11.6	1.0	9.0	8.0 - 13.0
Thickness (cm)	112	2.9	1.1	38.7	7.0 - 6.6
Grinding Area A (cm^2)	112	177.1	32.5	18.4	56.0 - 240.0
Grinding Area B (cm^2)	21	154.7	52.8	34.1	45.0 - 243.0
29SJ 1360:					
Weight (g)	74	1,154.5	591.8	51.3	4,602.0 - 3,124.8
Length (cm)	74	17.6	2.7	15.4	10.3 - 23.1
Width (cm)	74	11.1	1.2	10.7	7.3 - 13.0
Thickness (cm)	74	3.2	1.0	30.3	1.6 - 6.4
Grinding Area A (cm^2)	74	169.1	46.6	27.5	48.0 - 342.0
Grinding Area B (cm^2)	9	95.6	45.3	47.4	44.0 - 174.0

at the small sites. Abandonment of the small sites in the early A.D. 1000s, however, might have prevented accumulation of manos used with the thin metates.

Non-specialized, food processing tools used for a variety of tasks have been attributed to one-hand manos (Phagan 1988:183, 185)--tools that were rare at 29SJ 629 and other A.D. 900s/early A.D. 1000s house sites. Instead, the presence of two-hand manos and trough metates suggested increased specialization and reliance on corn horticulture through time (Hard 1986; Phagan 1988), although reliance on wild seeds may also be suspected (Jenny Adams, personal communication 1990). Manos at 29SJ 629 and the other contemporary small sites revealed substantial numbers of manos compared to the Basketmaker III and Pueblo I sites from the Dolores area and in Chaco Canyon. At Dolores, the highest ratio of whole manos-to-metates reached a mere 5:1 in the Cline Phase (A.D. 900-975), while at 29SJ 626 East, 29SJ 627, 29SJ 629, and 29SJ 1360, these ratios were approximately 39:0, 40:1, 19:1, and 25:1, respectively. A period of substantial investment in corn processing and possibly wild plant processing may have occurred in Chaco Canyon during the same period.

Metates

General Information

Eight whole trough metates, two that were unusable, were recovered from 29SJ 629, but fragments (105) were common (Table 4.3, Plates 4.17-4.20). Two single slab or flat metates also came from the site, although this form first appeared in the northern San Juan District by the A.D. 900s and became common after A.D. 1000 (Hayes and Lancaster 1975:151). Slab metates in Chaco Canyon were rare, however, and typically occurred in Mesa Verde phase (A.D. 1200s) contexts and on Navajo sites. Those found in Firepit 5 in the plaza and Layer 4 in Pithouse 2 (Plates 4.20b-c), were probably associated with the early A.D. 1100s kiva located a few centimeters away. All other metates at 29SJ 629 were of the trough variety, open at one end, except for two specimens that revealed troughs at both ends. One of the latter came from the trash deposits in Pithouse 3 and the other, a whole metate, from Plaza Grid 14. Two metate fragments open at both ends also were recovered from 29SJ 1360 (McKenna 1984:Table 4.18), Pueblo Alto (Windes 1987:339), and 29SJ 627, while Pueblo Bonito yielded just one (Judd 1954:135). Others were recovered from Bc 51 (Woodbury 1939:68) and Bc 362. The latter yielded an unusually high number that were open at both ends (6 of 11 whole metates; Schelberg 1987).

Because open-ended metates would allow materials to spill from both ends, they seemed inefficient for food preparation. We know that metates were occasionally used for pulverizing clay for pottery production, and Judd (1954:137-footnote) believed Room 17 at Pueblo Bonito was devoted to such a task. Whatever their use, these apparently occurred in small numbers in most sites, probably for use unrelated to food preparation. Multiple-trough metates, where a mano smaller than the one that created the initial trough wore a narrower trough (e.g., Windes 1987:Plate 4.15F) may also have marked special use or reuse. Judging from their secondary wear, these metates would seem inefficient for crushing food but perhaps were used for less-specialized reduction of other materials.

No basin metates or "Utah" types (having a shelf at the back of the trough for resting a mano) were recovered. All metates were made of a fine, well-indurated, hard (92 percent), tan or gray sandstone that probably was the same local source for other ground stone tools. Overall, the 29SJ 629 metates were similar in form and dimension to those in contemporary small-house and greathouse sites (Table 4.9).

Distribution

Distribution of metate fragments at 29SJ 629 did not always mirror the mano distribution (Table 4.3). Most metate fragments were recovered from the rooms and pitstructures where the majority were part of wall construction or were derived from collapsed walls. Rooms 1, 3, 6, and 9 each yielded between seven and nine metates or fragments. The seven from Room 1 were all built in the walls except for one fragment mortared upright in the floor for use as a step. Whole trough metates clustered in three areas: three in Rooms 2 and 3, and three in Room 9, while three others came from the Plaza. Only the ones from OP 1 in Room 9 and Plaza OP 14 might

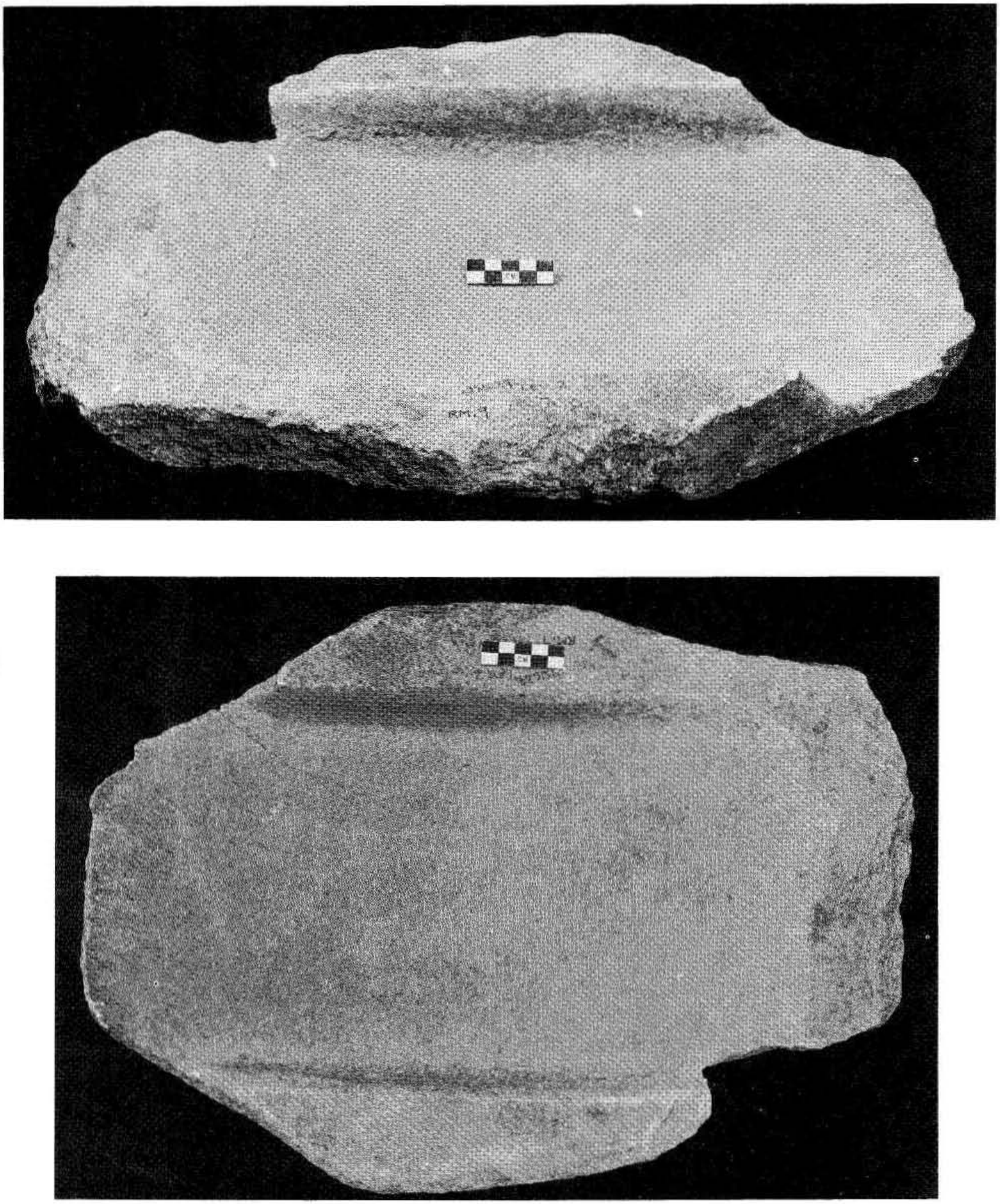


Plate 4.17. *Trough metate (thick variety) from Room 9, Layer 2 (two views) (NPS 16024C, 23738). 5-cm scales.*

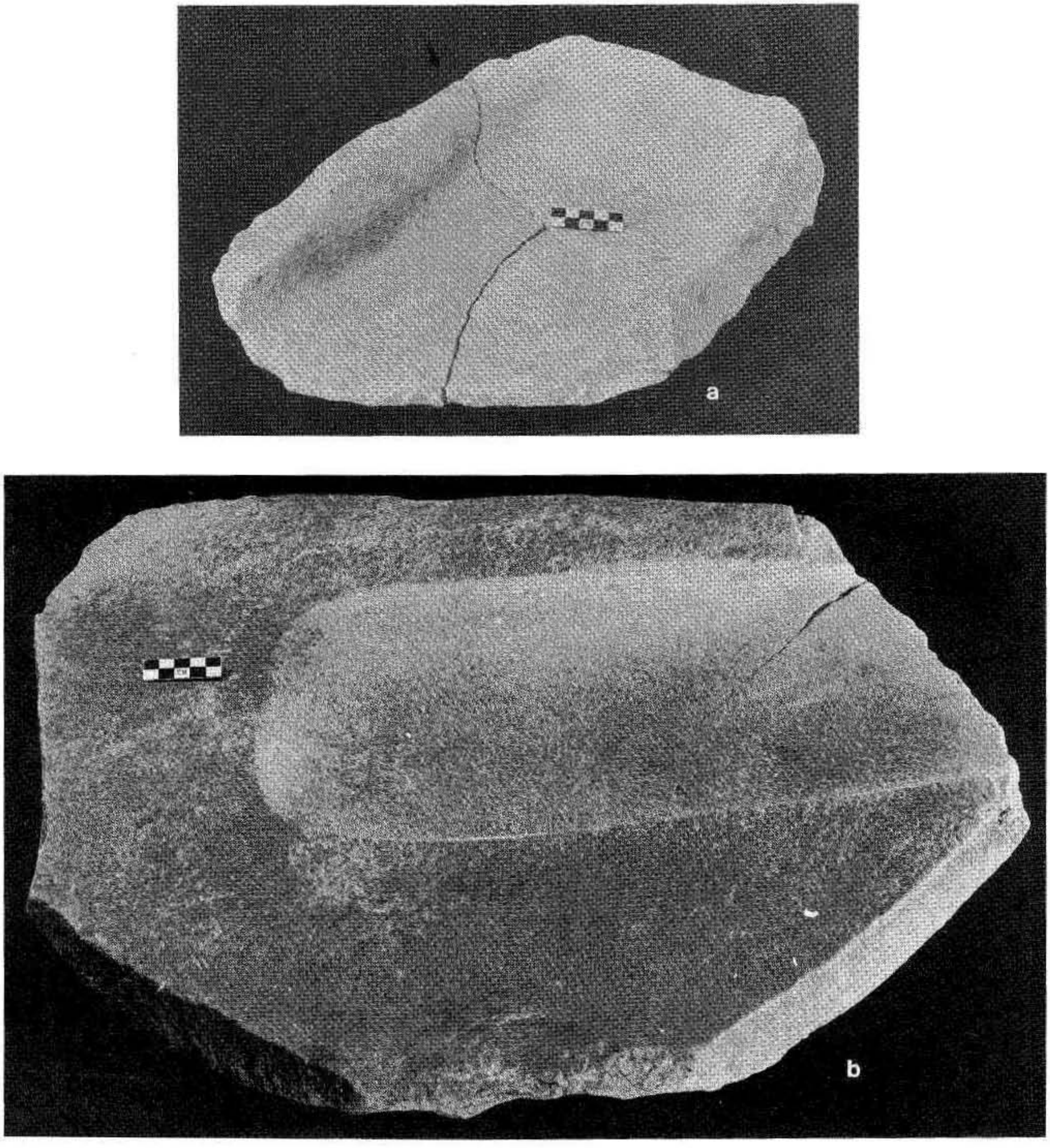
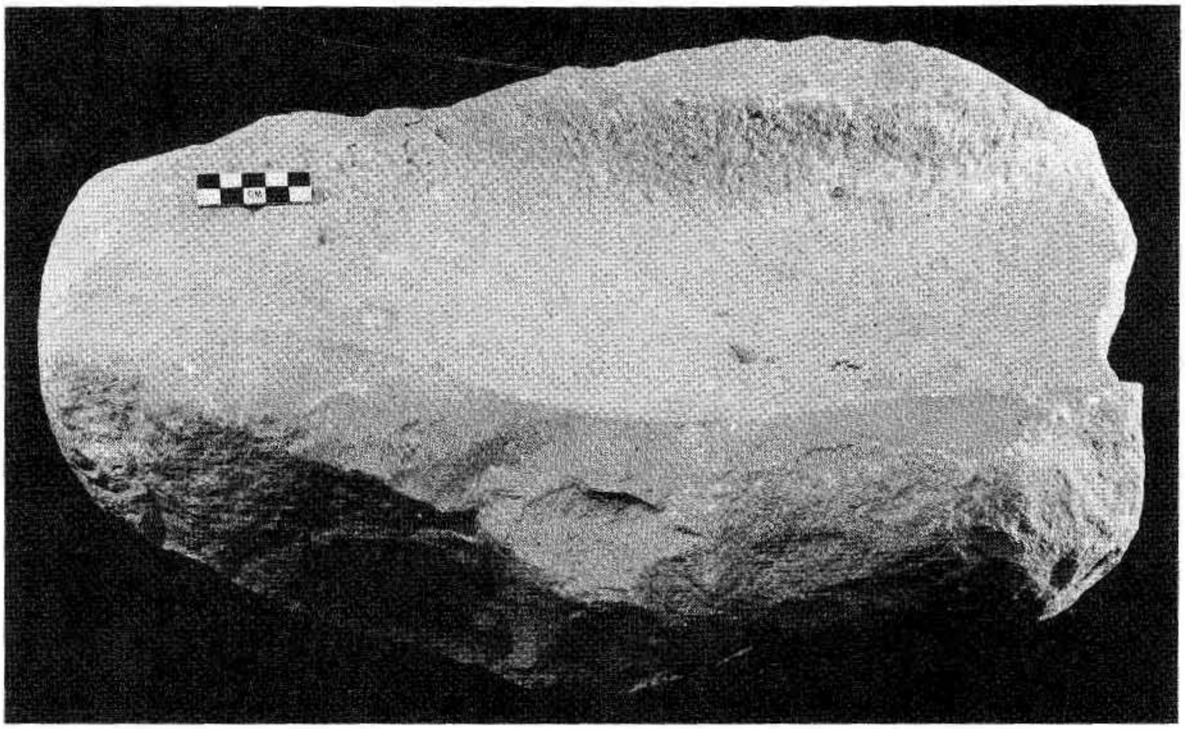


Plate 4.18. *Trough metates from Room 9. a) A thick variety built into the east wall of Bin 3 (NPS 14033C). b) A thin variety from the floor of Other Pit 1 (NPS 23747). 5-cm scales.*



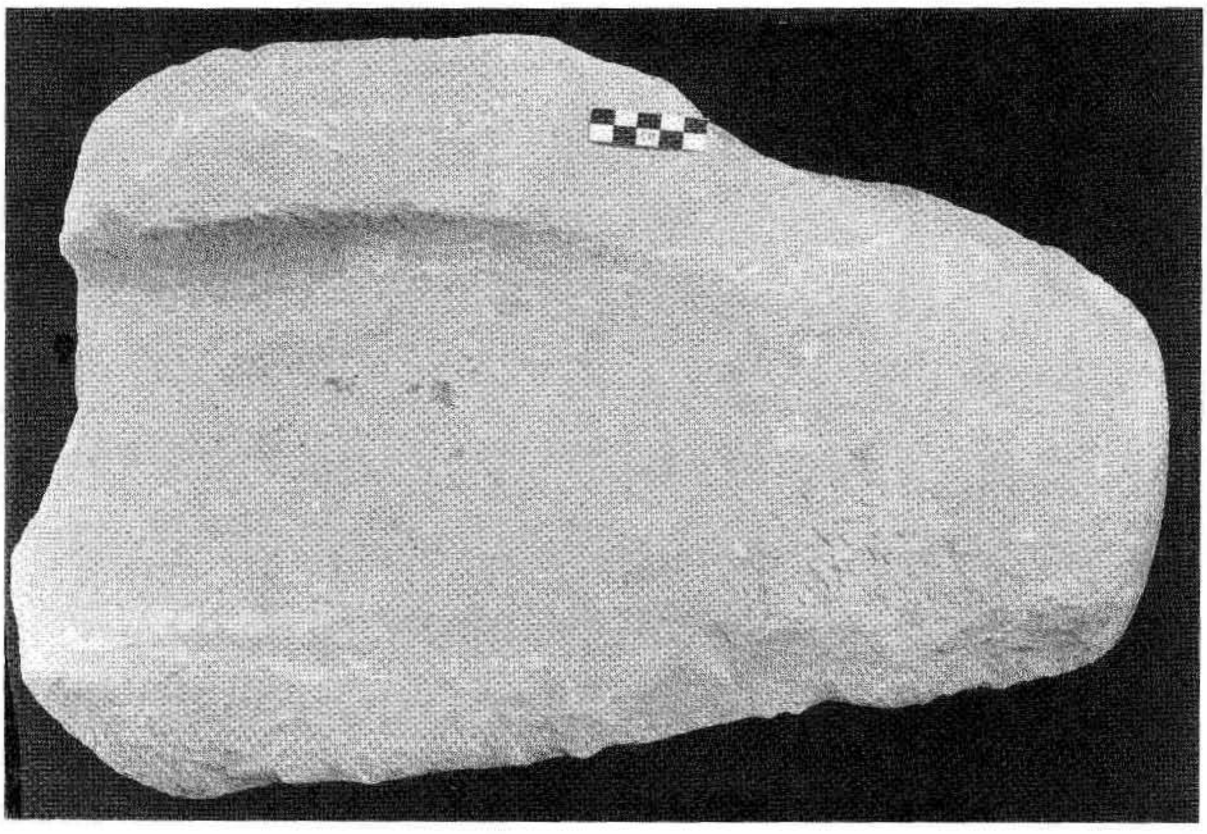


Plate 4.19. *Trough metate (thick variety) from Pithouse 3, Layer 8 (two views) (NPS 16030A and 23744). 5-cm scales.*

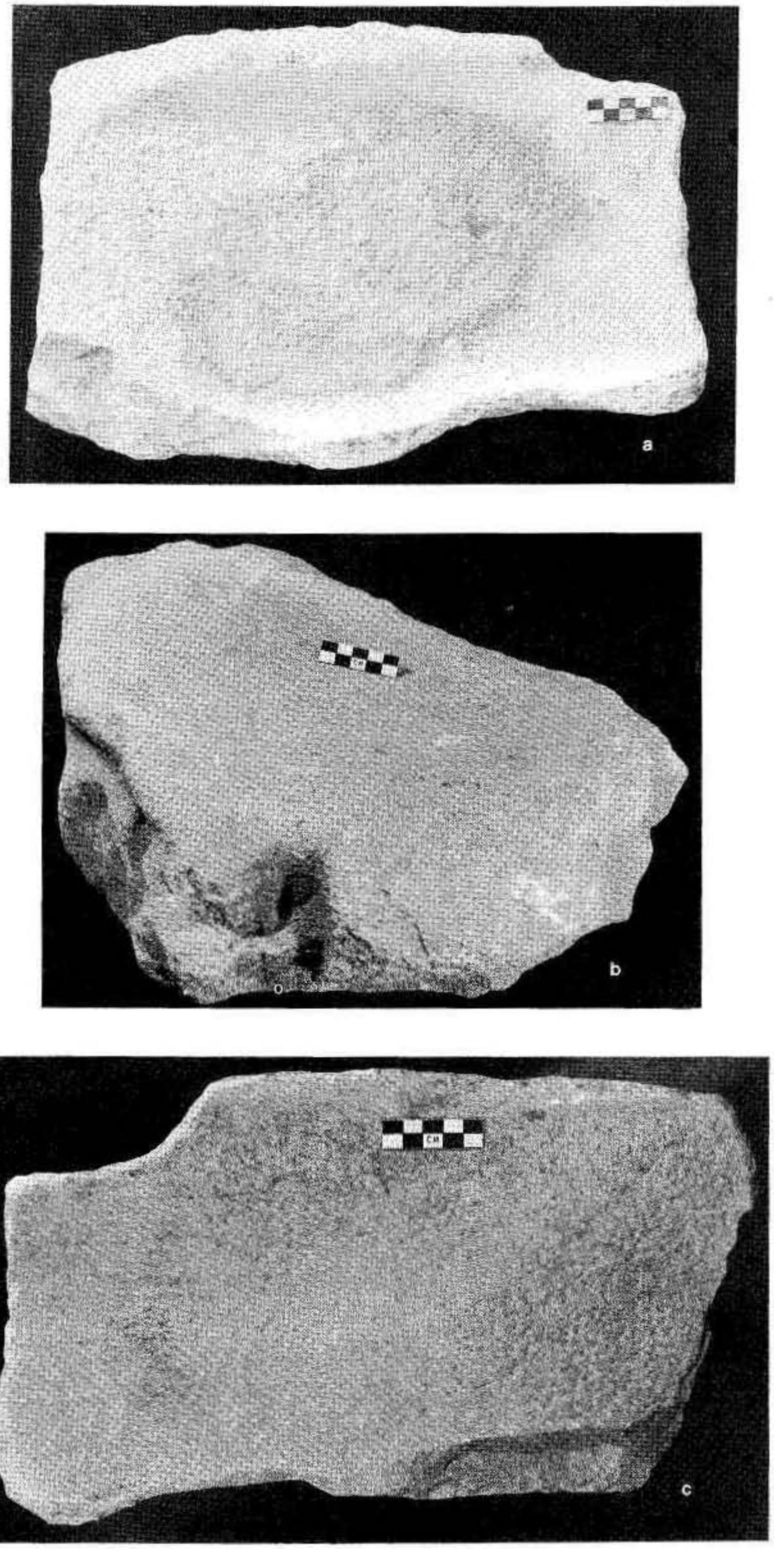


Plate 4.20. *Whole metates from 29SJ 629. 5-cm scales. a) Trough metate (thin variety) from Plaza Grid 14 (NPS 16018). b) Slab metate from Pithouse 2, Layer 4 (NPS 23741). c) Slab metate recovered from in Plaza Firepit 5 (NPS 16017A).*

Table 4.9. A comparison of trough metates from some contemporary small-house sites in the Fajada Gap and South Gap Communities, A. D. 900-1050.

Provenience	No.	Mean	sd	CV %	Range
29SJ 626 East[a]					
Length (cm)	3	46.3	2.0	4.2	44.3 - 48.2
Width (cm)	2	35.2	11.4	32.4	27.1 - 43.2
Thickness (cm)	12	8.5	2.7	32.0	3.6 - 13.7
Weight (kg)	2	19.8	6.6	33.2	15.2 - 24.5
Trough length (cm)	3	45.7	3.3	7.2	42.0 - 48.2
Trough width (cm)	2	21.1	1.3	6.4	20.1 - 22.0
Trough depth (cm)	11	6.9	2.3	33.0	4.3 - 11.9
29SJ 627[b]					
Length (cm)	7	52.0	7.3	14.0	40.0 - 63.0
Width (cm)	7	35.7	6.6	18.4	28.0 - 45.0
Thickness (cm)	7	11.1	1.8	15.9	9.0 - 14.0
Weight (kg)	7	20.1	5.7	28.3	9.0 - 25.3
Trough length (cm)	7	41.4	7.5	18.1	32.0 - 51.0
Trough width (cm)	7	21.4	2.4	11.1	19.0 - 25.0
Trough depth (cm)	7	5.9	4.1	70.7	0.0 - 10.0
29SJ 629[a]					
Length (cm)	11	47.5	6.5	13.6	36.0 - 59.0
Width (cm)	11	34.0	8.3	24.3	27.0 - 54.0
Thickness (cm)	98	7.2	3.0	42.2	2.0 - 18.0
Weight (kg)	9	21.3	8.2	38.4	10.4 - 34.5
Trough length (cm)	10	40.8	3.9	9.4	33.0 - 46.0
Trough width (cm)	12	18.1	2.7	15.2	14.0 - 23.0
Trough depth (cm)	66	4.7	2.1	42.4	1.0 - 10.0
Trough angle (°)[c]	57	40.2	13.1	32.6	15.0 - 85.0

Table 4.9. (continued)

Provenience	No.	Mean	sd	CV %	Range
29SJ 1360[b]					
Length (cm)	9	51.9	7.8	15.0	41.0 - 66.0
Width (cm)	9	35.8	5.9	16.5	25.0 - 42.0
Thickness (cm)	9	12.4	5.2	41.6	5.0 - 20.0
Weight (kg)	9	21.0	7.2	34.2	10.5 - 33.7
Trough length (cm)	9	39.4	4.4	11.1	32.0 - 45.0
Trough width (cm)	9	20.3	1.5	7.4	18.0 - 23.0
Trough depth (cm)	9	7.0	4.2	59.3	1.0 - 13.0
29SJ 392 (Kin Nahasbas)[a]					
Length (cm)	8	48.0	8.1	16.8	38.0 - 64.5
Width (cm)	8	34.7	7.5	21.6	22.0 - 45.5
Thickness (cm)	35	9.2	2.4	26.1	3.0 - 15.0
Weight (kg)	5	20.5	6.2	30.2	11.5 - 26.5
Trough length (cm)	8	41.9	4.1	9.7	35.5 - 47.2
Trough width (cm)	8	20.4	4.6	22.5	11.0 - 25.0
Trough depth (cm)	34	5.8	2.6	44.8	2.0 - 12.0
29SJ 827 (Bc 362)[d]					
Length (cm)	11	48.0	6.4	13.3	41.0 - 60.0
Width (cm)	11	34.7	8.0	23.0	23.0 - 46.0
Thickness (cm)	11	10.5	2.3	21.5	6.0 - 13.0
Weight (kg)	11	25.1	13.0	51.6	9.5 - 55.0
Trough length (cm)	11	42.7	5.7	13.2	30.0 - 51.0
Trough width (cm)	11	19.2	1.3	6.5	17.0 - 21.0
Trough depth (cm)	11	3.5	1.8	49.4	1.0 - 7.0

[a] Data from whole metates and fragments with at least one complete dimension.
[b] Data from only whole metates.
[c] Measured at the lip of the open end.
[d] Site is in the South Gap Community and also yields occupation into the early A.D. 1100s. Based on 2-sample t-tests, there were no dimensional differences at the site between the 5 trough metates open at one end and the 6 open at both ends.

be considered to have been left in primary situ. A tenth one was found in the roof fall in Room 7, where it probably was left on the roof at abandonment. All these locations were close to mealing catchment basins (Volume I, Chapter 7), where the heaviest concentrations of manos and hammerstones were found. Plaza OP 14, which was filled with numerous manos and hammerstones, yielded a mere three metate fragments--not a surprise considering the non-utility of such fragments for food preparation--and a whole trough metate that revealed some use as an anvil. Oddly, despite the presence of true mealing bins in Pithouse 2 and the common occurrence for storage of mealing equipment behind pithouse wingwalls, there was a lack of mealing equipment in Pithouse 2. Perhaps this paucity was related to a relocation of the primary mealing areas and other activities outside of the pithouse in the early A.D. 1000s where, at 29SJ 629, mealing basins were common.

Fortuitously, the ten whole metates equaled the number of mealing catchment basins located around the site that seemed to have been in coeval use near the end of the main occupation. This match does not quite fit because we know that the two slab metates were typologically later and that two others were unusable. We suspect that four to eight metates were in use at one time, two to four per domestic unit, for the multiple paired catchment basins common at the site. If they were all completely mobile metates, and the weight of some might suggest otherwise, only four would be needed for both the inside and outside locations. The number of whole metates recovered from 29SJ 629 seemed unusually high, suggesting that the inhabitants had stored some for eventual reuse, that the site escaped major scavenging, or that it was impractical to carry the metates away because of great distance (Schlanger and Wilshusen 1990).

Reuse

Metates, like other pieces of ground stone, were curated for reuse. Only a single specimen came from the Trash Midden, a finding consistent at other sites (McKenna 1984:Table 4.18; Windes 1987:340). Twelve percent of the 115 fragments were found in wall construction, and 24 percent became other tools. Of the latter 28 tools, most (21, 18 percent of the total) were used as crushers or choppers, perhaps during food reduction, 1 became a mano, 1 was used as a post shim, 2 became firedogs (andirons), 2 became active abraders, and 1 was used as an anvil. The amount of identified reuse was consistent with findings at 29SJ 1360, where 24 percent were reused tools. 29SJ 627, however, revealed tool reuse of 48 percent of 208 specimens, with most used as crushers/choppers (29, 14 percent) and anvils (28, 14 percent). The high frequency of anvils at 29SJ 627 was unusual and suggested a group of activities that were rare at the smaller contemporary sites of 29SJ 626 East, 29SJ 629, and 29SJ 1360 (see Akins 1987:364-367). Anvils were also common at Pueblo Alto, where 44 percent of the metate fragments were reused as tools.

In Chaco Canyon, the amount of ground stone recovered from the walls and wall fall often serves as a crude chronological marker--the latest constructions often yielded the most tools and tool fragments. This pattern held at 29SJ 629, where the greatest number of metate fragments were found in the late walls of Rooms 1 and 9. Many of the fragments recovered from Pithouse 2, most of them dumped into the ventilator shaft, allowed the trail of reuse to be followed for several metates (Table 4.10). For instance, pieces of metates in the mealing area of Pithouse 2 fit a fragment from the Kiva ventilator construction. This suggested that the fragments recovered from the pithouse floor during construction of the Kiva were reused by the Kiva builders. Where metate fragments and manos were found together in clusters at 29SJ 629, their association probably was related to common reuse strategies (e.g., in construction) rather than marking areas of food preparation (cf., Windes 1987:340, 343).

Burned fragments occurred in 43 percent of the 115-piece 29SJ 629 sample, indicating the high reuse of fragments for hearth construction. At Pueblo Alto, only 20 percent were burned, while 23 percent were recovered burned at 29SJ 627 and 29SJ 1360 and 13 percent at 29SJ 626 East. Judd (1954:136) found that metate fragments also enjoyed considerable reuse life at Pueblo Bonito. Over the life of a site, reuse undoubtedly increased because more material became available as tools wore out. We did not find metates used for lining and covering burial crypts, although it was common in the Casa Rinconada area small houses across from Pueblo Bonito. Many of

Table 4.10. Matches of metate fragments at 29SJ 629.

Provenience	Field Specimen No.
Metate A:	
Kiva, Level 8	388
Kiva, Level 9	584
Pithouse 2, Ventilator shaft fill (Layer 1)	3372
Metate B:	
Room 9, Bin 3 (Level 1)	614
Room 9, Level 3 (floor fill)	731
Metate C:	
Room 1, in wall in southwestern corner	3351
Pithouse 2, Ventilator shaft fill (Layer 1)	3372
Metate D:	
Pithouse 2, Ventilator shaft fill (Layer 1)	275
Room 9, Floor 2, Posthole 1 shim	2594
Metate E:	
Pithouse 2, Ventilator shaft fill (Layer 1)	3372
Pithouse 2, Layer 1 (backhoe trench)	3513
Metate F:	
Kiva 1, Ventilator construction (above tunnel)	2741
Pithouse 2, general fill (backhoe trench)	2813
Pithouse 2, Layer 5 (floor fill) (Wing Wall Area)	2938
Pithouse 2, Layer 5 (floor fill) (Wing Wall Area)	2942
Pithouse 2, Ventilator shaft fill (Layer 1)	3372

the small-house middens in Chaco Canyon, including the Fajada Gap Community, were covered with large, flat slabs and metates that were encountered when burials were looted from them near the turn of the century.

Kill holes in metates, where a hole was ritually knocked through the center of the trough, were rarely found in Chacoan sites. None were found at 29SJ 629 and the solitary example from 29SJ 1360 was thought to have been damaged from incidental reuse (McKenna 1984:266). A few were found at Pueblo Alto (Windes 1987:Plates 4.14-4.15), but it is difficult to separate those damaged from a ritual act from the more likely possibility of breakage during the sharpening process.

Form and Context

Of the whole metates recovered, the amount of trough-wear placed them into two categories: relatively new and unused, or heavily worn. Five of the eight trough metates exhibited wear exceeding 67 percent of the total metate thickness--clearly, well-worn specimens. The two unusable metates were in this category and all might be considered at or near the end of their use lives. One of these had been placed in Room 9's Other Pit 1, where it could have been cached for future use, but its weight (29 kg) would have made it difficult to remove regularly without breaking the pit rim or causing back injury. The newer metates, with less than 25 percent wear, were recovered in the refuse fill of Room 2 and the fill in Plaza Grid 14. There was no information on the metate recovered from OP 14, which could not be relocated.

Thick and thin metate types were found at Pueblo Alto (Windes 1987) and Pueblo Bonito (Judd 1954:135-136), and these also occurred in the small sites. A bar graph of 29SJ 629 metate thicknesses revealed slight bimodality between 7 and 8 cm thickness, a finding paralleled by the 29SJ 627 metates, with an overall range of 2 to 18 cm thickness for the entire sample. Nineteen of the 98 measurable 29SJ 629 specimens came from metates 4 cm or less thick. Because both mealing bins and isolated catchment basins were found at the site, two different metate types could have been in coeval use, with the thin ones made for the mealing bins and deep trough ones for portable use at the catchment basins. We would expect that mobile metates would reveal greater bottom wear than those built into bins, but in this small sample, all showed little bottom wear.

Despite the general philosophy that slab or flat metates were for use in bins, enclosed trough metates have been found at 29SJ 627 (Truell 1992), Chetro Ketl (Woodbury 1939:68), the Aztec Ruins (Morris 1928:369), and in Arizona (Bartlett 1933:17, Figures 4-5). Thin, shallow-trough metates may have become prominent in the A.D. 1000s when fixed mealing bins first appeared, although thin metates are known back into Basketmaker III times in Chaco Canyon. Our whole metate sample (n = 9) also exhibited two metate sizes based on length: those less than 45 cm (n = 4) and those more than 49 cm (n = 5), but the sample was small and may not be indicative of two standard sizes.

Summary

Few whole metates were generally left at A.D. 900s/1000s sites, although there were unusually high numbers recovered from 29SJ 629 and Bc 362. Many of these, however, were well-worn specimens close to the end of their use lives. Nevertheless, the numbers of fragments suggest that food reduction was a major task at 29SJ 629 and other contemporary sites. The use of shallow-trough metates might have marked the transition between an increased emphasis on centralizing specific loci for corn processing with the establishment of bins, or it might be related to changing subsistence strategies brought on by changing environmental conditions or by changes in social organization. Although the different metate types at these sites could have been informative regarding shifting social or economic strategies, the poor contexts and vast numbers of fragments discourage thorough investigations into these levels of behavior.

Percussion Tools (Unhafted Hammers)

Hand-held tools used for battering were commonplace in Anasazi sites. These were commonly recognized as spherical stones battered at the ends and designated as hammerstones. Tools used for battering, however, were not limited to those cobble-shaped stones that easily fit the hand. A wide assortment of stones, often discarded tools or tool fragments, were used as hammers, probably for a variety of tasks. Thus, manos and mano fragments, metate fragments, polishing stones, abraders, and worn-out axes, to name a few, often found final use as a battering agent (Plate 4.4a-b). Hammerstones, in particular, have been one of the most prolific tools recovered from Chaco Canyon sites (e.g., Judd 1954:118; 1959:135) but have typically warranted little study. In most accounts, hammers are described as multi-functional tools that, when compared to historic analogs, were used for a great variety of tasks.

Hammerstones

A broad range of ethnographic uses have been attributed to hammerstones (e.g., Gifford 1940; Hough 1919:270-271), including plant processing, sharpening (roughening) metate surfaces, shaping masonry, striking flakes from cores, and breaking bone. Consequently, hammerstones have gained a widespread reputation for multi-purpose use in prehistoric sites (e.g., Haury 1976:279; Judd 1954:118; Woodbury 1954:91), which at times has led to their being dismissed as useless for understanding human behavior (e.g., Haury

1976:279). Typically, hammerstone contexts in excavated sites were uninformative regarding specific tool tasks (e.g., McKenna 1984:245). More recently, however, hammerstones have been correlated with rising investments in architectural construction (Hruby 1988:349; Phagan 1988:194) and as a major tool component in food processing (Windes 1987). Although it is often true that hammerstones were ubiquitous in sites, their spatial and temporal distributions at 29SJ 629 (Table 4.11) suggest use for only a few specific tasks.

Materials

Hammerstones in sites dating before A.D. 900 were predominately of cherts, chalcedonies, and quartzites exhibiting fair to good fracturing qualities, although use left a surface dulled by concussion marks (Wills 1977). These tools were obtained primarily from local materials (e.g., Ojo Alamo gravels on top of the mesas and as clasts in alluvial deposits). After the A.D. 900s, there was greatly increased use of chunks of splintery, petrified wood for hammerstones that was also obtained from the general Chaco Canyon vicinity. Although the increase in the splintery silicified wood may be related to the exhaustion of other materials (Wills 1977), it may also have suggested changing technologies--in this case, the greatly increased investment in corn processing tools. Conversely, the reduced use of quartzite and chert hammerstones, which were efficient tools for chipped stone tool production (e.g., Semonov 1973; Speth 1972), also may have signaled the decreased emphasis on activities associated with chipped stone tools. Splintery petrified wood hammerstones and their debris, however, were not associated with the debris from bead-making activities in Chaco Canyon at Pueblo Alto and 29SJ 629, as previously reported (Windes 1987:302); instead, it was chalcedonic petrified wood.

Overall, the materials used for 29SJ 629 hammerstones (Table 4.13) comprised three major groups: splintery silicified wood (38 percent of the total), cherty silicified wood (14 percent), and quartzite (27 percent). This contrasted with the chipped stone debris and the materials preferred for cores, which were dominated by cherts and chalcedonies (Tables 4.13-4.14; i.e., Cameron, this volume). Clearly, materials, morphology, size, and wear separate hammerstones from other tool categories, especially cores. The hard sandstone hammers commonly used at Pueblo Alto during wall construction (Windes 1987) were absent from 29SJ 629. While reuse of hammerstones and rarely, tools reused as hammerstones (e.g., Plate 4.4), occurred, it seemed far less a problem than that of ground stones. Multiple use probably was most common among specimens identified as polishing stones, the vast majority having been made of quartzite and revealing battering (Akins 1980).

The fracturing qualities of quartzite and splintery silicified wood make useful hammers that are preferable over fine crystalline, siliceous materials. Additionally, chunks of the splintery petrified wood and cobbles and pebbles of quartzite were locally common within the Alamo gravels on the mesa tops, in the surrounding Kirtland-Fruitland formation badlands, and immediately adjacent to the site as clasts in the alluvial gravels. The continual sharp, irregular edges of splintery silicified wood produced by concussion made effective tools for roughening (sharpening) the use surfaces of manos and metates--in essence this material (type 1110) can be considered self-sharpening. Quartzite cobbles, on the other hand, particularly those made from hand-size pebbles or cobbles, were not suited for sharpening because they became quickly dulled and hurt the hand of the user (Dodd 1976, 1979). Quartzite's tough, durable qualities suggested better use for shaping, crushing, and breaking rather than for sharpening. Hammerstones of these two materials have been found associated with mealing equipment at Pueblo Alto (e.g., Windes 1987:303-308) as well as 29SJ 627, 29SJ 629, and 29SJ 1360.

Flakes and splinters generated from hammerstone use would be expected to co-occur with hammerstones in the use areas or when the tools were thrown out. In the Trash Midden, chipped stone and the hammerstones were of similar materials. Other Pit 14, where the identity of the tool assemblage used for food reduction seemed certain, debitage and hammerstones of splintery silicified wood debitage comprised the highest frequencies, followed by cherty silicified woods and quartzites, among others (Cameron, this volume). In this case, then, much of the chipped stone debris could be attributed to wastage from hammerstone use.

Table 4.11. Distribution of hammerstones at 29SJ 629.[a,b]

Material	Wgt. Class	Rooms 2 3 4 7 8 9	Kiva Fill	Pithouse 2 Layers 4 5 6	Pithouse 2 Fl Vent 1 2	Pithouse 3 Fill Fl.	Trash Midden Grids 64 65 70 71 76 82 88	Plaza Grids 8 14 35 Other	Pits FP6 OP6 OP12	Plaza OP 14 Layers 1-2 3 4 5 6 7 Fl.	Totals	%
1011	2	- - - - - -	-	- - -	- -	- 1	- - - - - - -	- - - -	- - -	- - - 1 2 1 1	6	1.9
	4	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - -	- - - - 1 - -	1	
											0.3	
1040	2	- - - - - -	-	- - -	- -	- -	- - - - - - -	1 - - -	- - -	- - - - - 1 -	2	
											0.6	
1042	1	- - - - - -	-	- - -	- -	- -	- - - - - 1 -	- - - -	- - -	- - - - - - -	1	
	5	- - - - - -	1	- - -	- -	- -	- - - - - - -	- - - -	- - -	- - - - - - -	0.3	
											1	
											0.3	
1051	1	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - -	- - - 1 - - -	1	
	2	- - - - - -	-	- - -	- -	- -	- 1 - - - - -	- - - -	- - -	- - - - - - -	0.3	
											1	0.3
1052	1	- - - - - -	-	- - -	- -	- -	- - - - 1 - -	- - - -	- - -	- - - - - - -	1	0.3
	2	- - - - - -	-	- - -	- -	- -	- 1 - - - - -	- - - -	- - -	- - - - - - -	1	0.3
	3	- - - - - -	-	- - -	- -	1 -	- - - - - - -	- - - -	- - -	- - - - - - -	1	0.3
1075	1	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - -	- 1 - - - - -	1	0.3
1091	1	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - -	- - 1 - - - -	1	0.3
	3	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - -	- - - - - 1 1	2	0.6
	4	- - - - - -	-	- - -	- -	1 -	- - - - - - -	- - - -	- - -	- - - - - - -	1	0.3
	8	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - -	- - 1 - - - -	1	0.3
1110	1	- - - - - 1	-	- - -	- -	1 -	- - - - - - 2	1 1 - -	- - -	2 - - - 5 1 1	16	5.0
	2	- - - - - -	1	- 1 -	- 1	4 1	- 1 - 1 - - 1	9 8 - 5	1 2 -	21 5 - 13 9 2	67	20.9
	3	- - - - - -	-	1 - -	- -	2 -	- - - - - - -	4 2 - 2	1 - -	- - 2 - 6 3 -	24	7.5
	4	- - - - - -	1	- - -	- -	3 2	- - - - - - -	1 - - 1	- - -	- - - - 1 2 -	10	3.1
	5	- - - - - -	-	- - -	- -	1 -	- - - - - - -	- - - -	- - -	- - - - - 1 -	2	0.6
	10	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - -	- - - - 1 - -	1	0.3
1111	1	- - - - 1 -	1	- - -	- -	1 -	- - - - - - 1	2 - - -	- - -	- - - - - - -	6	1.9
	2	- - - - - -	-	- - -	- -	- -	- - - - - - -	1 - - -	- - -	- - - - - 1 -	2	0.6
1112/1113	1	- - - - - -	-	- - -	- -	3 -	- 1 1 - 1 - -	- - - 3	- - -	- - - - 2 3 2	16	5.0
	2	1 2 - 2 - -	-	- - -	1 -	2 -	- 1 - - 1 1 -	3 - - 2	- - -	- - 2 1 4 - -	23	7.2
	3	- - - - - -	-	- - -	- -	1 -	- - - - - - -	- - - 1	- - -	- - - - 1 - -	3	0.9

Table 4.11. (continued)

Material	Wgt. Class	Rooms 2 3 4 7 8 9	Kiva Fill	Pithouse 2 Layers 4 5 6	Pithouse 2 Fl Vent 1 2	Pithouse 3 Fill Fl.	Trash Midden Grids 64 65 70 71 76 82 88	Plaza Grids 8 14 35 Other	Pits FP6 OP6 OP12	Plaza OP 14 Layers 1-2 3 4 5 6 7 Fl.	Totals	%
1120	1	- - - - - -	-	- - -	- -	- -	- - - - - - -	- 1 - -	- - -	- - - - - - -	1	0.3
	2	- - - - - -	-	- - -	- -	1 -	- - - - - - -	- - - -	- - -	- - 2 - - - -	3	0.9
1130	3	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	1 - -	- - - - - - -	1	0.3
1140	1	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - 1	- - -	- - - - - - -	1	0.3
	2	- - - 1 - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - -	- - 1 - - - -	2	0.6
	6	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - -	- - 1 - - - -	1	0.3
1231	1	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - -	- - 1 - - - -	1	0.3
2101	3	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - -	- - - - 3 - -	3	0.9
2123	6	- - - - - -	-	- - -	- -	- -	- - - - - - -	1 - - -	- - -	- - - - - - -	1	0.3
2125	5	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - -	- - - - 1 - -	1	0.3
	6	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - 1 -	- - -	- - - - - - -	1	0.3
	8	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - 1	- - -	- - - - - - -	1	0.3
2200	1	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - -	- - 1 - - - -	1	0.3
	3	- - - - - -	-	- - -	- -	- -	- - - - - - 1	- - - -	- - -	- - - - - - -	1	0.3
	7	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - -	- - 1 - - - -	1	0.3
2201	1	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - -	- - 1 - - - -	1	0.3
2202	1	- 1 - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - -	- - - - 1 - -	2	0.6
	2	- - - - - -	-	- - -	- -	2 -	1 1 - - - - -	- 1 - -	- - -	- - 2 - - - -	7	2.2
	3	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - -	- - - - 1 - -	1	0.3
	4	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - -	- - 1 - - - -	1	0.3
	6	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - 1 -	- - -	- - - - - - -	1	0.3
	8	- - - - - -	-	- - -	- -	1 -	- - - - - - -	- - - -	- - -	- - - - - - -	1	0.3
2850	2	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - -	- - - - 1 - -	1	0.3

Table 4.11. *(continued)*

Material	Wgt. Class	Rooms 2 3 4 7 8 9	Kiva Fill	Pithouse 2 Layers 4 5 6	Pithouse 2 Fl Vent 1 2	Pithouse 3 Fill Fl.	Trash Midden Grids 64 65 70 71 76 82 88	Plaza Grids 8 14 35 Other	Pits FP6 OP6 OP12	Plaza OP 14 Layers 1-2 3 4 5 6 7 Fl.	Totals	%
4000	1	- 2 1 - - -	-	- - -	- -	9 -	1 - - 1 1 - 1	- 1 - 4	- - -	- 2 - - 1 - -	24	7.5
	2	2 1 - - 1 2	2	- - -	- -	3 -	1 1 - - - - -	- 1 1 3	- - -	- 4 5 - 4 1 -	32	10.0
	3	1 1 - - - -	2	- - -	- -	4 1	- - 1 - - - -	- - - 3	- - -	- - - 1 3 1 -	18	5.6
	4	- 1 - - - -	-	- - 1	- -	- -	- - - - - - -	- - 1 -	- - -	- - - - - - -	3	1.0
	5	- - - - - -	-	- - -	- -	- -	- - - - - - 2	- - - -	- - -	- - - - - - -	2	0.6
	6	1 - - - - -	-	- - -	- -	2 -	- - - - - - -	- - - -	- - -	- - - - - - -	3	0.9
	8	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - -	- - - - - 1 -	1	0.3
	11	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	1 - -	- - - - - - -	1	0.3
	unkn.	- - - - - -	-	- - -	- -	1 -	- 4 - - 1 - -	- - - -	- - -	- - - - - - -	6	1.9
4200	1	- - - - - -	-	- - -	- -	- -	- - - - - - -	- - - -	- - 1	- - - - - - -	1	0.3
4370	4	- - - - - -	-	- - -	- -	- -	- - - - - - 1	- - - -	- - -	- - - - - - -	1	0.3
Subtotals		5 8 1 3 2 3	8	1 1 1	1 1	43 5	3 11 2 1 6 2 9	23 16 4 26	4 2 1	4 8 27 4 52 26 6	320	99.3
Totals		22	8	5		48	34	69	7	127	320	
%		6.8	2.5	1.6		15.0	10.6	21.6	2.2	39.7	100.0	

[a] Weight classes: 1 = <100g 4 = 301-400g 7 = 601-700g 10 = 901-1000g
2 = 101-200g 5 = 401-500g 8 = 701-800g 11 = 1000-1100g
3 = 201-300g 6 = 501-600g 9 = 801-900g

[b] Includes unanalyzed hammerstones listed in Table 4.12.; four hammerstones unaccounted for and counted in totals.

Table 4.12. Hammerstones and fragments not analyzed by Wills but recovered by Cameron during her lithic analysis of 29SJ 629.

Field Specimen Number	Provenience	Material	Weight (grams)	Whole/ Fragment
1301-1	Room 3, Floor 1	1112	153.7	W
2238-3	Room 3, Floor 1, OP 2	4000	162.6	W
434	Room 8, Layer 1 B/C	4000	118.6	W
479	Room 9, Level 1, N1/2	1110	87.3	W
2012-1	Kiva, Level 11	1110	69.3	W
2263-1	Pithouse 3, Level 7 (E1/2)	1110	8.5	F
2263-1	Pithouse 3, Level 7 (E1/2)	1113	71.0	F
1701	Pithouse 3, Ventilator 3, Level 1	4000	19.6	F
46A	Grid 3, surface	1054	94.0	F
135	Grid 21, Level 1	4000	96.5	W
143	Grid 28, Level 1	4000	63.6	W
219	Grid 49, Level 1	4000	19.4	F
277	Grid 20, Level 1	1112	82.2	W
277	Grid 20, Level 1	4000	195.4	W
1275	Plaza Grid 8, Level 2	1110	2.7	F[a]
1275	Plaza Grid 8, Level 2	1110	129.0	F
1275	Plaza Grid 8, Level 2	1110	83.6	F
1275	Plaza Grid 8, Level 2	1112	105.6	W
1406	Plaza Grid 9, Level 4	4000	21.8	F
1196	Plaza Grid 13, Level 1	4000	110.0	F
2760	Plaza Grid 14, OP 14 (Layer 4)	1110	31.3	F[b]
1965	Plaza Grid 16, Level 1	1110	105.5	W
1965	Plaza Grid 16, Level 1	1110	151.6	F
89A	Trash Midden 49, NE1/4, surface	4000	35.1	F

Table 4.12. (continued)

Field Specimen Number	Provenience	Material	Weight (grams)	Whole/ Fragment
1379	Trash Midden 65, Level 2	1053	57.4	F
1413	Trash Midden 65, Level 3	1053	29.0	F
1599	Trash Midden 82, Layer 1, Level 1	4000	5.1	F?
1036	Trash Midden 88, surface	1110	90.6	W

[a] Splinter.
[b] Recovered in 33 splinters.

Table 4.13. Hammerstone material frequency at 29SJ 629.

Material Type	Frequency	Percent	All[a] Cores %	All[a] Chipped Stones %
Chert/chalcedony (miscellaneous):	(24)	(9.6)	(19.6)	(7.0)
1011 (fossiliferous chert)	7	2.2	-	-
1040 (Brushy Basin chert)[b]	2	0.6	-	-
1042 (red/purple chert)	2	0.6	-	-
1075 (dark brown chert)	1	0.3	-	-
1091 (chalcedonic Pedernal chert)[b]	5	1.5	-	-
1111 (silicified wood, rod inclusions)	8	2.5	-	-
1120 (red silicified wood)	4	1.2	-	-
1130 (palm wood)	1	0.3	-	-
1231 (yellow moss jasper)	1	0.3	-	
High Surface Chert:	(6)	(1.9)	(10.3)	(8.7)
1051 (white chert, black mossy inclusions)	2	0.6	-	-
1052 (clear chalcedony)	3	0.9	-	-
1053 (clear chalcedony, black mossy inclusions)	1	0.3	-	-
Splintery Silicified Wood:	(122)	(37.7)	(1.9)	(8.2)
1110 (dark)	122	37.7	-	-
Cherty Silicified Wood:	(42)	(13.0)	(42.1)	(33.4)
1112 (dark)	39	12.0	-	-
1113 (light)	3	0.9	-	-
Chalcedonic Silicified Wood:	(4)	(1.2)	(21.5)	(36.6)
1140 (light)	4	1.2	-	-
Sandstone:	(7)	(2.2)	(0.0)	(0.5)
2101 (Chuska sandstone)	3	0.9	-	-
2123 (Cliff House formation)	1	0.3	-	-
2125 (Cliff House formation)	3	0.9	-	-

Table 4.13. (continued)

Material Type	Frequency	Percent	All[a] Cores %	All[a] Chipped Stones %
Quartzite Sandstone:	(17)	(5.2)	(3.7)	(2.6)
2200 (miscellaneous)	3	0.9	-	-
2201 (Brushy Basin/Morrison?)	1	0.3	-	-
2202 (Nacimiento)[b]	13	4.0	-	-
Quartzite:	(90)	(27.8)	(0.9)	(3.0)
4000 (undifferentiated)	47	14.5	-	-
4002 (gray)	3	0.9	-	-
4005 (miscellaneous cobbles)	40	12.3	-	-
Other:	(5)	(1.5)	-	-
2700 (limestone?)	1	0.3	-	-
2850 (undifferentiated fossil)	1	0.3	-	-
4200 (argillite)	1	0.3	-	-
4370 (metarhyolite)	2	0.6	-	-
	—	—	—	—
Totals	324	99.6	107	6,985
Group %		(100.1)	(100.0)	(100.0)

[a] Number of cores analyzed at site = 107; number of pieces of chipped stone (includes cores and other tools) = 6,985. See Cameron, this volume. Four pieces without provenience.

[b] Not local to the Chaco area (see Cameron, this volume).

Table 4.14. Mean weights of hammerstones and cores by selected materials at 29SJ 629 compared with 29SJ 627 and 29SJ 1360.[a]

Material Class	Hammerstones	Cores
All: 29SJ 629: (Total):	(272)	(107)
Mean (g)	190.2	57.0
sd	141.0	76.8
CV %	74.1	134.8
Range (g)	13-1,018	5.8-614.8
High Surface Chert 1051-1054 (Total):	(0)	(10)
Mean (g)	-	53.0
sd	-	24.0
CV %	-	45.3
Range (g)	-	27.6-91.8
Splintery Silicified Wood 1109-1110 (Total):	(115)	(4)
Mean (g)	186.3	100.9
sd	109.6	32.1
CV %	58.8	31.8
Range (g)	34-989	65.2-134.6
Cherty Silicified Wood 1112-1113 (Total):	(41)	(46)
Mean (g)	118.0	40.8
sd	54.7	31.5
CV %	46.4	77.3
Range (g)	25-283	7.1-133.9
Chalcedonic Silicified Wood 1140-1145 (Total):	(4)	(23)
Mean (g)	191.5	31.1
sd	214.0	21.1
CV %	111.7	67.7
Range (g)	13-502	7.1-77.4
Quartzite 4000-4005 (Total):	(56)	(2)
Mean (g)	213.3	67.6
sd	168.6	29.4
CV	79.1	43.5
Range (g)	53-1,018	46.8-88.4
All: 29SJ 627: (Total):	(140)	-
Mean (g)	230.3	-
sd	153.1	-
CV	66.5	-
Range (g)	48-1,051	-
All: 29SJ 1360: (Total):	(80)	-
Mean (g)	236.7	-
sd	152.0	-
CV	64.2	-
Range (g)	57-751	-

[a] 29SJ 629 limited to sample analyzed by Wills (1977).

Table 4.15. *Hammerstone material frequency in the four largest hammerstone assemblages at 29SJ 629.*

Material Type	Plaza Other Pit 14 Number	Plaza Other Pit 14 Percent	Plaza Grids 8-9, 13-14 Number	Plaza Grids 8-9, 13-14 Percent	Pithouse 3 Number	Pithouse 3 Percent	Trash Midden Number	Trash Midden Percent
Chert/chalcedony:	(15)	(11.8)	(5)	(12.8)	(4)	(8.3)	(2)	(5.9)
1011 (fossiliferous chert)	6	4.7	-	-	1	2.1	-	-
1040 (Brushy Basin)[a]	1	0.8	1	2.6	-	-	-	-
1042 (red/purple chert)	-	-	-	-	-	-	1	2.9
1075 (chert, dark miscellaneous	1	0.8	-	-	-	-	-	-
1091 (Pedernal chert)	4	3.1	-	-	1	2.1	-	-
1111 (rodlike inclusions)	1	0.8	3	7.8	1	2.1	1	2.9
1120 (red)	2	1.6	1	2.6	1	2.1	-	-
High Surface chert:	(1)	(0.8)	-	-	(1)	(2.1)	(3)	(8.8)
1051 (white chert, black mossy)	1	0.8	-	-	-	-	1	2.9
1052 (clear chalcedony)	-	-	-	-	1	2.1	2	5.9
Splintery silicified wood:	(57)	(44.9)	(26)	(66.7)	(14)	(29.2)	(5)	(14.7)
1110 (dark)	57	44.9	26	66.7	14	29.2	5	14.7
Cherty silicified wood:	(16)	(12.6)	(3)	(7.8)	(6)	(12.5)	(6)	(17.6)
1112/1113 (dark and light)	16	12.6	3	7.8	6	12.5	6	17.6
Chalcedonic silicified wood:	(2)	(1.6)	-	-	-	-	-	-
1140 (light)	2	1.6	-	-	-	-	-	-
Sandstone:	(4)	(3.1)	(1)	(2.6)	-	-	-	-
2101 (Chuska sandstone)	3	2.4	-	-	-	-	-	-
2123 (Cliff House formation)	-	-	1	2.6	-	-	-	-
2125 (Cliff House formation)	1	0.8	-	-	-	-	-	-
Quartzitic sandstone:	(8)	(6.3)	(1)	(2.6)	(3)	(6.3)	(3)	(8.8)
2200 (miscellaneous)	2	1.6	-	-	-	-	1	2.9
2201 (Morrison)	1	0.8	-	-	-	-	-	-
2202 (Nacimiento)[a]	5	3.9	1	2.6	3	6.3	2	5.9

Table 4.15. *(continued)*

Material Type	Plaza Other Pit 14 Number	Plaza Other Pit 14 Percent	Plaza Grids 8-9, 13-14 Number	Plaza Grids 8-9, 13-14 Percent	Pithouse 3 Number	Pithouse 3 Percent	Trash Midden Number	Trash Midden Percent
Quartzite:	(23)	(18.1)	(2)	(5.1)	(20)	(41.7)	(14)	(41.1)
4000-4005 (undifferentiated)	23	18.1	2	5.1	20	41.7	(14)	(41.1)
Other:	(1)	(0.8)	(1)	(2.6)	(0)	(0.0)	(1)	(2.9)
2850 (undifferentiated fossil)	1	0.8	-	-	-	-	-	-
4370 (metarhyolite)	-	-	1	2.6	-	-	1	2.9
Totals	127	100.1	39	100.4	48	100.2	34	99.7
Group %	-	(100.0)	-	(100.2)	-	(100.1)	-	(99.8)
Mean weight (g)	181.3		195.3		219.0		141.6	
sd	139.4		167.7		148.5		91.3	
CV %	76.9		85.9		67.8		64.5	
Range (g)	32-989		34-1018		43-750		25-427	
Sample number	123		36		41		24	

[a] Not local to the Chaco area (see Cameron, this volume).

In contrast, the adjacent plaza and Pithouse 3 refuse–both containing numerous hammerstones that seemed to have once been part of the Other Pit 14 assemblage–differs. Despite high frequencies of the quartzite and splintery-type hammerstones (the latter comprised 70 percent of the plaza total), very little debris of the same two materials was recovered. Actually, one splintery silicified wood hammerstone recovered from Plaza Grid 8 was in 33 pieces, but generally the lack of use-debris was disconcerting. Instead, high percentages of cherty and chalcedonic silicified wood were recovered from these proveniences, materials that seem linked to the turquoise workshop debris recovered from Plaza Other Pit 1 and the plaza surfaces. No hammerstones were recovered from Plaza Other Pit 1, although cores were common (Table 2.8). Just a solitary hammerstone came from turquoise-flecked Layer 6 in Pithouse 2. In both cases, we can deduce that there was little association between turquoise crafts and hammerstones at the site.

Morphology

The majority of the 324 hammerstones recovered from 29SJ 629 were analyzed by Wills (1977). Two other batches that escaped Wills' analysis were included under the discussion and calculations used here. During Cameron's analysis of the chipped stone (this volume), another 28 whole and fragmentary hammerstones were recovered (Table 4.12). Additionally, 24 others identified as hammerstones in the field were analyzed by Akins (1980) solely as abraders/polishing stones. Almost all of the latter were quartzite and most of these (Akins 1980:166, 172, 179, 186) revealed some battering, thus, comprising part of the total hammerstones discussed here.

On the basis of morphology, Wills (1977:24) argued for two kinds of Chaco Canyon hammerstones--angular and spherical--but only one kind is predominant at 29SJ 629. Angular hammerstones comprised 93.4 percent of his total (n=272), the highest relative frequency for any of the eight canyon sites analyzed except for Pueblo Alto. 29SJ 1360 (McKenna 1984) and 29SJ 627 had nearly three times as many spherical stones as did 29SJ 629 and Pueblo Alto, although the material preference was about the same. Whether these differences relate to differing functional uses at the sites was not known.

Contexts

The 29SJ 629 hammerstone collection clustered within four areas of the site (Tables 4.11, 4.15). The largest assemblage came from Plaza Other Pit 14 (127 hammerstones; 39 percent of the total) in association with numerous manos, a whole metate, and clumps of corn pollen. The lower trash deposits within Pithouse 3 also yielded a large number (48; 15 percent), as did the plaza surfaces and fill surrounding OP 14 (41; 13 percent; see Volume I, Figure 6.3). These three proveniences were adjacent to one another and their assemblages were probably related, based on their proximity, contemporaneity, and matches of other cultural materials. Surprisingly, despite the wealth of trash and frequency of manos found in Room 9, directly next to the plaza and OP 14, only two hammerstones were recovered, suggesting that the dissimilar deposits were unrelated.

Finally, 34 hammerstones (10 percent of the total) came from the Trash Midden, primarily in Grid 65 (11) and Grid 88 (9). All came from A.D. 900s deposits, the earliest hammerstone assemblage recovered at the site, with almost none occurring in the very earliest site deposits dating prior to about A.D. 950 or 925. The midden hammerstone assemblage was quite different from the others in the high percentages of cherty and chalcedonic materials, lower average weight, and the sparse use of splintery silicified wood. The use of materials for hammerstones found in the midden was similar to the midden cores (Table 2.8) and chipped stone debris (see Cameron, this volume: Tables 2.12-2.13). Without reexamination of these tools, it was difficult to be certain that the different hammerstone assemblages reflect different uses, although it was suspected. For instance, the majority of the site's projectile points came from the midden, suggesting that much of the debris came from flint-knapping activities rather than from food-processing tool debris. The lack of hammerstones, particularly those of splintery silicified wood, suggested either that the technology for sharpening the grinding tools changed rapidly or that little food processing was being done early in the life of the site.

Data from the contemporary excavated sites was less informative regarding the contextual and functional use of hammerstones, although they yielded similar materials. A large percentage of the 29SJ 1360 tools (40 percent of 94) were recovered from the backdirt (McKenna 1984:Table 4.8), while only 26 percent of the 535 hammerstones recovered from 29SJ 627 were analyzed (Wills 1977:Table 1), including all those from floor contexts. The mealing areas at both areas, however, yielded hammerstones, of which nearly half were made of splintery silicified wood--the material apparently favored for sharpening manos and metates. Oddly, the two rooms filled with metates and other evidence of grinding activites at Pueblo Bonito, Rooms 17 and 90, reportedly yielded no hammerstones (Pepper 1920:Table 3), but this may be attributed to excavation bias.

Summary

Hammerstones were made from a number of materials, but were dominated by splintery petrified wood, which is locally available. Although hammerstones were prolific at 29SJ 629, the contexts in it and other small sites were less informative regarding the certainty of specific task uses than was discovered at Pueblo Alto. Nevertheless, it was clear that there was often a close association of mealing equipment (e.g., manos, metates, and mealing bins) with hammerstones. The preference for splintery silicified wood and quartzite hammerstones in these contexts indicated that the majority of site hammerstones were generated for specific tasks associated with tool maintenance and tool-shaping rather than the myriad activites suggested in the literature. This does not deny that hammerstones were used for a number of activites, but that the constant maintenance required for maintaining mealing equipment, every five days for the Hopi, for example (Bartlett 1933:4), probably generated the vast majority of hammerstones. Considering the large numbers of manos and metate fragments found on every site, a large number of hammerstones for maintaining them should be expected. The general lack of secondary reuse of hammerstones, when it has been shown that it was easier to make a new one rather than recondition an old one (Judd 1954:118), attested to their low value and resulting prolific numbers. Their numbers may also be correlated with the emphasis devoted to corn processing, particularly when compared with earlier sites.

Food Reduction Tool Kits

In terms of change, the A.D. 900s mark one of the watersheds of the Chacoan Anasazi. This is partly reflected by the dominant character of the food processing equipment, compared to earlier periods. Prominent, specialized tools comprised the majority of food processing equipment, which include manos, metates, and hammerstones. Although these tools were often scattered throughout the site debris, concentrations of them mark related assemblages and mealing loci. Small numbers of other tools, not readily identified by classes, probably also made up these assemblages, including some types of abraders, sandstone hammers (often made from discarded tools), corn crushers (Akins 1980:77-79; McKenna 1984:271), and choppers. It must be kept in mind, however, that some manos and metates may have been used for crushing other kinds of materials, such as clay, ores, and selenite, rather than food.

The mass of mealing equipment found in A.D. 900s sites and thereafter attested to the increasing importance of horticulture, particularly corn, in the diet. On the other hand, the dramatic decrease of chert and quartzite hammerstones from earlier periods suggested a decrease in flaked tool reduction utilizing hard-hammer techniques. With greater commitments to horticulture, shifts in scheduling activities and hunting may have occurred. The decrease in local small mammals in the deposits, for instance, and the increase of non-local artiodactyls in the trash deposits (Akins 1984) suggested that shifts in hunting strategies were coeval with the increased reliance on corn.

Although it was suspected that multiple mealing loci at the small-house sites utilized different types of manos and metates, the extent of these differences was uncertain as was its character and its meaning within the social and economic spheres of behavior. The increased importance of these activity areas over earlier periods emphasizes the need for greater understanding and identity of these loci.

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5

ORNAMENTS AND MINERALS FROM SITE 29SJ 629

Frances Joan Mathien

Introduction

All ornaments and minerals included in this analysis were recovered during the 1975-1976 excavations at the Spadefoot Toad Site (29SJ 629). A master list of artifacts was compiled from the field specimen (FS) sheets and inventory catalog. Using this list, the artifact bags were collected and the materials analyzed using the methods described in Mathien (1985:19-47); standard definitions of artifact types, materials, and measurements insured comparability among materials analyzed for the Chaco Project.

Some material types consisted mainly of pieces that were modified only slightly or not at all, e.g., hematite, limonite, selenite; such materials were assigned a low priority and counted, but they were not analyzed in greater detail. These materials had not been systematically collected. They occur naturally in nearby deposits; therefore, their presence in sites may not be due to cultural factors in all instances. These were listed by provenience with the other ornaments and minerals in Table 5.1, but they are not discussed in detail in this chapter, other than to indicate possible sources of paint pigments.

The data are organized into several sections. Under material types, the ornaments and minerals are listed by proveniences and dates. The sources of the materials are provided by period, as is some information on changes in the number and kinds of materials available. The section on artifact classes indicates what materials were used for each type of ornament recovered at 29SJ 629 and the evidence for production techniques used in their manufacture. Because soft minerals may have been used as paint pigments on items that are not recovered in the archeological record, evidence for their presence and use is given under other minerals. Special use or deposition areas at 29SJ 629 are discussed under unusual or notable groupings. Because turquoise jewelry making areas were identified, an evaluation of the color of turquoise available and used is presented under color of turquoise. The summary and conclusions, however, are limited; for an examination of the broad picture of Chaco ornament production and use, see Mathien (1985).

Materials Types

To evaluate trade networks and their changes

Table 5.1. Artifacts by provenience at 29SJ 629.

Provenience	FS No.	No. Material	No Type	Dating (A.D.)
Pithouse 2, Lay. 1	2823	5 Selenite	5 Unmod.	925-1050
Pithouse 2, Lay. 1	2824	3 Turquoise	1 Unmod.	925-1050
			2 Debris	925-1050
Pithouse 2, Lay. 4, rubble	2843	2 Turquoise	1 Mod.	925-1050
			1 Debris	925-1050
Pithouse 2, Lay. 4	2846	1 Limonite	1 Mod.	925-1050
Pithouse 2, Lay. 4	2847	1 Glycymeris	1 Bracelet Pendant	925-1050
Pithouse 2, Lay. 5, Floor fill	2865	2 Limonite	2 Unmod.	925-1050
Pithouse 2, Lay. 5	2866	1 Turquoise	1 Mod.	925-1050
Pithouse 2, Lay. 5	2867	1 Selenite	1 Unmod.	925-1050
Pithouse 2, Lay. 6, Floor fill	2908	2603 Turquoise	2600 Debris	925-1050
			1 Bead Bl.	925-1050
			2 Bead Fr.	925-1050
		1 Shale	1 Bead	925-1050
Pithouse 2, Lay. 6	2909	1 Turquoise	1 Inlay	925-1050
Pithouse 2, Lay. 6	2910	1 Turquoise	1 Mod.	925-1050
Pithouse 2, Lay. 6	2911	1 Sepiolite	1 Unmod.	925-1050
Pithouse 2, Lay. 6	2912	2 Turquoise	1 Unmod.	925-1050
			1 Debris	925-1050
Pithouse 2, Lay. 6	2913	4 Turquoise	2 Unmod.	925-1050
			2 Mod.	925-1050
Pithouse 2, Lay. 6	2914	1 Turquoise	1 Mod.	925-1050
Pithouse 2, Lay. 7, wing wall	2969	1 Turquoise	1 Mod.	925-1050
Pithouse 2, Lay. 7	2970	1 Limonite	1 Mod.	925-1050
Pithouse 2, Floor 1, wing wall	2995	1 Turquoise	1 Debris	925-1050
Pithouse 2, Floor 1, wing wall	3001	540 Turquoise	538 Debris	925-1050
			2 Unmod.	925-1050
Pithouse 2, Floor 1	3018	1 Turquoise	1 Mod.	925-1050
Pithouse 2, Floor 1	3028	1 Selenite	1 Unmod.	925-1050
Pithouse 2, Layer behind mealing bin	3188	1+Limonite	1+ *	925-1050

Table 5.1. (continued)

Provenience	FS No.	No. Material	No Type	Dating (A.D.)
Pithouse 2, Floor 1, Other Pit 1	3149	5 Turquoise	4 Mod.	925-1050
			1 Pendant Blank	925-1050
Pithouse 2, Floor 1, Other Pit 2	3151	1 Turquoise	1 Mod.	925-1050
Pithouse 2, Floor 1, Other Pit 1	3155	1 Turquoise	1 Debris	925-1050
Pithouse 2, Floor 1, Other Pit 2	3156	1 Turquoise	1 Debris	925-1050
Pithouse 2, Floor 1, Other Pit 6	3205	1 Turquoise	1 Pendant Blank	925-1050
Pithouse 2, Floor 1, Other Pit 6	3206	1 Selenite	1 Unmod.	925-1050
Pithouse 2, Floor 1, Other Pit 6	3207	1 Turquoise	1 Debris	925-1050
Pithouse 2, Posthole fill	3214	1 Turquoise	1 Debris	925-1050
Pithouse 2, Ventilator tunnel	3379	1 Limonite	1 Unmod.	925-1050
Pithouse 2, Ventilator tunnel	3468	2 Turquoise	2 Debris	925-1050
Pithouse 2, Ventilator tunnel floor	3389	2 Turquoise	2 Mod.	925-1050
Pithouse 2, Floor 2, Lay. 1	3400	2 Turquoise	1 Mod.	925-1050
			1 Debris	925-1050
Pithouse 2, Floor 2, Heating Pit 1	3401	2 Turquoise	2 Debris	925-1050
Pithouse 2, Floor 2, Heating Pit 1	3403	1 Turquoise	1 Debris	925-1050
Pithouse 2, Floor 2, Other Pit 2	3407	2 Turquoise	2 Debris	925-1050
Pithouse 2, Floor 2, Heating Pit 2	3408	1 Turquoise	1 Unmod.	925-1050
Pithouse 2, Floor 2, Other Pit 5	3432	1 Turquoise	1 Debris	925-1050
Pithouse 2, Floor 2, Other Pit 10	3443	3 Turquoise	3 Debris	925-1050
Pithouse 2, under Floor 2	3476	1 Limonite	1 Unmod.	925-1050
Pithouse 2, Lay. 1, backhoe	3509	9 Selenite	9 Unmod.	925-1050
Pithouse 3, Lev. 3-6	2209	1 Shale	1 Mod.	975-1050
Pithouse 3, Lev. 4	1940	1 Turquoise	1 Unid.	975-1050
Pithouse 3, Lev. 7, east half	2263	3 Selenite	3 Unmod.	975-1050
Pithouse 3, Lev. 7	2264	4 Turquoise	2 Unmod.	975-1050
			1 Mod.	975-1050
			1 Debris	975-1050
Pithouse 3, Lev. 7	2265	1 Shale	1 Bead, black	975-1050
Pithouse 3, Lev. 7	2266	1 Argillite	1 Mod.	975-1050
Pithouse 3, Lev. 7	2269	1 Bone	1 Bead	975-1050

Table 5.1. (continued)

Provenience	FS No.	No. Material	No Type	Dating (A.D.)
Pithouse 3, Lev. 3-6	2337	1 Turquoise	1 Mod.	975-1050
Pithouse 3, Lev. 8	2338	8 Turquoise	2 Mod. 6 Debris	975-1050 975-1050
Pithouse 3, Lev. 8	2341	2 Selenite	2 Unmod.	975-1050
Pithouse 3, Lev. 8	2343	1 Bone	1 Ring Fr.	975-1050
Pithouse 3, Lev. 8	2346	1 Selenite	1 Unmod.	975-1050
Pithouse 3, Lev. 9	2408	2 Turquoise	2 Debris	975-1050
Pithouse 3, Lev. 9	2409	1 Selenite	1 Zoom. effigy	975-1050
Pithouse 3, Lay. 1, alluvium	2495	1 Gypsum	1 Unmod.	975-1050
Pithouse 3, Lay. 1	2492	5 Turquoise	5 Debris	975-1050
Pithouse 3, Lay. 2, trash	2506	1 Hematite	1 Unmod.	975-1050
Pithouse 3, Lay. 2	2515	5 Turquoise	5 Debris	975-1050
Pithouse 3, Lay. 2	2516	1 <u>Oliva</u> sp.	1 Ring Fr.	975-1050
Pithouse 3, Lay. 2	2517	1 Jet	1 Pendant	975-1050
Pithouse 3, Lay. 3	2613	5 Turquoise	2 Mod. 3 Debris	975-1050 975-1050
Pithouse 3, Floor 1 fill	2644	9 Turquoise	5 Mod. 4 Debris	975-1050 975-1050
Pithouse 3, Floor 1, center	2624	1 Turquoise	1 Debris	975-1050
Pithouse 3, Floor 1, Firepit 1	2706	2 Turquoise	2 Mod.	975-1050
Pithouse 3, Floor 1, Other Pit 3	2724	1 Turquoise	1 Debris	975-1050
Pithouse 3, Vent. 2 tunnel	3065	1 Turquoise	1 Unmod.	975-1050
Pithouse 3, Vent. 2 tunnel	3240	2 Turquoise	2 Debris	975-1050
Pithouse 3, Ventilator 2	1695	1 <u>Oliva incras.</u>	1 Pendant	975-1050
Pithouse 3, Ventilator 2	1698	1 Selenite	1 Unmod.	975-1050
Pithouse 3, Ventilator 2	1776	1 Limonite 1 Hematite	1 Mod. 1 Unmod.	975-1050 975-1050
Room 1, Lev. 1	119	1 Turquoise	1 Unmod.	975-1050
Room 1, Lev. 1	120	3 Turquoise	2 Unmod. 1 Debris	975-1050 975-1050
Room 1, Lev. 1	163	1+Limonite	1+ *	975-1050
Room 1, Lev. 1	164	1+Hematite	1+ *	975-1050

Table 5.1. (continued)

Provenience	FS No.	No. Material	No Type	Dating (A.D.)
Room 2, Lev. 2	258	1 Turquoise	1 Debris	975-1050
Room 2, Lay. 1	279	1 Turquoise	1 Bead Bl.	975-1050
Room 2, Lay. 2	300	2 Turquoise	2 Debris	975-1050
Room 2, Lay. 2	360	1 Turquoise	1 Debris	975-1050
Room 2, Floor	340	1 Turquoise	1 Unmod.	975-1050
Room 2, Firepit 1	378	1 Turquoise	1 Mod.	975-1050
Room 3, Lev. 3	591	1 Turquoise	1 Unmod.	975-1050
Room 3, Lev. 3	773	1 Fossil	1 Fossil	975-1050
Room 3, Lev. 4	769	3 Turquoise	2 Mod. 1 Debris	975-1050 975-1050
Room 3, Firepit 1, Layer 2	809	1 Turquoise	1 Unident.	975-1050
Room 3, Lay. 3, below roof to floor fill	1093	7 Selenite	7 Unmod.	975-1050
Room 3, Lay. 3, below roof to floor fill	1101	1 Selenite	1 Unmod.	975-1050
Room 3, Lay. 3, below roof to floor fill	1102	6 Selenite	6 Unmod.	975-1050
Room 3, Floor 1, Other Pit 1, fill	1388	6 Turquoise	3 Mod. 3 Unmod.	975-1050 975-1050
Room 3, Floor 1, Other Pit 2, fill	1292	1 Turquoise	1 Unident.	975-1050
"Room 4," Lev. 2, trash	1786	1 Selenite	1 Unmod.	875-925
Room 5, Lev. 1 and 2	936	3 Turquoise	2 Mod. 1 Debris	975-1050 975-1050
Room 5, Lev. 1 and 2	937	1 Azurite	1 Unmod.	975-1050
Room 5, Lev. 3	707	2 Turquoise	2 Mod.	975-1050
Room 5, Lev. 3	942	1 Selenite	1 Unmod.	975-1050
Room 5, Lev. 3	947	5 Turquoise	5 Mod.	975-1050
Room 5, Lev. 4	715	5 Sepiolite	5 Mod.	975-1050
Room 5, Lev. 4	1014	1 Selenite	1 Unmod.	975-1050
Room 5, Lev. 4	1019	1 Sepiolite	1 Mod.	975-1050
Room 5, Lev. 4	1020	1 Hematite	1 *	975-1050
Room 5, Lev. 4	1021	6 Turquoise	2 Mod. 2 Unmod. 2 Debris	975-1050 975-1050 975-1050
Room 5, Lev. 5	719	1 Azurite	1 Zoom.	975-1050

Table 5.1. (continued)

Provenience	FS No.	No. Material	No Type	Dating (A.D.)
Room 5, Floor	1376	1 Chama echinata	1 Ring Fr.	975-1050
Room 5, Ant Nest 18	1592	2 Turquoise	1 Unmod. 1 Debris	975-1050 975-1050
Room 6, Lev. 3	1793	1 Limonite 1 Lignite 1 Shale	1 Unmod. 1 Mod. 1 Unmod.	975-1050 975-1050 975-1050
Room 6, Lay. 2	2327	1 Turquoise	1 Debris	975-1050
Room 6, Lay. 3	3248	1 Selenite	1 Unmod.	975-1050
Room 6, Lay. 3	3249	3 Limonite	2 Unmod. 1 Mod.	975-1050 975-1050
Room 6, Floor 1	3256	2 Limonite	1 Mod. 1 Unmod.	975-1050 975-1050
Room 7, Lay. 1	705	1 Turquoise	1 Mod.	975-1050
Room 7, Tub floor	759	1 Gypsum	1 Unmod.	975-1050
Room 8, Lev. 1	381	4 Selenite	4 Unmod.	975-1050
Room 9, Lev. 1, Bin 2	571	1 Azurite	1 Unmod.	975-1050
Room 9, Lev. 1, Bin 2	486	1 Turquoise	1 Mod.	975-1050
Room 9, Lev. 1, Bin 2	487	1 Turquoise	1 Mod.	975-1050
Room 9, Lev. 1, Bin 2	488	2 Turquoise	1 Pendant 1 Pendant blank	975-1050 975-1050
Room 9, Lev. 1, NW section	627	4 Sepiolite	4 Mod.	975-1050
Room 9, Lev. 2	691	1 Turquoise	1 Pendant blank	975-1050
Room 9, Lev. 3	692	1 Chama echinata	1 Ring Fr.	975-1050
Room 9, Lev. 3	633	4 Selenite	4 Unmod.	975-1050
Room 9, Floor 1	694	1 Limonite	1 Mod.	975-1050
Room 9, Subfloor, Bin 3	738	1 Lignite	1 Mod.	975-1050
Room 9, North 1/3, fill	835	1 Calcite	1 Mod.	975-1050
Room 9, Firepit 1	839	1 Shale	1 Bead	975-1050
Room 9, Floor 2	2440	1 Turquoise	1 Bead Bl.	975-1050
Room 9, Floor 2, Other Pit 1	3296	1 Limonite 1 Selenite	1 Unmod. 1 Unmod.	975-1050 975-1950

Table 5.1. (continued)

Provenience	FS No.	No. Material	No Type	Dating (A.D.)
Room 9, Floor 2, Other Pit 1	3297	1 Turquoise	1 Unmod.	975-1050
Room 9, Floor 2, Other Pit 1	3305	1 Selenite	1 Unmod.	975-1050
Room 9, East Wall	3282	1 Turquoise	1 Debris	975-1050
Kiva, Lev. 1-4	1642	4 Turquoise	1 Unmod. 3 Debris	975-1150 975-1150
Kiva, Lev. 4-9	1641	1 Jet	1 Mod.	975-1150
Kiva, Lev. 4-9	1646	5 Turquoise	1 Other 4 Debris	975-1150 975-1150
Kiva, Lev. 6	1148	1 Limonite	1 Mod.	975-1150
Kiva, Lev. 6, Test Trench 2	323	2 Turquoise	1 Pendant blank 1 Unmod.	975-1150 975-1150
Kiva, Lev. 7	1085	1 Turquoise	1 Unident.	975-1150
Kiva, Lev. 7	1206	1 Turquoise	1 Debris	975-1150
Kiva, Lev. 7	1208	1 Selenite	1 Unmod.	975-1150
Kiva, Lev. 8	405	1 Turquoise	1 Unmod.	975-1150
Kiva, Lev. 8	406	2 Turquoise	2 Debris	975-1150
Kiva, Lev. 8	409	1 Turquoise	1 Debris	975-1150
Kiva, Lev. 8	706	10 Turquoise	10 Mod.	975-1150
Kiva, Lev. 8 and 9	1211	8 Selenite	8 Unmod.	975-1150
Kiva, Lev. 8 and 9	1213	1 Turquoise	1 Mod.	975-1150
Kiva, Lev. 9	669	4 Selenite	4 Unmod.	975-1150
Kiva, Lev. 9	671	2 Turquoise	1 Debris 1 Mod.	975-1150 975-1150
Kiva, Lev. 9	672	3 Hematite	3 Unmod.	975-1150
Kiva, Lev. 10	1590	1 Jet/Lig.	1 Mod.	975-1150
Kiva, Lev. 10	1279	1 Turquoise	1 Bead	975-1150
Kiva, Lev. 11, Floor fill	2012	1 Selenite	1 Unmod.	975-1150
Kiva, Lev. 11, Floor fill	2013	7 Turquoise	7 Debris	975-1150
Kiva, Lay. 10	1679	6 Turquoise	1 Bead 1 Unmod 4 Debris	975-1150 975-1150 975-1150
Kiva, Floor 1, contact	2043	1 Turquoise	1 Debris	975-1150

Table 5.1. (continued)

Provenience	FS No.	No. Material	No Type	Dating (A.D.)
Kiva, Floor 1, Posthole 1	2047	2 Turquoise	1 Unmod.	975-1150
			1 Debris	975-1150
Kiva, Feature between Firepit and Burn	2744	1 Turquoise	1 Debris	975-1050
Kiva, Ventilator tunnel, Lev. 1	2120	1 Turquoise	1 Debris	975-1050
Kiva, Ventilator tunnel, Lev. 1	2652	1 Turquoise	1 Debris	975-1050
Kiva, Clearing above ventilator tunnel	1003	1 Turquoise	1 Mod.	975-1050
Kiva, Clearing above ventilator tunnel	1074	1 Turquoise	1 Debris	975-1050
Plaza Grid 8, Lev. 1	1181	1 Selenite	1 Unmod.	975-1050
Plaza Grid 8, Lev. 1	1182	1 Limonite	1 Unmod.	975-1050
Plaza Grid 8, Lev. 2	1274	1 Glycymeris	1 Bracelet Pendant	975-1050
Plaza Grid 8, Lev. 2	1275	1 Hematite	1 Unmod.	975-1050
Plaza Grid 8, Lev. 2	1338	1 Azurite	1 Unmod.	975-1050
Plaza Grid 8, Lev. 3, Floor fill	1577	15 Turquoise	1 Unmod.	975-1050
			1 Bead Bl.	975-1050
			13 Debris	975-1050
Plaza Grid 8, Pit 3, Fill under Floor 1, Lev. 3	1495	2 Turquoise	2 Debris	975-1050
Plaza Grid 9, Lev. 1	1141	1 Turquoise	1 Mod.	975-1050
Plaza Grid 9, Lev. 1	1143	2 Limonite	2 Unmod.	975-1050
		2 Selenite	2 Unmod.	975-1050
Plaza Grid 9, Lev. 2, fill	1146	1 Limonite	1 Unmod.	975-1050
		1 Glycymeris	1 Bracelet fragment	975-1050
Plaza Grid 9, Floor 1	1135	19 Turquoise	19 Debris	975-1050
Plaza Grid 9, Lev. 3, between Floors 1 and 2	1267	79 Turquoise	8 Mod.	975-1050
			3 Unmod.	975-1050
			1 Bead	975-1050
			1 Other	975-1050
			12 Bead Bl.	975-1050
			54 Debris	975-1050
		1 Azurite	1 Unmod.	975-1050
Plaza Grid 9, Floor 2	1266	77 Turquoise	50 Unmod.	975-1050
			1 Bead	975-1050
			3 Bead Bl.	975-1050
			23 Mod.	975-1050
Plaza Grid 9, Floor 2	1264	2 Turquoise	1 Bead Bl.	975-1050
			1 Unmod.	975-1050

Table 5.1. (continued)

Provenience	FS No.	No. Material	No Type	Dating (A.D.)
Plaza Grid 9, Floor 3, North of Wall	1341	5 Turquoise	1 Bead Bl.	975-1025
			4 Debris	975-1025
Plaza Grid 9, Other Pit 1, Lev. 1	1613	6 Turquoise	6 Debris	975-1025
Plaza Grid 9, Other Pit 1, Lev. 3	1480	1 Turquoise	1 Debris	975-1025
Plaza Grid 9, Other Pit 1, Lev. 1	1498	5 Turquoise	1 Bead	975-1025
			1 Bead Bl.	975-1025
			1 Mod.	975-1025
			2 Debris	975-1025
Plaza Grid 9, Other Pit 1, Lev. 3	1500	1 Turquoise	1 Mod.	975-1025
Plaza Grid 9, Other Pit 1, Lev. 3	1581	9 Turquoise	1 Unmod.	975-1025
			2 Mod.	975-1025
			6 Debris	975-1025
Plaza Grid 9, Other Pit 1, Lev. 7	1685	8 Turquoise	5 Debris	975-1025
			1 Inlay	975-1025
			1 Bead Bl.	975-1025
			1 Unmod.	975-1025
Plaza Grid 9, Other Pit 1, Lev. 8	1633	5 Turquoise	5 Debris	975-1025
Plaza Grid 9, Other Pit 1, Lev. 8	1634	3 Turquoise	3 Debris	975-1025
Plaza Grid 9, Other Pit 1, Lev. 8	1687	4 Turquoise	2 Unmod.	975-1025
			1 Inlay	975-1025
			1 Debris	975-1025
Plaza Grid 9, Other Pit 1, Lev. 9	1900	1 Wood	1 Unident.	975-1025
Plaza Grid 9, Other Pit 1, Lev. 9	1860	1 Turquoise	1 Bead Bl.	975-1025
Plaza Grid 9, Other Pit 1, Lev. 9	1899	27 Turquoise	1 Bead	975-1025
			3 Bead Bl.	975-1025
			5 Unmod.	975-1025
			3 Mod.	975-1025
			15 Debris	975-1025
Plaza Grid 9, Other Pit 1, Lev. 9	1947	5 Turquoise	2 Mod.	975-1025
			3 Debris	975-1025
Plaza Grid 9, Other Pit 1, Lev. 9	2071	6 Turquoise	6 Debris	975-1025

Table 5.1. (continued)

Provenience	FS No.	No. Material	No Type	Dating (A.D.)
Plaza Grid 9, Other Pit 1,	2072	15 Turquoise	10 Debris	975-1025
Lev. 10			4 Mod.	975-1025
			1 Unmod.	975-1025
Plaza Grid 9, Other Pit 1,	1992	22 Turquoise	1 Unmod.	975-1025
Lev. 10			1 Bead Bl.	975-1025
			1 Pend.Bl.	975-1025
			1 Mod.	975-1025
			18 Debris	975-1025
Plaza Grid 9, Other Pit 1,	1980	75 Turquoise	26 Mod.	975-1025
Lev. 11			4 Bead Bl.	975-1025
			3 Unmod.	975-1025
			42 Debris	975-1025
	2073	42 Turquoise	23 Debris	975-1025
Plaza Grid 9, Other Pit 1,			15 Unmod.	975-1025
Lev. 11			4 Mod.	975-1025
Plaza Grid 9, Other Pit 1,	2087	219 Turquoise	13 Unmod.	975-1025
Lev. 12			6 Mod.	975-1025
			1 Bead Bl.	975-1025
			199 Debris	975-1025
Plaza Grid 9, Other Pit 1,	2088	25 Turquoise	9 Mod.	975-1025
Lev. 12			16 Unmod.	975-1025
Plaza Grid 9, Other Pit 1,	2149	201 Turquoise	8 Unmod.	975-1025
Lev. 12			8 Mod.	975-1025
			1 Bead Bl.	975-1025
			184 Debris	975-1025
Plaza Grid 9, Other Pit 1,	2150	141 Turquoise	18 Unmod.	975-1025
Lev. 12			19 Mod.	975-1025
			6 Beads	975-1025
			6 Bead Bl.	975-1025
			2 Pendants	975-1025
			1 Unident.	975-1025
			89 Debris	975-1025
Plaza Grid 9, Other Pit 1,	2151	5576 Turquoise	4065 Flecks	975-1025
Lev. 12			1386 Debris	975-1025
			2 Beads	975-1025
			20 Bead Bl.	975-1025
			94 Mod.	975-1025
			9 Unmod.	975-1025
		1 Azurite	1 Unmod.	975-1025
Plaza Grid 9, Other Pit 1,	2152	1+Turquoise	1+*	975-1025
Lev. 12				

Table 5.1. (continued)

Provenience	FS No.	No. Material	No Type	Dating (A.D.)
Plaza Grid 9, Other Pit 1, Posthole 1	2089	16 Turquoise	8 Unmod.	975-1025
			8 Mod.	975-1025
			1 Bead Bl.	975-1025
			184 Debris	975-1025
Plaza Grid 9, Other Pit 1, Other Pit fill	2481	25 Turquoise	12 Debris	975-1025
			1 Unmod.	975-1025
			11 Mod.	975-1025
			1 Bead Bl.	975-1025
Plaza Grid 9, Other Pit 2	1704	5 Turquoise	5 Mod.	975-1025
Plaza Grid 9, Other Pit 9, Level 7	1585	9 Turquoise	1 Bead	975-1025
			1 Unmod.	975-1025
			2 Bead Bl.	975-1025
			5 Mod.	975-1025
Plaza Grid 9/15, Lev. 8	2655	1 Turquoise	1 Mod.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 1 & 2	2659	1 Turquoise	1 Pend.Bl.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 3	2663	1 Limonite	1 Unmod.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 3	2700	1 Selenite	1 Unmod.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 4	2757	37 Selenite	37 Unmod.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 4	2758	11 Selenite	11 Unmod.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 4	2759	1 Limonite	1 Mod.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 4	2760	7 Selenite	7 Unmod.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 5	2775	1 Limonite	1 Unmod.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 5	2776	9 Selenite	9 Unmod.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 5	2778	1 Limonite	1 Mod.	975-1025
		1 Calcite	1 Unid.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 5	2780	82 Selenite	82 Unmod.	975-1025
		1 Limonite	1 Unmod.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 5	2781	2 Glycymeris	2 Bracelet Frags.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 5	2785	1 Limonite	1 Unmod.	975-1025
		5 Selenite	5 Unmod.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 6	2786	12 Selenite	12 Unmod.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 6	2800	94 Selenite	94 Unmod.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 6	2801	6 Selenite	6 Unmod.	975-1025

Table 5.1. (continued)

Provenience	FS No.	No. Material	No Type	Dating (A.D.)
Plaza Grid 14, Other Pit 14, Lay. 6	2802	1 Limonite	1 Unmod.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 6	2803	8 Turquoise	2 Unmod. 2 Mod. 2 Debris 1 Pendant 1 Other	975-1025 975-1025 975-1025 975-1025 975-1025
Plaza Grid 14, Other Pit 14, Lay. 6	2804	3 Glycymeris	3 Bracelet Frags.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 6	2805	1 Clay	1 Pendant	975-1025
Plaza Grid 14, Other Pit 14, Lay. 6	2806	2 Lignite	2 Unmod.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 7	3086	2 Selenite	2 Unmod.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 7	3087	1 Selenite	1 Unmod.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 7	3088	1 Selenite	1 Other	975-1025
Plaza Grid 14, Other Pit 14, Lay. 7	3090	1 Turquoise	1 Unmod.	975-1025
Plaza Grid 14, Other Pit 14, Lay. 7	3092	24 Selenite	24 Unmod.	975-1025
Plaza Grid 14/10, Other Pit 6, Lev. 2	1949	2 Selenite	2 Unmod.	975-1025
Plaza Grid 14/10, Other Pit 6, Lev. 2	1953	3 Selenite	3 Unmod.	975-1025
Plaza Grid 14/10, Other Pit 6, Lev. 2	1954	1 Turquoise	1 Mod.	975-1025
Plaza Grid 14/10, Other Pit 6, Lev. 3	2214	4 Selenite	4 Unmod.	975-1025
Plaza Grid 14/10, Other Pit 6, Lev. 3	2215	2 Olivella dama	2 Beads	975-1025
Plaza Grid 14/10, Other Pit 6, Lev. 3	2218	4 Selenite 1 Turquoise	4 Unmod. 1 Mod.	975-1025 975-1025
Plaza Grid 14/10, Other Pit 6, Lev. 4	2219	1 Hematite 1 Gypsite	1 Mod. 1 Unmod.	975-1025 975-1025
Plaza Grid 14/10, Other Pit 6, Lev. 4	2222	2 Selenite	2 Unmod.	975-1025
Plaza Grid 14/10, Other Pit 6, Lev. 4	2224	89 Selenite	89 Unmod.	975-1025
Plaza Grid 14/10, Other Pit 6, Lev. 4	2226	2 Hematite	2 Unmod.	975-1025
Plaza Grid 14/10, Other Pit 6, Lev. 5	2227	1 Hematite	1 Mod.	975-1025
Plaza Grid 14/10, Other Pit 6, Lev. 5	2228	43 Selenite	43 Unmod.	975-1025
Plaza Grid 14/10, Other Pit 6, Lev. 5	2231	1 Hematite	1 Mod.	975-1025

Table 5.1. (continued)

Provenience	FS No.	No. Material	No Type	Dating (A.D.)
Plaza Grid 14/10, Other Pit 6, Lev. 3	2314	1 Turquoise	1 Debris	975-1025
Plaza Grid 14/10, Other Pit 6, Lev. 3	2315	3 Selenite	3 Unmod.	975-1025
Plaza Grid 14/10, Other Pit 6, Lev. 3	2317	1 Limonite	1 Unmod.	975-1025
Plaza Grid 14/10, Other Pit 6, Lev. 5	2323	1 Selenite	1 Unmod.	975-1025
Plaza Grid 14/10, Other Pit 6, Lev. 5	2360	1 Turquoise	1 Pendant	975-1025
Plaza Grid 14/10, Other Pit 6, Lev. 3	2501	1 Jet/Lig.	1 Unmod.	975-1025
Plaza Grid 15, Lev. 1	1190	1 Azurite	1 Unmod.	975-1050
		2 Limonite	1 Mod.	975-1050
			1 Unmod.	975-1050
Plaza Grid 15, Lev. 1	1192	80 Turquoise	2 Bead Bl.	975-1050
			1 Unmod.	975-1050
			11 Mod.	975-1050
			66 Debris	975-1050
		1 Azurite	1 Unmod.	975-1050
Plaza Grid 16, Lev. 1	1960	12 Turquoise	2 Unmod.	975-1050
			7 Mod.	975-1050
			1 Bead	975-1050
			1 Bead Bl.	975-1050
			1 Debris	975-1050
Plaza Grid 16, Lev. 1	2139	1 Freshwater clam	1 Inlay	975-1050
Plaza Grid 16, Lev. 2	1961	1 <u>Olivella dama</u>	1 Bead	975-1050
Plaza Grid 16, Lev. 2	2430	1 Bone	1 Gaming pc.	975-1050
Plaza Grid 16, Lev. 2	2431	11 Turquoise	2 Mod.	975-1050
			3 Unmod.	975-1050
			1 Other	975-1050
			5 Debris	975-1050
Plaza Grid 16, Lev. 2	2432	21 Galena	21 Debris	975-1050
Plaza Grid 16, Other Pit 15, Floor	3528	2 Limonite	2 Unmod.	975-1025
Plaza Grid 16, Other Pit 15, Floor	3525	1 Lignite	1 Mod.	975-1025
		2 Sepiolite	2 Mod.	975-1025
Plaza Grid 16, Posthole 28	3537	1 Turquoise	1 Unmod.	975-1050
Plaza Grid 20, Other Pit 12, Lev. 1	2426	2 Selenite	2 Unmod.	975-1050
Plaza Grid 20, Lev. 1	246	1 Turquoise	1 Mod.	975-1050
Plaza Grid 20, Lev. 1	277	1 Limonite	1 Unmod.	975-1050
		1 Hematite	1 Unmod.	975-1050

Table 5.1. (continued)

Provenience	FS No.	No. Material	No Type	Dating (A.D.)
Plaza Grid 21, Lev. 1	133	1 Turquoise	1 Mod.	975-1050
Plaza Grid 21, Lev. 2	195	1 Azurite	1 Debris	975-1050
Plaza Grid 21, Lev. 2	194	1 Turquoise	1 Debris	975-1050
Plaza Grid 21, Lev. 3	971	1 Turquoise	1 Debris	975-1050
Plaza Grid 21, Lev. 5	1075	1 Selenite	1 Unmod.	975-1050
Plaza Grid 21, Lev. 6, clearing above Kiva	1079	4 Selenite	4 Unmod.	975-1050
		2 Turquoise	1 Mod.	975-1050
			1 Debris	975-1050
Plaza Grid 22, Lev. 2	2308	2 Limonite	1 Mod.	975-1150
			1 Unmod.	975-1150
		1 Hematite	1 Mod.	975-1150
Plaza Grid 22, Lev. 3	970	1+Turquoise	1+ *	975-1150
Plaza Grid 22, Bin 1, Floor 1	3533	1 Hematite	1 Unmod.	975-1150
		4 Limonite	4 Unmod.	975-1150
Plaza Grid 24, Surface	24	1 <u>Glycymeris</u>	1 Bead	975-1150
Plaza Grid 25, Surface	113	1 Turquoise	1 Mod.	975-1150
Plaza Grid 26, Surface	115	1 Selenite	1 Unmod.	975-1150
Plaza Grid 26, Surface	2161	1 Turquoise	1 Inlay	975-1150
Plaza Grid 31, Ant Nest 19	209	25 Turquoise	1 Bead Bl.	975-1050
			11 Unmod.	975-1050
			4 Mod.	975-1050
			9 Debris	975-1050
		1 Shale	1 Bead	975-1050
Plaza Grid 34, Surface	86	1 Turquoise	1 Unmod.	975-1050
Plaza Grid 34, Lay. 1	2579	2 Argillite	1 Pendant Blank	975-1050
			1 Mod.	975-1050
Plaza Grid 35, Lev. 1	1766	1 Argillite	1 Mod.	975-1050
Plaza Grid 35, Floor 1, Other Pit 9	1881	1 Turquoise	1 Debris	975-1050
Plaza Grid 41, Ant Nest 17	198	1 Shale	1 Bead	975-1050
		1 Malachite	1 Unmod.	975-1050
		41 Turquoise	14 Mod.	975-1050
			25 Unmod.	975-1050
			2 Bead Bl.	975-1050
Plaza Grid 41, Lay. 1	2582	1 Hematite	1 Unmod.	975-1050
Plaza Grid 98, Surface	1559	1 Turquoise	1 Unident.	975-1050

Table 5.1. (continued)

Provenience	FS No.	No. Material	No Type	Dating (A.D.)
Trash Midden, Lay. 1	401	1 Turquoise	1 Mod.	875-925/950
Trash Midden, Grids 52/53, Lev. 1	284	4 Selenite	4 Unmod.	875-925/950
Trash Midden, Grid 58, Surface	207	1 Glycymeris	1 Bracelet Frag.	875-925/950
Trash Midden, Grid 58, Lay. 2	402	1 Turquoise	1 Unmod.	875-925/950
Trash Midden, Grid 58, Lev. 4	422	1 Bone	1 Bead	875-925/950
Trash Midden, Grid 59, Lev. 1	1666	2 Hematite 1 Limonite	2 Unmod. 1 Unmod.	875-925/950
Trash Midden, Grid 59, Lev. 1	1668	1 Limonite	1 Unmod.	875-925/950
Trash Midden, Grid 59, Lev. 2	1672	1 Turquoise	1 Mod.	875-925/950
Trash Midden, Grid 64, Lev. 3	505	1 Hematite	1 Unmod.	975-925/950
Trash Midden, Grid 65, Lev. 1	1305	1 Limonite	1 Mod.	925/950-975
Trash Midden, Grid 65, Lev. 1	1712	1 Azurite	1 Unmod.	925/950-975
Trash Midden, Grid 65, Lev. 2	1379	1 Selenite	1 Unmod.	925/950-975
Trash Midden, Grid 65, Lev. 2	1716	1 Limonite	1 Mod.	925/950-975
Trash Midden, Grid 65, Lev. 2	1377	1 Turquoise	1 Debris	925/950-975
Trash Midden, Grid 65, Lev. 2	1636	1 Pet. wood	1 Pendant	925/950-975
Trash Midden, Grid 65, Lev. 3	1413	1 Lignite	1 Mod.	925/950-975
Trash Midden, Grid 65, Lev. 4	1514	1 Selenite	1 Unmod.	875-925/950
Trash Midden, Grid 65, Lev. 4	1637	1 Azurite	1 Mod.	875-925/950
Trash Midden, Grid 65, Lev. 5	1525	14 Selenite	14 Unmod.	875-925/950
Trash Midden, Grid 65, Lev. 5	1528	1 Turquoise	1 Other	875-925/950
Trash Midden, Grid 65, Lev. 6	1531	1 Selenite	1 Unmod.	875-925/950
Trash Midden, Grid 65, Lev. 6	1841	1 Limonite 1 Hematite	1 Unmod. 1 Unmod.	875-925/950
Trash Midden, Grid 65, Lev. 7	1597	1 Azurite	1 Mod.	875-925/950
Trash Midden, Grid 70, Lev. 2	865	1 Turquoise	1 Pendant	925/950-975
Trash Midden, Grid 70, Lev. 2	866	1 Selenite	1 Unmod.	925/950-975
Trash Midden, Grid 70, Lev. 2	870	2 Hematite 2 Limonite	2 Unmod. 2 Unmod.	925/950-975
Trash Midden, Grid 70, Lev. 2	871	1 Limonite	1 Mod.	925/950-975
Trash Midden, Grid 70, Lev. 3	915	1 Selenite	1 Unmod.	925/950-975

Table 5.1. (continued)

Provenience	FS No.	No. Material	No Type	Dating (A.D.)
Trash Midden, Grid 70, Lev. 3	916	1+Mineral	1+*	925/950-975
Trash Midden, Grid 70, Lev. 3	918	2 Selenite	2 Unmod.	925/950-975
Trash Midden, Grid 70, Lev. 3	919	1 Turquoise	1 Mod.	925/950-975
Trash Midden, Grid 70, Lev. 3	988	1 Selenite	1 Unmod.	925/950-975
Trash Midden, Grid 70, Lev. 4	956	2 Selenite	2 Unmod.	875-925/950
Trash Midden, Grid 70, Lev. 4	957	1 Turquoise	1 Debris	875-925/950
Trash Midden, Grid 70, Lev. 5	995	4 Selenite	4 Unmod.	875-925/950
Trash Midden, Grid 70, Lev. 6	1061	1 Selenite	1 Unmod.	875-925/950
Trash Midden, Grid 71, Lev. 1.	510	1 Turquoise	1 Mod.	925/950-975
Trash Midden, Grid 71, Lev. 2	540	1 Limonite 1 Hematite	1 Mod. 1 Unmod.	925/950-975
Trash Midden, Grid 71, Lev. 4	556	1 Selenite	1 Unmod.	875-925/950
Trash Midden, Grid 76, Surface	1151	1 Azurite	1 Unmod.	975-1025
Trash Midden, Grid 76, Lev. 1	864	2 Turquoise 1 Azurite	2 Mod. 1 Debris	975-1025 975-1025
Trash Midden, Grid 76, Lev. 1	1198	2 Azurite 3 Turquoise	2 Unmod. 1 Mod. 1 Unmod. 1 Unident.	975-1025 975-1025 975-1025 975-1025
Trash Midden, Grid 76, Lev. 2	963	4 Turquoise	2 Mod. 2 Unmod.	975-1025 975-1025
Trash Midden, Grid 76, Lev. 2	1311	1 Turquoise	1 Debris	975-1025
Trash Midden, Grid 76, Lev. 3	1025	2 Turquoise	1 Bead 1 Mod.	925/950-975
Trash Midden, Grid 76, Lev. 3	1324	3 Selenite	3 Unmod.	925/950-975
Trash Midden, Grid 76, Lev. 4	1056	3 Selenite	3 Unmod.	925/950-975
Trash Midden, Grid 76, Lev. 4, Burial 1 pit	1551	1 Selenite	1 Unmod.	925/950-975
Trash Midden, Grid 82, Surface	1537	1 Turquoise	1 Pendant	975-1025
Trash Midden, Grid 82, Lev. 1	1030	1 Turquoise	1 Mod.	975-1025

Table 5.1. (continued)

Provenience	FS No.	No. Material	No Type	Dating (A.D.)
Trash Midden, Grid 82, Lev. 1	1544	1 Turquoise	1 Mod.	975-1025
Trash Midden, Grid 82, Lev. 1	1545	1 Argillite	1 Bead	975-1025
Trash Midden, Grid 82, Lay. 1, Lev. 2	1599	1 Limonite	1 Unmod.	975-1025
Trash Midden, Grid 88, Lev. 2	1044	1 Shale	1 Mod.	975-1025
Trash Midden, Grid 88, Lev. 2	1662	1 Hematite	1 Unmod.	975-1025
Trash Midden, Grid 88, Lev. 4	1162	1 Selenite	1 Unmod.	925/950-975
Test Trench 99, Lev. 1, North of Rooms 1-3	2349	1 Selenite	1 Unmod.	875-925/950
Surface, Road grader area	2705	1 Turquoise	1 Mod.	Unknown
Surface, Associated with gully	3326	1 Argillite	1 Pendant	Unknown
Backdirt in gully	3281	1 Turquoise	1 Mod.	Unknown
Backdirt	3576	7 Turquoise	1 Bead Bl. 1 Mod. 5 Debris	975-1050 975-1050 975-1050
Backdirt	3577	1 Olivella dama	1 Bead	975-1050
TOTAL		10,969		

* Missing from collections.

through time or the evolution of cultural complexity in a region, it is important to understand where sources of different artifact types are located. Trade was a major question addressed during the Chaco Project, and some of the minerals and shell species found at 29SJ 629 aid in that evaluation. Twenty-one different material types and six species of shell were analyzed during this study. Table 5.2 lists these by time. Source areas for shell were determined by Helen DuShane of the Division of Malacology, Los Angeles County, Museum of Natural History (personal communication, 1979) who identified the shells and their modern habitats with reference to Keen (1971). David Love, now with the New Mexico Bureau of Mines and Mineral Research, (personal communication, 1979) and A. Helene Warren (personal communication, 1979), both geologists formerly associated with the Chaco Project, provided information about locally available minerals; other mineral locations were obtained from Northrop (1959). These materials are:

Argillite (also called red dog shale or burned shale): available in Chaco Canyon, as well as in the mountains surrounding the San Juan Basin.

Azurite: found in the mountains peripheral to the San Juan Basin (Zuni, San Juan, and Nacimiento ranges).

Bone: from faunal remains probably used for subsistence.

Table 5.2. Material types at 29SJ 629.

Material	Total No.	Rel. %	Source	Group I A.D. 875/950	Group I A.D. 925/950	Group II A.D. 925/950-975	Group II A.D. 925-1050	Group II A.D. 975-1025	Group II A.D. 975-1050	Group III A.D. 975-1150	Group III Unknown
Argillite	6	.05	Local	-	-	-	-	1 Bead	1 Pend. Bl. 3 Mod.	-	1 Pend.
Azurite	16	.15	Basin	-	2 Mod.	1 Unmod.	-	1 Debris 5 Unmod.	1 Zoom. 1 Debris 5 Unmod.	-	-
Bone	4	.04	Local?	-	1 Bead	-	-	-	1 Bead 1 Game Pc. 1 Ring Fr.	-	-
Calcite	2	.02	Local	-	-	-	-	1 Unident.	1 Mod.	-	-
Clay	1	.01	?	-	-	-	-	1 Pendant	-	-	-
Galena	21	.19	Basin	-	-	-	-	-	21 Debris	-	-
Gypsite	1	.01	Local	-	-	-	-	1 Unmod.	-	-	-
Gypsum	2	.02	Local	-	-	-	-	-	2 Unmod.	-	-
Hematite	25	.23	Local	-	4 Unmod.	3 Ummod.	-	3 Mod. 3 Unmod.	5 Unmod. 2+?	1 Mod. 4 Unmod.	-
Jet	4	.04	?	-	-	-	-	1 Unmod.	1 Pendant	2 Mod.	-
Lignite	6	.05	Local	-	-	1 Mod.	-	1 Mod. 2 Unmod.	2 Mod.	-	-
Limonite	51	.46	Local	-	3 Unmod.	4 Mod. 2 Unmod.	2 Mod. 4 Unmod. 1+?	2 Mod. 9 Unmod.	5 Mod. 11 Unmod. 1+?	2 Mod. 5 Unmod.	-
Malachite	1	.01	Basin	-	-	-	-	-	1 Unmod.	-	-
Mineral, unknown	1	.01	?	-	-	1+*	-	-	-	-	-
Other, fossil	1	.01	?	-	-	-	-	-	1 Fossil	-	-
Petrified wood	1	.01	Local	-	-	1 Pendant	-	-	-	-	-
Selenite	564	5.14	Local	1 Unmod.	29 Unmod.	14 Unmod.	17 Unmod.	1 Other 442 Unmod.	1 Zoom. 44 Unmod.	15 Unmod.	-

Table 5.2. (continued)

Material	Total No.	Rel. %	Source	Group I A.D. 875-925	925/950	Group II A.D. 925/950-975	A.D. 925-1050	A.D. 975-1025	A.D. 975-1050	Group III A.D. 975-1150	Unknown
Sepiolite	13	.12	Basin	-	-	-	1 Unmod.	2 Mod.	10 Unmod.	-	-
Shale	8	.07	Local	-	-	-	1 Bead	1 Mod.	3 Beads 1 Bead Bl. 1 Mod. 1 Unmod.	-	-
Shell: Chama E.	2	.02	Exter.	-	-	-	-	-	2 Ring Fr.	-	-
Freshw. Clam	1	.01	Basin?	-	-	-	-	-	1 Inlay	-	-
Glycymeris gigantea	10	.09	Exter.	-	1 Brac. Fr.	-	1 Brac. /Pend.	5 Brac. Fr.	1 Bead 1 Brac. /Pend.	1 Bead	-
Oliva incrassata	1	.01	Exter.	-	-	-	-	-	1 Pendant	-	-
Oliva sp.	1	.01	Exter.	-	-	-	-	-	1 Ring Fr.	-	-
Olivella dama	4	.04	Exter.	-	-	-	-	2 Beads	2 Beads	-	-
Turquoise	10,221	93.18	Exter.	-	1 Debris 1 Other 2 Mod. 1 Unmod.	1 Bead 1 Pend. 1 Debris 3 Mod.	2 Beads 1 Bead Bl. 1 Inlay 2 Pend. Bl. 3159 Debris 16 Mod. 7 Unmod.	11 Beads 43 Bead Bl. 2 Inlay 1 Other 5 Pend. 2 Pend. Bl. 2 Unid. 4065 Flecks 2033 Debris 218 Mod. 103 Unmod. 1 ?	3 Beads 26 Bead Bl. 2 Other 1 Pend. 2 Pend. Bl. 4 Unid. 224 Debris 108 Mod. 114 Unmod.	2 Beads 1 Inlay 1 Other 1 Pend. 1 Unid. 25 Debris 13 Mod. 5 Unmod. 1 ?	2 Mod.
Wood	1	.01	?	-	-	-	-	1 Unid.	-	-	-
TOTAL	10,969	100		1	45	33	3215	6971	620	80	3

Calcite: possibly local; found in Upper Cretaceous beds of the San Juan Basin. The "travertine" form is widespread as deposits in mineral springs in New Mexico (Northrop 1959:154-160).

Clay: source unknown.

Galena: found in the Grants District of McKinley County.

Gypsite: locally available in Chaco Canyon.

Gypsum: locally available in Chaco Canyon.

Hematite: found in Cliff House formation at Chaco Canyon.

Jet: objects of a black material whose exact mineral content has not been identified.

Lignite: locally available in Chaco Canyon.

Limonite: Available in Cliff House formation at Chaco Canyon.

Malachite: small quantities found in Haystack area of Grants District, McKinley County. Also available in mountains around the San Juan Basin (Zuni and Nacimiento Mountains).

Mineral, unknown.

Other, fossil.

Petrified wood: locally available.

Selenite: locally available in coal strata with especially good crystals found in Chaco Canyon.

Sepiolite: found in fractures at Green Knobs area of McKinley County.

Shale: Menefee shale is part of local formation. Mancos shale is found around the peripheries of the San Juan Basin.

Shell: the following habitat descriptions are taken from Keen (1971). Scientific names of species include the discoverer and year of report, based on a standard format used by malacologists; therefore, the reader is cautioned not to interpret these as references.

Chama echinata Broderip, 1835: Pelecypoda (bivalves, clams) found from the southern Gulf of California to Panama. Mazatlan is the northern point where it can easily be found.

Freshwater clam: Nearest source of year-round water is the San Juan River. Because species has not been determined, water requirements are not defined. Assumed available in the San Juan Basin.

Glycymeris gigantea (Reeve, 1843): Pelecypoda found from Bahia Magdalena, Baja California Sur to Acapulco and in the Gulf of California north to approximately Mulege, Baja California Sur. On the west coast of Mexico, only beach valves are found north of Mazatlan, Sinaloa.

Oliva incrassata [Lightfoot, 1786]: Gastropoda (snails) found throughout the Gulf of California, south to Peru. On sand beaches.

Oliva sp: Gastropoda found in the Gulf of California.

Olivella dama (Wood, 1828, ex Mawe MS): Gastropoda found in the head of the Gulf of California, Mexico south to Panama.

Turquoise: not found within the San Juan Basin. The nearest sources are over 100 airline miles distant, but positive identifications for sources of turquoise artifacts found in Chaco Canyon sites are limited to one piece (Mathien 1981a:Appendix C, 1981b, 1985).

To detect any differences in use of these materials or their importation, it was necessary to evaluate them in discrete time segments. Because the discrete periods assigned to the proveniences overlap somewhat, they were lumped into three larger groups: Group I, A.D. 875-975, includes two time spans listed in Table 5.2--A.D. 875-925 and A.D. 875-925/950. Less than one percent of the material recovered was assigned to this group.

Group II, A.D. 925-1050, includes three time spans from Table 5.2–A.D. 925-1050, 975-1025, and 975-1050. Group II covers the primary occupation of the site, and 98.51 percent of all the ornaments and minerals recovered was assigned to this group. Within Group II, a greater number of items (63.55 percent of all artifacts analyzed) fell within a 50-year time span (A.D. 975-1025), but the overlap in two spans (A.D. 925-1050 and 975-1050) makes it impossible to state how the remaining 34.96 percent would fall within those 50 years. In the overview of ornaments where the canyonwide time/space matrix was used to segregate materials, 97.55 percent of all ornaments and minerals were assigned to the A.D. 920-1020 period, with less than 1 percent in the A.D. 820-920 and 820-1020 combined time spans, 1.19 percent in the A.D. 920-1120 span, and less than one percent in the remaining A.D. 920-1120, 1120-1220 or unknown spans (Mathien 1985). As a result, I think that the materials analyzed in Group II should be considered together rather than in more discrete periods at this site.

Group III includes the A.D. 975-1150 and unknown periods. Less than one percent of the material was assigned to this group.

Using Windes' updated periods, very few minerals of any type were recovered from Group I (A.D. 875-950). Azurite, hematite, limonite, and selenite were present in small quantities. One bone bead, one Glycymeris gigantea shell bracelet fragment, and one other turquoise piece were the only ornaments recovered during this period (Table 5.3). None of these are remarkable, based on the presence of these materials at Chaco Canyon sites during the Basketmaker III-Pueblo I periods (Mathien 1985).

In Group II, turquoise is the most abundant material overall, and it was used for ornaments more often than any other material (Tables 5.2 and 5.3). Ornaments of argillite, bone, clay, jet, petrified wood, shale, and shell appear; and there are zoomorphic effigies in azurite and selenite. Notable is the greatly increased number of turquoise pieces as ornaments and unfinished material. If turquoise were not included, selenite would be the predominant material recovered during this period, as in the previous ones. The high number of turquoise pieces is due, in part, to the fine screening carried out at 29SJ 629. Additionally, micro flecks (debris so small that it cannot be picked up with the fingers but was collected as part of a larger sample and counted using tweezer tips to push the material around in a dish) that may have gone unnoticed in many excavations were recovered. The unusual numbers of turquoise bead blanks, which would have been found by any excavation crew (even without the benefit of screening), are also relatively rare at other excavated sites in Chaco Canyon (Mathien 1984, 1985). Therefore, it is concluded that the unusually large amounts of turquoise at this site does represent a pattern not found at other sites excavated in Chaco Canyon.

Group III continues to have a larger variety of material types. Again, turquoise is the predominant material type recovered. A total of 0.73 percent of all ornaments and minerals were assigned to A.D. 975-1150, a period which overlaps with the major period of occupation at this site. Also, 0.03 percent were not dated.

Artifact Classes

Materials that had been used and/or worked into some form for ornamental or ceremonial/religious purposes were divided into a number of different classes. A breakdown of these classifications by material type and grouped periods is found in Table 5.3.

Beads

Beads (30 total) made up 18.9 percent of the ornament collection. Of these, over half were made from turquoise, most of which were broken prior to completion of the manufacture stage. Table 5.4 provides information on their size, color, and other attributes.

Both of the bone beads recovered from this site were broken; however, the remaining fragments indicated that they were fairly well-made with grinding on the ends and polishing. Striations appeared on the surface of one, while the other had evidence of a cut perpendicular to the long axis of the bead. This occurred at one end and may represent either a decorative mark or cutting mark.

The 19 turquoise beads were limited to four proveniences: one (FS 1025) was found in the Trash Midden and is the only unbroken one recovered at 29SJ 629. Fourteen turquoise beads dating A.D. 925-1050 were all from Plaza Grid 9 which was identified as a general workshop area. Two other turquoise beads were recovered from a lithic and turquoise concentration area in Layer 6, the floor fill, in Pithouse 2. Two pieces of turquoise found in the Kiva (Pithouse 1) probably came from alluviated deposits that originated in the plaza, Level 10 dated to A.D. 920-1150. All of the beads in the plaza were 1/2 or 1/3 of the original disk that was broken after completion and indicate that this was a work area because pieces in various stages of manufacture and/or use were found (Plate 5.1). Mean size for these was 0.384 cm in diameter (var.=0.0048; sd=0.0718). Range of diameters was from 0.24 to 0.54 cm.

Table 5.3. Ornament classes at 29SJ 629.

Class	Total	Rel. %	Group I 875-925/950	Group II 925-1050	Group III 975-1150 or Unknown
Beads	30	18.9	1 Bone	1 Argillite 1 Bone 4 Shale 4 Olivella dama 17 Turquoise	2 Turquoise
Bead Blanks	71	44.7	-	1 Shale 70 Turquoise	-
Bracelet Fr.	7	4.4	1 Glycymeris gigantea	6 Glycymeris gigantea	1 Glycymeris gigantea
Bracelet/Pendant	3	1.9	-	2 Glycymeris gigantea	-
Gaming Piece	1	0.6	-	1 Bone	-
Inlay	5	3.1	-	1 Freshwater clam 3 Turquoise	1 Turquoise
Other	7	4.4	1 Turquoise	1 Selenite 3 Turquoise	2 Turquoise
Pendants	12	7.5	-	1 Clay 1 Jet 1 Pet. wood 1 Oliva inc. 7 Turquoise	1 Argillite
Pendant Blanks	8	5.0	-	1 Argillite 6 Turquoise	1 Turquoise
Ring Frag.	4	2.5	-	1 Bone 2 Chama echinata 1 Oliva sp.	-
Unidentified	9	5.7	-	1 Calcite 6 Turquoise 1 Wood	1 Turquoise
Zoomorphic figure	2	1.3	-	1 Azurite 1 Selenite	-
Totals	159	100.0	3	147	9

Table 5.4. Beads at 29SJ 629.

FS No.	Provenience	Length cm	Width cm	Thick. cm	Perf. cm	Color	Comments
Turquoise							
A.D. 925-1050							
1025	TM 76, Lev. 3	0.54	0.49	0.32	0.22	10 G 8/2	Drilled 1 side.
1267	Pl. Gr. 9, Lev. 3	0.34	0.22	0.10	0.07	5 BG 7/6	Drilled 2 sides. Broken, half.
1266	Pl. Gr. 9, Lev. 3	0.54	0.24	0.11	0.07	2.5 BG 7/4	Drilled 2 sides. Broken, half.
1585	Pl. Gr. 9, OP 1	0.37	0.31	0.12	0.06	2.5 BG 7/6	Drilled 2 sides. Broken, third.
1899	Pl. Gr. 9, OP 1	0.38	0.27	0.11	0.08	5 BG 7/6	Drilled 2 sides. Broken, half.
2150 (1)	Pl. Gr. 9, OP 1	0.24	0.24	0.10	0.11	7.5 BG 7/8	Drilled 1 side. Broken, half.
2150 (2)	"	0.39	0.29	0.14	0.15	2.5 BG 8/4	Drilled 2 sides. Broken, half. Striations.
2150 (3)	"	0.40	0.24	0.15	0.14	5 BG 8/4	Drilled 2 sides. Broken, half. Striations.
2150 (4)	"	0.46	0.27	0.12	0.09	7.5 BG 6/8	Drilled 2 sides. Broken, half. Striations.
2150 (5)	"	0.41	0.27	0.14	0.19	2.5 BG 6/6	Drilled 2 sides. Broken, half. Striations.
2150 (5)	"	0.37	0.27	0.19	0.09	7.5 BG 6/8	Drilled 2 sides. Broken, third.
2151 (1)	Pl. Gr. 9, OP 1	0.32	0.18	0.08	0.13	Light green	Drilled 2 sides. Broken, half.
2151 (2)	"	0.36	0.21	0.09	0.11	Light green	Drilled 1 side. Broken, half.
1960	Pl. Gr. 16, Lev. 1	0.41	0.21	0.17	0.15	10 BG 6/8	Drilled 2 sides. Broken, half.
2908 (1)	Pithouse 2, Floor fill, Lay. 6	0.32	-	0.12	0.10	7.5 BG 6/8	Drilled 2 sides. Broken, half.
2908 (2)	"	0.35	-	0.14	0.15	2.5 BG 8/4	Drilled 2 sides. Broken, half.
A.D. 975-1150 or Unknown							
1279	Kiva, Lev. 10	0.41	0.29	0.12	0.10	5 BG 8/4	Drilled 1 side. Broken, half.
1679	Kiva, Lev. 10	0.37	0.23	0.09	0.09	7.5 BG 7/8	Drilled 2 sides. Broken, half.

Table 5.4. *(continued)*

FS No.	Provenience	Length cm	Width cm	Thick. cm	Perf. cm		Comments
Argillite							
A.D. 925-1050							
1545	TM 82, Lev. 1	0.80	0.72	0.12	0.21	Reddish	Drilled 1 side, ground 2 sides.
Shale							
A.D. 925-1050							
198	Grid 41, Ant Nest 17	0.31	0.31	0.16	0.17	-	Drilled 1 side, ground all sides. Polished.
209	Grid 31, Ant Nest 19	0.31	0.36	0.17	0.17	-	Drilled 1 side, ground all sides. Polished.
1839	Room 9, hearth	0.32	0.32	0.16	0.13	Gray	Drilled 2 sides, ground all sides. Polished.
2908	Pithouse 2, Floor fill, Lay. 6	0.47	0.46	0.19	0.19	Gray	Drilled 1 side, ground all sides.
Olivella dama							
A.D. 925-1050							
3577	Room 8, tub	1.20	0.58	0.53	-	-	Ground 1 end.
2215 (1)	Pl. Gr. 14/10, OP 6	0.98	0.60	0.58	-	-	Ground 2 ends.
2215 (2)	"	0.88	0.59	0.58	-	-	Ground 2 ends, quarter of shell.
1961	Pl. Gr. 16, Lev. 2	1.63	0.76	0.67	0.19	-	Ground 1 end.
Bone							
A.D. 875-925/950							
422	TM 58	3.58	-	-	-	-	Broken, ground 1 end, polished, striations.
A.D. 925-1050							
2269	Pithouse 3, Lev. 7	3.35	-	-	-	-	Broken longitudinally. Ground 2 ends. Polished. Cut near 1 end.

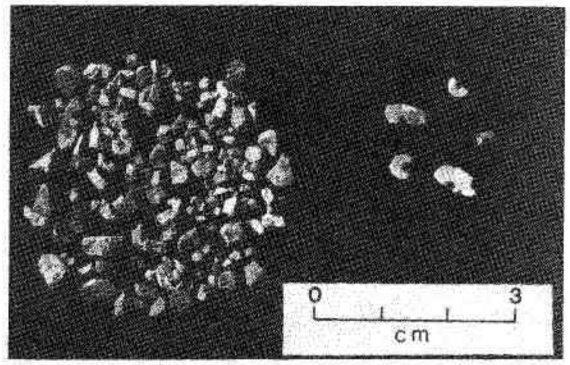


Plate 5.1. *Example of turquoise material from Plaza Grid 9: FS 1267 includes broken bead pieces as well as material in various stages of modification (NPS24526).*

The single argillite bead was found in the trash mound. Its diameter was at least twice the size of those for turquoise and shale, but the thickness was similar to beads made from these materials. Otherwise, it was not unusual in appearance.

Two shale beads, both found in ant hills, were fairly homogeneous in size, with a diameter of 0.31 cm. Another shale bead, from the firepit in Room 9, was 0.31 cm in diameter and quite similar to the other two. The shale bead found in the lithic concentration in the floor fill of Pithouse 2, however, was slightly larger in diameter.

The four Olivella dama beads all date between A.D. 975-1050 and show some variability in workmanship as two are ground on one end only, while the remaining two were ground on both ends.

Bead Blanks

The majority of the bead blanks (70 of 71, 98.62 percent) were made of turquoise (Table 5.5). Of these, 64 (90 percent) were found in various areas of Plaza Grid 9, where jewelry workshop material was recovered (Plate 5.1). All but one of these bead blanks were broken and most of them had some evidence of drilling. The circumferences of these disks were not perfectly round but they had been modified on the edges. Diameters ranged from 0.21 to 0.70 cm.

A single piece of shale which was considerably larger than most bead banks (e.g., 3.22 cm in diameter) had been ground into a discoid figure and incompletely drilled from one side. It dated A.D. 975-1050 and was found in Pithouse 3.

Bracelet Fragments and Bracelet/Pendants

A total of ten Glycymeris gigantea shell bracelet fragments were recovered (Table 5.6). Three of these had definitely been reworked into pendants. In all three instances, the perforations were placed in the umbo. Although they showed evidence of grinding on the two broken ends, FS 1274 had been reworked with considerably more care and resembled a pendant rather than a bracelet fragment (Plate 5.2).

The state of preservation of the various fragments varied; some were more powdery than others. Shell pieces that were harder and less eroded exhibited some polish and striations.

Gaming Piece

A single bone gaming piece (FS 2430) was recovered from Level 2 of Plaza Grid 16. It was oval and nicely ground on the two flat sides and around the edges. The top surface had a cross-hatched design, similar to that on many other gaming pieces found in nearby Chacoan sites in Marcia's Rincon (13 at 29SJ 626 East and 9 at 29SJ 627, Mathien 1985, 1990). Evidence of polish was found on the same surface as the design. The single piece from 29SJ 629 measures 1.70 cm in maximum length, 0.78 cm in width, and 0.22 cm in thickness.

Table 5.5. Bead blanks at 29SJ 629.

FS No.	Provenience	Dimensions in cm: Diameter	Thickness	Perforated	Color	Comments
<u>Turquoise</u>						
<u>A.D. 925-1050</u>						
2908	Pithouse 2, Floor fill Layer 6	0.56	0.17	-	2.5 BG 8/4	Irregular disk. Ground 2 sides.
<u>A.D. 975-1050</u>						
279	Room 2, Lay. 1	0.38	0.12	0.06	5 BG 7/6	Broken, half. Drilled 2 sides.
3576	Backdirt	0.36	0.11	0.11	10 BG 7/8	Broken, half. Drilled 2 sides, incomplete perf.
2440	Room 9, Floor 2	0.29	0.18	0.04	7.5 BG 7/6	Broken, third. Drilled 2 sides.
1577	Pl. Gr. 8, Lev. 3	0.31	0.08	0.09	5 BG 6/8	Drilled 1 side.
1266 (1)	Pl. Gr. 9, Lev. 2	0.38	0.13	0.09	7.5 BG 7/6	Broken, half. Drilled 1 side.
1266 (2)	"	0.40	0.10	0.08	5 BG 8/4	Broken, half. Drilled 2 sides.
1266 (3)	"	0.29	0.10	0.08	7.5 BG 7/8	Broken, half. Drilled 2 sides.
1267 (1)	Pl. Gr. 9, Lev. 3	0.47	0.15	0.09	5 BG 7/6	Broken, half. Drilled 1 side.
1267 (2)	"	0.34	0.10	0.06	7.5 BG 6/8	Broken, half. Drilled 1 side.
1267 (3)	"	0.37	0.10	0.07	7.5 BG 6/6	Broken, half. Drilled 1 side.
1267 (4)	"	0.32	0.10	0.08	5 BG 7/6	Broken, half. Drilled 1 side.
1267 (5)	"	0.42	0.14	0.08	7.5 BG 7/8	Broken, half. Drilled 1 side.
1267 (6)	"	0.34	0.10	0.07	2.5 BG 7/6	Broken, half. Drilled 1 side.
1267 (7)	"	0.35	0.10	0.12	5 BG 7/8	Broken, half. Drilled 1 side.

Table 5.5. *(continued)*

FS No.	Provenience	Dimensions in cm: Diameter	Thickness	Perforated	Color	Comments
1267 (8)	Pl. Gr. 9, Lev. 3	0.30	0.11	0.07	7.5 BG 6/8	Broken, half. Drilled 1 side. Perforation incomplete.
1267 (9)	"	0.70	0.20	0.19	5 GY 7/2	Broken, half. Drilled 2 sides. Perforation incomplete.
1267 (10)	"	0.66	0.07	0.12	10 GY 6/4	Broken, quarter. Drilled 2 sides.
1267 (11)	"	0.39	0.10	0.09	2.5 BG 7/8	Broken, half. Drilled 2 sides.
1267 (12)	"	0.32	0.07	0.07	7.5 BG 6/6	Broken, half. Drilled 2 sides.
1264	Pl. Gr. 9, Fl. 2	0.32	0.09	0.08	5 BG 6/6	Broken, half. Drilled 1 side.
198	Grid 41, Ant Nest 17	0.43	0.13	0.09	5 BG 5/6 2.5 BG 6/8	
209	Grid 31, Ant Nest 19				10 BG 6/6	
1192 (1)	Pl. Gr. 15, Lev. 1	0.32	0.12	0.08	7.5 BG 7/6	Broken, half. Drilled 1 side.
1192 (2)	"	0.33	0.16	0.10	10 BG 9/2	Broken, half. Drilled 2 sides.
1960	Pl. Gr. 16, Lev. 1	0.40	0.08	0.09	2.5 BG 6/6	Broken, half. Drilled 1 side.
A.D. 975-1025						
1341	Pl. Gr. 9, Fl. 3	0.29	0.11	0.12	5 BG 7/6	Broken, half. Drilled 1 side.
1498	Pl. Gr. 9, OP 1	0.55	0.20	-	5 BG 7/4	Broken, half.
1685	Pl. Gr. 9, OP 1	0.33	0.09	0.06	2.5 BG 7/6	Broken, half. Drilled 1 side.
1860	Pl. Gr. 9, OP 1	0.21	0.11	0.08	7.5 BG 7/6	Broken, quarter. Drilled 2 sides.

Table 5.5. (continued)

FS No.	Provenience	Dimensions in cm: Diameter	Thickness	Perforated	Color	Comments
1899 (1)	Pl. Gr. 9, OP 1	0.50	0.15	0.11	7.5 BG 7/8	Broken, half. Drilled 2 sides.
1899 (2)	"	0.49	0.11	0.10	5 BG 7/8	Broken, half. Drilled 1 side.
1899 (3)	"	0.33	0.12	0.10	5 BG 7/8	Broken, half. Drilled 1 side.
1980 (1)	Pl. Gr. 9, OP 1	0.43	0.11	0.09	5 BG 7/6	Broken, half. Drilled 1 side.
1980 (2)	"	0.46	0.13	0.10	10 BG 7/8	Broken, half. Drilled 1 side.
1980 (3)	"	0.35	0.10	0.10	5 BG 8/4	Broken, third. Drilled 2 sides. Perforation incomplete.
1980 (4)	"	0.34	0.09	0.07	2.5 BG 7/6	Broken, half. Drilled 2 sides.
1922	Pl. Gr. 9, OP 1	0.32	0.08	0.07	2.5 BG 6/6	Broken, third. Drilled 1 side.
2087	Pl. Gr. 9, OP 1	0.38	0.18	-	5 BG 7/6	Broken, half. Drilled 1 side.
2149	Pl. Gr. 9, OP 1	0.45	0.13	0.08	5 BG 6/8	Broken, half. Drilled 1 side. Perforation incomplete.
A.D. 925-1050						
2150 (1)	Pl. Gr. 9, OP 1	0.33	0.10	0.13	7.5 BG 7/8	Broken, half. Drilled 1 side.
2150 (2)	"	0.34	0.09	0.09	2.5 BG 4/8	Broken, half. Drilled 1 side.
2150 (3)	"	0.32	0.10	0.11	2.5 BG 7/6	Broken, half. Drilled 1 side.
2150 (4)	"	0.41	0.08	0.13	2.5 BG 8/4	Broken, half. Drilled 2 sides.

Table 5.5. (continued)

FS No.	Provenience	Dimensions in cm: Diameter	Thickness	Perforated	Color	Comments
2150 (5)	"	0.43	0.21	0.15	2.5 BG 7/6	Broken, half. Drilled 1 side.
2150 (6)	"	0.61	0.16	0.18	2.5 BG 7/6	Drilled.
A.D. 975-1025						
2151 (1)	Pl. Gr. 9, OP 1, (Lev. 12)	0.30	0.08	0.14	7.5 BG 7/6	Broken, half. Drilled 2 sides.
2151 (2)	"	0.45	0.14	0.13	5 BG 8/4	Broken, half. Drilled 2 sides, ground 2 sides.
2151 (3)	"	0.43	0.11	0.14	5 BG 8/4	Broken, half. Drilled 1 side, ground 2 sides.
2151 (4)	"	0.45	0.13	0.11	5 BG 8/4	Broken, half. Drilled 1 side, ground 2 sides.
2151 (5)	"	0.37	0.08	0.08	7.5 BG 7/6	Broken, half. Drilled 1 side, ground 2 sides.
2151 (6)	"	0.28	0.12	0.12	10 BG 7/6	Broken, half. Drilled 1 side, ground 2 sides.
2151 (7)	"	0.24	0.18	0.08	2.5 BG 7/6	Broken, half. Drilled 1 side, ground 2 sides.
2151 (8)	"	0.26	0.08	0.08	7.5 BG 7/6	Broken, half. Drilled 1 side, ground 2 sides.
2151 (9)	"	0.37	0.13	-	10 BG 7/6	Broken, half. Ground 2 sides.
2151 (10)	"	0.42	0.13	-	5 BG 7/6	Discoidal. Ground 2 sides.
2151 (11)	"	0.32	0.11	0.10	7.5 BG 6/8	Broken, half. Drilled 1 side, ground 2 sides.
2151 (12)	"	0.43	0.14	0.11	5 BG 7/6	Broken, half. Drilled 2 sides, ground 2 sides.
2151 (13)	"	0.39	0.10	0.09	7.5 BG 6/8	Broken, half. Drilled 1 side, ground 2 sides.

Table 5.5. (continued)

FS No.	Provenience	Dimensions in cm: Diameter	Thickness	Perforated	Color	Comments
2151 (14)	"	0.38	0.13	0.08	7.5 BG 6/8	Broken, half. Drilled 2 sides, ground 2 sides.
2151 (15)	"	0.40	0.09	0.10	7.5 BG 6/8	Broken, half. Drilled 2 sides, ground 2 sides.
2151 (16)	"	0.38	0.13	0.11	10 BG 6/8	Broken, half. Drilled 2 sides, ground 2 sides.
2151 (17)	"	0.44	0.06	0.13	7.5 BG 7/8	Broken, half. Drilled 1 side, ground 2 sides.
2151 (18)	"	0.33	0.10	0.12	10 BG 7/6	Broken, half. Drilled 2 sides, ground 2 sides.
2151 (19)	"	0.46	0.09	0.11	Light green	Broken, half. Drilled 1 side, ground 2 sides.
2151 (20)	"	0.30	0.28	0.06	10 BG 6/6	Broken, half. Drilled 1 side, ground 2 sides.
1585 (1)	Pl. Gr. 9, Other Pit 1	0.35	0.11	0.07	7.5 BG 7/6	Broken, half. Drilled 2 sides.
1585 (2)	"	0.31	0.10	0.06	2.5 BG 7/6	Broken, half. Drilled 1 side.
2481	Pl. Gr. 9, Other Pit 1	0.43	0.13	0.09	7.5 BG 7/8	Broken, half. Drilled 1 side.
Shale						
A.D. 975-1050						
2265	Pithouse 3, Lev. 7	3.22	1.46	1.05	-	Drilled 1 side, incomplete perforation. Striations.

Table 5.6. *Glycymeris bracelet fragments at 29SJ 629.*

			Dimensions in cm.				
FS No.	Provenience	Dating	Length	Width	Thick.	Perf.	Comments
207	Trash Midden 58, surface	875-925/950	5.04	0.77	0.38	-	Ground on 1 end.
2781	Pl. Gr. 14, Lev. 3	975-1025	2.33	0.41	0.23	-	Ground on all sides and edges, polished on all sides, edges. Striations.
2804	Pl. Gr. 14, Lev. 3	975-1025	5.16	3.43	0.39	-	Ground on all sides.
1146	Pl. Gr. 9, Lev. 2	975-1050	1.97	0.69	0.36	-	Ground on 2 sides, polished.
24	Grid 23	975-1150	3.06	0.63	0.59	-	Ground on 1 end.
Bracelet/pendants							
2781	Pl. Gr. 14, Other Pit 14	975-1025	4.68	0.98	0.46	0.16	Ground all sides, both ends. Drilled 1 side.
2847	Pithouse 2, Lay. 4	925-1050	4.67	0.76	0.30	0.16	Ground 2 sides. Perforated.
1274	Pl. Gr. 8, Lev. 2	975-1050	2.54	1.02	0.39	0.23	Ground all sides and ends. Polished on 1 surface. Striations. Drilled 1 side.

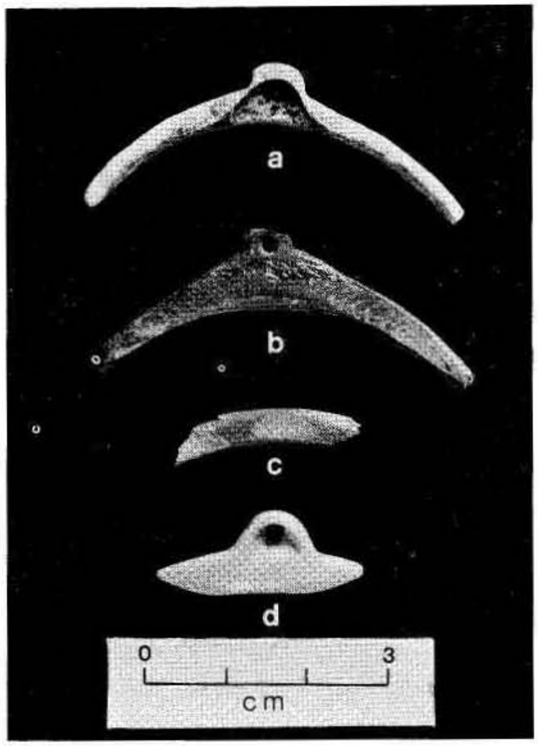


Plate 5.2. *Glycymeris gigantea bracelet fragments that may have been reused as pendants: FS 2847, FS 2781 (two pieces, pendant and bracelet fragment), FS 1274 (NPS 24520).*

Inlay

Five rectangular pieces (four turquoise and one freshwater clam) were classified as tesserae used for inlay because of their shape. Three of the turquoise pieces and the freshwater clam dated to A.D. 925-1050, while the remaining turquoise piece dated to A.D. 975-1150. Among the former, two (FS 1685 and 1687) were found together in Other Pit 1 of Plaza Grid 9 and are quite similar in size (0.27 x 0.23 x 0.12 cm and 0.32 x 0.20 x 0.16 cm in length, width, and thickness). The remaining three pieces are more variable. FS 2909 was the largest turquoise inlay (0.68 x 0.57 x 0.17 cm); this piece was from Pithouse 2. The remaining turquoise piece, FS 2161 from Grid 26, was 0.49 x 0.38 x 0.11 cm; however, this piece was broken.

The freshwater clam (FS 2139) was the largest inlay; it measured 1.71 x 0.80 x 0.09 cm and was found in Plaza Grid 16, Level 1. While somewhat rectangular in shape, its corners were rounded and it, therefore, was somewhat different from the turquoise inlay and probably was used for a different purpose.

Pendants

Table 5.7 summarizes the data on twelve pendants and eight pendant blanks; 70 percent of these were made of turquoise. Plate 5.3 illustrates several of these pieces.

Table 5.7. Pendants at 29SJ 629.

		Dimensions in cm.				
FS No.	Provenience	Length	Width	Thick.	Perf.	Comments
Turquoise						
A.D. 925/950-975						
865	Trash Midden 70, Lev. 2	0.77	0.59	0.12	0.13	Rectangular. Ground on all sides, edges. Drilled 1 side. 10 BG 7/8.
A.D. 975-1025						
2150 (1)	Pl. Gr. 9, Other Pit 1	0.50	0.39	0.13	0.11	Rectangular. Broken. Ground and polished on 2 sides. Drilled 1 side. 2.5 BG 7/8.
2150 (2)	"	0.52	0.34	0.18	0.15	Irregular, broken. Ground 2 sides. Drilled 2 sides. 2.5 BG 8/4.
2803	Pl. Gr. 14, Other Pit 14	0.92	0.62	0.20	0.20	Rectangular. Ground on all sides and edges. Drilled biconically. 5 GY 8/1.
2360	Pl. Gr. 14, Other Pit 6	0.84	0.59	0.19	0.12	Rectangular. Ground on all sides and edges. Drilled on 1 side. 5 G 8/1.
1537	Trash Midden 82, surface	0.78	0.57	0.26	0.17	Rectangular. Ground on all sides and edges. Drilled on 2 sides. 7.5 BG 8/4.
A.D. 975-1050						
488	Room 9, Bin 2	0.57	0.37	0.19	0.09	Triangular. Ground on all sides and edges. Polished on 2 sides. Drilled on 2 sides. 7.5 BG 6/8.
Jet						
A.D. 975-1050						
2517	Pithouse 3, Lay. 2	1.64	1.57	0.11	0.15	Rectangular. Ground on all sides and edges. Striations. Drilled on 2 sides.

Table 5.7. *(continued)*

FS No.	Provenience	Dimensions in cm. Length	Width	Thick	Perf.	Comments
Petrified wood						
A.D. 925/950-975						
1636	Trash Midden 65, Lev. 2	1.15	0.53	0.53	0.18	Ground on all sides. Striations. Drilled on 2 sides.
Clay						
A.D. 975-1025						
2805	Pl. Gr. 14, Other Pit 14	3.04	1.07	0.83	-	Zoomorphic. Ground on all sides and edges. Striations. Perforation is worn through.
Oliva incrassata						
A.D. 975-1050						
1695	Pl. Gr. 202, Lev. 1	1.64	1.14	0.69	0.28	Irregular in shape. Broken. Ground on 1 end. Polished. Drilled.
Argillite						
Unknown						
3326	Surface, gully	2.25	2.36	0.39	0.24	Ground and polished on 2 sides. Striations. Drilled on 2 sides.
Pendant blanks						
Turquoise						
A.D. 925-1050						
3149	Pithouse 2, Floor 1, Other Pit 1	0.48	0.42	0.16	0.07	Oval. Ground on 2 sides. Incomplete perforation drilled from 2 sides. 5 B 7/2.

Table 5.7. *(continued)*

FS No.	Provenience	Dimensions in cm. Length	Width	Thick	Perf.	Comments
3205	Pithouse 2, Floor 1, Other Pit 6	1.24	0.94	0.21	0.12	Rectangular. Ground on all sides and edges. Incomplete perforation drilled from 1 side. 5 BG 7/8.
<u>A.D. 975-1025</u>						
1992	Pl. Gr. 9, Other Pit 1	0.33	0.27	0.08	0.08	Irregular. Broken quarter. Incomplete perforation drilled from 2 sides. 2.5 BG 7/8.
2659	Pl. Gr. 14, Other Pit 14	0.46	0.46	0.15	0.08	Irregular, broken quarter. Ground on 2 sides and 3 edges. Drilled on 1 side. 7.5 BG 7/6.
<u>A.D. 975-1050</u>						
488	Room 9, Bin 2	0.96	0.36	0.26	-	Irregular, broken quarter. Ground and polished on 2 sides and 3 edges. 5 G 8/1.
691	Room 9, Lev. 2	0.78	0.54	0.12	0.10	Rectangular. Ground on 2 sides and 3 edges. Drilled on 1 side. 10 GY 7/2.
<u>A.D. 975-1150</u>						
323	Kiva, Lev. 6	0.57	0.28	0.11	0.08	Rectangular, broken half. Ground on 2 sides and 2 edges. Polished on 1 side. Drilled on 2 sides. 5 BG 6/8.
<u>Argillite</u>						
A.D. 975-1050						
2579	Pl. Gr. 34, Lay. 1	1.99	0.60	0.31	0.33	Broken quarter. Ground on 2 sides and 2 edges. Drilled 1 side.

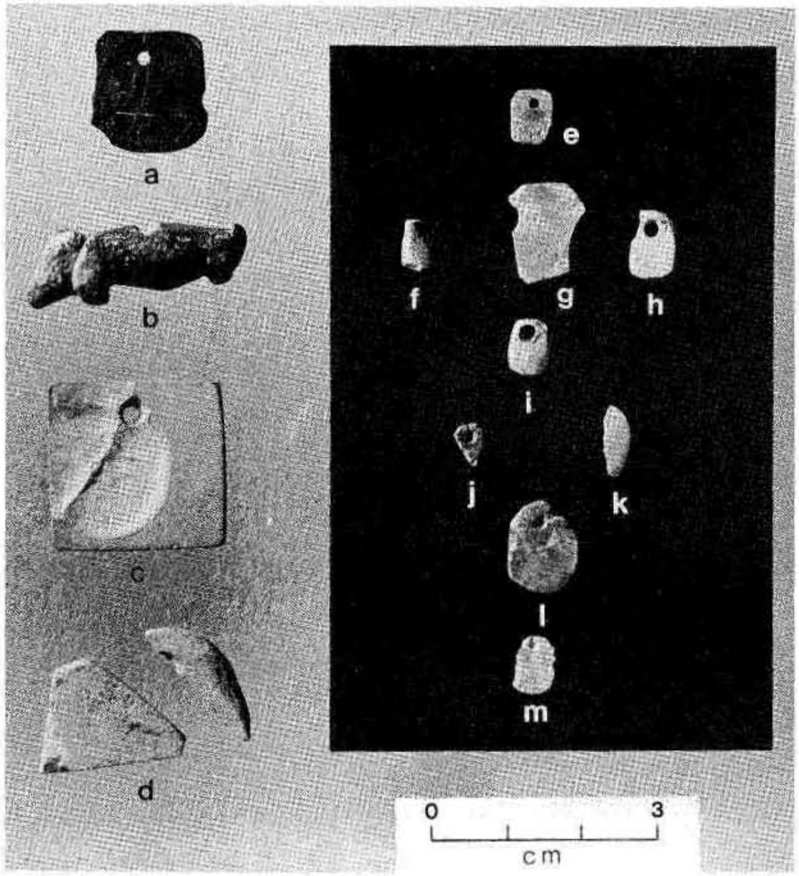


Plate 5.3. *Pendants and pendant blanks from 29SJ 629: From top to bottom of first column: FS 2517 (jet); FS 2805 (clay); FS 3326 and FS 2759 (argillite). Turquoise in second column, top to bottom: FS 865, FS 2803, FS 1537, FS 488, FS 3205, FS 691 (NPS 24523).*

For the occupation that dated between A.D. 925/950-975, only one turquoise pendant (FS 865) was recovered from the Trash Midden. No turquoise pendant blanks were recovered.

After A.D. 925/975 to 1050, there were numerous pendants made from several different material types. A single jet pendant (FS 2517) was recovered from the fill of Pithouse 3. It was rectangular in overall shape. The most unusual pendant from this period (FS 2805) came from Other Pit 14 in Plaza Grid 14. It was an effigy of a four-legged mammal which resembles a modern bear fetish. Extremely light-weight, it has been tentatively classified as clay. The exterior was blackened, but the interior was a tan/beige color. Extremely well worn, the perforation on the dorsal side had been eroded.

A broken Oliva incrassata shell (FS 1695) was probably used as a pendant. The center perforation had been enlarged; drilling and wear patterns on the back side suggested it had been strung and worn. The gray color of this piece suggested exposure to fire; yet some polish is still evident. Thus it may not have been directly in the flames. The remaining five turquoise pendants from A.D. 925/975-1050 are generally rectangular/trapezoidal in shape with the width at the upper end tapering slightly inward. Four turquoise pendant blanks also dated to this period.

A piece of gray-white petrified wood (FS 1636) recovered from the Trash Midden was triangular in cross-section (0.53 cm in height) with a somewhat half-moon shape in length (1.15 cm). An 0.18 cm perforation, drilled from both sides, was placed in the middle of the long axis and near the top of the ridge. Several striations on this piece indicated that it had been abraded into its finished shape.

The undated, complete argillite pendant (FS 3326) was a flat squarish piece (2.25 x 2.36 cm) that was 0.39 cm thick. It had suffered some damage through the years as a thin plate had been broken off one half of the upper surface. The argillite pendant blank (FS 2579) was a flat, irregularly shaped piece that probably broke off from another ground piece; however, it could not be matched to a flat triangular piece found with it. This latter piece had been ground on all three edges while the pendant blank had definite evidence of broken edges along its longest axis. A single perforation was evident.

One turquoise pendant, three turquoise and one argillite pendant blanks were also recovered from the primary site occupation.

In general, the turquoise pendants and pendant blanks were smaller than those made from other materials, but the figures listed in Table 5.7 indicate there is some variability for these turquoise ornaments.

Ring Fragments

Four different rings or ring fragments were recovered (Plate 5.4) from proveniences dating from A.D. 975-1050.

FS 2516, identified as Oliva sp., was found in two pieces which composed approximately one-half of the entire ring. Based on these fragments, the diameter on the inside of the ring was 2.21 cm. The band width was 1.13 cm and it had a groove running through the center. The ring had been ground on the two sides and around the edges. This piece was recovered from the trash fill of Pithouse 3.

Another broken ring (FS 2343) came from the same pithouse trash deposits; however, it was made of bone. It had been ground on two edges which exhibited striations. Because the fragment represented less than one-quarter of the entire ring, no measurements for the diameter are available. The width of the band was 1.69 cm, and there were no decorations or carving on its surface (Plate 6.4d).

The third and fourth ring fragments, FS 1376 and FS 692, were found on the floor of Room 5 and Level 3 of Room 9, respectively. Originally classified as bone, the former had been nicely ground and polished on all sides and had a few striations. The band width is 0.48 cm and it is 0.19 cm thick. The latter piece was made from Chama echinata and had a band width of 0.49 cm and thickness of 0.18 cm. The discrepancy in classification of material types was not noted until after analyses were completed; the two pieces fit together and their internal structure was denser than bone and more lamellar; thus, both are shell.

Zoomorphics

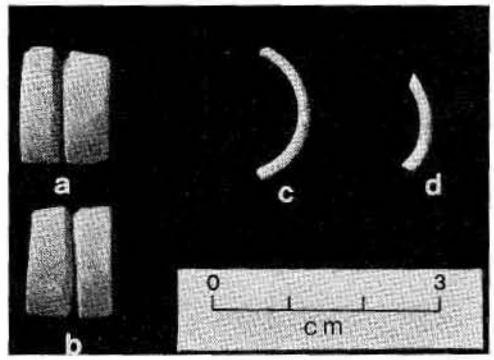
In addition to the effigy-shaped clay pendant described above, two zoomorphic pieces were recovered from material dated A.D. 975-1050 at 29SJ 629 (Plate 5.5). The first, from Room 5, Level 5, was made of azurite (FS 719). It was small (0.67 x 0.45 x 0.30 cm in length, width, and thickness) and had been ground on several surfaces to give it the appearance of a creature laying flat on its stomach. No appendages were present and a simple carved line separated the head from the torso.

The second zoomorphic figure, FS 2409, was found in Pithouse 3, Level 9. It was a flat selenite piece ground on several edges and carved/notched along two sides. Maximum length was 0.67 cm, width 0.45, and thickness 0.30. Similarly worked pieces of argillite and shell have been recovered at other sites in Chaco Canyon (Mathien 1985).

Other/Unidentified Shapes

Sixteen pieces were classified as having other or unidentified shapes: fourteen turquoise, one selenite, one wood, and one calcite. The single calcite piece (FS 2778) was irregular in shape, had been ground

Plate 5.4. *Ring fragments from 29SJ 629: a-b) first column: FS 1367 and FS 2516, two pieces of one Oliva ring; c-d) second column: FS 692, two pieces of a Chama echinata ring (NPS 24524).*



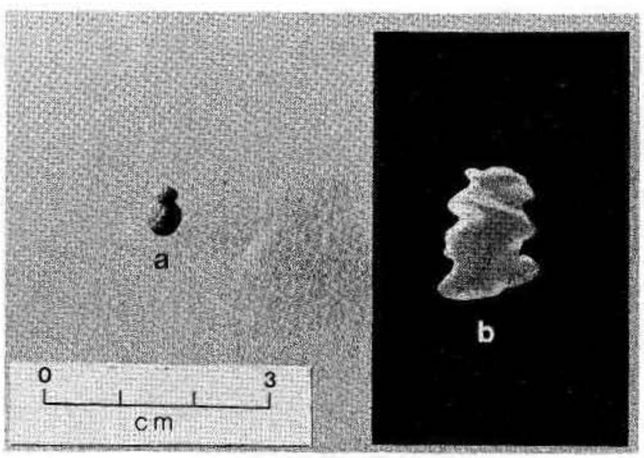


Plate 5.5. *Zoomorphic figures from 29SJ 629: a) FS 719 (azurite); b) FS 2409 (selenite) (NPS 24525).*

on two ends and notched on one (Plate 5.6). It had a central perforation, but did not resemble any of the pendants found in this or other Chacoan sites. It measured 1.78 x 1.52 x 0.36 cm in length, width, and thickness and the perforation was 0.44 cm in diameter. It was found in Other Pit 14 of the plaza.

The single selenite piece (FS 3088) was roughly a flat triangular piece measuring 5.65 cm in length, 4.35 cm in maximum width, and 0.63 cm in thickness. Ground in a few spots on the edges, the upper surface had been carved into a rectangular pattern. There was no evidence of perforations (Plate 5.6).

The remaining turquoise pieces were not the usual manufacturing debris. These had not been sufficiently worked to determine their eventual form; thus, they are not described further.

A somewhat fragile cylindrically shaped piece of wood (FS 1900) was recovered from Plaza Grid 9, Other Pit 1. It measures approximately 4.15 cm in length and 2.95 cm at its widest diameter (Plate 5.7). A few flecks of green paint (originally thought to be turquoise) remain on each of the two flat ends. Green painted wood has been recovered at other sites, e.g., Chetro Ketl (Vivian, Dodgen and Hartman 1978:123-124). The exact mineral used to obtain the green pigment has not been identified with certainty; it is thought to be malachite (ibid:123-124). The function of this piece from 29SJ 629 is not known.

In summary, the inhabitants of 29SJ 629 had access to beads, bracelets (often broken and reworked into pendants), pendants, rings, inlay pieces, zoomorphic figures, and other decorative objects. The presence of bead blanks and broken bead fragments are indicative of jewelry workshop areas at this site (see below).

Other Minerals

The recovery of other non-ornamental minerals often points toward special uses of them by prehistoric people. There were a number of organic and inorganic minerals that were not classified as ornaments (Table 5.2). As noted above, the majority of all minerals recovered were turquoise; this mineral also led the number in the non-ornamental category. The next most frequent mineral was selenite followed by limonite, hematite, galena, azurite, and sepiolite. The unusually high frequency of the last three minerals invites an explanation. With regard to the azurite, these pieces were found, one or two per provenience, in eight separate areas of the site. In contrast, all 21 galena fragments were found together in the plaza and may represent a breakdown of one or a few pieces through time. Sepiolite is a mineral not commonly found in Chacoan sites; two pieces were recovered at 29SJ 628, a Basketmaker III village located just downslope from 29SJ 629 in Marcia's Rincon (Mathien 1985).

When only soft minerals that could have been used for pigments were tallied, several minerals were represented during the period A.D. 920-1020 (Table 5.8). If these are listed by the basic colors that can be obtained, they follow a pattern seen at other sites in Chaco Canyon (Mathien 1985). Most popular was white (burned selenite is white), followed by yellow/red/brown, the blue/greens, and black. That some of these minerals were used as paint pigments at other sites has been documented by Breternitz and White (1987) for Pueblo Alto and by Dodgen (1978) for Chetro Ketl.

Unusual or Notable Groupings

29SJ 629 is unusual for the number of clusters of minerals, particularly turquoise, that indicate jewelry workshops. Several of the turquoise clusters contrast with other materials, e.g., selenite. The latter may also indicate specific work areas.

Pithouse 2, Floor 1 and associated pits (Other Pits 1, 2, 6), all date to A.D. 925-1050. Here, 3,156 pieces of turquoise, mostly debris, were recovered, as well as two pieces of selenite and some limonite. Three pieces of one lapidary abrader, analyzed by Akins (1980), were recovered from this floor or the fill above it. Chipped stone was abundant; Windes (Volume I of this report) indicates that there was one microdrill in the material associated with this floor. These artifacts support the identification of this room as a turquoise workshop area.

Pithouse 2, Floor 2 and associated pits (Heating Pits 1 and 2, Other Pits 2, 5, and 10) also contained

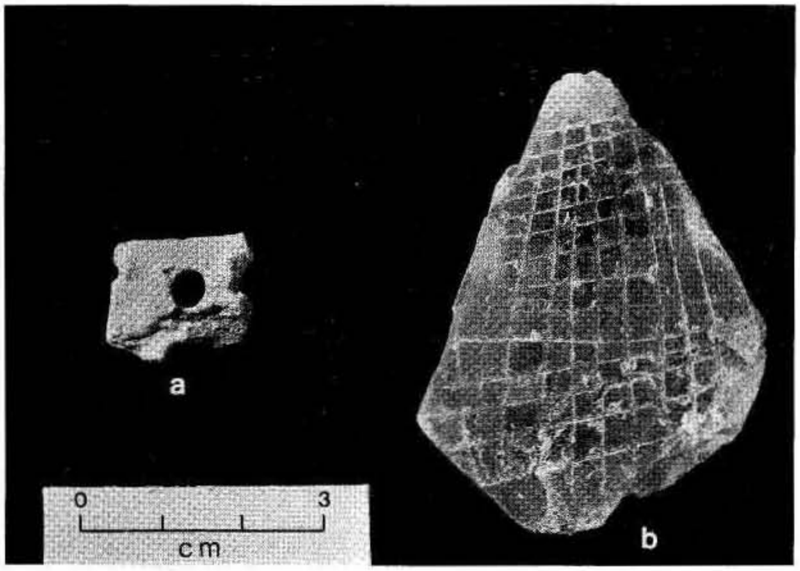


Plate 5.6. *Two unusual pieces from Plaza Other Pit 14: a) FS 2778, calcite piece that had been modified, included a perforation; b) FS 3088, a piece of selenite with incised design (NPS 24521).*

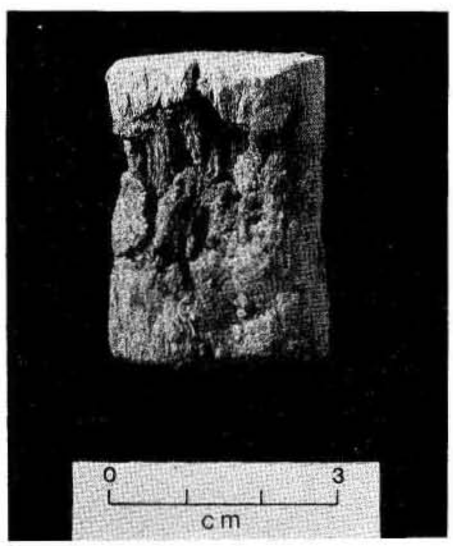


Plate 5.7. *Wood piece with small green paint fragments: FS 1900 (NPS 24522).*

Table 5.8. Soft minerals possibly used as pigments from 29SJ 629.

Mineral	Total No.	Percent of Soft Minerals
Azurite	10	1.81
Gypsite	1	0.18
Gypsum	2	0.36
Hematite	11	1.99
Lignite	4	0.72
Limonite	33	5.96
Malachite	1	0.18
Selenite	492	88.81
	554	100.01

some turquoise debris. Although no lapidary abraders were recovered from this floor, the pithouse probably represents living quarters that were refurbished through time.

The plaza in front of Rooms 6 and 7 had a considerable amount of turquoise and selenite. The surfaces of Plaza Grids 9 and 15 contained 264 pieces of turquoise in various stages of manufacture. Microdrills similar to that found with turquoise debris in Pithouse 2 are also recorded from the plaza (Cameron, this volume; Windes, Volume I of this report). In this plaza there were several pits located in this general area that also contained the remains of materials (Table 5.9). Associated with the different minerals and ornaments from these various pits were other stone tools. Other Pit 1 contained 34 passive lapidary abraders and three tiny, chalcedonic silicified wood (1140 series) drills; in contrast, Other Pit 14 had only one active and one passive lapidary abrader. None were recorded for Other Pit 6 or Other Pit 9 (Akins 1980:261-262). Although Other Pit 1 contained 41 percent of the site's lapidary abraders, Other Pit 14 had 39 percent of the site's hammerstones (Windes, this volume). According to Windes (Volume I of this report), there were numerous other materials which suggested that Other Pit 14 contained mealing equipment and other remains of food preparation. The presence of selenite, if it is assumed to have been used as a pigment (after burning and grinding), or as a polishing compound, also correlates in a functional manner. Together Other Pit 6 and Other Pit 14 contain 78 percent of the site's selenite, while 63 percent of the site's turquoise was in Other Pit 1.

Although all three of these pits are within approximately three meters of one another, there are differences in the use of space, perhaps based on family relations, task loci, or division of labor by sex.

Color of Turquoise

The color of turquoise artifacts may suggest differences in the quality of the material used for jewelry items, preference of the users, or the ability of jewelry makers to create an ornament, given the available technology. A total of 613 pieces of turquoise from this site were color-coded using four pages of the Munsell Color Chart for the blue-green hues, supplemented by a Rock Color Chart which included some additional hues on both ends of the blue-green spectrum. All larger pieces were color-coded; many small pieces of debris were too difficult to pick up and manipulate successfully. The larger-sized pieces should represent color preferences if the natives made their ornaments from pieces

Table 5.9. Turquoise and other minerals recovered from pits in the plaza at 29SJ 629.

Pit		Mineral
Other Pit 1	6440	turquoise (63% of the turquoise from this site. No other minerals found)
Other Pit 2	5	turquoise
Other Pit 9	9	turquoise
Other Pit 14	10	turquoise
	7	limonite
	292	selenite (51% of selenite from the site)
	1	calcite
	5	Glycymeris bracelet fragments
	2	lignite
Other Pit 6	151	selenite (26.8% of selenite at site)
	4	turquoise
	2	Olivella dama
	5	hematite
	17	gypsite
	1	limonite
	1	jet

selected on the basis of quality and color; the numbers of larger debris should reflect this as adequately as numbers of minuscule debris.

When the various colors were grouped by hue, value, and chroma, several inferences could be made. Based on the total sample, the following were the most frequent of the 50 colors utilized (Table 5.10). Thus, nine of the individually coded colors account for 57.42 percent of the entire sample.

When examined by preference for blues or greens, the hue with the largest number of artifacts was 7.5 BG with 201 pieces or 32.79 percent of the artifacts coded. The breakdown is shown in Table 5.11. The combined hues (2.5 BG, 5 BG, and 7.5 BG) represent 81.7 percent of the colors coded. Use of bluer colors was limited, and although the greener colors were used, the blue-greens were most frequently selected and/or available.

When colors were plotted according to value and chroma (instead of hue), several clusters could be determined. The 7/6 and 7/8 intensities accounted for 262 artifacts or 44.7 percent of the sample, followed by 8/4 and 6/8.

Thus, in spite of the fact that turquoise tends to change color (toward the greener end of the spectrum) with time, it is suggested that the inhabitants of 29SJ 629 tended to use pieces from the bluer end of the spectrum and chose colors which were fairly bright. When hue, chroma, and value in artifact classes were listed, the majority of the artifacts that were made into ornaments followed this pattern. Among the beads (Table 5.4), the only beads that did not fall within these patterns were the ones found in the Trash Midden, and the workshop material from Other Pit 1 in the plaza. Only three of the 70 bead blanks (Table 5.4) were in the green yellow range. An inlay (1 of 4) was also lighter than the majority.

Because the site excavator, Windes, noted that there was a difference in overall color among turquoise pieces recovered from Plaza Grid 9 and Pithouse 2, the material from these two areas was evaluated. Not included because of their small size were tiny, worked, turquoise pieces (FS 2908),

Table 5.10. Sample of turquoise colors at 29SJ 629.

Color	No. of Artifacts	% of Sample	Cumulative %
7.5 BG 7/8	74	12.07	12.07
7.5 BG 7/6	46	7.50	19.57
2.5 BG 8/4	42	6.85	26.42
7.5 BG 6/8	44	7.18	33.60
5 BG 7/6	36	6.36	39.96
2.5 BG 7/6	33	5.38	45.34
5 BG 7/8	32	5.22	50.56
10 G 8/2	21	3.43	53.99
5 BG 6/8	21	3.43	57.42

Table 5.11. Most frequent colors of turquoise from color-coded sample at 29SJ 629.

Hue	No. of Artifacts	Percent of Sample
5 GY	5	0.81
10 GY	15	2.44
5 G	20	3.26
10 G	21	3.43
2.5 BG	158	26.16
5 BG	142	23.16
7.5 BG	201	32.79
19 BG	49	7.99
5 B	2	0.33
TOTALS	613	99.98

painstakingly removed from the fill just above the floor in Pithouse 2, as well as over 5,000 from Other Pit 1 in Plaza Grid 9. Table 5.12 provides a breakdown for 48 of the large pieces that were analyzed for color by general level. When these are lumped by hue, the 2.5 BG category has the greatest number in all instances, followed by 5 BG. When all proveniences from Pithouse 2 are combined, the hues combine in Table 5.13. Therefore, it is concluded that 2.5 BG is the predominant hue from this pithouse.

Examination of value and chroma reveals the following combination (Table 5.14). Two combinations, 7/6 and 7/8, account for 47.9 percent of all coded artifacts. These two combinations are generally the ones which are the clearer representatives of a hue--not too much black or white. The third largest group, 8/4, had another 22.9 percent of the material; thus, 70.8 percent of it is accounted for by three combinations of value and chroma.

In the Plaza (Grid 9), 334 pieces of turquoise had been color-coded. Here, the hue with the largest number of artifacts was 7.5 BG, followed by 5 BG and 2.5 BG. Value and chroma combinations were also examined. Again, 7/8 and 7/6 accounted for the largest number of artifacts, with 8/4 as the third most frequent combination. Therefore, the tendency was toward what would seem to be clear (and somewhat deeper colored) artifacts. If one considers the clearer or darker colors representative of harder materials (lighter colored stones tend to be softer), this may indicate selection for better quality material by the site inhabitants. While this is a speculative assumption on the author's part, it does seem to hold throughout the various sites analyzed during the Chaco Project (Mathien 1985).

Table 5.15 was constructed using relative frequency of hue and contrasts these two proveniences. Examining only this variable, there is some evidence of a difference in color between the two proveniences at this site; but the value and chroma (evaluated as a single variable) were not a useful measurement of this visual difference. Windes' general impression of a difference between colors of turquoise in Pithouse 2 and Plaza Grid 9, however, is borne out.

Summary and Conclusions

Most of the evidence for ornaments and mineral use at 29SJ 629 fell within the period A.D. 925-1050. The data indicate that prior to A.D. 925, fewer material types were either available or used, which is consistent with data on ornaments and minerals from other excavated sites in Chaco Canyon (Mathien 1984, 1985). After A.D. 925 turquoise was the most frequently used mineral.

The presence of complete turquoise ornaments was not extensive, but the number of partially completed beads and the debris from manufacturing was unusual. Unlike most of the other small sites in Marcia's Rincon, there was additional evidence to suggest that the inhabitants of 29SJ 629 made turquoise ornaments. The presence of chalcedonic silicified wood drills and abraders in Pithouse 2 and the plaza support the inference that these were processing areas. These tools were not closely associated with turquoise debris at 29SJ 626 East where it was scattered throughout the site (Mathien 1990) or at 29SJ 627 where this material could represent an offering in the kiva ventilator (Mathien 1985), even though unfinished jewelry items were present among the artifacts at these other two small sites.

Other possible contemporary jewelry making sites include 29SJ 1360, where materials from Kiva B and the floor of Plaza Area 5 indicate that someone had been working turquoise (Mathien 1984; McKenna 1984). At Pueblo Alto (29SJ 389), a pit in Plaza Grid 8 also included turquoise pieces in various stages of manufacture, but these artifacts may be part of an offering (Mathien 1984, 1987). Windes (Volume I of this report) also identifies an area on the eastern side of Chaco Canyon (outside of the park boundaries) as one in which turquoise jewelry was made; considerable amounts of turquoise in various stages of manufacture were noted during survey at the East Chaco greathouse and a number of small sites located in the same area that date to the A.D. 900s. In the southern part of the San Juan Basin, turquoise collections from the small and large sites in the Andrews Community indicate jewelry making in that area between A.D. 950 and 1050 (Marshall et al. 1979:117; Mathien 1985), and Jim Judge (personal communication, 1980) found similar remains at the

Table 5.12. Turquoise colors, Pithouse 2 at 29SJ 629.

Provenience	Color	No.	Total
Fill	2.5 BG 8/4	1	
	2.5 BG 7/8	1	
	5 BG 7/6	1	
	5 BG 6/6	1	4
Layer 6, fill above floor	5 G 8/1	1	
	2.5 BG 9/2	2	
	2.5 BG 8/4	2	
	2.5 BG 7/8	1	
	2.5 BG 7/6	1	
	7.5 BG 7/6	1	
	7.5 BG 6/6	1	
	10 BG 7/8	1	
	10 BG 6/8	1	
Layer 6, lithic concentration area	2.5 BG 8/4	2	
	7.5 BG 6/8	1	14
Floors/subfloors	10 G 8/2	3	
	2.5 BG 8/4	6	
	2.5 BG 7/6	3	
	2.5 BG 6/8	2	
	5 BG 7/6	6	
	5 BG 7/8	1	
	7.5 BG 7/8	3	
	10 BG 7/6	1	
	5 B 7/2	1	26
Ventilator	5 G 7/4	1	
	2.5 BG 7/8	2	
	7.5 BG 7/8	1	4
			48

Table 5.13. Colors of turquoise from Pithouse 2 at 29SJ 629 coded by hue.

Hue	Number
5 G	2
10 G	3
2.5 BG	23
5 BG	9
7.5 BG	7
10 BG	3
5 B	1

Table 5.14. Colors of turquoise from Pithouse 2 at 29SJ 629 coded by value and chroma.

Value/Chroma	No.
6/6	2
6/8	4
7/2	1
7/4	1
7/6	13
7/8	10
8/1	1
8/2	3
8/4	11
9/2	2

Table 5.15. Comparison of turquoise colors at 29SJ 629.

	Pithouse 2		Plaza Grid 9	
Hue	No.	%	No.	%
5 GY	0	-	19	5.68
10 GY	0	-	-	-
5 G	2	4.17	7	2.10
10 G	3	6.25	2	0.60
2.5 BG	23	47.92	75	22.46
5 BG	9	18.75	91	27.25
7.5 BG	7	14.58	117	35.03
10 BG	3	6.25	23	6.89
5 B	1	2.08	0	-
Totals	48	100.00	334	100.01

large site of San Mateo. It is concluded, therefore, that although the evidence for jewelry making from 29SJ 629 distinguishes it from other sites in Marcia's Rincon, it is not unique. Turquoise ornaments were made at other contemporary sites within Chaco Canyon and the San Juan Basin.

That families at different sites or even within one site included members who made different contributions to the society is expected. Although most of the beads and bead blanks were recovered from the pits in the plaza at 29SJ 629, these were intentionally placed there and the area of manufacture remains undetermined. The beads recovered from Other Pit 1 also tended to be greener and lighter than the 16 incomplete beads from other areas of the site. Because turquoise changes color over time and exposure and because the effects on it by different depositional variables are not known to me, it is impossible to determine whether this represents different values held by manufacturers who used the pithouse and the plaza, different color selection for different artifact types, or different sources of turquoise. To date, the source(s) of Chaco turquoise are not clearly defined (Mathien 1981a, 1981b), and it is possible that several sources were used. Harbottle and Weigand (1992) suggest the Cerrillos Mining District southeast of Santa Fe, but other investigators (Sigleo 1970) indicate other possible source areas.

Material from fill in two pits in the plaza suggested differential use of space at this site. The predominance of selenite and other grinding tools and debris in Other Pit 14 could be clearly distinguished from the turquoise and abraders from Other Pit 1. Here, inferences include a division of tasks by either person or group.

Materials other than turquoise that were recovered from 29SJ 629 also reflect some differences among contemporaneous sites in Marcia's Rincon. At 29SJ 627, located nearby, several species of shell were recovered; six of these were species that had not occurred in excavated sites dating earlier than A.D. 900-1000 in the Chaco sequence. At 29SJ 627, a number of these shells had been worked into pendants; the styles indicate an increased labor expenditure in the shaping and polishing of shell ornaments through time (Mathien 1985). Although the shell manufacturing location has not been identified, these data support the inference of the beginning of labor specialization for the manufacture of ornamental objects in the A.D. 900s by the Chaco Anasazi.

In conclusion, the ornaments and minerals from 29SJ 629 provide some insight into turquoise jewelry making. The data from this site and others indicate that some people were using their skills to perform different tasks from their neighbors, but until additional evidence is gathered, this discussion of jewelry making is only in its incipient stages.

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6

BONE ARTIFACTS FROM A CHACOAN SMALL SITE

Judy Miles

Bone artifacts from the Spadefoot Toad Site (29SJ 629) represent the later end of the prehistoric bone industry in Chaco Canyon (ca. A.D. 875-1150), with the best contexts at 29SJ 629, dated at about A.D. 1000-1150. Although few in numbers, 21 morphological types of bone artifacts are identified. The assemblage is not unlike most of those seen from all of the Chaco Project excavated sites but does contain three rare forms: a finger ring, pendant, and weaving tool. No unusual functions are suggested by the bone tools except there is perhaps clearer clustering of different types of awls than is normally found. Even so, the clustering does not necessarily represent single functions in every case.

In general, bone artifact assemblages from sites in and near Marcia's Rincon, including 29SJ 629, show only minor differences. Temporally, bone artifact contexts overlap at 29SJ 629, 29SJ 627, 29SJ 626 East, 29SJ 625, and 29SJ 1360. 29SJ 628 yielded bone artifacts from slightly earlier contexts than 29SJ 629. There was apparently a higher incidence of bone tool use in surface rooms than normally found in Marcia's Rincon, as well as canyon wide. Nonetheless, primary activity areas involving bone artifacts were located in pitstructures.

Aside from the higher use of surface rooms at 29SJ 629, the assemblage stands out from its neighbors with regard to its state of preservation. 29SJ 629 has the greatest number of badly damaged bone artifacts in Marcia's Rincon.

In almost all cases, fauna indigenous to the area were modified into bone artifacts, usually artiodactyl long bone. 29SJ 629's assemblage was somewhat out of the ordinary in that rib, mandible, and phalanx were utilized. These are rarely found, although it is interesting that rib and mandible elements were also present in the artifacts from 29SJ 628.

The Inventory

Excavation of 29SJ 629 yielded 54 bone artifacts, half of which were assigned to a specific artifact type with the other half being fragments (Table 6.1). Pieces classified as fragments were re-examined in

Table 6.1. Frequency of bone artifacts by functional group and class type at 29SJ 629.

Artifact Type	Frequency	Percent
Perforating tools (15)		
Awls	13	24.1
Needles	2	3.7
Weaving tools (1)		
Battens	1	1.9
Other tools (5)		
End scrapers	3	5.6
Spatulates	2	3.7
Non-tools (6)		
Tubular beads	2	3.7
Finger rings	1	1.9
Pendants	1	1.9
Gaming pieces	1	1.9
Tinklers	1	1.9
Miscellaneous (27)		
Fragments or unfinished worked bone	27	50.0
Totals	54	100.3

hopes that the original artifact forms could be construed. Unfortunately, that attempt failed, leaving a very small group of known artifact types to analyze. The pendant, finger ring, and weaving tool are notably uncommon, particularly given the small assemblage size. Identifiable types are dominated by awls, as is frequently the case in Southwestern sites.

Definitions and descriptions of artifact types are the same used in the overall analysis of Chacoan bone artifacts (Miles 1989). Descriptions of those types recovered from 29SJ 629 are based on those by McKenna (1980, 1984) and given in the following paragraphs.

Awls (13) - These elongated implements have at least one sharply tipped end. Butt ends are either unmodified articular heads, heads with slight rounding, or completely remodeled butts (Plates 6.1, 6.3e).

Needles (2) - These tools are quite distinctive, exhibiting complete remodeling of the bone. Moore (1979) states they have a high length-to-width ratio, a sharp tip, are highly polished, and exhibit a feature at the butt end–either an eye, transverse grooves, or longitudinal notch or combination thereof--for the attachment of fiber (Plate 6.2x-z).

Weaving tools (1) - The one weaving tool, a batten, found at 29SJ 629, like those found elsewhere, is morphologically identical to awls. The distinguishing characteristic is the presence of transverse grooves along the shaft edge. The tip is flattened but pointed. The single specimen has a broad shaft (Plate 6.3a).

End scrapers (3) - These tools have their distal ends removed by diagonally cutting the shafts, forming thin, flaring ends that exhibit interior and/or exterior beveling. The working edge of the bevel is polished (Plates 6.4a, 6.5b,f).

Spatulates (2) - These tools are elongated bone shafts whose tips terminate in flat, squared edges that show intermittent polish (Plate 6.5d-e).

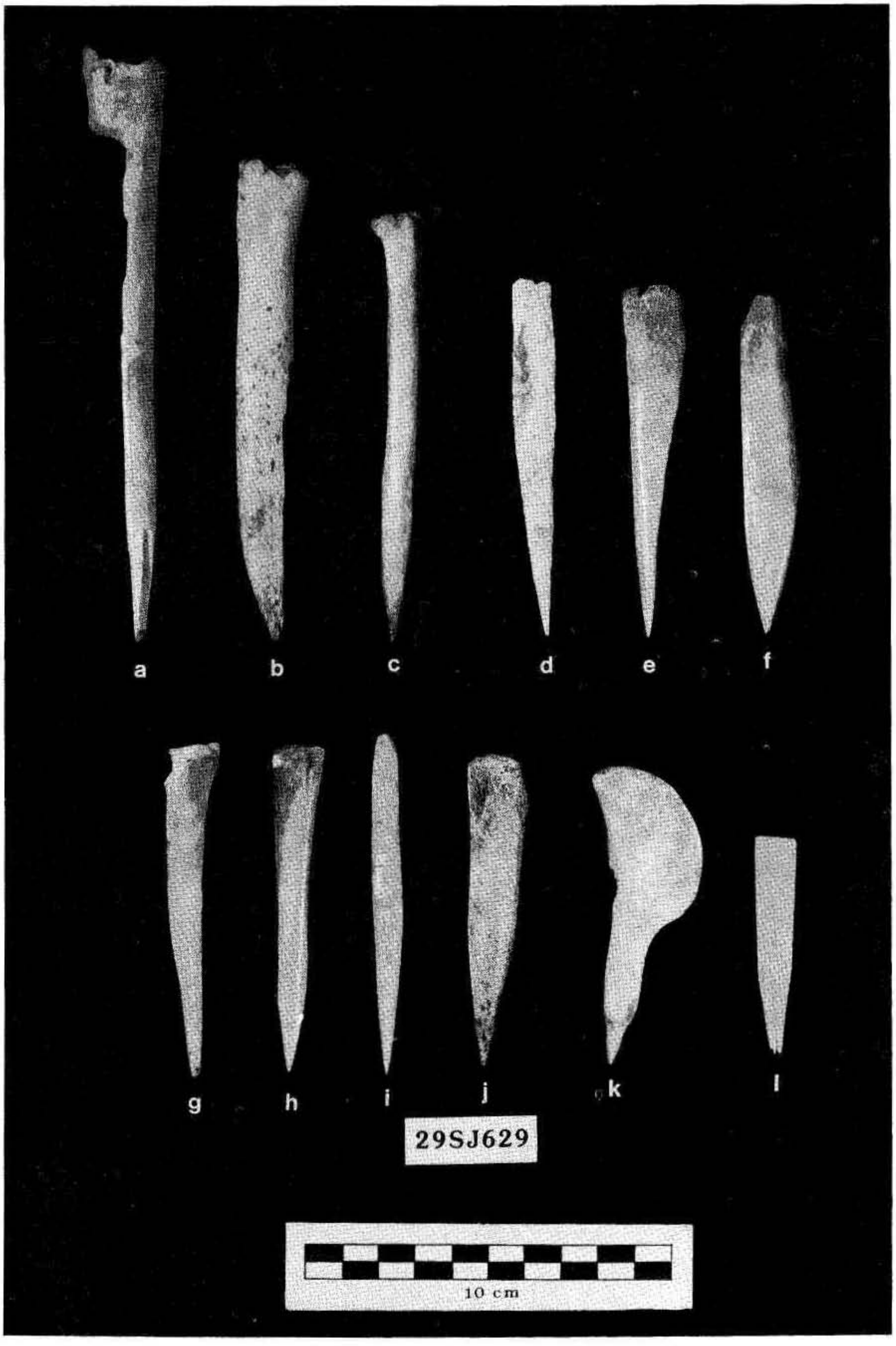

Plate 6.1. *Bone awls from 29SJ 629 (NPS 25655).*

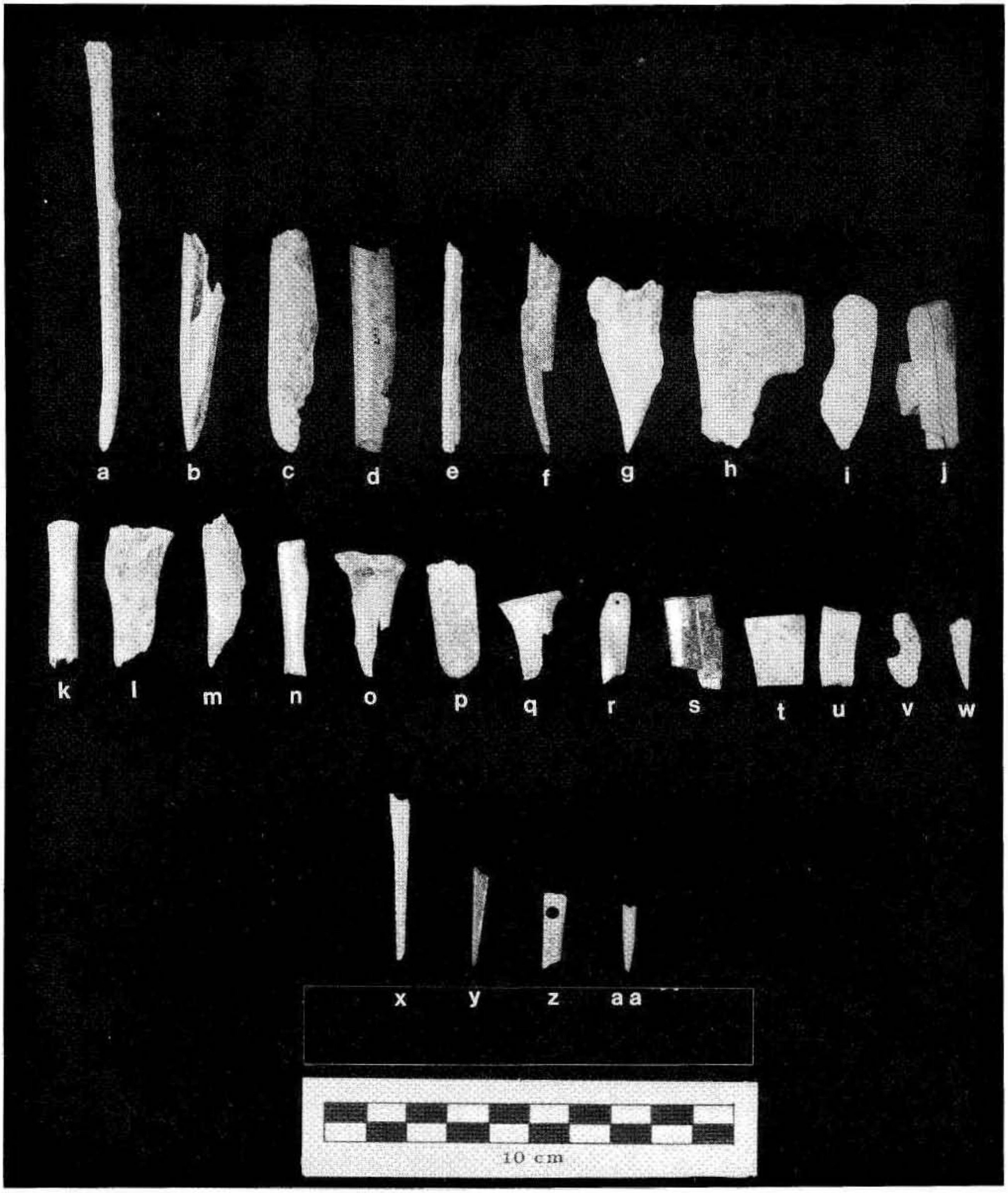

Plate 6.2. *Bone tools and bone tool fragments from 29SJ 629. n) and t) are tubular beads. x), y), and z) are needles (NPS 25656).*

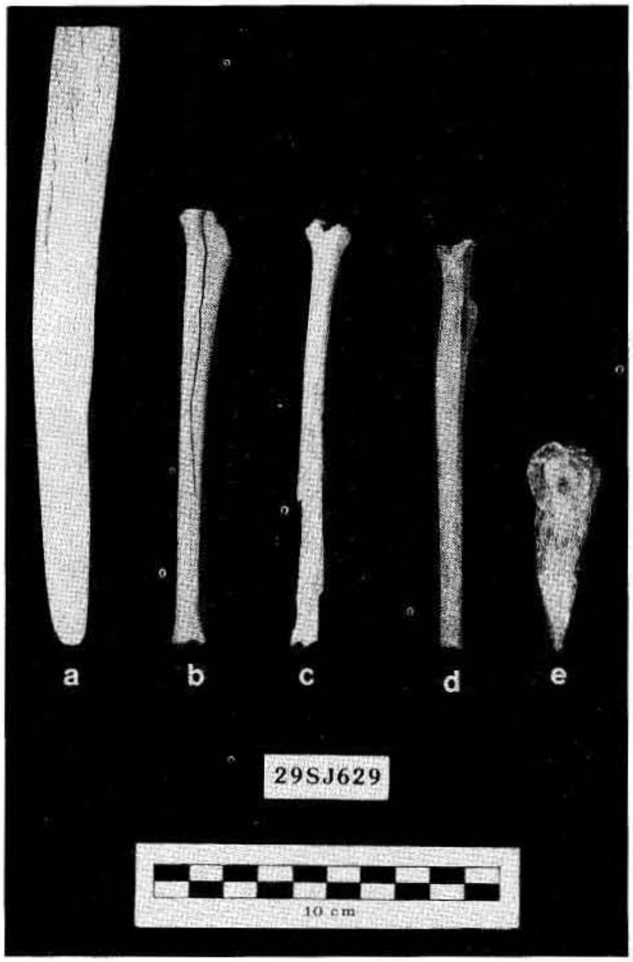

Plate 6.3. *Bone tools from 29SJ 629. a) weaving tool, b-c) tinkler fragments, d) tinkler, e) awl (NPS 25667).*

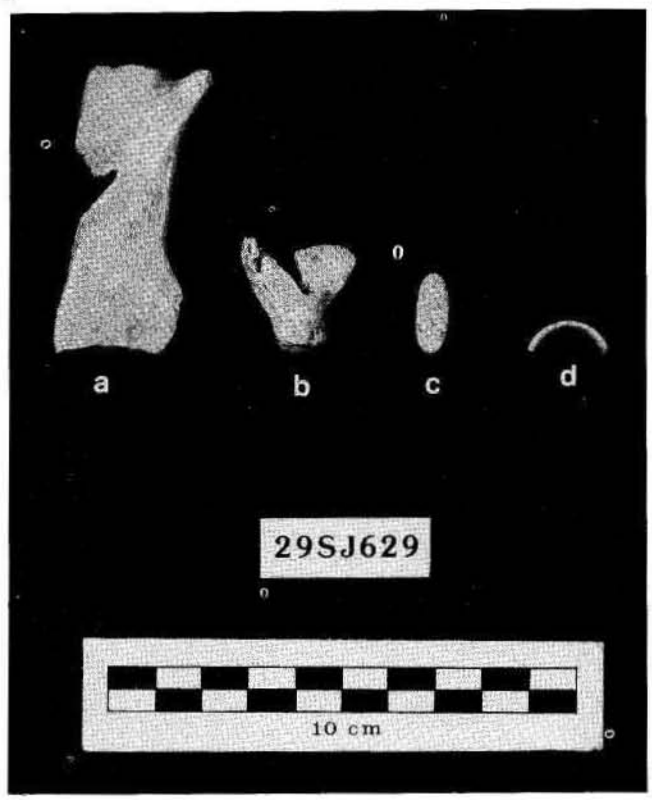

Plate 6.4. *Worked bone from 29SJ 629. a) end scraper, b) pendant, c) gaming piece, d) ring fragment (NPS 25659).*

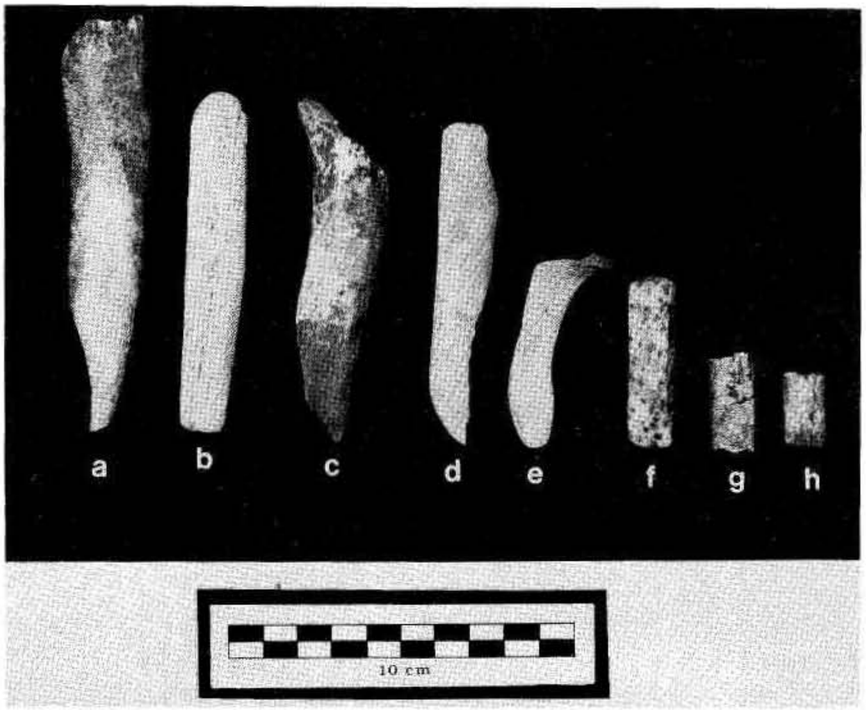

Plate 6.5. *Bone tools from 29SJ 629. a, c, g-h) fragments, d-e) spatulates, b, f) end scraper (NPS 25658).*

Tubular beads (2) - These items have hollow shafts with blunt and large open ends. The exterior surface is usually highly polished (Plate 6.2h, t).

Finger rings (1) - This particular ornament from this site is a fragment of what was a single band. Rings have the interesting quality of being very light colored bone (Plate 6.4d).

Pendants (1) - These come in many shapes and sizes. What is distinct is their extensive overall surface treatment in addition to some feature--usually holes, notches, or grooves--by which the artifact can be suspended (Plate 6.4b).

Gaming pieces (1) - These are small, oblong-shaped tablets of bone often with carved, diagonal hachures, as in the specimen here (Plate 6.4c) or circular-like scars on one surface, although some examples have no surface carving.

Tinklers (1) - Also known as perforated mammal tibias, these enigmatic artifacts have the following characteristics: proximal head ground flat, the shaft is longitudinally bored from the proximal end, and a small hole may or may not be drilled in the shaft and distal end. Some specimens have the distal end completely and bluntly ground away (Plate 6.3b-d).

The Manufacture

The manufacture of bone artifacts is characterized by primary and secondary modification, tip shape, butt modification, and special features. Four primary techniques producing the artifacts' general shapes and three secondary, detail-oriented modifications were identified for the 29SJ 629 bone artifacts. The majority (93 percent) were subjected to some form of primary modification with unmodified whole elements rendered in four artifacts. Table 6.2 provides a breakdown of primary and secondary manufacturing steps by specific artifact types. The predominant process is longitudinal splitting of an element, then secondary shaping using an abrasive medium, probably sandstone, as reported in Hill's (1982:91) ethnography of Santa Clara Pueblo. All but four of the tools were manufactured in this fashion.

While it is true that the functioning tip of a tool is the part which is directly and most severely

Table 6.2. Manufacturing techniques seen in individual artifact types at 29SJ 629.

	Attributes of Manufacture[a]						
Type of Artifact	A/E	A/F	B/E	C/E	D/E	A/G	D/G
Awls	10	1	-	1	-	1	-
End scrapers	3	-	-	-	-	-	-
Needles	2	-	-	-	-	-	-
Spatulates	1	-	-	1	-	-	-
Weaving tools	-	-	1	-	-	-	-
Gaming pieces	1	-	-	-	-	-	-
Tinklers	-	-	-	-	1	-	-
Beads	-	-	-	-	1	-	1
Rings	-	-	-	-	-	1	-
Pendants	-	-	1	-	-	-	-
Fragments	22	-	2	-	2	1	-
Totals	39	1	4	2	4	3	1

[a] Key to attributes of manufacture

Primary modification:
- A = longitudinally split.
- B = whole elements.
- C = diagonally cut; spirally fractured.
- D = circumference groove/snapped.

Secondary modification:
- E = general striae and/or polish.
- F = same as "E" plus lateral splint removed from shaft.
- G = high surface polish.

affected by use, use and manufacturing marks are nearly indistinguishable. Regardless of this observation, it is felt that the tip shape resulting from both is directly related to function. In this assemblage, perforating tools are highly consistent in having tips that are round in cross section, although one awl does show exterior beveling (Table 6.3). The question is whether this is the result of a broad spectrum of multiple functions or specialized tasks. Tip diameter and other measurements will be helpful in the assessment of this question and is discussed later in the section, "Artifact Dimensions."

The other tools in the assemblage have, by definition, distinct tip shapes according to their artifact type. Both end scrapers have beveled tip ends; one displays interior beveling and the other is chisellike. The two spatulates are so-called because their ends are thin and flat, although their maximum widths are quite different. One is narrow at 6.5 mm and the other, although incomplete, was possibly as wide as 30 mm. Striations occurring mostly along the shaft of the weaving tool indicate primary use as a batten as is found on contemporary hand-held battens used to separate the warp before beating down the weft.

Non-tools have carefully finished ends. The rough edges of the beads' snapped-off ends are neatly ground leaving an exterior bevel of consistent width and angle the entire distance around the openings. Both ends of the tinkler were bluntly ground smooth,

Table 6.3. Tip shapes as related to type of artifact at 29SJ 629.

	Tip Shape					
Artifact Type	Pointed and round in cross section	Pointed and beveled exterior	Pointed and beveled interior	Chisel-like	Miscell-aneous grinding	Spatulate
Awls	6	1	-	-	-	-
Needles	1	-	-	-	-	-
End scrapers	-	-	1	1	-	-
Spatulates	-	-	-	-	-	2
Weaving tool	-	-	-	-	1	-
Tinklers	-	-	-	-	1	-
Gaming pieces	-	-	-	-	1	-
Tubular beads	-	-	-	-	2	-
Totals	7	1	1	1	5	2

a trait more common among tinklers found in Chaco Canyon than those found at Mesa Verde where only the proximal end is ground and the shaft is perforated with a small hole (e.g., Hayes and Lancaster 1975; Rohn 1971; Swannack 1969). Gaming piece edges are very thin, rounded, and polished.

Some form of butt modification was identified on 33 specimens, 21 of which were also categorized by tool type (Table 6.4). Almost one-half of the awls possess articulating heads not modified by either manufacture or use. The slight rounding or complete modification of the remaining tools perhaps indicates a different way of holding or handling these tools as compared to the other awls.

Some unique and detailed modification was present on three artifacts. Two needles had drilled eyes and the gaming piece had wide parallel and crossed hatch-marks carved on one face of the tablet. These special features are hardly extravagant as far as invested labor is concerned.

Artifact Dimensions

Length, width, and thickness in centimeters were measured from complete specimens to get some feeling about functional variability defined by size differentiation. Length is the longest line parallel to the long axis of the bone element. Width is measured between the right and left sides of the artifact at the midpoint of the long axis. Thickness is front to back at the same midpoint. Tip diameters were measured in millimeters, one millimeter from the tip end, on those artifacts with unbroken tips. All of the end scraper tips are damaged sufficiently to be immeasurable.

The measurements statistically summarized in Table 6.5 given some scale of variability with regard to artifact dimensions (i.e., size). Widths and thicknesses have negligible variation and are, therefore, not considered a viable factor in functional diversity. It is also probably true that width and thickness are mostly the result of tool manufacture; however, one awl shows intentional thinning of its width by removal of a splinter shaft after the initial step of splitting the element.

Breternitz's (1982) report on bone artifacts from Bis sa'ani, located northeast of Chaco Canyon on the Escavada Wash, states that dichotomous short and long awls may have been intended for work on different materials or materials of different weights. The measurements of the 29SJ 629 awls do not fit the idea of dichotomous awl groups. Instead, there is clustering of a single group of awls that are between 8 cm and 10 cm long (n=8 or 62 percent).

Table 6.4. Tabulated frequencies showing types of butt modification among specific bone tools at 29SJ 629.

	Butt Description		
Artifact type	Completely Ground Smooth	Articulating End present and Not Modified	Articulating End Present and Slightly Rounded
Awls	6	5	-
Needles	1	-	-
End scrapers	2	-	1
Spatulates	1	-	1
Weaving tools	1	-	-
Totals	11	5	2

Another way to identify subtypes of awls is to look at two variables of size at the same time. Specifically, these are length (the most varying of the basic measurements) and tip diameter (the measurement probably most directly related to function). Linear or cluster patterns resulting from these measurements may be due to specialized tool use. The linear relationship can be investigated through a correlation coefficient. Statistically, a coefficient between -.90 and .90 is usually considered significant (Runyon and Haber 1980). The correlation here of tip diameter and awl length is high (-.81), but not significant (depending on the degrees of freedom) and indicates that as awl lengths decrease, their points become more blunt. Additionally, the scatter diagram in Figure 6.1 shows the relationship is a clustering pattern rather than the linear regression relationship that normally underlies strong correlations. The five longer awls from 29SJ 629, unlike the ones from Bis sa'ani, tend to have sharper points (i.e., less than 1 mm) than the two shorter ones (i.e., tips greater than 1 mm).

A third dimension representing resistance to use stress is also considered through the variable of butt-end modification. The premise being that the more the butt is modified, the less grasping power, and thus force, can be produced during use. Categorizing the several awls shown in Figure 6.1 by the variables of length, tip diameter, and butt modification, results in three possible groups described as:

1) Short, blunt awls with articulating heads completely ground away (n=2);
2) Long, sharp awls with unmodified articulating butt ends (n=2); and
3) Long, sharp awls with articulating heads completely ground away (n=3).

These three groups might be logically linked to certain tasks representing functional variability, as suggested by scant ethnographic reports. Hill (1982:91) reports that sewing of bundled and coiled baskets at Santa Clara Pueblo was done with bone awls. It can be assumed that tightly coiled baskets would require very sharply pointed awls that function quite nicely in executing a stitch with only a minimum of force. For coiled basketry, then, long, sharp awls with or without modified handles could be used (Groups 2 and 3 in previous paragraph).

Although not adequately tested, the sharply-pointed awls with articulating head intact (Group 2) might well serve the function of hide-piercing, as suggested by Olsen's (1979) experiments, which revealed that the tips need to be less than 1 mm in diameter to perform this task.

Underhill (1946:107) describes sewing of prehistoric clothing as a technique requiring a bone awl. Apparently, single holes were punched along a seam line through both thicknesses of material with a bone awl. A leather strip or cordage was then

Table 6.5. Measurements of bone artifacts from 29SJ 629.

Dimension Measured		Artifact Types: Awls	End Scraper	Weaving Tool	Tinkler	Gaming Piece	Spatulate	Pendant
Length (cm)	x̄	9.6	7.4	18.3	11.7	1.6	5.5	2.3
	sd	2.8	3.6	-	-	-	-	-
	R	5.8-16.4	4.8-9.9	-	-	-	-	-
	N	13.0	2.0	1	1	1	1	1
Width (cm)	x̄	1.1	1.6	1.8	0.8	0.6	1.1	1.6
	sd	0.3	0.4	-	-	-	-	
	R	0.6-1.5	1.3-1.8	-	-	-	-	
	N	13.0	2.0	1	1	1	1	
Thickness (cm)	x̄	0.5	0.8	0.4	0.7	0.2	0.6	1.2
	sd	0.2	0.1	-	-	-	-	-
	R	0.3-0.8	0.8-0.9	-	-	-	-	-
	N	13.0	2.0	1	1	1	1	1
Tip diameter (mm)	x̄	0.9	13.2	7.6	8.2	-	6.5	-
	sd	0.3	0.1	-	-	-	-	-
	R	0.7-1.5	13.2-13.3	-	-	-	-	-
	N	7.0	2.0	1	1	0	1	0

Key:
x̄ = the mean (average) value.
sd = the standard deviation from the mean value using N-1.
R = the range of value between minimum and maximum extremes.
N = the number of individual measurements.

Note: Incomplete artifacts were not measured.

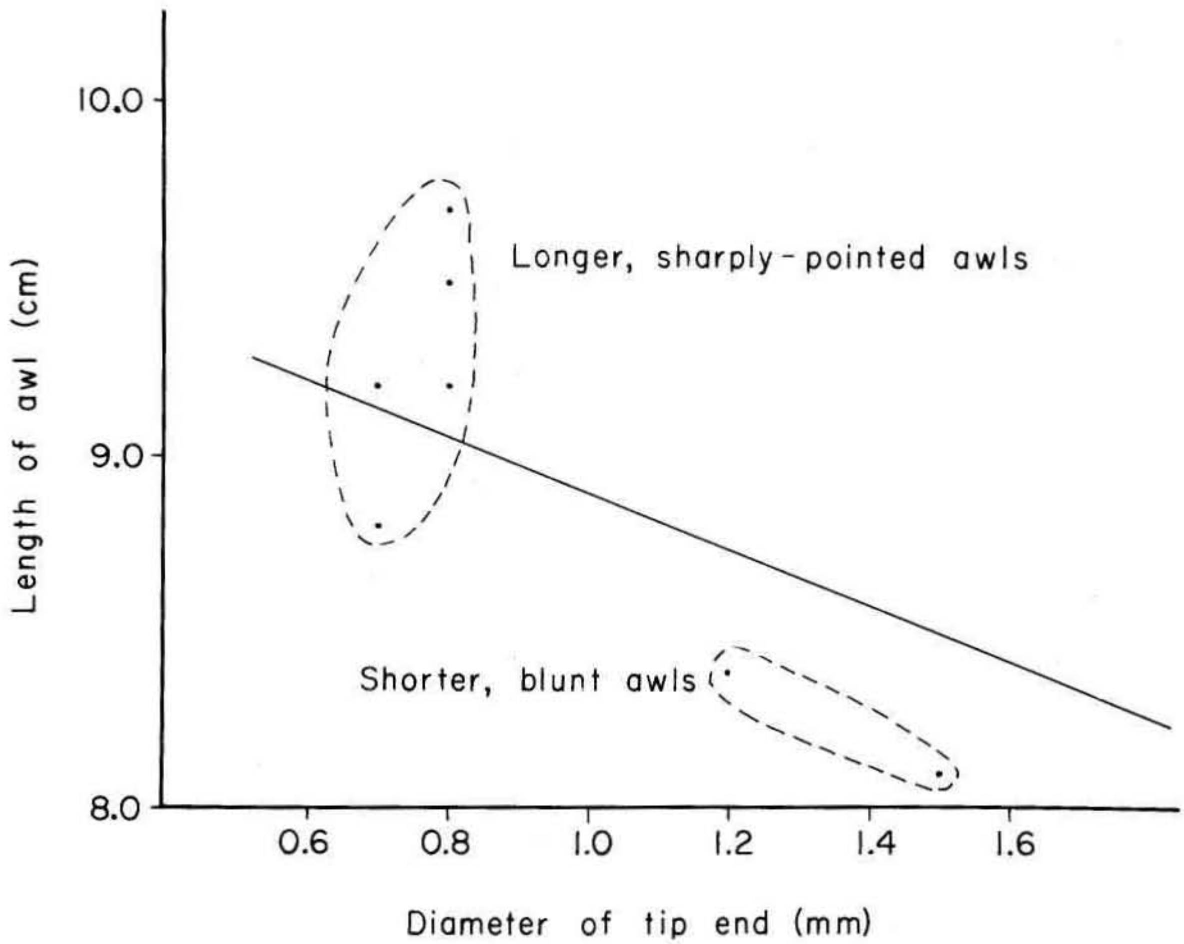

Figure 6.1. *Scattergram showing relationship of bone awl tip diameter to length (NPS 310/82827 A).*

pulled through and tied to fasten the seam. On the other hand, Schneider (1972) replicated prehistoric striations on awls when crafting plaited baskets, yucca sandals, and cordage. Perhaps short, blunt awls were the tools of choice for these crafts.

Condition of Bone Artifacts

Table 6.6 indicates the condition of the 29SJ 629 bone artifacts by type. Each category listed is in one of two of the more general groups of complete specimens (or those with very little damage--essentially complete) or badly damaged items. The physical distribution of these two groups within the site is given in Table 6.7 and graphically in Figure 6.2. Badly damaged artifacts outnumber the others two to one (36:18).

Essentially complete items were found in the Kiva, Pithouse 2, Trash Midden, and plaza; none were from the roomblock. Pithouse 3 contained the largest accumulation of badly damaged artifacts, another indication of the structure's service as the main trash receptacle during the sites most formidable occupation (Windes, Volume I).

The Fauna

A survey of animal genus shows that just over one-half (28/54) of the artifacts could not be identified (Gillespie, this volume). Because of this, a more general taxa is used in this part of the discussion. The distribution of artifact type relative to taxa is shown in Table 6.8.

The fauna represented were common to the area at the time of occupation (Akins 1985) and show little variety of species. All of the small mammals were identified as Lepus californicus (jackrabbit), except one which could only be ascertained as a small-to-medium mammal. Both mid-sized mammals were of the family felidae. Other than those unidentifiable (22 in number), medium-to-large mammals were either Odocoileus hemionus (mule deer, n=3) or some kind of artiodactyl (n=14).

The phalanx from Felis concolor (mountain lion) is unique in three respects. It is the only bone of this species from the site. Second, it was the only phalanx that was recovered during the Chaco excavations conducted between 1973 and 1978. Last, bone pendants are very rare with only four pendants in the 931 bone artifacts collected during the five years.

Exploitation of certain bone elements at this site is that typical of contemporaneous habitation sites in the area. Long bones are undoubtedly the most popular; however, three modified elements rarely found at other similar sites occurred at 29SJ 629. There are mandibles (two), ribs (three), and the phalanx (one, mentioned above). Exact counts of all elements are provided in Table 6.9.

Spatial and Temporal Analysis

Specific proveniences for bone artifacts are given in Table 6.10 with their temporal affiliations obtained from Windes (Volume I) presented in Table 6.11. Investigations into contexts reveal only a vague understanding of temporal and spatial associations. This is due to extensive mixing of trash-filled structures and very few (five) feature-related specimens. For example, Room 2 and Room 9 may contain fill from Pithouse 2, put there when the Kiva was constructed (Windes, Volume I). However, the origin of the Pithouse 2 fill is unclear.

The last construction at the site began around A.D. 1100, and resulted in construction of the Kiva and possibly Room 1. It is at this time that the other structures functioned as refuse repositories. It is fairly certain that deposits in the last of the occupied structures (i.e., the Kiva and Room 1) were mixed with earlier artifacts, but again, this is only a small fraction of the assemblage.

Feature-associated artifacts and those from the lowest deposits in the Kiva are thought to mark in situ or nearby activities, but these represent only 18 percent of the bone artifacts recovered from this site. The artifacts recovered from the Kiva were probably found in or close to their original context; their placement cannot be explained by natural processes, given the direction of slope in the immediate area and

Table 6.6. Condition of bone artifacts by specific artifact class at 29SJ 629.

Artifact class	Condition of Bone[a]							
	A	B	C	D	E	F	G	H
Awls	3	-	3	6	-	1	-	-
Needles	-	1	-	-	-	-	1	-
End scrapers	-	-	-	-	1	2	-	-
Spatulate	1	-	-	-	1	-	-	-
Weaving tools	-	-	1	-	-	-	-	-
Tubular beads	-	1	-	-	1	-	-	-
Finger rings	-	-	-	-	1	-	-	-
Pendant	-	-	-	1	-	-	-	-
Tinklers	-	-	-	1	-	-	-	-
Gaming pieces	-	-	1	-	-	-	-	-
Fragments	-	4	-	1	17	-	2	3
Totals	4	6	5	9	21	3	3	3

[a] Key:
A = consolidated and complete.
B = consolidated fragment.
C = slightly eroded but complete.
D = slightly eroded with minor damage.
E = slightly eroded fragment or extensively damaged.
F = badly eroded but otherwise complete.
G = badly eroded fragment.
H = completely burned and extensively damaged.

architectural obstacles. The pattern emerging from this small sample is nonetheless in agreement with other sites in Chaco Canyon where it has been argued that activities involving bone artifacts are traditionally more-or-less excluded from the roomblock (Miles 1989). Historically, there is a continuation of basket-making (probably using bone awls) at a women's kiva in Oraibi on the Hopi reservation (Stephen 1936:1179).

Conclusions

The small site of 29SJ 629 presents a case where bone artifacts in many ways cannot receive in-depth analyses due to a limited sample size. Temporal assignments also suffer from the extensive mixing of trash-filled areas where most of the bone artifacts were found. Four artifacts were found in direct feature or structure association and only five others have strong but less definite contexts; their places in time are even more obscure. With little to be gained from trying to pin down time/space contexts, more emphasis is given to certain physical attributes of the 54 artifacts in this assemblage.

Common tools, such as awls, needles, and scrapers, were recovered, along with some unusual varieties (i.e., a batten, finger ring fragment, and pendant). Proportionally, the types are typical for Chacoan small sites; awls are the most abundant, constituting about 25 percent of the collection.

Little effort was expended by bone tool makers. Awl manufacture was consistent in longitudinally splitting long bone elements, smoothing out the rough edges, and grinding a point so that it is round in cross section. This corresponds with the predominant bone artifact manufacturing technique seen in other Chacoan assemblages (McKenna 1980; Miles 1989; Moore 1979).

Table 6.7. Physical distribution of essentially complete and badly damaged bone artifacts at 29SJ 629.

	Condition	
Provenience	Essentially complete	Badly damaged
Kiva	6	1
Pithouse 2	3	5
Pithouse 3	-	8
Room 2	-	1
Room 3	-	1
Room 5	-	3
Room 6	-	1
Room 9	-	1
Plaza	3	7
Trash mound	6	7
Test trench (general association)	-	1
Totals	18	36

The other bone artifacts were produced by simple shaping techniques followed by rough grinding. Ornaments were given fine, smooth edges but their broad surfaces lacked extensive polishing or other aesthetics. In that the reduction technique used is not elaborate nor does it require a highly skilled hand, it can be argued that the tools essentially have a utilitarian character whose manufacture and use is common to small sites in Chaco Canyon. The ornaments, on the other hand, may tell a different story (see Mathien, this volume).

Three morphological awl groups emerge when evaluating the variability of handle type, length, and tip sharpness. These are short, blunt awls with butt ends completely ground away; long, sharp awls with the same extensively altered top; and long, sharp perforators with the articular heads intact. Assuming the differences are due to the kind and weight of materials being worked with the bone, functions can be suggested for each group. The short awls are apparently designed for separating fibers or fiber bundles during the manufacture of perhaps loosely woven matting and baskets. The next group--long, sharp, smooth-topped awls--would be most effective as devices with which to work tight fiber bundles such as in coiled basketry. These tools could also double as a perforator on lighter weight skins like that from a rabbit. The last group has a high potential to take on more physically stressing tasks such as making small perforations in deer hide.

If these groups are real, there is probably some down-the-line functional evolution for any given tool. For instance, as resharpening slowly reduces awl length in a deer hide perforator, the ability to use the tool effectively also decreases until a point is reached when the tool is more suited to the making of loosely woven matting. The sharpness of the point becomes less critical and is not maintained. Also, if an articular process breaks off, thus reducing the tool's resistance against force in hide-piercing, the tool can still function for less stressful perforating jobs. Awl function/use is, therefore, defined as multiple activities that evolve concurrently with morphological changes resulting from use.

Residents of 29SJ 629 relied on prevailing abundance of jackrabbit and mule deer that contributed to their diet as a source of bone artifacts. On the other hand, the rather exotic mountain lion phalanx from the Kiva floor is the only specimen of that species recovered by recent excavations in the canyon. Its form (pendant), skeletal element, fauna type, and context imply ceremonial use of this artifact. How this importance rates relative to contemporaneous kivas is not exactly known, but as a single island of evidence, appears minimal in the

Table 6.8. The distribution of artifact class relative to faunal taxon at 29SJ 629.

	Artifact Class											
Faunal Taxon[a]	Awls	Needles	Weaving tools	End scrapers	Spatulates	Tubular beads	Finger rings	Pendants	Gaming pieces	Tinklers	Fragments	Totals
Lepus californicus (jackrabbit)	-	-	-	-	-	-	-	-	-	1	6	7
Felis concolor (mountain lion)	-	-	-	-	-	-	-	1	-	-	-	1
Felis rufus (bobcat)	1	-	-	-	-	-	-	-	-	-	-	1
Odocoileus hemionus (mule deer)	1	-	-	1	1	-	-	-	-	-	-	3
Small-to-medium mammal	-	-	-	-	-	-	-	-	-	-	1	1
Artiodactyl	8	-	-	-	1	-	-	-	-	-	5	14
Medium-to-large mammal	3	2	1	2	-	1	-	-	1	-	12	22
Aves	-	-	-	-	-	1	-	-	-	-	1	2
Unknown bird or mammal	-	-	-	-	-	-	1	-	-	-	2	3
Totals	13	2	1	3	2	2	1	1	1	1	27	54

[a] Jackrabbit is a small-to-medium mammal; mountain lion is a medium-sized mammal; and mule deer is a medium-to-large mammal.

Table 6.9. Distribution of element exploitation among bone artifacts at 29SJ 629.

Faunal Taxon	Skeletal Elements								
	Mandible	Rib	Humerus	Radius	Tibia	Metatarsal	Metapodial	Phalanx	Unident. Long Bone
Lepus californicus (jackrabbit)	-	-	-	-	7	-	-	-	-
Felis concolor (mountain lion)	-	-	-	-	-	-	-	1	-
Felis rufus (bobcat)	-	-	-	1	-	-	-	-	-
Odocoileus hemionus (mule deer)	2	-	-	-	1	-	-	-	-
Small-to-medium mammal	-	-	-	-	-	-	-	-	1
Artiodactyl	-	-	2	-	2	6	1	-	4
Medium-to-large mammal	-	3	-	-	1	-	-	-	17
Aves	-	-	-	-	-	-	-	-	2
Unknown bird or mammal	-	-	-	-	-	-	-	-	3
Totals	2	3	2	1	11	6	1	1	27

Table 6.10. Provenience of all bone artifacts from 29SJ 629.

Provenience	Artifact Class	Condition of Bone	Field Specimen Number	Taxa	Measurements (l x w x th) (cm)	Plate No.
Kiva						
Level 9 (fill)	Awl	Slightly eroded with minor damage	673-1	Medium-to-large mammal	5.8x1.0x0.3	6.11
Level 10 (fill)	Weaving tool (batten)	Complete but slightly eroded	469-1	Medium-to-large mammal	18.3x1.8x0.4	6.3a
Level 11 (floor fill); south side of SW 1/4	Awl	Consolidated bone/ complete tool	2018-1	Artiodactyl	9.5x1.2x0.5	6.1e
Layer 7 (floor fill)	Fragment	Slightly eroded	2925-1	Artiodactyl	No measurements	6.5a
Floor 1	Pendant	Slightly eroded with minor damage	2037-1	Felis concolor	2.3x1.6x1.2	6.4b
Ventilator tunnel, Level 1	a) Awl b) Awl	a) consolidated bone/ complete tool b) slightly eroded/ complete tool	a) 2118-1 b) 2118-2	a) Artiodactyl b) Artiodactyl	a) 8.8x0.9x0.5 b) 9.2x0.6x0.7	6.1f 6.1h
Pithouse 2						
Layer 4 (fill)	End scraper	Complete but badly eroded	2844-4	Medium-to-large mammal	9.9x1.8x0.9	6.5b
Layer 5 (floor fill)	Fragment	Slightly eroded	2871-1	Medium-to-large mammal	No measurements	6.2f
Layer 6 (among Lithic Concentration 1)	End scraper	Complete but badly eroded	2875-1	Medium-to-large mammal	4.8x1.3x0.8	6.5f
Layer 6 (floor fill)	a) Awl b) Awl c) Fragment	a) slightly eroded with minor damage b) complete but slightly eroded c) slightly eroded	a) 2906-1 b) 2904-1 c) 2907-1	a) Felis rufus b) Artiodactyl c) Artiodactyl	a) 11.9x0.8x0.6 b) 8.4x1.4x0.7 c) No measurements	6.1c 6.1j 6.5c
Floor 1	Awl	Complete but slightly eroded	3032-1	Artiodactyl	5.9x1.4x0.8	6.3e

Table 6.10. (continued)

Provenience	Artifact Class	Condition of Bone	Field Specimen Number	Taxa	Measurements (l x w x th) (cm)	Plate No.
Ventilator 1, tunnel shaft, Layer 1	Fragment	Slightly eroded	3387-1	<u>Lepus californicus</u>	No measurements	6.2q
<u>Pithouse 3</u>						
Level 7 (trash), E 1/2	a) Fragment b) Fragment c) Tubular bead	a) consolidated b) slightly eroded c) consolidated bone/ fragment	a) 2268-1 b) 2269-1 c) 2269-2	a) Artiodactyl b) Medium-to-large mammal c) Aves	a) b) and c) no measurements	6.2h 6.2c 6.2n
Level 8 (trash), E 1/2	a) Tubular bead b) Fragment	a) and b) Slightly eroded fragments	a) 2343-1 b) 2343-2	a) Medium-to-large mammal b) Aves	a) 1.6x?x? b) no measurement	6.2t 6.2u
Layer 2 (trash)	Fragment	Burned black	2510-2	Medium-to-large mammal	No measurements	6.2s
Ventilator 2, tunnel (trash fill)	Fragment	Slightly eroded	3065-1	Unknown bird or mammal	No measurements	6.2v
Ventilator 3, Plaza Grid 202, Level 1	Fragment	Slightly eroded	1697-1	Medium-to-large mammal	No measurements	6.2r
<u>Room 2</u>						
Level 1, E 1/2	Fragment	Slightly eroded	243-1	Artiodactyl	No measurements	6.2d
<u>Room 3</u>						
Layer 1 (wall fall), W 2/3	Fragment	Slightly eroded	930-1	Medium-to-large mammal	No measurements	6.2p
Floor 1	Fragment	Eroded	1114-1	Medium-to-large mammal	4.1x2.0x0.3	6.2g
<u>Room 5</u>						
Floor of tub	Finger ring	Slightly eroded fragment	1376-1	Unknown bird or mammal	1.8x0.5x0.1	6.4d

Table 6.10. (continued)

Provenience	Artifact Class	Condition of Bone	Field Specimen Number	Taxa	Measurements (l x w x th) (cm)	Plate No.
Level 3-4	Fragment	Consolidated bone	711-1	Artiodactyl	No measurements	6.2i
Level 5 (fill)	Spatulate	Slightly eroded and extensively damaged	720-1	Artiodactyl	No measurements	6.5d
<u>Room 6</u> Layer 1, N 1/2	Needle	Badly eroded fragment	2584-1	Medium-to-large mammal	No measurements	6.2x
<u>Room 9</u> Level 3 (floor fill)	Fragment	Slightly eroded	749-1	Medium-to-large mammal	No measurements	6.2j
<u>Plaza</u>						
Other Pit 14 (Layer 4), Level 3 of Grid 14	a) Fragment b) Fragment c) Fragment	a) Slightly eroded b) Slightly eroded c) Slightly eroded	a) 2766-1 b) 2766-2 c) 2766-3	a) <u>Lepus californicus</u> b) and c) Medium-to-large mammal	a) b) and c) No measurements	6.2b 6.2l 6.2m
Other Pit 14 (Layer 4)	Awl	Slightly eroded with minor damage	2795-2	Artiodactyl	13.2x1.4x0.5	6.1b
Other Pit 14 (Layer 6)	Awl	Slightly eroded with minor damage	2767-1	Artiodactyl	9.0x0.9x0.3	6.1g
Firepit 5 (Layer 5)	Fragments (2)	Burned black	2460-1	Medium-to-large mammal	No measurements	6.5g-h
Grid 8, Level 1 (fill)	a) Fragment b) Fragment	a) and b) Badly eroded	a) 1180-1 b) 1180-2	a) and b) medium-to-large mammal	a) and b) No measurements	6.2a 6.2e
Grid 16, Level 1 (structural rubble)	Awl	Complete but badly eroded	1963-1	Medium-to-large mammal	9.7x1.1x0.3	6.1d
Grid 16, Level 2 (structural rubble)	Gaming piece	Complete but slightly eroded	2430-1	Medium-to-large mammal	1.6x0.6x0.2	6.4c

Table 6.10. (continued)

Provenience	Artifact Class	Condition of Bone	Field Specimen Number	Taxa	Measurements (l x w x th) (cm)	Plate No.
Trash Midden						
Grid 1, Layer 2, SW 1/4	Awl	Slightly eroded with minor damage	395-1	Medium-to-large mammal	9.2x0.9x0.5	6.li
Grid 58, Level 4, N 1/3	Fragment	Slightly eroded	422-1	Lepus californicus	No measurements	6.2k
Grid 59, Level 1	Fragment	Slightly eroded	1667-1	Lepus californicus	No measurements	6.2o
Grid 59, Level 2	Tinkler	Slightly eroded with minor damage	1671-1	Lepus californicus	11.7x0.8x0.7	6.3d
Grid 65, Level 2	End scraper	Slightly eroded with minor damage	1378-1	Odocoileus hemionus	6.0x2.5x1.0	6 .4a
Grid 65, Level 3	Tinkler Fragment	Slightly eroded with minor damage	1411-1	Lepus californicus	12.6x0.7x0.7	6.3b
Grid 65, Level 5	a) Awl b) Fragment	a) Consolidated bone/complete tool b) Consolidated	a) 1523-1 b) 1836-1	a) Artiodactyl b) Small-to-medium mammal	a) 8.1x1.5x0.7 b) No measurements	6.1k 6.2w
Grid 70, Level 5, N 1/3	Awl	Slightly eroded with minor damage	998-1	Odocoileus heminous	16.4x1.1x0.4	6.1a
Grid 70, Level 6, N 1/3	Spatulate	Consolidated bone/complete tool	1064-1	Odocoileus hemionus	5.5x1.1x0.6	6.5e
Grid 76, Test Trench 1, Level 1	Fragment	Consolidated bone	1200-1	Unknown bird or mammal	No measurements	6.2aa
Grid 82, Layer 1, Level 2	a) Needle Fragment b) Needle Fragment	a) Consolidated fragment b) Burned black	a) 1601-1 b) 1601-2	a) and b) Medium-to-large mammal	a) and b) same tool: 4.3x0.4x0.2	6.2z 6.2y
Test Trench 99						
Level 1 (trash fill)	Tinkler Fragment	Slightly eroded	2350-1	Lepus californicus	11.2x1.2x0.8	6.3c

Table 6.11. Provenience and temporal associations at 29SJ 629.

Provenience and Dates of Occupation	Location in the Archeological Record	Artifact type and Temporal Designation		Artifacts with Strong Spatial Association[a]
Kiva				
(A.D. 1100-1150)	Ventilator tunnel (fill)	2 Awls	(A.D. 1100-1150)	-
	Floor fill	Awl	(A.D. 1100-1150)	X
	General fill	Awl	(A.D. 1100-1150)	-
	Floor contact	Pendant	(A.D. 1100-1150)	X
	General fill	Weaving tool	(A.D. 1100-1150)	-
	Floor fill	Fragment	(A.D. 1100-1150)	X
Pithouse 2	Floor contact	Awl	(A.D. 1000-1050)	Y
(A.D. 875-1050)	Floor fill	2 Awls	(A.D. 1000-1050)	-
	General fill	2 End scrapers	(post A.D. 1025)	-
	Ventilator (fill)	Fragment	(post A.D. 1025)	Y
	Floor fill	2 Fragments	(A.D. 1000-1050)	-
Pithouse 3	General fill	2 Tubular beads	(post A.D. 1000)	-
(A.D. 950-1000)	Ventilator (fill)	2 Fragments	(post A.D. 1000)	-
	General fill	4 Fragments	(post A.D. 1000)	-
Room 2 (A.D. 975-1050)	General fill	Fragment	(no date)	-
Room 3 (A.D. 975-1050)	Wall fall	Fragment	(no date)	-
Room 5	General fill	Spatulate	(no date)	-
(A.D. 950-1050)	Floor contact	Finger ring	(A.D. 1000-1050)	Z
	General fill	Fragment	(no date)	-
Room 6 (A.D. 950-1050)	General fill	Needle	(no date)	-
Room 9 (A.D. 975-1050)	Floor fill	Fragment	(no date)	-

Table 6.11. (continued)

Provenience and Dates of Occupation	Location in the Archeological Record	Artifact type and Temporal Designation		Artifacts with Strong Spatial Association[a]
Plaza (A.D. 950-1050)	Other Pit 14 (fill)	2 Awls	(post A.D. 975)	-
	Structural rubble	Awl	(no date)	-
	Structural rubble	Gaming piece	(no date)	-
	Other Pit 14 (fill)	3 Fragments	(post A.D. 975)	-
	Firepit 5 (fill)	Fragment	(A.D. 1100-1200)	-
	General fill	2 Fragments	(no date)	-
Trash Mound (A.D. 875-1025)	General fill	3 Awls	(A.D. 875-1025)	-
	General fill	Needle	(A.D. 875-1025)	-
	General fill	End scraper	(A.D. 875-1025)	-
	General fill	Spatulate	(A.D. 875-1025)	-
	General fill	6 Fragments	(A.D. 875-1025)	-
Test Trench 99[b] (A.D. 875-925)	General fill	Fragment	(no date)	-

[a] X = non-habitational; religious and work area.
Y = non-habitational; work area.
Z = storeroom for economically important plants.
[b] North of Rooms 2 and 3.

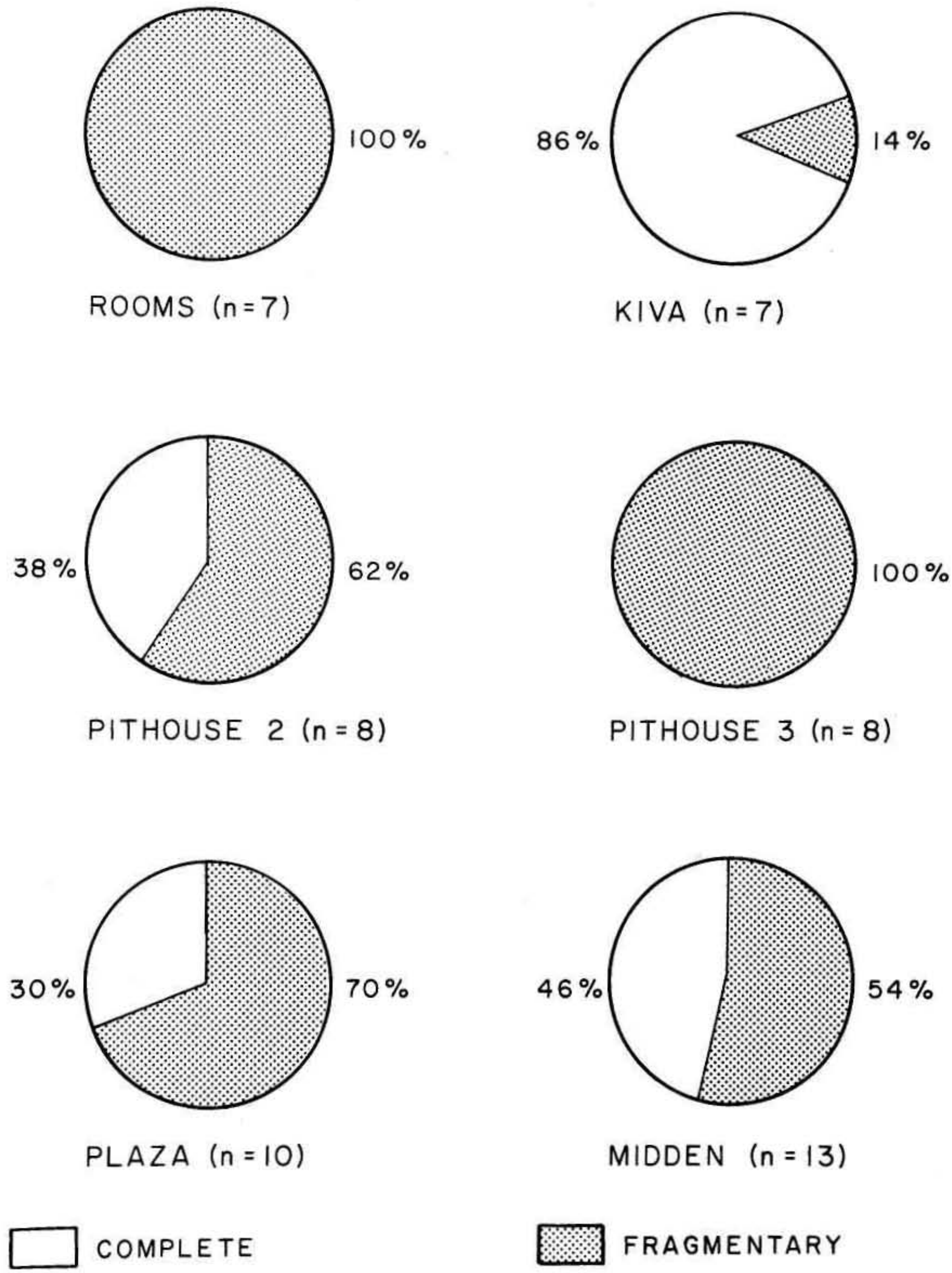

Figure 6.2. *Percentage distribution of essentially complete versus badly damaged (fragmentary) bone artifacts (NPS 310/82828 A).*

large scope of canyon-wide activities. Clearly, the main bone tool industry at 29SJ 629 was associated with basketry.

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7

VERTEBRATE REMAINS FROM 29SJ 629

William B. Gillespie

Introduction

The extensive excavations at the Spadefoot Toad Site (29SJ 629) during 1975 and 1976 resulted in the recovery of some 2,818 specimens of vertebrate skeletal material. Of this total, slightly more than half (53 percent) can be identified to genus level and, for most of these, at least tentative species identifications can be made. Thirty-four species are represented, the majority of them mammals (Table 7.1). The most abundant cultural taxa are cottontails, jackrabbits, prairie dogs, and dogs. The estimated number of individuals represented varies with the method of calculation; the minimum total for the site is 152, while incorporating provenience information into the calculation gives an estimate of 346.

This report has four basic parts: 1) summary of analytical procedures; 2) account of taxonomic composition; 3) discussion of spatial and temporal variability; and, 4) miscellaneous information on charring, meat weight contributions, age distributions, and bone artifacts.

Procedures

Excavations at 29SJ 629 were relatively complete in that all recognized rooms and pitstructures were cleared, the bulk of the Trash Midden east of the house area was excavated, and several tests of non-structural space, adjacent to architectural features, were made. Accordingly, it is probable that the collected faunal remains represent the majority of bones present at the time of excavation. Recovery techniques used at the site are thorough compared to many past excavations and standardized throughout most of the site. Nearly all excavated dirt was passed through a 1/4-inch screen. Exceptions include major work done in 1975 (most of the Kiva fill and Room 9), when screens were not employed, and there was a small amount of backhoe testing where only a few large mammal remains were recovered.

Identification of mammalian specimens was performed at the Chaco Center using comparative material there and at the University of New Mexico, Museum of Southwest Biology. Non-mammal remains were segregated during examination of the mammals. Bird specimens were identified by Steven Emslie (University of Arizona/Center for Western Studies), and John Applegarth (University of New Mexico) analyzed amphibian and reptile bones. For each specimen, taxonomic identification, provenience information, skeletal element, side, age category, and miscellaneous information, such as charring,

Table 7.1. Vertebrate taxa present at 29SJ 629.

MAMMALS

- Lagomorphs
  - Leporidae
    - Sylvilagus cf. S. audubonii (Desert Cottontail)
    - Lepus californicus (Black-tailed Jackrabbit)
- Rodents
  - Sciuridae
    - Ammospermophilus leucurus (White-tailed Antelope Squirrel)
    - Spermophilus variegatus (Rock Squirrel)
    - Cynomys gunnisoni (Gunnison's Prairie Dog)
  - Geomyidae
    - Thomomys bottae (Botta's Pocket Gopher)
  - Heteromyidae
    - Perognathus flavescens (Plains Pocket Mouse)
    - P. flavus (Silky Pocket Mouse)
    - Dipodomys ordii (Ord's Pocket Mouse)
    - D. spectabilis (Banner-tailed Kangaroo Rat)
  - Cricetidae
    - Peromyscus cf. P. maniculatus (cf. Deer Mouse)
    - Onychomys leucogaster (Northern Grasshopper Mouse)
    - Neotoma cinerea (Bushy-tailed Woodrat)
    - N. cf. N. stephensi (Stephen's Woodrat)
  - Erethizontidae
    - Erethizon dorsatum (Porcupine)
- Carnivores
  - Canidae
    - Canis sp. (Dog or Coyote)
    - C. cf. C. latrans (Coyote)
    - C. lupus (Grey Wolf)
    - C. familiaris (Domestic Dog)
  - Mustelidae
    - Taxidea taxus (Badger)
  - Felidae
    - Felis concolor (Mountain Lion)
    - F. (Lynx) rufus (Bobcat)
- Artiodactyls
  - Cervidae
    - Cervus canadensis (Wapiti or Elk)
    - Odocoileus hemionus (Mule Deer)
  - Antilocapridae
    - Antilocapra americana (Pronghorn)
  - Bovidae
    - Ovis canadensis (Mountain Sheep)

Table 7.1. (continued)

BIRDS

- Falconiformes
  - Accipitridae
    - Aquila chrysaetos (Golden Eagle)
    - Buteo sp. (Unidentified Hawk)
    - B. Jamaicensis (Red-tailed Hawk)
- Galliformes
  - Pasianidae
    - Meleagris gallopavo (Turkey)
- Gruiformes
  - Gruidae
    - Grus c. canadensis (Lesser Sandhill Crane)
- Passeriformes
  - Corvidae
    - cf. Corvus corax (cf. Common Raven)

AMPHIBIANS

- Anura
  - Pelobatidae
    - Spea (Scaphiopus) bombifrons (Plains Spadefoot)
    - S. (S.) hammondi (Western Spadefoot)

REPTILES

- Squamata
  - Iquanidae
    - Sceloporus undulatus (Northern Plateau Lizard)
    - S. graciosus (Sagebrush Lizard)

fragmentation, and weathering were entered on standard IBM coding forms.

Quantification of the occurrence of each taxon is given using three commonly used calculations--number of identified specimens (or elements), minimum numbers of individuals (MNI), and meat weight amounts. The first of these is relatively straightforward and, for the site total, involves a simple summation of the fragments of identified elements. Articulated sections, either of complete skeletons or more limited body parts of more than five elements, are tabulated as single specimens.

Calculation of minimum numbers of individuals avoids the major limitation of specimen counts, that is the lack of independence of quantified units. As Grayson (1979) has pointed out, however, MNI counts of taxa and their relative frequencies depend to a large extent upon the selection and aggregation of the provenience units which form the basis for MNI calculations. At 29SJ 629, individual excavation units were aggregated into larger units that are thought to be most realistic in avoiding inflated MNI estimates (from dividing deposits with shared faunal remains) and underestimates (from lumping deposits which have little probability of shared faunal material). In the house area, each room and pitstructure was considered a discrete structure, independent of other structures. Additionally, the pitstructures were divided into fill, floor features, and subfloor. Large features in the plaza were tabulated independently and MNIs were calculated separately for each 3-by-3-m grid around the house area.

In the Trash Midden, units for MNI calculation are more arbitrary and less satisfactory. It would be preferable to use natural stratigraphic units, but such strata were vague, poorly defined, and considerably mixed, as shown by ceramic matching. Considering the midden as a whole would give minimum figures, but would lead to very low estimates of common taxa. Moreover, this is practically difficult because of the vast amount of material present. The procedure adopted here is to consider each 3-by-3-m grid separately, even though these units are not discrete. One result is a tendency toward overestimation, particularly of less common taxa, because of the potential for counting the same individual more than once if it occurs in adjacent grids; however, this tendency is in part offset by the lumping of different (if mixed) strata within each grid. Because of these limitations, the resulting MNI numbers should not be considered to be accurate determinations but are instead estimates of the relative numbers of individuals. MNI calculations are also given (Table 7.2) using the "minimum distinction method" (Grayson 1979), i.e., considering the site as a single unit.

Abundance of different species can also be compared using estimated meat weight, usually as a simple derivation from the MNI values (after White 1953). Here, meat weight values are presented using two approaches, the available meat weight (White's method) and the consumed meat weight, which adjusts for actual skeletal representation of larger taxa. The latter approach is used in an attempt to dampen the effect of having very high meat weight estimates for large animals represented by very few bones. More details of this approach are given below.

Specimens which could not be identified to genus level were placed in one of seven categories, based largely on probable body size of the individual. These categories are 1) unidentified small rodent (mouse- and rat-size mammals); 2) unidentified small mammal (rabbit- and prairie dog-size); 3) unidentified medium mammal (the size of dogs or other carnivores); 4) unidentified medium-large mammal (carnivore-, artiodactyl-, or human-size); 5) unidentified artiodactyl (deer, sheep, or pronghorn); 6) unidentified vertebrate (unknown mammal or other vertebrate, size undetermined); and 7) unidentified bird. The first six of these are tabulated by provenience along with the identified mammals (Table 7.3), while the unknown birds are given with the identified bird remains (Table 7.4).

Most of the faunal remains from 29SJ 629 can be placed into one of five temporal categories discussed under Volume I, Chapters 3 and 8. Frequencies of specimens in these categories are given for mammalian taxa in Table 7.5. The proveniences included in each category are as follows:

Phase I	Early Trash Midden. ca. A.D. 875-925. TM Grids 1, all; 59, Level 1-2; 64, Level 2-4; 65, Level 4-7; 70, Level

Table 7.2. Site totals of elements and minimum number of individuals (MNI) for taxa at 29SJ 629. MNI figures are calculated only for identified mammals.

Specimen	Number of Specimens	Percent	Est. MNI No.	Est. MNI Percent	Absolute Minimum MNI No.	Absolute Minimum MNI Percent	Ratio Minimum MNI No. Species
Lagomorphs							
Sylvilagus cf. audubonii	381	27.3	48	15.9	15	11.7	.04
Lepus californicus	395	28.3	46	15.3	13	10.2	.03
Rodents							
Ammospermophilus leucurus	15	1.1	4	1.3	2	1.6	.13
Spermophilus variegatus	1	0.1	1	0.3	1	0.8	1.00
Cynomys gunnisoni	225	16.1	46	15.3	13	10.2	.06
Thomomys bottae	55	3.9	17	5.6	7	5.5	.13
Perognathus spp.	54	3.9	23	7.6	19	14.8	.35
Dipodomys ordii	37	2.6	19	6.3	11	8.6	.30
D. spectabilis	3	0.2	3	1.0	2	1.6	.67
Peromyscus sp.	30	2.1	13	4.3	9	7.0	.30
Onychomys leucogaster	10	0.7	2	0.7	2	1.6	.20
Neotoma spp.	16	1.1	8	2.7	4	3.1	.25
Erethizon dorsatum	4	0.3	3	1.0	2	1.6	.50
Carnivores							
Canis sp.	32	2.3	6	2.0	-	-	-
C. cf. C. latrans	28	2.0	9	3.0	3	2.3	.11
C. lupus	2	0.1	2	0.7	1	0.8	.50
C. familiaris	67	4.8	24	8.0	14	10.9	.21
Taxidea taxus	1	0.1	1	0.3	1	0.8	1.00
Felis concolor	1	0.1	1	0.3	1	0.8	1.00
F. (Lynx) rufus	1	0.1	1	0.3	1	0.8	1.00
Artiodactyls							
Cervus canadensis	1	0.1	1	0.3	1	0.8	1.00
Odocoileus hemionus	22	1.6	12	4.0	3	2.3	.14
Antilocapra americana	8	0.6	5	1.7	1	0.8	.12
Ovis canadensis	7	0.5	6	2.0	2	1.6	.29
Total identifiable mammals	1,396	100.0	301	99.9	128	100.2	.09

Table 7.2. (continued)

Specimen	Number of Specimens	Est. MNI	Absolute Minimum MNI
Birds			
Meleagris gallopavi	54	16	7
Aquila chrysaetos and cf. Aquila	11	6	2
Buteo jamaicensis	2	1	1
Buteo sp.	12	8	2
Grus canadensis	1	1	1
cf. Corvus corax	1	1	1
Amphibians			
Spea sp.	3	3	3
S. hammondi	5	5	5
S. bombifrons	2	2	2
Reptiles			
Sceloporus undulatus	1	1	1
S. graciosus	1	1	1
Total identified and unidentified specimens	2,818	345	154

Unidentified Remains	Number of Specimens	Percent of Unidentified Total
Small rodent	96	7.2
Small mammal	542	40.8
Medium mammal	55	4.1
Medium-to-large mammal	223	16.8
Artiodactyl	94	7.1
Vertebrate	280	21.1
Bird	39	2.9
Total unidentified specimens	1,329	100.0

Table 7.3. Mammal remains at 29SJ 629.[a]

Specimen	Room 1	2	3	4	5	6	7	8	9	Room Totals
Lagomorphs										
Sylvilagus cf. audubonii	3/1	-	5/1	-	-	-	-	-	-	8/2
Lepus californicus	3/1	1/1	1/1	2/2	-	-	-	-	-	7/5
Rodents										
Ammospermophilus leucurus	-	-	-	-	-	-	-	-	-	-
Spermophilus variegatus	-	-	-	-	-	-	-	-	-	-
Cynomys gunnisoni	8/2	2/1	2/1	1/1	-	1/1	-	-	2/2	16/8
Thomomys bottae	-	1/1	-	-	-	-	-	-	5/1	6/2
Perognathus sp.	-	1/1[b]	-	-	-	-	-	-	-	1/1
Dipodomys ordii	-	-	-	-	-	-	-	-	-	-
D. spectabilis	-	-	-	-	-	-	-	-	-	-
Peromyscus sp.	-	-	-	-	-	-	-	-	9/1	9/1
Onychomys leucogaster	1/1	-	-	-	-	-	-	-	-	1/1
Neotoma sp.	-	-	-	-	-	-	-	-	-	-
Erethizon dorsatum	-	-	-	-	-	-	-	-	-	-
Carnivores										
Canis sp.	-	-	1/1	-	-	-	1/1	-	-	2/2
C. cf. latrans	-	-	-	-	-	-	-	-	-	-
C. lupus	-	-	-	-	-	-	-	-	-	-
C. familiaris	-	-	-	-	-	-	-	-	-	-
Taxidea taxus	-	-	-	-	-	-	-	-	-	-
Felis concolor	-	-	-	-	-	-	-	-	-	-
F. (Lynx) rufus	-	-	-	-	-	-	-	-	-	-
Artiodactyls										
Cervus canadensis	-	-	-	-	-	-	-	-	-	-
Odocoileus hemionus	-	-	1/1	-	-	2/1	-	-	-	3/2
Antilocapra americana	-	-	-	-	-	-	-	-	-	-
Ovis canadensis	-	-	-	-	-	-	-	-	-	-
Total identifiable mammals	15/5	5/4	10/5	3/3	-	3/2	1/1	-	16/4	53/24

[a] Totals = element frequency/MNI.
[b] Articulated skeleton.

Table 7.3. (continued)[a]

Specimen	Kiva (Pithouse 1) Fill	Floor Contact	Vent Fill	Firepit	Totals
Lagomorphs					
Sylvilagus cf. audubonii	9/2	-	4/1	2/1	15/3/4
Lepus californicus	14/2	-	7/1	2/1	23/2/4
Rodents					
Ammospermophilus leucurus	-	-	-	-	-
Spermophilus variegatus	-	-	-	-	-
Cynomys gunnisoni	-	-	4/1	17/1	21/2/2
Thomomys bottae	-	-	-	-	-
Perognathus sp.	-	10/4[b]	11/4[c]	10/1	31/8/9
Dipodomys ordii	-	17/7[d]	1/1[e]	1/1	19/8/9
D. spectabilis	-	-	-	-	-
Peromyscus sp.	2/1	-	-	-	2/1/1
Onychomys leucogaster	-	-	-	-	-
Neotoma sp.	-	-	-	-	-
Erethizon dorsatum	-	-	-	-	-
Carnivores					
Canis sp.	-	1/1	-	-	1/-/1
C. cf. latrans	-	-	-	-	-
C. lupus	-	-	-	-	-
C. familiaris	1/1	-	-	-	1/1/1
Taxidea taxus	-	-	-	-	-
Felis concolor	-	1/1[f]	-	-	1/1/1
F. (Lynx) rufus	-	-	-	-	-
Artiodactyls					
Cervus canadensis	-	-	-	-	-
Odocoileus hemionus	3/1	-	1/1	-	4/1/2
Antilocapra americana	1/1	-	-	-	1/1/1
Ovis canadensis	1/1	-	-	-	1/1/1
Total identifiable mammals	31/9	29/13	28/9	32/5	120/29/36

[a] Totals = element frequency/minimum MNI/maximum MNI.
[b] Four skeletons.
[c] Two skeletons.
[d] Seven Skeletons
[e] One partial skeleton.
[f] Artifact.

Table 7.3. (continued)[a]

	Pithouse 2			
Specimen	Lower Fill and Floor	Vent Fill	Feature and Sub-floor	Totals
Lagomorphs				
Sylvilagus cf. audubonii	7/2	9/2	1/1	17/3/5
Lepus californicus	13/2	26/4	-	39/4/6
Rodents				
Ammospermophilus leucurus	-	-	-	-
Spermophilus variegatus	-	-	-	-
Cynomys gunnisoni	4/2	7/1[b]	-	11/3/3
Thomomys bottae	-	3/1	-	3/1/1
Perognathus sp.	13/10[c]	-	-	13/10/10
Dipodomys ordii	2/1[d]	2/1	-	4/2/2
D. spectabilis	-	-	-	-
Peromyscus sp.	2/2[e]	-	1/1[d]	3/3/3
Onychomys leucogaster	-	-	-	-
Neotoma sp.	-	-	-	-
Erethizon dorsatum	1/1[f]	-	-	1/1/1
Carnivores				
Canis sp.	-	-	-	-
C. cf. latrans	-	-	-	-
C. lupus	-	-	-	-
C. familiaris	2/2[d]	-	-	2/2/2
Taxidea taxus	-	-	-	-
Felis concolor	-	-	-	-
F. (Lynx) rufus	-	-	1/1[g]	1/1/1
Artiodactyls				
Cervus canadensis	-	-	-	-
Odocoileus hemionus	-	1/1	-	1/1/1
Antilocapra americana	-	-	-	-
Ovis canadensis	1/1	-	-	1/1/1
Total identifiable mammals	45/23	48/10	3/3	86/32/36

[a] Total = element frequency/minimum MNI/maximum MNI.
[b] Includes articulated skeleton.
[c] Ten partial skeletons.
[d] One partial skeleton.
[e] Two partial skeletons.
[f] An articulated foot.
[g] Artifact.

Table 7.3. (continued)[a]

Specimen	Pithouse 3 Upper Fill	Lower Fill	Vent Fill	Features & Subfloor	Totals
Lagomorphs					
Sylvilagus cf. audubonii	-	16/1	1/1	3/1	20/1/3
Lepus californicus	1/1	62/3	11/2	-	74/4/6
Rodents					
Ammospermophilus leucurus	-	-	-	-	-
Spermophilus variegatus	-	-	-	-	-
Cynomys gunnisoni	3/1	32/4	4/2	6/1	45/6/8
Thomomys bottae	-	1/1	-	-	1/1/1
Perognathus sp.	-	-	-	-	-
Dipodomys ordii	-	-	-	2/1	2/1/1
D. spectabilis	-	-	-	-	-
Peromyscus sp.	-	-	-	2/1[b]	2/1/2
Onychomys leucogaster	-	-	-	-	-
Neotoma sp.	-	-	-	-	-
Erethizon dorsatum	1/1	1/1	-	-	2/1/1
Carnivores					
Canis sp.	1/1	2/-	-	-	3/-/1
C. cf. latrans	-	-	-	-	-
C. lupus	-	-	-	-	-
C. familiaris	-	1/1	-	3/1	4/1/2
Taxidea taxus	-	-	-	-	-
Felis concolor	-	-	-	-	-
F. (Lynx) rufus	-	-	-	-	-
Artiodactyls					
Cervus canadensis	-	1/1	-	-	1/1/1
Odocoileus hemionus	1/1	5/1	-	-	6/2/2
Antilocapra americana	-	4/1	-	-	4/1/1
Ovis canadensis	-	2/1	-	-	2/1/1
Total identifiable mammals	7/5	127/15	16/5	16/5	166/21/30

[a] Total = element frequency/minimum MNI/maximum MNI.
[b] Articulated skeleton.

Table 7.3. (continued)

Specimen	Plaza Features[b] Large Pits Other Pit 1	Other Pit 6	Other Pit 12	Other Pit 14	Other Features	Test Trench 99	Misc. Grids
Lagomorphs							
Sylvilagus cf. audubonii	-	14/3	2/1	22/4	1/1	-	8/6
Lepus californicus	-	6/1	2/1	27/3	-	1/1	7/6
Rodents							
Ammospermophilus leucurus	-	-	-	1/1	-	-	-
Spermophilus variegatus	-	-	-	-	-	-	-
Cynomys gunnisoni	3/1	14/2	4/2	32/4	1/1	1/1	1/1
Thomomys bottae	-	1/1	1/1	3/1	1/1	-	-
Perognathus sp.	-	-	-	-	-	-	-
Dipodomys ordii	2/2[c]	1/1	-	-	-	-	-
D. spectabilis	-	-	-	-	-	-	-
Peromyscus sp.	2/1	-	-	13/4	-	-	-
Onychomys leucogaster	-	-	-	-	-	-	-
Neotoma sp.	-	2/2	-	-	-	1/1	-
Erethizon dorsatum	-	-	-	-	-	-	-
Carnivores							
Canis sp.	-	-	-	1/-	-	-	1/1
C. cf. latrans	-	-	-	3/1	-	-	1/1
C. lupus	-	-	-	-	-	-	-
C. familiaris	-	1/1	-	-	-	3/1	-
Taxidea taxus	-	-	-	-	-	-	-
Felis concolor	-	-	-	-	-	-	-
F. (Lynx) rufus	-	-	-	-	-	-	-
Artiodactyls							
Cervus canadensis	-	-	-	-	-	-	-
Odocoileus hemionus	-	-	-	4/1	-	-	1/1
Antilocapra americana	-	-	-	-	-	-	-
Ovis canadensis	-	1/1	-	-	-	-	1/1
Total identifiable mammals	7/4	40/12	9/5	106/19	3/3	6/4	20/17

[a] Totals = element frequency/MNI.
[b] See separate tabulations for grids for more details (Table 7.13). MNI estimates assume that grids and features are discrete.
[c] Includes 1 skeleton.

Table 7.3 (continued)[a]

Specimen	Midden Test Trench 1	Trash Midden Grid Number 52-53	58	59	64	65	70	71	76	82	87-98	Trash Totals
Lagomorphs												
Sylvilagus cf. audubonii	9/2	-	1/1	7/1	-	37/4	58/4	4/1	118/4	40/2	-	274/19
Lepus californicus	10/2	4/1	6/1	7/1	-	47/2	62/2	5/1	44/2	22/1	2/1	209/14
Rodents												
Ammospermophilus leucurus	-	-	-	-	-	-	13/2[b]	-	1/1	-	-	14/3
Spermophilus variegatus	-	-	-	-	-	-	-	-	1/1	-	-	1/1
Cynomys gunnisoni	2/1	1/1	1/1	1/1	2/1	14/1	36/2	2/1	9/1	5/1	5/2	78/13
Thomomys bottae	-	-	-	-	-	2/1	12/3	-	23/3	1/1	1/1	39/9
Perognathus sp.	-	-	-	-	-	-	8/2	-	1/1	-	-	9/3
Dipodomys ordii	-	-	-	-	-	2/1	1/1	-	5/1	1/1	-	9/4
D. spectabilis	-	-	-	-	-	1/1	1/1	-	1/1	-	-	3/3
Peromyscus sp.	-	-	-	-	-	-	7/2	-	1/1	-	-	8/3
Onychomys leucogaster	-	-	-	-	-	-	-	1/1	-	-	-	1/1
Neotoma sp.	-	-	-	-	-	1/1	6/1	-	2/1	3/1	-	12/4
Erethizon dorsatum	-	-	-	-	-	-	1/1	-	-	-	-	1/1
Carnivores												
Canis sp.	1/1	-	-	1/-	-	8/-	6/-	-	4/-	3/-	1/-	24/1
C. cf. latrans	-	-	-	-	-	-	4/1	-	11/3	6/2	3/1	24/7
C. lupus	-	-	-	-	-	-	1/1	-	1/1	-	-	2/2
C. familiaris	-	-	2/1	4/1	7/2	7/3	6/3	5/3	20/2	4/2	1/1	56/18
Taxidea taxus	-	-	-	-	-	-	-	-	1/1	-	-	1/1
Felis concolor	-	-	-	-	-	-	-	-	-	-	-	-
F. (Lynx) rufus	-	-	-	-	-	-	-	-	-	-	-	-

Table 7.3. (continued)

Specimen	Test Trench 1	Trash Midden Grid Number 52-53	58	59	64	65	70	71	76	82	87-98	Trash Totals
Artiodactyls												
Cervus canadensis	-	-	-	-	-	-	-	-	-	-	-	-
Odocoileus hemionus	-	-	-	-	-	-	-	-	1/1	1/1	1/1	3/3
Antilocapra americana												
Ovis canadensis	-	-	1/1	-	-	-	-	-	1/1	-	1/1	3/3
	-	-	-	-	-	-	-	1/1	-	-	-	1/1
Total identifiable mammals	22/6	5/2	11/5	20/4	9/3	120/15	226/26	18/8	235/25	86/12	15/8	773/114

[a] Total = element frequency/MNI.
[b] Includes skeleton.

Table 7.3. (continued)[a]

Specimens	Rooms 1	2	3	4	5	6	7	8	9	Room Totals
Unidentified Remains										
Small rodent	-	4	1/(1)	-	-	-	-	-	-	5
Small mammal	9	6	3	-	2/(1)	-	-	2/(1)	2	24
Medium mammal	-	-	-	-	-	-	-	-	-	-
Medium-to-large mammal	6	-	3	1/(1)	2	6	-	-	8	26
Artiodactyl	1/(1)	3/(1)	4	-	1/(1)	3	-	-	3/(1)	15
Vertebrate	18	-	-	1	-	-	-	1	2	22
Totals	34	13	11	2	5	9	-	3	15	92

Specimens	Kiva (Pithouse 1) Fill	Floor Contact	Vent Fill	Firepit	Totals
Unidentified Remains					
Small rodent	-				
Small mammal	8	-	-	-	-
Medium mammal	-	-	1	70	79
Medium-to-large mammal	7	-	-	-	-
Artiodactyl	4	-	2	-	9
Vertebrate	5	-	7	-	11
Totals	24	-	1	-	6
		-	11	70	105

Specimens	Pithouse 2 Lower Fill & Floor	Vent Fill	Feature & Sub-floor	Totals
Unidentified Remains	1	-	-	-
Small rodent	3	6	2	11
Small mammal	-	-	-	-
Medium mammal	3	1	-	4
Medium-to-large mammal	2	-	-	2
Artiodactyl	-	1	1	2
Vertebrate	9	8	3	20
Totals				

[a]Some totals = element frequency/(estimated MNI).

Table 7.3. (continued)[a]

Specimens	Pithouse 3 Upper Fill	Lower Fill	Vent Fill	Features & Sub-floor	Totals
Unidentified Remains					
Small rodent	-	-	-	-	-
Small mammal	6	29	3	1	39
Medium mammal	3	3	-	1	7
Medium-to-large mammal	4	11	-	6	21
Artiodactyl	1	26	-	1/(1)	28
Vertebrate	5	45	-	3	53
Totals	19	114	3	12	148

Specimens	Plaza Features Other Pit 1	Other Pit 6	Other Pit 12	Other Pit 14	Other Features	Test Trench 99	Misc. Grids
Unidentified Remains							
Small rodent	-	-	-	1	-	-	1
Small mammal	-	17	8	20	2	3	13
Medium mammal	-	-	-	4	-	2	1
Medium-to-large mammal	1	8	2	14	2	1	12
Artiodactyl	1/(1)	-	2/(1)	5	1/(1)	1	3
Vertebrate	3	21	-	7	-	-	7
Totals	5	46	12	51	5	7	36

Specimens	Test Trench 1	Trash Midden Grid Number 52-53	58	59	64	65	70	71	76	82	87-98	Trash Total
Unidentified Remains												
Small rodent	-	-	-	-	-	1	86	-	2	-	-	89
Small mammal	16	1	1	6	4	47	92	7	67	78	7	326
Medium mammal	-	-	-	-	-	6	1	-	11	18	5	41
Medium-to-large mammal	1	-	-	2	-	8	12	3	28	59	10	123
Artiodactyl	1	1	-	1	1/(1)	-	3/(1)	-	5	11	2	25
Vertebrate	5	-	-	10	-	25	44	1	54	18	2	159
Totals	23	2	1	19	5	87	238	11	167	184	26	763

[a] Some totals = element frequency/(estimated MNI).

Table 7.4. Bird remains at 29SJ 629.[a]

Specimen	Room 1 Fill	Room 3 Floor	Room 4 Fill	Kiva Fill	Pithouse 2 Fill	Pithouse 2 Vent	Pithouse 3 Fill	Pithouse 3 Vent	Pithouse 3 Floor	Plaza Features Other Pit 1	Plaza Features Other Pit 6	Grid 14 Level 1	Grid 10 Surface
Meleagris gallopavo (Turkey)	1/1	-	1/1	1/1	1/1	-	2/1	-	3/1[b]	31/4[c]	-	-	1/1[d]
Aquila chrysaetos (Golden Eagle)	-	-	-	-	1/1	-	1/1	-	1/1	1/1	2/1	-	-
cf. Aquila (Eagle sp.)	-	-	-	-	-	-	-	-	-	-	-	-	-
Buteo jamaicensis (Red-tailed Hawk)	-	-	-	-	-	-	-	-	-	-	-	-	-
Buteo sp. (Unidentified Broad-winged Hawk)	-	-	-	-	-	1/1	-	-	-	-	2/1	1/1	-
Falconiformes sp. (Unidentified hawk, eagle, etc.)	-	-	-	-	-	-	-	-	-	-	-	-	-
Grus c. canadensis (Lsr. Sandhill Crane)	-	-	-	-	-	-	1/1	-	-	-	-	-	-
cf. Corvus corax (cf. Common Raven)	-	-	-	-	-	-	-	-	-	-	-	-	-
Unidentified Bird	1	1/(1)	1	-	1	-	14	1/(1)	2	2	1	-	1
Totals	2/1	1/(1)	2/1	1/1	3/2	1/1	18/3	1/(1)	6/2	34/5	5/2	1/1	2/1

[a] Number of elements/MNI.
[b] Includes articulated wing and foot.
[c] Includes complete or partial skeletons of 3 juveniles and 1 adult male.
[d] Partial skeleton.

Table 7.4. (continued)[a]

Specimen	Test Trench 99 Level 1	Midden Test Trench 1	Trash Midden Grids								Site Totals
			52-53	59	65	70	71	76	82	87-98	
Meleagris gallopavo (Turkey)	-	1/1[b]	-	-	3/1	3/1	-	4/1	2/2[c]	-	54/16/17[d]
Aquila chrysaetos (Golden Eagle)	-	-	-	-	-	1/1	-	3/1	-	-	10/6/7[d]
cf. Aquila (Eagle sp.)	-	-	-	-	-	-	-	1/-	-	-	1/-
Buteo jamaicensis (Red-tailed Hawk)	2/1	-	-	-	-	-	-	-	-	-	2/1
Buteo sp. (Unidentified Broad-winged Hawk)	-	-	1/1	1/1	1/1	2/1	-	3/1	-	-	12/8
Falconiformes sp. (Unidentified hawk, eagle, etc.)	-	-	-	-	1/-	-	-	-	-	-	1/-
Grus c. canadensis (Lsr. Sandhill crane)	-	-	-	-	-	-	-	-	-	-	1/1
cf. Corvus corax (cf. Common Raven)	-	-	-	-	-	-	-	-	1/1	-	1/1
(Unidentified Bird)	1	-	-	-	1	4	1/(1)	5	1	1/(1)	39
Totals	3/1	1/1	1/1	1/1	6/2	10/3	1/(1)	16/3	4/3	1/(1)	121/33/35[d]

[a] Totals = element frequency/MNI or element frequency/minimum MNI/maximum MNI.
[b] Articulated foot.
[c] Includes partial juvenile skeleton.
[d] Differences between MNI estimates for Meleagris and Aquila is dependent upon whether or not Pithouse 3's lower fill and floor are considered to be discrete.

Table 7.5. Frequencies of identified mammals, turkeys, and unidentified remains by temporal divisions (Number of specimens/MNI) at 29SJ 629.

	Temporal Period (Phase)					
	I	II	III	IV	V	
Specimen	Early Trash	Mid-Trash	Pithouse 3 Fill	Late Trash, Rooms, Pithouse 2	Kiva-Room 1	Totals
Lagomorphs						
Sylvilagus cf. audubonii	48/7	224/13	16/1	23/7	18/5	329/33
Lepus californicus	60/10	139/9	63/4	54/11	26/5	342/39
Rodents						
Ammospermophilus leucurus	-	14/3	-	-	-	14/3
Spermophilus variegatus	-	1/1	-	-	-	1/1
Cynomys gunnisoni	17/8	55/8	35/5	25/12	29/4	161/37
Thomomys bottae	2/1	37/7	1/1	10/4	-	49/13
Perognathus sp.	-	9/3	-	14/11	31/9	54/23
Dipodomys ordii	-	8/3	-	5/3	19/9	32/15
D. spectabilis	1/1	2/2	-	-	-	3/3
Peromyscus sp.	-	8/3	-	3/3	2/1	13/7
Onychomys leucogaster	1/1	-	-	9/1	-	10/2
Neotoma sp.	2/2	10/3	-	1/1	-	13/6
Erethizon dorsatum	-	1/1	1/1	1/1	-	3/3
Carnivores						
Canis sp.	11/1	-	3/1	4/3	1/1	30/6
C. cf. latrans	1/1	22/7	-	1/1	-	24/9
C. lupus	-	2/2	-	-	-	2/2
C. familiaris	25/11	29/6	1/1	5/4	1/1	61/23
Taxidea taxus	-	1/1	-	-	-	1/1
Felis concolor	-	-	-	-	1/1	1/1
F. (Lynx) rufus	-	-	-	-	-	-
Artiodactyls						
Cervus canadensis	-	-	1/1	-	-	1/1
Odocoileus hemionus	-	3/3	6/2	4/3	4/2	17/10
Antilocapra americana	-	1/1	4/1	2/2	1/1	8/5
Ovis canadensis	-	1/1	2/1	1/1	1/1	5/4

Table 7.5. *(continued)*

Specimen	Temporal Period (Phase) I Early Trash	II Mid-Trash	III Pithouse 3 Fill	IV Late Trash, Rooms, Pithouse 2	V Kiva-Room 1	Totals
Subtotal, identifiable mammals	168/43	577/76	133/19	162/68	134/40	1,174/247
Turkeys						
Meleagris gallopavo	5/3	8/3	5/2	2/2	2/2	22/12
Unidentified remains						
Small rodent	1	88	0	6	0	95
Small mammal	67	255	38	34	88	482
Medium mammal	3	35	7	5	0	50
Medium-to-large mammal	16	92	15	38	15	176
Artiodactyl	3	21	27	17	12	80
Bird-mammal	34	120	50	9	24	237
Subtotal	124	611	137	109	139	1,120
Total elements	297	1,196	275	273	275	2,316

6; 71, Level 5; Room 4 fill; Test Trench 99, all.

Phase II — Middle Trash Midden. ca. A.D. 925-975.
TM Grids 64, Surface-Level One; 65, Surface-Level 3; 70, Surface-Level 5; 71, Surface-Level 4; 76, all; 82, Level 2-5; 87, all; 88, Layer 2; 97, all.

Phase III — Pithouse 3, fill. ca. A.D. 975-1025.
All of Pithouse 3 trash fill above the floor.

Phase IV — Late Trash Midden, Rooms, and Pithouse 2. ca. A.D. 1025-1050.
Pithouse 2 above floor; all rooms except Rooms 1 and 4; Trash Midden Grids 82, Layer 1, Level 1; 88, Surface,Layer 1, Level 1-2; 94, all.

Phase V — Late Occupation, ca. A.D. 1100-1150.
Kiva, fill; Room 1, fill; Grids 202-203.

These are not completely discrete temporal categories, as suggested by the estimated dates. Overlap and uncertainty exist largely because of extensive mixing in the Trash Midden and the lack of definitive dating controls. Still, this division does give at least a rough temporal framework with which to examine changing frequencies through time.

Taxonomic Composition

Identified taxa from 29SJ 629 include 25 species of mammals, five of birds, two of amphibians, and two of reptiles. These species are listed in Table 7.1. Table 7.2 shows the overall frequencies of specimens and MNIs for mammalian taxa, while non-mammals are tabulated separately below (Tables 7.4 and 7.6). Table 7.3 is a massive multi-page compilation of the distribution of mammalian taxa (and unidentified specimens) according to provenience units. This could be thought of as a single, over-sized table, but for ease of preparation, it has been divided into six sections; rooms, the Kiva, Pithouse 2, Pithouse 3, plaza features and house area grids, and Trash Midden. Birds and herptile specimens are tabulated according to provenience in separate tables below (Tables 7.4 and 7.6).

The bulk of the discussion of species present at the site (their abundance, notes on distribution, and significance, etc.) is given here under "Species Accounts." First, however, it is useful to give a brief summary of the overall composition of the 29SJ 629 faunal assemblage and the relative abundances of major taxa. Numerically, the assemblage is dominated by three common small game animals, Sylvilagus cf. S. audubonii (Desert Cottontail), Lepus californicus (Black-tailed Jackrabbit), and Cynomys gunnisoni (Gunnison's Prairie Dog). These three are abundant in almost all Chaco Canyon archeological deposits and here constitute 72 percent of the number of identified specimens and 47 percent of the total MNI. On the basis of estimated number of individuals, the three are nearly equal in abundance.

Other rodents which were probably procured for food are rather sparse. Erethizon dorsatus (Porcupine), which may have been exploited for quills as well as food, is represented by an estimated three individuals and woodrats (Neotoma sp.) by eight. Two squirrels other than Cynomys (Spermophilus variegatus and Ammospermophilus leucurus) are present in only low frequencies. Pocket gopher (Thomomys bottae) remains are common and spread throughout the site.

Mice are abundant, but most, if not all, appear to be non-cultural intrusives. The most abundant genera are Dipodomys (Kangaroo rats) and Perognathus (pocket mice), with more than 20 individuals of each present. These are most plentiful on or near the floor of the Kiva where they apparently succeeded the Anasazi as inhabitants. White-footed mice (Peromyscus sp.) are also common and a few of the larger grasshopper mice (Onychomys leucogaster) were identified.

Carnivore remains are dominated by canids, especially domestic dogs. As many as 24 individual dogs are represented, most of them disarticulated remains from the Trash Midden. Remains referred to as coyote (C. latrans) are not as plentiful, but there are still a number of specimens from the lower end of

Table 7.6. Herpetofaunal remains from 29SJ 629.[a]

Specimen	Kiva (fill) Lower	Kiva (fill) Vent	Pithouse 2 Lower Fill	Pithouse 2 Vent Fill	Pithouse 2 East Wall Niche	Room 3 Other Pit 1 Floor	Trash Midden Grid 70	Site Totals
Spea sp. (Spadefoot toad)	-	-	-	2/2[b]	-	-	1/1	3/3
S. hammondi (Western spadefoot)	1/1[c]	4/4[d]	-	-	-	-	-	5/5
S. bombifrons (Plains spadefoot)	-	-	1/1[e]	-	1/1[c]	-	-	2/2
Sceleporus undulatus (Northern Plateau lizard)	1/1	-	-	-	-	-	-	1/1
S. graciosus (Sagebrush lizard)	-	-	-	-	-	1/1	-	1/1

[a] Totals = element frequency/MNI.
[b] Two partial skeletons.
[c] Complete skeleton.
[d] Four partial skeletons, cf. S. hammondi.
[e] Partial skeleton, cf. S. bombifrons.

the Trash Midden, many of them charred. Two elements of wolf (C. lupus) are also present. Other carnivores are sparse with badger, bobcat, and mountain lion each represented by a single bone. At least with the latter two species, the specimens recovered may have been artifacts.

Remains of four large ruminants were recovered from 29SJ 629, but in rather low frequencies, given the extent of excavation. Only 38 specimens could be identified to genus and over half of these are mule deer (Odocoileus hemionus). Mountain sheep (Ovis canadensis) and Pronghorn (Antilocapra americana) are approximately equal in abundance, although both are sparse (seven and eight specimens, respectively). A single element of elk (Cervus canadensis) was recovered.

Turkeys (Meleagris gallopavo) are the most abundant bird taxon, with an estimated 16 individuals represented. The presence of young and juvenile specimens indicates that these large birds were kept at the site. Golden eagles (Aquila chrysaetos) and broad-tailed hawks (Buteo sp.) make up most of the wild bird assemblage by accounting for 26 of 28 specimens (and 14 of 16 estimated individuals). The two remaining bird specimens are from a sandhill crane (Grus canadensis) and a raven (cf. Corvus corax).

Amphibian remains entail at least ten individual spadefoot toads, including both of the species now present in the canyon, Spea hammondi and S. bombifrons (these are often placed in the genus Scaphiopus). Nearly all of these are juvenile specimens found in the deep pitstructures, and are almost certainly postoccupational intrusives. Only two specimens of lizards were recovered, both of species now common in Chaco Canyon (Sceleporus undulatus and S. graciosus).

Mammals

Sylvilagus audubonii (Desert Cottontail)

Although cottontails are abundant at 29SJ 629, as they are at nearly all Chaco Canyon sites, their numbers are not as overwhelming here as elsewhere. Cottontails rank second (by a few bones) to jackrabbits in number of elements and are nearly the same as both jackrabbits and prairie dogs in estimated number of individuals. These totals respectively are 381 elements (28 percent of the identified mammals) and 48 individuals. By comparison, in nearby 29SJ 633 (Gillespie 1991), limited excavations in two rooms produced 1,103 cottontail elements (62 percent of the identified mammals) and an estimated 60 MNI (35 percent). Thirteen (3 percent) of the cottontail specimens at 29SJ 629 are charred.

Cottontails are most abundant, relative to Lepus and Cynomys in the Trash Midden. Only in Grid 76, however, do cottontail elements exceed the number of jackrabbit elements. In that grid, the ratio of elements to MNI is high (48 elements, 4 MNI) suggests that only a few individuals are represented. In the house area Sylvilagus is consistently less abundant than either Lepus or Cynomys. In the dense trash fill of Pithouse 3 there are more than twice as many elements and minimum individual counts of each of these taxa than Sylvilagus.

Only nine dentaries are intact enough to allow measurements to assist in species determination. All of these specimens fall within the range of S. audubonii, given by Findley et al. (1975), and none within range of S. nuttallii. All of the lower third premolar (P_3) enamel patterns more closely resemble S. audubonii, the only species now present in the Chaco area. One mandibular specimen (from Grid 52 at the early end of the Trash Midden), however, appears morphologically more similar to S. nuttallii. Unfortunately, the alveolus has been damaged making measurement uncertain, and the third premolar tooth is missing so that positive identification is impossible. Noting this possible exception, it is almost certain that Desert Cottontail accounts for nearly all of the cottontails.

Lepus californicus (Black-tailed Jackrabbit)

Jackrabbits are the most abundant mammal at 29SJ 629 in terms of number of elements (395) and rank only slightly behind Sylvilagus in estimated number of individuals (46 versus 48). They are common throughout the site and undoubtedly constituted a major source of meat. In calculated consumed meat weight estimates, Lepus ranks first among all identified taxa, although it falls below the available meat weight estimates of the larger game animals.

Distribution throughout the site is more even and consistently higher than other taxa. Jackrabbits are relatively more abundant in the trash fill of Pithouse 3 where, in the lower fill, they make up nearly half of the identified specimens. Four percent (16 elements) of the bones are charred. No articulated sections were found that might indicate postoccupational intrusion.

Ammospermophilus leucurus (White-tailed Antelope Squirrel)

Today this small ground squirrel is frequently seen at Chaco Canyon, but is not common in the archeological record. At 29SJ 629 it is represented by 15 elements and an estimated 4 individuals. A cranial fragment was found in the Trash Midden Grid 76, and a dentary was recovered from OP 14 of the plaza. It is uncertain whether these small squirrels were used for food.

Spermophilus variegatus (Rock Squirrel)

Although characteristic of much of the southwest, rock squirrels are presently rare in the San Juan Basin and Chaco Canyon (and few have been found in archeological sites). Here, a single dentary was found in Trash Midden Grid 76. Post-cranial elements may also be present but are listed as Cynomys gunnisoni because of the great similarity of these two species.

Cynomys gunnisoni (Gunnison's Prairie Dog)

Although now absent in Chaco Canyon, prairie dogs are common in archeological sites and were a major small game source. They are particularly abundant at 29SJ 629, approximately equal in number of individuals to Sylvilagus and Lepus. At most sites, rabbits are considerably more abundant.

Cynomys is most abundant in the roomblock area rather than in the Trash Midden. Although at 29SJ 629 Cynomys has fewer elements than the two rabbit species, in the rooms themselves, Cynomys is represented by more elements and individuals than the other two combined. In all but the Trash Midden, Cynomys has more specimens and individuals than Sylvilagus. In the Trash Midden, however, it is third in both elements and individuals behind the rabbits, with less than one-sixth the number of elements.

In terms of the five temporal categories, prairie dogs show a general increase in frequency through time. The relative number of elements is below the average in the first two categories and above-average in the last three. As with other taxa, however, it is difficult to know whether this is a temporal trend or simply a difference between the Trash Midden and the rest of the site. The relatively high abundance in the late part of the Trash Midden may suggest that a temporal trend is present.

Thomomys bottae (Botta's Pocket Gopher)

Gophers are moderately abundant at 29SJ 629, with 55 specimens and an estimated 17 individuals. These counts rank fifth and seventh, respectively, among mammalian taxa. On a strictly skeletal basis, a minimum of seven individuals are represented. All gopher cranial and dental material which can be identified to genus is Thomomys and all that can be identified to species is T. bottae. Accordingly, it seems most likely that all geomyid remains are of T. bottae, the only gopher presently occurring in the Chaco Canyon area.

Not only adult individuals but also at least two juveniles (with deciduous dentition) and one infant are represented (all from the Trash Midden). As is characteristic with gophers, the adult individuals show a wide range of sizes.

The majority of gopher remains were recovered from the Trash Midden, especially the middle and late sections. Other specimens were scattered in the rooms (2 MNI), Pithouse 2 (1 MNI), Pithouse 3 (1 MNI), and in the plaza pits (4 MNI). It is uncertain to what extent these gophers may have been used for food. Usually, these burrowers are considered to be postoccupational intrusives, but their relative abundance and disarticulation here suggests that some may have been exploited for food.

Perognathus flavescens and P. flavus (Plains Pocket Mouse and Silky Pocket Mouse)

Some 55 specimens, many of them partial or nearly complete skeletons, were recovered from 29SJ 629 from an estimated 23 individuals. This number of individuals is the fifth highest at the site and is far more than found at most sites at Chaco Canyon. Distribution is not random, as the majority of specimens are from near the floors of Pithouse 2 and the superimposed Kiva. These include minimum numbers of ten individuals in Pithouse 2 and eight in the Kiva. Other remains are limited to Room 2 and Grids 70 and 76 of the Trash Midden. All of these small mice are assumed to be postoccupational.

Two species of pocket mice are presently found in Chaco Canyon and both appear to be present in the 29SJ 629 sample. The distinction between the two is basically that of size rather than morphology. In the San Juan Basin, P. flavescens has been noted as distinctly larger than P. flavus (Harris 1965; Williams 1971, 1978). Segregation is not always definite, however; though P. flavescens is about 18 percent larger in overall body size, not all body parts show this distinction. Age differences (especially immature P. flavescens) confuse the issue further. Separation is reasonably reliable with nearly complete crania and dentition (to control for age) but both of these conditions are rare with the 29SJ 629 specimens. Still, identifications were made for 19 individuals.

Thirteen individual specimens were identified as P. flavescens (six immature) and six as P. flavus. All of the P. flavus individuals are from the lower fill of Pithouse 2. In that structure, Perognathus were recovered from Layers 1, 4, and 5 in the south end near the ventilator. It is uncertain whether these represent a single group or two or more. In the Kiva, all specimens (P. flavescens) were from immediately above the floor or in the ventilator tunnel. Two adults and juveniles were found on the floor (with a few bones in the upper fill of Firepit 1) and the same numbers came from the vent. The larger of the two adults from the vent is a very large male, so large that some of the cranial dimensions exceed the observed range noted by Williams (1978) for 32 modern specimens from the San Juan Basin. Still, this individual is too small for the next largest Perognathus which could possibly have occurred at Chaco Canyon, the Rock Pocket Mouse (P. intermedius) (based on measurements of Kennerly 1956).

Dipodomys ordii (Ord's Kangaroo Rat)

These kangaroo rats are common in Chaco Canyon now and numerous burrows occur in the 29SJ 629 area. They are relatively common at the site with 19 MNI and 37 specimens, many of them whole or partial skeletons. About one-half of the rats are from on or near the floor of the Kiva. Here, seven skeletons were found on the floor and another in the ventilator tunnel. These are in direct association with a comparable number of pocket mice, both P. flavenscens and P. flavus. These are evidently intrusives who occupied the structure soon after abandonment. Another possibility is that they were deposited there as raptoral bird pellets or carnivore scats. Many of the remains, however, are clearly articulated skeletons that indicate they have not been eaten, digested, and redeposited. The Dipodomys specimens include a variety of sizes and degrees of epiphyseal closure with but one fully mature individual (epiphyseal closure complete) represented. Another skeleton was found in the lower fill of Pithouse 2 along with a few bones and yet another partial skeleton was in Other Pit 1 in the plaza. Elsewhere in the site, D. ordii remains are sparse. In the Trash Midden, only nine bones were found, perhaps reflecting the relative unimportance of this taxa as a subsistence resource.

Dipodomys spectabilis (Banner-tailed Kangaroo Rat)

This very large kangaroo rat is present in low frequencies in Chaco Canyon today and only occasionally has been noted in the archeological record. At 29SJ 629, three specimens [two tibiae (two MNI) and a metatarsal] were recovered, all from deposits in the central part of the Trash Midden. These animals, which weigh about the same as a small woodrat, could have been exploited for food.

Peromyscus cf. P. maniculatus (cf. Deer Mouse)

White-footed mice of the genus Peromyscus are quite common at Chaco Canyon and frequent in archeological excavations where recovery procedures are fine enough for mouse bones. P. maniculatus is far and away the most common species and is found in essentially all habitats. The smaller P. crinitus (Canyon Mouse) tend to occur in denser vegetation, particularly pinyon-juniper woodland.

It is difficult to distinguish these species on the basis of remains, and identification is tentative, at best. On the basis of size and complexity of molar dentition, nearly all of the 29SJ 629 specimens (and most other Chaco Canyon archeological material) appear to be P. maniculatus. One of the 29SJ 629 specimens (from the Pithouse 3 floor) is relatively small for P. maniculatus but is larger than comparative P. crinitus material. Accordingly, although other species may be present, all 29SJ 629 Peromysous are considered P. cf. P. maniculatus.

At 29SJ 629, an estimated 13 individuals of deer mice were recovered, mostly from structures where they are presumed to be postoccupational (or late occupational) intrusives. Partial skeletons of three individuals were found on or near the floor of Pithouse 2 where specimens of D. ordii, P. flavus, and P. flavenscens were also found. Partial articulations were also found on the floor and in a pit of Pithouse 3, and a minimum of four individuals occurred in the large Other Pit 14 in the plaza. Other remains are sparsely scattered in the plaza-pitstructure area and the Trash Midden. Only eight elements from two grids were recovered from the Trash Midden and no specimens were found in the roomblock proper.

Onychomys leucogaster (Northern Grasshopper Mouse)

These large mice are present but not abundant at Chaco Canyon now and are only rarely found in archeological deposits. At this site, a minimum of two individuals represented by ten specimens were found. Nine of the specimens were scattered in Other Pit 1 of Room 9 and apparently are from a single individual. The other specimen is from Trash Midden Grid 71. These are thought to be non-cultural intrusions.

Neotoma cf. N. cinerea and N. cf. N. stephensi (Bushy-tailed Woodrat and Stephen's Woodrat)

Woodrat remains are sparse at 29SJ 629, with only 16 specimens scattered throughout the site. On the basis of provenience distribution, a minimum number of eight individuals is estimated, though on strictly skeletal criteria, the minimum number is four. Three dentaries have teeth present and thus have the potential for species identification. Unfortunately, none of the three can be identified with certainty. One is immature but on the basis of size is probably N. cinerea. Of the two mature specimens, one appears to be a small N. cinerea and the second a N. stephensi.

It is uncertain whether or not these are food remains or non-cultural intrusions. None shows any charring or evidence of butchering, but also lacking are any articulated sections. It seems more probable that they are food remains, but some may be non-cultural.

Erethizon dorsatum (Porcupine)

Although porcupines are usually associated with woodland cover, they are frequently noted in sparser vegetation and have been observed in the 29SJ 629 vicinity. At the site, four elements represent a minimum of two, and more likely three individuals. Most intriguing of the specimens is an articulated right front foot (from carpals on down) found just above the floor of Pithouse 2. Barring an unknown Anasazai tradition of keeping "lucky porcupine feet," this probably represents a remnant from a hide. Of interest is the direct association of this foot with an assemblage of turquoise bead manufacturing tools. Perhaps porcupine quills were used as part of this activity set, either in bead manufacture as drills or directly in quillwork ornamentation.

Other specimens include two limb bones from the trash fill of Pithouse 3 and a very large radius from Trash Midden Grid 70. All of these bones are fractured which, together with their context in trash, suggest they were food items.

Canis familiaris (Domestic Dog)

Dogs are abundant at 29SJ 629, with an estimated 24 individuals represented. This is more than are known from any other Chaco Canyon site. Distribution within the site is unique among the taxa recovered in being overwhelmingly in the Trash Midden and specifically in the early deposits of the trash. Nearly 50 percent of the number of individuals are from the first of the five temporal categories, i.e., the early trash. Dogs are also common in the second time period but their numbers drop off in the later periods.

Dogs are found in nearly all grids of the Trash Midden, but in many they are found only in the lowest level, just above the bottom of the buried arroyo. Somewhat surprisingly, articulated skeletons are lacking in the trash mound and the only one from the entire site is an incomplete puppy from the floor of Pithouse 2. A few dog remains were also found on the floor of Pithouse 3 but other remains in the house area are sparse.

There is a possibility that the estimated number of individuals from the Trash Midden is slightly inflated because of the method implemented here of considering grids separately in estimating MNI numbers. On strictly skeletal criteria, however, there are still 12 MNI (versus 18 when grids are considered separately). The ratio of skeletal MNI (minimum distinction) to skeletal plus provenience MNI is as high or higher than any other common taxa, suggesting that over-estimation is not a major factor.

In the Trash Midden, crania are particularly common and form the basis for the skeletal MNI. Many are badly fractured and eroded but several are in good condition. These appear to be from rather small dogs, comparable in size to other dog remains from Chaco Canyon. Many researchers have noted the difficulty of distinguishing dogs from coyotes, but most of the dog remains we have from Chaco Canyon, including all post-cranial material here identified as C. familiaris, is typically somewhat smaller than C. latrans and morphologically distinct. Remains where the distinction was doubtful are here tabulated as Canis sp. Allen (1954) examined a single very large individual from Pueblo Bonito, however, which he noted to be about the size of C. latrans, though still morphologically somewhat different. It is possible then, that specimens identified here as C. cf. C. latrans include very large dogs, although the lack of large crania suggests that this is unlikely.

Dog remains show a diversity of ages from immature juveniles to apparently ancient individuals with little more than a few rounded nubbins left for teeth. Although no very young puppies were found, three juveniles, less than one year of age were recovered, two from the Trash Midden and one from Pithouse 2. All are apparently partial skeletons, though not well articulated. This contrasts with the lack of any articulated sections of adults. Although this may be testimony to the skills of other dogs to hurry a trash deposit along the road to entropy, this disarticulation could also indicate human consumption. Several canid post-cranial bones from the Trash Midden were fractured and thoroughly burned (nearly all are thought to be C. latrans).

Also suspicious is the temporal distribution at the site, with a marked drop-off in relative abundance during the course of occupation. A basic characteristic of late sites at Chaco Canyon (e.g., 29SJ 633, Pueblo Alto) and the Mesa Verde area is a lack of dogs during the last century or two of Anasazi occupation. It could be that the temporal divisions of 29SJ 629 record the main period of decline at Chaco Canyon (at ca. A.D. 1000) and suggest that human consumption could have been a contributing factor.

It should be noted that, although the dog remains are limited, the occurrence of C. familiaris on the floors of both pithouses is another case of the association of dogs with pitstructure abandonment that has been noted at Chaco Canyon (e.g., Kluckhohn 1939) and the Mesa Verde area (e.g., Emslie 1977). Note that the later kiva here (and most later pitstructures excavated at Chaco Canyon) lacks any such association, perhaps reflecting unavailability of dogs in later times.

Canis cf. C. latrans (Coyote)

A total of 28 specimens compare very closely with modern coyotes and are substantially larger than C. familiaris skeletons recovered from recent excavations at Chaco Canyon. As noted above, however, there is a possibility that some of these remains could be very large dogs. Based on their provenience distribution, an estimated eight individuals are suggested.

Like C. familiaris, the C. cf. latrans remains are heavily concentrated in the Trash Midden; however, unlike the dogs, they are found mainly in the later, eastern end of the midden and only in the upper levels. Most of these are found in temporal category No. 2, which includes the bulk of the Trash Midden.

Unlike the C. familiaris material, all of the probable coyote specimens are post-cranial, perhaps lending more credence to the possibility that large dogs are represented. One surprising characteristic is the high percentage of C. cf. latrans elements that are charred--40 percent (11 elements). Charred specimens were found in four of the Trash Midden grids (see Table 7.7). This high frequency strongly suggests cooking and use as food. Probable coyote remains outside the Trash Midden are limited to three bones in the trash-filled Other Pit 14 in the plaza and a single element from Grid 35.

Canis sp. (Dog or Coyote)

Some 32 canid elements are either domestic dog or coyote, but were not distinctive enough to confidently determine which. The bulk of these are from the Trash Midden where both C. familiaris and C. latrans are prevalent. Most are probably C. familiaris, the more common of the two species.

Canis lupus (Grey Wolf)

Two elements of this large canid were found, both in the Trash Midden. Included are a femur from Grid 70 and a charred second metatarsal from adjacent Grid 76. It is interesting to note that charring occurs with wolves as with coyotes.

Taxidea taxus (Badger)

Only one element of this common carnivore was found at the site. This is a thoracic vertebra from Trash Midden Grid 76, Layer 4. Significance of this specimen is unknown.

Felis (Lynx) rufus (Bobcat)

A single specimen of bobcat is a broken left fibula from below the floor of Pithouse 2 (FS 3492, Subfloor, Layer 3). This is most likely an artifact (e.g., a needle) as many felid remains in Chaco Canyon are, but its archeological context is uncertain. Another bobcat element, a radius, was modified into an awl and is not tabulated here.

Felis concolor (Mountain Lion)

Again, a single element of this species is probably an artifact. This is a large distal phalanx (claw) found lying on the floor of the Kiva (FS 2037). This is somewhat eroded but was drilled and probably strung as a pendant.

Cervus canadensis (formerly C. elaphus) (Wapiti or Elk)

A single element, a first phalanx, was recovered from the trash fill of Pithouse 3, Layer 2 (FS 2150). Elk remains are relatively rare at Chaco Canyon sites and are never represented by more than a few elements. Given this sparsity, these may well be the results of hunting a rather long distance from Chaco Canyon.

Odocoileus hemionus (Mule Deer)

As at most sites, deer are the most common of the large game animals at 29SJ 629. A total of 22 elements and an estimated ten individuals were found. Both of these frequencies are more than pronghorn and mountain sheep combined. Unlike nearly all of the smaller taxa, deer remains were found predominantly in the site structures rather than the Trash Midden. Only three (14 percent) of the 22 specimens were recovered from the Trash Midden and these are all from the later, eastern end of the trash (Grids 76, 82, and 88). Half of the elements are from the three pitstuctures, with six from Pithouse 3. Other elements are scattered in the rooms and in Other Pit 14 (four specimens). This distribution shows that deer are more common in the later occupation of the site than earlier, a condition

Table 7.7. Occurrence of charred specimens at house area proveniences at 29SJ 629.

Specimen	Room 2 Fill	Room 3 Firepit 1	Room 9 Fill	Room 9 Firepit 1	Room 9 Bin 1	Kiva Firepit 1	Pithouse 3 Fill	Plaza Other Pit 6	Plaza Other Pit 14	Plaza Grids
Sylvilagus	-	-	-	-	-	1	-	-	-	-
Lepus	1	-	-	-	-	1	4	-	2	-
Cynomys	1	-	-	-	-	16	-	-	-	-
Perognathus sp.	-	-	-	-	-	1	-	-	-	-
Dipodomys ordii	-	-	-	-	-	1	-	-	-	-
Canis sp.	-	-	-	-	-	-	-	-	-	-
C. cf. latrans	-	-	-	-	-	-	-	-	-	-
C. lupus	-	-	-	-	-	-	-	-	-	-
Odocoileus	-	-	-	-	-	-	-	-	-	1
Ovis	-	-	-	-	-	-	1	-	-	-
Buteo sp.	-	-	-	-	-	-	-	-	-	-
Unidentified mammal										
Small	1	1	-	-	-	70	-	-	2	3
Medium	-	-	-	-	-	-	-	-	4	1
Artiodactyl	2	-	-	-	-	-	2	-	-	1
Medium-to-large	-	-	2	1	1	-	2	2	-	-
Vertebrate	-	-	-	-	-	-	-	1	-	1
Unidentified Bird	-	-	-	-	-	-	-	-	-	-
Totals	5	1	2	1	1	90	9	3	8	7

Table 7.7. (continued)

Specimen	Test Trench 1	Trash Midden Grids 53	65	70	71	76	82	88	94	Trash Totals	Site Totals	Percent
Sylvilagus	1	-	2	2	-	6	1	-	-	12	13	3.4
Lepus	1	1	1	2	-	2	1	-	-	8	16	4.1
Cynomys	-	-	1	-	-	-	-	-	-	1	18	8.0
Perognathus sp.	-	-	-	-	-	-	-	-	-	-	1	1.9
Dipodomys ordii	-	-	-	-	-	-	-	-	-	-	1	2.7
Canis sp.	-	-	-	-	-	-	-	1	-	1	1	3.1
C. cf. latrans	-	-	-	2	-	4	3	2	-	11	11	39.3
C. lupus	-	-	-	-	-	1	-	-	-	1	1	50.0
Odocoileus	-	-	-	-	-	-	-	-	-	-	1	4.5
Ovis	-	-	-	-	-	-	-	-	-	-	1	14.3
Buteo sp.	-	-	-	1	-	-	-	-	-	1	1	7.1
Unidentified mammal												
Small	3	1	-	4	1	6	5	1	-	21	98	18.1
Medium	-	-	-	-	-	1	-	3	-	4	9	16.4
Artiodactyl	-	-	-	1	-	1	5	-	1	8	13	13.8
Medium-to-large	-	-	-	3	-	4	1	1	-	9	17	7.6
Vertebrate	-	-	1	-	-	1	-	-	-	2	4	1.4
Unidentified bird	-	-	-	1	-	-	-	-	-	1	1	2.6
Totals	5	2	5	16	1	26	16	8	1	80	207	7.7

which apparently pertains to other artiodactyls as well. Deer were almost certainly procured for food and nearly all specimens are fractured, presumably during the course of butchering or marrow extraction. Only one specimen was charred.

Antilocapra americana (Pronghorn)

Eight elements and an estimated five individuals (based on provenience distribution) of pronghorn were recovered from this site. Three specimens are from the Trash Midden, proportionally more than either deer or mountain sheep. The remaining specimens are from pitstructures, four from Pithouse 3, and one from the Kiva. None of the specimens is charred, though this game animal was undoubtedly an important meat source.

Ovis canadensis (Mountain Sheep)

Sheep are about as abundant as pronghorn here, with seven specimens from as many as six individuals. As with the other artiodactyl species, half or more of the specimens are from pitstructure fills (two from Pithouse 3, one from Pithouse 2, and one from the Kiva). Other remains are from Grid 3, Plaza Other Pit 6, and Trash Midden Grid 71. One specimen, from the Pithouse 3 trash fill, is charred.

Birds

Both turkeys and wild birds are scattered throughout the site, although neither group is particularly plentiful (Table 7.4). As at most Anasazi sites, turkeys are more numerous than other birds, with an estimated 16 individuals represented by 54 elements or articulated sections. Three nearly complete skeletons were found, and these are all young juvenile birds from Plaza Other Pit 1.

Steven Emslie has identified four species of wild birds, representing an estimated minimum of 17 individuals. This group is dominated by large raptorial birds, specifically golden eagle (Aquila chrysaetos) and broad-tailed hawks (Buteo sp.). Large raptors account for 26 of the 28 elements and 15 of the estimated 17 individuals. An additional 39 elements could be identified only as being from birds.

Meleagris gallopavo (Turkey)

More than half (31) of the 54 specimens identified as turkeys are from Other Pit 1 of the Plaza. Here, most of three small juvenile birds estimated to be about four to five weeks old were found in the lower part of this large, bell-shaped pit. Two of these are complete, while the third is missing a few parts. Also in the pit were an articulated right wing, a foot, and a tibiometatarsus of one or more adult birds. The tibiometatarsus is from a male, as indicated by the presence of a spur core.

Other articulated sections include a left wing of a very small individual (presumably female) and a small foot from the floor of Pithouse 3, several bones of a mature individual from the surface of Grid 10, another foot from Grid 1 of the Trash Midden and several bones of an about four-month-old juvenile from Trash Midden Grid 82. The two occurrences in Pithouse 3 appear to be directly associated with the floor and were labelled in the field as Floor Artifacts. Their function, if they had such, was unknown.

Other than these articulated parts and the Other Pit 1 specimens, only 17 turkey bones were found at the site. As shown in Table 7.4, these are for the most part scattered individually throughout the site. Eleven of these are from the Trash Midden, all from adults. The single specimen from the Kiva (Layer 11 fill) is the cut distal end of a tarsometatarsus which is probably the discarded by-product of bead manufacturing. Disarticulation of all adult birds may indicate use for food but charring and intentional fracturing were not noted. The presence of young juvenile birds of various ages and frequent occurrence of eggshells (small amounts notwithstanding) clearly suggest that birds were kept at the site.

Aquila chrysaetos (Golden Eagle)

Ten elements and probably another item listed by Emslie as "Eagle sp." are referable to golden eagle. On a strictly skeletal basis, these could be from a minimum of two individuals, but on provenience separation, a minimum of six is estimated. Skeletal representation and spatial distribution suggest a basically ceremonial use of the birds. Skeletally, all but two of the bones are from wings. Elements recovered include one coracoid, two ulnae, two carpometacarpi, one cuneiform, one pollux, one wing digit, two phalanges, and one femur fragment. Both of the non-wing bones are artifactual. The ungual phalanx (talon) was found on the floor of Pithouse 3, while the femur specimen, found in Pithouse 2, Layer 4, is a proximal head cut from the shaft, presumably in the course of tubular bead manufacture. Six of the ten elements (and four of the six estimated individuals are from the pitstructures or large, bell-shaped pits in the plaza (Other Pits 1 and 6). The other specimens are from Grids 70 and 76 of the Trash Midden. One of the elements in the trash, a wing digit from Trash Midden Grid 70, Layer 4, was charred.

Buteo jamaicensis (Red-tailed Hawk) and Buteo sp.

Fourteen elements and an estimated nine individuals were identified as the broad-tailed hawk genus Buteo, but only two of these could be identified to the species level. The two identified specimens are the articulated coracoid and scapula of a B. jamaicensis from Test Trench 99, Layer 1. Other specimens may be from jamaicensis, which is the most abundant Buteo from Chaco Canyon sites, but might also be B. lagopus (Rough-legged hawk), B. regalis (Ferruginous hawk), or B. swainsoni (Swainson's hawk), all of which have been found in Chaco Canyon sites.

The hawk remains differ from the eagle's in two respects: 1) relatively more are found in the Trash Midden, and 2) wing parts are less abundant. Eight of the 12 Buteo sp. specimens are from the Trash Midden and three of the other four are from the large plaza pits (Other Pits 6 and 14). Unlike the eagles, most of the hawk specimens are from the axial skeleton or the legs, with only a single scapula and the articulated scapula and coracoid of B. jamaicensis representing the front limbs. There are wing bones other than these pectoral elements.

Grus canadensis canadensis (Lesser Sandhill Crane)

A single bone of this large bird is a distal fragment of a right coracoid from the trash fill of Pithouse 3 (Layer 2). Although the sandhill crane is only an occasional migrant in northwestern New Mexico, several have been found in Chaco Canyon archeological sites.

cf. Corvus corax (cf. Common Raven)

This is a distal fragment of a right humerus from Trash Midden Grid 82, Layer 2, Level 1. Identification is tentative because of the young age of the specimen, estimated by Emslie to be about two months. Ravens are, of course, common in Chaco Canyon today.

Amphibians

Amphibian remains, examined by Dr. John Applegarth, include ten individual spadefoot toads, nine of which are partial or whole skeletons (Table 7.6). These are almost certainly postoccupational intrusives who either burrowed down into the deeper fill of the site and died in their burrows or were present at a small puddle that formed after abandonment of the structure. All nine of the skeletons are from the Kiva--Pithouse 2 structure and all are from at or near floor level. The only single element specimen is a parasphenoid from the Trash Midden (Grid 70, Level 4).

Two species of Spea, S. hammondi (Western spadefoot) and S. bombifrons (Plains spadefoot), were present at 29SJ 629--both are placed in the genus Scaphiopus by many authors. Each has one positive identification and there are four juveniles tentatively assigned to S. hammondi and one to S. bombifrons. Both species presently occur in Chaco Canyon with S. hammondi the more abundant.

Only one adult individual, about 6.5 cm in snout-vent length, is represented. This is the single element (Spea sp.) from the Trash Midden. Of the nine skeletons, two are subadults (the two positive species identifications) and the rest are juveniles from 2.5 to 4 cm snout-vent length. It is possible that the single Trash Midden element, given its singular occurrence, adult size, and trash context, could indicate cultural use.

Reptiles

No snake remains and only two lizard bones were found at 29SJ 629 (Table 7.6). The two identified specimens are the pelvis of a Sceleporus undulatus (Northern Plateau lizard) from the Kiva, lower fill, and a dentary of a S. graciosus (Sagebrush lizard) from Room 3, Other Pit 1. Both of these lizards are common in Chaco Canyon today, although they apparently have marked habitat separation (Jones 1970). Sceleporus undulatus is closely associated with vertical rock faces (cliffs, boulders, and ruin walls), while S. graciosus is found on soft sandy soils. Although these specimens could represent cultural remains, both are more likely postoccupational intrusions.

Intra-Site Variability

As with any other artifact class, faunal remains are not randomly distributed throughout the site. Variations in absolute and relative frequencies of different taxa occur through time and among different types of deposits and structures. These two basic dimensions of variability--spatial and temporal--are easy to conceptualize, but it is much more difficult to measure the variability in each, to determine what underlying causes may be in operation, or even to adequately separate the two.

Distinguishing spatial from temporal variability is difficult at 29SJ 629 because of the tendency for spatially discrete deposits to also be temporally different. For example, most of the Trash Midden was evidently deposited before most of the trash debris in the house area, such as the trash fill of Pithouse 3. Accordingly, if there are major differences in the composition of the samples from the Trash Midden and the Pithouse 3 trash, it cannot readily be known whether such differences are a function of one being a pit and the other an open dump, or of some environmental, ecological, or cultural change which occurred during the length of time separating the two. Obviously, making justifiable determinations of causes of intra-site variability is difficult and is likely to be tenuous. The objective here is to call attention to some of the more obvious patterns of spatial and temporal variability and to suggest some possible reasons for the variability.

After presenting taxonomic frequency data in a temporal framework (spatial data are given in Table 7.3), discussion is directed to the distributional patterns of larger taxonomic groups. This is in part a summary and synthesis of comments made for individual taxa in the preceding species accounts.

With regard to simple abundance of remains, the 29SJ 629 faunal assemblage is nearly evenly divided between the Trash Midden (52 percent) and all of the house area (Table 7.8). In the Trash Midden, remains are particularly concentrated in the central portion where over half of the specimens are from Grids 70 and 76 alone. Amounts and densities drop off toward both ends of the midden deposit. In the house area, bones are sparse in the rooms themselves (16 specimens per room), but are more abundant in the pitstructure fills. Remains are most plentiful and dense in the fill of Pithouse 3, the largest trash deposit in the house area. Faunal remains are also apparently dense in Pithouse 2, where there was little remaining fill because of the superposition of the Kiva. Except for abundant intrusive rodents, bone remains in the Kiva are sparse, presumbably reflecting the natural, postoccupational infilling of the structure. Other material from the house area is concentrated in the few large bell-shaped pits in the plaza, particularly the trash-filled Other Pit 14, which probably contains the densest concentration of cultural bone remains in the site (157 specimens).

As can be seen from Tables 7.5, 7.8, and 7.9, the distribution of large game animals (artiodactyls) is not random at the site. Spatially, there are disproportionately few in the Trash Midden and temporally, artiodactyls increase in relative abundance in the later part of the occupation. In terms of the five temporal categories, identified artiodactyl taxa are absent from Phase I, and sparse in Phase II and are above their mean frequency in Phases III, IV, and V. This pattern pertains for each of the common taxa (deer, mountain sheep, and pronghorn) and for the number of unidentified artiodactyl specimens as well. Accordingly, there is no strong evidence for any significant change in the abundance of these different species, relative to each other through time. Instead, the basic change appears to be an increase in all big game taxa, relative to smaller game.

Table 7.8. Frequencies of mammalian taxa in the house area and Trash Midden at 29SJ 629.

	House Area				Trash Midden			
Specimen	Element	Percent	MNI	Percent	Element	Percent	MNI	Percent
Lagomorphs								
Sylvilagus cf. audubonii	107	17.1	29	15.5	274	35.5	19	16.7
Lepus californicus	186	29.8	32	17.1	209	27.1	14	12.3
Rodents								
Ammospermophilus leucurus	1	0.2	1	0.5	14	1.8	3	2.6
Spermophilus variegatus	-	-	-	-	1	0.1	1	0.2
Cynomys gunnisoni	147	23.6	33	17.6	78	10.1	13	11.4
Thomomys bottae	16	2.6	8	4.3	39	5.1	9	7.9
Perognathus sp.	45	7.2	20	10.7	9	1.2	3	2.6
Dipodomys ordii	28	4.5	15	8.0	9	1.2	4	3.5
D. spectabilis	-	-	-	-	3	0.4	3	2.6
Peromyscus sp.	22	3.5	10	5.3	8	1.0	3	2.6
Onychomys leucogaster	9	1.4	1	0.5	1	0.1	1	0.9
Neotoma sp.	4	0.6	4	2.1	12	1.6	4	3.5
Erethizon dorsatum	3	0.5	2	1.2	1	0.1	1	0.9
Carnivores								
Canis sp.	8	1.3	5	2.7	24	3.1	1	0.9
C. cf. latrans	4	0.6	2	1.1	24	3.1	7	6.1
C. lupus	-	-	-	-	2	0.3	2	1.8
C. familiaris	11	1.8	6	3.2	56	7.3	18	15.8
Taxidea taxus	-	-	-	-	1	0.1	1	0.9
Felis concolor	1	0.2	1	0.5	-	-	-	-
F. (Lynx) rufus	1	0.2	1	0.5	-	-	-	-
Artiodactyls								
Cervus canadensis	1	0.2	1	0.5	-	-	-	-
Odocoileus hemionus	19	3.0	9	4.8	3	0.4	3	2.6
Antilocapra americana	5	0.8	2	1.1	3	0.4	3	2.6
Ovis canadensis	6	1.0	5	2.7	1	0.1	1	0.9
Total identifiable mammals	624	100.1	187	99.8	772	100.1	114	100.0

Table 7.9. Percentages of each taxa by temporal divisions at 29SJ 629.[a]

Specimens	Temporal Period (Phase) I A.D. 875-925	II A.D. 925-1025	III A.D. 975-1025	IV A.D. 1025-1050	V A.D. 1100-1150
Lagomorphs	14.6/21.2	68.1/39.4	4.9/3.0	7.0/21.2	5.5/15.2
Sylvilagus cf. audubonii	17.5/25.6	40.6/23.1	18.4/10.3	15.8/28.2	7.6/12.8
Lepus californicus					
Rodents					
Ammospermophilus leucurus	-	100.0/100.0	-	-	-
Spermophilus variegatus	-	100.0/100.0	-	-	-
Cynomys gunnisoni	10.6/21.6	34.2/21.6	21.7/13.5	15.5/32.4	18.0/10.8
Thomomys bottae	4.1/7.7	73.5/53.8	2.0/7.7	20.4/30.8	-
Perognathus sp.	-	16.7/13.0	-	25.9/47.8	57.4/39.1
Dipodomys ordii	-	25.0/20.0	-	15.6/20.0	59.4/60.0
D. spectabilis	33.3/33.3	66.6/66.6	-	-	-
Peromyscus sp.	-	61.5/42.9	-	23.1/42.9	15.4/7.7
Onychomys leucogaster	10.0/50.0	-	-	90.0/50.0	-
Neotoma sp.	15.4/33.3	76.9/50.0	-	7.7/16.7	-
Erethizon dorsatum	-	33.3/33.3	33.3/33.3	33.3/33.3	-
Carnivores					
Canis sp.	36.7/16.7	36.7/ -	10.0/16.7	13.3/50.0	3.3/16.7
C. cf. latrans	4.2/11.1	91.7/77.8	-	4.2/11.1	-
C. lupus	-	100.0/100.0	-	-	-
C. familiaris	41.0/47.8	47.5/26.1	1.6/4.3	8.2/17.4	1.6/4.3
Taxidea taxus	-	100.0/100.0	-	-	-
Felis concolor	-	-	-	-	100.0/100.0
F. (Lynx) rufus	-	-	-	-	-
Artiodactyls					
Cervus elaphus	-	-	100.0/100.0	-	-
Odocoileus hemionus	-	17.6/30.0	35.3/20.0	23.5/30.0	23.5/20.0
Antilocapra americana	-	12.5/20.0	50.0/20.0	25.0/40.0	12.5/20.0
Ovis canadensis	-	20.0/25.0	40.0/25.0	20.0/25.0	20.0/25.0
Total identifiable mammals	14.4/17.8	49.1/30.8	11.3/7.2	13.8/27.5	11.4/16.2

Table 7.9. (continued)

	Temporal Period (Phase)				
	I	II	III	IV	V
Specimens	A.D. 875-925	A.D. 925-1025	A.D. 975-1025	A.D. 1025-1050	A.D. 1100-1150
Meleagris gallopavo (Turkeys)	22.7/25.0	36.4/25.0	22.7/16.7	9.1/16.7	9.1/16.7
Unidentified Remains					
Small rodent	1.1	92.3	-	6.3	-
Small mammal	13.9	52.9	7.9	7.1	18.3
Medium mammal	6.0	70.0	14.0	10.0	-
Medium-to-large mammal	9.1	52.3	8.5	21.6	8.5
Artiodactyl	3.8	26.2	33.8	21.2	15.0
Bird-mammal	14.3	50.6	21.1	3.8	10.1
Totals	11.1	54.6	12.2	9.7	12.4

[a] Row totals = element percentage/MNI percentage.

Artiodactyls are most abundant in Pithouse 3 (Phase III), where there are more identified and unidentified artiodactyl remains than in the entire Trash Midden. It is possible that the relative frequency of artiodactyls is slightly inflated in Pithouse 3 because of the collection of some specimens from backhoe trenching backdirt; however, only a few specimens were collected from the backhoe excavation; even with these excluded, the absolute and relative abundance of artiodactyls from this structure are still high.

When smaller rodents are excluded, the abundance of artiodactyls in the Kiva relative to the main small game taxa (Sylvilagus, Lepus, Cynomys) is nearly equal to that of Pithouse 3, even though absolute amounts are lower. This high frequency is not duplicated in the small amount of fill in Pithouse 2. It is interesting to note that Kluckhohn (1939:147) noted a similar high frequency of artiodactyls in pitstructure fills at Bc 51.

Within the Trash Midden, large game animals are somewhat more common at the later or eastern end of the deposit, particularly in the sparse trash in Grid 88. Pronghorn is relatively more abundant in the Trash Midden, but as shown in Tables 7.5 and 7.9 this attribute does not show up in any conspicuous temporal difference, vis-a-vis the other artiodactyls.

Our understanding of the abundance of artiodactyls in different proveniences and temporal periods is of course relative to the abundance of other taxa.

In addition to comparing a group such as the artiodactyls to all other taxa, it is also useful to compare them to a smaller group, such as the major small game taxa. Table 7.10 and Figure 7.1 give relative frequencies of only the artiodactyls and the major small game animals. For this purpose, only Sylvilagus (cottontail), Lepus (jack rabbit), and Cynomys (prairie dog) are considered among smaller animals. This is not to deny that other small taxa were not used for food, but for examining differences in "big game" versus "small game," considering only these major species is satisfactory. These results show more clearly the greater relative abundance of artiodactyls in later times.

In part because of their higher frequencies, these three small game taxa show more even distributions through time. Still, there is substantial variation among them. Sylvilagus is quite abundant in the "mid-Trash Midden" but is far more sparse than Lepus or Cynomys in Pithouse 3. In terms of both number of specimens and MNI, the latter two taxa are apparently less variable in their occurrences in different time periods. This pattern contrasts with that at nearby 29SJ 633, where Sylvilagus and Lepus tended to covary closely and Cynomys was the most variable of the three.

Note that the peak in abundance of artiodactyls corresponds to the lowest frequency of Sylvilagus (Pithouse 3, Phase III) and, in general, Sylvilagus shows the lowest correlation with the big game animals. Calculating pair-wise Chi-square values for the MNIs of these four taxa (Sylvilagus, Lepus, Cynomys, and artiodactyls), four of the five temporal categories show that the only significant difference at the .05 level among them is between Sylvilagus and the artiodactyls ($\chi^2=10.77$, df=4).

These associations may tell us something about basic strategies of animal food procurement. For instance, if relative abundance of large game is accepted as an indication of relatively high availability of faunal resources (and subsequent greater procurement of preferred large mass animals), then cottontails would appear to have been used most heavily in times of relative stress. This possibility would fit well with data from 29SJ 633, where a much higher proportion of Sylvilagus and a much lower proportion of artiodactyls are thought to be indications of a stressful situation (Gillespie 1991).

There are, of course, other possible causes which should be considered. For example, procurement of different taxa has some basis in seasonality and what other activities are going on. Among modern groups, large game are most often hunted in the fall or winter when they are fattest and the demands of agriculture and wild plant food procurement are least. On the other hand, although available year round, rabbits are more frequently procured in summer, partly in protecting the agricultural fields. Thus, the negative association between artiodactyls and cottontails could be a result of seasonal accumulation. The closer association of prairie dogs with big game, however,

Table 7.10 Relative frequencies of big and small game for five temporal divisions of deposits at 29SJ 629.

Specimen	Temporal Period (Phase) I A.D. 875-925	II A.D. 925-1025	III A.D. 975-1025	IV A.D. 1025-1050	V A.D. 1100-1150	Site Totals
Identified MNI[a]						
Small game	25	30	10	30	14	140
%	100	85.7	66.7	83.3	77.8	85.4
Big game	-	5	5	6	4	24
%	-	14.3	33.3	16.7	22.2	14.6
Number of Specimens[b]						
Small game	192	673	152	136	161	1,543
%	98.5	96.3	79.2	85.5	89.9	92.1
Big game	3	26	40	24	18	132
%	1.5	3.7	20.8	15.0	10.1	7.9

[a] Comparison of identified MNI's.

[b] Comparison of number of identified and unidentified specimens. Small game are given as Sylvilagus, Lepus and Cynomys, while big game are Odocoileus, Antilocapra, Ovis and Cervus. Number of specimens are these taxa plus unidentified small mammals for small game and unidentified artiodactyls for big game.

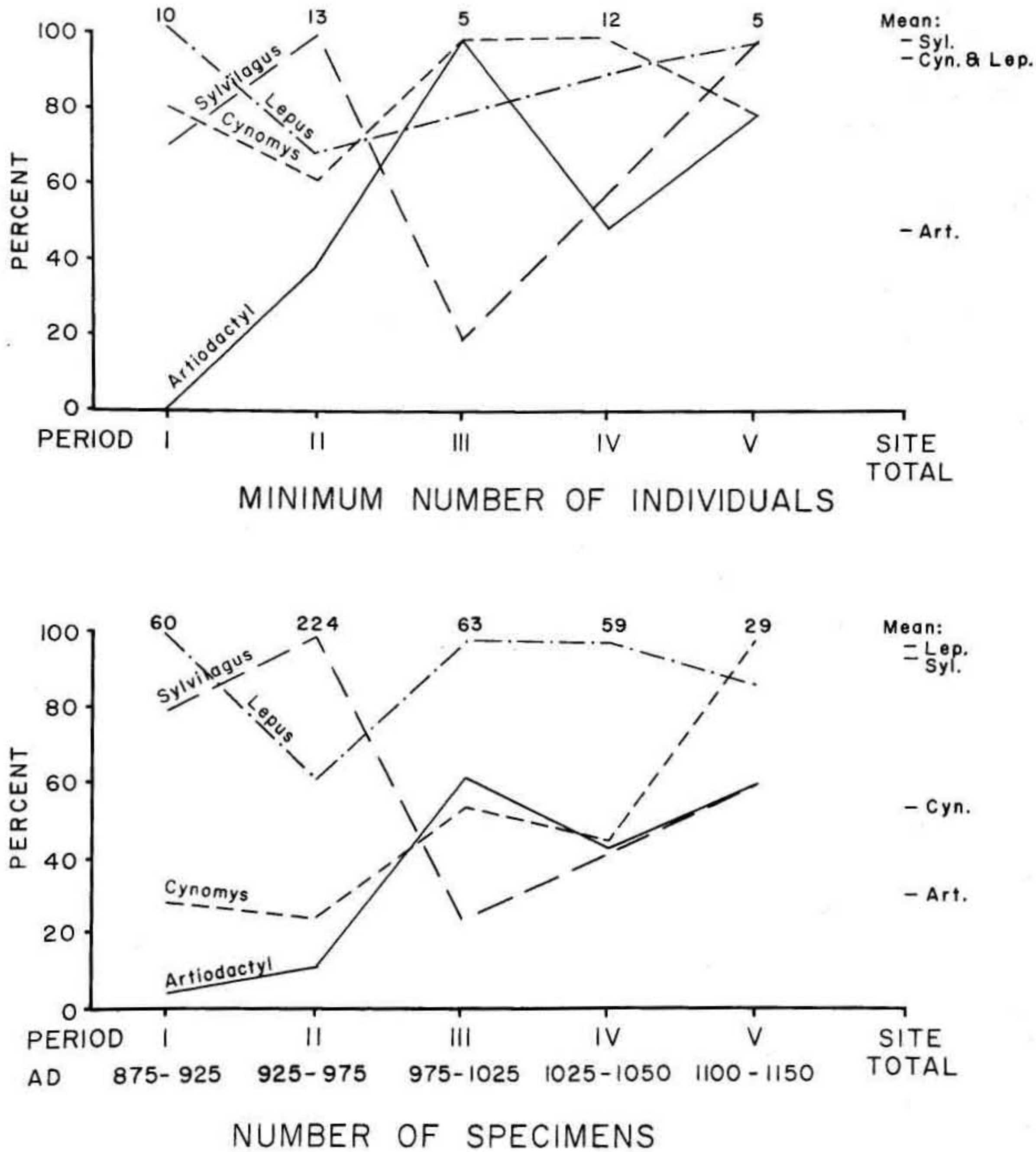

Figure 7.1. *Relative frequencies of four major taxa for five temporal categories at 29SJ 629. Values are standardized with most abundant taxa in each (NPS 310/82829 A).*

militates against this suggestion, in that prairie dogs, as hibernators are available only in the warmer months (unless they are dug from burrows). Another possible factor influencing the abundance of artiodactyl bones may be the presence of dogs at the site. Tables 7.5 and 7.9 above show that canids have a definite negative correlation with artiodactyls. The evidence shows that dogs were abundant while the Trash Midden was accumulating but are relatively sparse later, when artiodactyls are most common. Binford and Bertram (1977) have recently shown the profound effect that dogs can have on the preservation of artiodactyl bone, and accordingly, it is feasible that the paucity of artiodactyl in the midden is, in part, a product of carnivore destruction. Several artiodactyl bones that were recovered from the Trash Midden do show signs of carnivore gnawing. On the other hand, the evidence that these canids may have been eaten (disarticulated dogs and charred coyote remains) and their co-occurrence with abundant rabbits and sparse big game may be taken as support of the initial suggestion above, i.e., that the early Trash Midden deposits represent a time of relative stress.

Diversity

The overall composition of each assemblage in each time period, in terms of variety and equitability, can be approached by calculating diversity and evenness indices. Table 7.11 shows the number of species, "H" (diversity index), and "J" (evenness index) for each temporal category. Small rodents (the genera Dipodomys, Perognathus, and Peromyscus) have been excluded so that only taxa whose presence is probably from cultural deposition are included (though undoubtedly a few animals are excluded which are indeed cultural and vice versa).

Diversity indices calculated on the basis of estimated minimum numbers of individuals show that diversity is lowest in time Phase I where the three main small game taxa are dominant and identified artiodactyls are absent. Part of the reason that the diversity index is low is the fact that there are relatively few species (seven) and elements. The evenness, however, is also the lowest for all time periods (although note that evenness indices are all fairly similar). Diversity is nearly as low in Phase V, again where number of species is low (only the three main small game and three large game animals). Here, however, evenness is slightly higher than elsewhere.

Diversity is highest in Phase II, but this appears to be largely a result of the greater number of taxa which in turn is undoubtedly partly a result of this being the largest collection. Evenness is only average for this assemblage.

Diversity for the site as a whole is relatively high, but of course, the number of species is at a maximum compared to any of the temporal subsets. Evenness is slightly lower than in any of the temporal divisions. It is interesting to compare these figures with those of 29SJ 633 (Gillespie 1991). Both diversity and evenness are substantially lower at 29SJ 633, where a single taxa (Sylvilagus) is far more dominant than here.

Miscellaneous Distributional Data

Tables 7.12 and 7.13 present some specific compilations of the occurrence of faunal remains in small provenience units, which have been lumped in site-wide Table 7.3 above. Included here are tabulations for individual 3-by-3-m grids in the plaza fronting the roomblock (Table 7.12); tabulation for specimens in miscellaneous grids and test pits in the house area (Table 7.13); a tally of all specimens recovered from all features throughout the site; and a discussion of all faunal specimens found in floor contact which are thought to be in situ artifacts.

Bone Found in Floor Contact

In all three of the pitstructures there were items of animal bone on the floor that appear to have been associated with the structure, rather than unrelated postoccupational debris. These include:

Kiva: FS 2037: The large claw of a Felis concolor (mountain lion) found on the floor and drilled, presumably to make an ornament such as a pendant or necklace piece.

Also on or immediately above the floor were numerous postoccupational intrusives including seven Dipodomys ordii (kangaroo rat) and four Perognathus sp. (pocket mice).

Table 7.11. Measures of diversity and evenness of mammalian taxa for five temporal categories at 29SJ 629 and 29SJ 633.[a]

Measures	Temporal Categories (Phase) I A.D. 875-925	II A.D. 925-1025	III A.D. 975-1025	IV A.D. 1025-1050	V A.D. 1100-1150	29SJ 629 Site Totals	29SJ 633 Site Totals[b]
Number of elements	297.00	1,196.00	275.00	273.00	273.00	2,316.00	3,912.00
MNI	46.00	79.00	21.00	70.00	42.00	345.00	111 or 209.00
Number of Species	7.00	13.00	9.00	10.00	6.00	14.00	28.00
Diversity (H)	1.58	2.24	1.95	1.90	1.61	2.06	1.52
Evenness (J)	.81	.87	.89	.82	.90	.78	.66

[a] Calculations based on estimated minimum numbers of individuals.
[b] MNI from 29SJ 633 are primarily from two excavated rooms.

Table 7.12. Distribution of faunal remains in Plaza Grids at 29SJ 629.[a]

Specimen	Plaza Grids 8	9	14	22	35	Ramada 1 Grids
Mammals						
Sylvilagus	-	1	1	-	-	-
Lepus	-	-	1	1	-	-
Cynomys	1	-	-	-	-	-
Neotoma	-	-	-	-	-	-
Canis sp.	-	-	-	-	-	1
C. latrans	-	-	-	-	1	-
Odocoileus	-	-	1	-	-	-
Ovis canadensis	-	-	-	-	-	-
Identified total	1	1	3	1	1	1
Unidentified						
Small mammal	-	-	3	-	2	1
Medium mammal	-	-	-	-	-	-
Medium-to-large mammal	2	-	-	-	2	1
Artiodactyl						
Vertebrate	1	-	-	-	1	-
	-	-	-	-	1	-
Birds						
Meleagris	-	-	-	-	-	-
Buteo sp.	-	-	1	-	-	-

[a] Element frequency.

Table 7.13. Distribution of faunal remains from miscellaneous grids at 29SJ 629.[a]

Specimen	Grid 3	4	10	11	12	18	24	31	36	41	46	103	104	Test Trench 99
Mammals														
Sylvilagus	-	-	-	-	-	-	1	1	-	-	-	-	4/2	-
Lepus	-	-	-	1	-	2/1	-	-	1	-	1	-	-	1
Cynomys	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Neotoma	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Canis familiaris	-	-	-	-	-	-	-	-	-	-	-	-	-	3/1
Ovis canadensis	1	-	-	-	-	-	-	-	-	-	1	-	-	-
Total identified	1	-	-	1	-	2/1	1	1	1	-	2	-	4/2	6/4
Unidentified mammal														3
Small	-	-	-	-	-	3	1	-	2	1	-	-	-	2
Medium	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Medium-to-large	1	1	-	1	1	2	-	-	-	-	1	-	-	1
Artiodactyl	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Vertebrate	1	-	-	1	-	4	-	-	-	-	-	-	-	
Birds														-
Meleagris gallopavo	-	-	1	-	-	-	-	-	-	-	-	-	-	2/1
Buteo jamaicensis	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Unidentified bird	-	-	1	-	-	-	-	-	-	-	-	-	-	

[a] Some totals = element frequency/MNI. Majority are element frequencies only.

Table 7.13. (continued)

Specimen	Test Trench 1	Trash Midden Grids 53	65	70	71	76	82	88	94	Trash Total	Site Total	Percent
Sylvilagus	1	-	2	2	-	6	1	-	-	12	13	3.4
Lepus	1	1	1	2	-	2	1	-	-	8	16	4.1
Cynomys	-	-	1	-	-	-	-	-	-	1	18	8.0
Perognathus sp.	-	-	-	-	-	-	-	-	-	-	1	1.9
Dipodomys ordii	-	-	-	-	-	-	-	-	-	-	1	2.7
Canis sp.	-	-	-	-	-	-	-	1	-	1	1	3.1
C. cf. latrans	-	-	-	2	-	4	3	2	-	11	11	39.3
C. lupus	-	-	-	-	-	1	-	-	-	1	1	50.0
Odocoileus	-	-	-	-	-	-	-	-	-	-	1	4.5
Ovis	-	-	-	-	-	-	-	-	-	-	1	14.3
Buteo sp.	-	-	-	1	-	-	-	-	-	1	1	7.1
Unidentified mammal												
Small	3	1	-	4	1	6	5	1	-	21	98	18.1
Medium	-	-	-	-	-	1	-	3	-	4	9	16.4
Artiodactyl	-	-	-	1	-	1	5	-	1	8	13	13.8
Medium-to-large	-	-	-	3	-	4	1	1	-	9	17	7.6
Vertebrate	-	-	1	-	-	1	-	-	-	2	4	1.4
Unidentified bird	-	-	-	1	-	-	-	-	-	1	1	2.6
Total	5	2	5	16	1	26	16	8	1	80	207	7.7

Pithouse 2: FS 3031: Approximately one-half of a young puppy (C. familiaris) was found on the floor. The front quarters and about one-half of the torso were present; the skull and back-half were missing.

Pithouse 3: Floor Artifact (FA) #1. This is a small articulated left wing of a turkey (M. gallopavo).

FA #2. This was a large mammal bone, probably a section of a rib of either a wapiti or large deer. Slight polish suggests possible use as a tool.

FA #3. On the floor was a left dentary of a mature domestic dog. Teeth are highly worn and suggest old age. The canine is blunted and the first premolar is only a nubbin. The second premolar was lost antemortem.

FA #4. This was an ungual phalanx (talon) of a golden eagle (A. chrysaetos). This is probably an artifact, but destruction of the proximal end precludes determination of any modification.

FA #5. This was the partial skeleton of a Peromyscus cf. maniculatus (deer mouse) and is undoubtedly an early postoccupational intrusive.

FA #6. An articulated foot of a turkey (seven phalanges) was also found on the floor.

FA #7. These are two articulated vertebrae of a domestic dog (the last thoracic and first lumbar). Both have pathological disturbances: dorsal processes are bent to one side, tranverse processes have been broken and healed, and the ventral sides of the centra show pronounced lipping. These two articulated with a second lumbar found in the southwestern quarter of Layer 3 (FS 2609).

Charring

A total of 207 or 7.7 percent of the faunal specimens recovered from 29SJ 629 are charred by fire. Table 7.7 lists the occurrence of these specimens by provenience unit. This shows that most of the specimens are scattered throughout the house area and Trash Midden, except for a conspicuous concentration of charred bones in the firepit of the Kiva. Here, many small mammal bones have fragmented into tiny pieces, most of which are unidentifiable. Those that can be identified are predominantly prairie dog, although this is the only place where two taxa usually considered intrusive (Perognathus and Depodomys) were charred. Both, however, are common on the floor of the Kiva and in the upper part of the firepit fill.

All three of the major small game taxa have comparable and rather low percentages of charring. Cynomys is highest, but this is clearly biased by the remains in the Kiva firepit (16 of 18 for the site). Not considering these firepit specimens, Cynomys shows less charring than the two rabbit species. Unidentified small mammals show a much higher charring frequency (18.1 percent) than these taxa, partly from the greater fragmentation (and hence lower probability of identification) but again, biased by the Kiva firepit.

Larger mammals show more charring. Coyotes have the highest frequency (39 percent) of any taxon, other than the one of two for wolves. Ovis canadensis (small sample), unidentified carnivore-size mammals, and unidentified artiodactyls also all exceed 10 percent charring.

Meat Weight

Table 7.14 shows calculations of available and consumed meat weight amounts for taxa at 29SJ 629. Available meat weight is calculated simply by multiplying the estimated or minimum MNI of each taxon by an estimate of the amount of meat weight available on an average individual of that taxon. Table 7.15 shows the body weights and percentages of usable meat used for these calculations. Small rodents and all carnivores, except coyotes, have been excluded and among the birds, only turkeys have been included. Most carnivores are excluded because they are thought to have usually been procured or kept (in the case of dogs) for purposes unrelated to food. This may be a mistake, especially with dogs, for which there is some evidence that they may have been eaten, but it seems a reasonable assumption in most cases.

The available meat weight calculations show the clear dominance of artiodactyls. Despite their numbers, big game accounts for over 80 percent of the available meat. Of this total, nearly half is from

Table 7.14. Available and consumed meat weight (MTWT) estimates for faunal remains at 29SJ 629.[a]

Taxon	Available MTWT Per Indivudal	Site-Wide MNI			Estimated MNI			Consumed MTWT	Percent
		Number	Available MTWT	Percent	Number	Available MTWT	Percent		
Sylvilagus	0.382	15	5.73	1.6	48	18.34	1.8	18.34	6.3
Lepus	1.100	13	14.30	4.0	46	50.60	5.1	50.60	17.4
Ammospermophilus	0.040	2	0.08	trace	4	00.16	trace	00.16	0.1
Spermophilus variegatus	0.320	1	0.32	0.1	1	00.32	trace	00.32	0.1
Cynomys	0.370	13	4.81	1.3	46	17.02	1.7	17.02	5.8
Thomomys	0.068	7	0.48	0.1	17	1.56	0.2	1.56	0.5
Neotoma	0.090	4	0.36	0.1	8	0.72	0.1	0.72	0.2
Erethizon	2.400	2	4.80	1.3	3	7.20	0.7	7.20	2.5
Canis cf. latrans	5.500	3	16.50	4.6	9	49.50	5.0	18.64	6.4
Cervus	120.000	1	120.00	33.3	1	120.00	12.1	1.27	0.4
Odocoileus	33.240	3	99.72	27.7	12	398.88	40.2	37.97	13.0
Antilocapra	19.930	1	19.93	5.5	5	99.65	10.0	8.64	3.0
Ovis canadensis	33.240	2	66.48	18.4	6	199.44	20.1	16.96	5.8
Unidentified Artiodactyl	(33.24)	-	-	-	-	-	-	83.91	28.8
Meleagris	2.350	3[b]	7.05	2.0	12[b]	28.20	2.8	28.20	9.7
Totals	-	70	360.56	100.0	218	991.59	99.8	291.51	100.0

[a] Consumed meat weight values are adjusted for skeletal portion representative in artiodactyls and coyotes. Small rodents and carnivores other than coyotes are excluded. All weights are in kg.

[b] Juvenile turkeys excluded.

Table 7.15. Estimated average live weights of Chaco area mammals and estimated available meat weights. Taxa arranged by increasing size.[a]

Taxon	Estimated Live Weight (g)	Pounds	Log Grams	Estimated % Usable Meat	Estimated Meat Weight (g)
Perognathus flavus	8	0.02	0.9	-	-
P. flavescens	10	0.02	1.0	-	-
Reithrodontomys megalotis	10	0.02	1.0	-	-
Peromyscus crinitus	17	0.04	1.2	-	-
P. maniculatus, boylii, treui	25	0.06	1.4	-	-
Microtus mexicanus	30	0.07	1.5	-	-
Onychomys leucogaster	32	0.07	1.5	-	-
Microtus longicaudus	50	0.11	1.7	-	-
M. pennsylvanicus	60	0.13	1.8	-	-
Dipodomys ordii	70	0.15	1.8	0.4	28
Ammospermophilus leucurus	100	0.22	2.0	0.4	40
Spermophilus spilosoma	110	0.24	2.0	0.4	44
Thomomys bottae	170	0.40	2.2	0.4	69
Depodomys spectabilis	175	0.40	2.2	0.4	70
Small Neotoma (N. stephensi, albigula, mexicana)	175	0.40	2.2	0.4	70
Unidentified Neotoma	225	0.50	2.4	0.4	90
Large Neotoma (N. cinerea)	275	0.60	2.4	0.4	110
Spermophilus variegatus	800	1.80	2.9	0.4	320
Cynomys gunnisoni	925	2.00	3.0	0.4	370
Sylvilagus audubonii	995	2.10	3.0	0.4	382
Lepus californicus	2,750	6.00	3.4	0.4	(1,100)
Erethizon dorsatum	6,000	13.00	3.8	0.4	(2,400)
Taxidea taxus	10,000	22.00	4.0	(0.5)	(5,000)
Lynx rufus	10,000	22.00	4.0	(0.5)	(5,000)
Canis familiarus	7,000	15.50	3.8	(0.5)	(3,500)
Canis latrans	11,000	24.00	4.0	(0.5)	(5,500)
Canis lupus	27,000	60.00	4.4	(0.5)	(13,500)
Urocyon cineroargenteus	4,500	10.00	3.7	(0.5)	(22,500)
Ursus americanus	90,000	200.00	5.0	(0.5)	(45,000)
Antilocapra americana	45,000	100.00	4.7	(0.4)	(19,930)
Odocoileus hemionus	75,000	165.00	4.9	(0.4)	(33,240)
Ovis canadensis	75,000	165.00	4.9	(0.4)	(33,240)
Cervus canadensis	300,000	660.00	5.5	(0.4)	(120,000)

[a]Live weight values from Armstrong (1972), Lechleitner (1969), Bailey (1931) and White (1953). For those larger species in parentheses, calculation of consumed meat weight on the basis of anatomical portions is favored, though figures for calculation of available biomass are given here. Using anatomical portions, Ovis, Odocoileus, and Antilocapra, available meat weight is estimated to be 44 percent of live weight.

deer. Coyotes and jackrabbits are the only other taxa with more than 5 percent of the total weight.

Estimates of consumed meat weight are made largely in response to an opinion that the above method may greatly overestimate the abundance of the few large game taxa. Unlike small game, where nearly all individuals presumably represent whole carcasses brought to the site, with large game, carcasses may be divided and portions consumed elsewhere (Binford 1978). The basic procedure with consumed meat weight estimates is to consider only the skeletal portions that are represented by the elements, and not assume that the entire potential meat volume was brought to the site and consumed there. For example, a single phalanx of an elk was found at 29SJ 629. The available meat weight method (which is after White 1953) assumes that a 300 kg animal was consumed at the site with an amount of meat equivalent to 300 cottontails. The consumed meat weight approach does not make this assumption and instead registers the estimated meat weight of the lower leg of an elk.

Table 7.16 shows meat weight estimates used for the different body parts of the three common artiodactyls, and Table 7.17 lists the calculations made for these taxa at 29SJ 629. Note that with this approach, unidentified artiodactyl remains are included because many of these are ribs and vertebrae which were not identified as to genus. Omitting these would mistakenly exclude large amounts of meat which are represented in the assemblage. A slightly modified approach was used with the coyote remains. Here, because of the lack of comparative data, the body was divided into three basic portions (axial skeleton, front limbs and hind limbs), rather than the nine finer divisions given in Table 7.16. Both of these methods of dividing the body for consumed meat weight calculations are outlined by Lyman (1979).

Using this approach, artiodactyls still account for 50 percent of the meat weight estimate, but their proportions relative to each other and other taxa are thought to be more realistic. Lepus has the highest meat weight estimate of the identified taxa, although the amount for unidentified artiodactyls clearly indicates that Odocoileus and the other artiodactyls probably yielded more. These consumed meat weight figures suggest a greater diversity of important game animals than might be interpreted from available meat weight estimates. A total of seven species contribute more than 5 percent to the estimated consumed meat weight total. In comparison, the consumed meat weight values at 29SJ 633 were dominated by only two taxa, Sylvilagus and Meleagris (Gillespie 1991).

Another technique for presenting this information is to calculate the number of calories represented by the meat weight estimates. Assuming a value of 125 cal/100 grams of meat, the conversions of the different site assemblage estimates given in Table 7.14 would be 450.7 kcal. for available meat weight from minimum MNIs; 1,239.5 kcal. for available meat weight from provenience based MNIs; and 364.4 kcal. for consumed meat weight estimates. Further assuming human daily needs at 2 kcal/day and that meat made up about 10 percent of the diet (simply a convenient figure), then the minimum available meat weight estimate would provide sustenance for about 6,200 man/days. This unrealistically low figure only serves to substantiate what we already suspect; i.e., that the amount of bone recovered from a site is only a fraction of what once was deposited. For example, if an average occupation of 10 people for 200 years is assumed, then the recovered meat weight would account for less than 1 percent of the estimated needs. Even assuming less intensive occupation (e.g., seasonal or periodical), the estimated amount of meat is insufficient.

Age Distribution and Seasonality

Examination of the age composition of the taxa present at the site can give some indication of exploitation patterns and of season of occupation. Larger taxa, such as the artiodactyls, typically have restricted periods at birth and can often be aged relatively accurately by the eruption and wear of dentition. Unfortunately, no dental series were recovered from the site. Age can also be approximated by examination of epiphyseal closure of long bones. Not a single case of unfused epiphyses was found among the identified artiodactyls, suggesting that only adult (or nearly adult) individuals were selected. All isolated teeth are also well worn. One suggestion of procurement of a subadult is from one of the antlers found in Pithouse 3. This is quite small (about 2 cm in diameter) and about the size of

Table 7.16. Another estimate for artiodactyl meat weight equating Binford's (1978) "gross weight" with the butchered "dressed weight" used by wildlife biologists.

Specimen	Percent of Total Meat Weight	Meat Weight as Percent of Gross Weight	Ovis canadensis and Odocoileus hemionus (kg)	Antilocapra americana (kg)
Estimated average live weight	-	-	75.00	45.00
Estimated dressed weight (53% of live weight)	-	-	39.75	23.85
Head	9.9	8.3	3.30	1.98
Cervical Vertebrae	7.4	6.3	2.50	1.50
Thoracic vertebrae	8.7	7.3	2.90	1.74
Lumbars vertebrae and pelvis	11.6	9.7	3.86	2.32
Sternum (ventral ribs)	10.7	9.0	3.57	2.14
Ribs (dorsal parts)	9.7	8.1	3.21	1.93
Front leg (each)	8.7	7.3	2.90	1.74
Rear leg (each)	10.3	8.6	3.43	2.06
Feet (each)	0.9	0.8	0.31	0.18
Totals	(99.6)	83.7	33.24 (44.3% of live weight)	19.93 (44.3% of live weight)

a yearling. Other antler fragments are considerably larger in diameter.

Since most small mammals breed in the spring or summer months and develop quickly, young, immature specimens usually represent summer or autumn death. With hunted small game, this of course is indicative of occupation at that time; with non-cultural intrusives, it means very little in terms of human occupation. Several young specimens and subadults of Perognathus, Dipodomys, Thomomys were recovered, but since these are likely postoccupational intrusives they do not indicate summer occupation.

The frequencies of juvenile (less than about two months) and subadult specimens of the three main small game animals (Sylvilagus, Lepus, and Cynomys) are generally low, although examples are present in each case. At least two young Sylvilagus are represented in the collection, including a partial skeleton. The skeleton was found in the ventilator tunnel of the Kiva, a situation which suggests that it was a non-cultural victim that fell into the structure after its abandonment. Based on the length of the tibiae, both specimens are estimated to have been about two weeks old.

Subadult Sylvilagus (as seen in nearly full size and incomplete epiphysis fusion) are uncommon. For example, fusion of the distal tibia epiphysis was complete in all cases (n=7). This contrasts significantly with the 29SJ 633 collection, where 10 of 18 specimens were unfused ($\chi^2=4.4$, significant at

Table 7.17. Consumed meat weight estimates for artiodactyl remains at 29SJ 629. Weights are in kilograms.

	Cervus canadensis		Odocoileus hemionus		Antilocapra americana		Ovis canadensis		Unidentified Artiodactyl	
Skeletal Portion	No.	MTWT	No.	MTWT	No.	MTWT	No.	MTWT	No.	MTWT
Head	-	-	6	19.80	1	1.98	-	-	-	-
Cervical region	-	-	-	-	-	-	1	2.50	3	7.50
Thoracic region	-	-	1	2.90	-	-	-	-	-	-
Lumbar-pelvic region	-	-	-	-	1	2.32	1	3.86	4	15.44
Rib side	-	-	-	-	-	-	-	-	7	11.24
Front leg	-	-	-	-	1	1.74	-	-	5	14.50
Rear leg	-	-	4	13.72	1	2.06	3	10.29	10	34.30
Foot	1	1.27	5	1.55	3	0.54	1	0.31	3	0.93
Totals	1	1.27	16	37.97	7	8.64	6	16.96	32	83.91

the .05 level). Wildlife biologists usually use proximal humeri when they use epiphyseal fusion for aging (e.g., Pelton 1969), but this end of the humerus is usually poorly preserved in archeological sites. Only two specimens were preserved at 29SJ 629 and both are fused. Because they fuse later, tibiae are probably a better indication of adulthood than distal tibiae and at 29SJ 629 six of eight are fused.

Seasonal implications of young Sylvilagus are limited by the very long breeding season, which in Chaco Canyon apparently lasts for more than half the year (Jack Cully, personal communication ca. 1981). For this reason and the variability in fusion of epiphyses, subadults can be found at any time of the year. However, the proportion of juveniles is highest in the fall (over 80 percent among other species of Sylvilagus: Edwards 1964) and diminishes to the following summer. This suggests that rabbits at 29SJ 629 were more often procured in the spring or early summer, or alternatively, early summer, or alternatively, that the hunters were quite selective with their rabbits (more selective than the modern hunters upon which the 80 percent juvenile compositon is based). The prevalence of adults here fits well with Beaglehole's (1936) description of Hopi rabbit hunts in the spring, prior to the appearance of agricultural crops.

Remains of at least two young Lepus were found, suggesting summer death. As with Sylvilagus, subadults are less common than adults. Seven of nine distal tibiae are fused as are five of seven proximal tibiae.

At least two young prairie dogs were found, again indicating summer accumulation. Nearly all long bones of larger specimens have fused epiphyses, indicating, as with the two rabbit species, a predominance of adults. Three of fifteen mandibular tooth row series, however, are not fully developed. In one case, the permanent P_4 has not yet erupted and, in two cases, it has erupted but is not in occlusion. Fully erupted dentitions most often show light or medium wear.

One other species which is represented by young individuals and is clearly cultural is the turkey. Wild turkeys hatch in the spring or early summer and it seems unlikely that the breeding period would be greatly expanded with kept birds. It is improbable that young birds would be present any time other than the warmer months; if so, the remains at 29SJ 629 would clearly indicate summer occupancy, although not necessarily to the exclusion of other seasons.

In summary, the lack of subadult large game animals suggests selective hunting, and the same may be indicated by the predominance of adult specimens of small game. Warm seasonal occupation is indicated by the abundance of prairie dogs and the occasional occurrence of young individuals of several species. The lack of subadult rabbits may indicate procurement in spring or early summer.

Bone Artifacts

A total of 54 bone artifacts were recovered from the site (Miles, Chapter 6) including tools (awls, etc.) as well as a number of probable ornaments (perforated tibiae, pendants, beads, etc.; Mathien, Chapter 5). Taxonomic identification could be made for only 12 of the artifacts (Table 7.18). Lepus is the most abundant of the identified taxa, and all seven specimens are tibia artifacts. Most have ground-off proximal heads and distal ends cut off (when preserved). None of the Lepus specimens is a tool.

Artiodactyls make up most of the awl tools, but only three could be identified to genus with confidence. All of these are Odocoileus, the most common artiodactyl in the unmodified bone collection. Other artiodactyl taxa may be represented among the unidentified artifacts, but none could be definitely identified. In addition to the "Unidentified artiodactyl" category, a number of the "Unidentified large mammals" and "Unidentified medium-large mammals" are probably artiodactyl bones as well.

The other two identified specimens are of the two cat species found in northwestern New Mexico, the bobcat and the mountain lion. The bobcat bone is right radius of a large individual which has been modified into an awl, while the F. concolor specimen is a distal phalanx made into a pendant. This latter specimen is tabulated and discussed above.

Table 7.18. Taxonomic identifications of bone artifacts recovered at 29SJ 629.

Taxonomic Category	Number
Lepus californicus (Black-tailed Jackrabbit)	7
Felis concolor (Mountain lion)	1
F. (Lynx) rufus (Bobcat)	1
Odocoileus hemionus (Mule deer)	3
Unidentified small mammal	1
Unidentified medium-large mammal	11
Unidentified large mammal	11
Unidentified artiodactyl	14
Unidentified bird	2
Unidentified vertebrate	3
Totals	54

Addendum

After the report on bones from 29SJ 629 was written, a small number of specimens from Room 2, Layer 1 (FS 474) was found mixed in with macrobotanical remains. Although only a few bones are involved, they merit note inasmuch as taxa are present which are not found in the other sparse collections from the room. Included are:

> Sylvilagus cf. audubonii - 2 metatarsals from 1 individual. Lepus californicus - a fragment of a scapula. Canis cf. familiarus - a small distal phalanx of a small canid, probably a dog, but possibly a coyote. Unidentified small mammal a long bone shaft fragment, probably of a cottontail.
> cf. Homo sapiens - a small fragment of a rib.

Neither Sylvilagus nor Canis (nor any human remains that I know of) were found in other collections from the room.

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8

THE HUMAN REMAINS AT 29SJ 629

Thomas C. Windes

Few complete human remains were recovered during exacavation, despite the lengthy use of the Spadefoot Toad Site (29SJ 629). A lack of human remains was not unusual for Pueblo II sites, although the impact of looting middens has undoubtedly skewed burial patterns throughout the Anasazi region. There was no indication of looting at 29SJ 629, perhaps because the primary midden was hidden within an old arroyo channel. The trash-filled channel at 29SJ 629 yielded two burials and numerous parts of others, probably from an additional two to three individuals, while other human bone fragments were found scattered about the site (Table 8.1).

Burial 1

Near the bottom of Grid 76 in the Trash Midden was a semi-flexed adult male (Volume I, Plate 6.10). The burial was contained in a pit 120 by 65 cm, sunk through Layer 2 into nearly sterile yellow sand and gravel deposits. The top of the pit was unclear but undoubtedly derived during or after deposition of Layer 1. A door slab (Plate 4.2a) recovered from Level 2 above the burial and about 50 cm below the surface must have marked the pit opening. The burial was 90-110 cm below the present surface and only 6 cm above bedrock (under the skull). Trash and fine gravel filled the burial pit. The body faced upwards and towards the southeast, with the knees towards the north, the legs south, and the head west. Much of the lower torso, hands, and lower arms were missing, probably because of ground moisture.

A pinch flotation sample taken from around the body revealed a high diversity of seeds including Cheno-ams, Portulaca, Descurainia, Mentzelia, and Bahia and Physalis (see M. Toll, Chapter 10). Four other flotation samples from trash deposits (Trash Midden Grid 70 at 29SJ 629 and three from Kiva C at 29SJ 627) revealed very low frequencies of the above plants with the last three species being absent. Some of the seeds were burnt and may reflect intentional placement of plants with the body. Other kinds of offerings were not evident.

Burial 2

Against the bedrock side of the channel, near the bottom of Grid 65, was a poorly preserved, semi-flexed adult male (?) burial without offerings. Although it had been placed in a pit that intruded into

Table 8.1. Distribution of human remains at 29SJ 629.

Provenience	Elements	Age Status	Sex	Field Specimen Number
Room 2, Layer 1	Rib fragment (L)	Adult	?	474
Room 9, Level 2	Rib fragment (L)	Adult	?	563
Pithouse 3, Level 4	Fibula shaft (R)	Adult	?	1939
Pithouse 3, Levels 3-6	Humerus shaft (L)	Adult	?	2207
Pithouse 3, Layer 2	Rib fragment	Adult	?	2510
Plaza Grid 9, Other Pit 1	Arm	Sub-adult	M?	1993
Plaza Grid 14, surface	Ulna shaft (L)	Adult	?	77
Trash Midden:				
Grid 58, Level 1	Phalanx (hand)	Adult	?	422
Grid 64, Level 5	Tibia fragment (R)	Adult	?	1823
Grid 65, Level 2	2 teeth	Adult	?	1377
Grid 65, Level 3	Maxilla fragment	Adult	?	1412
Grid 65, Level 4	Pubis fragment (L)	Adult	M?	1834
Grid 65, Level 5	Metacarpal	Adult	?	1520
Grid 65, Level 5	Rib fragment	Adult	?	1520
Grid 65, Level 6	Skull-case fragment	Adult	?	1844
Grid 65, Level 6	Rib fragment	Adult	?	1844
Grid 65, Level 7	Distal radius (L)	Adult	?	1922
Grid 65, Level 7	BURIAL 2 (incomplete)	Adult	M?	1847
Grid 70, Level 2	Tarsal fragment	Adult	?	872
Grid 70, Level 4	Femur shaft (R)	Adult	?	959
Grid 70, Level 4	Mandible	Adult	M?	959
Grid 70, Level 5	Rib fragment (R)	Adult	?	1000
Grid 71, Level 5	Thoracic vertebrae fragment	Adult	?	1926

Table 8.1. (continued)

Provenience	Elements	Age Status	Sex	Field Specimen Number
Grid 76, Level 1	Phalanx (foot)	Adult	?	1199
Grid 76, Level 1	Metacarpal shaft	Adult	?	1200
Grid 76, Level 2	Femur shaft (R)	Adult	?	964
Grid 76, Level 2	2 rib fragments	Adult	?	1310
Grid 76, Level 3	Ulna shaft (R)	Adult	?	1026
Grid 76, Level 3	2 rib fragments	Adult	?	1026
Grid 76, Level 3	Carpal	Adult	?	1026
Grid 76, Level 3	Patella fragment (R)	Adult	M?	1026
Grid 76, Level 3	Distal ulna (R)	Adult	M?	1321
Grid 76, Level 4	Rib fragment	Adult	?	1053
Grid 76, Level 4	BURIAL 1 (incomplete)	Adult	M?	1548
Grid 82, Level 1	Innominate fragment (R)	Adult	?	1029
Grid 82, Level 2	Lower molar	Adult	?	1722
Grid 82, Level 4	Phalanx (foot)	Adult	?	1314
Grid 82, Layer 1, Level 2	Metatarsal	Adult	M?	1606
Grid 82, Layer 1, Level 2	Phalanx (foot)	Adult	M?	1606
Grid 82, Layer 1, Level 2	2 tarsals	Adult	M?	1606
Grid 82, Layer 2, Level 1	2 metatarsals	Adult	?	1654
Grid 82, Layer 2, Level 1	Phalanx (foot)	Adult	?	1654
Grid 82, Layer 2, Level 1	Carpal	Adult	M?	1654
Grid 88, Level 6	Skull-parietal	Adult	?	1171

the lower trash deposits, the pit top could not be discerned. A large rectagular flat slab may have marked the opening 60 cm below the surface and 18-60 cm above the skull. The body rested 111-129 cm below the surface. Surrounding trash deposits filled the burial pit.

Although the time of internment was uncertain, it was definitely associated with final use of the channel for trash. Ground water was thought to be the principal cause of the poor bone preservation. Only the leg bones and feet remained in good condition, perhaps due to their greater distance from the bedrock walls and channel bottom. The jaw was missing but was not the one recovered to the east, 180 cm downslope from the feet. Orientation of the body was to the northwest (head) and the southeast (feet), with it facing upwards and towards the east. Although no funerary material was observed, the flotation and pollen samples from the burial have not been examined.

Burial Summary

Both burials were partly flexed, although differently oriented. Accompanying materials were not evident, except for the pit cover slabs and possible plant offerings with Burial 1. The burial pits had been sunk through earlier deposits and covered with large architectural slabs. A stone slab set horizontally above the burial was a typical funerary practice in Chaco Canyon and its greater environs (e.g., Roberts 1940a:132-133, 1940b:48, 50; Vivian 1965:36). Archival photographs from the 1937 excavations at Bc 51 illustrated several slab-lined crypts covered with large flat slabs that were probably typical Chacoan internments. The mass of flat slabs littering the ground near 29SJ 1360, on the densely occupied ridge below Fajada Butte, undoubtedly attested to the success of earlier investigators in finding burials (McKenna 1984:347). Large flat slabs were also common to other extensive small site middens in Chaco Canyon that evidently were looted. Both the burials from 29SJ 629 were placed just above the bottom of an arroyo and like those nearby at the 3-C Site (29SJ 625) and 29SJ 626 East, suffered considerable decomposition from moisture.

Miscellaneous Human Parts

Numerous human bones and teeth were recovered from the site, mostly in the Trash Midden. In Grid 70, Level 4, a male (?) mandible was found resting over a right femur (William Gillespie believed that the latter was female). Both articular heads of the femur had been broken. The bones were in excellent condition and probably represented two individuals. More human remains (teeth, a radius, and a femur) were found at the same level in adjacent Grid 76, all clearly in secondary positions near Burial 1. Some parts not mentioned may belong to the two incomplete burials and others that have been scattered.

Burials in Marcia's Rincon

Work in Marcia's Rincon did not resolve the question of the lack of burials in Chacoan sites. Although there is little evidence of looting in the rincon, historic records reveal that widespread looting for burials took place at the small sites throughout Chaco Canyon (Akins 1986:7-12; McKenna 1984:347). Certainly the scattered bones found throughout 29SJ 629 indicates the former presence of more burials than those recovered and may mark former areas of looting.

The large sample of trash examined in the main site refuse dump revealed that few persons were buried there. The total human remains recovered from 29SJ 629 represented no more than four to five people (Nancy Akins, personal communication 1982). This number, even allowing for some error, seems inadequate for an expected normal population reaching a peak of perhaps 8-12 folks by the late A.D. 900s/early A.D. 1000s. Life expectancy is known to have been relatively short and infant mortality high, yet no infant bones were recovered. Except for a sub-adult arm found in Plaza OP 1, only male adults were identified at the site, although one femur may have been female. Nevertheless, females and children were absent or nearly absent among the human remains identified at the site.

Nearby 29SJ 627 yielded six burials, despite a lengthy occupation and as many as four families in residence (Truell 1992). These six individuals included two children and a male and female adult (Akins 1986:Table B.1). At 29SJ 626 East, however, at least six burials were noted during testing of the midden, although this site was occupied for less than 50 years. Burials at 29SJ 626 East and 29SJ 625 were placed in very shallow graves, so that more remains were probably once present. Additionally, 29SJ 625 (the 3-C Site) yielded 16 burials in a midden that was not completely excavated (Vivian 1965). Its occupation span and size were similar to that at 29SJ 629. Although not in Marcia's Rincon, nearby 29SJ 1360 yielded the remains of 6-12 burials, representing both sexes, children, and adults. It too was similar in size and occupation duration to 29SJ 629. Thus, the burial population at 29SJ 629 seems unusual when compared to other nearby excavated sites. Either differential burial practices by age and sex occurred, the population was not typical (perhaps influenced by seasonal or special use of the site), or the sample was skewed by differential preservation or historic looting.

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9

POLLEN ANALYSIS OF EIGHT SAMPLES FROM MEALING CATCHMENT BASINS AT 29SJ 629

Glenna Dean

Introduction

The focus of the analysis was to examine the pollen from a number of probable mealing catchment basins at the Spadefoot Toad Site (29SJ 629), which had not been studied during the overall site pollen analysis by Cully (1985). Eight samples collected during 1976 (Table 9.1) were analyzed at the Castetter Laboratory for Ethnobotanical Studies (CLES), University of New Mexico, to target and quantify only the cultigen pollen grains present in the samples; standard 200-grain counts were not conducted. Instead, a modification of the Intensive Systematic Microscopy (ISM) method described by Dean (1991b) was applied to the samples. Specifically, the samples underwent normal laboratory extraction processes as described below, but microscopic examination was directed at estimating the total pollen concentration/g of each sample, and estimating the pollen concentration of the target corn (Zea) and squash (Cucurbita) pollen grains.

Laboratory Techniques

Chemical extraction of the pollen samples from 29SJ 629 was performed by CLES personnel using the CLES procedure designed for arid Southwest sediments. This process avoids the use of reagents such as nitric acid, bleach, and potassium hydroxide, which are potentially destructive to pollen grains (Gray 1965:545-547, 555-557, 566). The details of the process are as follows:

1) The dry samples were screened through a tea strainer (mesh openings of about 2 mm) into numbered beakers, to a total screened weight of 25 grams. The samples were "spiked" with three tablets of pressed Lycopodium (clubmoss) spores (batch 414831, Department of Quantitative Geology, Lund,

Table 9.1. Proveniences of archeological pollen samples from 29SJ 629.

CLES No.	FS No.	Provenience
92093	FS 3211	Pithouse 2, Floor 1, Other Pit 6 (Layer 4, floor contact).
92099	FS 3159	Pithouse 2, Wingwall area, Floor 1, Other Pit 3 (Layer 3 sand).
92097	FS 1238	Room 3, Floor 1, Other Pit 2 (Layer 2) plugged pit.
92094	FS 3320	Room 9, Other Pit 1 (floor, beneath metate).
92095	FS 1423	Plaza Grid 8, Other Pit 3 (floor).
92098	FS 1420	Plaza Grid 8, Other Pit 4 (floor).
92096	FS 2293	Plaza Grid 9, South of Wall 3, Other Pit 10 (fill).
92100	FS 3530	Plaza Grid 16, Other Pit 15 (floor).

Sweden), for a total addition of 36,300 marker grains to each sample.

2) Concentrated hydrochloric acid (38%) was added to remove carbonates, and the samples were allowed to sit overnight.

3) Distilled water was added to each sample, and the acid and dissolved carbonates were removed by siphoning the supernatant off the sediment after a settling period of at least three hours. More distilled water was added, the water-sediment mixture swirled, allowed to sit no longer than 5 seconds, and the fine fractions were decanted off of the settled heavier residue through a 195μ mesh into another beaker. This process, essentially similar to bulk soil flotation, differentially floated off light materials, including pollen grains, from heavier non-palynological matter. After three such "flotations" of the sediment, the fine fractions were concentrated by centrifugation at 2,000 RPM, and the heavy fraction remaining in the beakers was discarded. Rinsing of the recovered fine fractions was accomplished by mixing them with distilled water, followed by centrifugation, three times.

4) The fine fractions were mixed with 49 percent hydrofluoric acid and allowed to sit in beakers overnight to remove smaller silicates. The next day, distilled water was added to dilute the acid-residue mixture. Centrifugation and washing of the compacted residue with distilled water was repeated as above to remove acid and dissolved siliceous compounds.

5) Trisodium phosphate (2.5% solution) was mixed with the residues and centrifuged. Repeated centrifuge-assisted rinses with distilled water subsequently removed much fine charcoal and small organic matter.

6) The residues were mixed with a saturated solution of zinc chloride (specific gravity 2.0) and centrifuged for 8.5 minutes to concentrate mechanically the lighter pollen fractions at the top of the heavy liquid. The liquid was poured into numbered beakers and diluted with hydrochloric acid and distilled water to drop the specific gravity. The compacted heavy residues in the centrifuge tubes were checked under the microscope for stray pollen grains before being discarded. The diluted heavy liquid was centrifuged, poured off the compacted pollen residues, and the residues were then washed with distilled water several times. The residues were washed with glacial acetic acid to remove remaining water in preparation for acetolysis.

7) Acetolysis mixture (9 parts acetic acid anhydride to 1 part concentrated sulfuric acid) was added to the residues in the centrifuge tubes to destroy small organic particles. The tubes were heated in a boiling water bath for 5 minutes, followed

by a five-minute cool-down. The residues were compacted by centrifugation and the acetolysis mixture was poured off. Following a rinse with glacial acetic acid, multiple centrifuge-assisted washes with distilled water removed remaining traces of acid and dissolved organic compounds. Total exposure of the residues to acetolysis mixture was about 15 minutes.

8) The sample residues were rinsed with methanol, stained with safranin O, rinsed with tertiary butyl alcohol (butanol), transferred to 1-dram screw-top vials, and mixed with 1000 CKS silicon oil. After evaporation of the butanol, the storage vials were closed. These vials are in permanent storage at CLES; the unused sediment samples were returned for curation with the National Park Service Chaco Collections, University of New Mexico.

Microscopy

Microscope slides were made from droplets of the pollen residues using 1000 CKS silicon oil as the mounting medium under 22 by 22 mm cover slips sealed with fingernail polish. The liquid mounting medium allowed the grains to be turned over during microscopy, facilitating identifications. Slides were completely examined at a magnification of 200 power, and individual grains were identified at a magnification of 400 power. All pollen identifications were positive. In the case of corn pollen grains, no identification was made unless the single pore was clearly identifiable. Corn grains that were torn but still retained the pore were counted and noted as torn, and possible corn grains from which the pore had been torn were not counted. Isolated pores and torn grains of corn pollen, found to be indicative of grinding activities in other studies (Williams-Dean 1986:199), were seen in all but samples FS 3159 and FS 2293 from 29SJ 629.

Clumps of three or more pollen grains seen on the slides were tallied as a single grain in order to avoid skewing the counts. The presence of clumps was noted, as were the numbers of grains comprising the clumps.

Pollen grains from cultivated plants are usually rare in archeological samples, and finding a rare pollen type in a sample requires a different approach than the standard 200-grain count. Examining the entire sample is the only sure way to learn whether a rare pollen type is present in very low numbers, just seeming to be absent, or whether the sample is truly negative for a given rare pollen type. This level of examination is obviously beyond the budgets of most archeological projects, and some method of sampling must be employed instead.

Previous attempts by myself and other workers to concentrate the pollen grains of cultivated plants from features such as suspected agricultural fields, have generally focused on physical methods, typically screening of the pollen residue to separate the pollen types by size (Dean 1989), but these methods do not give results that can be manipulated numerically. Recently, I developed a regimen of intensive systematic microscopy to search for rare pollen types at 200-power magnification. As a result, very low concentrations of cotton and corn pollen grains were detected in pollen samples from high-altitude prehistoric field features in northern New Mexico (Dean 1991a). A refinement of this approach was used for the 29SJ 629 pollen samples reported here.

A two-step series of observations was employed for the 29SJ 629 pollen samples. First, the total number of pollen grains present on the slide and in the sample were estimated. These estimates were accomplished by counting the number of pollen and spike grains seen in two transects of each slide at 200-power magnification. This amounts to about a 10 percent sample of the area available for examination under a 22 by 22 mm cover slip ringed with fingernail polish. Second, the remainder of the slide was examined at 200 power, but only the spike grains, any cultigen grains, and the number of transects were tallied. An average was computed for the number of pollen grains per transect for the first two transects, and this average was multiplied by the total number of transects examined to yield an estimate of the total number of pollen grains present on the slide. This value, and the total number of spike grains counted on the slide, were then used to solve the pollen concentration equation, discussed in detail in the next section, yielding the estimated pollen concentration of the sample.

A further use of the "total spike present on the slide" observation was the estimation of potential abundance of a rare pollen type, squash in the current instance, that might be present in a given sample but which happened to be absent from the particular slide chosen for examination. This estimate also made use of the pollen concentration equation discussed below. The potential abundance was calculated by assuming that a squash pollen grain would be the first pollen grain seen on the subsequent slide; solving the pollen concentration equation using the value 1 for the "number of pollen grains counted" and the total number of spike grains counted on the previous slide for the "number of spike grains counted," portions of the equation yielded the maximum potential concentration for the unseen pollen type. This estimate appears in Table 9.2.

Each slide was completely examined during the scan, even after a cultigen pollen type was found, to compensate for the uneven distribution of rare pollen types on the slides. Windes stipulated that one slide from each sample be examined for the presence of cultigen pollen; slides negative for cultigen pollen would be evaluated for potential pollen content, by means of the estimates just described, before committing to the examination of additional slides. All eight samples from 29SJ 629 yielded at least one cultigen pollen grain on the first slide and no additional slides were examined. If, however, it had been necessary to examine more than one slide in order to see a rare pollen type, then the concentration of the rare type would have been estimated using the number of counted spike grains and estimated pollen grains summed from all slides examined for that sample. Likewise, the total pollen concentration for the sample would have been computed using the pollen and spike grains estimated for all the slides of that sample.

Theoretical Considerations

Limitations of Pollen Data

Two statistical considerations should be explored in order to evaluate pollen data. The first consideration is the routine "200-grain count" derived from the work of Barkley (1934), and augmented by Dimbleby (1957:13-15) and Martin (1963:30-31). Counting pollen grains to a total of 200 per sample allows the microscopist to inventory the most common taxa present in the sample. My calculations using the data presented by Dimbleby (derived from counts of slides containing about 20 pollen taxa) reveal that from 70 percent to 85 percent of the total population of taxa can be seen during a 200-grain count. Taking a different approach, Barkley (1934:286) reported from 72 percent to 94 percent agreement (average 85 percent) in comparing the first 100 grains counted from a sample to the second 100 grains counted from the same sample (total grains counted: 200). Barkley's (1934:287) statistical consideration of these data, from three slides of a single sample, indicated that comparison of two 161-grain counts (a total of 322 counted grains) would be required to yield 90 percent agreement between the two counts. He concluded that the 5 percent average increased accuracy ("0.5 coefficient of reliability") did not warrant the work of counting 122 additional grains, and that a 200-grain count was sufficient.

Counting fewer than 200 grains results in a less accurate assessment of even the most common pollen taxa. Because 200-grains counts are designed to inventory the most common pollen types in a sample, taxa unseen at that level of accuracy are considered too minor to affect the relative accuracy of the counts. Counting more than 200 grains increases the accuracy of the analysis in terms of recognizing rarer taxa, but at the expense of greatly increased time at the microscope. Because cultigen pollen grains were the focus of the 29SJ 629 analysis, and because these grains were assumed to be comparatively uncommon in occurrence, the decision was made to target the cultigen pollen grains in a systematic way.

The second consideration is the "1000-grains-per-gram" rule, summarized by Hall (1981:202) and used to assess the degree of pollen destruction in his study of samples from a rockshelter. This technique has subsequently been adopted by many palynologists, working with samples from other contexts, as a guide for deciding which pollen samples warrant attention at the microscope. In practice, an estimate of the number of pollen grains present in a unit of sample is made possible by the addition of known numbers of marker grains ("spike") to the sample at the beginning of the processing procedure (Benninghoff 1962; Maher 1981). Separate tallies are then kept of the spike grains and pollen grains counted under the microscope, allowing the abundance of pollen grains in the sample to be estimated by means of the following equation:

Table 9.2. Results of scans for cultigen pollen types at 29SJ 629.

	Pithouse 2 Floor 1 Other Pit 6 (floor contact) FS 3211		Pithouse 2 Wingwall area, Floor 1 Other Pit 3 (Layer 3 sand) FS 3159		Room 3 Floor 1 Other Pit 2 (Layer 2) FS 1238		Room 9 Other Pit 1 (floor beneath metate) FS 3320	
Taxon	No.	Conc.[a]	No.	Conc.[a]	No.	Conc.[a]	No.	Conc.[a]
Zea	22	16	9	20	[144][b]	3802	6	14
Cucurbita	-	(1)	-	(2)	-	(3)	-	(2)
Total Pollen[c]	672	502	53	116	2464	6776	1364	3226
Total Spike	1943		665		528		614	

	Plaza Grid 8 Other Pit 3 (floor) FS 1423		Plaza Grid 8 Other Pit 4 (floor) FS 1420		Plaza Grid 9 S. of Wall 3 Other Pit 10 (fill) FS 2293		Plaza Grid 16 Other Pit 15 (floor) FS 3530	
Taxon	No.	Conc.[a]	No.	Conc.[a]	No.	Conc.[a]	No.	Conc.[a]
Zea	13	66	[17]	882	10	52	[38][b]	484
Cucurbita	-	(5)	2	13	1	5	12	13
Total Pollen[c]	84	427	759	4792	250	1301	683	757
Total Spike	286		230		279		1311	

[a] Pollen concentration expressed as estimated number of pollen grains/g of sample.
[b] FS 1238: one or more clumps of up to 15 grains seen during examination of the slide;
FS 3530: one or more clumps of up to 5 grains seen during examination of the slide.
[c] One slide completely examined for each sample; numbers reflect the sum of grains estimated to have been examined (No.), and the estimated pollen concentration (Conc.).
Note: [n] number of grains counted in first two rows in slides with great abundance of cultigen pollen.
(n) maximum potential number of grains/g in squash-negative samples.

$$PC = \frac{K \cdot \sum_P}{\sum_L \cdot S}$$

where PC = Pollen Concentration

K = *Lycopodium* Spores added

$\sum_P$ = Fossil Pollen counted

$\sum_L$ = *Lycopodium* Spores counted

S = Sediment weight in grams

Without the use of spike, pollen abundance is often subjectively judged by the ease (or difficulty) with which the microscopy can be accomplished--few pollen grains seen per unit of slide or per unit of time translates as "poor pollen abundance." Objectively calculating pollen concentration removes the goal of 200 pollen grains from the influence of poor laboratory extraction or slide preparation. Given a chance to be seen in a preparation, pollen grains can be recovered in the tens or hundreds of thousands/g in well-preserved sediments. To Hall (1981), amounts fewer than 1000 grains/g were a signal that the forces of degradation may have been at work. For archeological samples from certain contexts, amounts fewer than 1000 grains/g can signal that the potential natural pollen rain was restricted in some (cultural) way. For example, archeological samples taken from pit features or from floors within enclosed rooms commonly yield fewer than 1000 estimated pollen grains/g as the result of a pit covering or the walls and roof of the structure. By the same token, the pollen grains recovered from such contexts can often be interpreted largely as the result of human activities.

Although this 29SJ 629 analysis was specifically limited to quantification of cultigen pollen grains, in other analyses it is helpful to assess the degree of degradation seen in the pollen grains which remain for analysis. It is known that the pollen grains from different taxa do not degrade at the same rate; degradation is differential (Holloway 1981, and references cited therein). Some pollen taxa are relatively resistant to destruction, remaining part of the pollen record long after other types have disappeared altogether. Many pollen types readily degrade beyond recognition, while others are so distinct in shape that they remain identifiable even when degraded to transparent "ghost grains" lacking sufficient structure to take up stain. Thus, differential pollen degradation is compounded by differential pollen recognition, leading to varying assessments of pollen diversity from sample to sample.

Pollen grains in perfect condition are uncommon in archeological samples from open contexts. Pollen grains in excellent or pristine condition are noteworthy when they do occur, and are often indicators of disturbance and recent introduction to the sample. A description of the condition of a sample's pollen grains is important in order to have any idea how much the pollen spectrum has been affected by post-depositional disturbance and the continuing processes of degradation.

Cushing (1967) devised a six-step scale for observations of degradation; Hall (1981) refined this to a four-step scale. The utility of such scales is that they provide quantifiable evidence of degradation, independent of the goals of 200-grain counts or 1000 grains/g. The obvious limitation of such scales is that they can assess only those grains which remain in the sample. The amounts and degrees of degradation have direct implications for the representativeness of the pollen counted by the analyst, but it must be recognized that most sediment samples have completely lost some pollen types. For all practical purposes, the original pollen spectrum can never be known for most sediment samples, regardless of the condition of the remaining pollen grains.

In my work, the assessment of the degree of pollen degradation involves relatively subjective consideration of 1) the number of pollen taxa able to be identified during microscopy (pollen diversity), 2) the number of pollen grains unable to be identified even to family (unidentifiable grains), and 3) the estimated total number of pollen grains/g of sample (pollen concentration). A sample from the modern surface usually provides an idea of the pollen diversity, as well as an idea of the concentration of pollen grains/g, that might be expected from well-preserved sediments.

Pollen grains still recognizable as such, but in the final stages of disintegration, constitute unidentifiable grains in my work. Only grains exhibiting three furrows, with or without pores, or complex wall architecture are classified as unidentifiable pollen grains. Small, poorly-preserved pollen grains with simple wall architecture and no furrow apertures cannot be distinguished from spores with confidence. These constitute a set of unrecognized degraded pollen grains excluded from my usual counts, and this set is of unknowable size. I consider the unidentifiables to reflect "minimum degradation," that is, the proportion of the pollen spectrum in the final stages of disintegration but still recognizable as pollen. It should be understood from the foregoing considerations, however, that this estimate of degradation is artificially low.

Larger percentages of unidentifiable grains indicate increasingly altered pollen spectra; the higher the percentage of unidentifiable grains, the lower the fidelity of the remaining pollen spectrum to the original. Because degraded grains may still be identifiable to family or genus, the number of degraded grains, as measured by the unidentifiables, is a low estimate of the total. Therefore, I usually consider unidentifiables above 20 percent to indicate advanced degradation, but specific research questions will determine whether very poorly preserved pollen samples retain analytical utility. Such research questions can concern the general pollen abundance from various intrasite or intersite sampling loci, for example, or the simple presence of cultivated plants.

In summary, although these points are not directly applicable to the eight samples reported here, three considerations must be weighed simultaneously for pollen spectra: statistical validity (200-grain count), relative abundance (1000 grains/g), and representativeness (amount of degradation, usually measured by the unidentifiable grains). Lower diversity of pollen taxa can also be used as a preliminary indicator of pollen preservation, although some loss of diversity and abundance is to be expected as the result of natural pollen degradation. Consideration of the number of pollen grains/g of sample and the percentage of unidentifiable grains can indicate an unusual sample to the analyst in a way not possible by the mere accomplishment of a 200-grain count alone.

In this report, pollen abundance is expressed as the estimated numbers of pollen grains/g of sample (pollen concentration). Although the resulting numbers are sometimes small, the description of pollen abundance in terms of pollen grains/g of sample allows the direct comparison of these types from sample to sample and from site to site. This is a distinct advantage over the use of relative percentages, in which pollen abundance is expressed in relation to a fixed sum (200 grains); rare pollen types always comprise 1 percent or less of the total spectrum, and insight into behavioral implications is impossible when the data are expressed solely as percentages. The advantages of scale gained by calculating pollen concentration are considerable.

For example, 100 grains of taxon X may be 10 percent of the estimated total of 1000 pollen grains/g in one sample, and 1000 grains of taxon X may be 10 percent of the estimated total of 10,000 pollen grains/g in another sample. Both samples yielded abundances of 10 percent for taxon X, but the description of that abundance as a percentage obscures the differences in scale between the two pollen samples. Why are there 1000 total grains/g in one sample and 10,000 total grains/g in the other? Why are there 100 grains of taxon X in one sample, but 1000 grains of taxon X in the other? What are the implications for pollen dispersal, or prehistoric human behavior, in the differences in estimated pollen abundance?

Implications of Sampling Loci

Practically speaking, greater or lesser numbers of pollen grains are recoverable from probably any context. Given this, it follows that the archeological and geomorphological implications of the sampled context become paramount for the interpretation of the recovered pollen spectrum. Just as one example, a pollen sample from pit fill provides information on the fill of the pit. If research questions are directed at events connected with the filling of the pit, the recovered pollen spectrum probably will be appropriate. If, however, research questions are directed at the original function(s) of the pit before it filled, then the recovered pollen spectrum from this sample will probably not be appropriate.

Another example is a pollen sample from a burned feature such as a hearth. Because pollen grains are destroyed by heat (Ruhl 1986) as well as by exposure to fire, it is likely that most, if any, of the pollen grains recovered from such a burned context do not relate to the use of the feature per se.

On the other hand, indoor hearths are likely depositories for floor sweepings, and outdoor hearths similarly accumulate ambient site-area pollen between uses. Questions aimed at identifying the plants which were present in the area of the hearth after its last use are more reasonable and can justify the pollen analysis of hearth fill. Well-considered research questions are required, and are most defensible for samples in which the goal of the research is simply finding evidence of cultivated plants. Research questions aimed at identifying vegetal foods cooked in hearths are the classic provenience of flotation analyses.

Pollen samples scraped from horizontal surfaces, such as floors or elevated benches, are the best source of information on plants once present in a structure. Environmental pollen brought in on plants or on the site inhabitants' persons will also be present in the recovered pollen spectra. This is just one instance where the use of estimated pollen abundance/g of sample will allow real differences in amounts of individual pollen taxa to be seen, in turn allowing inferences to be made regarding prehistoric human behavior.

To summarize, location-specific archeological considerations usually dictate where pollen samples will be taken. Research questions formulated by the archeologist must be tested at the time of sampling to take into account the anticipated recovery of pollen grains from a sampling locus (why are pollen grains expected from this sampling locus?), and the implications of those recovered grains for site formation processes (how did the pollen get there?; what will that tell us?). In all instances, pollen data should be integrated with flotation data, because each data set is usually preserved by different conditions.

Results

Corn pollen was seen in every sample from 29SJ 629; preservation of individual pollen grains ranged from good in most samples to poor in FS 1238. Squash pollen was seen in three samples. The results of the pollen scans are presented in Table 9.2.

Pollen concentrations represented by the corn pollen grains were estimated to be from 14 to 3,802 grains/g of sample (median 59 grains/g). Corn pollen grains travel with every part of the corn plant, and indicate the former presence of one or more corn products at each of the sampling loci. The presence of nearly 4000 corn grains/g from FS 1238 definitely reflects prehistoric behavior, but more contextual information is needed to explore the implications of this and the other samples.

Concentrations of the squash pollen grains were estimated to be from 5 to 13 grains/g of sample (median 13 grains/g). Squash pollen is only found in the male flowers or in the fertilized female flowers. Female flowers wither and fall from the developing squash fruit soon after fertilization, making it unlikely that the pollen seen in these samples accompanied a harvest of squash. The storage or processing of male squash flowers for use as food is the more likely source for the squash pollen seen here.

No detailed provenience or site information was provided with the pollen samples, and little more can be done in the way of analysis at this writing. It is interesting, however, to note that squash pollen was present only in the plaza samples. This picture might change with the examination of additional slides from the non-plaza samples, but such additional examinations would yield from 1 to 5 squash pollen grains/g or less, as indicated by the figures in parentheses in Table 9.2, leaving the plaza samples with up to 13 times the estimated number of squash pollen grains/g. This difference would seem to be behavioral in origin, but more contextual information is needed to evaluate the implications of this possibility.

In conclusion, the use of spike allowed the objective estimation of cultigen pollen grain abundance reported here. Yet spiking of sediment samples is not practiced by all palynologists analyzing archeological samples, and the unspiked pollen data cannot be compared to an objective standard as a result. As this study makes clear, rare pollen types can be recovered from prehistoric features by ordinary laboratory procedures. More importantly, rare pollen types can be recovered in amounts that can be quantified numerically instead of described only as "trace," "rare," or "present."

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10

FLOTATION AND MACRO-BOTANICAL ANALYSES AT 29SJ 629

Mollie S. Toll

Introduction

Flotation and macro-botanical analyses were undertaken at the Spadefoot Toad Site (29SJ 629), a small pueblo occupied between approximately A.D. 900 and 1150. The site is one of several small-house sites investigated by the Chaco Center in Marcia's Rincon on the south side of Chaco Canyon. Objectives were to gather detailed information about the botanical record of prehistoric occupation at this site, to help in explication of room and feature function, and to contribute to a picture of the subsistence system at this site over time. Macro-botanical remains were collected in the field from all proveniences excavated, and a systematic program of pollen and flotation sampling (based in part on results from nearby 29SJ 627; Cully 1985b; Struever 1977a; Toll 1987a) was followed. Selection of pollen and flotation samples for analysis was closely co-ordinated; samples were analyzed from paired proveniences in many cases, with emphasis on floor surfaces for pollen, and features for flotation.

Site 29SJ 629, excavated by the Chaco Center in 1975 and 1976, is similar in configuration and building sequence to 29SJ 627. Both sites began with a single row of tub-shaped storage rooms, with adjoining ramada work spaces and a plaza pit-structure to the east. Subsequent expansion included addition of storage and living rooms to the initial roomblock, and proliferation of ceremonial pitstructures (McKenna 1986; Truell 1992; Windes, this report). At both sites, pollen and flotation samples were taken from features and occupation surfaces in rooms, ramadas, and pit structures, and from trash middens.

An objective of present botanical analyses has been simply to describe subsistence activities at the smaller sites, while later work at Pueblo Alto (a formal greathouse) has focused on whether the botanical record reflects the obvious differentiation of small and large site types in Chaco Canyon (Toll 1987a). Given the economic, social, and organizational differences that have been postulated to have existed, and the possibility of differential participation in a regional trade network (Judge 1979), dissimilar subsistence strategies could be expected.

Methods

Samples Chosen for Analysis

Flotation samples were selected for analysis in consultation with site supervisor, Thomas Windes. Sample selection was aimed at representing all time periods, provenience units, and provenience types found at site 29SJ 629 (Figure 10.1, Table 10.1). Priorities for sample selection derived in part from results of flotation analysis at neighboring 29SJ 627. At 29SJ 627, examination of blocks of samples in specific provenience types (floor fill, floor plaster, postholes) revealed considerable differences in botanical debris throughout an individual room (Struever 1977a). Floors were also shown to contain few plant remains which could be related reliably to subsistence activities. Accordingly, in several cases at 29SJ 629, pinch samples were taken from throughout quads or halves of individual rooms or pithouses to encompass some of the variability present without expending large numbers of samples. Postholes at 29SJ 627 were viewed as largely reflecting post-use filling from room debris. While such deposits may remain as records of activity in rooms otherwise swept clean, time affiliation is usually ambiguous. Furthermore, flotation results have little or nothing to add to what is known about function of postholes. Consequently, postholes were omitted from analysis at 29SJ 629. Based on unfortunate disappointments at 29SJ 627, extra care was taken at 29SJ 629 to avoid sample locations that were cleaned out prehistorically and filled with alluvium, or that were disturbed by rodents.

Flotation and Microscopic Sorting Procedures

During the excavation seasons of 1977 and 1978, (at Pueblo Alto) water flotation was carried out in Chaco Canyon by Lou Ann Jacobson, Marcia Donaldson, Mary Jo Windes, and Adrian White. The technique employed takes advantage of the simple principle that organic materials (particularly non-viable or charred ones) tend to be less dense than water and will float or hang in suspension. When the soil matrix contains a high proportion of sand, as at Chaco Canyon, the sand particles sink rapidly in water, affording a clean separation of materials.

Sample volumes were measured prior to flotation, so that botanical remains could be compared as to density. Each sample was immersed in a bucket of water, and the heavier sand particles allowed to settle out for a period of 30 to 45 seconds. The water was then poured through a fine screen (0.35 mm mesh). The bucket was filled and screened repeatedly, until no appreciable amount of material was left floating or in suspension. This basic method has been used as long ago as 1936 (Watson 1976) but did not become widely used for the recovery of subsistence data until the 1960s and 1970s (Bohrer and Adams 1977; Struever 1968).

The floating and suspended materials were dried on newsprint. Dry samples were weighed, and then sorted by particle size with the use of graduated geological screens (mesh sizes 1.00, 0.50, and 0.25 mm). The screen separation produces a rough sorting of seed types, facilitating microscopic scanning and identification. Distinctive plant parts were removed, counted, and identified at 20 to 45x. The taxon was determined in most cases to genus or species level. The numerical coding system devised by Karen Adams (1978) for the San Juan Valley Archeological Project was used. Taxonomy and scientific nomenclature follow Kearney and Peebles (1960). Common names are used according to the Field Guide to Native Vegetation of the Southwest Region (U.S. Department of Agriculture 1974).

Several aspects of seed condition were recorded, including charring, color, and numerous categories of damage or deterioration. These attributes help in determining whether specific seeds are prehistoric or modern contaminants. The relative abundance of certain non-botanical items (insect parts, bones, rodent or insect feces, snails) was noted, with the hope of isolating causes of disturbance in the ethnobotanical record.

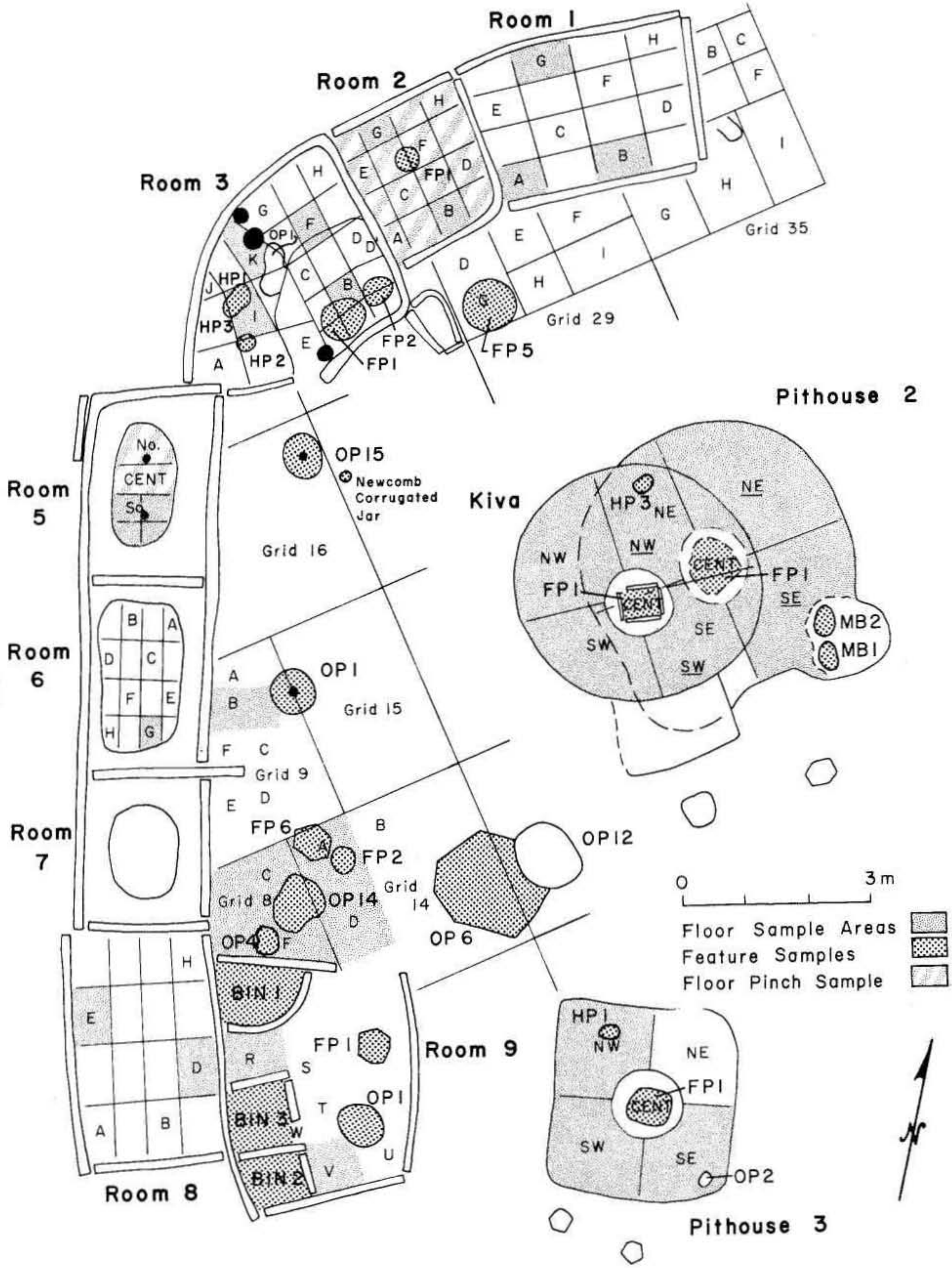

Figure 10.1. Flotation sample locations at 29SJ 629 (NPS 310/82830 B).

Table 10.1. Flotation samples analyzed at 29SJ 629.

Provenience Unit/ Floor or Level	Grid or Quad	Floor FS Number	Feature	Feature FS Number
Surface		2		
Room 1				
Floor	A	178		
	B	179		
	G	184		
Room 2				
Floor	B	340		
	G	344		
	Pinch[a]	346		
			Firepit 1	440
Room 3				
Floor 1	B	654		
	F	653		
	I	1112		
	K	1114		
			Firepit 1	809
			Heating Pit 1	1225
			Heating Pit 2	1233
			Heating Pit 3	1248
Subfloor			Firepit 2	2097
Room 5				
Tub Floor	Pinch[a]	1364		
	S 1/2	785		
Room 6				
Tub Floor	G	2285		
Room 8				
Floor 1	E	454		
	D	455		
Room 9				
Floor	V	787		
	R	794		
			Firepit 1	799
			Bin 1	801
			Bin 2	538
			Bin 3	658
			Other Pit 1	3319
Kiva (Pithouse 1)				
Floor	NE	2055		
	SE	2056		
	SW	2057		
	NW	2058		
			Firepit 1	2100
Pithouse 2				
Layer 6	NW (lithic conc.)	2915		
Floor 1	NE	2999		
	NE (NW 1/4 of lithic area)	3001		
	SE	3000		
	SE (wing wall area)	2998		
			Firepit 1	3141
			Mealing Bin 1	3166
			Mealing Bin 2 basin	3184
Floor 2			Heating Pit 3	3414

Table 10.1. (continued)

Provenience Unit/ Floor or Level	Grid or Quad	Floor FS Number	Feature	Feature FS Number
Pithouse 3				
Floor	NW	2625		
	SE	2627		
	SW	2628		
			Heating Pit 1	2631
			Firepit 1	2712
Plaza				
Floor	8 (C)	1484		
	8 (F)	1495		
	9 (B)	1341		
	14 (A)	1491		
	14 (D)	1498		
	14		Firepit 2	1618
	29		Firepit 5	2473
	14		Firepit 6	2539
	9		Other Pit 1:	
			Level 9	1860
			Floor	2088
	8		Other Pit 4	1424
	14 and 20		Other Pit 6:	
			Level 3	2086
			Level 4	2298
	14		Other Pit 14:	
			Layer 3	2690
			Layer 4	2770
			Layer 7	3099
	16		Other Pit 15	
			Floor	2689
	22		Newcomb Corr. Jar	2672
Trash Midden				
	65		Burial 2-cranium	1854
	65		Burial 2-torso	1857
Layer 1/Level 1	70	1449		
Layer 2/Level 1	70	1450		
Level 4	71	641		
Layer 1/Level 2	76	1453		
Level 4	76		Burial 1-pinch	1457
Layer 1/Level 2	82	1432		
Layer 1/Level 1	88	1428		

Total Samples: 34 Floor, 31 Features, 9 Trash, 1 Surface.

[a] Pinch sample taken from throughout the stratigraphic unit.

Presentation of Flotation Data

For most samples, the entire volume of organic material recovered by flotation was examined under magnification for seeds and other identifiable plant specimens. Frequently, however, the large number of seeds present required subsampling to economize on microscope sorting time. Materials from each of the four particle sizes (items caught by the 1.00, 0.50, and 0.25 mm screens, and those items passing through the smallest screen) were subsampled separately. The two largest sizes were sorted in their entirety in all but the very largest volume samples. A fraction (one half to one eighth) of the two smaller sizes was sorted, and the quantities of seeds retrieved were multipled by the reciprocal (i.e., 2 in the case of 1/2) to produce an approximation of the total of seeds expected to occur in the entire sample.

To allow comparison between samples and between sites as to overall seed density or density of specific seed types, it is necessary to standardize all seed counts to a common measure of number of seeds per standard unit volume. Most soil samples were a standard one liter size, but others ranged from 660 to 1150 ml. Seed frequencies were adjusted by dividing the actual seed count (or the estimated seed count, when subsampling has been used) by the proportion of standard sample size (actual sample size divided by one liter). Thus, for eight Chenopodium seeds from a 670 ml sample:

$$\frac{670 \text{ ml}}{1000 \text{ ml}} = 0.67 \qquad \frac{8 \text{ seeds}}{0.67} = 11.9 \text{ seeds/liter}$$

In this report, the actual number of seeds separated and identified from a sample is given, as well as an estimated number of seeds per liter (which takes into account any subsampling, as well as nonstandard sample sizes).

Procedures Used in Macro-Botanical Analysis

All macro-botanical remains collected during excavation were examined individually and recorded as to taxonomic classification and condition (burned or unburned, whole or broken). Erosion, or other post-depositional alteration, which would affect size dimensions or taxonomic identification, were also noted. Items were counted and measured if whole or more than half present; less than half of an item was considered to be a fragment. Pristine uncharred specimens (such as weed-seed caches suspected of being rodent-introduced) were noted as probable modern contaminants. Voucher specimens were consulted throughout and were of particular importance with fragmentary remains of Pinus edulis (pinyon), Cucurbita sp. (squash or pumpkin), and Phaseolus sp. (bean).

Corn remains were treated in greater detail (Toll 1985). Width and thickness of kernels were measured. Cob length was measured on all complete cob specimens, while mid-cob diameter and number of kernel rows were recorded for all specimens with a complete circumference. Cupule width was measured whenever possible. All measurements were performed according to descriptions by Nickerson (1953). Also noted were overall cob shape (cigar, pyramidal, flared-out), cross-sectional shape (circle versus ellipse), configuration of rows (straight versus spiral), presence of irregular or undeveloped kernel rows, and post-discard effects (compression, erosion).

Results

Plant Taxa Recovered

Conifers

Juniperus monosperma (Engelm.) Sarg. (one-seed juniper); Pinus edulis Engelm. (pinyon pine). While the distribution and abundance of conifer species during the prehistoric eras in Chaco has been extensively debated (Betancourt and Van Devender 1981; Douglass 1935; Judd 1954; Hall 1975), two taxa found at the lower elevational limit for conifers grow today in the immediate Chaco area. Juniper is present on the mesa immediately above and southwest of the Marcia's Rincon; pinyon trees are more common (but still sparse) at a slightly higher elevation on Chacra Mesa, a few kilometers to the east.

Juniper remains consisted of charred twig segments and individual scale leaves, and probably represent use as firewood. Their distribution in the site is consistent with this interpretation; they were found most frequently in hearths and heating pits. Based on a sample of 120 pieces of charcoal, taken from 13 proveniences, juniper wood constituted a minor component (6 percent) of fuel usage at 29SJ 629 (Welsh 1979). Juniper is most commonly listed as a fuel or construction material in the ethnobotanical literature (Jones 1930:32-33; Stevenson 1915:93; Whiting 1939:16, 62-63). Strong aromatic resins are present in the branches and berries of this conifer, an attribute probably responsible for juniper's usage in ceremonial and medicinal contexts (Cook 1930:24; Reagan 1928:158; Robbins et al. 1916:39-40) and to relegation of the berries to food use as seasoning or stress food (Castetter 1935:31-32;, Swank 1932:50).

In addition to being a preferred firewood, pinyon pine has provided one of the more valuable wild food resources available for Southwestern peoples. The fall-ripening nut crop has a very high energy value (635 calories per 100 grams), higher than most other plant and animal foods used, including corn (Ford 1968:158, 160). The nuts were estimated to be sufficiently valuable in the past that collecting trips of considerable distances were made by such groups as the Tewa (Robbins et al. 1916:41), Isleta (Jones 1930:37), and Zuni (Castetter 1935:40-42). Pinyon nuts were harvested and stored in the shell. The nuts were roasted in the shell before or after storage, or left raw. Consequently, broken empty nutshells could be expected to occur in and around firepits, heating pits, or storage facilities, and anywhere food processing may have taken place. At 29SJ 629, charred pinyon shell occurred in two burned, trash-filled mealing bins in Pithouse 2, and unburned shell was found in several plaza locations (Grids 8 and 16, and in a bell-shaped storage pit). The recovery of pinyon nuts at 29SJ 629 is of particular interest as they are entirely absent at nearby 29SJ 627 (Struever 1977a:79-80). On the other hand, pinyon was found in 35 percent of the Pueblo Alto flotation samples, in coprolites, and as macro-remains at several of the greathouses (Toll 1985:Table 5.4). Pinyon wood was used very rarely as firewood at 29SJ 629 (3 percent of 120 pieces identified; Welsh 1979).

Atriplex canescens (Pursh.) Nutt. (four-wing saltbush). Saltbush is particularly common in the canyon bottom today, where this shrub species has invaded areas of finer soil texture and higher alkalinity as the water table has dropped (Potter 1974:14). Saltbush is also widespread in coarse outwash soils at the base of cliffs (such as the rincon area), where it may co-dominate with ricegrass and dropseed grasses (Potter 1974:10,14) A second, smaller species of perennial Atriplex [A. confertifolia (Torr. & Frem.) Wats.; shadscale] is also present in the rincon, but does not occur in botanical remains at sites 29SJ 627 or 29SJ 629.

Charred saltbush fruits were found in two storage features in Room 9 and on Floor 1 of Pithouse 2. Uncharred fruits were present in several locations on the Kiva floor and in Plaza Other Pit 14. Saltbush seems to have been used principally as fuel (Hough 1897:42), with the resultant alkaline ashes saved for use as medicine and as a food dye (Castetter 1935:18; Robbins et al. 1916:54). Other medicinal or food uses involve the young tender leaves and immature blossoms (Stevenson 1915:44; Whiting 1939:18). Consequently, the presence of mature fruits is consistent with firepit debris, and not with storage of food or other household products. Chenopodiaceous wood (comprising Atriplex and Sarcobatus) was the predominant fuel material utilized at 29SJ 629 (63 percent of 120 charcoal pieces identified; Welsh 1979).

Scirpus sp. (bulrush). Members of the genus Scirpus generally require relatively uniform moisture conditions. They tend to be perennials growing from creeping rootstocks in riparian habitats such as "marshes, stagnant ponds, stream banks and ditches" (Kearney and Peebles 1960:151). Although cattails (Typha latifolia L.) and sedges (Carex filifolia Nutt.) grow near seeps in Chaco Canyon today, no Scirpus has been observed or collected during the historic period (Cully 1985a).

Bulrush seeds occurred in two features at 29SJ 629: Other Pit 14 in the plaza and Bin 2 in Room 9. A charred seed was found in Layer 2 of Room 2; this trash layer was heavily burned and contained debris from numerous economic plant taxa. Bulrush seeds were also present in floor and feature samples at 29SJ 627 (Struever 1977a:64-65) and at other Pueblo period sites in northwestern New Mexico (Salmon Ruins, Doebley 1976; Howiri, Toll 1987b; PM 224, Toll and Donaldson 1982). In all cases, the seeds occur in very low frequency per sample.

The distribution of Scirpus seeds in archeological sites is both scattered and sparse, and ethnographic accounts of consumption of bulrush seeds are also rare. However, recovery of Scirpus seeds in numerous human coprolites from three sites bordering Lake Cahuilla in California (ca. 1500 A.D.) shows that someone made use of bulrush seeds in their diet (Farrell 1988:135; Wilke 1978). Incidental presence of seeds in sites may otherwise relate to non-seed uses, such as consumption of raw roots and tender shoots (Swank 1932:68), or the manufacture of mats from leaves (Doebley, 1976:30; Judd 1954:50). Presence of this taxon in Chaco Canyon archeological sites is of interest, as we must suspect that either the prehistoric distribution of Scirpus differed from today's and/or Puebloan inhabitants intentionally collected this plant from some distance.

Grasses

Orysopsis hymenoides (Roem. & Schult.) Ricker. (Indian ricegrass); Sporobolus sp. (Dropseed grass). Ricegrass and dropseed are grass taxa common in Chaco Canyon today. Both are most widespread in the upland plateaus, in the Hilaria bouteloua association (Potter 1974:6-9), but are present in all areas of sandy soil in the canyon, including the rincon where 29SJ 627 and 29SJ 629 are located. Oryzopsis, like several other cool-season grasses, was considerably more abundant in the Southwest before the cattle boom of the 1880s, and subsequent widespread overgrazing (Bohrer 1975).

Oryzopsis uses winter and spring moisture to produce its early summer crop of relatively large (3-4 mm) and nutritious seeds. The late May to June seed crop comes at a "critical time of the year for the hunter-gatherer and the agriculturalist" (Bohrer 1975:199) when food stores are at their lowest level, most wild food plants are not yet available, and cultivated crops are far from ready for harvest. In a spring following a poor harvest from both wild and domestic crops, the availability of an early wild crop such as Indian ricegrass could be particularly important. Oryzopsis seeds were found in small quantities throughout site 29SJ 629 but more frequently in feature locations (Table 10.2). Over 70 percent of ricegrass seeds at the site occurred in a burned trash level (Layer 2) in Room 2. At 29SJ 627, ricegrass seeds were less abundant and were found only in features (Struever 1977a:68-69).

When ripe, Sporobolus spp. caryopses drop easily from the surrounding glumes (hence the name, dropseed), "making harvesting easy and threshing unnecessary" (Whiting 1939:18). The ease in collecting the dropseeds offsets their small size (S. cryptandrus seeds average 0.7 to 0.9 mm, and S. contractus seeds are slightly larger). S. cryptandrus seeds were ground to make a meal for cakes by the Hopi (Hough 1897:37) and the Navajo (Elmore 1944:27). Unburned Sporobolus seeds were present in a hearth, and charred seeds were found in several floor locations (Table 10.3). Burned dropseed was similarly found on floors at 29SJ 627 (Struever 1977a:70).

Although grass remains occur in very small numbers (seeds of all species amount to less than 1 percent of seeds recovered at the site), specimens found in flotation were nearly always charred; consequently, there is good reason to link them to prehistoric subsistence activities.

Cactus

Echinocereus sp. (Hedgehog cactus); Opuntia sp. (Prickly pear cactus). The fruits of the prickly pear cactus, available in the early fall, were highly regarded as a wild food resource by many Southwestern peoples (Castetter 1935:37; Elmore 1944:64-5; Havard 1895:116; Jones 1930:35-36; Robbins et al. 1916:62; Stevenson 1915:69). The relatively large seeds (2-7 mm) were sometimes separated out before eating (Castetter and Underhill 1935:22-23). The seeds also survive whole in coprolites (Fry and Hall 1975:89; Stiger 1977; Toll 1981). Castetter reports that the genus Echinocereus has "the best flavored fruits of all the cacti," and that the Navajo "speak of them as being very sweet and delicious, but scarce" (1935:26). In this genus, "the seeds are small and can be eaten along with the pulp" (Standley 1911:450). In addition to being eaten immediately, raw or cooked, the fruits were often sun-dried and stored (Standley 1911).

A small, dry-fruited species of prickly pear (Opuntia hystricina Englem. & Bigel), grows today in Chaco Canyon, but few specimens of fleshy-fruity prickly pear, or hedgehog cactus, have been recorded or collected during the historic era. The presence of hedgehog cactus in two floor locations at 29SJ 629 points to a wider natural distribution during the Puebloan period, or to non-local collecting trips.

Table 10.2. *Distribution of Oryzopsis seeds at 29SJ 629.*[a]

	Hearths (n = 10)	Heating Pits (n = 5)	Mealing Bins (n = 3)	Bell-Shaped O.P.'s (n = 9)	Other Storage (n = 4)	All Features (n = 31)	All Floors (n = 34)	Trash (n = 9)	Total (n = 74)
Actual no. of seeds	58	1	0	6	1	66	184	1	251
Seeds/liter	63.4	1.3	0	7.0	1.2	72.9	229.7	1.0	303.6
Percent of all seeds/liter	1%	+[a]	0	1%	+	+	1%	+	1%
No. of samples	4	1	0	3	1	9	6	1	16
Percent of samples	40%	20%	0	33%	25%	29%	18%	11%	22%
No. of samples burned	2	1	0	3	1	7	5	0	12

[a] + = less than 0.5 percent.

Table 10.3. Distribution of Sporobolus seeds at 29SJ 629.[a]

	Hearths (n = 10)	Heating Pits (n = 5)	Mealing Bins (n = 3)	Bell-Shaped O.P.'s (n = 9)	Other Storage (n = 4)	All Features (n = 31)	All Floors (n = 34)	Trash (n = 9)	Total (n = 74)
Actual no. of seeds	16	0	0	0	0	16	19	0	35.0
Seeds/liter	16.0	0	0	0	0	16.0	27.9	0	43.9
Percent of all seeds/liter	+	0	0	0	0	+	+	0	+
No. of samples	1	0	0	0	0	1	4	0	5
Percent of samples	10%	0	0	0	0	3%	12%	0	7%
No. of samples burned	0	0	0	0	0	0	4	0	4

[a] + = less than 0.5 percent.

Significance of prickly pear remnants is ambiguous, as condition of the remains does not allow species determination. Seeds recovered were unburned (Table 10.4), and indeed one concentration (FS 2616, found in Layer 2 of Pithouse 3) shows clear signs of rodent manipulation. No cactus seeds have appeared in Chaco Canyon coprolites (Toll 1981). Thus all seeds may possibly be modern intrusives, and only green parts (pads and buds) can unequivocably be associated with prehistoric activity. There is no certain evidence that prickly pear fruits were exploited by Puebloan residents; therefore, use may have been limited to the present-day indigenous species.

Edible Weeds

Amaranthus sp. (pigweed); Chenopodium sp. (goosefoot); Portulaca sp. (purslane); Descurainia sp. (tansy mustard); Mentzelia albicaulis Dougl. (stickleaf); Cleome sp. (beeweed); Cycloloma atriplicifolium (Spreng.) Coult. (winged pigweed); Helianthus sp. (sunflower); Physalis sp. (groundcherry). Herbaceous weedy annuals played an important part in the wild food diets of native peoples of the Southwest, frequently supplying a double crop of tender greens in the spring, and abundant small seeds later in the summer or early fall. Weeds have an adaptive advantage under disturbed conditions, thus increasing their usefulness to man by proliferation around human habitations, middens, and agricultural fields. Except where unusually good preservation conditions allow retention of parts such as stems, leaves, and inflorescences (i.e., Bat Cave, Smith 1950; Tularosa Cave, Cutler 1952; Antelope House, Hall and Dennis 1986), remains of the weedy annuals are recovered only by flotation and palynological techniques.

Three weed taxa in particular--Chenopodium, Amaranthus, and Portulaca--appear repeatedly in the ethnobotanical literature as substantial components in the wild food diet (Castetter 1935:15-16; Elmore 1944:44, 46; Jones 1930:21, 39) and in flotation assemblages from archeological sites (Gasser 1978; Minnis 1982; Struever 1977a; Toll 1985). In his tabulation of energy consumption during the historic period at San Juan Pueblo, Ford (1968:158) found that these three taxa comprised 38 percent by weight--though only 3 percent of calories--of wild gathered food plants.

Throughout the Southwest the young tender plants of pigweed and goosefoot were collected in April and May and cooked as greens (Castetter 1935; Swank 1932). Seeds became available in the late summer or early fall and were commonly ground and used as meal. Parching was frequently incorporated as a processing step prior to storage or grinding and may be responsible for some charred seeds in the archeological assemblage. Neither Chenopodium nor Amaranthus has been abundant in Marcia's Rincon from 1975 to 1981. The following species have been collected in Chaco Canyon (asterisks indicate taxa recovered in flotation): Chenopodium berlandieri Moq.*, C. incanum (S. Wats.) A. Heller*, C. leptophyllum Nutt., C. watsonii A. Nels.*, Amaranthus graecizans L.*, A. hybridus L., A. powellii Wats. (Cully 1985a; Potter 1974). Pigweed and goosefoot seeds are distributed very differently at 29SJ 629. Whereas goosefoot seeds form a substantial component of the total seed assemblage and are frequently charred in feature contexts (Table 10.5), pigweed seeds form a much smaller portion of the whole and are rarely charred (Table 10.6).

Purslane is low-growing and succulent compared to the considerably taller and fairly bushy pigweed and goosefoot. Purslane leaves have a pleasant, tart taste due to the presence of small quantities of oxalic acid and remain palatable over a period of many weeks, rather than becoming tough. They were "gathered in large quantities in the summer" by the Isleta (Jones 1930:29) and often dried as winter greens (Krenetsky 1964:47). Interestingly, purslane seeds will ripen on a plant that has been pulled from the ground. Thus, plants hanging from a ceiling to dry might drop seeds to the floor below. Today purslane forms a squeaky carpet underfoot in late summer in many areas of the rincon in wet years. Purslane was the single most abundant seed taxon at 29SJ 629, forming over a third of all seeds recovered by flotation (Table 10.7). Many of these seeds are unburned and relatively new-looking and may be post-occupational contaminants (these occur chiefly on floors, and in the plaza bell-shaped pits). Burned purslane seeds are concentrated in firepit contexts.

Tansy mustard is an annual weed that is very sensitive to early spring ground moisture. It appears in abundance when its moisture requirements are met, but it is sparse or absent in drier years. In Chaco Canyon, mustard formed dense stands in slightly

Table 10.4. Distribution of cactus remains at 29SJ 629.[a]

	Hearths	Trash-Filled Mealing Bins	Bell-Shaped Pits	Floor Levels
Echinocereus				
seeds[b]	0	0	0	2
Opuntia				
seeds[b]	10	0	1	1
seed cache[c]	0	0	0	+
pads[c]	0	1[d]	0	5[d]
buds[c]	0	0	0	3[d]

[a] + = less than 0.5 percent.
[b] In flotation samples.
[c] Macro-botanical specimens.
[d] = charred.

alkaline, clayey soils of the canyon bottom and lower outwash slopes in 1973 and 1978. Mustard greens, available as early as March, are among the first foods available in the new year and consequently have been recognized as an important spring crop (Castetter and Underhill 1935:24; Balls 1970:25-26). In early summer "the minute red-brown seeds...are shaken into baskets as soon as they are ripe" (Curtin 1949:84). The utilization of Descurainia as a food resource has necessarily been subject to the taxon's patchy distribution (both in time and space). Many of the mustard seeds recovered at 29SJ 629 are unburned and they may be unrelated to cultural activity (i.e., in heating pits, large bell-shaped pits, and on floors; Table 10.8). Charred mustard seeds are concentrated significantly in hearths.

Stickleaf is another weed crop sensitive to winter and spring precipitation levels; some years it is abundant and others very sparse. Its distribution in Chaco Canyon is different than mustard, as it favors sandier soils of the upper outwash slopes and mesa tops (Potter 1974). It is noteworthy that these complementary distribution patterns overlap some in and around the rincon where small-house sites 29SJ 627 and 29SJ 629 are located. Mentzelia produces a seed crop slightly later than Descurainia (May to June). According to ethnographic reports, "the ripe seeds were threshed on the spot" using a seed beater, and the dry seeds were stored without parching (Smith 1973:103). The seeds were prepared for eating either by parching and grinding or by grinding and boiling (Fewkes 1896:20; Castetter 1935:34). Consequently, we would expect to find Mentzelia seeds in both parched and unparched forms in contexts of food preparation or storage. Recovery of an intact Mesa Verde seed jar (Chaco Center Collections, Catalog C 2009), filled with unburned Mentzelia albicaulis seeds from the Kiva A bench at Una Vida is a compelling clue as to the probable cultural usefulness of this seed species in Chaco Canyon. Seeds at 29SJ 629 were found in a wide array of provenience types (heating and storage features, floors and trash) and in all cases were unburned (Table 10.9). It is probable that fragile Mentzelia seed coats do not preserve well in soil, unburned or carbonized.

Beeweed is a disturbed ground weed with multiple economic uses. Young beeweed plants were "gathered and boiled for food" (Whiting 1939:18), and "the large seeds used...to make a flour" (Jones

Table 10.5. Distribution of Chenopodium seeds at 29SJ 629.

	Hearths (n = 10)	Heating Pits (n = 5)	Mealing Bins (n = 3)	Bell-Shaped O. P.'s (n = 9)	Other Storage (n = 4)	All Features (n = 31)	All Floors (n = 34)	Trash (n = 9)	Total (n = 74)
Actual no. of seeds	306	104	1093	2415	100	4018	2961	171	7150
Seeds/liter	332.3	113.3	1097.0	3001.5	98.7	4642.8	5843.4	191.2	10677.4
Percent of all seeds/liter	5%	9%	81%	31%	8%	23%	20%	26%	21%
No. of samples	7	3	3	9	4	26	33	9	68
Percent of samples	70%	60%	100%	100%	100%	84%	97%	100%	92%
No. of samples burned	5	1	3	0	1	10	2	3	15

1930:26), while the plant was also boiled down to a thick black paste, to be used as a pottery paint (Robbins et al. 1916: 59; Stevenson 1915:82). Evidence of utilization of beeweed was entirely lacking at neighboring 29SJ 627 (Struever 1977a:81). Cleome seeds (some charred) were found in very small numbers in feature and floor locations at 29SJ 629 (Table 10.10). It is unlikely that any of these seeds are recent contaminants, as beeweed today seems to be limited to the wash and protected side canyons (Potter 1974; Anne Cully, personal communication 1981).

Cycloloma is an annual herb with a scattered distribution in sandy areas of grassland and pinyon-juniper woodland associations. To date, it has only been observed growing in small quantities in Chaco Wash (Anne Cully, personal communication 1981). While the leaves were used medicinally by the Hopi (Whiting 1939:74), it is also reported that the "Indians made mush and cakes from the ground-up seeds" (Kearney and Peebles 1960:254). Cycloloma seeds appear in a wide variety of contexts at 29SJ 629, in about a third of all samples (Table 10.11). Cycloloma may have played a more important role in prehistoric economics than the scant historic ethnographic record would lead us to believe, and/or Cycloloma may have been distributed more widely, as the seeds are found in numerous sites in the San Juan Basin (Table 10.12).

The common sunflower (in Chaco, Helianthus annuus L., or H. petiolaris Nutt.) has kernels very much smaller than those of cultivated species of the historic period. Nevertheless, they provide a valued food source high in oils, and were encouraged, or cultivated, by several Southwestern groups including the Hopi (Whiting 1939:12) and the Chaco Navajo (Elmore 1944:87). The seeds were often parched and ground before consumption (Havard 1895:103; Heiser 1951:436-437). Additionally, the pericarps were sometimes boiled to make a dark red or purple dye (Whiting 1939:87; Elmore 1944:87). In most cases (Table 10.13), sunflowers at 29SJ 629 were represented by longitudinal shreds of the achene. Helianthus remains in this condition have been observed in human coprolites from Chaco Canyon sites (Atlatl Cave and Pueblo Bonito, Toll 1981). Achenes pounded or ground on a metate and achenes utilized by rodents for food would also be expected to show this pattern in the debris. Wild and cultivated sunflowers have been reported by Bailey (1931) as food for kangaroo rats (Dipodomys spp.) and by Martin, Zim, and Nelson (1951:257-8) as food for pocket mice (Perognathus spp.). Thus, there is no clear evidence for how (and by whom) sunflowers were utilized at 29SJ 629.

Table 10.6. Distribution of Amaranthus seeds at 29SJ 629.[a]

	Hearths (n = 10)	Heating Pits (n = 5)	Mealing Bins (n = 3)	Bell-Shaped O. P.'s (n = 9)	Other Storage (n = 4)	All Features (n = 31)	All Floors (n = 34)	Trash (n = 9)	Total (n = 74)
Actual no. of seeds	0	1	17	140	4	162	477	8	647
Seeds/liter	0	1.3	17.4	168.7	4.7	192.1	688.0	8.3	888.4
Percent of all seeds/liter	–	+	1%	13%	+	1%	2%	1%	2%
No. of samples	0	1	2	7	1	11	15	3	29
Percent of samples	0	20%	67%	78%	25%	35%	44%	33%	39%
No. of samples burned	0	1	0	0	0	1	1	0	2

[a] + = less than 0.5 percent.

Table 10.7. Distribution of Portulaca seeds at 29SJ 629.

	Hearths (n = 10)	Heating Pits (n = 5)	Mealing Bins (n - 3)	Bell-Shaped O. P.'s (n = 9)	Other Storage (n = 4)	All Features (n = 31)	All Floors (n = 34)	Trash (n = 9)	Total (n = 74)
Actual no. of seeds	1559	125	96	3582	94	5456	6521	140	12117
Seeds/liter	1790.5	140.8	98.7	3826.0	106.5	5962.5	12233.8	149.7	18346.0
Percent of all seed/liter	25%	12%	7%	40%	9%	29%	41%	21%	36%
No. of samples	9	4	3	9	4	29	31	8	68
Percent of samples	90%	80%	100%	100%	100%	94%	91%	89%	92%
No. of samples burned	7	0	2	2	1	12	4	2	18

Table 10.8. *Distribution of Descurainia seeds at 29SJ 629.*

	Hearths (n = 10)	Heating Pits (n = 5)	Mealing Bins (n = 3)	Bell-Shaped O.P.'s (n = 9)	Other Storage (n = 4)	All Features (n = 31)	All Floors (n = 34)	Trash (n = 9)	Total (n = 74)
Actual no. of seeds	81	331	6	512	385	1315	3148	166	4629
Seeds/liter	91.4	411.3	6.0	657.0	583.0	1748.7	5833.4	173.6	7755.7
Percent of all seeds/liter	1%	34%	+[a]	7%	48%	9%	20%	24%	15%
No. of samples	8	4	1	9	1	23	29	8	60
Percent of samples	80%	80%	33%	100%	25%	74%	85%	89%	81%
No. of samples burned	6	0	1	0	0	7	3	2	12

[a] less than 0.5 percent.

Table 10.9. Distribution of Mentzelia seeds at 29SJ 629.

	Hearths (n = 10)	Heating Pits (n = 5)	Mealing Bins (n = 3)	Bell-Shaped O.P.'s (n = 9)	Other Storage (n = 4)	All Features (n = 31)	All Floors (n = 34)	Trash (n = 9)	Total (n = 74)
Actual no. of seeds	45	380	0	636	143	1204	431	38	1673
Seeds/liter	49.5	463.9	0	689.9	144.5	1347.8	787.1	43.8	2178.7
Percent of all seeds/liter	17%	38%	0	7%	12%	7%	3%	6%	4%
No. of samples	6	4	0	9	2	21	20	7	48
Percent of samples	60%	80%	0	100%	50%	68%	59%	78%	65%
No. of samples burned	0	0	0	0	0	0	0	0	0

Table 10.10. Distribution of Cleome seeds at 29SJ 629.[a]

	Hearths (n = 10)	Heating Pits (n = 5)	Mealing Bins (n = 3)	Bell-Shaped O.P.'s (n = 9)	Other Storage (n = 4)	All Features (n = 31)	All Floors (n = 34)	Trash (n = 9)	Total (n = 74)
Actual no. of seeds	0	0	0	8	0	8	3	0	11
Seeds/liter	0	0	0	8.1	0	8.1	3.7	0	11.8
Percent of all seeds/liter	0	0	0	+	0	+	+	0	+
No. of samples	0	0	0	3[b]	0	3	2	0	5
Percent of samples	0	0	0	33%	0	10%	6%	0	7%
No. of samples burned	0	0	0	0	0	0	1	0	1

[a] + = less than 0.5 percent.
[b] Samples are from 3 layers in Other Pit 14.

Table 10.11. Distribution of Cycloloma seeds at 29SJ 629.[a]

	Hearths (n = 10)	Heating Pits (n = 5)	Mealing Bins (n = 3)	Bell-Shaped O.P.'s (n = 9)	Other Storage (n = 4)	All Features (n = 31)	All Floors (n = 34)	Trash (n = 9)	Total (n = 74)
Actual No. of seeds	7	1	2	50	0	60	932	0	992
Seeds/liter	7.0	1.0	2.0	58.2	0	68.2	947.4	0	1015.6
Percent of all seeds/liter	+	+	+	1%	0	+	3%	0	2%
No. of samples	3	1	1	6	0	11	13	0	24
Percent of samples	30%	20%	33%	67%	0	35%	38%	0	32%
No. of samples burned	2	0	0	1	0	3	1	0	4

[a] + = less than 0.5 percent.

Table 10.12 Occurrence of Cycloloma seeds at archeological sites in the San Juan Basin.

Site/Description		Reference	No./Percent of samples with Cycloloma	Charred?
29SJ 627	Small PI-PIII Pueblo village, Chaco Canyon	Struever 1977a	5/7%	+
29SJ 629	Small PI-PIII Pueblo village, Chaco Canyon	(this report)	24/32%	+
Bis sa'ani	Chacoan outlier (NE of Chaco)	Donaldson & Toll 1982	26/74%	+
LA 16029	Basketmaker Village, Chuska Valley	Struever 1982	7/29%	+
Salmon Ruin	Large pueblo on San Juan River	Doebley 1976	9/22%	0
12 Anasazi Sites	Small Puebloan structures; Pittsburg & Midway Coal Lease, NW of Gallup, NM.	Struever & Donaldson 1980b	13/17%	+

Physalis flourishes in sand dunes and other disturbed habitats, and consequently increases around human habitations and agricultural fields. Groundcherry, in the same family as tomatoes and peppers, produces tart berries in mid to late summer. These are eaten fresh by various puebloan groups in the historic Southwest (Jones 1930:36; Robbins et al. 1916:59; Swank 1932:59; Whiting 1939:21), while the Zuni "boil then crush small quantities of the fruit for use as a condiment" (Castetter 1935:39). Groundcherry seeds, found in very small quantities throughout 29SJ 629 (Table 10.14), compare well with the species common in Chaco Canyon today (P. hederafolia var. cordifolia (Gray) Waterfall; Cully 1985a). Charred specimens were found in a hearth, linking groundcherry with probable food use.

Miscellaneous weeds

Euphorbia sp. (spurge); Oenothera albicaulis Pursh. (evening primrose); Nicotiana attenuata Torr. (coyote tobacco); Sphaeralcea-type (globe mallow) Corispermum sp. (tickseed); Cryptantha sp. (hiddenflower); Phacelia crenulata Torr. (scorpionweed). Spurge is a small-leaved annual growing close to the ground that produces its small carrot-shaped seeds in mid to late summer (Kearney and Peebles 1960:520). Several species of spurge are common in Chaco Canyon, including Marcia's Rincon (Cully 1985a). Records of food use for this plant are limited to use of the root as a corn meal sweetener by the Zuni (Stevenson 1915:51). Note, however, that the gathering of roots need not involve collection of the herbaceous seed-bearing portion as well. Most known ethnobotanical uses of the entire plant involve the preparation of medicine (Krenetsky 1964:45; Reagan 1928:158; Stevenson 1915). Spurge seeds are very abundant throughout 29SJ 629, and in all cases are unburned (Table 10.15). As possible prehistoric economic uses are minimal and local rodent food utilization is confirmed by the presence of seed fragments in rodent scats from flotation samples, it is highly suspect that many (if not all) spurge seeds are modern contaminants.

Oenothera is an herbaceous plant that prefers sandy soil and is distributed in "dry, grassy, and disturbed places" (Kearney and Peebles 1960:596). In Chaco Canyon, it is found on the mesa tops, on dunes (as in the Marcia's Rincon), and in the Chaco Wash (Potter 1974). The plant enjoys little ethnobotanical recognition, although Castetter mentions that the Mescalero Apache ate the fruits of the evening primrose (1935:17). The unburned seeds turn up in very small quantities in 11 samples, including occupation surfaces and features, both in the plaza and inside rooms. Its limited appearance at 29SJ 629 suggests that it served a minimal (if any) part in the economic system.

Wild tobacco tends to grow in specialized habitats such as sandy ground near streams and washes (Martin and Hutchins 1980:1752) or shady spots in canyons (Paul Knight, personal communication 1981). To date, it has not been seen in Chaco Canyon (Cully 1985a, personal communi-

Table 10.13. Distribution of Helianthus achenes at 29SJ 629.[a]

	Hearths (n = 10)	Heating Pits (n = 5)	Mealing Bins (n = 3)	Bell-Shaped O.P.'s (n = 9)	Other Storage (n = 4)	All Features (n = 31)	All Floors (n = 34)	Trash (n = 9)	Total (n = 74)
Actual no. of seeds	19	0	0	7	0	26	10	0	36
Seeds/liter	20.2	0	0	7.2	0	27.4	11.6	0	39.0
Percent of all seeds/liter	+	0	0	+	0	+	+	0	+
No. of samples	5	0	0	6	0	11	8	0	19
Percent of samples	50%	0	0	67%	0	35%	24%	0	26%
No. of samples burned	1	0	0	0	0	1	0	0	1

[a] + = less than 0.5 percent.

Table 10.14. Distribution of Physalis seeds at 29SJ 629.[a]

	Hearths (n = 10)	Heating Pits (n = 5)	Mealing Bins (n = 3)	Bell-Shaped O.P.'s (n = 9)	Other Storage (n = 4)	All Features (n = 31)	All Floors (n = 34)	Trash (n = 9)	Total (n = 74)
Actual no. of seeds	5	0	0	17	1	23	10	10	43
Seeds/liter	5.0	0	0	17.1	1	23.1	11.2	14.6	48.9
Percent of all seeds/liter	+	0	0	+	+	+	+	2%	+
No. of samples	2	0	0	5	1	8	8	2	18
Percent of samples	20%	0	0	56%	25%	26%	24%	22%	24%
No. of samples burned	1	0	0	0	0	1	0	0	1

[a] + = less than 0.5 percent.

Table 10.15. Distribution of Euphorbia seeds at 29SJ 629.

	Hearths (n = 10)	Heating Pits (n = 5)	Mealing Bins (n = 3)	Bell-Shaped O.P.'s (n = 9)	Other Storage (n = 4)	All Features (n = 31)	All Floors (n = 34)	Trash (n = 9)	Total (n = 74)
Actual no. of seeds	3590	33	35	707	176	4541	992	61	5594
Seeds/liter	4156.8	38.2	35.0	793.1	202.6	5225.7	1808.1	72.0	7105.8
Percent of all seeds/liter	59%	3%	3%	8%	17%	26%	6%	10%	14%
No. of samples	4	3	2	8	3	20	27	6	53
Percent of samples	40%	60%	67%	89%	75%	65%	79%	67%	72%
No. of samples burned	0	0	0	0	0	0	0	0	0

cation 1981). The leaves contain nicotine and were smoked ceremonially by the Zuni and Apache (Stevenson 1915:95; Reagan 1928:158-9). Morris (1980:103) describes numerous quids composed of "finely prepared yucca fiber, carefully wrapped around cores of finely divided leaves and stems of tobacco (Nicotiana attenuata)" from a Basketmaker cave in northeastern Arizona. Appearance of the unburned seeds at 29SJ 629 (and also in seven samples at nearby site 29SJ 627) is reasonable evidence that some use (smoking and/or sucking "pastilles") was made of tobacco at the small-house sites (Table 10.16). Tobacco may have been acquired by trade or may have been cultivated (as by the Hopi; Whiting 1939:90).

Sphaeralcea, a member of the mallow family, is represented in Chaco Canyon by several species, growing generally in disturbed alkaline soils (Potter 1974). Several groups in the Southwest used the roots of perennial mallows for medicinal purposes. In most cases, the root is mashed or boiled, and the resulting sap or tea applied or ingested for any variety of ailments (Swank 1932:71-72; Whiting 1939:31, 85; Curtin 1949:80-81; Krenetsky 1964:48). The occurrence of mallow seeds in archeological sites is often limited to a very small number of unburned seeds, and has been interpreted, in these cases, as recent contamination (Minnis 1982; Donaldson and Toll 1982; Toll and Donaldson 1982). At both 29SJ 627 and 29SJ 629, however, burned mallow seeds occur in several samples, indicating clear association with prehistoric activity (Table 10.17). In the absence of ethnographic records of food use, I will assume that the small number of seeds recovered were brought into the site on plants collected and stored for medicinal purposes, or were accidental intrusions.

Corispermum is an herbaceous annual that becomes a tumbleweed. It belongs to the large and widespread Chenopodiaceae family with such members as Chenopodium, Cycloloma, Salsola (Russian thistle), Atriplex, and Sarcobatus. Several species of Corispermum grow in New Mexico today, and all are thought to be introduced from Eurasia (Martin and Hutchins 1980:598-600). The recovery by flotation of carbonized tickseeds at several Anasazi sites in the Four Corners area (Bis sa'ani, Donaldson and Toll 1982:11; Puebloan middens in southeastern Utah, Alan Reed, personal communication 1989; Tsaya Wash, Minnis 1982; Pittsburgh-Midway coal lease, Toll and Donaldson 1982; and Navajo Mines, Toll 1983) suggests that there was a species present in the Southwest before the historic era. Betancourt et al. (1984) has recently provided direct accelerator dates of Corispermum seeds that amply antedate the Anasazi period. Tickseed fragments in three Bis sa'ani coprolites (Donaldson and Toll 1982) and in coprolites from Cowboy Cave (Hogan 1980) provide convincing evidence that this weed served as a food resource, despite its absence from the many ethnographic records of Southwestern aboriginal plant utilization.

Two unsavory local weeds are almost surely present in 29SJ 629 deposits as a result of modern (or possibly in some cases, prehistoric) contamination. Cryptantha is a bristly plant that inhabits dry, sandy, or gravelly soil. Most seeds in good condition were assignable to a common local species, C. crassisepala (Torr. & Gray) Greene. Only medicinal uses are recorded in the ethnobotanical literature for the Hopi (Whiting 1939:88) and the Zuni (Stevenson 1915:45). Among the Keres, Cryptantha is "considered a bad poisonous weed" (Swank 1932:24). Phacelia has hairy pinnatifid leaves, glandular pubescence, and a peculiar onionlike smell. Contact with the plant "causes dermatitis in susceptible persons" (Kearney and Peebles 1960:698). No economic uses of this taxon were noted, and it is probable that it was avoided. Cryptantha seeds occurred in 15 samples and Phacelia in 3. None of these seeds were burned, lending further support to the notion that they are intrusive.

Cultivars

Zea mays L. (corn); Phaseolus vulgaris L. (common bean); Cucurbita sp. (squash/pumpkin). All corn and bean remains were charred, while most squash remains were not. All remains of domesticated crop plants, whether charred or not, are directly attributable to agriculture practiced by man (these taxa have all lost the ability to perpetuate themselves outside of cultivation).

The great majority of corn remains were cobs, many of which were fragmentary. Cupules (the cob segment holding a pair of side-by-side kernels) were recovered from over half of all flotation samples (Table 10.18). Carbonized cobs are most likely the

Table 10.16. *Distribution of Nicotiana seeds at 29SJ 629.*[a]

	Hearths (n = 10)	Heating Pits (n = 5)	Mealing Bins (n = 3)	Bell-Shaped O.P.'s (n = 9)	Other Storage (n = 4)	All Features (n = 31)	All Floors (n = 34)	Trash (n = 9)	Total (n = 74)
Actual no. of seeds	0	1	0	4	3	8	11	0	19
Seeds/liter	0	1.0	0	4.5	3.5	9	8.4	0	17.4
Percent of all seeds/liter	0	+	0	0	+	+	+	0	+
No. of samples	0	1	0	2	1	4	7	0	11
Percent of samples	0	20%	0	22%	25%	13%	21%	0	15%
No. of samples burned	0	0	0	0	0	0	0	0	0

[a] + = less than 0.5 percent.

Table 10.17. Distribution of Sphaeralcea-type seeds at 29SJ 629.[a]

	Hearths (n = 10)	Heating Pits (n = 5)	Mealing Bins (n = 3)	Bell-Shaped O.P.'s (n = 9)	Other Storage (n = 4)	All Features (n = 31)	All Floors (n = 34)	Trash (n = 9)	Total (n = 74)
Actual no. of seeds	9	1	1	18	3	32	25	2	59
Seeds/liter	9.3	1.0	1.0	21.2	3.5	36.0	25.3	2.5	63.8
Percent of all seeds/liter	+	+	+	+	+	+	+	+	+
No. of samples	3	1	1	7	1	13	10	2	25
Percent of samples	30%	20%	33%	78%	25%	42%	29%	22%	34%
No. of samples burned	3	0	1	1	0	5	3	0	8

[a] + = less than 0.5 percent.

Table 10.18. *Distribution of Zea mays remains at 29SJ 629.*[a]

	Hearths	Heating Pits	Mealing Bins	Bell-Shaped O.P.'s	Other Storage	All Features	All Floors and Fill	Trash	Total
Actual no. of seeds	20	0	38	0	0	58	3	2	63
Seeds/liter	20.8	0	38.0	0	0	58.8	3.8	3.0	64.6
Percent of all seeds/liter	+	0	3%	0	0	+	+	+	+
No. of samples	9	1	2	5	2	19	13	8	40
Percent of samples	90%	20%	67%	56%	50%	61%	38%	89%	54%
Macro: no. of cobs	16	-	1	91	8	-	77	13	205
No. of kernels	1	-	2	-	21	-	239	-	263
Other parts (macro and float)	-	-	-	-	-	-	tassel frags	shank	-

[a] + = less than 0.5 percent.

product of cobs recycled as fuel. Cob parts were recovered largely from hearths and from other contexts which might reasonably include hearth dumpings (large plaza pits filled with trash, trash-fill layers in rooms and pitstructures, and the Trash Midden). Kernels, presumably preserved due to accidental charring, followed a different distribution. A large concentration (229 kernels; FS 2435) found in Plaza Grid 16 may be due to a single such accident. These kernels form the bulk of kernels retrieved at the site. Most other kernels were recovered by flotation from hearths and the Trash Midden, with a substantial number coming from burned organic trash layers in Room 2 and the Pithouse 2 mealing bins. The range of proveniences with small numbers of isolated kernels may be underrepresented in macro-remains, as charred kernels may often be greatly distorted, and are less distinctive and recognizable during excavation than cobs. While excavators made no errors in labeling cobs collected in the field, swollen kernels were frequently designated as "beans," or "unknown seeds." Carbonized male spikelets (fragmentary tassels) were preserved in Room 2, Layer 2 (flotation sample FS 346), and a single shank (diameter 8.1 x 10.0 mm; FS 954) in Trash Midden Grid 70.

Cobs from 29SJ 629 were largely 10-rowed, with significant portions of 8- and 12-rowed cobs. With respect to this character, 29SJ 629 corn seems to be very similar to a small sample of cobs analyzed from 29SJ 627 (Table 10.19). Very few cob segments included the basal portion, but the four that did were all tapered. In gross morphology, cobs from 29SJ 629 are small, cigar-shaped, and round in cross-section (many cobs exhibit some degree of compression presumed to have occurred after deposition).

Kernels range in width from 5.1 to 9.8 mm ($\bar{x}=6.9$), and in thickness from 3.1 to 8.2 mm ($\bar{x}=4.6$). Considerable variation in kernel shape and size is observable within single proveniences. Variable burning conditions may be responsible: Cutler (1956) has pointed out that slow carbonization will result primarily in a slight increase in kernel thickness, while rapid carbonization of moist (not completely matured) kernels off the cob will result in considerable distortion, including globular swelling. Both forms of distortion were observed at 29SJ 629.

All specimens of cultivated beans were charred and lacked seed coats. In spite of their poor condition, all could reasonably be assigned to the species of common bean, Phaseolus vulgaris. Species-level determination of Southwestern bean types is a relatively clear-cut matter--species overlap only slightly in constellations of size and shape parameters and possess distinctive morphological characters. Scarlet runner beans (P. coccineus) are very large and round; teparies (P. acutifolius) are small and flat with squared ends and have proportionately-small hilums; and limas (P. lunatus) have a characteristic venation pattern and hilum conformation. The only real area for possible confusion is between nontypical teparies and some common bean types (Robert Gasser, personal communication 1979).

The known distribution of cultivated bean species in time and space leads us to expect only P. vulgaris in the Chaco area during the Anasazi period, although other species might conceivably arrive in the area as trade products. P. vulgaris is the most widely utilized of the food beans (prehistorically as well as currently) and can be raised in a wide range of conditions, from neutral to slightly alkaline soils and from sea level to elevations over 2000 meters (Kaplan 1965a). Varieties of the scarlet runner beans, limas, and teparies were cultivated as far north as the Verde Valley in Arizona, but they never reached the Four Corners area during the Puebloan era (Kaplan 1965b).

Apparent accidental burning of organic trash was responsible for preservation of all bean specimens from 29SJ 629. These included five beans in Room 2, Layer 2, and one from the mealing bins in Pithouse 2. The archeological record is usually very underrepresentative of actual bean use, as "beans, unlike corn, seldom have a waste or by-product which can accumulate" (Kaplan 1956:199). Beans also have a "thin, fragile seed coat which breaks rapidly leaving the interior immediately susceptible to external factors" (Gasser and Adams 1981:183). This characteristic hastens deterioration of beans stored under variable atmospheric conditions: cotyledons may split apart, seeds may actually germinate, and mold infestations may set in. One 29SJ 629 bean (FS 297) shows signs of such deterioration in progress: emergence of the hypocotl

Table 10.19. *Morphological attributes of Zea cobs.*

	Row Number				Cob Diameter				Cupule Width				Cupule Thickness			
	n	$\bar{x}$	sd	cv	n	$\bar{x}$	sd	cv	n	$\bar{x}$	sd	cv	n	$\bar{x}$	sd	cv
29SJ 627	25	10.1	1.717	.170		-----				-----				-----		
29SJ 629	202	10.0	1.762	.176	202	9.8	2.693	.275	202	5.1	1.176	.231	48	2.8	.457	.163
Adjustment[a]						11.9	2.693	.227		6.2	1.176	.191		3.4	.457	.135

[a] 21% added to compensate for estimated average shrinkage of cobs during carbonization (Cutler 1956).

shows that germination was taking place when the fire occurred. Perhaps the absence of similar conflagrations at 29SJ 627 accounts for the lack of beans at that site. Unhappily, many of the 29SJ 629 beans were destroyed by a flooded museum exhibit.

Bean specimens from 29SJ 629 fall within the size range for P. vulgaris given by Kaplan (1956; Table 10.20). Some size variation can be expected in beans from a single pod (smaller seeds found in apical positions) and as a result of variable growing conditions. Given the very small sample size and poor condition of specimens, it is not possible to determine whether the considerable variability observed is attributable to more than one variety.

mealing bins) was charred, and all were fragmentary and brittle. The seeds were classified as C. pepo on the basis of similar characteristics of size, shape, color, and seed body and margin treatments (Cutler and Whitaker 1961; Whitaker and Bohn 1950). It should be noted, however, that distinctive attributes of C. mixta seeds (sculptured or split, soft white body; acute wavy margins) may erode, leaving seeds which are sometimes indistinguishable from deteriorated C. pepo seeds (Gasser 1980:103). As with corn remains, the record of distribution of squash at 29SJ 629 must be pieced together using both flotation and macro-botanical data (Table 10.21). Once again, note that flotation is capable of picking up smaller and less distinctive fragments than those

Table 10.20. Dimensions of beans (in cm) compared to Kaplan's (1956) type characteristics.

	Length	Width	Thickness
29SJ 629 Beans			
Average	1.2	0.7	0.5
Range	0.9 - 1.5	0.5 - 1.0	0.4 - 0.8
	n = 6	n = 7	n = 7
Phaseolus vulgaris[a]			
Range	0.74 - 1.85	0.49 - 1.08	0.34 - 0.85

[a] Kaplan 1956.

The five cultivated species of the genus Cucurbita are of tropical American origin. In the Southwest, three species (C. pepo, C. moschata, and C. mixta) are known archeologically. C. Pepo remains accompany early Zea specimens in preceramic deposits ca. 300 B.C. at several Southwestern sites (Tularosa, Cordova, and Bat Caves; Sheep Camp Shelter–Donaldson 1984; Kaplan 1963; Martin et al. 1952; Smith 1950). C. moschata was never widespread in the Southwest prehistorically or during historic times (Cutler and Whitaker 1961:479). C. mixta began appearing in Pueblo sites between A.D. 900-1100, but it was never as widely distributed as C. pepo (Cutler and Whitaker1961:48).

Fourteen squash seeds were recovered at 29SJ 629. Only one (from burned trash in the Pithouse 2

recognizable in the field, and that the two data collection methods are not comparable in their comprehensiveness. Squash seeds occurred in small numbers in varied locations; most were found on floors, or in trash deposits in features.

Only a very small proportion of discarded peduncles and rind was charred (as evidenced by botanical assemblages from dry caves and protected sites; Gasser 1980; Struever 1980, etc.). In open sites, deterioration of uncharred stems and rind may be responsible for the absence of these remains (at 29SJ 627 a single charred C. pepo peduncle was recovered). Based on the archeobotanical record in the Southwest, cucurbit seeds must be relatively resistant to decay.

Table 10.21. Distribution of Cucurbita seeds at 29SJ 629.

	Features		Floors	
	Flotation	Macro	Flotation	Macro
Large Plaza pits	3	-	-	-
Living Room pits	-	1	-	-
Pithouse 2 mealing bins	1[a]	-	-	-
Tub Room floor	-	-	-	5
Pithouse 2				
Floor 1	-	-	3	-
Floor 2	-	-	1	-
Total	4	1	4	5

[a] Charred.

Discussion: Occurrence of Plant Taxa at 29SJ 629

Flotation assemblages at 29SJ 627 and 29SJ 629 were grossly similar in that most seeds belonged to weedy plant species growing in the immediate vicinity of the sites. Four taxa, goosefoot, purslane, tansy mustard, and stickleaf, account for 78 percent of seeds from 29SJ 627 and 77 percent of seeds from 29SJ 629. All of these taxa are found ubiquitously in every type of provenience sampled for flotation at 29SJ 629 (Figure 10.2). Because these taxa have extensive ethnographic records of economic use, are loally abundant, and produce tremendous numbers of tiny seeds, we might expect these taxa to form a major component in the wild food diet of prehistoric inhabitants of the rincon. Two things cast considerable suspicion on the question of prehistoric association of these seeds. First, a significant proportion of these seeds are unburned (and hence of uncertain origin). Second, a fifth taxon, spurge, shows a similar distribution of large numbers of unburned seeds in the rincon sites, although it is not a reasonable candidate for major food use.

Plant taxa which have more discriminating reproductive strategies (produce fewer, larger seeds) tend to be found far more sparsely and are represented by fewer seeds at sites 29SJ 627 and 29SJ 629. Economic taxa in this category include some of the weedy annuals (Figure 10.3) and perennials (Figure 10.4). In some cases, modern distribution of these taxa is patchy or scattered in the rincon (groundcherry, prickly pear), or, in others, restricted to other habitats (beeweed, pinyon, bulrush). Presence of such taxa in the archeobotanical collection more often can be assumed to be a direct reflection of prehistoric manipulation.

Clearly there is a problem in determining the relationship between probable modern contaminants and probable remnants of prehistoric economic behavior. Some investigators have suggested that all non-carbonized plant materials be disregarded since they are potentially intrusives (Asch, Ford, and Asch 1972; Minnis 1982). This approach makes good sense in areas where soil and edaphic conditions result in poor preservation but is not altogether warranted in the arid Southwest. At 29SJ 629, throwing out all taxa that never occur burned will eliminate such dubious characters as Russian thistle (an introduced pest) and hiddenflower and scorpionweed (native pests), but at the same time it will result in dismissal of several taxa which may well have been utilized. For instance, stickleaf seeds have been recovered in a large concentration from an intact prehistoric context at Chaco (a covered Mesa Verdean kiva jar at Una Vida; Bohrer 1978); tobacco and hedgehog cactus have not been seen growing in Marcia's Rincon. All three taxa have excellent potential economic utility. Several other taxa occur charred only rarely but are clearly economic. Beeweed, pinyon, bulrush, and cultivated squash

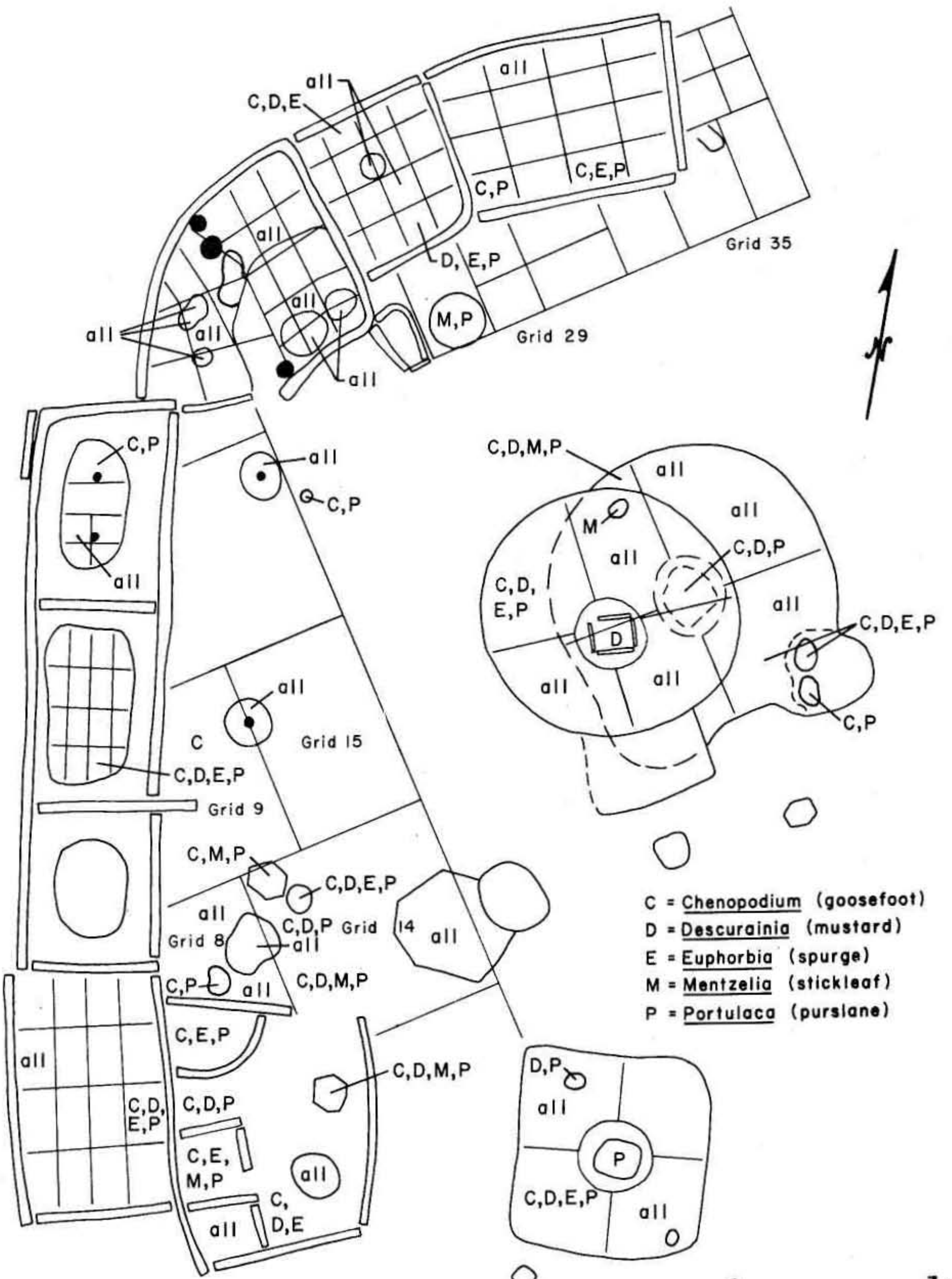

Figure 10.2. Distribution of economic weeds at 29SJ 629: taxa with abundant natural dispersal (NPS 310/82831 B).

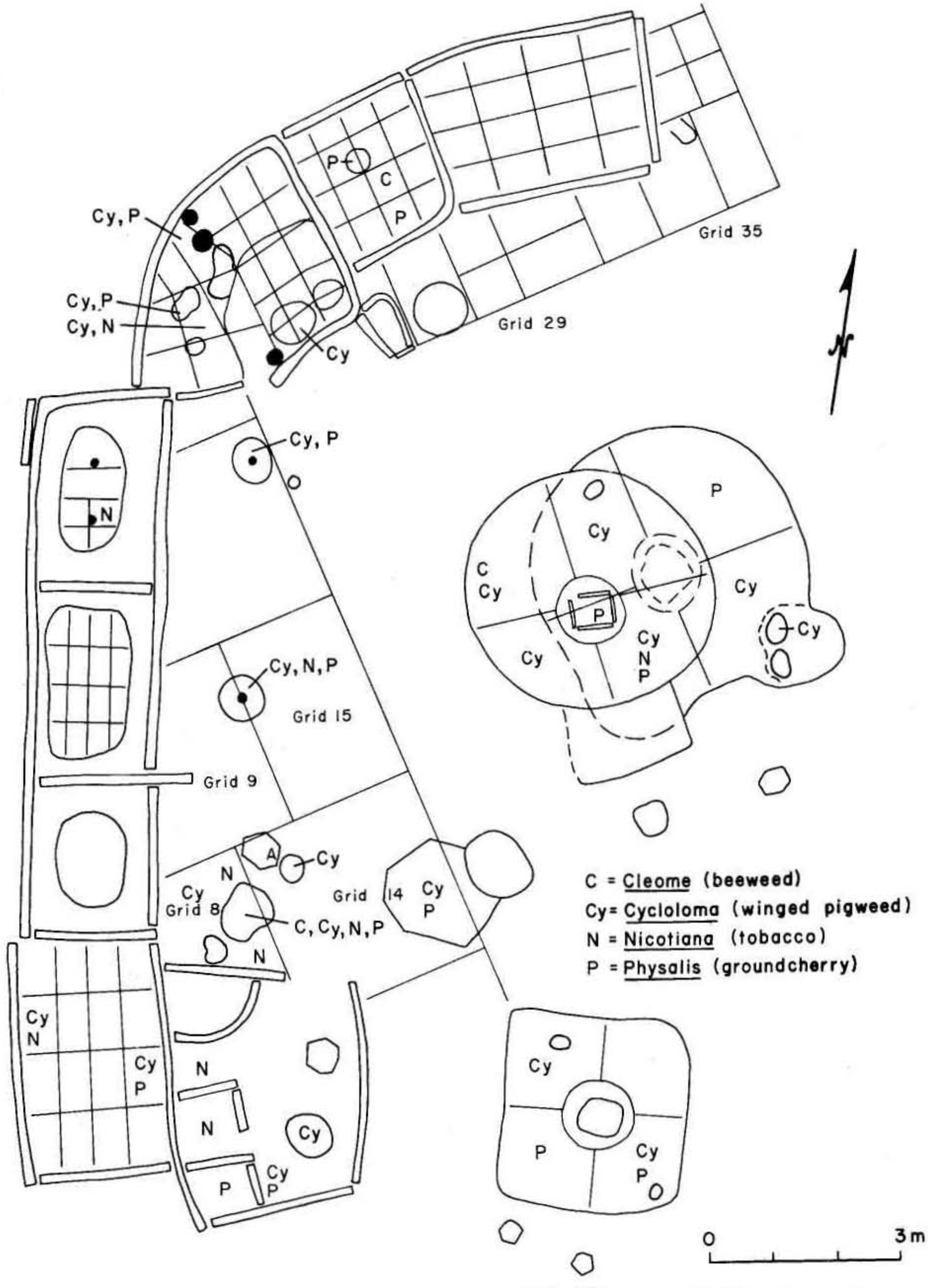

Figure 10.3. Distribution of economic weeds at 29SJ 629: taxa with limited natural dispersal (NPS 310/82832 B).

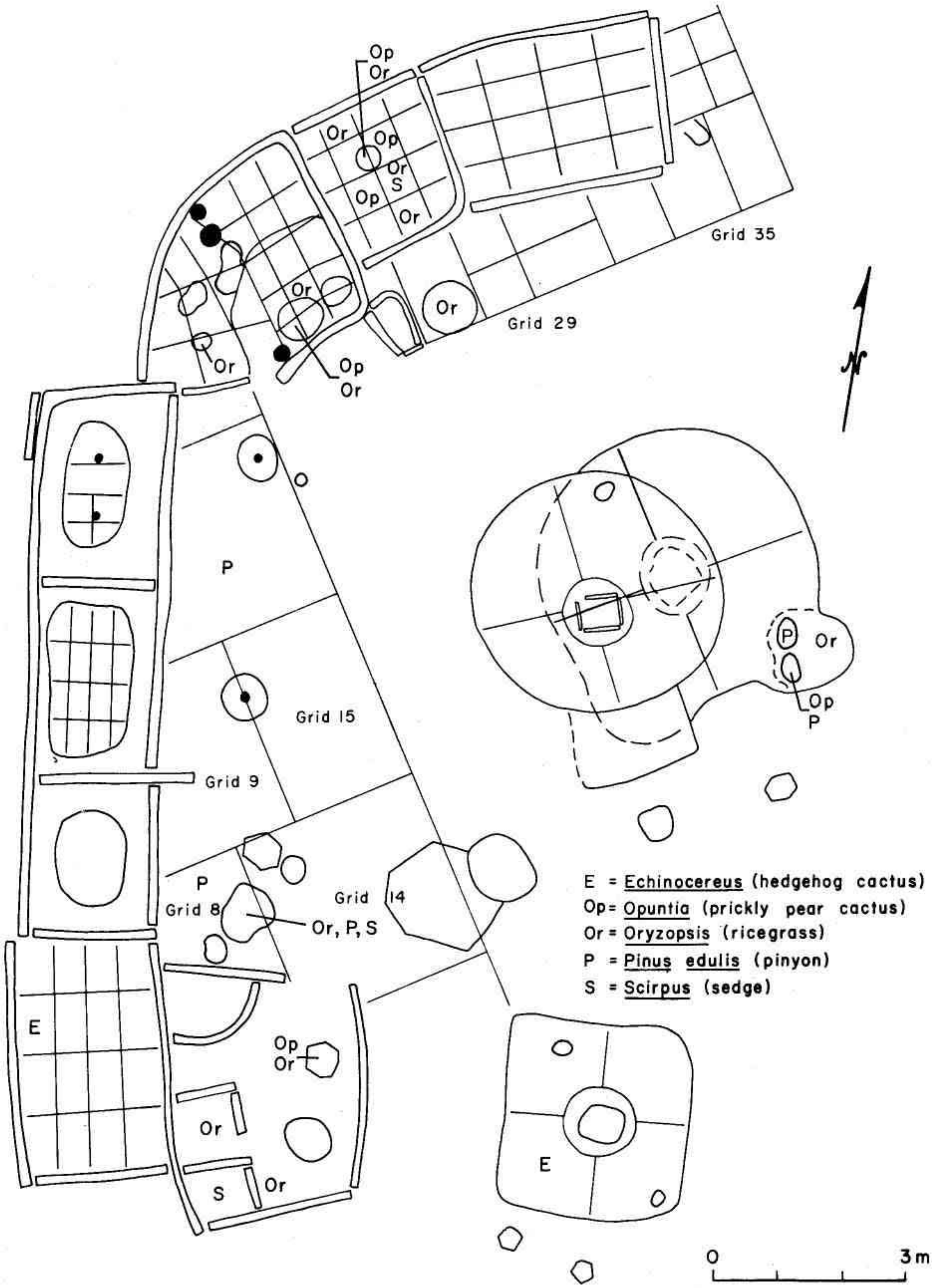

Figure 10.4. Distribution of non-weedy wild economic taxa (NPS 310/82833 B).

simply do not grow in the rincon today. Unburned pinyon shell and sunflower achenes have been recovered in Chaco Canyon coprolites (prime direct evidence of food utilization). It is evident that, in Chaco Canyon, out-of-hand dismissal of uncharred seeds will result in an incomplete and highly skewed record of prehistoric economic behavior.

Table 10.22 is included to help sort out this complex and confusing situation. Of local weedy annuals which might be expected to form the backbone of the wild food diet (see above), two at least (goosefoot and purslane) appear to do so. While seeds of these taxa are frequently unburned, charred goosefoot and purslane are still far more ubiquitous (found in 19 and 24 percent of all samples, respectively) than charred seeds of other weed species. Pigweed seems to have been less important; it occurs in fewer samples, in small numbers, and is rarely charred (2 out of 29 samples with pigweed). The role of mustard and stickleaf is as yet unknown. All stickleaf seeds and nearly all mustard seeds are unburned and could be intrusive. In this context, it is noteworthy that fragmentary unburned mustard seeds were observed in human coprolites from several Chaco Canyon sites (Toll 1981). Winged pigweed, groundcherry, beeweed, and sunflower probably were minor dietary constituents. Spurge (in spite of its large numbers) and other weeds such as primrose may have had a negligible role in the Puebloan economy. As with stickleaf, tobacco is (intuitively) assumed to be a probable resource in spite of inconclusive evidence. Mallow belies its reputation by occurring more often (and more often charred) than its ethnobotanical record would seem to warrant.

Among non-weeds, two local grasses seem to be largely economic (ricegrass is carbonized in 12 out of 16 samples and dropseed in 4 out of 5). Charred prickly pear macro-remains are clearly prehistoric, while a cache of new rodent-gnawed prickly pear seeds (FS 2616) are equally clearly not. Pinyon and bulrush were transported to the site from elsewhere; the distances involved are too great to consider even the most enterprising small rodent as possibly responsible.

As at 29SJ 627, the record of cultivar use was dominated by corn, which leaves a more durable waste-product. Corn remains (almost entirely cob parts) were distributed throughout 29SJ 629 (Figure 10.5). Squash seeds were clustered in the deeper pitstructures. Recovery of beans (absent at 29SJ 627) seems to have been conditional on some unusual burning circumstances (in Room 2, Layer 2, and in Pithouse 2 mealing bins).

Several economic taxa (pinyon, beeweed, prickly pear, and bean) were noted as "conspicuously absent" at 29SJ 627 (Struever 1977a:79-81). All four turned up in very low frequencies at 29SJ 629 (together these taxa comprised less than 0.1 percent of seeds at 29SJ 629). Differences in occurrence of these taxa at the two nearby sites may be largely a question of sampling error.

Direct and indirect evidence of fuel usage at 29SJ 627 and 29SJ 629 produced slightly different records. Small samples of charcoal pieces from throughout both sites indicated that locally common shrubby species provided the bulk of fuel (Table 10.23). Saltbush/greasewood constituted the great majority at 29SJ 627, while more variety of shrub types appeared at 29SJ 629 (small sample size may be responsible). Low elevation conifers were present in small quantities at both sites. Charred juniper twigs and scale leaves were recovered by flotation from two samples at 29SJ 627 and from 11 samples at 29SJ 629 (where juniper fuel measured slightly more abundant). However, saltbush fruits were absent at 29SJ 627 but found in 9 samples (4 charred) at 29SJ 629.

Botanical Data Applied to Provenience Units

Tub Rooms

The earliest construction at site 29SJ 629 (at approximately A.D. 875) includes a row of three tub-shaped rooms (Rooms 5, 6, and 7), with adjoining ramada areas, and a pitstructure centered in front of the roomblock (Pithouse 2; see Figure 10.1). This basic spatial pattern is common to contemporaneous Pueblo I sites, both in Chaco Canyon and throughout the eastern Anasazi country (Windes, Volume I). The sequence of wall abutments indicates that Rooms 5, 6, and 7 were built as a single, semi-subterranean unit. Walls below ground level were of coursed masonry (rather than upright slabs, as in tub rooms at 29SJ 627 and other

Table 10.22. Expected and actual distribution of weed species.[a]

Taxon	Expected Role	Expected Distribution	Actual Distribution	Modern Vegetation	Contamination
Chenopodium (goosefoot)	Major economic weed, used for greens and seeds.	Widespread, large numbers, often burned.	Widespread, large numbers, only occasionally burned.	+[a]	ND
Portulaca (purslane)	Major economic weed, used for greens and seeds.	Widespread, large numbers, often burned.	Widespread, large numbers, only occasionally burned.	VC	ND
Amaranthus (pigweed)	Major economic weed, used for greens and seeds.	Widespread, large numbers, often burned.	Far less common than Chenopodium or Portulaca, rarely burned.	+	ND
Descurainia (mustard)	(May be exploited extensively, depending on availability); greens and seeds.	Less widespread and abundant than the "major weeds."	Widespread, large numbers, burned seeds cluster in firepits.	VC	ND
Mentzelia (stickleaf)	(May be exploited extensively, depending on availability); seeds.	Less widespread and abundant than the "major weeds."	Widespread, large numbers, never burned.	VC	ND
Cycloloma (winged pigweed)	Minor food weed (seeds).	Very patchy distribution, small numbers, some charred.	Follows expectation.	0	
Physalis (groundcherry)	Minor food weed (fruits).	Very patchy distribution, small numbers, some charred.	Follows expectation.	+	
Cleome (beeweed)	Minor food weed (greens and seeds) with important ancillary uses.	Very patchy distribution, small numbers, some charred.	Follows expectation.	0'	
Helianthus (sunflower)	Minor food weed (achenes),	Very patchy distribution, small numbers, some charred.	Rarely charred.	+	R
Euphorbia (spurge)	Very minor food use (roots).	Rare.	Widespread, large numbers, never charred.	VC	ND, R
Oenothera (primrose)	Very minor medicinal use.	Rare.	More widespread than expected (15% of samples); never burned.	+	ND, R
Nicotiana (tobacco)	Ceremonial (smoking) only; (greens).	Rare; include some kiva association.	Found in kiva, but numerous other locations also.	0	
Sphaeralcca (mallow)	Very minor medicinal use.	Rare.	34% of samples (more widespread than expected), sometimes burned.	+	

[a] + = present in modern plant community (not in large numbers).
0-has not been observed growing in rincon (0'- grows a short distance away in Chaco Wash).
VC-very common in modern plant communtiy.
ND-natural dispersal (gravity, wind) may be responsible for many of seeds in the archeological assemblage.
R-rodent activity may be responsible for many of seeds in the archeological assemblage.

Table 10.23. Fuel use at 29SJ 627 and 29SJ 629.[a]

	Juniper	Pinyon	Saltbush/ Greasewood	Sagebrush	Rabbitbrush	Rose family (Chokecherry?)	Cottonwood	Grass	Unknown	Total
29SJ 627										
Number of pieces	1	3	86	—	2	—	6	—	—	98
Percent	1%	3%	88%	—	2%	—	6%	—	—	100%
29SJ 629										
Number of pieces	7	4	75	6	4	4	1	1	18	120
Percent	6%	3%	63%	5%	3%	3%	1%	1%	15%	100%

[a] Based on two samples of charcoal pieces, selected by Thomas Windes from 6 proveniences at 29SJ 627 and 13 proveniences at 29SJ 629, and identified by Stanley Welsh, Endangered Plant Studies Inc., Orem, Utah (Welsh 1979).

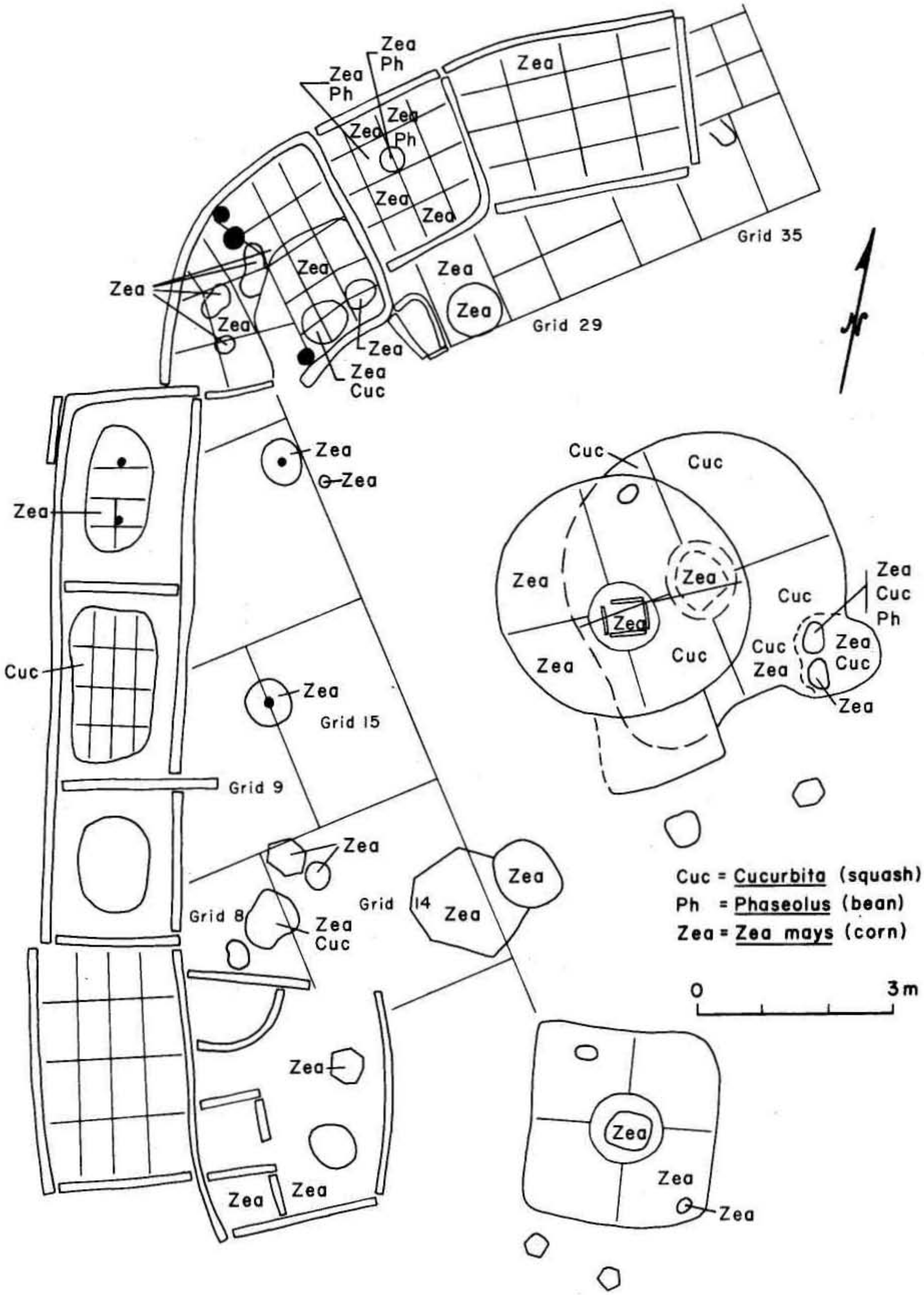

Figure 10.5. Distribution of cultivar remains (NPS 310/82834 B).

Chaco Canyon sites), while the small amount of stone rubble suggests that above ground level the walls were largely mud. Lack of features implies their use as storage facilities.

Flotation samples from floor surfaces in Rooms 5 and 6 were examined. Dating based on ceramics and archeomagnetic samples indicates these rooms were used through the end of the main site occupation (to A.D. 1025-1050). Floor surfaces were smoothed (but otherwise unprepared) sand. Flotation remains here are consistent with those from tub-room floors at 29SJ 627 and 29SJ 724; they consist largely of uncharred, pristine seeds from weedy annuals dispersing a large number of tiny seeds (Table 10.24; Struever 1977a, 1977b). These same seed types--goosefoot, purslane, mustard, and spurge--are most common in all 29SJ 629 flotation samples and may reflect a ubiquitous "seed rain." Thus, a large harvester ant nest in the northern half of Room 5 may bear some relation to the high density of pristine seeds (especially purslane) in FS 785 (see Windes, Volume I, Chapter 9). Botanical remains that can be attributed to the prehistoric period are uniformly scarce on these tub floors. Agricultural taxa found in tub rooms include a few charred corn cupules in Room 5 and five uncharred squash seeds (Cucurbita sp.) in Room 6. Corn pollen was found in floor samples from Rooms 5 and 6, but other economic pollen could largely be attributed to potential roofing materials (scouring rush, cattail/bur-reed; Cully 1985b:Table 4.3).

Ramada/Plaza Areas

The ramada immediately to the east of the tub rooms was delineated by a rectangular pattern of postholes. The generally sterile occupation surface, just a few centimeters below modern ground level, was not clearly definable during excavation. Floor levels had to be inferred (i.e., from occasional concentrations of cultural debris at a level with tops of features). This presumed plaza work area contained little in the way of plant micro- (pollen) and macro-fossils, or other artifactual materials. This pattern of few flotation remains on plaza surfaces has been observed elsewhere (29SJ 627, 29SJ 724, Salmon Ruins) and has been attributed to exposure to wind (Doebley 1976). One area of the plaza at 29SJ 629 (Grid 8, east of Room 7) has been characterized as a possible center of work activity due to the concentration of features. Here wall fall may have served to preserve a layer of cultural materials in situ from further erosion or deterioration. Both pollen and flotation remains reflect this situation. The pollen sample from Grid 8 contained substantial fractions of corn, cheno-ams, and grasses, while a sample from Grid 14 was essentially sterile (Cully 1985b:Table 4.4). Seed remains were confined to low densities of the seed types most common at the site (cheno-ams, purslane, and mustard) in three areas of the plaza (FS 1341 in Grid 9, and FS 1489 and 1491 in Grid 14), but higher densities of a wider variety of seeds were present in Grid 8 (Tables 10.24-10.26).

Botanical materials (eight flotation samples and macro-remains) from four large (ca. 1 m^3) plaza pits were examined. Three of these were bell-shaped pits (Other Pits 15, 1, 14) positioned directly in front of Rooms 5, 6, and 7, respectively. The former ramada structures would have sheltered all three pits. Each pit was trash- and rubble-filled and then plugged with construction rubble. Windes notes that the spatial arrangement of the pits, their similar morphology and volume, and their process of post-occupational filling argues for a similar function and history.

Other Pits. Other Pit 1 was located east of Room 6. Sherds from a single vessel distributed from top to bottom of the pit fill indicated that the pit was intentionally filled in a single episode. The fill contained an abundance of artifacts, including a significant percentage of the site's bead-making debris and tools, together with human and turkey skeletal remains. Flotation sample FS 1860 represented Level 9 (approximately 20 percent refuse and the rest sand and rubble), and FS 2088 represented the earth floor of the pit. The results were fairly similar, except for the relative percentages of some of the more common types (particularly mustard and spurge, Tables 10.25 and 10.27). The samples also differed in the presence or absence of more rarely occurring types.

Other Pit 14 was located east of Room 7 in the sheltered area of high feature concentration designated the plaza work area. Like Other Pit 1, Other Pit 14 apparently represents a single deposition (although natural layers are distinguishable) and was plugged with masonry and rubble. This pit was a repository for significant portions of several

Table 10.24. Flotation results from tub storage Rooms 5 and 6, and Plaza Grid 8 at 29SJ 629.[a]

	Room 5		Room 6	Plaza Grid 8		
FS Number:	785	1364	2285	1484	1495	1424
Provenience:	Tub Floor, South Half	Tub Floor (pinch)	Tub Floor, Grid G	Floor Grid C	Floor Grid F	Other Pit 4
Cupressaceae Juniperus (T = twig)	-	-	-	-	-	-
Gramineae Oryzopsis	-	-	-	-	-	-
Amaranthaceae Amaranthus	-	-	-	28/27.5	3/3.3	1/1.4
Capparidaceae Cleome	-	-	-	-	-	-
Chenopodiaceae Chenopodium	13/11.7	3/2.9	2/2.0	70/68.6	69/76.6	9/13.0*
cheno-ams	6/5.4	-	-	15/14.7	9/10.0	5/7.2
Chenopodiaceae Atriplex	-	-	-	-	-	-
Chenopodiaceae Cycloloma	-	-	-	9/8.8	-	-
Compositae Helianthus	-	1/1.0	-	1/1.0	-	-
Cruciferae Descurainia	20/18.0	-	3/3.0	7/6.9	1/1.1	-
Euphorbiaceae Euphorbia	13/11.7	-	2/2.0	4/3.9	25/27.8	-
Loasaceae Mentzelia	19/17.1	-	-	4/3.9	2/2.2	-
Malvaceae Sphaeralcea	1/0.9	-	2/2.0	-	-	-
Portulacaceae Portulaca	376/338.7	23/22.5	7/7.0	14/13.7	14/15.6	6/8.7*
Solanaceae Nicotiana	1/0.9	-	-	1/1.0	1/1.1	-
Solanaceae Physalis	-	-	-	-	-	-
Zea mays (c = cob, cupule)	c*	-	-	-	-	-
OTHERS	-	-	+[b]	-	-	-
UNKNOWNS	-	-	-	1/1.0*[c]	-	-
UNIDENTIFIABLE	-	11/10.8	7/7.0	-	3/3.3	-
No. of Taxa	9	4	7	11	10	4
No. of Taxa charred	3	0	0	1	0	2
TOTAL SEEDS Actual count	449	38	23	154	127	21
TOTAL SEEDS Seeds/liter	404.5	37.3	23.0	151.0	141.1	30.4

* indicates that some or all items were charred.

[a] Number before slash = actual number of seeds recovered; number after slash = seeds/liter.

[b] Salsola kali bracts.

[c] Unknown 9029.

Table 10.25. Flotation results from Plaza Grids 9 and 14 at 29SJ 629.[a]

	Plaza Grid 9			Plaza Grid 14			
FS Number:	1341	1860	2088	1489	1491	1618	2539
Provenience:	Floor Grid B	Other Pit 1 Level 9	Other Pit 1 Floor	Floor Grid D	Floor Grid A	Firepit 2	Firepit 6
Cupressaceae Juniperus (T = twig)	-	-	-	-	-	T*	-
Gramineae Oryzopsis	-	-	-	-	-	-	-
Amaranthaceae Amaranthus	-	4/4.4	3/2.6	-	-	-	-
Capparidaceae Cleome	-	-	-	-	-	-	-
Chenopodiaceae Chenopodium	2/2.4	475/572.8	900/782.6	13/12.7	23/23.0	15/15.0*	8/10.3*
cheno-ams	-	-	-	-	-	18/18.0*	6/7.7*
Chenopodiaceae Atriplex	-	-	-	-	-	-	-
Chenopodiaceae Cycloloma	-	-	3/2.6	-	-	1/1.0*	-
Compositae Helianthus	-	-	1/0.9	-	-	1/1.0	-
Cruciferae Descurainia	-	269/298.9	12/10.4	4/3.9	3/3.0	34/34.0*	-
Euphorbiaceae Euphorbia	-	515/572.2	34/29.6	-	-	2/2.0	-
Loasaceae Mentzelia	-	54/60.0	200/180.9	1/1.0	-	-	1/1.3
Malvaceae Sphaeralcea	-	1/1.1	-	-	-	-	1/1.3*
Portulacaceae Portulaca	-	1003/1114.4	1642/1427.8	11/10.8	25/25.0	14/14.0	11/14.1*
Solanaceae Nicotiana	-	3/3.3	-	-	-	-	-
Solanaceae Physalis	-	-	2/1.7	-	-	-	-

Table 10.25. (continued)

	Plaza Grid 9			Plaza Grid 14			
FS Number:	1341	1860	2088	1489	1491	1618	2539
Provenience:	Floor Grid B	Other Pit 1 Level 9	Other Pit 1 Floor	Floor Grid D	Floor Grid A	Firepit 2	Firepit 6
Zea mays (c = cob, cupule)	-	-	c*	-	-	5/5.0*	c*
OTHERS	-	1/1.1[b]	4/3.5[c]	-	1/1.0[d]	16/16.0[e]	16/20.5*[f]
UNKNOWNS	-	-	-	-	1/1.0*[g]	2/2.0*[h]	1/1.3*[i]
UNIDENTIFIABLE	-	4/4.4	19/16.5*	3/2.9	-	3/3.0*	32/41.0*
No. of Taxa	1	13	15	5	5	12	9
No. of Taxa charred	0	0	2	0	1	8	8
Total Seeds Actual count	2	2333	2827	32	53	110	76
TOTAL Seeds/liter	2.4	2592.2	2460.0	31.4	53.0	110.0	97.4

* Indicates that some or all items were charred.
[a] Number before slash = actual number of seeds recovered; number after slash = seeds/liter.
[b] Opuntia.
[c] Oenothera (3/2.6), Phacelia (1/0.9).
[d] Cryptantha.
[e] Sporobolus.
[f] Corispermum.
[g] Unknown 9029.
[h] Unknown 9020.
[i] Unknown 9031.

Table 10.26. *Flotation results from Plaza Grids 14 (cont.), 14/20, 16, 22, and 29 at 29SJ 629.*[a]

	Plaza Grid 14			Plaza Grids 14/20		Plaza Grid 16	Plaza Grid 22	Plaza Grid 29
FS Number:	2690	2770	3099	2086	2298	2689	2672	2473
Provenience:	Other Pit 14, Layer 3	Other Pit 14, Layer 4	Other Pit 14, Layer 7	Other Pit 6, Level 3	Other Pit 6, Level 4	Other Pit 15	Newcomb Jar	Firepit 5
Cupressaceae Juniperus (T = twig)	-	-	-	-	-	-	-	-
Gramineae Oryzopsis	2/1.8*	3/4.0*	1/1.2*	-	-	-	-	19/21.1*
Amaranthaceae Amaranthus	62/61.4	27/46.0	32/42.4	9/8.9	-	-	-	-
Capparidaceae Cleome	4/3.6	3/3.5	3/3.5	-	-	-	-	-
Chenopodiaceae Chenopodium	296/359.5	94/171.0	422/921.2	84/83.2	35/38.4	75/83.3	5/0.5*	-
cheno-ams	14/16.4	20/23.0	59/88.2	-	3/3.3	-	-	-
Chenopodiaceae Atriplex	3/2.7	-	-	-	-	-	-	-
Chenopodiaceae Cycloloma	1/0.9	8/9.0	26/30.6	-	-	1/1.1	-	-
Compositae Helianthus	1/0.9	1/1.0	1/1.2	1/1.0	2/2.2	-	-	-
Cruciferae Descurainia	21/34.5	99/107.0	19/22.4	1/1.0	80/88.9	26/28.9	-	-
Euphorbiaceae Euphorbia	2/1.8	28/51.0	-	2/2.0	67/74.4	28/31.1	-	-
Loasaceae Mentzelia	19/25.5	31/61.0	13/29.4	59/58.4	89/98.9	115/127.8	-	2/2.2
Malvaceae Sphaeralcea	1/0.9*	3/5.0	1/1.2	3/3.0	8/8.9	1/1.1	-	-
Portulacaceae Portulaca	176/237.7	241/240.0*	121/240.0*	26/25.7	131/145.6	214/237.8	5/0.5	305/338.9
Solanaceae Nicotiana	-	1/2.0	-	-	-	-	-	-
Solanaceae Physalis	2/1.8	9/9.0	3/3.5	-	-	1/1.1	-	-
Zea mays (c = cob, cupule)	c*	c*	c*	c*	-	-	c*	-
OTHERS	22/26.8[b]	5/10.0[c]	2/3.6[d]	-	1/1.1[e]	9/10.0[c]	-	-

Table 10.26. (continued)

	Plaza Grid 14			Plaza Grids 14/20		Plaza Grid 16	Plaza Grid 22	Plaza Grid 29
FS Number: Provenience:	2690 Other Pit 14, Layer 3	2770 Other Pit 14, Layer 4	3099 Other Pit 14, Layer 7	2086 Other Pit 6, Level 3	2298 Other Pit 6, Level 4	2689 Other Pit 15	2672 Newcomb Jar	2473 Firepit 5
UNKNOWNS	-	-	-	-	-	-	-	4/4.4*[f]
UNIDENTIFIABLE	25/30.9*	5/9.0	15/32.9*	-	6/5.6	11/12.2	-	6/6.7*
No. of Taxa	23	20	16	10	10	10	3	5
No. of Taxa charred	5	3	5	1	0	0	2	3
TOTAL SEEDS Actual count	651	555	718	185	421	481	10	336
TOTAL SEEDS Seeds/liter	807.3	881.0	1421.2	183.2	467.8	534.4	0.9	373.3

* Indicates that some or all items were charred.
[a] Number before slash = actual number of seeds recovered; number after slash = seeds/liter.
[b] Pinus edulis (1/0.9), Scirpus (1/0.9), Cryptantha (8/10.0), Suaeda (9/11.4), Oenothera (2/2.7), Cucurbita (1/0.9).
[c] Cryptantha.
[d] Scirpus (1/1.2), Oenothera (1/2.4).
[e] Oenothera.
[f] Unknown 9044.

Table 10.27. Flotation results summary, Plaza Other Pit 1.

Taxon	Level 9		Floor	
	No. of Seeds	Percent of Seeds	No. of Seeds	Percent of Seeds
Cheno-ams	532.2	21%	785.2	32%
Purslane	1114.4	43%	1427.8	58%
Mustard	298.9	12%	10.4	(0.4%)
Stickleaf	60.0	2%	180.9	7%
Spurge	572.2	22%	29.6	1%

categories of the site's lithic artifacts (Windes, this report).

Flotation results are available from three locations in the pit. The pit floor (FS 3099) contained a higher seed density (due principally to a large number of unburned goosefoot seeds) than soft trash in the pit: Layers 3 and 4 (FS 2690 and 2770). Otherwise, the diversity and density of plant types represented was quite uniform, as well as being distinct from the other plaza pits (Table 10.26). While Other Pit 1 (outside neighboring Room 6) has the highest seed density of all plaza "other pits," Other Pit 14 very clearly has the widest diversity of plant types and the highest proportion of taxa with burned specimens (Table 10.28). Macro-botanical remains (found throughout the pit) included a large number of charred corn cobs and fragments.

The botanical assemblage from Other Pit 14 (numerous and diverse, with burned specimens present and economic types represented) is characteristic of an area of intensified food preparation activities. This correlates well with the pit's location within the feature-packed "plaza work area." It is tempting to make note of the association between the profusion of cultural and botanical "artifacts" in Other Pit 14. Such an association is not always the case: for instance, at 29SJ 627, Kiva C trash layers, although heavily-laden with cultural materials, were practically barren of flotation ethnobotanical remains (Struever 1977b:1).

Other Pit 15 (east of Room 5) was distinguished by a protruding rubble plug, as were Other Pits 1 and 14. Again the fill was largely stone, sand, and rubble, but unlike Other Pits 1 and 14, artifacts were sparse, and the sherds were largely unmatched. The botanical assemblage was most similar to Other Pit 6: a moderate density of unburned seeds, mostly weedy annuals (Table 10.26).

Other Pit 6 was a large, tub-shaped pit located east of the feature concentration in the south plaza. The unburned trashy fill was likely deposited at one time. Sherd matches throughout all levels of this pit support this conclusion, as do similar flotation results in two layers. Both samples contained seeds from ten taxa, mostly common weedy annuals. Substantial numbers of stickleaf seed were present in each. The only charred plant remains were corn cob fragments (found in flotation and as macro-remains). All seeds in both samples were unburned. The samples differed most in density of materials recovered:

	Floated material	Seed density
FS 2086	2.1 grams/liter	183.2 seeds/liter
FS 2086	4.0 grams/liter	467.8 seeds/liter

Other Pit 1 in Room 9: Although located within the walls of Room 9, it is possible that Other Pit 1 was situated in a plaza area at the time of its construction. The somewhat smaller pit is similar in morphology to the plaza bell-shaped pits (Other Pits 1, 14, and 15). The Room 9 pit, however, was not rubble-filled but instead contained fine sand difficult to distinguish from the native earth sides and floor except for the presence of charcoal flecks, twigs, and light trash (Windes, Volume I). We know that the

Table 10.28. Summary of Plaza Other Pit results.

Pit No.	No of Samples	Mean No. of Taxa	Mean No. burnt Taxa	Mean Seeds/ Liter	Mean Grams/ Liter	Zea[a]	Cucurbita[a]
OP 1[b]	2	14.0	1.0	2526.1	1.3	+	0
OP 6	2	10.0	0.5	325.5	3.1	++	0
OP 14[b]	3	19.7	4.3	1047.7	9.1	++	+
OP 15	1	10.0	0	534.4	2.3	0	0
All Pits	8	14.6	2.0	1172.6	4.8	-	-
Total no. taxa	-	27	-	-	-	-	-
Total no. burnt taxa	-	-	6	-	-	-	-

[a] + = small quantities recovered by flotation.
++ = large quantities recovered as macro-remains, in addition to some recovered by flotation.
[b] Pits with heavy artifact concentrations.

pit was open and in use at the time of abandonment of Room 9. The evidence consists of sherd matches between the pit, another floor feature, and fill above the floor, as well as eggshell in all levels of Other Pit 1 and on and just above the floor. Flotation sample FS 3319 will thus represent the use of this feature in relationship to Room 9 (or post-occupational trash), regardless of the original function of the pit.

Plaza Pit Summary. Flotation samples from the large plaza pits were characterized by a moderate to high density of seeds, a high diversity of plant types, and very few burned types. Macro-remains were limited to corn cobs and fragments; these were very abundant in Other Pit 14, and much less so in Other Pit 6. Flotation assemblages from individual pits were distinguishable, indicating some differences in use or filling. Where results were available from more than one layer in a single pit, the plant materials were consistent from top to bottom (further confirmation that the pits were filled at one time, and not by accretion).

Determination of the function and relationship of the plaza pits to other proveniences presents some interpretive problems. With the exception of Other Pit 14, the botanical assemblage is not characteristic of food processing: economic types were rare and few items were burned. The samples also bore little resemblance to those from known storage areas (where diversity and density has tended to be much lower). The large plaza pits seem to be botanically unique. Many taxa, usually rare or occurring sparsely in flotation samples at sites 29SJ 627 and 29SJ 629, were considerably more common or abundant in the plaza Other Pits. These plants are types which seldom or never occur charred in the sites in Marcia's Rincon (Table 10.29). It is unfortunately possible that these types may sometimes be present as modern and/or prehistoric contaminants, and their presence in the redeposited fills of the plaza pits reflects this. Note that the combined Other Pit seed assemblage is quite different from the site 29SJ 629 modern surface sample (Table 10.30). Whereas the surface sample is heavily biased towards late spring (coinciding with the time of collection of the sample), the plaza pits reveal a wider seasonal spread (spring, summer and early fall annuals are all well represented). The botanical array merely affirms what we already know from the nature of the fill: while the plaza pits may have been

Table 10.29. Occurrence of selected taxa in Other Pit samples compared to all samples from 29SJ 627 and 29SJ 629.

	Cryptantha	Cycloloma	Helianthus	Mentzelia	Sphaeralcea	Oenothera	Scirpus	Physalis
Other Pits (n = 8)								
Occurrence (percent of samples)	50%	63%	75%	100%	75%	50%	25%	63%
Avg. occurrence (no. of seeds/ sample)	8.6	8.8	1.2	80.2	3.5	2.2	1.1	3.4
SITE 629 (n = 74)								
Occurrence	20%	32%	27%	68%	34%	15%	5%	23%
Avg. occurrence	23.2	42.3[a]	2.0	43.6	2.6	7.1	1.1	2.8
SITE 627 (n = 69)								
Occurrence	6%	7%	14%	29%	35%	3%	10%	13%
Avg. occurrence	1.4	3.2	1.3	13.9	2.3	1.0	2.6	2.6

[a] High because of one sample, FS 455 with 871.0 seeds/liter. Without FS 455, average occurrence is 6.3 seeds.

filled at once, the debris represents accumulation from multiple use contexts over time.

Windes pictures the following scenario. Initially, tub rooms, ramada, and associated pits were utilized together, with activities centered around storage, and (later?) turquoise processing. About or before A.D. 1000 (few later sherds are present), plaza debris was swept into the bell-shaped pits and they were sealed, leaving a "clean plaza." A more diversified domestic scene emerged later in the south plaza/Room 9 area, and we find features plus cultural and botanical debris representative of a variety of food processing activities in Grid 8 and Other Pit 14. In contrast, other Pits 1, 6, and 15 reflect possible storage function in combination with plaza debris from a narrower and different range of activities.

Amongst other plaza features examined were two firepits and a possible mealing catchment, all associated with the Grid 8/14 "plaza work area." Firepits 2 and 6 contained flotation assemblages typical of primary firepit deposition (a wide variety of burned economic seed types, plus corn remains, and evidence of use of juniper for fuel in Firepit 2). Seeds in Other Pit 4 were few and included both burned and unburned weed seeds (Table 10.24). This sample provides no conclusive evidence to support or refute the suggestion of use of the pit in connection with grinding activities. Unfortunately, such ambiguous assemblages are common in mealing features, particularly in locations where preservation of uncharred organics is expected to be low.

Plaza Firepit 5 was located in Grid 29, south of Room 2. The feature was partially slab-lined, but the south side was missing. Ash and charcoal were present, but most of the contents probably washed into the Kiva depression. Firepit 5 could not be dated, but the presence of a slab metate low in the ash fill was indicative of late use of the feature ["slab metates are extremely rare in Chaco Canyon and (tend to) occur in late (post A.D. 1100) contexts"; Windes, Volume I)]. Use of Firepit 5 was, therefore, probably contemporaneous with the Kiva rather than with the main site occupation. The

Table 10.30. Plaza Other Pit flotation results compared to a modern surface sample.

	Surface (n = 1)	Plaza Pits (n = 8)
Chenopodium and other cheno-ams	3%	33%
Portulaca	1%	41%
Descurainia	94%	6%
Mentzelia	1%	7%
Euphorbia	<1%	8%
Others	1%	5%

sample was large (31.2 grams, or 34.7 grams per liter of soil) due to large amounts of charcoal. Aside from several charred ricegrass seeds, botanical remains which can clearly be associated with firepit use were few.

The eleven-liter contents of a Newcomb Corrugated jar were floated and examined. The jar was located next to Other Pit 15 in Plaza Grid 22. Lack of sooting suggests its original use was for storage, perhaps in conjunction with Other Pit 15 (Windes, Volume I). It was hoped that flotation remains might provide some clue as to the pot's former contents, but the sample contained mostly modern roots and very few seeds. This pattern for contents of intact jars has been observed elsewhere (Struever and Donaldson 1980:27; Paul Knight, personal communication 1982). Presumably, the jar serves as a moisture collector (hence the roots, as well as poor preservation of uncharred organic material).

Storage Rooms

Several rooms were added on to the core tub room unit during later construction phases: Rooms 2, 3, 8, and 9 were added somewhere between A.D. 975-1000. Room 1 may be contemporaneous with these rooms, or it may have been added later, along with the Kiva. Rooms 1 and 8 are considered to be storage rooms because of their generally small size and lack of features. The most notable feature of the flotation remains are the high density and diversity of seeds in three of the five samples (Table 10.31), in direct contrast to results from storage room floors at site 29SJ 627. With the exception of corn cupules in Room 1 and small numbers of badly damaged seeds in Room 8, the flotation materials are unburned seeds from locally-common weed and grass species. Contamination must, therefore, be considered as a possible contributor to the seed pattern observed.

Room 1, the easternmost room on the north leg of the pueblo, had a featureless floor fairly close (within 40 cm) to the modern ground surface. Remnants of the thin adobe floor were evident only in the vicinity of Grid G (FS 184). Elsewhere in the room (including Grids A and B, FS 178 and 179) there was little sign of floor surface. It is tempting to point out that botanical activity (including corn remains) is concentrated in the area of known prehistoric floor. While Grids A and B may be at the same level as the interpolated floor, the dramatic drop in both number and variety of seeds may serve as an indication of the absence of actual floor and associated debris in this section of the room. It should be kept in mind, however, that 1) considerable variability in flotation remains across a single room floor has been documented both at 29SJ 627 and at Pueblo Alto (Struever 1977a; Toll 1987a), and 2) intrusion of modern seeds may be a big obfuscator of the actual prehistoric plant record. Charred corn cobs from the floor fill (FS 157 and 160) may relate to post-occupational filling of Room 1.

Room 8 is likewise an empty "end" room (at the south end of the west leg of the site). While the floor was slightly deeper than the floor in Room 1 (ca. 60 cm below ground surface), it was similar in lack of preparation, consisting only of uneven, slightly compacted native earth. Flotation samples from two grids gave similar results to Grid G in Room 1. There were no corn remains from Room 8. Pollen analysis might have been useful as a means of

Table 10.31. Flotation results from storage Rooms 1 and 8 at 29SJ 629.[a]

	Room 1			Room 8	
FS Number:	178	179	184	454	455
Provenience:	Floor Grid A	Floor Grid B	Floor Grid G	Floor Grid E	Floor Grid D
Cupressaceae Juniperus (T = twig)	-	-	-	-	-
Gramineae Oryzopsis	-	-	-	-	-
Amaranthaceae Amaranthus	-	-	2/2.0	15/14.3	533/533.0
Capparidaceae Cleome	-	-	-	-	-
Chenopodiaceae Chenopodium	3/3.0	4/4.0	441/441.0	226/215.3	16/16.0
cheno-ams	-	13/13.0	-	14/13.3	-
Chenopodiaceae Atriplex	-	-	-	-	-
Chenopodiaceae Cycloloma	-	-	-	25/23.8	871/871.0
Compositae Helianthus	-	-	-	-	-
Cruciferae Descurainia	-	-	1764/1764.0	538/512.4	781/781.0
Euphorbiaceae Euphorbia	-	125/125.0	521/521.0	71/67.6	591/591.0
Loasaceae Mentzelia	-	-	485/485.0	18/17.1	-
Malvaceae Sphaeralcea	-	-	-	3/2.9	2/2.0
Portulacaceae Portulaca	29/29.0	4/4.0	3834/3834.0	553/526.7	4184/4184.0
Solanaceae Nicotiana	-	-	-	5/4.8	-
Solanaceae Physalis	-	-	-	-	1/1.0
Zea mays (c = cob, cupule)	-	-	c*	-	-
OTHERS	-	-	375/375.0[b]	18/17.2[c]	10/10.0[d]
UNKNOWNS	-	-	1/1.0[e]	1/1.0[f]	-
UNIDENTIFIABLE	2/2.0	-	136/136.0	17/16.2*	22/22.0*
No. of Taxa	3	5	13	14	10
No. of Taxa charred	0	0	1	1	1
TOTAL SEEDS Actual count	34	150	7558	1504	7011
TOTAL SEEDS Seeds/liter	34.0	150.0	7558.0	1432.4	7011.0

* Indicates that some or all items were charred.
[a] Number before slash = actual number of seeds recovered; number after slash = seeds/liter.
[b] Gramineae (8/8.0); Cryptantha (2/2.0); Oenothera (2/2.0); Sporobolus (363/363.0).
[c] Cryptantha (17/16.2), Echinocereus (1/1.0).
[d] Sporobolus.
[e] Unknown 9041.
[f] Unknown 9037.

distinguishing whether cultivars were actually associated with storage room use at 29SJ 629, or whether the few charred corn remains in Room 1 simply represent post-use trash; however, no samples from Rooms 1 and 8 (with indistinct floors) were run.

Living Rooms

Eight living room samples (six from floors and two from features) were distinctly different from the storage room samples (Tables 10.32 and 10.33). Corn was present in 50 percent of the samples, and burned seeds were more common. Living rooms at 29SJ 629 are characterized by an abundance of features representing various food processing activities (firepits, heating pits, and storage pits or bins).

Room 3 has a curved back wall and forms a corner between the north and west legs of the pueblo (Figure 10.1). Windes (Volume I) details various lines of evidence to suggest that this room was roofed and enclosed by walls on three sides, but it was at least partially open on the side facing the Plaza and hence probably used only seasonally. Four samples were examined from the floor surface. Grids F and B (FS 653 and 654) were located in an area of floor covered by post-occupational trash. These samples had very high seed densities ($\bar{x}=3801.0$ seeds per liter). Grids I and K (FS 1112 and 1114) were from a segment of floor protected by wall fall and thus probably represent a reasonably intact picture of the original floor use. There was very little cultural debris on the floor surface here. This area produced a moderate seed density ($\bar{x}=170.4$ seeds per liter) and a greater diversity of types ($\bar{x}=12$ taxa per sample) than grids F and B. Pollen samples from Grids I and K yielded pollen from corn, the grass family, mallow, and prickly pear (Cully 1985b). Likewise flotation yielded charred corn cupules and a globemallow seed.

Firepit 1 was located near the plaza entrance to Room 3, against the south wall. The pit was lined with small upright tabular stones and mortar. A layer of mortar from roof fall sealed the ash and charcoal contents of the firepit. This feature contained an assemblage indicative of primary firepit deposition, including charred juniper twigs, saltbush fruits, ricegrass, and weed seeds (Table 10.32). Corn remains were abundant, and included kernels retrieved by flotation and cobs (FS 821) collected as macro-remains. Pollen from the adjoining Grid E included 4 percent corn and 27 percent cheno-ams, but no Portulaca or Euphorbiaceae. The 7 percent Compositae pollen may possibly relate to the sunflower achenes recovered from flotation.

Use of Firepit 2, in the southeast corner of the room, probably dates prior to construction of Room 3, as the feature is partially overlain by Firepit 1 and the east wall of the room. Charred corn cupules found in this firepit are probably fragments of cobs used as fuel. The diversity of charred taxa is considerably lower, compared to Firepit 1. The majority of seeds (93 percent) belong to only two taxa, goosefoot and purslane. Unburned mustard, spurge, and stickleaf may be unrelated to firepit use of either feature.

Three, shallow, unlined pits in the west half of Room 3 were designated as heating pits. Their fill consists of charred twigs and some burned sand. Although it is clear these structures contained burning material at some time, they differ from firepits in that there is no evidence of hot, intense fires. Examination of plant remains from these two feature types in Room 3 indicates that they may have different functions in regard to food processing (see Windes, Volume I). Samples from the three heating pits were compared with other Room 3 botanical remains (Table 10.34). As a whole, Room 3 had a good diversity of plant taxa. Heating pits, with the lowest average diversity, still had a considerably higher variety of plant materials than many other proveniences in the site. Floors showed the lowest proportion of burned taxa and firepits, by far the highest. Both wild and cultivated economic plants were well-represented on the floor, in firepits, and Other Pits. Heating pits contained no plant macro-remains, however, and only one ricegrass seed and a single corn cupule in flotation. Identification of a sample of charcoal from Heating Pit 1 indicated that only shrubby species had been used as fuel (60 percent saltbush/greasewood and 40 percent sage, n=10; Welsh 1979).

Room 9 probably had a very similar wall and roofing arrangement to that postulated for Room 3: a solid masonry west wall, with partial walls facing the plaza, and a ramada roof supported on the plaza

Table 10.32. Flotation results from living rooms (Room 3) at 29SJ 629.[a]

	Floor				Features				
FS Number: / Provenience:	653 Grid F	645 Grid B	1112 Grid I	1114 Grid K	1225 Heating Pit 1	1233 Heating Pit 2	1248 Heating Pit 3	809 Firepit 1	2097 Firepit 2
Cupressaceae <u>Juniperus</u> (T = twig)	-	-	-	-	T*	-	-	T*	-
Gramineae <u>Oryzopsis</u>	-	2/2.7	-	-	-	1/1.3*	-	-	-
Amaranthaceae <u>Amaranthus</u>	-	-	1/1.0	3/3.8	-	1/1.3*	-	6/6.0*	-
Capparidaceae <u>Cleome</u>	-	-	-	-	-	-	-	-	-
Chenopodiaceae <u>Chenopodium</u>	1216/ 3027.7	468/1163.5	74/70.5	144/184.6	70/72.2*	27/33.8	7/7.3	91/91.0*	75/85.2*
cheno-ams	11/28.9	-	-	-	-	2/2.5	4/4.2	14/14.0*	-
Chenopodiaceae <u>Atriplex</u>		-	-	-	-	-	-	1/1.0*	-
Chenopodiaceae <u>Cycloloma</u>	-	-	3/2.9	2/2.6	-	-	1/1.0	5/5.0*	-
Compositae <u>Helianthus</u>		2/2.7	-	-	-	-	-	4/4.0	1/1.1
Cruciferae <u>Descurainia</u>	791/ 2031.6	280/425.7	19/18.1	3/3.8	7/7.2	320/400.0	3/3.1	4/4.0	1/1.1
Euphorbiaceae <u>Euphorbia</u>	29/71.1	52/101.4	2/1.9	1/1.3	13/13.4	29/36.3	1/1.0	1/1.0	16/18.2
Loasaceae <u>Mentzelia</u>	46/118.4	8/21.6	7/6.7	6/7.7	51/52.6	327/408.8	1/1.0	6/6.0	2/2.3
Malvaceae <u>Sphaeralcea</u>	-	-	-	1/1.3	-	-	1/1.0	1/1.0	-
Portulacaceae <u>Portulaca</u>	138/355.3	135/256.8	13/12.3	4/5.1	51/52.6	55/68.8	14/14.6	34/34.0	231/262.5*
Solanaceae <u>Nicotiana</u>	-	-	1/1.0	-	-	-	-	-	-

Table 10.32. *(continued)*

	Floor				Features				
FS Number:	653	645	1112	1114	1225	1233	1248	809	2097
Provenience:	Grid F	Grid B	Grid I	Grid K	Heating Pit 1	Heating Pit 2	Heating Pit 3	Firepit 1	Firepit 2
Solanaceae <u>Physalis</u>		-		1/1.3	-	-	1/1.0	-	-
<u>Zea mays</u> (c = cob, cupule)	-	c*	c*	-	c*	-	-	11/11.0*	c*
OTHERS		1/2.7[b]	-	-	-	-	-	8/8.0[c]	-
UNKNOWNS	4/5.3[d]	-	-	6/7.7*[e]	-	-	-	1/1.0[f]	-
UNIDENTIFIABLE	7/15.8	-	5/4.8*	2/2.6	2/2.1*	7/8.8	1/1.0	9/9.0*	4/4.5*
No. of Taxa	8	9	10	12	8	10	10	17	8
No. of Taxa charred	0	1	2	1	4	2	0	8	4
TOTAL SEEDS Actual count	4297	1463	125	173	194	769	34	196	330
TOTAL SEEDS Seeds/liter	5653.9	1977.0	119.0	221.8	200.0	961.3	35.4	196.0	375.0

* Indicates that some or all items were charred.
[a] Number before slash = actual number of seeds recovered; number after slash = seeds/liter.
[b] <u>Oenothera</u>.
[c] <u>Opuntia</u>.
[d] Unknown 9038.
[e] Unknown 9029 (4/5.1*); Unknown 9039 (2/2.6).
[f] Unknown 9009.

Table 10.33. Flotation results from living rooms (Room 9) at 29SJ 629.[a]

	Floor		Features				
FS Number: / Provenience:	787 Grid V	794 Grid R	538 Bin 2	658 Bin 3	801 Bin 1	799 Firepit 1	3319 Other Pit 1
Cupressaceae Juniperus (T = twig)	-	-	-	-	-	-	-
Gramineae Oryzopsis	2/1.0*	-	-	1/1.2*	-	13/14.1	-
Amaranthaceae Amaranthus	-	-	-	4/4.7	-	-	3/3.0
Capparidaceae Cleome	-	-	-	-	-	-	-
Chenopodiaceae Chenopodium	16/16.0	32/34.4	84/84.0	3/3.5	9/10.7	17/18.5	34/34.0
cheno-ams	9/9.0	19/20.4	19/19.0	3/3.5*	-	8/8.7	-
Chenopodiaceae Atriplex	-	-	10/10.0*	-	-	-	5/5.0*
Chenopodiaceae Cycloloma	2/2.0	-	-	-	-	-	14/14.0
Compositae Helianthus	-	-	-	-	-	-	-
Cruciferae Descurainia	1/1.0	8/8.6	583/583.0	-	-	7/7.6*	5/5.0
Euphorbiaceae Euphorbia	1/1.0	-	180/180.0	4/4.7	-	-	31/31.0
Loasaceae Mentzelia	-	-	141/141.0	3/3.5	-	3/3.3	48/48.0
Malvaceae Sphaeralcea	-	2/2.2*	-	3/3.5	-	-	-
Portulacaceae Portulaca	-	9/9.7*	74/74.0	8/9.4*	19/22.6	620/673.9*	28/28.0
Solanaceae Nicotiana	-	1/1.1	-	3/3.5	-	-	-

Table 10.33. (continued)

	Floor		Features				
FS Number:	787	794	538	658	801	799	3319
Provenience:	Grid V	Grid R	Bin 2	Bin 3	Bin 1	Firepit 1	Other Pit 1
Solanaceae <u>Physalis</u>	3/3.0	-	1/1.0	-	-	-	-
<u>Zea mays</u> (c = cob, cupule)	c*	-	c*	-	-	c*	-
OTHERS	-	3/3.2*[b]	3/3.0[c]	3/3.5*[b]	15/17.9[b]	9/9.8[d]	4/4.0[e]
UNKNOWNS	-	-	-	1/1.2[f]	-	-	-
UNIDENTIFIABLE	3/3.0	5/5.4	13/13.0*	2/2.4	-	2/2.2	12/12.0*
No. of Taxa	9	8	13	12	3	12	10
No. of Taxa charred	3	3	3	4	0	2	2
TOTAL SEEDS Actual count	36	79	1108	38	43	679	184
TOTAL SEEDS Seeds/liter	36.0	84.9	1108.0	44.7	51.2	738.0	184.0

* Indicates that some or all items were charred.
[a] Number before slash = actual number of seeds recovered; number after slash = seeds/liter.
[b] Gramineae.
[c] <u>Oenothera</u> (1/1.0); <u>Cryptantha</u> (1/1.0), <u>Scirpus</u> (1/1.0).
[d] <u>Opuntia</u> (2/2.2); <u>Cryptantha</u> (7/7.6).
[e] <u>Cryptantha</u>.
[f] Unknown 9035.

Table 10.34. Room 3 botanical remains: summary by provenience type.

	Heating Pits[a]	Firepits	Other Pits	Floor
Flotation:				
Number of samples	3	2	*	4
Average no. of taxa	9.3	14.0	*	9.8
Percent of taxa containing burned specimens	23%	58%	*	10%
Average seed density (seeds/liter)	398.9	280.0	*	1992.9
Average weight of floated material (g/liter)	35.0	15.1	*	2.9
Economic taxa	corn ricegrass	corn ricegrass cholla cactus	*	corn
Pollen:[b]				
Number of samples	*	*	1	9
			Corn 10.8% Grasses 74.8%	Corn 2.0%[c] Grasses 11.0% Prickly pear 0.5%
MACRO-BOTANICAL:	None	corn cob (FS 821)	squash seed (FS 1289) 2 corn cob frags (FS 1291) cache of unburnt <u>Cycloloma</u> seeds (FS 1293)	2 corn cob frags (FS 3454)

* = no samples analyzed.

[a] Average values for heating pits should be looked at with caution. While Heating Pits 1 and 2 have the highest weights/liter of floated material for all Room 3 flotation samples, Heating Pit 3 has the <u>lowest.</u> And, although Heating Pits 1 and 2 have high seed densities, Heating Pit 3 has the lowest in the room.

[b] Cully 1985b.

[c] Present in all 9 samples.

side by posts. Three large masonry bins are the principal distinctive features in Room 9. Bins 1 and 3 were roofed with small vigas covered with brush and reeds, and mud (Windes, Volume I). An uncharred Scirpus (bulrush) seed in Bin 2 provides a clue as to the identity of some of this roofing material. Flotation remains, both in the bins (FS 538, 658, 801) and on adjacent floor grids (FS 787, 794), included unburned seeds of several likely candidates for storage of wild plant foods in the bins (Table 10.33). Most were weed species, and these included tobacco and groundcherry. Of course, modern contamination is another possible source of some or all of the unburned seeds (especially the Cryptantha seeds found in several locations in the room).

Present in fill of the bins is scattered charcoal, which may have derived from a mixture of remains from the bin and room roofs. Charred wood in Other Pit 1 [identified as mostly saltbush/greasewood, but with some pinyon and juniper present; Welsh (1979)] also indicates debris unrelated to bin use. In fact, there are some similarities in components of Room 9 flotation samples that suggest that post-occupational trash, consisting, at least in part, of firepit dumpings, was scattered throughout the room after the room was no longer used. Carbonized four-wing saltbush fruits, for instance, were found both in Bin 2 and Other Pit 1. While making good sense in a firepit context (where dried, mature, saltbush twigs might be used as kindling or fuel), such remains seem entirely out of place in any kind of storage facility. Charred corn cupules, found both on the floor and in Bin 2, probably also reflect fuel remnants out of context. Burned grass caryopses (Indian ricegrass and a second, unidentified type) and winged pigweed seeds are also scattered between various feature and floor locations.

Some fill in the slab-lined firepit may have derived from its original use: charred corn cob fragments were found both in flotation (FS 799) and as macro-remains (FS 744), and a large concentration of charred purslane seeds was recovered (Table 10.33). Charred mustard seeds occur also, and these seem to be a trademark of firepits at site 29SJ 629.

Room of Unknown Function

Interpretation of Room 2 is problematic: its small size and general lack of features is usually thought characteristic of storage rooms, but the presence of large quantities of burned vegetal material and a central fireplace suggests activities (such as food processing) that are more likely to take place in a habitation room. Results of pollen and flotation analyses also confirm the likelihood of food processing activities in this room. A wide variety of economic plant materials, including both cultivars and wild food plants, were found in both fill layers, as well as directly on the floor and in the firepit (Tables 10.35-10.36).

Lying on the floor was a 5-10 cm thick deposit (Layer 2) of burnt brush and grass full of blackened artifacts and other cultural debris. Charred macro-remains found in this level included corn, beans, cactus, and ricegrass. Flotation also yielded corn and a large collection of ricegrass seeds, as well as numerous weedy economics. Several things about the Layer 2 assemblage indicate that it represents a collection of trash burned in situ rather than ordinary firepit dumpings. Charred corn, in both macro and flotation, included several kernels, a few cob pieces, and tassel fragments. Corn found in firepits usually consists largely of cobs, which are assumed to have been recycled as fuel. The Room 2 corn suggests that loose kernels and/or whole ears were present, as well as non-ear parts. (It is possible that leaves, stalks, and other corn plant parts were either entirely consumed by fire, or are subsumed under "burnt grass" observed during excavation; Windes, Volume I). Because beans are relatively large, and most often boiled rather than parched, they are rarely charred in food processing accidents. Instead they are more likely to be preserved as a result of conflagrations in storage or trash contexts (Kaplan 1956). Indeed, all seven beans recovered at 29SJ 629 are attributable to such conditions (five of these beans occurred in Layer 2). Charred cactus pads and buds, also unusual plant debris, are again associated with burning in storage or trash contexts.

Rodent activity observed during excavation seems to be responsible for vertical mixing of deposits in Room 2. Several items found above Layer 2 in rubble fill Layer 1 (an additional bean, and cactus pads and buds) clearly relate to Layer 2. Many unburned seeds in the cultural levels are indicative of rodent transportation as well (especially hiddenflower, primrose and scorpionweed, and the

Table 10.35. Flotation results from Room 2 (of unknown function) at 29SJ 629.[a]

	Floor			Feature
FS Number:	340	344	346	440
Provenience:	Grid B	Grid G	Pinch	Firepit 1
Cupressaceae <u>Juniperus</u> (T = twig)	T*	T*	T*	T*
Gramineae <u>Oryzopsis</u>	1/1.3	3/3.9*	175/218.8*	20/22.2*
Amaranthaceae <u>Amaranthus</u>	-	-	2/2.5*	-
Capparidaceae <u>Cleome</u>	-	-	2/2.5*	-
Chenopodiaceae <u>Chenopodium</u>	-	17/22.3*	19/23.8*	98/108.9
cheno-ams	8/10.7	9/11.8*	4/5.0*	35/38.9*
Chenopodiaceae <u>Atriplex</u>	-	-	-	-
Chenopodiaceae <u>Cycloloma</u>	-	-	-	-
Compositae <u>Helianthus</u>	-	1/1.3	-	10/11.1
Cruciferae <u>Descurainia</u>	8/10.7*	3/3.9	83/103.8*	11/12.2*
Euphorbiaceae <u>Euphorbia</u>	3/4.0	7/9.2	15/18.8	3722/4135.6
Loasaceae <u>Mentzelia</u>	-	-	3/3.8	31/34.4
Malvaceae <u>Sphaeralcea</u>	-	1/1.3*	-	-
Portulacaceae <u>Portulaca</u>	4/5.3	-	83/103.8*	304/337.8
Solanaceae <u>Nicotiana</u>	-	-	-	-
Solanaceae <u>Physalis</u>	1/1.3	-	-	4/4.4*
<u>Zea mays</u> (c = cob, cupule)	c*	c*	3/3.8*	c*
OTHERS	3/4.0*[b]	31/40.7*[c]	11/13.9*[d]	196/217.8[e]
UNKNOWNS	-	-	-	71/78.9[f]
UNIDENTIFIABLE	3/4.0	10/13.2*	38/47.5*	6/6.7*
No. of Taxa	10	13	16	16
No. of Taxa charred	4	8	12	9
TOTAL SEEDS Actual count	31	82	449	4508
TOTAL SEEDS Seeds/liter	41.3	107.9	561.3	5008.9

* Indicates that some or all items were charred.
[a] Number before slash = actual number of seeds recovered; number after slash = seeds/liter.
[b] <u>Sporobolus.</u>
[c] <u>Sporobolus</u> (2/2.6*); <u>Oenothera</u> (28/36.8); <u>Phacelia</u> (1/1.3).
[d] <u>Sporobolus</u> (9/11.3*); <u>Scirpus</u> (1/1.3*): <u>Opuntia</u> (1/1.3).
[e] <u>Oenothera</u> (1/1.1); <u>Cryptantha</u> (195/216.7).
[f] <u>Unknown</u> 9027 (3/3.3); <u>Unknown</u> 9028 (68/75.6).

Table 10.36. Room 2 botanical remains: summary by provenience type.

	Firepit	Floor Grid B	Other Grids	Layer 2 (Trash Fill)	Layer 1 (Rubble-Fill)
Flotation:					
Number of samples	1	1	1	1	*
Number of taxa	16	10	13	16	*
Percent of taxa containing burned specimens	50%	40%	62%	75%	*
Seed density (seeds/liter)	5008.9	41.3	107.9	561.3	*
Weight of floated material (g/liter)	3.7	4.5	4.6	3.7	*
Economic taxa	corn ricegrass groundcherry (+ weeds)	corn dropseed-grass	corn ricegrass dropseed-grass (+ weeds)	corn ricegrass dropseed-grass beeweed bulrush (+ weeds)	*
Pollen:[a]					
Number of samples	*	1	3	*	*
		Corn 1.9% Cyperaceae 0.6% Cheno-ams 72.6% Grasses 5.7%	Corn 8.6% Prickly pear 0.3% Cheno-ams 34.9% Grasses 41.3%	*	*

Table 10.36. (continued)

	Firepit	Floor Grid B	Other Grids	Layer 2 (Trash Fill)	Layer 1 (Rubble-Fill)
Macro-Botanical:				small quantities of corn cobs and kernels (FS 259, 294, 297-298, 358-359) 5 beans (FS 295, 297-298) 1 prickly pear cactus bud (FS 359) 5 ricegrass seeds (FS 331)	1 corn cob (FS 474) 1 bean (FS 240) 5 prickly pear pads and 1 bud (FS 233, 239)

* no samples analyzed.
[a] Cully 1985b.

large concentration of spurge seeds in the firepit). Windes points out that the actual clay floor in Room 2 was elusive and very fragmentary. Since there are so many points of similarity between floor grids, the firepit, and Layer 2, and considerable mixing is known to have occurred, I suggest that the flotation and macrobotanical record is largely reflective of the overlying trash layer and that it will be impossible to distinguish any plant materials or activities which are specifically related to use of the floor and firepit in Room 2.

There are many parallels in the combined flotation, macrobotanical, and pollen assemblage from Room 2. Corn is ubiquitous, found in all flotation and pollen samples. Grass pollen was found in all grids (especially high in Grids E and F), while charred dropseed and ricegrass caryopses, and charred grass stems, were present throughout the Room 2 deposits. Prickly pear pollen in Grids A and E may well relate to the prickly pear buds and pads found in Layers 1 and 2 (the uncharred seed found in Layer 2 showed typical signs of rodent manipulation and is probably intrusive). A bulrush (Scirpus sp.) seed in Layer 2 may relate to pollen from the same family (Cyperaceae) in Grid B. Charred juniper twigs were present in all flotation samples, and juniper pollen was found in Grid A.

Room 2 contains a wide array of food and other economic debris. To what extent this trash derived from use of this room is another question, however. Given its small size and lack of features other than the single firepit, it is unlikely that the room served as a location for the diversified battery of functions normally associated with a full-blown habitation room (viz. Room 3). Room 2 may instead be some variety of specialized food-processing area, which later became a trash depository or storage room for occupants of Room 3.

Pithouses and Kiva

The earliest pitstructure constructed at 29SJ 629, Pithouse 2, lies directly east of the earliest room unit (tub rooms 5, 6, 7; Figure 10.1). As originally constructed, Pithouse 2 had a central firepit, many heating pits, and a mealing area behind one of the wing walls. At this stage, use seems to have been entirely domestic. Floor 2 flotation remains included only a single squash seed of certain cultural origin (Table 10.37). A heating pit contained evidence that juniper twigs were burned there, and it was otherwise essentially sterile.

During the eleventh century the structure was remodeled and took on some kiva characteristics. Windes believes the lack of heating pits and debris from traditionally male tasks (chipped stone and turquoise manufacture) are particularly important in defining some non-domestic use for Floor 1. The mealing bins were retained, however, indicating a combined or intermediate role between habitation and kiva. The mealing bins contained a layer of mostly organic trash which burned in situ. Much of Floor 1 botanical remains can be attributed to this post-occupational burning event. Floor samples contained few cultural materials, except in the vicinity of the mealing bins (FS 2998; Table 10.37) (the exception to this is the presence of unburned squash seeds, which seem to be distributed without relation to the wing wall area). It would appear that squash remains were associated generally with Floor 1, but were charred only as a result of this presumed accident. Note that the trash in the bins bears a great deal of resemblance to that in Room 2, Layer 2 (subject to a similar kind of burning): included are juniper twigs, pinyon nuts, corn (with a high proportion of kernels), beans, prickly pear pad, and a yucca leaf fragment (Table 10.38).

Early in the tenth century, a small square pithouse was constructed in the south plaza area. Gillespie and Windes believe that Pithouse 3 fulfilled an auxiliary ceremonial function (perhaps warranted by population growth within the village). Various signs, including lack of floor or feature remodeling, point to short occupation and/or limited use. Flotation remains were relatively sparse. Mustard and purslane occur in all samples and are charred in the firepit. Several other weed species are present, including mallow and groundcherry. The heating pit was filled with clean sand, except for a layer of charred twigs (including sage) at the bottom. The flotation sample (FS 2631) was essentially sterile, indicating that this feature probably had a single purpose related to the heat or smoke produced by burning aromatic shrubwood. Flotation remains in both the firepit and heating pit corroborate the notion that these features were not used intensively or extensively. Charred corn remains were abundant in Pithouse 3, and corn pollen was present in extremely

Table 10.37. Flotation results from Pithouse 2 at 29SJ 629.[a]

	Layer 6	Floor 1				Features			Floor 2 Feature
FS Number:	2915	2998	2999	3000	3001	3141	3166	3184	3414
Provenience:	NW Quad (lithic conc.)	SE Quad Wing Wall Area	NE Quad	SE Quad	NE Quad (lithic conc.)	Firepit 1	Mealing Bin 1, basin	Mealing Bin 2, basin	Heating Pit 3
Cupressaceae *Juniperus* (T = twig)	-	-	-	-	-	-	T*	T*	T*
Gramineae *Oryzopsis*	-	2/2.0*	-	-	-	-	-	-	-
Amaranthaceae *Amaranthus*	2/2.2	2/2.0	-	-	1/1.0	-	-	16/16.0	-
Capparidaceae *Cleome*	-	-	-	-	-	-	-	-	-
Chenopodiaceae *Chenopodium*	10/11.1	74/74.0	159/176.7	21/23.8	3/3.3	2/3.4*	467/467.0	617/617.0*	-
cheno-ams	-	-	-	2/2.3	1/1.1*	-	1/1.0	-	-
Chenopodiaceae *Atriplex*	-	-	1/1.1*	-	-	-	-	-	-
Chenopodiaceae *Cycloloma*	-	-	-	1/1.1	-	-	-	2/2.0	-
Compositae *Helianthus*	-	-	-	-	-	-	-	-	-
Cruciferae *Descurainia*	1/1.1	3/3.0	8/8.9	8/9.1	2/2.2	1/1.7*	-	6/6.0*	-
Euphorbiaceae *Euphorbia*	-	5/5.0	86/95.6	3/3.4	2/2.2	-	-	34/34.0	-
Loasaceae *Mentzelia*	5/5.6	-	10/11.1	2/2.3	5/5.6	-	-	-	1/1.5
Malvaceae *Sphaeralcea*	-	-	-	-	-	-	1/1.0*	-	-
Portulacaceae *Portulaca*	65/72.2	49/49.0*	1536/1706.7	262/297.7	34/37.8	14/23.7*	37/37.0	53/53.0*	-

Table 10.37. (continued)

	Layer 6	Floor 1				Features			Floor 2 Feature
FS Number:	2915	2998	2999	3000	3001	3141	3166	3184	3414
Provenience:	NW Quad (lithic conc.)	SE Quad Wing Wall Area	NE Quad	SE Quad	NE Quad (lithic conc.)	Firepit 1	Mealing Bin 1, basin	Mealing Bin 2, basin	Heating Pit 3
Solanaceae <u>Nicotiana</u>	-	-	-	-	-	-	-	-	-
Solanaceae <u>Physalis</u>	-	-	1/1.1	-	-	-	-	-	-
<u>Zea mays</u> (c = cob, cupule)	-	c*	-	-	-	c*	19/19.0*	19/19.0*	-
OTHERS	1/1.1[b]	6/6.0*[c]	82/91.1[d]	1/1.1[b]	-	-	1/1.0[e]	2/2.0*[f]	-
UNKNOWNS	-	-	-	-	-	-	-	-	-
UNIDENTIFIABLE	3/3.3*	9/9.0*	-	7/8.0	-	6/10.2*	2/4.0*	40/40.0*	1/1.5*
No. of Taxa	7	10	10	9	7	5	8	16	3
No. of Taxa charred	1	4	1	0	1	5	4	10	2
TOTAL SEEDS Actual count	87	150	1883	307	48	23	531	789	2
TOTAL SEEDS Seeds/liter	96.7	150.0	2092.2	348.9	53.3	39.0	531.0	789.0	3.0

* Indicates that some or all items were charred.
[a] Number before slash = actual number of seeds recovered; number after slash = seeds/liter.
[b] Cucurbita.
[c] Gramineae (5/5.0*); <u>Cucurbita</u> (1/1.0).
[d] <u>Cryptantha</u> (61/67.8); <u>Corispermum</u> (20/22.2); <u>Cucurbita</u> (1/1.1).
[e] <u>Pinus edulis.</u>
[f] <u>Cucurbita</u> (1/1.0*); <u>Pinus edulis</u> (1/1.0*).

Table 10.38. Botanical remains from pitstructures at 29SJ 629.[a]

	Early ca. AD 925-1000[b]				Later ca. AD 1000-1025[b]		Latest ca. AD 1100-1150[b]	
	Pithouse 2 Floor 2		Pithouse 3		Pithouse 2 Floor 1		Kiva	
	Floors	Features (HP)	Floors	Features (FP, HP)	Floor	Features (FP, HP)	Floor	Feature (FP)
Flotation:								
Number of samples	n = 1 1 squash seed	n = 1 (HP essentially sterile) *Juniper twigs.	n = 3 *corn hedgehog cactus	n = 2 *corn and *weeds (HP essentially sterile)	n = 4 *corn (wing wall area) only *saltbush fruit *ricegrass	n = 3 *corn *pinyon shell *squash seed *juniper twigs	n = 4 *corn 1 squash seed saltbush fruits	n = 1 *corn *juniper twigs *mallow *sunflower
Mean number of taxa per sample	7.0	3.0	8.7	3.0	9.0	9.7	12.8	9.0
Percent of taxa burned	14%	67%	19%	67%	17%	66%	8%	78%
Pollen:								
Number of samples	No sample analyzed.	No sample analyzed.	n = 3 cattail corn 59% prickly pear	No sample analyzed.	n = 1 corn prickly pear	No sample analyzed.	n = 1 cattail corn	No sample analyzed.
Macro:	None	None	*52 cobs 1 kernel	*2 cobs	None	*corn *1 bean *1 Opuntia pad *3 pinyon nuts *Yucca leaf	* 1 corn cob	*7 corn cobs and kernel frags.
Charcoal:	No sample analyzed.	No sample analyzed.	No sample analyzed.	All shrubby (saltbush/greasewood and sage)	No sample analyzed.	MB's: some pinyon; mostly saltbush/greasewood	No sample analyzed.	No sample analyzed.

[a] * = charred. Samples not available.
[b] Dates provided by Thomas Windes (based on ceramics and architecture).
FP = Firepit.
HP = Heating Pit.
MB = Mealing Bin.

high concentrations in all three floor locations sampled (Table 10.39). Both pollen and carbonized corn may relate to trash dumped into the structure shortly after abandonment. This episode of trash deposition apparently coincides with filling of the large plaza pits. It is interesting to note that the plaza pits and Pithouse 3 share characteristics of high concentrations of hammerstones, abraders, corn cobs, and pollen.

The Kiva (Pithouse 1) was the latest structure in use at 29SJ 629. There is no evidence of habitation or other activities at 29SJ 629 contemporaneous with the period of Kiva use (early twelfth century). The Kiva was built on top of Pithouse 2, and the Kiva floor was reutilized Floor 1 of Pithouse 2 in the area where the two structures overlap. Samples from all quadrants of Floor 1 contact were examined, as well as a sample from the central firepit (Table 10.40). The floor samples all contained a wide variety of seed types, including domesticates (corn, squash) and economic wild taxa, but few of these seed specimens were burnt. FS 2100 from Firepit 1 was unusual in that it contained a lower density of seeds per liter sample and a lower diversity of plant species than the related floor samples--the reverse of the usual case. FS 2100 is typical of firepit assemblages, however, in that a high percentage of taxa include burnt specimens. The sample is from an ash layer; perhaps intense burning consumed many of the organic remains, biasing the vegetal record. There is considerable continuity between the Kiva samples: winged pigweed, sunflower, and mustard occur in all five locations. Several other taxa occur throughout the floor but not in the firepit. Purslane and stickleaf seeds in particular were considered as valuable foods; their presence as unburnt seeds on the floor and total absence from the firepit may indicate that the plants were processed in the Kiva and any seeds that made it into the firepit were completely consumed. Alternatively, purslane and stickleaf plants or seeds may have been stored in the Kiva, but not consumed or processed by any method utilizing heat. Unburnt saltbush fruits in the Kiva may be escapees from intended firewood or kindling; here again, there is no direct evidence of association of saltbush and the firepit, possibly due to hot burning.

The botanical record from pitstructures at 29SJ 629 differs considerably according to temporal and functional variables, as well as vagaries of deposition and preservation. The early, habitation floor in Pithouse 2 was largely missing, and produced very few plant remains. Pithouse 3 was deep (ca. 2 m) and thus, theoretically well-suited to preservation, but activities here (and consequent debris) seem to have been limited in variety and extent. The principal cultural plant debris was corn. The later occupations of 29SJ 629 pitstructures (the upper floor of Pithouse 2 and the Kiva) contain macro-botanical and flotation assemblages with a wider array of both domestic and wild economic plants. Similar economic pollen types are present in Pithouses 1 (Kiva), 2, and 3 (corn, prickly pear, cattail)--the significant difference between structures lies in relative frequencies of corn. The complete absence of cucurbit pollen is interesting, considering 1) the occurrence of squash seeds in several later pitstructure locations and 2) the frequent association of squash blossoms with ceremonial contexts (Stevenson 1904; Whiting 1939). Beans, pinyon nuts, cactus, ricegrass, and sunflower are all exclusively found in the later pitstructures. From the limited information available, fuel usage depended largely on shrubby species (as elsewhere at 29SJ 629). Juniper twigs were found in several locations in the Kiva and Pithouse 2, but were absent in Pithouse 3. Saltbush fruits may have arrived in both Pithouses 1 and 2 with saltbush firewood (saltbush is listed as "one of the four kiva fuels," Hough 1897:42). Pinyon wood occurred only in the upper floor of Pithouse 2.

Trash Midden and Associated Burials

A large sheet trash midden was present downslope from 29SJ 629, where site occupants discarded much of their refuse in a former arroyo channel east of the roomblock. The trash deposits are dated with ceramics at about A.D. 875-925 for initial dumping with continued use of the channel throughout the tenth century (Windes, Volume I). Apparently, trash deposition was shifted to another location during the later occupation of the site, as later ceramic assemblages common within the houseblock and pitstructures were noticeably absent from the channel refuse.

Trash at 29SJ 629 generally produced a low to moderate density of botanical remains (Table 10.41). Burned weedy annual seeds, and burned corn (five out of six midden samples) are expectable kitchen debris. Small amounts of charred cob fragments

Table 10.39. Flotation results from Pithouse 3 at 29SJ 629.[a]

	Floor			Features	
FS Number: / Provenience:	2625 NW Quad	2627 SE Quad	2628 SW Quad	2631 Heating Pit 1	2712 Firepit 1
Cupressaceae Juniperus (T = twig)	-	-	-	-	-
Gramineae Oryzopsis	-	-	-	-	-
Amaranthaceae Amaranthus	-	-	-	-	-
Capparidaceae Cleome	-	-	-	-	-
Chenopodiaceae Chenopodium	12/12.8	21/24.4	13/13.9	-	-
cheno-ams	2/2.1	-	-	-	-
Chenopodiaceae Atriplex	-	-	-	-	-
Chenopodiaceae Cycloloma	1/1.1	1/1.2	-	-	-
Compositae Helianthus	-	-	-	-	-
Cruciferae Descurainia	36/38.3	3/3.5*	2/2.1	1/1.0	25/29.8*
Euphorbiaceae Euphorbia	105/111.7	6/7.0	4/4.3	-	-
Loasaceae Mentzelia	-	3/3.5	-	-	-
Malvaceae Sphaeralcea	4/4.3	3/3.5*	-	-	-
Portulacaceae Portulaca	50/53.2	98/103.5	15/16.0	5/4.8	77/91.6*
Solanaceae Nicotiana	-	-	-	-	-
Solanaceae Physalis	-	1/1.2	1/1.1	-	-
Zea mays (c = cob, cupule)		c*		-	4/4.8*
OTHERS	-	-	2/2.1[b]	-	-
UNKNOWNS	-	-	-	-	-
UNIDENTIFIABLE	-	-	11/11.7*	-	1/1.2*
No. of Taxa	8	9	9	2	4
No. of Taxa charred	0	3	2	0	4
TOTAL SEEDS Actual count	211	128	48	6	107
TOTAL SEEDS Seeds/liter	224.5	148.8	51.0	5.8	127.4

* Indicates that some or all items were charred.

[a] Number before slash = actual number of seeds recovered; number after slash = seeds/liter.

[b] Echinocereus.

Table 10.40. *Flotation results from the Kiva (Pithouse 1) at 29SJ 629.*[a]

	Floor				Feature
FS Number:	2055	2056	2057	2058	2100
Provenience:	NE Quad	SE Quad	SW Quad	NW Quad	Firepit 1
Cupressaceae <u>Juniperus</u> (T = twig)	-	-	-	-	T*
Gramineae <u>Oryzopsis</u>	-	-	-	-	-
Amaranthaceae <u>Amaranthus</u>	34/34.0	20/24.4	27/27.0	8/9.3	-
Capparidaceae <u>Cleome</u>	-	-	-	1/1.2	-
Chenopodiaceae <u>Chenopodium</u>	11/11.0	9/11.0	29/29.0	18/20.9	-
cheno-ams	19/19.0	-	19/19.0	-	2/2.0
Chenopodiaceae <u>Atriplex</u>	1/1.0	-	9/9.0	1/1.2	-
Chenopodiaceae <u>Cycloloma</u>	3/3.0	17/20.7	8/8.0	1/1.2	1/1.0
Compositae <u>Helianthus</u>	1/1.0	2/2.4	1/1.0	1/1.2	3/3.0*
Cruciferae <u>Descurainia</u>	4/4.0	26/31.7	4/4.0	21/24.4	1/1.0*
Euphorbiaceae <u>Euphorbia</u>	7/7.0	2/2.4	5/5.0	5/5.8	-
Loasaceae <u>Mentzelia</u>	2/2.0	52/63.4	8/8.0	-	-
Malvaceae <u>Sphaeralcea</u>	-	6/7.3	-	-	7/7.0*
Portulacaceae <u>Portulaca</u>	42/42.0	17/20.7	35/35.0	35/40.7	-
Solanaceae <u>Nicotiana</u>	-	1/1.2	-	-	-
Solanaceae <u>Physalis</u>	-	1/1.2	-	-	1/1.0*
<u>Zea mays</u> (c = cob, cupule)	-	-	c*	c*	4/4.0*
OTHERS	-	2/2.4[b]	2/2.0*[c]	1/1.2[d]	-
UNKNOWNS	-	-	-	1/1.2[e]	-
UNIDENTIFIABLE	-	18/22.0	4/4.0	12/14.0*	5/5.0*
No. of Taxa	10	14	14	13	9
No. of Taxa charred	0	0	2	2	7
TOTAL SEEDS Actual count	124	173	151	105	20
TOTAL SEEDS Seeds/liter	124.0	211.0	151.0	122.1	20.0

* Indicates that some or all items were charred.
[a] Number before slash = actual number of seeds recovered; number after slash = seeds/liter.
[b] <u>Cryptantha</u> (1/1.2); <u>Cucurbita</u> (1/1.2).
[c] Gramineae (1/1.0*); <u>Corispermum</u> (1/1.0).
[d] <u>Corispermum</u>.
[e] Unknown 9043.

Table 10.41. Flotation results from the Trash Midden at 29SJ 629.[a]

	Trash Levels						Burials in Trash		
FS Number:	641	1428	1432	1449	1450	1453	1457	1854	1857
Provenience:	Grid 71	Grid 88	Grid 82	Grid 70	Grid 70	Grid 76	Burial 1	Burial 2	Burial 2
Cupressaceae <u>Juniperus</u> (T = twig)	-	-	-	-	-	-	-	-	-
Gramineae <u>Oryzopsis</u>	-	-	-	-	-	1/1.0	-	-	-
Amaranthaceae <u>Amaranthus</u>	-	6/6.2	-	1/1.1	1/1.0	-	-	-	-
Capparidaceae <u>Cleome</u>	-	-	-	-	-	-	-	-	-
Chenopodiaceae <u>Chenopodium</u>	8/8.0	14/14.4	34/34.7	10/11.0*	1/1.0	10/10.0	62/64.6*	11/15.7*	21/31.8
cheno-ams	-	6/6.2	-	3/3.3*	1/1.0	-	9/9.4	-	-
Chenopodiaceae <u>Atriplex</u>	-	-	-	-	-	-	-	-	-
Chenopodiaceae <u>Cycloloma</u>	-	-	-	-	-	-	-	-	-
Compositae <u>Helianthus</u>	-	-	-	-	-	-	-1/1.0	-	-
Cruciferae <u>Descurainia</u>	107/107.0	23/23.7	-	6/6.6	1/1.0	4/4.0*	13/13.5*	4/5.7	8/12.1
Euphorbiaceae <u>Euphorbia</u>	3/3.0		1/1.0	16/17.6		10/10.0	14/14.6	-	17/25.8
Loasaceae <u>Mentzelia</u>	2/2.0	8/8.2	-	3/3.3	-	7/7.0	8/8.3	2/2.9	8/12.1
Malvaceae <u>Sphaeralcea</u>	-	-	-	1/1.1	-	-	-	1/1.4	
Portulacaceae <u>Portulaca</u>	20/20.0	7/7.2*	-	13/14.3	7/7.2	14/14.0	68/70.8*	6/8.6	5/7.6
Solanaceae <u>Nicotiana</u>	-	-	-	-	-	-	-	-	-
Solanaceae <u>Physalis</u>	-	-	-	-	-	-	1/1.0	-	9/13.6

Table 10.41. (continued)

	Trash Levels						Burials in Trash		
FS Number:	641	1428	1432	1449	1450	1453	1457	1854	1857
Provenience:	Grid 71	Grid 88	Grid 82	Grid 70	Grid 70	Grid 76	Burial 1	Burial 2	Burial 2
Zea mays (c = cob, cupule)	c*	c*	-	c*	c*	c*	1/1.0*	c*	c*
OTHERS	-	1/1.0[b]	-	2/2.2[c]	-	-	2/2.0[b]	-	-
UNKNOWNS	-	-	-	-	-	1/1.0*[d]	2/2.1[e]	-	-
UNIDENTIFIABLE	3/3.0	8/8.2*		2/2.2*	1/1.0*	10/10.0*	2/2.1*	-	8/12.1
No. of Taxa	8	9	2	11	7	9	13	7	8
No. of Taxa charred	1	3	0	4	2	4	5	2	1
TOTAL SEEDS Actual count	145	73	35	57	12	57	182	24	76
TOTAL SEEDS Seeds/liter	145.0	75.3	35.7	62.6	12.3	57.0	189.6	34.3	115.2

* Indicates that some or all items were charred.
[a] Number before slash = actual number of seeds recovered; number after slash = seeds/liter.
[b] Cryptantha.
[c] Phacelia.
[d] Unknown 9045.
[e] Unknown 9009.

were recovered as macro-remains from throughout the midden. Rodent activity was extensive in the trash area, and rodents may be largely responsible for the presence of stickleaf and spurge seeds (each in four out of six samples) and a cache of pigweed seeds (FS 1829, in Grid 65).

The pit containing Burial 1 was dug through Grid 76 of the midden into nearly sterile soil. This individual was likely an adult male. The pit was located close to bedrock, where ground water may have been the principal cause of the poor bone preservation. Pit fill included trash. Burial 2, in Grid 65, was also an adult in semi-flexed position, without offerings. Here, bone deterioration was sufficiently advanced that identification of sex was not possible. The pit was filled with trash, probably derived from the surrounding deposits. Flotation results from the burials looked very similar to those from surrounding layers. Burned seeds, and corn remains in particular, attest to the trashy origins of the burial pit fills. Groundcherry seeds are present with both burials, though absent from all six trash samples. It would be tempting to suspect intentional inclusion of this plant with the burials, but unhappily, I know of no ethnobotanical record of such usage of Physalis. Hence, we must leave open the possibility of contamination combined with sampling error. Burial 2 samples match trash samples very well, except for a higher organic fraction ($\bar{x}=9.0$ grams of floated matter/liter of soil sample) compared to the surrounding trash ($\bar{x}=4.1$ grams/liter). The better-preserved Burial 1 has results distinguishable from Burial 2 and trash levels. The density of seeds is higher (189.6/liter) compared to averages of 74.8/liter for Burial 2 and 64.7/liter for trash. The variety of types is distinctly greater (13) compared to averages of 7.5 for Burial 2 and 7.7 for trash. The Burial 1 assemblage is very much like a fireplace dumping. This is probably a case of a burial with a high proportion of intrusive trash (note that FS 1453 from surrounding Grid 76 has a similar spread of taxa and burned types, but at much lower densities). In summary, no conclusive use of plants as burial offerings could be demonstrated.

Surface Sample

On July 22, 1975, before excavation began, a surface "control" sample (FS 2) was "pinch" collected from all grids at site 29SJ 629. This sample was taken as a means of investigating parameters of local seed production at one point in the annual cycle. In conjunction with observations of modern vegetation growing on the site, it provided information on the species likely to contribute contaminants.

FS 2 contained a very high density of seeds (6,588.8 per liter), although the amount of material recovered by flotation was low (1.5 grams per liter). It is of interest that many of the taxa present in the surface sample are taxa which are rarely or never charred when they occur in archeological contexts (Table 10.42). Taxa recovered from FS 2 include two grasses and several disturbed-ground annual weeds producing large seed crops. The presence of these weed seeds in site deposits must thus be looked on with great caution. These candidates for contamination include prickly and toxic plants of no known economic use (hiddenflower and scorpion-weed), one weed of very limited economic use (spurge), as well as several weeds which have been recorded as forming major components of human wild food diets (goosefoot, mustard, stickleaf, and purslane). This complicates the job of distinguishing modern (or prehistoric) contaminants from prehistoric plant utilization debris.

While similar to the 29SJ 629 record in being dominated by small seeds of weedy annuals, FS 2 otherwise showed a very different emphasis in species composition. Mustard made up 94 percent of the seeds recovered, and stickleaf (another early annual dependent on winter and spring precipitation) was also present. Although stickleaf seeds comprised only 1.2 percent of all seeds in FS 2, their density (76.3 seeds per liter) was higher than is usual for this taxon in sub-surface samples. The sample was collected in mid-summer, before cheno-am and purslane seeds would have ripened and dispersed. This may account in part for the low representation of these usually abundant seed types and the heavy leaning (95 percent of all seeds) towards the spring annuals.

One seed type (Stipa, needle-and-thread grass) was found which has not previously turned up in any Chaco Canyon flotation sample. The caryopses were obviously modern, but, interestingly enough, no modern plant specimens from this genus have yet been observed or collected from the rincon. (Stipa

Table 10.42. *Surface sample seed content compared to combined flotation results from 29SJ 629.*[a]

	Surface (FS 2)		All of 29SJ 629			
	No. of seeds/seeds per liter	Percent of seeds per liter	Mean seeds per liter, per sample	Percent of seeds per liter	No. of seeds (n = 74)	No. of samples burned
Oryzopsis ricegrass	1/1.3	+	4.1	0.6	16	12
Cryptantha hiddenflower	11/17.5	0.3	4.7	+	15	0
Chenopodium goosefoot	77/171.3	2.6	144.1	21.0	68	14
cheno-ams	28/35.0	0.5	6.3	0.9	36	9
Descurainia mustard	4215/6205.0	94.2	104.0	15.2	61	12
Euphorbia spurge	3/3.8	+	96.0	14.0	53	0
Phacelia scorpionweed	3/4.0	+	+	+	3	0
Mentzelia stickleaf	36/76.3	1.1	29.4	4.3	48	0
Portulaca purslane	28/46.3	0.7	247.9	36.2	68	18
Stipa needle-and-thread	3/7.5	+	0	0	0	0
Unknowns	10/21.0	0.3	11.2	1.6	55	35
No. of Taxa	11	-	-	-	-	-
No. of Taxa Burned	0	-	-	-	-	-
No. of seeds/liter	4415/6588.8	-	685.0	-	-	-

[a] Number before slash = actual number of seeds recovered; number after slash = seeds/liter.
+ = less than 0.1 percent.

comata, S. neomexicana, and S. speciosa have been collected in the past elsewhere in the canyon; Cully 1985a).

Not all seeds in this sample were "brand new" or pristine; many seeds exhibited effects of aging or damage. The most common conditions observed were various degrees of dessication (deflation, or brittleness leading to cracking and breaking), oxidation (discoloration, darkening), and erosion (dulling of surface treatment). Most specimens of tansy-mustard looked modern (seeds were pale to dark orange, surface reticulations were crisp and distinct, and the seeds were nearly translucent). Some seeds still had parts of the original silique, or seed capsule, adhering to them; such silique fragments have never been found to date in any sub-surface flotation sample at Chaco Canyon sites. However, many mustard seeds were darkened, deflated, and otherwise indistinguishable from mustard seeds found in proveniences considered to be prehistoric. While pristine seeds in prehistoric contexts can readily be pinpointed as modern contamination, older-looking seeds present more of a problem. Modern seeds found in site deposits are probably easily blown in while the site is exposed during excavation. Seeds that are modern, but show signs of aging, are undoubtedly also blown in and may be indistinguishable from the prehistoric floral remains. Information about the processes (and particularly about the timing) of aging in seeds would be of great use in evaluation of seed age and in reconstruction of specific seed dispersal histories.

In addition to wind-borne contamination, such factors as soil mixing, and seed transportation by rodents and insects affect the seed record. Wood and Johnson (1978:369) point out that soils are "dynamic, open systems in which numerous processes operate to... move objects vertically and horizontally." The presence of new-looking seeds in deep archeological deposits demonstrates the downward movement of seeds, but, as none of the more than 4,000 seeds recovered in FS 2 were charred, there is at least no evidence here of known prehistoric items being transported upwards. Indications are that intrusion of contaminants and disruption of the original deposition of the archeological botanical record varies considerably from site to site, and within sites, and are thus difficult to predict or quantify. In an area just north of Chaco Canyon, site depth, structural protection, site age, and time of year of excavation were all shown to have some effect on flotation results (Donaldson 1981). Some investigators are tempted to disregard all uncharred seeds as possible contaminants (Keepax 1977; Minnis 1981). My personal bias (at least for deeper sites in the arid Southwest) runs counter to this approach. Several excellent candidates for prehistoric use occur chiefly or solely uncharred in Chaco samples (Cucurbita, Scirpus, Cleome, Mentzelia, etc.). Further, having had the opportunity to examine in detail a well-preserved and relatively intact botanical assemblage from one of the Hopi villages, Gasser and Adams (1981:191) caution that "less than one percent of the plant remains... were carbonized, and what was charred... [presented] a very skewed picture" of the entire assemblage. Dismissal of uncharred seed specimens, while safely doing away with all intrusives, may also result in the loss of important information.

Discussion

Provenience Categories

Botanical remains might reasonably be expected to be distributed non-randomly with respect to different kinds of features, and interior and exterior floors, based on the very reasonable notion that different subsistence activities took place in certain kinds of places. For instance, at both 29SJ 627 and 29SJ 629, features built to contain fires can be divided into two types: firepits were larger and more formally prepared (usually slab- or adobe-lined) and heating pits were shallow and unlined. Firewood in firepits included fragments of sizeable branches and was frequently burned to ash (indicating intense fires of long-duration). Heating pits seemed to have been fueled entirely with brush, which was seldom burned to ash (indicating shorter duration fires with lower heat production). Windes (Volume I) suggests that cooking took place in firepits, while heating pits may have served as warming areas for sleeping or to keep food hot that had been removed from the firepit. At both 29SJ 627 and 29SJ 629 differential distribution of plant debris corroborates the notion that these features were used differently (Table 10.43). Corn and several wild economics were found regularly in firepits, while heating pits contained little in the way of food debris. Charred specimens of two weeds (mustard and mallow) occurred more frequently in

Table 10.43. Comparison of firepits and heating pits at 29SJ 627 and 29SJ 629.

	Firepits	Heating Pits
29SJ 627		
Number of samples	2	2
Average number of taxa per sample	11.0	2.0
Average number of charred taxa	6.0	0
29SJ 629		
Number of samples	10	5
Average number of taxa per sample	10.1	6.6
Average number of charred taxa	6.2	1.6

firepits than elsewhere in the site (Table 10.44). The Fisher Exact Test (Zar 1976) indicated in each case that the association of these seeds with firepits was significant at the .05 level. Six of the twelve occurrences of carbonized mustard seeds were in firepits, and the remaining six samples included two from the midden (possible firepit dumpings) and the two unusual burning situations (Room 2, Layer 2, and the Pithouse 2 mealing bins). This difference, however, was not as distinct at Pueblo Alto (Toll 1987a:760, 762).

Among other provenience categories at 29SJ 629, the large bell-shaped plaza pits stand out as having a particularly high diversity of floral remains (Table 10.45). Most of these are unburned, but cannot be entirely discounted as probable intrusives, since they include squash, pinyon, bulrush, and beeweed, and as the pits were sealed. The nature of plant debris in these pits continues to defy adequate explanation. Too few samples were analyzed from either mealing bins (see footnote, Table 10.45) or burials (see above) to allow characterization of plant assemblages for these provenience types. Trash (midden deposits), as a whole, bears some resemblance to firepits, with some dilution (poor preservation due to the wash running through the midden?).

At site 29SJ 627, features, in general, provided a more intensive record of prehistoric plant use than did floors: nearly all seed remains were recovered from features, although features constituted only half of all samples (Table 10.46). In features, a wider array of taxa was found, and certain economic plants, including corn, occurred more commonly (Struever 1977a:133-34). At 29SJ 629, on the other hand, seed density was actually higher on floors (Table 10.46). While the differences in seed density between sites 29SJ 627 and 29SJ 629 appear to be great, they can probably be attributed largely to "noise" from modern intrusive seeds. The majority (96 percent) of 29SJ 627 samples come from the deeper primary occupation of the site (ca. 40 to 90 cm below modern ground level), while at 29SJ 629 deposits in rooms and ramada areas (71 percent of all non-midden samples) are relatively close to the surface (ca. 5 to 60 cm). At 29SJ 627, the floor record is dominated by 16 samples from an essentially sterile tub room floor ($\bar{x}=1.3$ seeds/liter in Room 4). At 29SJ 629, several floor samples in shallow rooms contained very large quantities of unburned weed seeds (as FS 184 in Room 1, FS 653 and 654 in Room 3, FS 454 and 455 in Room 8). Clearly, the original conception of variability in seed remains in feature and floor samples, as articulated in the 29SJ 627 report, needs some modification on the basis of 29SJ 629 data. Overall seed density is not an effective differentiator between feature and floor locations, especially where

Table 10.44. Occurrence of charred Descurainia and Sphaeralcea seeds in firepits as compared to all other samples.

Descurainia

	Samples with Charred Seeds	Samples with only Uncharred Seeds	Total
Firepits	6	2	8
Other Locations	6	47	53
Total	12	49	61
(Fisher Exact Test: p = .0004)			

Sphaeralcea

	Samples with Charred Seeds	Samples with only Uncharred Seeds	Total
Firepits	3	0	3
Other Locations	5	17	22
Total	8	17	25
(Fisher Exact Test: p = .0243)			

contamination is a possible significant factor (intrusive seeds end up on floors just as frequently as in features). Taxonomic diversity and increased occurrence of charred economic plants, however, are more characteristic of features compared to floors.

Room Function

At 29SJ 627, seed contents (both floor and feature samples) of tub and other storage rooms were compared with those of living rooms. Both density and taxonomic diversity were found to be significantly greater in living rooms at the .001 level, using the approximate t-test (appropriate when sample variances are unequal; Sokal and Rohlf 1969:376). I suggested a possible explanation for this pattern, that "food materials were probably carried in and out of storage rooms in vessels, whereas plants underwent a variety of treatments in habitation rooms, offering numerous and varied opportunities for dispersal," or put more simply, that more was going on in living rooms; Struever 1977a). Plant debris follows a similar pattern at Broken K Pueblo (greater density and diversity of both cultivated and wild plant remains in habitation rooms, as opposed to storage rooms or kivas; Hill 1970:43).

Examination of 29SJ 629 flotation data compared to room type (Table 10.47) showed that again seed density is not a good criterion for distinguishing ways rooms were used. Large quantities of unburned weed-seeds of uncertain (but possibly modern) origin were present, especially in shallow rooms. Ramadas have far lower seed density (and diversity) than any of the enclosed room types. As at 29SJ 627 though, habitation rooms show significantly higher taxonomic diversity and presence of burned taxa, compared to storage rooms. In view of Hill's findings at Broken K, it is interesting that kiva floors are more similar to habitation rooms than to storage rooms.

Distribution of cultivar remains in the pollen and flotation records did not seem to vary significantly with regard to room type at either 29SJ 627 or 29SJ 629. Small amounts of corn (usually cupules) were found in flotation samples from all room types at

Table 10.45. Taxonomic ubiquity and diversity by provenience category at 29SJ 629.

	Firepits (n = 10)	Heating Pits (n = 5)	Mealing Bins (n = 3)	Bell-Shaped Pits (n = 8)	Floors (n = 34)	Trash (n = 9)	All Site (n = 74)
Taxa Occurring Consistently (More than 80 percent of samples):							
Chenopodium	+	-	+	+	+	+	-
Descurainia	+	+	-	+	+	+	-
Euphorbia	-	-	-	+	-	-	-
Mentzelia	-	+	-	+	-	-	-
Portulaca	+	+	+	+	+	+	+
Zea	+	-	-	-	-	+	-
Average Number of Taxa per sample:							
All taxa	10.1	6.6	9.3	14.1	9.5	8.2	9.7
Burned taxa only	6.2	1.6	5.3[a]	2.1	1.3	2.4	2.7

[a] Two of the 3 mealing bin samples contain carbonized trash from a post-use fire.

both sites. Corn pollen percentages did not differ greatly between living and storage room types, at either 29SJ 627 or 29SJ 629. Corn pollen was absent from Kiva C at 29SJ 627, but extraordinarily abundant in Pithouse 3 (and present in small quantities in Pithouse 2 and the Kiva) at 29SJ 629 (Cully 1985b). Corn macro-botanical remains, on the other hand, showed an affinity with trash areas at both sites and were not found in any quantity in storage rooms (corn at 29SJ 629 was concentrated in Living Room 3, trashy Room 2, the large plaza pits, trash fill of pitstructures, and the Trash Midden). Remains of cucurbits and beans were far fewer. Squash seeds occurred in a tub room, in plaza pits, and on kiva floors at 29SJ 629, and in trash fill of a tub room and a living room, and in several kiva contexts at 29SJ 627. Cucurbit pollen was found in very small amounts in three samples at 29SJ 627 (both tub/storage and habitation floors) and a single sample at 29SJ 629 (Plaza Other Pit 1; Cully 1985b). Beans were absent at 29SJ 627 and found only in special burning situations at 29SJ 629 (Room 2, Layer 2, and the Pithouse 2 mealing bins).

Time

At 29SJ 627, locations dating early in the occupation of the site (ca. A.D. 800 to 950) were compared with locations reflecting later remodelings of rooms (ca. A.D. 950 to 1075). Later contexts generally exhibited higher density and diversity of seed remains, and greater prevalence of certain economic types (corn, ricegrass; Struever 1977a:118). The distribution of plant remains paralleled that of other cultural debris, which apparently was cleaned off lower floors (Truell 1992). It should be noted that decreased diversity is expected to accompany decreased abundance of seed remains as the majority of seed taxa recovered by flotation (including many economics; see above) occur in very small frequencies. It is also possible that population pressure or environmental stress may have forced 29SJ 627 inhabitants to make greater use of a wider spectrum of resources towards the end of the occupation period.

At 29SJ 629, absence of multiple floors in rooms complicates comparison of botanical remains over time. Most structures were used from their construction throughout the main occupation (A.D. 925 to 1050), and floor-associated debris relates to the end of that occupation (Windes, Volume I). Unfortunately, for purposes of chronological comparison, lines of demarcation of time periods at 29SJ 629 coincide quite a bit with functional use categories. Areas of the site where use terminated about A.D. 1025 include Pithouses 2 and 3 and much of the plaza. Areas where cultural debris reflects the

Table 10.46. Comparison of floor and feature samples at 29SJ 627 and 29SJ 629.

	Features	Floors
29SJ 627		
Number of samples	35	34
Percent of all seeds	83	17
Mean seeds/liter	107.9	22.0
Number of taxa	22	18
Presence of corn (percent of samples)	34	3
29SJ 629		
Number of samples	31	34
Percent of all seeds	41	59
Mean seeds/liter	657.3	870.8
Mean number of taxa/sample	10.3	9.5
Mean number of burned taxa/sample	3.7	1.6
Presence of corn (percent of samples)	61	38

period A.D. 1025-1050 include the complete gamut of room types (tub and other storage rooms, habitation). The twelfth century reoccupation is manifested largely in the Kiva (plus empty Room 1 and Plaza Firepit 5). Any variability detected between these periods may, in fact, be influenced by a complex array of factors. In lieu of better alternatives, and at the risk of comparing apples and oranges, chronological analysis of 29SJ 629 flotation data was reduced to comparing the main site occupation with the twelfth century reoccupation (Table 10.48). Note that diversity stays essentially the same (if anything, decreasing in the later occupation), and that Cycloloma is the only taxon of the several tabulated whose distribution increases with time. Of course, it is uncertain whether the apparent stability over time is real, because of the apples and oranges problem. There is, for instance, no reason to believe that normal subsistence activities were taking place at the site during the late reoccupation. A similar tabulation, comparing only pitstructures from the two time periods, showed that seed density decreased, and certain food taxa (ricegrass, pinyon, hedgehog cactus) were absent in the Kiva, while overall diversity and presence of cultivars and the two charred weed taxa stayed steady. This information may reflect more diversified use of pitstructures (including food processing) during the main occupation of the site.

Chronological considerations to this point have lumped the period corresponding to the entire occupation at 29SJ 627, in comparison with a considerably later period of partial, probably specialized use of the site. The Trash Midden at 29SJ 629 was examined to look for indication of any shift in subsistence strategy during the time of main occupation of 29SJ 627 and 29SJ 629. Nine samples from three different stratigraphic units (Layer 4, A.D. 875-925; Layer 2, A.D. 925-1000; Layer 1, A.D. 975-1025) were compared. There are no midden deposits corresponding to the late re-use of site 29SJ 629 (further indication that subsistence activities were reduced during that occupation). A single sample (FS 1432 from Layer 1) stands out as inconsistent, with only very small quantities of modern weed seeds. All other samples are similar to one another (and similar also to three samples from trash fill of Kiva C at 29SJ 627; Struever 1977b) in that they contain low frequencies of corn cupules and charred weed seeds (including mustard at both sites). Thus, the flotation record provides no evidence of change in adaptation over time.

Table 10.47. Comparison of room types at 29SJ 629.

	Tub/Storage	Habitation	Ramadas	Pithouses/ Kivas
Floor Samples				
Number	8	6	5	8
Mean seeds/sample	2081.3	1348.8	75.7	406.6
Mean taxa/sample	8.4	10.2	6.4	11.4
Mean B taxa/sample	0.6	1.7	0.4	1.3
No./percent of samples with corn	2/25%	3/50%	0/0	3/38%
Feature Samples				
Number	0	10	13	4
No./percent of samples with corn	0/0	5/50%	8/62%	4/100%

Summary

Several aspects of the flotation record at 29SJ 629 should be particularly noted. First, preservation of unburned prehistoric plant remains in this open site is confirmed. Evidence includes cultivated squash seeds, pinyon nutshell, beeweed, and bulrush seeds. Squash seeds and bulrush were found also at 29SJ 627. Second, 29SJ 629 flotation results appear to be wildly different than those obtained at 29SJ 627: approximately 5,000 seeds were recovered at 29SJ 627, and 50,000 seeds at 29SJ 629, from essentially the same number of samples at each site. Several economic taxa conspicuously absent at 29SJ 627 (beans, pinyon, beeweed, and prickly pear) were present in 29SJ 629 deposits. Third, differences in the assemblages are due primarily to enormous numbers of unburned seeds of locally-common weedy annuals at 29SJ 629, where many of the deposits are very shallow. Improved selection of samples for analysis (based in part on what was learned at 29SJ 627) resulted in a greater proportion of samples productive of economic remains. Thus, the great majority of increased seed density witnessed at 29SJ 629 may be "noise" from modern contamination, and the presence of very small frequencies of important economic taxa missing at 29SJ 627 may be attributable to sampling error. Conceivably, 29SJ 627 and 29SJ 629 are actually very similar, rather than very different.

Large numbers of potentially intrusive seeds are a source of confusion and ambiguity in several cases. At 29SJ 627, seed density and diversity were greater in feature samples as compared to floor surface samples, and in habitation rooms as compared to storage rooms. At 29SJ 629, seed density appears to be inflated by possible contaminants, but greater diversity (and presence of charred economic taxa) continues to be associated with features and habitation contexts. Thus, diversity seems to be a more reliable indicator of functional role, where contamination is a possible significant factor. It was demonstrated that two types of heating features (firepits and heating pits) were used differently, on the basis of differential distribution of plant debris: corn and several wild economics were found regularly in firepits, while heating pits contained little in the way of food debris. Some differences between the main occupation (ending mid eleventh century) and the early twelfth century reoccupation could be discerned; however, these may relate principally to the specialized use of 29SJ 629 during the later period (presumed ceremonial rather than subsistence activities) and not

Table 10.48. Comparison of two major time periods in non-midden proveniences at 29SJ 629.

	Density[a]		Diversity	
	Total	Mean	Mean no.[b]	Mean no.[c]
Early Proveniences (A.D. 925 - 1025)				
Floors n=28	20908.9	746.7	8.9	1.8
Features n=31	19982.9	644.6	9.9	3.4
All n=59	40891.3	693.1	9.4	2.6
Late Proveniences (A.D. 1100 -1150)				
Floors n=7	8350.1	1192.9[d]	10.6	0.7
Features n=2	393.3	196.7	7.0	5.0
All n=9	8743.4	971.5[d]	9.8	1.7

	Presence of Specific Taxa (no./percent of samples)							
	Corn	Squash	Ricegrass	Pinyon	Hedgehog	Winged Pigweed Cycloloma	Mustard[e]	Mallow[e]
Early Proveniences (A.D. 925 - 1025)								
Floors n=28	10/36%	4/14%	6/21%	–	2/7%	9/32%	3/11%	3/11%
Features n=31	18/58%	4/13%	8/26%	4/13%	–	9/29%	5/16%	4/13%
All n=59	28/47%	8/14%	14/24%	4/7%	2/3%	18/31%	8/14%	7/12%
Late Proveniences (A.D. 1100 - 1150)								
Floors n=7	3/43%	1/14%	1/14%	–	–	4/57%	–	–
Features n=2	1/50%	–	1/50%	–	–	1/50%	1/50%	1/50%
All n=9	4/44%	1/11%	2/22%	–	–	5/56%	1/11%	1/11%

[a] Seeds per liter.
[b] All taxa.
[c] Burned taxa only.
[d] A floor sample in Room 1 (FS 184) has enormous quantities of uncharred seeds, possibly modern. If this sample is omitted, the average of seeds per floor sample is 132.0, and the average seeds for all late provenience samples is 148.2.
[e] Charred specimens only.

to any change in adaptation. Midden samples datable to periods throughout the main occupation give no indication of change over time. An economy based on corn agriculture is postulated for 29SJ 629; utilization of common bean and squash or pumpkin (Cucurbita pepo) are also documented. The bulk of the wild food component of the flotation assemblage--even with uncharred specimens factored out--is composed of two local weeds, goosefoot and purslane. Pigweed, mustard, and stickleaf are less certain candidates for major economic use--while these local weeds are abundant in the record, they are rarely or never burned. Probable minor economic weeds include beeweed, winged pigweed, groundcherry, mallow, and sunflower. Seeds of two local grasses, ricegrass and dropseed, were consumed. Pinyon nuts were collected from nearby mesas or farther away. Charred prickly pear cactus pads and buds indicate probable food utilization of a local dry-fruited type. There is no certain evidence that prickly pear fruits were collected (this would have required travel to another area, or prehistoric occurrence of a juicy-fruited type). Bulrush may have been eaten, or used for matting. Local shrubs (predominantly saltbush/greasewood) provided the great majority of fuel, with small amounts of low elevation conifers (juniper and pinyon) also represented.

The presence at 29SJ 629 and other Chaco Canyon sites of unburned plant debris, which is known to be cultural, and the possibility of prehistoric affiliation of other unburned plant material, have considerable ramifications for the business of explicating prehistoric subsistence and environment. We are lucky at Chaco Canyon to have access to botanical data, which in other areas would be lost due to poorer preservation; our data base is richer, but more difficult to interpret.

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11

EGGSHELLS FROM 29SJ 629

Thomas C. Windes

Eggshells recovered from the Spadefoot Toad Site (29SJ 629) were probably from turkey eggs. Their color, shell thickness, and the predicted size of the eggs suggested turkey origins (J. David Ligon, ornithologist at the Biology Department, University of New Mexico, personal communication, 1976). The hundreds of eggshells recovered from the site were impressive (Table 11.1), but by weight there was only enough shell to reconstruct three complete eggs.

Eggshells appeared widespread at the site, but in reality were concentrated by number and weight in a single living room, Room 9. A large concentration of eggshells were found on the room floor and slightly above in the floor fill, as well as in a large bell-shaped pit in the middle of the room. These comprised 96.2 percent by weight and 95.9 percent by number of the 1,470 shells from the site. Although fine-screening undoubtedly would have resulted in more widespread recovery of eggshells, it would not have affected the overwhelming proportion of the total found in Room 9. Because of the heavy concentration of eggshells in front of the opening of the small masonry bin (Bin 3) in Room 9, it is suspected that the bin served as a turkey pen late in the site occupation. The bin did not contain recognizable turkey dung, but the opening on the side to floor level was an unusual method of access had it been for storage like its two neighbors.

At Pueblo Alto, eggshell distribution suggested differential deposition, with possible avoidance of pitstructures for depositing eggshell refuse (Windes 1987:684-686). Despite the great amount of trash recovered in pitstructures at 29SJ 629 and other contemporary rincon sites (29SJ 626 East and 29SJ 627), the pattern noted at Pueblo Alto was repeated.

At 29SJ 629, only 37 of 1,470 (2.5 percent) eggshells weighing 0.92 g compared to the site total of 33.21+ g (2.8 percent) came from the three pitstructures. Even less came from the trash layers. Nearby 29SJ 627 yielded far fewer eggshells than 29SJ 629–780 compared to 1,470 (9.7 g versus 33.2 g)--although much of the fill at 29SJ 627 was not screened. Again, the majority of eggshells at 29SJ 627 came from rooms and postoccupation room fill, rather than from pitstructures. Eggshells were nearly as numerous at 29SJ 1360 than at 29SJ 629, despite the lack of screening at the former site. Undoubtedly, far higher totals would have been

Table 11.1. Eggshells from 29SJ 629.[a]

Provenience	Number	Weight (grams)	Field Specimen Number
Room 2, Layer 1	1	0.05	280
Room 3, Other Pit 1 (Floor)	6[b]	0.01	1216
Room 5, Ant Nest fill	1	0.01	1592
Room 8, Layer 1-C	1?[b]	?	436
Room 9, Level 2 (between Bin 1 and 3)	16	0.35	564
Room 9, Floor 1 (in Bin 3 doorway)	23	0.31	607
Room 9, Floor 1 (northeastern part of Bin 3)	118	3.11	634
Room 9, Bin 3 (Floor)	24[b]	0.25	658
Room 9, floor fill/Floor 1 (in front of Bin 3)	1178	26.34	693
Room 9, Floor 1, Other Pit 1 (Level 1)	5	0.15	3293
Room 9, Floor 1, Other Pit 1 (Level 2)	27	0.76	3294
Room 9, Floor 1, Other Pit 1 (Level 3)	1[c]	0.03	3302
Room 9, Floor 1, Other Pit 1 (Level 3)	16	0.42	3303
Room 9, Floor 1, Other Pit 1 (Floor)	4[b]	0.06	3318
Room 9, Floor 2	3	0.16	2332
Kiva (Pithouse 1), Level 10	1	0.03	1280
Pithouse 2, Subfloor 2, Layer 2 (SW1/4)	1	0.05	3477
Pithouse 2, Floor 2, Other Pit 10 (Layers 2-3)	1	0.01	3422
Pithouse 3, Layer 1 (balk and SW1/4)	1	0.25	2493
Pithouse 3, Layer 2	5	0.10	2518
Pithouse 3, Floor 1 (SW quadrant)	28[b]	0.48	2628
Plaza Grid 29, Floor 1, Firepit 5 (fill)	1	0.07	2453
Plaza Grid 14, Floor 1, Other Pit 14 (Layer 4)	3[d]	0.03	2779
Plaza Grid 14, Floor 1, Other Pit 14 (Layer 6)	2[b]	0.00	2812
Trash Midden, Grid 65, Level 6 (Sections G & I)	3	0.18	1842
Total	1,470	33.21+	

[a] Eggshell colors: 10YR8/3, 10YR8/1, 2.5Y8/2 and 2.5Y8/3.
[b] Recovered from flotation samples.
[c] Recovered from twig species identification sample.
[d] All eggshells are burned black.

obtained at 29SJ 1360, where only 3.4 percent of the total, by number (45 of 1,342), came from pitstructures. In contrast, at 29SJ 626 East, eggshells (250) were dominant in the pitstructure fill (98 percent of the total), although shallow room and plaza deposits and considerable fine-screening in pitstructures undoubtedly allowed recovery of far more eggshells in the pitstructures than in the rooms or plazas.

The abundance of turkey shell in the latest deposits at 29SJ 629 may coincide temporally with the sharp increase in turkey remains in the early A.D. 1100s and later deposits in Chaco Canyon

(Akins 1984; Gillespie 1991; Windes 1987) when turkeys may have become a prominent food source. Interestingly, turkey remains were rare in earlier deposits of the site and in those of contemporary time at other sites. The widespread distribution of eggshells, however, attested to a greater presence of turkeys than their bones would have us believe. There was little evidence that these earlier turkeys were eaten, so they may have been kept for their feathers. In contrast, dogs were common during the period when there was little evidence for turkeys but became scarce later when turkeys became prevalent. The use of these two domestic animals at small-house sites was unclear, but their inverse appearance and disappearance suggest an interrelationship tied to subsistance or ritual needs.

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