

An Analysis of Whole Vessels from the Mills
Collection Curated at Eastern Arizona College,
Thatcher, Arizona

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ABSTRACT

The archaeological record of southeastern Arizona is currently being destroyed at a rapid rate in the face of increasing and extensive development. Large sites occupied late in the prehistoric sequence (A.D. 1200-1450) that are visible from the surface are often the first to suffer damage, as they are targeted by pothunters due to their visibility. In addition, because they are located in areas that are as well suited to habitation today as they were in the past, such sites are often directly in the path of modern development. As a result, collections curated in museums throughout Arizona often represent the only or the best record of many of these sites. In order better understand the past in southeastern Arizona, it is incumbent upon archaeologists to not only protect the sites that are left, but also to seek out existing collections and utilize them to their fullest extent. The Mills Collection at Eastern Arizona College is one such collection that has vast potential to shed light on migration, subsistence practices, exchange, and many other aspects of life in southeastern Arizona and southwestern New Mexico between A.D. 1200 and 1450.

The Mills Collection is the result of more than 30 years of excavation by Jack and Vera Mills, two very enthusiastic and well-trained avocational archaeologists. The Millses excavated at ten sites throughout southeastern Arizona beginning in the early 1940s, and continuing through the mid 1970s. All of these sites were occupied between A.D. 1200 and 1450 (many of them after A.D. 1300). The Millses wrote and published excavation reports, most in *The Artifact*, the journal of the El Paso Archaeological Society, and curated the artifacts they collected in a museum in their home in Elfrida, Arizona. In 1983, Eastern Arizona College purchased the Mills Collection from Jack and Vera Mills in order to keep it in the local area. Much of the Mills Collection is now on display in the Student Services Building at Eastern Arizona College in Thatcher, Arizona.

Currently there are more than 500 whole ceramic vessels, as well as numerous projectile points, pieces of worked shell, ground stone, and other artifacts from the Mills Collection on display. Over the course of a week in September 2004, the decorated whole vessels on display in the Student Services Building were analyzed. More than 300 vessels were photographed and measured in order to obtain information for a Ph.D. dissertation and the Center for Desert Archaeology's Coalescent Communities project. In addition, the usefulness of the Mills Collection for future research was assessed.

Despite a week of analysis, it is clear that the research possibilities associated with the Mills Collection have not been exhausted. In light of the ongoing destruction of sites in southeastern Arizona, and the Greater Southwest as a whole, existing collections such as the Mills Collection often offer the best chance of refining our knowledge of the past. We hope this work represents a first step towards future research and collaboration between Eastern Arizona College and the greater archaeological community.

INTRODUCTION

This report describes the results of analyses conducted on the whole vessels from the Mills Collection on display at the Student Services Building at Eastern Arizona College, Thatcher, Arizona. The analysis was conducted during the week of September 13th through 17th, 2004 by three archaeologists from the Center for Desert Archaeology, Tucson, Arizona; Dr. Patrick Lyons, Preservation Archaeologist, Dr. Anna Neuzil, Preservation Archaeologist (then a Preservation Fellow and Ph.D. Candidate at the University of Arizona's Department of Anthropology), and Mr. Mathew Devitt, Research Assistant. Of the 537 vessels on display, a total of 317 were analyzed and photographed.

The analysis was driven by six primary goals:

1. to obtain information from a representative sample of whole vessels from excavated contexts at the Curtis siteⁱ (AZ CC:2:3[ASM]) for Neuzil's dissertation research,
2. to obtain information from a sample of whole vessels that will contribute to the Center for Desert Archaeology's ongoing "Coalescent Communities" project,
3. to gain a better understanding of the pottery produced by immigrants from northeastern Arizona during the 13th and 14th centuries,
4. to obtain information about and photographs of poorly known and poorly defined ceramic types that were important during the latest period of prehistoric occupation in the Greater Southwest,
5. to reexamine the Chihuahuan Polychromes in the Mills Collection in light of recent refinements in typology, and
6. to assess the potential of the Mills Collection to contribute to future research on the Greater Southwest by archaeologists from the Center for Desert Archaeology, as well as other research institutions,

Dissertation Research

Neuzil's dissertation research focused on the scale and effect of prehistoric migrations into the Safford and Aravaipa areas during the Classic Period (A.D. 1200-1450). Previous research at the Goat Hill site by Kyle Woodson has demonstrated that migrants from the Four Corners area settled in the Safford Valley beginning in approximately A.D. 1275 (see Woodson 1995, 1999; all references are listed in Appendices A and C). Indications from other unpublished manuscripts, such as Wesley Jernigan's notes on excavations at the Krider Kiva Site (AZ CC:1:43[ASM]), suggest that immigration was widespread and had a great impact on both migrant and indigenous populations in the area. However, the overall amount of archaeological research in the Safford Valley and the Aravaipa Creek area has been so small that the scale of migration is poorly understood. Neuzil's recent research focused on a sample of 35 sites in the Safford and Aravaipa areas in order to understand approximately how many migrants came into these areas, and how migrants and local groups interacted.

In order to get an overview of settlement in the Safford and Aravaipa areas, Neuzil mapped and collected a representative sample of artifacts from the surfaces of sites. In an effort to help preserve the archaeological record of these areas, no excavations were conducted. Therefore, Neuzil analyzed existing excavation collections to supplement data obtained in the field. Although collections from the Curtis site are held at the University Museum at the University of Colorado at Boulder, the assemblage from the Curtis Site in the Mills Collection at Eastern Arizona College has better locational information, tying individual vessels to excavated contexts, and is the largest in the local area. It is, therefore, an invaluable resource for studying the archaeology of the Safford Valley in general, and the Curtis Site in particular.

Coalescent Communities Project

The senior researchers at the Center for Desert Archaeology are currently undertaking a large scale research project funded by the National Science Foundation (grant number BCS-0342661) entitled “Precontact Population Decline and Coalescence in the Southern Southwest,” with the goal of understanding why prehistoric populations declined so dramatically toward the end of the prehistoric sequence. This large scale research project is focusing on five geographical areas: the Phoenix, Tonto, and Safford basins, the Perry Mesa area, and the San Pedro River Valley. In the Tonto Basin, one of the primary geographical foci, the VIV Ruin excavated by the Millses appears to be one of the latest occupied sites in the area. Because no additional excavations will be carried out to complete the Coalescent Communities project, existing excavated collections, such as the assemblage from the VIV Ruin in the Mills Collection at EAC, are crucial resources.

Immigrants and their Pottery

Migration has been an important topic of research in Southwest archaeology since the inception of the discipline, but recent research into the modes of migration and its consequences has significantly improved archaeologists’ understanding of this important social process. Much of this recent work has focused on ceramics and how they can be used to identify immigrant populations at archaeological sites. However, since some ceramic types associated with immigrants are relatively rare, especially as whole vessels, progress on this topic has been somewhat slow. The Mills Collection at EAC contains a number of these rare types (in whole vessel form), such as Los Muertos Polychrome and all types in the Maverick Mountain series, including Prieto Polychrome. The research we conducted with the Mills Collection will allow us to refine our understanding of when these types were produced and consumed, the diversity inherent in the decorative styles of these types, and the actions of immigrant populations and their consequences for the local populations with whom they interacted.

Poorly Known Ceramic Types

Despite the fact that prehistoric ceramics have been intensively studied in Southwestern archaeology for more than a century, pottery types that date to the latest

period of prehistoric occupation (A.D. 1300-1450) are relatively poorly understood, particularly those that postdate A.D. 1400. This is partly a result of the small number of sites that date from A.D. 1400 to 1450, as well as the lack of research that has been undertaken to understand this late time period. However, ceramics are often the best way to assign occupational dates to a given site, particularly when only working with collections obtained from surface collections and not from excavation. Understanding when and where these ceramics were used is, therefore, a prerequisite to understanding the A.D. 1300-1450 occupation of the Greater Southwest.

The Mills Collection at Eastern Arizona College includes a number of these late and rare ceramic types. Lyons has named most of them after the sites from which the Mills excavated examples suitable for use as type specimens (prime examples used to formally describe a pottery type). These new types include Nine Mile Polychrome, Phoenix Polychrome, Dinwiddie Polychrome, Los Muertos Polychrome, and Cliff White-on-red. The presence of these types at a site indicates occupation after A.D. 1350, and the descriptions made possible by work with the Mills Collection will allow other archaeologists to refine the pottery-based chronologies in their study areas. As a result, our understanding of late prehistoric society will improve throughout the Greater Southwest.

Chihuahuan Polychrome Typology

Northwest Mexico has been the focus of significantly less archaeological research than the Southwestern United States. As a result, much less is known about the prehistory of Northwest Mexico overall, and the understanding of how artifacts relate to occupation sequences is provisional at best. However, recent typological work with Mexican ceramics has substantially increased archaeological knowledge. We reviewed the assemblage of Chihuahuan Polychromes in the Mills Collection in order to understand how sites with Chihuahuan Polychromes located in the United States relate temporally to sites south of the international border.

Potential of the Mills Collection

Although the Mills Collection has been at Eastern Arizona College for a number of years, only a handful of researchers have taken advantage of the opportunity to utilize it in archaeological research. The Mills collection has vast potential because it represents a diverse group of sites, the artifacts can be easily referenced back to the locations from which they were excavated, and many of the sites from which these materials were recovered have since been heavily disturbed. The analysis conducted by Lyons, Neuzil, and Devitt focused on decorated ceramic vessels due to the nature of their research questions, but possibilities for research using the plainware and textured ceramic vessels, projectile points and other flaked stone objects, exotic artifacts such as shell, turquoise, copper bells, and other items in the collection are virtually unlimited. Thus the results presented in this report represent only a small sample of what could potentially be learned from the Mills Collection.

JACK AND VERA MILLS

Jack and Vera Mills were avocational archaeologists who conducted excavations at a minimum of ten sites in southeastern Arizona and southwestern New Mexico, over a span of almost 40 years (see Table 1). Many of their excavations focused on sites that had been occupied during the latest period of prehistory, from A.D. 1200 to 1450. While they only excavated a handful of rooms at most sites, the Millses excavated a substantial number at the Curtis (approximately 70 rooms) and Kuykendall (approximately 130 rooms) sites. Due to their extensive excavations at sites dating to this late time period, the Millses became very familiar with the artifacts and architectural patterns associated with it, and rapidly became adept excavators. The Millses took notes and photographs during their excavations, which later became published reports (see Appendix A for references), and utilized new archaeological techniques, such as archaeomagnetic dating, as they became available to archaeologists. In addition, the Millses consulted professional archaeologists, such as Emil Haury, Albert Schroeder, Lyndon Hargrave, Rex Gerald, Robert DuBois, Charles Di Peso, Gloria Fenner, and Florence Hawley Ellis for help in identifying ceramics, analyzing faunal remains, and utilizing dating techniques. Despite the fact that neither Jack nor Vera Mills had a degree in archaeology, they contributed significantly to the understanding of post-A.D. 1200 population movements in the Greater Southwest. The collections from each of the sites they excavated remain important resources for developing the archaeological understanding of later periods of prehistory.

ANALYSIS

All decorated ceramic vessels on display at the Student Services Building, as well as a small sample of plainware vessels, were analyzed and photographed. A total of 14 variables were recorded in a Microsoft Excel spreadsheet for each vessel (see Table 2). Comments were also recorded regarding anything else of note about each vessel.

Database and Variables

The three catalog number variables recorded represent unique identifiers assigned to each vessel by Jack and Vera Mills, the EAC Anthropology Museum, and an unknown source. Catalog numbers assigned by the Millses were generally sequential according to the order in which they excavated sites, and were sometimes followed by letter designations that specified the site from which each artifact came. For example, vessel 7622CS came from the Curtis site, vessel 1981V came from the VIV Ruin, and vessel 6157K came from the Kuykendall site. EAC and other catalog numbers appear to include a year designation (an accession number), followed by other numbers that specify when the artifact was cataloged, such as 90-5-1333 or 80.10.2. However, additional information is needed to determine this for certain.

Table 1. Sites excavated by Jack and Vera Mills.

Site Name	ASM Site Number	Amerind Foundation Site Number	Location	Years Excavated
Nine Mile site		ARIZONA:CC:15:1(AF)	near Bowie, AZ	1940-1949
Hereford site	AZ EE:12:36(ASM)	ARIZONA:EE:8:8(AF)	near Hereford, AZ	mid 1940s
Kuykendall site	AZ FF:2:2(ASM)	ARIZONA:FF:2:1(AF)	Sulphur Springs Valley, AZ	January 7, 1951 to unknown date
Webb site	AZ FF:6:1(ASM)	ARIZONA:FF:6:1(AF)*	near Webb, AZ	1955
VIV Ruin	AR-03-12-06-17(TNF)**		near Punkin Center, AZ	early 1960s, ending 1962
Glass Ranch site			east side of Chiricahua Mountains in Arizona	March 3, 1965 to May 4, 1965
Slaughter Ranch site	AZ FF:11:21(ASM)	ARIZONA:FF:11:2(AF)	Cochise County near the Mexican border east of Douglas	April 25, 1966 to unknown date
Dinwiddie site	NM S:14:1(ASM)		near Cliff, NM	May 3, 1966 to May 1970
Pitts site			New Mexico	April 23, 1970 to unknown date
Curtis site	AZ CC:2:3(ASM)	ARIZONA:CC:2:2(AF)	near Sanchez, AZ	November 11, 1971 to June 1976

* also NA5788 in the Museum of Northern Arizona numbering system

**site number is from the Tonto National Forest numbering system; also known as the Meredith Ranch site

Table 2. Variables Recorded.

Mills Catalog Number
Eastern Arizona College Catalog Number
Other Catalog Number
Ware
Type
Vessel Shape
Vessel Form
Vessel Height
Maximum Vessel Diameter
Orifice Diameter
Presence/Absence and Location of Banding Line
Presence/Absence of Break in Banding Line
Presence/Absence of Vessel Reconstruction
Presence/Absence of Vessel Repainting

The variables “ware” and “type” specify the formal typological classification of each vessel analyzed. Table 3 correlates the codes used in the database with their ware and type designations. The system of organizing Southwestern ceramics into wares and types will be explained in the following section. Vessel shape refers to the general shape of the vessel (e.g. bowl or jar; see Table 4), and vessel form refers to the specific form of the rim in relation to the body (see Table 5 and Figures 1 and 2). Vessel height is the height of each vessel from the base to the rim (see Figure 3). Maximum vessel diameter was measured at the widest point on the vessel, usually near the middle of the body of a jar and near the rim of a bowl (see Figure 4). Orifice diameter was measured at the widest point of the opening around the rim (see Figure 5). The variables for presence and absence of banding lines and banding line breaks are most relevant to Gila Polychrome and Cliff Polychrome bowls, on which banding lines are most often found (see Figures 6 and 7 and Table 6). The presence or absence of reconstruction and repainting was also recorded.

The variables recorded provide a variety of information about each vessel. Catalog numbers allow us to tie each vessel to the site and the location within the site from which each vessel came. Specific provenience information for artifacts is crucial, as it allows archaeologists to ask and answer very specific questions about the sequence of site construction and occupation, the functions of spaces (such as habitation, craft production, storage, and ritual), and the method and reasons for abandonment. Ware and type designations allow archaeologists to determine when sites were occupied, as most wares and types were produced and used during a limited period of time, and also to understand very generally who occupied the site. Wares and types can generally be tied to specific regions and cultural groups in the past, although this can be confused by processes of trade and migration, which can transport vessels out of the region in which they were made and away from the people who manufactured them.

Table 3. Ware and type codes.

Ware Code	Type Code	Ware	Type
1	18	Tucson Basin Brown Ware	Tanque Verde Red-on-brown
2	251	Red Ware	Belford Red Smudged
2	272		Indeterminate Classic Period Red Ware
2	5002		Gila White-on-red
7	702	San Simon Series	Encinas Red-on-brown
8	800	Belford Brown Ware	Belford Plain
10	1091	N/A	Playas Red Incised
13	1300	N/A	San Carlos Red-on-brown (phyllite sand temper)
13	1301		San Carlos Red-on-brown (non-phyllite sand temper)
13	1302		San Carlos Red-on-brown (sherd temper)
13	1306	N/A	Thatcher Red
14	1403	Mimbres Black-on-white	Mimbres Style II Black-on-white
14	1404		Mimbres Style III Black-on-white
14	1406		Mimbres Style II or III Black-on-white
17	1799	N/A	Indeterminate Red-on-brown
18	1813	Middle Gila Buff Ware (Safford Varieties)	Sacaton/Rincon Style Red-on-buff
18	1816		Casa Grande/Tanque Verde/San Carlos Style Red-on-buff
19	1905	Dragoon Series	Tres Alamos Red-on-brown
24	2406	Cibola White Ware	Escavada Black-on-white
24	2415		Reserve Black-on-white
24	2420		Tularosa Black-on-white
24	2430		Pinedale Black-on-white
24	2490		Indeterminate Cibola White Ware
50	31		Roosevelt Red Ware
50	32	Gila Polychrome: Gila Variety (bowl)	
50	33	Gila Polychrome: Tonto Variety (bowl)	
50	34	Gila Polychrome, exterior decoration only (bowl)	
50	41	Tonto Polychrome (bowl)	

50	61		Cliff Polychrome
50	63		Cliff Polychrome: Tonto Variety
50	72		Ninemile Polychrome: Gila Variety
50	73		Ninemile Polychrome: Tonto Variety
50	75		Phoenix Polychrome: Gila Variety
50	76		Phoenix Polychrome: Tonto Variety
50	78		Dinwiddie Polychrome: Gila Variety
50	79		Dinwiddie Polychrome: Tonto Variety
50	80		Gila Style body/Gila Style neck polychrome jar
50	81		Tonto Style body/Tonto Style neck polychrome jar
50	82		Tonto Style body/Gila Style neck polychrome jar
50	84		Los Muertos Polychrome
50	85		Gila Style body/Tonto Style neck polychrome jar
50	90		Cliff White-on-red
50	5005		Pinto Polychrome
50	5093		Gila Polychrome: Salmon Variety (bowl)
51	5103	White Mountain Red Ware	St. Johns Black-on-red
51	5104		St. Johns Polychrome
51	5108		Cedar Creek Polychrome
51	5109		Fourmile Polychrome
51	5192		Indeterminate White Mountain Red Ware Polychrome
60	6000	Jeddito Yellow Ware	Awatovi Black-on-yellow
60	6001		Awatovi/Jeddito Black-on-yellow
60	6003		Bidahochi Polychrome
60	6006		Jeddito Engraved
60	6010	Jeddito Orange Ware	Huckovi Polychrome
65	6508	Zuni Glaze Ware	Heshotauthla Polychrome
65	6510		Kwakina Polychrome
66	6602	Maverick Mountain Series	Maverick Mountain Black-on-red

66	6604		Maverick Mountain Polychrome
66	6610		Prieto Polychrome
66	6612		Tucson Black-on-red
66	6614		Tucson Polychrome
70	7000	N/A	El Paso Polychrome
70	7001	Chihuahuan Polychromes	Ramos Polychrome
70	7002		Villa Ahumada Polychrome
70	7090		Carretas Polychrome
89	8999	Mogollon Brown Ware	Tularosa White-on-red
-9	-9	Indeterminate	Indeterminate

Table 4. Vessel shape codes.

Code	Vessel Shape
1	bowl
2	jar
3	scoop
5	pitcher
6	ladle
7	effigy vessel

Table 5. Vessel form codes.

Code	Vessel Form
101	flare-rim bowl
102	plate/platter
103	outcurved bowl
104	hemispherical bowl
106	incurved bowl
120	semi-flare rim, hemispherical bowl
121	semi-flare rim, incurved bowl
124	recurved bowl
127	low shouldered bowl
210	tall flare-rim jar
211	short flare-rim jar
213	short straight collared jar
214	tall straight collared jar
215	seed jar
217	neckless jar
219	incurved straight collared jar
230	double jar
242	semi-flaring angled long collared jar
243	semi-flaring short straight collared jar
320	oval shaped scoop
710	bird effigy
720	anthropomorph effigy
790	effigy vessel

Note: codes for jar vessel forms were used to describe pitchers

Figure 1. Bowl vessel forms

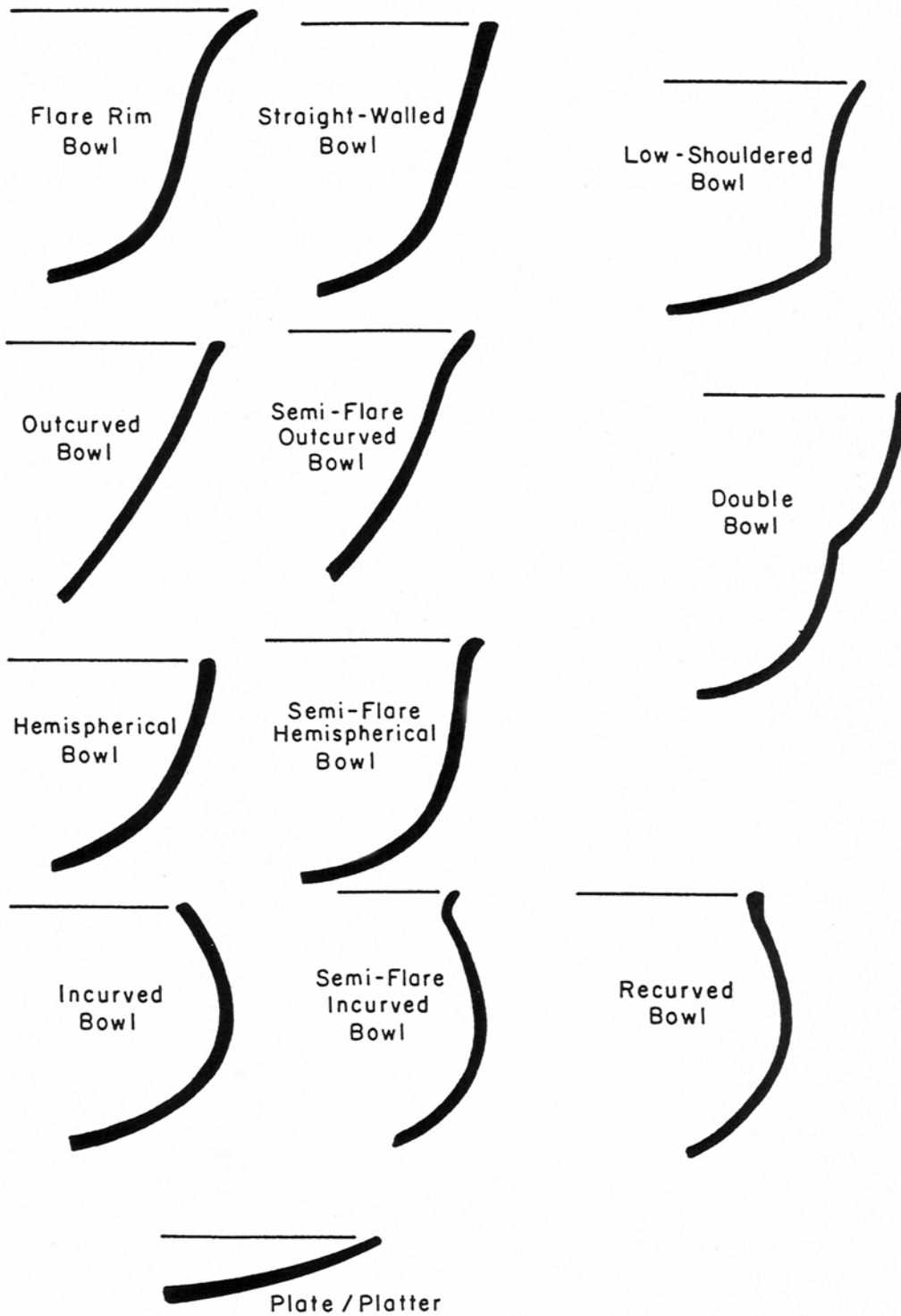
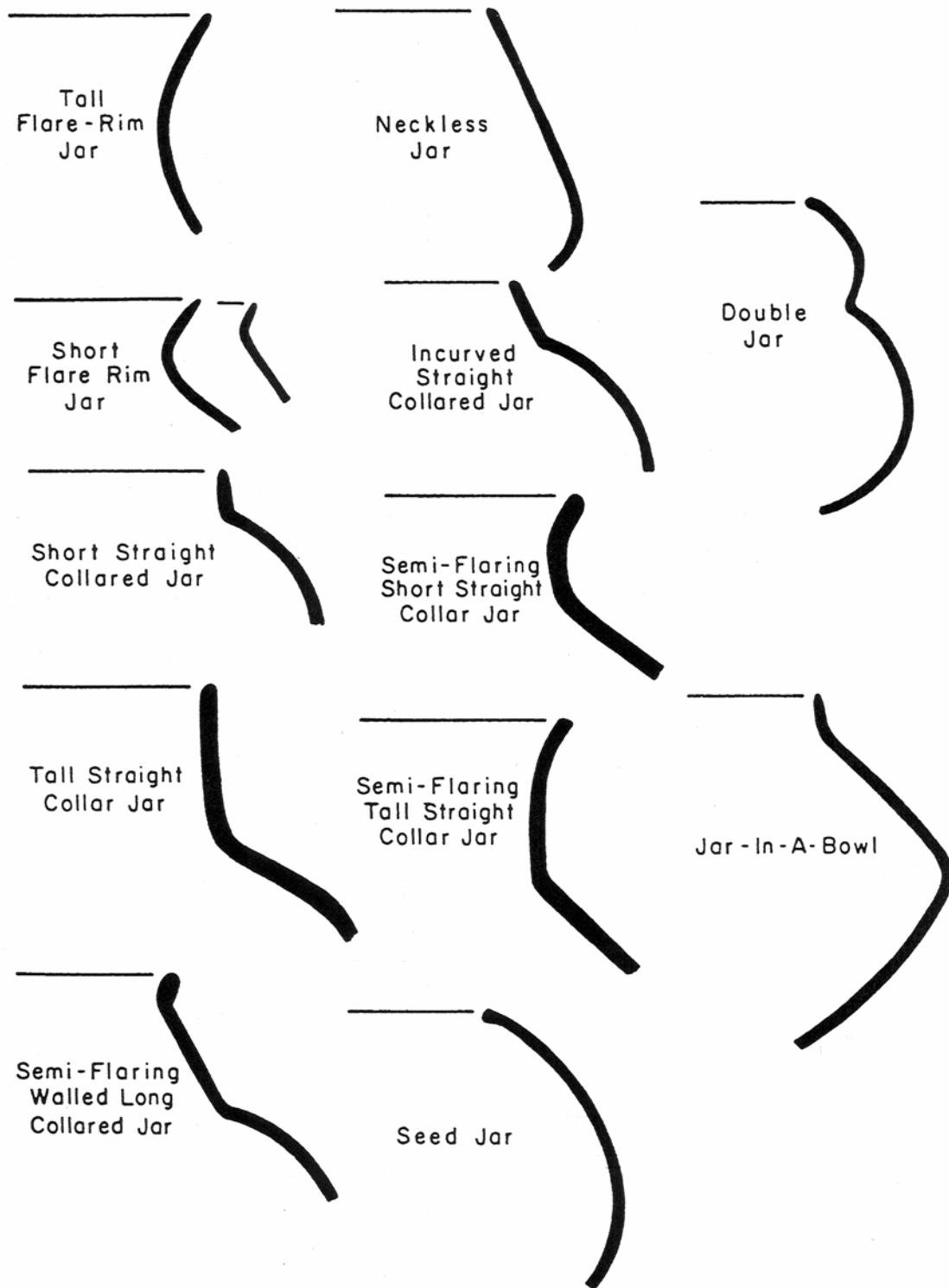


Figure 2. Jar vessel forms



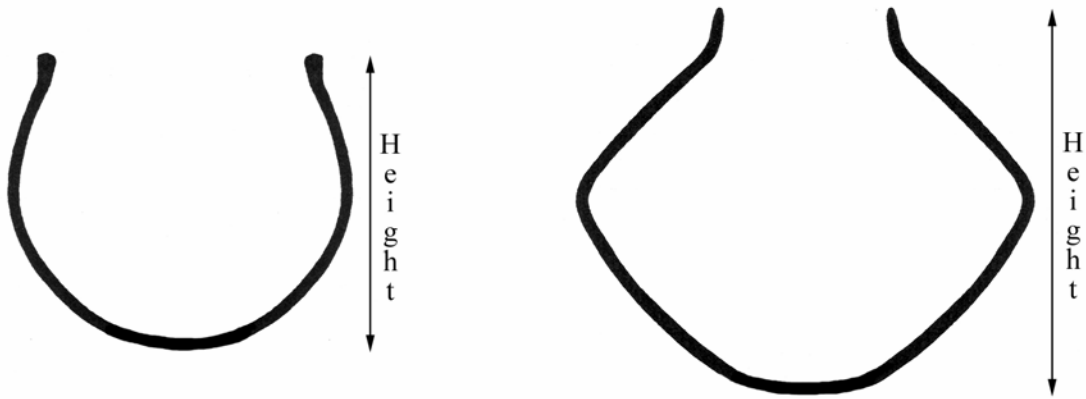


Figure 3. Vessel height

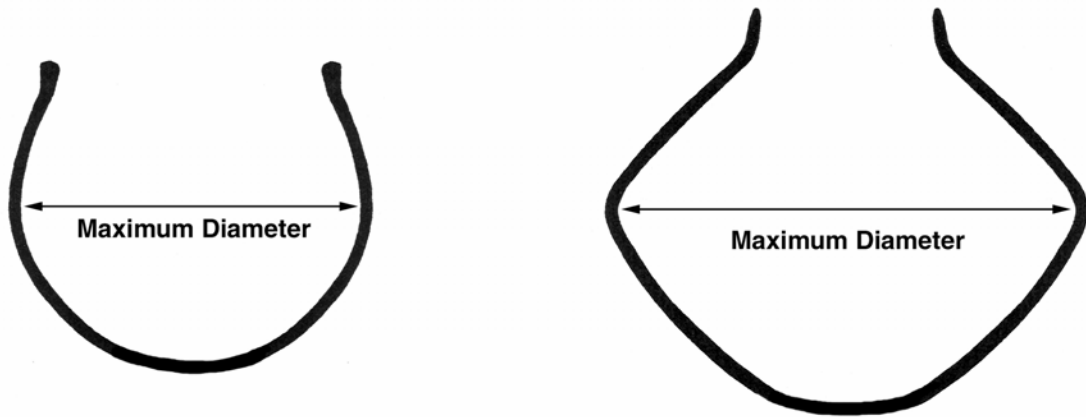


Figure 4. Vessel maximum diameter

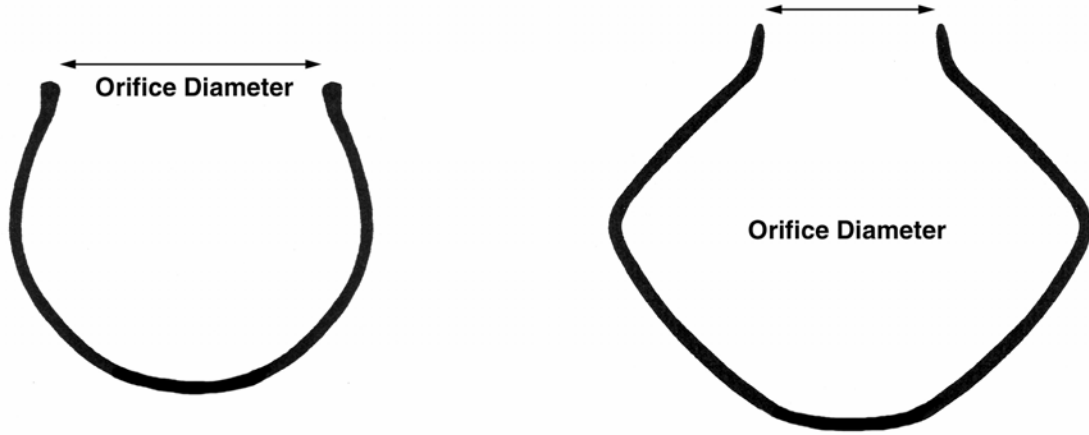


Figure 5. Vessel orifice diameter



Figure 6. Cliff Polychrome bowl exhibiting a banding line.



Figure 7. Gila Polychrome bowl exhibiting a broken banding line.

Table 6. Banding line codes.

Code	Banding Line Placement
0	no banding line
1	banding line at rim
2	distance between rim and banding line is less than the width of the banding line
3	distance between rim and banding line is equal to the width of the banding line
4	distance between rim and banding line is more than the width of the banding line

We collected information on vessel shape and form, height, maximum diameter, and orifice diameter to examine the variety of forms and sizes within wares and types, and to look at changes in vessel size and shape through time. As a result we will also be able to compare these data to information about vessels from sites that date to the same time period. Vessels seem to become more variable in form and size later in time, and we would like to be able to describe this variation quantitatively.

The banding line is associated with design styles that originated in the area around the Hopi Mesas and spread through much of the Southwest through migration. Therefore, banding lines are a useful tool in tracking prehistoric migrants. The presence and absence of reconstruction and repainting was recorded for each vessel to determine how much of each vessel is unaltered. While reconstruction and repainting make artifacts more

aesthetically pleasing, both processes can obscure information about ceramic raw materials and stylistic variability, complicating future analyses.

Photographs

Each vessel analyzed was photographed to provide a visual record of form and painted design. Between two and eight photographs were taken of each vessel. Jars were generally photographed four times from the side to capture the profile of the vessel as well as design variation over the entire vessel. Bowls were generally photographed three times, once from the side to capture the vessel form, once at an oblique angle to capture the designs near the rim of the vessel, and once from above to capture the entire design inside the vessel. However, there were variations in this system. For example, bowls decorated only on the exterior were treated like jars, and photographed four times from the side.

Eleven CDs included with this report contain all photographs taken during the analysis. Disks 1 through 10 contain all research photographs, and Disk 11 contains artistic photographs of a variety of vessels, which we hope can be used in promotional materials associated with the Mills Collection. The research photographs are labeled with the catalog number of the vessel, followed by a space, and then a number designating the photograph number. For example, photo 1533K 1 is the first photograph of vessel 1533K. Similarly, photo 90-5-716 3 is the third photograph of vessel 90-5-716. When possible, the catalog numbers assigned by the Millses were used, as these can be more easily tied to sites and reports with information currently available. If no Mills catalog number was found on the vessel, an EAC or other catalog number was used. A key to the photographs that can be found on each disk is in Appendix B.

CERAMICS IN THE SOUTHWEST

Wares, Types, and Series

Southwestern archaeologists generally talk about different kinds of pottery in terms of wares and types. A ware is a group of related types, in the same way that a genus is a group of related species. Ware is the more general term and species is more specific. Wares reflect the distinct ways of making pottery that developed in different locations, i.e., certain raw materials were used and particular methods of forming vessels were adopted. In this way, wares vary mainly across space, from group to group.

Each ware is associated with a unique mix of technological characteristics, that represent different choices in pottery making materials and techniques. Archaeologists define wares based on paste, slip, and paint. Paste is the clay from which the vessel is constructed and includes temper, material added to the clay to make it more workable and to prevent cracking during the drying and firing process. Different groups used different colored clays and different kinds of tempers in their pottery pastes. Some chose white clay and crushed-stone temper, some chose white clay and sand temper, and some used gray clay and crushed-potsherd temper. Many other choices were available.

A slip is a clay that is used as a paint, covering large portions of the interior or exterior of a vessel, or the entirety of one or both surfaces. The slip clay is usually used as a background color for painted designs. Slip clays may not be well suited for use as vessel construction clays, i.e., they may be brittle, but may polish well and produce a more pleasing color than the clays available for vessel building. Some groups used gray clays to build vessels and slipped them with white clays, others used white clays to construct pots and slipped them red. Again, many different choices were available to ancient potters, resulting in a wide variety of color combinations.

Paints are typically broken down into two categories: organic and mineral. Organic paint, which is black, is made from boiled plants such as Rocky Mountain Beeweed or Tansy Mustard. Mineral paints are most often organic paints to which iron or manganese has been added. These paints fire to a brownish, black, or red color, depending upon the specific form of mineral oxide used. White paints are made from clay minerals (kaolin). Designs applied with organic paints typically exhibit a "fuzzy" appearance around the edges, whereas the margins of designs applied in mineral paint are crisp. Organic paint tends to sink into the surface of the vessel, whereas mineral paint tends to "sit above" the surface of the vessel. Mineral paint, when it erodes, tends to flake off, revealing the slip or polished surface below. Organic paint, because it is tightly bonded to the surface of the vessel, weathers as the polished surface becomes weathered.

Besides being distinguished on the basis of raw materials, wares differ in terms of vessel forming techniques and firing conditions. Some wares were made using the coil-and-scrape method, others using the paddle-and-anvil technique. The former method involves building a vessel up from long, thin, spirally coiled ropes of clay, which are joined together by pinching with the thumb and forefinger. The coil joints are later smoothed over via scraping with a piece of gourd, or a potsherd ground to shape. Pots that are destined to be painted are polished, after the scraping process, using a smooth pebble. The paddle-and-anvil technique involves the joining of slabs or short, thick coils of clay by compacting them between an anvil stone held inside the vessel wall and a wooden paddle (archaeological and ethnological specimens look like ping-pong paddles) applied to the exterior of the vessel wall. Vessel walls were also thinned and shaped through this process.

Ware names have two parts, referring to the place where archaeologists first recognized a unique mixture of traits, and some descriptive term that relates to color or forming technique, e.g., "White Mountain Red Ware," "Tusayan Corrugated." The rules for naming and describing pottery wares and types were established by Harold Colton and Lyndon Hargrave of the Museum of Northern Arizona, in Flagstaff. Most archaeologists have followed these rules regarding the naming of types, but archaeologists working in central and southern Arizona have been reluctant to formally group types into wares.

Types, for the most part, reflect change through time. Types are usually defined based on differences in painted design styles, such that within a ware, there are many

related types exhibiting the same or similar technology (raw materials and forming techniques) but different painted decorations. Patterns of decoration that occur over and over again are given names, and are referred to as styles. These style names are also used to name types. Some styles were popular among many different ancient groups and crosscut wares.

Type names, like, ware names, have two parts. They refer to the place where archaeologists first noticed the type as a unique phenomenon and they include a descriptive phrase or word reflecting the types defining trait, such as corrugation, or if it is a decorated type, the colors used in the design. Pottery types that consist of a single paint color on a single background color, e.g., black-on-white, are called bichromes. Pottery types that exhibit three or more colors, e.g., black and white on red, are called polychromes. Examples of proper pottery type names include: Jeddito Black-on-yellow, Gila Polychrome, Encinas Red-on-brown, Pinedale Black-on-red, and St. Johns Polychrome. A series is a group of pottery types that are more closely related to each other than other types within the same ware, e.g., Polacca Series (of Tusayan White Ware). The term "series" is also used to refer to groups of related types that lack a formal ware definition, such as the Maverick Mountain Series.

Decorated Wares, Series, and Types

"Decorated," as it is used here refers to painted pottery. Some archaeologists refer to red-slipped and polished vessels or corrugated pottery as decorated. We use the term "Utility Ware" to discuss unpainted pottery. Such vessels were most often used for cooking and storage, whereas painted vessels were most often used to serve food.

Roosevelt Red Ware

Roosevelt Red Ware, as originally defined, refers to a group of stylistically and technologically related types that includes Pinto Polychrome, Gila Polychrome, and Tonto Polychrome. However, later conceptions of this ware included types whose relationships to the initial three remain unclear. Some researchers have chosen to use the term "Salado polychromes," in order to avoid a reference to the Roosevelt Lake area, previously thought of as the center of Roosevelt Red Ware production. This is sound reasoning, as the results of numerous trace element and mineralogical sourcing studies strongly suggest that these types were produced in nearly every river valley in the Greater Southwest, south of the Hopi Mesas.

The term "Salado," however, has its own baggage, initially referring to an archaeological culture that allegedly developed in the Salt River drainage and supposedly spread from there over much of the Southwest. Given the problems associated with both terms, we have chosen to follow historical precedent. In this study, Roosevelt Red Ware includes the three polychrome types discussed above, as well as the "salmon varieties" of Pinto and Gila Polychrome, the bichrome types Pinto Black-on-red and Gila Black-on-red, Cliff White-on-red, and several newly defined subtypes.

Roosevelt Red Ware vessels exhibit a brown paste and, most often, sand temper. The brown paste is usually covered by red and/or white slip. The interior surfaces of some types are smudged. Roosevelt Red Ware types and varieties are distinguished based on differences in "decorative configuration" and "decorative treatment." Decorative configuration is a unit of analysis that is more inclusive than named styles such as Pinedale Style or Tularosa Style, for example. Decorative configurations may, however, like styles, crosscut types. A decorative configuration is a recurrent group of colors and a method of combining them on one or more ceramic surfaces – a basic structure for painted embellishment consisting of one or more background colors, one or more foreground colors, and modal methods of integrating them on specific portions of a vessel. Decorative treatments are color schemes that cross-cut configurations.

The two most common decorative configurations exhibited by Roosevelt Red Ware vessels are termed here "Gila" and "Tonto." The Gila configuration consists of black-on-white bowl interiors and wide bands of black-on-white decoration on the exteriors of jars. The Gila configuration involves the presence of red, but the relationship of red to white areas is always in terms of alternating zones. In contrast, the Tonto configuration is defined by interaction between red and white in both the horizontal and vertical planes. In the case of Roosevelt Red Ware bowls, there is a strong correlation between decorative configuration and vessel form. The Gila configuration is associated mainly with hemispherical and slightly incurved bowls, whereas recurved (also semi-flaring incurved and semi-flaring hemispherical) bowls are associated with a number of different configurations.

The standard Roosevelt Red Ware decorative treatment is black paint on a white-slipped surface, but this can vary for specific types. For example, the Los Muertos decorative treatment, characteristic of Los Muertos Polychrome, involves the use of red paint alongside black paint on white-slipped areas. The decorative treatment associated with Cliff White-on-red is white paint on red slip.

Pinto Polychrome only occurs in bowl form. Gila and Tonto Polychrome occur as bowls and jars, as well as effigy vessels. Pinto and Gila Polychrome bowls exhibit red-slipped exteriors and white-slipped interiors with black painted designs (Gila configuration). Pinto Polychrome bowls can be distinguished from Gila Polychrome bowls based on a number of stylistic traits. Gila Polychrome bowls exhibit a broad, black banding line (or "life-line") on the vessel interior, just below the rim. Pinto Polychrome bowls lack this motif. Pinto Polychrome painted designs consist of opposed hatched and solid shapes, whereas Gila Polychrome designs are dominated by bold solid shapes. A number of authors have used the term Pinto-Gila Polychrome to refer to vessels that display a mixture of traits characteristic of Pinto Polychrome and Gila Polychrome, e.g., bowls that exhibit bold designs dominated by large, solid, elaborated motifs yet lack a subrim banding line; bowls with banding lines that exhibit layouts composed of balanced solid and finely hatched motifs.

Gila Polychrome jar exteriors display wide horizontal bands of white slip with black painted decoration. Usually one wide band covers the majority of the vessel and a

narrower band encircles the neck. When multiple black-on-white bands are present, they are most often separated by horizontal stripes of red slip. The bases of Gila Polychrome jars are usually slipped red as well. Tonto Polychrome vessels, which are predominately jars, are characterized by narrow ribbons and/or panels of black-on-white decoration surrounded by red slip. When the red-slipped exteriors of late Roosevelt Red Ware bowls exhibit painted decoration, such elaboration most commonly takes one of two forms: the pattern characteristic of Gila Polychrome jars or that associated with Tonto Polychrome jars. Many Roosevelt Red Ware jars display body layouts typical of Tonto Polychrome and banded neck designs characteristic of Gila Polychrome. Such vessels are typed as Tonto Polychrome.

Cliff Polychrome is distinguished by the Cliff configuration, which represents an alteration of the Gila configuration. Gila configuration bowl interiors consist of a single black-on-white design field, typically bounded at the rim by the banding line (in the case of Gila Polychrome). The Cliff configuration, which is characteristic of recurved, semi-flaring incurved, and semi-flaring hemispherical bowls, is comprised by dual interior, black-on-white design fields. One field encompasses the bottom and sides of the bowl, and the other covers the area near the rim. These fields are separated by a banding line (see Figure 8). Cliff Polychrome vessels bearing Gila configuration exterior designs are referred to as Cliff Polychrome: Gila Variety. Those exhibiting Tonto configuration exterior decoration are referred to as Cliff Polychrome: Tonto Variety (see Figure 9).

Available evidence suggests that Cliff Polychrome was introduced after A.D. 1350, and was produced more frequently through time. Cliff Polychrome is the most widespread of the post-Tonto Polychrome Roosevelt Red Ware types. It has been found as far north as Homol'ovi II, near Winslow, Arizona, and as far south as Casas Grandes, in Chihuahua. The eastern edge of its distribution includes the Upper Gila Valley, in New Mexico, and the western margin lies beyond the Perry Mesa-Agua Fria region. This type is most common, however, in southeastern Arizona and southwestern New Mexico.

Nine Mile Polychrome is named for the Nine Mile site in the San Simon Valley, which was excavated by the Millses during the 1940s. The resulting report is one of the few that the Millses failed to publish (Mills and Mills 1940-1949a). The only copy of the manuscript available to the archaeological community is on file in the archives of the Amerind Foundation, in Dragoon. Wendy Glenn, a rancher from the San Bernardino Valley, and a long-time friend of the Millses recently obtained a copy of an earlier, draft version of the manuscript from one of the Millses' grandchildren (Mills and Mills 1940-1949b). Wendy has been kind enough to provide us with a copy. The description of Nine Mile Polychrome that follows is based on type specimens currently on display at EAC.

Nine Mile Polychrome is similar to Cliff Polychrome, in that both occur only in recurved (or semi-flaring incurved, or semi-flaring hemispherical) bowl form and both exhibit a banded design field on the interior surface, at the rim. This design field consists



Figure 8. Cliff Polychrome



Figure 9. Cliff Polychrome: Tonto Variety

of black painted decoration on a wide band of white slip. The Nine Mile configuration differs from the Cliff configuration in that the remainder of the interior surface is slipped red and bears no painted designs. Another difference is the absence of the banding line characteristic of both Gila Polychrome and Cliff Polychrome. The exterior surface of a Nine Mile Polychrome bowl usually bears a Gila or Tonto configuration design. Rarely, exteriors are left unadorned except for a red slip (see Figure 10). Nine Mile Polychrome vessels bearing Gila configuration exterior designs are referred to as Nine Mile Polychrome: Gila Variety (see Figure 11). Those exhibiting Tonto configuration exterior decoration are referred to as Nine Mile Polychrome: Tonto Variety (see Figure 12).



Figure 10. Nine Mile Polychrome with no exterior decoration.



Figure 11. Nine Mile Polychrome: Gila Variety.

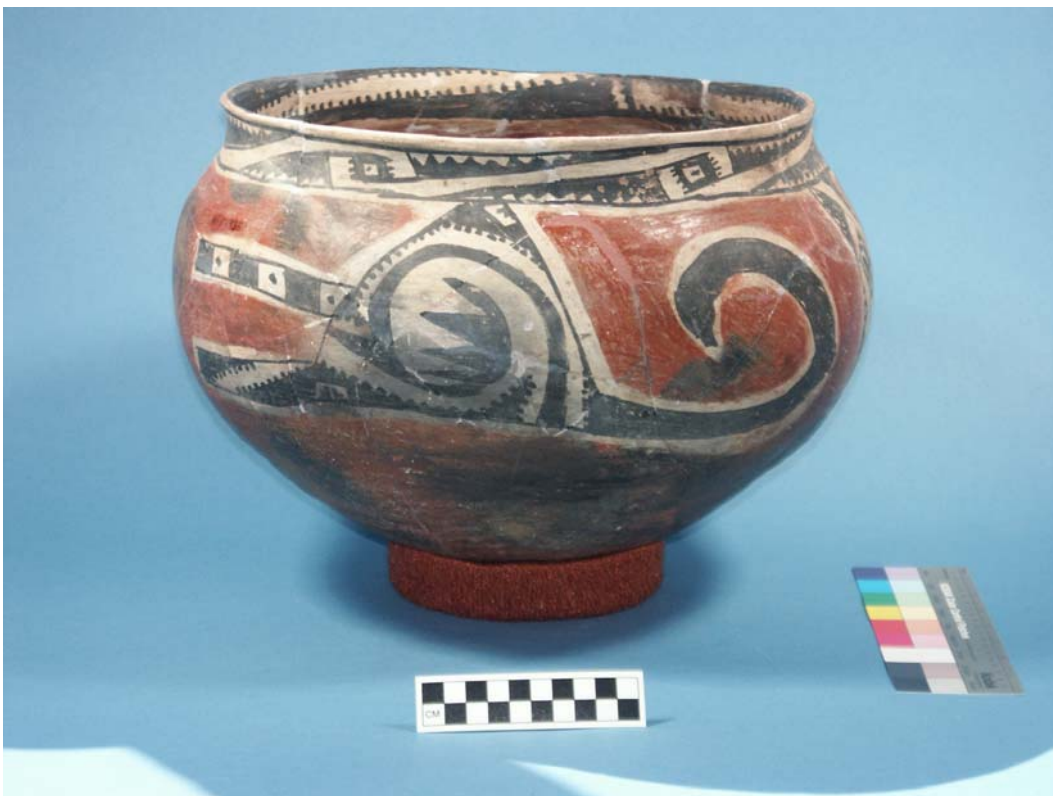


Figure 12. Nine Mile Polychrome: Tonto Variety.

Nine Mile Polychrome is found from the Cliff Valley to Perry Mesa, and from the Middle Verde Valley to the area around Douglas, Arizona. The type is rare, however, in the San Pedro Valley, and the Tucson and Tonto basins. Overall, Nine Mile Polychrome seems to be more common in the far southeastern portion of its geographical range. A possible precursor of Nine Mile Polychrome has been observed in whole vessel collections. This variant occurs in the form of hemispherical and incurved bowls bearing Gila Polychrome jar designs on their interiors. This configuration creates a large, solid, red circular zone on the center of the bowl's interior surface. One such specimen is present in the Mills Collection (see Figure 13).



Figure 13. Gila Polychrome bowl that is a possible precursor to Nine Mile Polychrome.

Named for Phoenix, Arizona, Phoenix Polychrome is described here based on type specimens from the site Las Colinas, La Ciudad, Escalante Ruin, and Pueblo Salado (all located near Phoenix), as well as the Nine Mile site and the Curtis site. This type basically represents Nine Mile Polychrome without a banded zone of black-on-white interior decoration; the entire interior surface is slipped red. Phoenix Polychrome bowls, which are recurved (or semi-flaring incurved, or semi-flaring hemispherical) in profile, exhibit either Gila or Tonto configuration exterior designs. Phoenix Polychrome vessels displaying Gila configuration exterior designs are referred to as Phoenix Polychrome: Gila Variety (see Figure 14). Those with Tonto configuration exterior decoration are referred to as Phoenix Polychrome: Tonto Variety (see Figure 15).



Figure 14. Phoenix Polychrome: Gila Variety.



Figure 15. Phoenix Polychrome: Tonto Variety.

As the name suggests, Phoenix Polychrome seems to be most abundant in ceramic assemblages recovered from late sites in the Phoenix Basin. It also occurs, however, as far east as the Cliff Valley and has the same northern and southern limits as Nine Mile Polychrome. Like Nine Mile Polychrome, there may be a precursor of Phoenix Polychrome. A small number of incurved Roosevelt Red Ware bowls exhibit a similar decorative configuration. A vessel matching this description is present in the Mills Collection (see Figure 16).



Figure 16. Possible precursor to Phoenix Polychrome.

Rarely, recurved (or semi-flaring incurved, or semi-flaring hemispherical) Roosevelt Red Ware bowls display either Gila or Tonto configuration exterior designs and smudged interiors. This configuration is characteristic of Dinwiddie Polychrome, which can be thought of as Phoenix Polychrome with a smudged interior. The type is named for the Dinwiddie site, located near Cliff, New Mexico. The type specimens, which were excavated by the Millses, can be viewed at EAC. Dinwiddie Polychrome vessels exhibiting Gila configuration exterior designs are referred to as Dinwiddie Polychrome: Gila Variety (see Figure 17). The presence of Tonto configuration exterior decoration results in classification as Dinwiddie Polychrome: Tonto Variety (see Figure 18).



Figure 17. Dinwiddie Polychrome: Gila Variety



Figure 18. Dinwiddie Polychrome: Tonto Variety

Dinwiddie Polychrome has a very limited spatial distribution. To date, there is strong evidence that this type does not occur west of a line drawn through Kinishba, near Whiteriver, and the Nine Mile site, near Bowie. Although Patricia Crown did not provide new type names for smudged-interior Roosevelt Red Ware vessels, she did note the small geographical range of this phenomenon.

As early as 1927, just three years after Kidder published his basic description of Lower Gila Polychrome – the type later known as Gila Polychrome – Frank Midvale noted an unusual decorative treatment on polychrome vessels he recovered from the site of La Ciudad, in Phoenix. Midvale referred to a variant of "Gila Polychrome with four colors." The specimen described thus in Midvale's excavation catalog is slipped red on one surface and white on the other. The painted decoration that was applied over the white-slipped surface consists of both black and red lines. Lyons's recent work with the La Ciudad material curated at the Mesa Southwest Museum revealed that this treatment is present in that assemblage on bowls and jars that would otherwise be typed as Gila Polychrome and Phoenix Polychrome. Emil Haury described similar specimens in the Hemenway Collection, recovered from Los Muertos (AZ U:9:56[ASM]) and Las Acequias (AZ U:9:44 [ASU]). He suggested that they represented a late manifestation of Roosevelt Red Ware but he neglected to provide them with a name.

The first name associated with this phenomenon was "Las Colinas Polychrome," which was proposed in an unpublished manuscript by Carol Weed based on material recovered from Las Colinas in 1968. When Patricia Crown later published her analysis of the 1968 Las Colinas ceramic assemblage, she decided not to use Weed's terminology, but described the material in question as a variant of Gila Polychrome. By the 1980s, apparently based on its abundance in the Perry Mesa region, this pottery type came to be known, at least colloquially, as "Perry Mesa Polychrome." In his 1987 report on Midvale's previously unpublished work at La Ciudad, David Wilcox used the term Perry Mesa Polychrome.

Crown, in her 1994 magnum opus, referred to this decorative treatment as "Gila style with red" and discussed its presence on vessels normally typed as Gila Polychrome or Tonto Polychrome. This manifestation of Roosevelt Red Ware has also been referred to as "Gila Polychrome, Trichrome Variety." Motsinger used this label in his report on the ceramics from Pueblo Salado. Because "standard" Gila Polychrome itself is a trichrome type, and because the infrequent use of red paint adjacent to black paint was first published by Haury (1945) in his report on Los Muertos, Lyons proposed that this type be referred to as Los Muertos Polychrome (see Figure 19).

Los Muertos Polychrome vessels are assigned to varieties based on the decorative configurations they exhibit. For example, those that otherwise would be classified as Gila Polychrome are designated Los Muertos Polychrome: Gila Variety. This type, like Dinwiddie Polychrome, exhibits a very restricted spatial distribution. It has only been recovered from sites in the Verde Valley, the Agua Fria-Perry Mesa area, the Lower Salt

River Valley, the Middle Gila, the Santa Cruz Flats, and the Tonto Basin. The type appears to be most abundant in the southwestern portion of this area.



Figure 19. Los Muertos Polychrome

According to Oppelt, Cliff White-on-red was named by Richard "Red" Ellison, based on material recovered from the site of Kwilleylekia, near Cliff, New Mexico. Although Oppelt indicates that a published definition of the type is lacking, the Millses offered a preliminary description in their 1972 report on the nearby Dinwiddie site, which appeared in *The Artifact*. In the 1998 publication that reported the 1965-1966 highway salvage work at Ormand Village, not far from Kwilleylekia and Dinwiddie, C. Dean Wilson discusses a similar pottery type, which he does not name, choosing instead to refer to it simply as "white-on-red."

The Millses identified most of the traits critical to defining this type: well-polished surfaces, a red-slipped exterior, a smudged interior, and white painted decoration on top of the red slip (see Figure 20). They also noted that the type occurred primarily in bowl form and that in terms of "shape, design, and paste, it is typically Saladoan." Based on the context of this statement, it is clear that by using the term "Saladoan," the Millses were emphasizing the similarity of Cliff White-on-red to Roosevelt Red Ware types such as Gila Polychrome and Tonto Polychrome. Wilson later noted these same resemblances but wrestled with the idea that the material at Ormand Village might be related to Gila White-on-red, Salado White-on-red, and/or Tularosa White-on-red.



Figure 20. Cliff White-on-red

Gila White-on-red, however, was thinned by paddle-and-anvil and exhibits lustrous striations resulting from pattern-polishing. Cliff White-on-red was thinned via scraping and does not display the striations associated with Gila White-on-red. Furthermore, the white, painted decorations exhibited by the two types are quite different. The lines that comprise Gila White-on-red decorations are usually relatively narrow. Cliff White-on-red designs, in contrast, are made up of fairly wide lines, or a combination of wide and narrow lines. In addition, large (sometimes very large), solid motifs are common, including a number characteristic of Roosevelt Red Ware, such as the Kayenta-derived bird wing. Other typical motifs include cross-hatching and checkerboards, negative elements, and parrots. All of the specimens from Dinwiddie display layouts comprised by – from top to bottom – a wide, sub-rim banding line, an unpainted zone, and a banded zone of decoration. Usually, the latter area's upper boundary is marked by a framing line to which pendant motifs have been appended. The effect created is similar to that resulting from Kayenta-derived "Y-frame" layouts exhibited many Gila Polychrome jars.

Salado White-on-red is also quite different from Cliff White-on-red. The former is an obliterated corrugated type whereas the latter was scraped smooth and then well polished. In addition, the white, painted decoration displayed by Salado White-on-red is similar to that seen on Gila White-on-red and different from that characteristic of Cliff White-on-red. These three types, however, all exhibit thin lines with pendant dots. Although this motif is very commonly displayed by vessels of Gila White-on-red and Salado White-on-red, it is relatively uncommon among vessels of Cliff White-on-red.

The last type Wilson compared to Cliff White-on-red is Tularosa White-on-red. This comparison makes the most sense, as both types exhibit recurved (or semi-flaring incurved, or semi-flaring hemispherical) bowls, as well as smudged interiors and red-slipped, well polished exteriors, and both were formed using the coil-and-scrape technique. Nonetheless there are important differences between these two types. Tularosa White-on-red basically represents Tularosa Fillet Rim with a red-slipped exterior and St. Johns Polychrome-style white-line designs. The differences boil down to the presence of two to four unobliterated, indented neck coils on Tularosa White-on-red and the absence of this feature among vessels of Cliff White-on-red; the relatively narrow lines used to construct Tularosa White-on-red designs versus the predominately wide lines used to decorate Cliff White-on-red; the predominance of interlocking rectangular frets and/or stepped motifs on Tularosa White-on-red and their near absence on Cliff White-on-red; the complete lack of solid and negative motifs on Tularosa White-on-red and their abundance on Cliff White-on-red; and the apparent absence of banding lines on Tularosa White-on-red.

It is important to note that the cluster of traits described here as Cliff White-on-red is most clearly visible when vessel form is considered. The type definition provided here is limited to bowls similar in shape to Cliff Polychrome (recurved, semi-flaring incurved, and semi-flaring hemispherical bowls). The type specimens, from the Dinwiddie site, are currently on display at EAC.

The distributions of Los Muertos Polychrome, Dinwiddie Polychrome, and Cliff White-on-red are more restrictive than those of Phoenix and Nine Mile Polychrome. One can argue that this pattern reflects change through time and the contraction of population in the region. One can easily imagine that it became more difficult for groups to maintain the close contact that was necessary to preserve region-wide stylistic homogeneity. It seems that as interaction between late prehistoric settlement clusters decreased, an east-west split developed in the Roosevelt Red Ware decorative tradition. The western subtradition is defined by Los Muertos Polychrome, which does not occur in the east, and, to some extent, by the apparent abundance of Phoenix Polychrome. The eastern subtradition is marked by Dinwiddie Polychrome and Cliff White-on-red, which do not occur in the west, and the apparent relative abundance of Nine Mile Polychrome. Perhaps the most interesting result of this study is that the eastern tradition seems to be present at protohistoric sites on the Zuni reservation. The question remains as to what became of the western subtradition. Lyons suggests looking to the Hopi Mesas for the answer, and perhaps more work in the Agua Fria-Perry Mesa area and in the Verde Valley will provide the data necessary to make that connection.

Table 7. Roosevelt Red Ware types in the Mills Collection.

Types	Date Range	Geographic Range
Pinto Polychrome	A.D. 1280-1330	along the Mogollon Rim (in Arizona), Tonto Basin, Sierra Ancha, Globe Highlands, San Pedro Valley, Point of Pines area, Kinishba area, Upper Gila Valley (in Arizona)
Gila Polychrome	A.D. 1300-1450	Arizona, New Mexico, northern Mexico
Gila Polychrome: Salmon Variety	A.D. 1300-1450	
Tonto Polychrome	A.D. 1340-1450	
Cliff Polychrome	A.D. 1350-1450	
Cliff White-on-red	A.D. 1350-1450	southwestern New Mexico, southeastern Arizona
Dinwiddie Polychrome: Gila Variety	A.D. 1375-1450	
Dinwiddie Polychrome: Tonto Variety	A.D. 1375-1450	
Los Muertos Polychrome	A.D. 1375-1450	Phoenix Basin, Santa Cruz Flats, Queen Creek Delta, Perry Mesa, Verde Valley, Tonto Basin, Globe Highlands
Nine Mile Polychrome: Gila Variety	A.D. 1375-1450	southern Arizona, southwestern New Mexico
Nine Mile Polychrome: Tonto Variety	A.D. 1375-1450	
Phoenix Polychrome: Gila Variety	A.D. 1375-1450	
Phoenix Polychrome: Tonto Variety	A.D. 1375-1450	

Other Roosevelt Red Ware types: Pinto Black-on-red (A.D. 1280-1330), Pinto Polychrome: Salmon Variety (A.D. 1280-1330), Gila Black-on-red (A.D. 1300-1450), Cliff Polychrome: Gila Variety (A.D. 1350-1450), Cliff Polychrome: Tonto Variety (A.D. 1350-1450).

Maverick Mountain Series

This group of pottery types was named for the Maverick Mountain phase Kayenta and/or Tusayan occupation at Point of Pines Ruin (AZ W:10:50[ASM]), which is usually dated between A.D. 1265 and 1300. Originally classified as Kayenta and Tusayan (northern Arizona) pottery types made using materials locally available in the Point of Pines region, the Maverick Mountain Series was defined alongside other evidence pointing to the presence of northern immigrants, including a D-shaped kiva and perforated-rim ceramic plates.

The series, as it was first conceived, included five types, Maverick Mountain Black-on-red, Maverick Mountain Polychrome, Nantack Polychrome, Prieto Polychrome, and Tucson Polychrome. The series was made a subdivision of White Mountain Red

Ware by Harold Colton, presumably based on the recovery location of the type specimens of most of the types in the series. Roy Carlson, however, has more recently argued that the Maverick Mountain series should be placed within a category including Kayenta polychrome types, reflecting its northern origin. Also present at Point of Pines, but not included in the Maverick Mountain series or provided with unique names, are presumably locally produced versions of Tusayan Black-on-white and Kayenta Black-on-white. Later, Tucson Black-on-red was recognized as a separate type. Charles Di Peso also named a "Tucson Polychrome (Hachured variant)" that seems indistinguishable from Maverick Mountain Polychrome.

Di Peso and others working in the San Pedro recognized an additional type that straddles the Maverick Mountain Series and Roosevelt Red Ware. This type is variously known as "Pinto-Tucson Polychrome," "Gila-Tucson Polychrome," and "Tucson-Gila Polychrome" and is manifest as bowls with interiors decorated in the same manner as Gila Polychrome and exteriors decorated in the style of Tucson Polychrome.

Alexander Lindsay has characterized Maverick Mountain Polychrome and Maverick Mountain Black-on-red as versions of Kiet Siel Polychrome and Kiet Siel Black-on-red, respectively, produced by Kayenta and/or Tusayan immigrants using raw materials indigenous to the Point of Pines region. Likewise, he considers Nantack Polychrome a category that represents Tusayan Polychrome and Kayenta Polychrome produced outside their areas of origin. Prieto Polychrome, according to Lindsay, is an attempt by Maverick Mountain phase immigrant potters to make Machonpi Polychrome, a type that apparently originated on the Hopi Mesas.

Based on the results of limited petrographic analyses of a small sample of sherds from the Safford Basin and the Point of Pines area, Jeffrey Brown named Point of Pines and Safford varieties of Maverick Mountain Black-on-red, Maverick Mountain Polychrome, and Nantack Polychrome. The names of these varieties correlate with their likely loci of manufacture. In her recent dissertation research, Neuzil found that almost 90 percent of the Maverick Mountain Series ceramics she tested were made locally in the Safford and Aravaipa valleys. Other recent petrographic analyses suggest Maverick Mountain Series types were also produced in the Cliff Valley of New Mexico.

Tucson Polychrome, originally called Martinez Hill Polychrome and first formally defined by Edward Danson in his work with materials from the University Indian Ruin in Tucson, has traditionally been characterized as derivative of Kiet Siel Polychrome. Its manufacture in the Santa Cruz Valley has been documented as a result of petrographic analysis, and its production at Point of Pines has been posited based on the similarity between its distinctive paste and the pastes of the other Maverick Mountain Series types found there. Lindsay points out that some of the sherds typed as Tucson Polychrome at University Indian Ruin actually represent Maverick Mountain Polychrome. Therefore, based on Roberts Wallace's petrographic work, both types appear to have been produced in the Tucson Basin.

At the Goat Hill site (AZ CC:1:28[ASM]) south of Pima, Arizona, Kyle Woodson recovered Maverick Mountain Polychrome, Nantack Polychrome, and Tucson Black-on-red. Woodson's analyses, and previous work by Jeffrey Brown suggest that the Maverick Mountain Series types from the site were produced using locally available granitic material as temper. The Spear Ranch site (AZ CC:1:11[ASM]) boasts a ceramic assemblage dominated early on by Maverick Mountain Polychrome, some of which was apparently locally manufactured. A number of other sites in the Safford Valley have yielded Maverick Mountain Series types, including the Curtis site (AZ CC:2:3[ASM]), the Marijilda Ruin (AZ CC:5:6[ASM]), the Bandelier site (AZ CC:1:7 [ASM]), and the Bonita Creek Cache (AZ W:14:1[ASM]). Some of the Maverick Mountain Series pottery at Marijilda was locally produced, based on Brown's and Neuzil's petrographic analysis. Maverick Mountain Series sherds traceable to Point of Pines, however, were found at the Methodist Church site (AZ CC:2:15[ASM]), located in the center of the distribution of Safford Basin immigrant sites identified by Woodson - many of which are listed above.

Maverick Mountain series vessels have a brown paste, which can vary from light to dark, and generally exhibit sand temper. The entire interior and exterior surface of the bowls of most types are slipped red. The same is true of the entire exterior and the interior rim of each jar. Two types occur as bowls that either lack slip entirely, or only exhibit slip on one surface. Designs in this series are painted with black mineral paint, or some combination of black, red, and white paint (two types employ red as a paint on unslipped surfaces). The black mineral paint can sometimes appear purplish depending on the minerals used to create it.

The distinction between Tucson Polychrome and Maverick Mountain Polychrome has been blurred in the past, and Di Peso's "Tucson Polychrome (Hachured variant)" type designation has not helped to clarify the situation. Tucson Polychrome vessels, including bowls, are most often decorated on the exterior surface. Black paint is applied in broad, simple, usually rectilinear, solid motifs, most often pendant from a wide encircling band. These are then outlined with white paint. On Tucson Black-on-red vessels the white paint is omitted. Maverick Mountain Polychrome, on the other hand, incorporates hatched filler as well as solid motifs outlined in white. Maverick Mountain Black-on-red lacks white paint. Bowls of Maverick Mountain Black-on-red and Maverick Mountain Polychrome are most often painted on the interior and usually lack exterior decoration. Some Maverick Mountain Polychrome bowls, however, exhibit St. Johns Polychrome style white-line exterior designs. Tucson Polychrome, which seems to be the longest-lived of the Maverick Mountain Series, most often occurs in a recurved bowl form characteristic of late (post-A.D. 1350) Roosevelt Red Ware types such as Cliff Polychrome, whereas Maverick Mountain Polychrome bowls are usually incurved or hemispherical in shape. Exceptions to this bifold division have been noted, in the form of bowls bearing exterior decorations composed of both solid and hatched elements.

Nantack Polychrome comes in two varieties, one that mimics Tusayan Polychrome, which has red designs painted on an unslipped background and then outlined in black, and another that mimics Kayenta Polychrome, which has red designs painted on an unslipped background outlined in black and then outlined again in white.

Prieto Polychrome is mainly found in bowl form, and contains red painted designs on an unslipped background outlined in white, with a space between the red and white paint.

Table 8. Maverick Mountain Series types in the Mills Collection.

Types	Date Range	Geographic Range
Maverick Mountain Black-on-red	A.D. 1275-1325	Arizona, western New Mexico
Maverick Mountain Polychrome	A.D. 1275-1325	
Tucson Black-on-red	A.D. 1275-1450	
Tucson Polychrome	A.D. 1275-1450	
Prieto Polychrome	A.D. 1275-1400	

Other Maverick Mountain Series Types: Nantack Polychrome (A.D. 1275-1450).

Chihuahuan Polychromes

Archaeologists have not yet formally defined a modern ware-level category that encompasses all or some of the late prehistoric bichrome and polychrome types of northwestern Chihuahua. These types represent the decorated ceramic tradition associated with sites in the Río Casas Grandes Valley and adjacent valleys. Harold Colton's term, "Chihuahua Red Ware," which was published without a definition, has seemingly been abandoned. Typological ambiguity at the ware level is seemingly related to the fact that uncertainty remains regarding the production zones associated with these types, although many researchers make provenance-related assumptions based on the criterion of abundance.

Gordon Rakita and Gerry Raymond have recently reviewed the development of ceramic typology in Chihuahua, noting that the earliest systematic approach is attributable to A. V. Kidder, who defined five "wares": rough dark, polished black, red, polychrome, and corrugated. The type names currently in use were introduced early on by Charles Amsden, Donald Brand, and E. B. Sayles. Sayles provided the first formal type descriptions and Di Peso and others later expanded the typology, based on work at Casas Grandes, defining a few new types and creating a number of subtypes or variants of existing types. Donald Brand referred to the polychrome types of the region as "Chihuahuan Polychromes" and a subset of these (Corralitos, Ramos, and Dublan Polychrome) as "Casas Grandes Polychromes." Many researchers have continued to use the term Chihuahuan Polychromes, although some have employed variations such as "Chihuahua Polychromes."

The Chihuahuan Polychromes are associated with the Medio period at the site in northwestern Chihuahua known as Casas Grandes or Paquimé, which most researchers now place between A.D. 1200 and 1450 or 1500. Although precise dating of individual types is lacking at present, the results of recently reported frequency seriations based on sherd collections (Rakita and Raymond 2003) and a stylistic seriation of whole vessels (Hendrickson 2003) suggest that significantly refined temporal resolution can be achieved in the near future.

Different paste colors are associated with the Chihuahuan Polychromes, but only two types exhibit slip. All the types in this category display fairly similar painted decorations and all appear to have sand temper. However, stylistic changes that reflect the passage of time have been observed (see Hendrickson 2003). Chihuahuan Polychromes appear in bowl and jar form, although jars predominate. The current typology emphasizes paste color, the presence of absence of slip, and finally, decorative style.

Carretas Polychrome exhibits an orange paste and surfaces and decoration in black and red paint. The paints (both black and red) are often subglazes and much opposition of simple black and red motifs is characteristic. The outlining of red motifs with black occurs very rarely. Huérigos Polychrome is Carretas Polychrome with the addition of white slip on portions of the vessel (on the exteriors of jars and the interiors of bowls). Babícora Polychrome exhibits a light brownish or grayish paste and light brown unslipped surfaces with black and red painted decoration. Simple opposed red and black motifs are typical. Textured vessels, typically neck-corrugated jars, that also bear red and black painted decoration over the textured area and exhibit a paste similar to Babícora Polychrome are classified as Dublan Polychromes. Villa Ahumada Polychrome exhibits a dark brown paste and white slip on the exteriors of jars and bowls. Painted designs are applied in red and black and consist of simple opposed elements.

Ramos Polychrome is characterized by white to light gray paste and surfaces. It is not slipped. Ramos Polychrome has been split into three variants: the standard (or Paquimé style) variant, the black-on-white variant, and the Capulín variant. The standard variant, which is now recognized as the latest expression of the Chihuahuan Polychrome stylistic tradition, is characterized by fine line work in black and red, red motifs outlined in black, and a series of complex motifs such as macaws, snakes, and parts thereof. Stylistically, late specimens of Babícora Polychrome and Villa Ahumada Polychrome resemble Ramos Polychrome, standard variant. The black-on-white variant of Ramos Polychrome is identical to the standard variant except that red paint is lacking. The Capulín variant exhibits more red line work (more opposition of red and black), simpler motifs, and red motifs without black outlining. This combination of stylistic traits, which is similar to that characteristic of most Babícora and Villa Ahumada Polychrome vessels, is now recognized as an early expression of the Chihuahuan Polychrome tradition.

Corralitos Polychrome is characterized by textured designs comprised of incised lines or punctate motifs surrounded by black painted lines and red painted lines and/or areas of red slip. Currently available information suggests Corralitos Polychrome and the other textured polychrome type, Dublan Polychrome, were most popular at the beginning of the Medio Period and that those types began to fade as Ramos Polychrome (standard variant) became established among consumers.

Table 9. Chihuahuan Polychrome types in the Mills Collection.

Types	Date Range	Geographic Range
Carretas Polychrome	A.D. 1250-1450 (most common A.D. 1250-1350)	northwest Mexico, southeastern Arizona,

Villa Ahumada Polychrome	A.D. 1250-1450 (most common A.D. 1250-1350)	southwestern New Mexico
Ramos Polychrome	A.D. 1250-1450 (most common A.D. 1350-1450)	

Other Chihuahuan Polychromes: Babícora Polychrome, Dublan Polychrome, Corralitos Polychrome, Huérigos Polychrome (all A.D. 1250-1450).

White Mountain Red Ware

White Mountain Red Ware is by far one of the better studied and understood wares in the Greater Southwest. It was recognized early on as a distinct tradition, and was used to establish contemporaneity in sites across the region. During the 1930s, White Mountain Red Ware became one of the best dated wares in the Southwest, as it is often found in sites along the Mogollon Rim, which often produce tree ring dates. As a result, researchers working in the Mogollon Rim region and adjacent areas have been able to precisely bracket the periods of time during which the different types of White Mountain Red Ware were made.

White Mountain Red Ware was made in the Mogollon Rim area, the Upper Little Colorado River Valley, the Grasshopper region, and the Point of Pines region. It is found throughout much of the Southwest as well, from Durango, Colorado, to Casas Grandes, Chihuahua, and from the Verde Valley, Arizona to El Paso, Texas. Its distribution varied through time, reaching its greatest extent during the 13th century.

White Mountain Red Ware is characterized by light buff or gray paste, with sherd, and sometimes sand and sherd temper. The majority of White Mountain Red Ware vessels are bowls, although jars are sometimes found. The interior and exterior surfaces of bowls, and the exterior surfaces of jars are covered with a thick orange-red slip. Designs are painted with a black mineral paint, and some vessels also exhibit white kaolin clay paint, generally used to outline black designs. Most specimens of all types display decoration on bowl interiors; some types exhibit decoration on the bowl exteriors as well. Some bowls are slipped red on the interior surface and bear painted decoration on the exterior surface only.

There are eleven types within White Mountain Red Ware. These types are distinguished based on changes in the style of painted design used through time. Many of these design styles crosscut wares and share names with types, which can lead to considerable confusion. Table 10 summarizes and clarifies these relationships. See Carlson (1970) for an in-depth discussion of the design styles characteristic of White Mountain Red Ware.

Table 10. Correlation of styles with types and wares.

STYLES	WARES				
	Cibola White Ware	White Mountain Red Ware	San Carlos Red-on-brown	Middle Gila Buff Ware	Tucson Basin Brown Ware
Puerco	Puerco Black-on-white	Puerco Black-on-red			
Reserve	Reserve Black-on-white	Wingate Black-on-red and Polychrome			
Tularosa	Tularosa Black-on-white	St. Johns Black-on-red and Polychrome and Springerville Polychrome			
Pinedale	Pinedale Black-on-white	Pinedale Black-on-red and Polychrome, Cedar Creek Polychrome			
Fourmile		Fourmile and Showlow Polychrome			
Casa Grande			San Carlos Red-on-brown	Casa Grande Red-on-buff	Tanque Verde Red-on-brown
Sacaton				Sacaton Red-on-buff	Rincon Red-on-brown
Santa Cruz				Santa Cruz Red-on-buff	Rillito Red-on-brown
Gila Butte				Gila Butte Red-on-buff	Cañada del Oro Red-on-brown

Puerco Black-on-red vessels are decorated in Puerco Style, and exhibit black painted designs that are divided into panels by groups of parallel lines. Wingate Black-on-red and Wingate Polychrome vessels are both decorated in Reserve Style, which is typified by opposed solid and hatched design elements. Overall, the solid design elements in Reserve Style are smaller than the hatched elements. Wingate Polychrome is distinguished from Wingate Black-on-red by the presence of large unslipped areas on the bowl exteriors, which create a pattern in negative (the unslipped, white areas create the design). St. Johns Black-on-red and St. Johns Polychrome vessels are both decorated in Tularosa Style, which is also typified by opposed solid and hatched design elements. The difference between Tularosa and Reserve style lies in the size of the hatched elements. Reserve Style hatched elements are much larger than Tularosa Style hatched elements. St. Johns Polychrome vessels are distinguished by the presence of bold white line designs on the exterior of bowls. These white line designs are absent on St. Johns Black-on-red vessels. Springerville Polychrome is also decorated in Tularosa Style, and similar to St. Johns Polychrome has broad white line designs on the exterior. Springerville Polychrome differs from St. Johns Polychrome in the addition of black elements to the white-line design on the exterior.

After the heyday of St. Johns and Springerville Polychrome, White Mountain Red Ware changed dramatically with the introduction of Pinedale Style, very likely a result of the arrival of northern immigrants. Pinedale Black-on-red and Pinedale Polychrome vessels are both decorated in Pinedale Style, which has some similarities to Tularosa Style. The main difference is that Pinedale Style designs are internally elaborated. For example, interior spaces of designs may have crosshatching or checkerboarding. Bowls of Pinedale Black-on-red and Pinedale Polychrome usually exhibit isolated exterior motifs. These designs are executed in black only on Pinedale Black-on-red vessels and are outlined in white on vessels of Pinedale Polychrome. White is sometimes incorporated into the designs on the interiors of Pinedale Polychrome bowls. Cedar Creek Polychrome is a type that is transitional between Pinedale Polychrome and Fourmile Polychrome. Cedar Creek Polychrome has Pinedale Style interior designs, and Fourmile Style exterior designs, which are bands painted in black and white mineral paint that encircle the entire vessel. The interiors of Fourmile Polychrome bowls are decorated in Fourmile Style, which is very distinctive, marked by the use of asymmetrical, often representational designs. Fourmile Polychrome bowls almost always exhibit an unbroken interior sub-rim banding line. As noted above, the exteriors of Fourmile Polychrome bowls are decorated with banded designs, like Cedar Creek Polychrome. These banded designs often contain “F” hooks, which are unique to Fourmile Style. Showlow Polychrome is a variant of Fourmile Polychrome that can be distinguished by the presence of white slip used as a background on the interior of bowls, as opposed to the red slip seen on all other White Mountain Red Ware types. The exteriors of Showlow Polychrome bowls bear Fourmile Style banded designs.

Table 11. White Mountain Red Ware types in the Mills Collection.

Types	Date Range	Geographic Range
St. Johns Black-on-red	A.D. 1200-1300	

St. Johns Polychrome	A.D. 1200-1300	east-central Arizona and west-central New Mexico
Cedar Creek Polychrome	A.D. 1300-1350	
Fourmile Polychrome	A.D. 1330-1390	
Indeterminate	variable	

Other White Mountain Red Ware types: Puerco Black-on-red (A.D. 1000-1180), Wingate Black-on-red (A.D. 1050-1200), Wingate Polychrome (A.D. 1100-1200), Pinedale Black-on-red (A.D. 1280-1330), Pinedale Polychrome (A.D. 1290-1330), Show Low Polychrome (A.D. 1330-1390).

Cibola White Ware

Cibola White Ware is also one of the better dated and understood wares in the Greater Southwest. Precise knowledge of the use and production spans of Cibola White Ware types, like White Mountain Red Ware types, has been established on the basis of tree ring dates. Cibola White Ware is found across much of the Greater Southwest, from the northern San Juan Basin to south of the Gila River, and from the Verde Valley to the Acoma-Laguna area. Cibola White Ware was also relatively long lived, beginning in A.D. 550 with La Plata Black-on-white, the earliest type, and extending to A.D. 1320 with the latest type, Pinedale Black-on-white. Production areas of Cibola White Ware are basically the same as for White Mountain Red Ware, although no evidence of the production of Cibola White Ware has been found at Point of Pines.

Cibola White Ware refers to black-on-white pottery exhibiting sherd temper (after about A.D. 900) and black mineral paint, which sometimes fades to a reddish black or brownish black. Early types of Cibola White Ware that pre-date A.D. 900 can also have sand temper. The paste color can vary from pure white to gray. The initial definition of Cibola White Ware allowed for significant variation in technological attributes, but this definition has since been refined to the criteria stated above. The technology of Cibola White Ware may also be more variable on the outskirts of its areas of production. Types within this ware are distinguished on the basis of named styles of painted decoration (see Goetze and Mills [1993] for detailed descriptions and photos of types).

La Plata Black-on-white is characterized by narrow elaborated line designs with no solid elements present. White Mound Black-on-white also has narrow lines, but they are not elaborated, and solid design elements are present. Kiatuthlanna Black-on-white exhibits medium width lines that overlap at their junctures, but are not elaborated. Squiggly hatching is also characteristic of this type. Red Mesa Black-on-white is characterized by medium-width lines elaborated with pendant dots or ticks, and interlocking scrolls and scalloped triangles. Escavada Black-on-white exhibits broad lines that are barbed with acute triangles and has no hatching. Puerco Black-on-white displays Puerco Style designs of solid elements separated by panels of parallel lines. Gallup Black-on-white and Chaco Black-on-white vessels exclusively exhibit hatched designs. These two types can be distinguished from one another based on the relative width of framing lines and hatching lines. Gallup Black-on-white vessels have hatching and framing lines that are generally the same width, and are poorly executed. Chaco Black-

on-white, on the other hand, has hatching lines that are much thinner than the framing lines, and are generally more closely spaced than those on Gallup Black-on-white. Snowflake Black-on-white is characterized by solid designs that are often “stepped.” Reserve Black-on-white and Tularosa Black-on-white are decorated in Reserve and Tularosa styles, respectively, which are described in the White Mountain Red Ware section. Pinedale Black-on-white is decorated in Pinedale Style, which is also described in the White Mountain Red Ware section. The introduction of Pinedale Style to Cibola White Ware also signals a dramatic break in the stylistic continuum, similar to that seen in White Mountain Red Ware.

Table 12. Cibola White Ware types in the Mills Collection.

Types	Date Range	Geographic Range
Escavada Black-on-white	A.D. 1000-1100	east-central Arizona and west-central New Mexico
Reserve Black-on-white	A.D. 1100-1200	
Tularosa Black-on-white	A.D. 1180-1300	
Pinedale Black-on-white	A.D. 1270-1320	
Indeterminate	variable	

Other Cibola White Ware types: La Plata Black-on-white (A.D. 550-750), White Mound Black-on-white (A.D. 700-850), Kiatuthlanna Black-on-white (A.D. 850-930), Red Mesa Black-on-white (A.D. 880-1040), Puerco Black-on-white (A.D. 1030-1200), Gallup Black-on-white (A.D. 1040-1160), Chaco Black-on-white (A.D. 1075-1150), Snowflake Black-on-white (A.D. 1100-1275).

San Simon Series

The San Simon Series was defined by Sayles (1945) based on his work in the San Simon Valley, which defined the San Simon branch of the Mogollon. The San Simon Series, as originally described, includes four red-on-brown types (Dos Cabezas, Pinaleño, Galiuro, and Encinas Red-on-brown) and one red-on-white type (Cerros Red-on-white). Although some researchers have argued that the San Simon Series and the Dragoon Series (discussed below) are indistinguishable, suggesting that the "Dragoon Culture" should be considered part of the San Simon branch, others point to important differences between these groups of types. According to Robert Heckman (2000:61; 2000:70), San Simon Series vessels are characterized by "well-polished surfaces; hard, dense paste; and well-bonded paints and slips"; Dragoon Series vessels exhibit "thicker, granular slips; a softer, lighter paste; and thinner, less dense paint." He adds that Dragoon Series pottery displays more curvilinear motifs (reminiscent of Middle Gila Buff Ware and Tucson Basin Brown Ware), whereas San Simon Series motifs are more typical of the painted pottery of the Mogollon highlands. Another marker of close affinity between Dragoon Series pottery and the painted types of the Hohokam tradition, according to Heckman, is the fact that jars (including shouldered jars) and flare-rimmed bowls are common among Dragoon Series vessels.

Sayles' San Simon Series typology, consisting of categories defined on the basis of painted style and line width (and in the case of Cerros Red-on-white, the presence of

white slip), has recently been critiqued and revised by Stephanie Whittlesey and others (1994), and Robert Heckman (2000). Pinaleño Red-on-brown, as originally described, was used to refer to specimens bearing painted designs characteristic of both Dos Cabezas and Galiuro Red-on-brown. One of the key attributes used by Sayles to separate these types was line width. Because Pinaleño Red-on-brown grades into both Dos Cabezas Red-on-brown (at the broad end of the line-width continuum) and Galiuro Red-on-brown (at the narrow end), both Whittlesey and Heckman argue that the use of Pinaleño Red-on-brown as a typological category should be discontinued. Instead, they recommend typing sherds and vessels previously assigned to Pinaleño Red-on-brown as either Dos Cabezas or Galiuro Red-on-brown. This results in a tripartite red-on-brown sequence from simple broad-line rectilinear designs (Dos Cabezas Red-on-brown), to simple fine-line rectilinear designs (Galiuro Red-on-brown), to elaborated designs composed of rectilinear and/or curvilinear motifs (Encinas Red-on-brown).

Heckman has also addressed Cerros Red-on-white, noting that specimens assigned to this type display painted designs characteristic of either Galiuro Red-on-brown or Encinas Red-on-brown. He recommends that researchers note which style is present (Galiuro or Encinas), as this distinction can have temporal significance.

San Simon Series ceramics are characterized by a brown paste that can sometimes have an orange tint, with sand temper. Designs are painted in a red paint that can sometimes fade to purplish through time. The interiors of bowls were polished after designs were painted, which often smeared the paint and gave the designs an overall “streaky” appearance. The exteriors of bowls were often slipped red or white, but were sometimes only polished. Designs generally appear messy.

Table 13. San Simon Series types in the Mills Collection.

Types	Date Range	Geographic Range
Encinas Red-on-brown	A.D. 1050-1200	southeastern Arizona, extreme southwestern New Mexico, northwest Mexico

Other San Simon Series types: Dos Cabezas Red-on-brown (A.D. 650-800), Galiuro Red-on-brown (A.D. 700-900), Cerros Red-on-white (A.D. 800-1000).

Jeddito Yellow Ware

This ware was defined by Harold Colton and Lyndon Hargrave (1937:146-156) and later refined by Colton and Watson Smith based on types and subtypes defined earlier by Hargrave. Kelley Hays-Gilpin, Lyons, and others have recently presented more up-to-date treatments of Jeddito Yellow Ware typology.

Jeddito Yellow Ware was made on the Hopi Mesas, exclusively, but was widely exchanged. The production locales and long-distance exchange of Jeddito Yellow Ware have been established via trace-element compositional studies employing instrumental

neutron activation analysis (INAA). This technique is so precise and Jeddito Yellow Ware is so well suited to it that sherds and vessels can be matched with individual clay deposits that yielded the materials used to produce them. In this way, links between individual ancient villages hundreds of miles apart can be demonstrated.

Awatovi (Awatobi) Yellow Ware was also produced on the Hopi Mesas. This ware, however, includes unpainted types only. These plain, corrugated, and tooled types were most often used for cooking and storage rather than serving.

The sequence of types in Jeddito Yellow Ware has been securely established and the broad outlines of the ware's chronology are well understood. However, the precise dating of individual types has been hampered by a lack of associated tree-ring dates. The recent argument by Alexander Benitez, that Jeddito Yellow Ware was not produced until after A.D. 1325 is not supported by evidence from the Homol'ovi villages.

As its name implies, Jeddito Yellow Ware includes types exhibiting yellow paste and surfaces. Initial conceptions of the ware included earlier, stylistically and technologically related types made from orange-firing clays. Today, researchers most often refer to the orange types originally placed in Jeddito Yellow Ware by the term "Jeddito Orange Ware," which is described below. The hallmarks of Jeddito Yellow Ware, beyond its color, include a fine, hard, high-fired paste. Jeddito Yellow Ware was fired using coal, and during most of its production span, was made with very little or no temper. When struck, whole vessels of this ware "ring" like specimens of fine china.

Types within Jeddito Yellow Ware are distinguished in large part based on the color(s) of painted designs and/or incised decoration they exhibit. Some distinctions, such as the difference between Awatovi Black-on-yellow and Jeddito Black-on-yellow, are more subtle, involving an evaluation of surface color, temper, and painted design style.

Awatovi Black-on-yellow is the earliest type in this ware. It is characterized by temper visible with the naked eye (usually clear quartz and red flecks of sandstone, but occasionally sherds as well), a brownish-yellow surface color (rather than a light yellow to ivory surface color), and painted designs associated with the early end of Jeddito Yellow Ware production. The painted designs exhibited by Awatovi Black-on-yellow were produced using a mineral paint that is more brown in color than black. This is true of all Jeddito Yellow Ware types. Most Bidahochi Polychrome is Awatovi Black-on-yellow with the addition of white outlining around the black painted designs. Some Bidahochi Polychrome, likely late specimens, display a finer texture like that of Jeddito Black-on-yellow. Jeddito Black-on-yellow has no visible temper, although occasional stray flecks of red sandstone or rock may be present, and its surface color is a whitish-yellow. Vessels that exhibit a mixture of traits associated with both Awatovi Black-on-yellow and Jeddito Black-on-yellow are referred to as Awatovi/Jeddito Black-on-yellow.

Jeddito Black-on-yellow vessels that also exhibit motifs created as a result of scratching away the surface layer of the vessel (most often in areas covered by paint) are classified as Jeddito Engraved. Jeddito Engraved appeared at some point after the

introduction of Jeddito Black-on-yellow. Jeddito Stippled is distinguished from Jeddito Black-on-yellow by the use of stippling (small, light, short strokes or dots of paint used as filler) in some parts of the decoration. This type, like Jeddito Engraved, was introduced after Jeddito Black-on-yellow.

Paayu Polychrome, a rare type defined by Hays (1991), bears painted decoration in two similar colors: two tones of the brownish-black pigment characteristic of Awatovi Black-on-yellow and other types. The lighter, slightly reddish, of the two colors was apparently achieved by diluting the normal paint recipe. Technologically, this type is similar to Jeddito Black-on-yellow. Sikyatki Polychrome is Jeddito Black-on-yellow with the addition of reddish-orange paint. Early specimens display red outlining of black designs, whereas later specimens exhibit solid red motifs outlined in black. Awatovi Polychrome is Sikyatki Polychrome with shallow, incised decoration like that characteristic of Jeddito Engraved. Kawaioku Polychrome is Sikyatki Polychrome with the addition of massed (large, solid) white elements. This use of white is distinct from the outlining characteristic of Bidahochi Polychrome.

Smith described the ancestral Hopi pottery tradition manifest in Jeddito Yellow Ware and Jeddito Orange Ware as the "Jeddito School." Lyons has recently extended Smith's work, defining Kayenta, Tuwiuca, Jeddito, Awat'ovi, and Sikyatki styles of painted decoration. Both Smith and Lyons trace the origins of the Hopi pottery tradition to the nearby Kayenta region, north of Black Mesa. Both also recognize the sub-rim banding line (see the discussion of Roosevelt Red Ware, above) and the line-break (unpainted portion of the banding line) that occur on bowls as distinctive elements of the Hopi decorative repertoire.

The styles named by Lyons and the distance between the lip of a bowl and the top of the banding line can be used to refine the chronology of Jeddito Yellow Ware assemblages, placing vessels and groups thereof at the beginning, the middle, or the end of the ware's production span.

Table 14. Jeddito Yellow Ware types in the Mills Collection.

Types	Date Range	Geographic Range
Awatovi/Jeddito Black-on-yellow	A.D. 1300-1375	northeastern and central Arizona
Awatovi Black-on-yellow	A.D. 1300-1375	
Jeddito Engraved	A.D. 1375-1700	
Bidahochi Polychrome	A.D. 1250-1400	

Other Jeddito Yellow Ware types: Jeddito Black-on-yellow (A.D. 1350-1700), Paayu Polychrome (A.D. 1350/1375-1400), Sikyatki Polychrome (A.D. 1375-1700), Jeddito Stippled (A.D. 1350/1375-1600), Awatovi (Awatobi) Polychrome (A.D. 1400-1700), Kawaioku Polychrome (A.D. 1450-1700).

Mimbres Black-on-white

Jesse W. Fewkes was the first to describe decorated ceramics from the Mimbres area in a series of publications from 1914 to 1924. He focused on the latest expression of Mimbres ceramics, those decorated with animals and anthropomorphic figures, from the personal collections of landowners who lived in the Mimbres area. Fewkes divided the decorative style on the vessels he saw into three categories: realistic, conventional, and geometric. These three categories would probably all fall into the current definition of Mimbres Black-on-white Style III.

Mimbres Black-on-white vessels were next described in 1932 by the Cosgroves who excavated at the Swarts Ruin in southwestern New Mexico. They divided Mimbres vessels into two categories, Classic and Boldface, based on differences in line work. Classic Black-on-white, as defined by the Cosgroves, appears on bowls, seed jars, effigy jars, and ollas, and is characterized by fine line work, geometric and naturalistic designs, and on bowls, multiple parallel-line borders (thin, concentric sub-rim banding lines). Boldface Black-on-white, on the other hand, exhibits bold designs extending to the rim and coarse straight or wavy hatchure, and overall appears less well executed than Classic Black-on-white. Although the stratigraphy at the Swarts Ruin was difficult to interpret, the Cosgroves suggested that Boldface dated earlier than Classic Black-on-white, based on the prevalence of the former in early contexts.

Emil Haury later refined the definition of Boldface Black-on-white and added a new type, Three Circle Red-on-white, based on his work at Mogollon Village and the Harris site. Haury saw Three Circle Red-on-white as an outgrowth of Mogollon Red-on-brown, a transitional type that linked the brown ware and white ware traditions of the area. He also added to the definition of Mimbres Boldface Black-on-white, noting that vessels of this type were reminiscent of Mogollon Red-on-brown, but displayed “characteristically Hohokam” design elements. He concluded that these vessels were an amalgamation of Mogollon and Hohokam influences. Excavations at the Harris site also confirmed that Boldface Black-on-white preceded Classic Black-on-white (Haury refers to the latter type as Mimbres Black-on-white).

In their report on the Galaz Ruin, Roger Anyon and Steven LeBlanc define one additional ceramic category intermediate between Classic and Boldface to further refine the Mimbres sequence. This type, alternatively referred to as Style II or Transitional, exhibits elements characteristic of the earlier Style I (Boldface) and aspects of later Style III (Classic) design styles.

Although archaeologists have come to agree that there are four related types of Mimbres ceramics (Three Circle Red-on-white, Mimbres Black-on-white Style I, Mimbres Black-on-white Style II, and Mimbres Black-on-white Style III; also known as Boldface, Transitional, and Classic, respectively), these types have never been formally grouped into a ware-level category as defined by Harold Colton and Lyndon Hargrave. This has led to some confusion over how to refer to these types, but consensus has settled on “Mimbres Black-on-white” as a general name to refer to all of these related variants.

Mimbres Black-on-white vessels are characterized by a gray to gray-brown paste with crushed rock temper. Bowls are slipped on the interior, but not on the exterior. Jars, which are much less common than bowls, are slipped on the exterior but not on the interior. Designs are applied with a black mineral paint, which can sometimes appear reddish due to irregularities in firing. Mimbres Black-on-white vessels that bear red paint due to firing accidents should not be confused with Three Circle Red-on-white vessels, which are meant to have red paint.

Three Circle Red-on-white appears to be the earliest manifestation of this group of types, and is characterized by medium-width-line designs, with surrounding solids that have serrated edges. The slip on these ceramics is often more cream-colored and less often white. Mimbres Black-on-white Style I (Boldface) vessels exhibit thick-line designs in predominantly large scrolls, wavy line hatchure, and often a three-pronged “F”. Naturalistic designs are rare and are always executed more crudely than on later types. Early Mimbres Black-on-white Style II (Transitional) bowl designs go to the rim; later designs stop short of the rim. Designs are mostly rectilinear, but some curvilinear elements are present. Hatchure is done with straight lines, and framing lines are always thicker than hatching lines. Mimbres Black-on-white Style III (Classic) is characterized by extremely well-executed naturalistic and geometric designs, and hatchure and framing lines that are the same width. Bowls of this type bearing naturalistic designs are often thought of as the quintessential Mimbres ceramics.

Table 15. Mimbres Black-on-white types in the Mills Collection.

Types	Date Range	Geographic Range
Mimbres Black-on-white Style II	A.D. 1000-1100	west-central New
Mimbres Black-on-white Style II or III	A.D. 1000-1150	Mexico and east-
Mimbres Black-on-white Style III	A.D. 1000-1150	central Arizona

Other Mimbres Black-on-white types: Three Circle White-on-red (A.D. 850-950), Mimbres Black-on-white Style I (A.D. 900-1000).

Zuni Glaze Ware

The typology of Zuni pottery types has been and remains confused in the archaeological literature. Some archaeologists treat these types as a series within White Mountain Red Ware. Given that available evidence strongly suggests Zuni pottery developed out of White Mountain Red Ware, considering them a series within White Mountain Red Ware makes sense.

Harold Colton and Lyndon Hargrave initially placed Zuni pottery types in two different wares. They grouped Pinnawa Black-on-red (a now obsolete term for Heshotauthla Black-on-red), Heshotauthla Polychrome, Wallace Polychrome (a now obsolete term for a variant of Kwakina Polychrome), Pinnawa Polychrome (a now obsolete term for Kechipawan Polychrome), and Adamana Polychrome (a now obsolete term for a variant of Kwakina Polychrome) into a series of White Mountain Red Ware, which they named after the Zuni pueblo of Hawikuh. Zuni types not placed in the

Hawikuh Series were included in Zuni White Ware: Pinnawa Red-on-white, Pinnawa Glaze-on-white, and Arauca Polychrome (an obsolete term for a variant of Kechipawan Polychrome).

Colton later grouped these types into a now obsolete category, "Shiwanna Red Ware," in which he also included the White Mountain Red Ware types that predate Pinedale Black-on-red and Pinedale Polychrome. Colton reserved the name "White Mountain Red Ware, White Mountain Series" for Pinedale Black-on-red, Pinedale Polychrome, Showlow Polychrome, Fourmile Polychrome, Point of Pines Polychrome, and Kinishba Polychrome. Later, he renamed Shiwanna Red Ware, calling it the Zuni Series of White Mountain Red Ware.

Contemporary researchers recognize a technological and stylistic break between Zuni types and related types in White Mountain Red Ware, referring to a small group of types as Zuni Glaze Ware. This name reflects the use of black, purple, and green glaze paints (paints that turn to glass when fired at a high temperature). The early types in Zuni Glaze Ware either exhibit Tularosa Style or a unique style of painted decoration called Heshotauthla (or Heshota) Style, which is related to Pinedale Style. Heshotauthla style is more open than Pinedale style (more background color appears relative to painted areas), tends to be sloppier, and retains more Tularosa Style-like elements than Pinedale Style.

The types in Zuni Glaze Ware include Heshotauthla Black-on-red, Heshotauthla Polychrome, Kwakina Polychrome, Pinnawa Glaze-on-white, Pinnawa Red-on-white, Kechipawan Polychrome, Matsaki Brown-on-buff, Matsaki Polychrome, and Hawikuh Polychrome. The key reference for Zuni Glaze Ware type descriptions is Woodbury and Woodbury (1966).

All Zuni Glaze Ware types are tempered with crushed sherds and sand. Heshotauthla Black-on-red and Heshotauthla Polychrome vessels are slipped red (bowl interiors and exteriors, jar body exteriors and rim/neck interiors) and decorated with black, glaze-paint designs. Kwakina Polychrome bowl exteriors were slipped red and were either slipped white over the entire interior surface or exhibit areas of white slip surrounded by red slip. Jars were slipped red over most of the exterior surface and slipped white over a portion of the vessel, usually around the neck. Black glaze-paint was applied over the slip(s).

The interiors of Heshotauthla Polychrome and Kwakina Polychrome bowls display either Tularosa or Heshotauthla Style. Exterior designs take three forms: (1) white-line, often meandering or banded arrangements like those exhibited by St. Johns Polychrome; (2) white and black designs like those characteristic of Springerville Polychrome; and (3) isolated black designs outlined in white like those seen on Pinedale Polychrome.

Pinnawa Glaze-on-white is distinguished by the use of white slip on the interior and exteriors of bowls and the exteriors of jars. The paint associated with this type normally fires in the black or green range, but sometimes has a purplish cast. Kechipawan

Polychrome is Pinnawa Glaze-on-white with the addition of red paint. Pinnawa Red-on-white is Kechipawan Polychrome without the black glaze-paint. Matsaki Brown-on-buff and Matsaki Polychrome appear to represent Zuni versions of the Hopi (Jeddito Yellow Ware) pottery types Jeddito Black-on-yellow and Sikyatki Polychrome. Both Zuni types exhibit a buff slip. The bichrome type is decorated with a brownish-reddish paint, and the polychrome type exhibits two paint colors, one redder than the other. Hawikuh Polychrome bowls and jars are slipped partly red and partly white and exhibit a runny black glaze-paint and a matte red paint.

Andrew Duff recently conducted a trace-element sourcing project that documented the production of early Zuni Glaze Ware types (pre-Matsaki Polychrome) in the Zuni area and in adjacent areas of the Upper Little Colorado River Valley, between St. Johns and Springerville. Zuni Glaze Ware types are not usually recovered in high frequencies outside the Zuni area and the Little Colorado Valley. However, specimens have been recovered from places as far afield as the Tonto Basin, the Perry Mesa area, the Tucson Basin, the San Pedro Valley, the Sulphur Springs Valley, and Casas Grandes, Chihuahua. Some types, such as Matsaki Brown-on-buff and Pinnawa Glaze-on-red, are quite rare any significant distance from Zuni.

Zuni Glaze Ware has previously been documented at a handful of sites in the Safford Basin, and the Millises were among the few to recognize its presence. It is possible that other sites in the area have yielded Zuni Glaze Ware and that it has been classified as White Mountain Red Ware. Heshotauthla Polychrome, for example, is often difficult to distinguish from St. Johns Polychrome (a White Mountain Red Ware type), especially in sherd form, and sherds of Kwakina Polychrome could be mistaken for fragments of Showlow Polychrome vessels (a White Mountain Red Ware type).

Table 16. Zuni Glaze Ware types in the Mills Collection.

Types	Date Range	Geographic Range
Heshotauthla Polychrome	A.D. 1270-1380	southern Arizona,
Kwakina Polychrome	A.D. 1280-1380	western New Mexico

Other Zuni Glaze Ware types: Heshotauthla Black-on-red (A.D. 1275-1500), Pinnawa Glaze-on-white (A.D. 1350-1630), Kechipawan Polychrome (A.D. 1375-1630), Pinnawa Red-on-white (A.D.1400-1630), Matsaki Polychrome (A.D. 1400-1680), Matsaki Brown-on-buff (A.D.1400-1680), Hawikuh Polychrome (A.D. 1630-1680).

Middle Gila Buff Ware

Following recent work by Henry Wallace (2001) at the Grewe Site, we refer to the group of red-on-buff pottery types that exhibit micaceous schist temper as Middle Gila Buff Ware. These types are also known as "Hohokam Buff Ware." Like Wallace, we prefer the term that refers to the area where these types were produced, as local "Hohokam" buff ware traditions were established in other regions, including the San Pedro River Valley, the Safford Basin, the Gila Bend area, and some would argue, the Tucson Basin.

Middle Gila Buff Ware types were originally defined by Winifred and Harold Gladwin (1933) and Emil Haury (1937) based on their excavations at Snaketown, south of Phoenix, in the 1930s. Haury and the Gladwins originally defined seven types: Estrella Red-on-grey, Sweetwater Red-on-grey, Snaketown Red-on-buff, Gila Butte Red-on-buff, Santa Cruz Red-on-buff, Sacaton Red-on-buff, and Casa Grande Red-on-buff. No Casa Grande Red-on-buff was found at Snaketown, but it was known from other archaeological research in the area. Haury further refined the understanding of the design styles of this typological sequence as well as their temporal ranges in the report from his later excavations at Snaketown in the 1960s. Based on a numerical seriation of attributes exhibited by specimens in the assemblages from the Grewe site, in the middle Gila River Valley, Henry Wallace has recently subdivided some of the Haury and Gladwin type definitions to reflect an increased sensitivity to ceramic changes through time. See Wallace (2001) for detailed type descriptions.

Middle Gila Buff Ware is characterized by a pink to pinkish-gray paste that is considerably less dense than that characteristic of most other ceramics, and often contains many voids. Temper is generally crushed micaceous shist, but sherd temper is found alongside schist temper in some variants made outside the Phoenix Basin, as is the case in the Safford variety. Vessels are slipped with a buff colored slip, which sometimes can appear yellow or light green in color. The mineral paint used on Middle Gila Buff Ware is red in color, and can grade to purplish or brownish red. Varieties made outside the Phoenix Basin generally only vary in some portion of the technology, but exhibit the same design styles as the types made in the Phoenix Basin.

Sacaton Red-on-buff is found in both bowl and jar form. Layouts on Sacaton Red-on-buff vessels are dominated by plaited bands that wrap around the design field and give the effect of an interwoven basket-like design. Bowl designs are often laid out in offset quartered arrangements. Fringed design elements are also common. Sacaton Red-on-buff can often be a difficult category to apply, as a variety of design elements and motifs are included under the rubric of Sacaton Style.

Casa Grande Red-on-buff is only found in jar form. It is characterized by layouts made up of triangular panels that appear to create a plaited design, but in reality are not plaited, contrasting with the true plaited bands exhibited by Sacaton Red-on-buff. Design elements are usually rectilinear; curvilinear elements are uncommon. Lines integral to the structure of the design are often elaborated with ticks, barbs, "F-shaped" elements, or "E-shaped elements." Crosshatching is much more common on Casa Grande Style vessels than Sacaton Style vessels.

Table 17. Middle Gila Buff Ware types in the Mills Collection.

Types	Date Range	Geographic Range
Sacaton Red-on-buff: Safford Variety	A.D. 950-1150	southern Arizona
Casa Grande Red-on-buff: Safford Variety	A.D. 1150-1300	

Other Middle Gila Buff Ware types: Estrella Red-on-grey (A.D. 625-775), Sweetwater Red-on-grey (A.D. 600-700), Snaketown Red-on-buff (A.D. 725-775), Gila Butte Red-on-buff (A.D. 725-875), Santa Cruz Red-on-buff (A.D. 875-950).

Tucson Basin Brown Ware

Edward Danson offered the first published descriptions of Tucson Basin Brown Ware ceramics, based on the 1940 excavations at the University Indian Ruin in Tucson. However, these types were originally defined by Isabel Kelly based on her work at the Hodges Ruin in the 1930s. Danson discussed three types: Tanque Verde Red-on-brown, Pantano Red-on-brown, and Tucson Polychrome. With later research, it became apparent that Tucson Polychrome belonged in the Maverick Mountain Series, and although likely locally produced in Tucson, could not be considered a Tucson Basin Brown Ware type. Pantano Red-on-brown was described as a variant of Tanque Verde Red-on-brown with micaceous temper and more temper overall.

Types defined by Kelly include Cañada del Oro Red-on-brown, Rillito Red-on-brown, Picacho Red-on-brown, and Rincon Red-on-brown. Kelly also noted that the stylistic sequence of Tucson Basin Brown Ware closely parallels that of Middle Gila Buff Ware, such that Tanque Verde Red-on-brown exhibits the same painted designs as Casa Grande Red-on-buff; Rincon Red-on-brown is an analog of Sacaton Red-on-buff; Rillito Red-on-brown is similar to Santa Cruz Red-on-buff; and Cañada del Oro Red-on-brown matches Gila Butte Red-on-buff. Picacho Red-on-brown, originally described as variant of Rillito Red-on-brown, and Pantano Red-on-brown have since been discarded as legitimate types.

Tucson Basin Brown Ware is concentrated in the middle and upper reaches of the Santa Cruz River Valley. It is characterized by a brown paste with primarily sand temper. Schist is also a common tempering material in earlier types. Vessels can be slipped white or red. The paints used to create designs on Tucson Basin Brown Ware are red and sometimes brownish black. See the preceding Middle Gila Buff Ware section for type descriptions by style.

Table 18. Tucson Basin Brown Ware types in the Mills Collection.

Types	Date Range	Geographic Range
Tanque Verde Red-on-brown	A.D. 1150-1300	Tucson Basin and immediate surrounding area

Other Tucson Basin Brown Ware types: Cañada del Oro Red-on-brown (A.D. 700-800), Rillito Red-on-brown (A.D. 800-950), Rincon Red-on-brown (A.D. 950-1150), Rincon Black-on-brown (A.D. 1000-1100), Rincon Polychrome (A.D. 1000-1100), Tanque Verde Black-on-brown (A.D. 1150-1300), Tanque Verde Polychrome (A.D. 1150-1300).

Mogollon Brown Ware

Mogollon Brown Ware has often been used as a catch-all category to classify many ceramic types that do not belong to other wares. For our purposes, we use Mogollon Brown Ware to describe textured ceramic types that were produced in the Mogollon highlands areas. Most of these have never been effectively classified. A multitude of typological names have been applied to the corrugated ceramics of the Mogollon highlands, few of which have held up to close scrutiny. A few ceramic types that persist, such as McDonald Corrugated, Cibicue Painted Corrugated, Tularosa Fillet Rim, and Tularosa White-on-red, are Mogollon Brown Ware types. Because this category has been used so variably in the past, nothing is listed under “Other Mogollon Brown Ware types,” as most archaeologists would disagree as to what types belong in this ware.

Mogollon Brown Ware types exhibit brown to dark brown paste, and generally sand temper. They are usually unslipped, but their interiors can be highly polished and smudged. The exteriors of some types are polished. Not all vessels bear painted designs. If a vessel does exhibit painted designs, it is often executed in white kaolin clay paint, sometimes in conjunction with a black mineral paint (as on Cibicue Painted Corrugated).

The only Mogollon Brown Ware type seen in the Mills Collection was Tularosa White-on-red. This type always appears in bowl form. Both the inside and outside of the bowl are highly polished. Sometimes bowl interiors are smudged and sometimes they are slipped red. Three to four rows of indented corrugated coils are left exposed at the neck of the vessel, about 2-3 cm below the rim. Bowls are often recurved or semi-flaring incurved in shape. Broad white-line designs, similar to those seen on the exteriors of St. Johns Polychrome bowls, are painted on the exteriors of these bowls, generally in geometric patterns. Tularosa Fillet Rim is similar to Tularosa White-on-red, but does not exhibit white-line designs on the exterior.

Table 19. Mogollon Brown Ware types in the Mills Collection.

Types	Date Range	Geographic Range
Tularosa White-on-red	A.D. 1200-1350	west-central New Mexico and east-central Arizona

Other Mogollon Brown Ware Types: N/A.

Jeddito Orange Ware

Early attempts to organize information about the orange pottery types of the Hopi Mesas resulted in the lumping of some types into Tsegi Orange Ware, the orange pottery tradition of the Kayenta area to the north. As noted above, other orange types were initially placed in Jeddito Yellow Ware. More recent organizational efforts have produced the category discussed here: Jeddito Orange Ware.

The dominant orange pottery types of the Hopi Mesas for most of the period from A.D. 1250 to 1350 were Jeddito Black-on-orange and Jeddito Polychrome. E. Charles Adams has placed Jeddito Black-on-orange and Jeddito Polychrome under the rubric

"Jeddito Orange Ware," a name that highlights the fact that these types were made on the Hopi Mesas, rather than in the Kayenta area. Accepting Smith's arguments about the origin of and the relationships among these types, and following Adams' logic and Michael Andrews' example, Lyons proposed including several other types: Kokop Black-on-orange, Kokop Polychrome, Kwaituki Black-on-orange, Kwaituki Polychrome, Huckovi Black-on-orange, and Huckovi Polychrome. All of these types, like Jeddito Black-on-orange and Jeddito Polychrome, have red or orange exteriors and/or interiors (some of these surface colors are achieved with slips, however), and as a group, they represent the transition from Tsegi Orange ware to Jeddito Yellow Ware, in terms of color, decoration, and technology. The Jeddito Orange Ware types are poorly dated, most securely placed between A.D. 1250 and 1350 on the basis of stratigraphic associations at Awat'ovi.

Jeddito Black-on-orange, Jeddito Polychrome, Huckovi Black-on-orange, and Huckovi Polychrome are types characterized by orange paste and surfaces (with the exception of rare, red-slipped specimens of Jeddito Black-on-orange and Jeddito Polychrome). Jeddito Black-on-orange and Jeddito Polychrome exhibit yellow sherd temper, whereas the Huckovi types display finer paste, and temper similar to that characteristic of Awatovi Black-on-yellow (a Jeddito Yellow Ware type described above).

Kokop Black-on-orange and Kokop Polychrome exhibit yellow paste and temper like that of Jeddito Black-on-yellow and finer specimens of Awatovi Black-on-yellow. However, one or both surfaces of Kokop vessels are coated with a reddish-orange slip, upon which the painted design was applied. Kwaituki Black-on-orange and Kwaituki Polychrome exhibit reddish-yellow paste and abundant clear quartz sand temper. The surfaces of Kwaituki vessels, like Kokop vessels, bear a reddish slip, upon which the painted design was applied.

Styles named by Lyons and the distance between the lip of a bowl and the top of the banding line can be used to refine the chronology of Jeddito Orange Ware assemblages, placing vessels and groups thereof at the beginning, the middle, or the end of the ware's production span.

Table 20. Jeddito Orange Ware types in the Mills Collection.

Types	Date Range	Geographic Range
Huckovi Polychrome	A.D. 1250-1350	northeastern Arizona

Other Jeddito Orange Ware types: Jeddito Black-on-orange (A.D. 1250-1350), Jeddito Polychrome (A.D. 1250-1350), Huckovi Black-on-orange (A.D. 1250-1350), Kokop Black-on-orange (A.D. 1250-1350), Kokop Polychrome (A.D. 1250-1350), Kwaituki Black-on-orange (A.D. 1250-1350), Kwaituki Polychrome (A.D. 1250-1350).

Dragoon Series

Dragoon Series ceramics were first named by William Shirley Fulton and Carr Tuthill in the report on their excavations at the Gleeson Site. Fulton had described these ceramics in previous publications focusing on the archaeology around Texas Canyon, but had not assigned names to the types. Fulton and Tuthill described Dragoon Red-on-brown in detail, calling it a hybrid of Hohokam and Mogollon technology and design.

In his later work at the Tres Alamos Site, Tuthill added to the types of the Dragoon Series, naming and describing Cascabel Red-on-brown, Tres Alamos Red-on-brown, Deep Well Red-on-brown, and Benson Red-on-brown, as well as Dragoon Red-on-brown. However, as Robert Heckman (2000) points out, the type descriptions provided by Tuthill are ambiguous and overlapping, and do not conform to a chronological classification. Instead, Heckman suggests a classification system dividing Dragoon Series ceramics into three categories: broad-line, fine-line, and elaborated designs. This is roughly similar to the classification system used to define types in the San Simon series.

Dragoon Series ceramics are characterized by a brown to orange brown paste and sand temper. Vessels can have white, red, or tan to brown slips, and paint on Dragoon Series vessels is brownish-red. The distribution of Dragoon Series ceramics is confined generally to the San Pedro River Valley.

Only one Dragoon Series vessel was found in the Mills Collection. We chose to type this vessel as Tres Alamos Red-on-brown, which is one of Tuthill's original types. The Dragoon Series vessel in the Mills Collection clearly had Dragoon Series technology, but was decorated in the Tanque Verde design style, leading us to the Tres Alamos Red-on-brown designation.

Table 21. Dragoon Series types in the Mills Collection.

Types	Date Range	Geographic Range
Tres Alamos Red-on-brown (elaborated design)	A.D. 1150-1350	Lower San Pedro River Valley

Other Dragoon Series types: broad-line design (A.D. 650-800), fine-line design (A.D. 700-900).

Belford Brown Ware

Belford Brown Ware was originally described by Charles Di Peso in his 1958 report detailing work at Reeve Ruin along the San Pedro River. Di Peso described it as one of the most numerous locally produced wares at the site. As originally described, Belford Brown Ware includes the types Belford Plain, Belford Burnished, Belford Perforated Rim, Belford Corrugated, Belford Sobaipuri Plain, and a Belford variant of Whetstone Plain. All of these types were notably different, as they were made with coil and scrape technology in an area where most ceramics were made using the paddle and anvil technique. Based on a constellation of other material traits present at Reeve Ruin, such as perforated plates and the entrybox complex, Di Peso argued that this site had

been settled by Western Pueblo immigrants. Subsequent research has demonstrated that there is a ceramic horizon associated with Western Pueblo immigrants, which is dominated by bowl forms with recurved or semi-flaring incurved rims, such as those seen most often on Belford Brown Ware ceramics. This horizon is present in the southern Southwest from approximately A.D. 1300 to 1450, and stretches from the boot heel of New Mexico to the Phoenix Basin. Therefore, Belford Brown Ware ceramics are one of the many material cultural traits that can be used to identify Western Pueblo immigrants in the archaeological record.

Belford Brown Ware ceramics exhibit a reddish-brown to dark brown paste and sand temper. Some vessels are smudged on the interior. No slip or paint is present on these vessels. Vessel forms are dominated by recurved or semi-flaring incurved bowls. Only one Belford Plain vessel, from the Kuykendall site, was found in the Mills Collection.

Table 22. Belford Brown Ware types in the Mills Collection.

Types	Date Range	Geographic Range
Belford Plain	A.D. 1300-1450	San Pedro, Cliff, and Mimbres valleys, Phoenix Basin, and potentially the Globe-Miami area

Other Belford Brown Ware types: N/A.

Types Without Wares

Playas Red Incised

Playas Red Incised is a poorly known and poorly understood type. It was first described by Sayles in his 1936 work describing ceramic types associated with the Chihuahuan culture area. Very little subsequent work has been done to understand this type and how it fits temporally, spatially, and culturally with others. Playas Red Incised vessels appear to be concentrated around the international four corners area, in southeastern Arizona, southwestern New Mexico, northeastern Sonora, and northwestern Chihuahua.

Playas Red Incised vessels are all jars, including some effigy vessels, and exhibit a brown paste and sand temper. After each vessel was formed, lines were incised in patterns around the neck and down the shoulder of the vessel. The vessel was then slipped red over much of the exterior and around the rim on the interior. The slip sometimes covers the incised areas, and sometimes does not.

Table 23. Playas Red Incised in the Mills Collection.

Type	Date Range	Geographic Range
Playas Red Incised	A.D. 1150-1450	southeastern Arizona,

		southwestern New Mexico, northwest Mexico
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El Paso Polychrome

El Paso Polychrome is another poorly known and under-researched ceramic type associated most strongly with northwest Mexico. It was the most ubiquitous import to the site of Paquimé (Casas Grandes) in northwest Chihuahua during the Medio Period. El Paso Polychrome is characterized by a brown paste, sand temper, and thin walls. It occurs as bowls and jars. On jars, black designs are painted in mineral paint from the neck to the shoulder, and slip is then applied to the rest of the exterior surface (around the black lines). Bowl exteriors are slipped red. Black designs are painted on the interiors of bowls and are then usually surrounded by red slip. Paint and slip application order does vary, however. Designs are large and bold, and tend to be curvilinear.

Table 24. El Paso Polychrome in the Mills Collection.

Type	Date Range	Geographic Range
El Paso Polychrome	A.D. 1150-1450	western Texas, southern New Mexico, southeastern Arizona, northwest Mexico

Thatcher Red

Thatcher Red is a ceramic type for which a formal description has never been published. Closer scrutiny of this proposed type may reveal that it is not a type at all, but part of a continuum of red-slipped, obliterated-corrugated ceramics. From what is known of Thatcher Red, it has been described as a highly obliterated corrugated type with brown paste and sand temper. The exteriors of these vessels are slipped with a thick red slip that tends to flake off.

Thatcher Red is likely related to Thatcher White-on-red, another poorly understood proposed ceramic type. Thatcher White-on-red has been described as highly obliterated red slipped corrugated pottery that exhibits broad white-line designs on the exteriors of vessels. These white line designs may be Tanque Verde style, but further research is needed to determine this for certain. These types may represent a local manifestation of Salado Red and Salado White-on-red ceramics found to the west.

Table 25. Thatcher Red in the Mills Collection.

Type	Date Range	Geographic Range
Thatcher Red	unknown	unknown

Other related types: Thatcher White-on-red (dates unknown).

Indeterminate Red-on-brown

Vessels that clearly had brown paste and red paint, but could not be further identified, were placed in this category. Paste, temper, paint, and slip are all variable. It is likely that the vessels in this category are either San Simon Series, Dragoon Series, San Carlos Red-on-brown, or Tucson Basin Brown Ware.

Table 26. Indeterminate Red-on-brown in the Mills Collection.

Type	Date Range	Geographic Range
Indeterminate Red-on-brown	variable	variable

Indeterminate Classic Period Red Ware

Vessels that were slipped red, but could not be confidently assigned to a type or a ware were placed in this category. Paste and temper are variable. It is likely that the vessels in this category are some variety of red wares described in this report.

Table 27. Indeterminate Classic Period Red Ware in the Mills Collection.

Type	Date Range	Geographic Range
Indeterminate Classic Period Red Ware	variable	variable

San Carlos Red-on-brown

San Carlos Red-on-brown is often considered, as it is here, a type without a ware or a series. J. Scott Wood placed it under his "Salt-Gila Buffware" rubric along with the Hohokam buff ware types of the Phoenix Basin, and Michael Foster talks of a "San Carlos Series" that includes San Carlos Red-on-brown and San Carlos Red. Typological difficulties and differences of opinion seem to be related to the question of whether San Carlos Red-on-brown should be considered part of the Hohokam tradition or the Mogollon tradition. Some researchers conceive of the type as a potential "hybrid" of these two traditions. Joseph Cray has posited that San Carlos Red-on-brown represents a fusion of the pottery traditions of the San Simon and Reserve areas.

The first published formal type description was offered by Florence Hawley, although descriptions have since been offered by Alan Olson, based on materials recovered from the Point of Pines area, Hayward Franklin, based on specimens found at Second Canyon Ruin (AZ BB:11:20 [ASM]) in the Lower San Pedro Valley, and by Wood, for vessels and portions thereof found in the Tonto Basin. Type descriptions for San Carlos Red-on-brown all make reference to interior smudging and the style of painted decoration that appears on vessel exteriors (all vessel forms). This design style is the same as that displayed by Tanque Verde Red-on-brown and Casa Grande Red-on-buff. Most descriptions of this type also mention its relatively thin walls (those who have offered data on the subject report a range between 4 mm and 6.5 mm) and lustrous polish on vessel interiors and exteriors. Type descriptions differ, however, in terms of the tempering materials reported and whether or not the author suggests the type is slipped.

San Carlos Red-on-brown is a pottery type that is somewhat poorly understood in terms of its typological relationships, geographical and cultural historical origin(s), areal distribution, dating, production locations, and technological and stylistic variability. To date, the areas that have yielded the highest percentages of this type include the Safford Basin and the Lower San Pedro Valley. San Carlos Red-on-brown has also been recovered from sites in the Globe-Miami area, the Phoenix Basin, the Tucson Basin, the Tonto Basin, the Dripping Springs Valley, and the Point of Pines region. Work in the Safford Basin and in the San Pedro Valley has revealed distinctive tempering materials in the San Carlos Red-on-brown sherds and vessels recovered from these two regions. Lyons has proposed splitting the type into varieties named for suspected production locations, inferred on the basis of temper: "San Carlos Red-on-brown: Aravaipa Variety" and "San Carlos Red-on-brown: Safford Variety."

W. Bruce Masse first offered the hypothesis that Hohokam buff ware and San Carlos Red-on-brown were produced in the San Pedro Valley, at the mouth of Aravaipa Creek. This inference was based on the concentration of Hohokam buff ware and San Carlos Red-on-brown sherds and vessels tempered with crushed phyllite at sites near the San Pedro River and Aravaipa Creek confluence. Henry Wallace later noted the close proximity of these sites to phyllite outcrops and phyllite-bearing sands found near the San Pedro-Aravaipa confluence. San Carlos Red-on-brown recovered from the Safford Basin, in contrast, is tempered with red, angular fragments that appear to be sand-tempered sherds. Those lacking sherd temper are tempered with granitic sand. Apparently, sherd-tempered San Carlos Red-on-brown has not been recorded elsewhere, suggesting this is a Safford Basin phenomenon and an indicator of local production. Wallace notes the presence of San Carlos Red-on-brown made with sand temper derived from local petrofacies in the Tonto Basin. A fourth possible production area is the Globe-Miami area, where David Doyel found a variety of tempers represented. One tempering material, fine quartz sand, is apparently consistent with local manufacture.

San Carlos Red-on-brown vessels exhibit brown paste that usually grades from dark black near smudged surfaces, to light brown on the exterior. Temper can be sand or sand and sherd. Bowls and jars are highly polished. Bowls are smudged on the interior, and jars are often smudged around the rim. Both bowls and jars are painted on the exterior with red to purplish-red paint. Designs generally exhibit Tanque Verde style, although some exceptions have been noted.

Table 28. San Carlos Red-on-brown in the Mills Collection.

Types	Date Range	Geographic Range
San Carlos Red-on-brown, phyllite sand temper	A.D. 1250-1450	Lower San Pedro River Valley
San Carlos Red-on-brown, non-phyllite sand temper	A.D. 1250-1450	southeastern Arizona
San Carlos Red-on-brown, sherd temper	A.D. 1250-1450	

Other related types: San Carlos Red (A.D. 1200-1400).

Belford Red Smudged

Di Peso (1958) named the types Belford Red and Belford Red Smudged based on material he recovered from Reeve Ruin, in the San Pedro Valley. Recently, archaeologists have noted that Belford Red is essentially the same as a type called Phoenix Red, which occurs in the Phoenix Basin, and Cliff Red, which is found in the Cliff and Mimbres valleys of New Mexico. Lyons suggests that Kinishba Red, made in the area around Whiteriver, Arizona, is part of the same phenomenon.

Belford Red basically represents Cliff Polychrome (recurved, semi-flaring incurved or semi-flaring hemispherical Roosevelt Red Ware bowls) with no white slip and no black paint; both surfaces are slipped red. Belford Red Smudged differs only in terms of the presence of interior surface smudging. Belford Red Smudged, then can be thought of as Dinwiddie Polychrome without any white slip or black, painted decoration on the exterior.

Table 29. Belford Red Smudged in the Mills Collection.

Types	Date Range	Geographic Range
Belford Red Smudged	1350-1450	Arizona, New Mexico, northern Mexico

Gila White-on-red

Although the Gladwins (1930) described Gila White-on-red, the first formal definition is attributable to Colton and Hargrave (1937:176-177). This type was made using the paddle-and-anvil technique and is characterized by a brown paste, red-slipped exteriors and smudged interiors. Vessel exteriors exhibit a lustrous polish, most often marked by patterns of striations, and white, painted designs. As noted above in the discussion of Cliff White-on-red, the designs characteristic of Gila White-on-red are composed of narrow lines. Pendant dots are also common, and nested squares are sometimes present.

Table 30. Gila White-on-red in the Mills Collection.

Types	Date Range	Geographic Range
Gila White-on-red	1150-1400	Middle Gila Valley, Lower Salt Valley, Tonto Basin

Indeterminate

Vessels categorized as indeterminate are those that could not be confidently assigned to a ware or a type. Indeterminate vessels were variable in their paste, temper, slip, paint, and design. These vessels may belong to a currently undefined or poorly understood type or ware, or may exhibit characteristics of multiple ceramic types and wares.

Table 31. Ceramics of indeterminate type and ware in the Mills Collection.

Type	Date Range	Geographic Range
indeterminate	variable	variable

PRELIMINARY RESULTS OF ANALYSIS

Although our results will be placed in the context of larger research projects and disseminated elsewhere, we will summarize some preliminary findings here. Research reports resulting from projects that utilized data from the Mills Collection will be submitted to the Eastern Arizona College administration and anthropology instructor as they are completed.

The assemblage as a whole contains a wide variety of ceramics representing diverse production locales and associated, in general, with habitation sites in southeastern Arizona and southwestern New Mexico occupied after A.D. 1000. The Mills Collection is quite unique in the number of distinct types and wares represented, in fact. If the sherd collections held by EAC contain a similar variety in materials, the collection as a whole may be one of the most informative for researchers interested in this area.

Table 32 lists the number of vessels assigned to each ware and type. Ware and type counts are further broken down by site. Of the ten sites known to have been excavated by the Millses, only nine were represented in the collections analyzed. Each site is represented by a column in Table 32. An additional column provides counts for vessels that came from unknown proveniences. A portion of these vessels had Mills catalog numbers, and therefore must have come from one of the ten sites that the Millses excavated. However, the catalog numbers of these vessels were not listed in any of the Millses reports, and their proveniences cannot be determined without additional information. The rest of the vessels in the “unknown provenience” column had either EAC or other catalog numbers, and likewise, their proveniences cannot be determined without additional information. Some of these vessels undoubtedly came from sites other than those excavated by the Millses.

Of the vessels with known provenience, most were from the Kuykendall site, followed by the Curtis site, VIV Ruin, and the Dinwiddie site. The Millses spent a significant amount of time at each of these sites, so the high number of vessels sites is not surprising. Between one and six vessels were analyzed from each of the assemblages from the remainder of the sites (Hereford site, Nine Mile Ruin, Pitts site, Slaughter Ranch site, and the Webb site). Roosevelt Red Ware vessels were by far the most numerous in the collection on display, followed by the Maverick Mountain Series, Chihuahuan Polychromes, White Mountain Red Ware, Cibola White Ware, and the San Simon Series. Six or fewer vessels were analyzed from the remainder of the wares and types in the assemblage. Among Roosevelt Red Ware vessels, Gila, Tonto, and Cliff Polychrome were the most numerous types, while other types and subtypes were represented by significantly fewer vessels. Overall, the diversity of wares and types represented in the

Total	15	0	0	10	1	0	0	2	0	5	34
<i>Total Number of Vessels</i>	65	29	1	103	22	1	3	45	3	45	317

Mills Collection reflects the diversity of the sites excavated by the Millises, which covered a wide range in size, geographical location, age, and length of occupation.

Similar diversity is seen in the vessel shapes and forms at each site, and in the collection as a whole (see Tables 33 and 34). Vessel shapes are dominated by bowls and jars, but a remarkable seven effigy vessels, including one human effigy, are present in the collection, as well as scoops, pitchers, and a ladle. Common bowl forms were split between hemispherical bowls, incurved bowls, and semi-flaring incurved bowls. Given that these three forms are common among Gila and Cliff Polychrome bowls, their dominance in the collection is not surprising. Jar forms were somewhat less variable, being dominated almost completely by short flare-rim jars. This form is common among both Gila and Tonto Polychrome jars.

Descriptive statistics on measurements taken for height, maximum diameter, and orifice diameter are presented in Table 35 for sites and types with adequate sample size. An examination of the means of all measurements reveals that bowls and jars from the Curtis site were consistently the smallest, while those from the Dinwiddie site were consistently the largest. Furthermore, the Coefficients of Variation (CV) reveal that bowl size showed the least diversity at the Dinwiddie site (Crown 1994), and the most diversity at the VIV Ruin. The trend is slightly different for jars, however. Jars are most variable in size at the Curtis site, rather than the VIV Ruin.

Table 36 shows the results of a closer examination of these trends from the two sites with large enough samples of Gila Polychrome bowls and jars, and Tonto Jars to permit statistically meaningful analyses. The results of these analyses are similar to those presented in Table 35. Gila Polychrome bowls from the Kuykendall site are consistently smaller and less variable in size than those from the VIV Ruin. Gila Polychrome jars from the Kuykendall site are consistently bigger and less variable in size than those from the VIV Ruin. Statistics for Tonto Polychrome jars reveal a slight departure from Table 35, however, in that those from the Kuykendall site are larger and *more variable* than those from the VIV Ruin. Combining data for all jars, as in Table 35, initially obscured this trend.

Crown (1994:115-122) investigated CV as a measure of standardization among Roosevelt Red Ware vessels and found some interesting trends. She suggested, based on previous ethnographic research, that vessels with a CV lower than 0.10 may have been produced by specialists, while vessels with a CV greater than 0.10 were not. When looking at all Roosevelt Red Ware bowls or jars from specific sites, she found enough variation (i.e. CVs over 0.10) to conclude that these vessels were not made by specialists. However, when she broke the sample down by vessels size, she found that there was substantially less variation in large vessels when compared to small vessels. This was particularly true in her sample from VIV, which resulted in CVs of 0.08 and 0.07 for height and maximum diameter, respectively, for Tonto Polychrome jars with a maximum diameter over 315mm. Her sample, however, was relatively small, and selecting jars of a certain maximum diameter necessarily leads to less variability in measures of maximum diameter, which could account for the low CV for this variable. Nonetheless, her results

collared jar											
double jar				3				2		1	6
semi-flaring angled long-collared jar	2			1				2		1	6
semi-flaring short straight-collared jar										1	1
oval shaped scoop	1									1	2
bird effigy	1						1				2
anthropomorphic effigy	1									1	2
effigy vessel	2			1							3
indeterminate										1	1
Total	65	29	1	103	22	1	3	45	3	45	317

are intriguing and suggest that Roosevelt Red Ware vessels, especially large ones, may have been produced by people who specialized in pottery production. Our results, seen in Table 36, do not support this conclusion, as all CVs are over 0.10. Data from additional vessels, which would increase our sample size, may change this pattern. The possibility that Roosevelt Red Ware vessels were produced by specialists, perhaps for elite or ritual consumption or distribution, must be further explored.

Table 35. Metric descriptive statistics.

Bowl Height				
	Curtis site	Dinwiddie site	Kuykendall site	VIV Ruin
N	40	19	46	21
Minimum	4	9.3	6.2	5.1
Maximum	15.1	28.6	18.5	21.7
Mean	10.403	16.974	13.313	11.529
Std. Deviation	3.128	4.013	3.173	4.689
CV	0.301	0.236	0.238	0.407
Bowl Maximum Diameter				
Minimum	8	21.3	14	13.1
Maximum	33.7	43.1	34.3	36.3
Mean	22.547	34.837	26.696	23.776
Std. Deviation	6.705	5.911	5.675	8.143
CV	0.297	0.17	0.213	0.342
Bowl Orifice Diameter				
Minimum	7	19	2.2	12.1
Maximum	31.3	37.3	31.6	33.6
Mean	20.757	30.553	23.607	21.738
Std. Deviation	6.119	4.929	5.875	7.329
CV	0.295	0.161	0.249	0.337
Jar Height				
N	15	10	56	24
Minimum	8.3	11.1	9.6	10.1
Maximum	30.3	33.1	38.6	29.3
Mean	17.893	24.21	24.073	20.513
Std. Deviation	6.314	6.775	7.072	6.293
CV	0.353	0.28	0.294	0.307
Jar Maximum Diameter				
Minimum	11.9	17.1	13.8	13.2
Maximum	42.7	49.7	52.7	43.6
Mean	22.653	37.2	34.395	29.796
Std. Deviation	8.906	9.697	10.141	10.366
CV	0.393	0.261	0.295	0.348
Jar Orifice Diameter				
Minimum	6	10.1	7.5	4
Maximum	19	23.3	25.7	22.9
Mean	10.853	17.76	16.491	12.896

Std. Deviation	4.092	4.017	4.484	4.431
CV	0.377	0.226	0.272	0.344

Additional tests were performed to determine if the differences seen in Tables 35 and 36 were statistically significant (see Table 37). These tests reveal significant differences in height, maximum diameter, and orifice diameter when all bowls are compared, and when all jars are compared. However, when types are separated out this is not the case. There are no significant differences in the measurements taken among Gila Polychrome bowls, and no significant differences seen in height or maximum diameter in Gila and Tonto Polychrome jars. This also hints that a larger sample of Roosevelt Red Ware may reveal little enough variability in size to conclude that these vessels were made by specialists. Therefore, the differences seen in the first tests (when all bowl and jar forms were combined) were the result of differences between ceramic types, and likely reflect differences seen in types through time rather than other factors.

Table 36. Metric descriptive statistics by type.

	Gila Polychrome Bowls					
	Height		Maximum Diameter		Orifice Diameter	
	Kuykendall site	VIV Ruin	Kuykendall site	VIV Ruin	Kuykendall site	VIV Ruin
N	11	12	11	12	11	12
Minimum	6.3	6.1	16.9	13.1	2.2	12.1
Maximum	17.2	18.2	33	33.9	28.2	31
Mean	11.355	11.700	23.3	24.208	19.345	22.158
Std. Deviation	3.397	3.808	5.290	7.639	7.087	6.867
CV	0.299	0.326	0.227	0.316	0.366	0.310
	Gila Polychrome Jars					
	Height		Maximum Diameter		Orifice Diameter	
	Kuykendall site	VIV Ruin	Kuykendall site	VIV Ruin	Kuykendall site	VIV Ruin
N	19	10	19	10	19	10
Minimum	12.8	11.2	13.9	13.2	8	4
Maximum	32.9	29.3	49.5	43.6	25.2	16.1
Mean	23.011	20.87	32.589	27.92	15.500	11.73
Std. Deviation	6.057	6.378	9.145	10.305	4.532	4.294
CV	0.263	0.306	0.281	0.369	0.292	0.366
	Tonto Polychrome Jars					
	Height		Maximum Diameter		Orifice Diameter	
	Kuykendall site	VIV Ruin	Kuykendall site	VIV Ruin	Kuykendall site	VIV Ruin
N	30	11	30	11	30	11
Minimum	9.6	13.6	13.8	18.2	7.5	7.5
Maximum	35	28.3	52.7	43.4	25.7	18.1
Mean	25.047	22.327	37.157	33.6	17.253	13.964
Std. Deviation	6.684	5.463	10.025	9.08	4.188	3.282
CV	0.267	0.245	0.27	0.27	0.243	0.235

Table 37. Non-parametric tests of difference.

1. All Bowls, All Sites				
Variable Tested	K-W² Test Statistic	p	df	Result
Height	50.800	0.000	8	significant difference
Maximum Diameter	47.435	0.000	8	significant difference
Orifice Diameter	39.951	0.000	8	significant difference
2. All Jars, All Sites				
Variable Tested	K-W Test Statistic	p	df	Result
Height	26.003	0.001	7	significant difference
Maximum Diameter	36.041	0.000	7	significant difference
Orifice Diameter	37.656	0.000	7	significant difference
3. Gila Polychrome Bowls, Kuykendall site and VIV Ruin				
Variable Tested	M-W³ Test Statistic	p	df	Result
Height	63.500	0.878	1	no significant difference
Maximum Diameter	58.000	0.622	1	no significant difference
Orifice Diameter	54.000	0.460	1	no significant difference
4. Gila Polychrome Jars, Kuykendall site and VIV Ruin				
Variable Tested	M-W Test Statistic	p	df	Result
Height	116.000	0.335	1	no significant difference
Maximum Diameter	122.000	0.215	1	no significant difference
Orifice Diameter	140.000	0.039	1	significant difference
5. Tonto Polychrome Jars, Kuykendall site and VIV Ruin				
Variable Tested	M-W Test Statistic	p	df	Result
Height	217.50	0.122	1	no significant difference
Maximum Diameter	202.50	0.270	1	no significant difference
Orifice Diameter	252.00	0.010	1	significant difference

IMPLICATIONS OF RESEARCH

The information gathered from the Mills Collection and presented here has a great number of implications for research. First and foremost, this analysis gave us a much clearer picture of when each site was occupied, and for how long (as summarized in Table 38). Although it was possible to obtain a general idea of occupational span from the Millses reports, analyzing the vessels gave us the opportunity to utilize a more specialized ceramic typology that employs refinements made in the last two decades, and was therefore unavailable to the Millses at the time they conducted their excavations. The best example of this refinement is in the recognition of Cliff Polychrome and other Roosevelt Red Ware subtypes. Until 2005, Cliff Polychrome bowls were lumped in with Gila Polychrome bowls. However, whereas Gila Polychrome has been dated to A.D. 1300 to 1450, Cliff Polychrome has a more restricted date range, from A.D. 1350/1375 to 1450 (and it is known to increase in frequency through time). Therefore, the recognition of Cliff Polychrome has allowed archaeologists to much more accurately assign dates to sites that date to this late time period.

Table 38. Occupation spans of sites excavated by Jack and Vera Mills.

Site Name	Occupation Span
Nine Mile site	A.D. 1300-1450
Hereford site	A.D. 1250-1400
Kuykendall site	A.D. 1275-1450
Webb site	A.D. 1275-1375
VIV Ruin	A.D. 1300-1450
Glass Ranch site	A.D. 1275-1375
Slaughter Ranch site	A.D. 1300-1450
Dinwiddie site	A.D. 1350-1450
Pitts site	A.D. 1000-1150
Curtis site	A.D. 1100-1450

Dissertation Research and the Curtis Site

Neuzil’s dissertation evaluated the scale and impact of immigrants from northeastern Arizona who arrived in the Safford and Aravaipa valleys in the late thirteenth and fourteenth centuries, specifically looking at how they interacted with the local population upon their arrival. Her data from the Curtis site indicated it was one of the longest and latest occupied in the Safford Valley, a conclusion supported by the diversity of whole vessels from this site present in the Mills Collection. Furthermore, the vessels in the Mills Collection supported Neuzil’s contention that as one of the latest occupied sites in the area, the Curtis site was likely inhabited by both immigrants and locals, as reflected in the migrant associated ceramics, such as Maverick Mountain Series, and locally associated ceramics, such as Middle Gila Buff Ware and San Carlos Red-on-brown from the Curtis site seen in the Mills Collection.

Furthermore, one of the stated goals of this research was to understand how the assemblage from the Curtis site in the Mills Collection compared with the assemblage at the University Museum at the University of Colorado at Boulder (Tyberg 2000). Ratios of number of types represented to number of decorated vessels, and number of wares represented to number of decorated vessels were calculated to determine the diversity of each collection (see Table 39). As is apparent from this table, the assemblage from the Curtis site in the Mills Collection is more diverse in terms of both the number of types and wares represented. Therefore, the sum total of both assemblages is considerably more representative of the site than just the University Museum collection alone. This analysis of the Mills Collection has significantly improved our understanding of the full occupational span and diversity of population present at the Curtis site.

Table 39. Relative Numbers of wares and types present in collections from the Curtis site, AZ CC:2:3(ASM).

	Wares		Types	
	Number	Ratio	Number	Ratio
University Museum (N=36)	2	0.06	6	0.17
Mills Collection (N=64)	11	0.17	23	0.36

Coalescent Communities Project

The VIV Ruin figures in the Center for Desert Archaeology's ongoing "Coalescent Communities" project. Previous research has suggested that the VIV Ruin was one of the latest occupied sites in the Tonto Basin area, and we hoped the assemblage from the VIV Ruin in the Mills Collection would shed some light on this inference. The presence of two late ceramic types in the VIV Ruin assemblage – Cliff Polychrome and Los Muertos Polychrome – confirmed its late occupation span. This information will allow the scholars working on the Coalescent Communities project to more precisely date the occupation at the VIV Ruin, and more accurately place it within the larger regional context of the Tonto Basin.

Migrant Pottery, Poorly Defined Types, and Chihuahuan Polychromes

The analysis of the Mills Collection greatly improved our understanding of types of ceramics associated with migrant populations from northern Arizona, aided in the definition of five new ceramic types (Ninemile Polychrome, Phoenix Polychrome, Dinwiddie Polychrome, Los Muertos Polychrome, and Cliff White-on-red), and allowed us to reevaluate the Chihuahuan Polychromes in the collection in light of recent improvements to typology. More specific results will be published in future reports and journal articles. These publications will be provided to Eastern Arizona College as they are completed.

Future Research

The week spent at Eastern Arizona College made it abundantly clear that the research opportunities associated with the Mills Collection, as well as the rest of EAC's holdings, are numerous. The Mills Collection alone contains approximately 800 to 1000 complete or reconstructable vessels from at least 10 prehistoric sites spread over a wide geographic area. Many of these sites date to the same time period, and thus their artifacts provide opportunities for comparative research. Although our research focused specifically on decorated vessels, the utilitarian vessels, shell, turquoise, obsidian, ground stone, projectile points, and other artifacts have great potential to answer a number of important research questions. Examples of research questions that may be addressed with the Mills Collection include:

- From where did exotic raw materials such as shell, obsidian, and turquoise found at sites in the Mills Collection come, and how did it arrive at these sites? Was it through long distance trade, migration, or other social mechanisms?
- Can individual artisans or families of craftspeople be recognized in flaked stone (projectile point) or ceramic technology at individual sites?
- What can craft items such as beads and pendants tell us about the organization of production in each settlement? Was production organized on a household basis, or was it specialized? Were men, women, or both involved in craft production?
- What can manos, metates, mescal knives and other artifacts associated with agriculture tell us about subsistence practices at each site? Were the inhabitants of

each of the sites heavily reliant on agriculture, or did they supplement with wild resources?

These examples of research questions that could be answered with the Mills Collection provide a glimpse of the unique potential of this exceptional resource. The research possibilities are, in reality, endless.

SUMMARY

The analysis performed by archaeologists at the Center for Desert Archaeology represented a unique opportunity to examine one of the most complete, yet poorly understood collections of ceramic vessels dating to the A.D. 1200-1450 time period. Access to the portion of the Mills Collection currently on display at the Student Services building allowed us to answer research questions important in Southwestern archaeology today that could not be answered otherwise. This analysis will allow us to make great strides in improving our understanding of prehistoric population dynamics and social organization not only in the Safford Basin, but throughout the Greater Southwest.

Access to the remainder of the Mills Collection, currently not on display, as well as the rest of the EAC holdings would help us obtain a more complete inventory of the Mills Collection, a better understanding of Safford Basin archaeology in general, and would greatly enhance the research potential of this collection for future scholars. Although our recent analyses provided us with important information, access to the full collection would allow us to assign more accurate dates of occupation to each site, to understand the complete range of stylistic designs present on each ceramic type, and to place more confidence in statistical analyses. Furthermore, the remainder of the EAC holdings contain excavated but unpublished collections from sites in the Safford Basin recovered by previous EAC anthropology instructors. Because archaeological research in the Safford Basin is so sparse, access to these collections would complement new findings generated by work with the Mills collection. This goal can be met without further disturbance to sites through additional excavations.

In sum, the Mills Collection at Eastern Arizona College is a one-of-a-kind resource, and its importance to the study of Southwest archaeology cannot be overstated. We hope our work will be the first of many research programs that involve the Mills Collection, as these objects undoubtedly have the potential to make substantial contributions to the study of Southwest archaeology as a whole.

NOTES

¹ The Curtis Site, named by Jack and Vera Mills in their 1978 report, has also been called the Buena Vista Ruin (Fewkes 1904) and the Solomonsville site (Tyberg 2000).

²Kruskal-Wallis Test Statistic.

³Mann-Whitney U Test Statistic.

Appendix A. Bibliography of excavation reports written by Jack and Vera Mills.

Mills, Jack P., and Vera M. Mills

- n.d. The Hereford Site: A Prehistoric Village on the San Pedro River, Babocomari Culture. Ms on file, Amerind Foundation, Dragoon.
- 1940- Archaeological Notes on the Nine Mile Site. Ms on file, Amerind Foundation, 1949a Dragoon.
- 1940- Archaeological Notes on the Nine Mile Site. Ms on file, Center 1949b for Desert Archaeology, Tucson.
- 1955 The Webb Site: A Report on an Archaeological Salvage Operation. Ms on file, Museum of Northern Arizona, Flagstaff.
- 1966 *The Glass Ranch Site: A Prehistoric Village in Southeastern Arizona*. Special Report No. 4. El Paso Archaeological Society, El Paso.
- 1969 Burned House: An Additional Excavation at the Kuykendall Site. *The Artifact* 7(3):21-32.
- 1969 *The Kuykendall Site: A Prehistoric Salado Village in Southeastern Arizona*. Special Report No. 6. El Paso Archaeological Society, El Paso.
- 1971 The Slaughter Ranch Site: A Prehistoric Village Near the Mexican Border in Southeastern Arizona. *The Artifact* 9(3):23-52.
- 1972 The Dinwiddie Site: A Prehistoric Salado Ruin on Duck Creek, Western New Mexico. *The Artifact* 10(2):i-50.
- 1972 The Pitts Site: A Prehistoric Mimbres Village in Western New Mexico. *The Artifact* 10(4):31-54.
- 1975 *The Meredith Ranch Site, VIV Ruin: A Prehistoric Salado Pueblo in the Tonto Basin, Central Arizona*. Privately published by Jack P. Mills and Vera M. Mills, Elfrida, AZ.
- 1978 *The Curtis Site: A Pre-Historic Village in the Safford Valley*. Privately published by Jack P. Mills and Vera M. Mills, Elfrida, AZ.

Appendix B. List of vessels by disk.

Disk 1

1. 1056K
2. 1057K
3. 1058K
4. 1067K
5. 1082V
6. 1132CS
7. 1152K
8. 1289W
9. 1385K (originally labeled 13__)
10. 1307K
11. 1322W
12. 1323W
13. 1382K
14. 1386K
15. 1387K
16. 1388K
17. 1389K
18. 141
19. 1412K
20. 1413K
21. 1414K
22. 1416K
23. 1417K
24. 1418K
25. 1420K
26. 1421K
27. 1423K
28. 1425
29. 1426K
30. 1428K

Disk 2

1. 1429K
2. 1430K
3. 1444K
4. 1446K
5. 1447K
6. 1450K
7. 1453K
8. 1459K
9. 1475K
10. 1476K
11. 1477K

12. 1478K
13. 1479K
14. 15
15. 1516K
16. 1522K
17. 1532H
18. 1533K
19. 1559K
20. 1570K
21. 1571K
22. 1602K
23. 1605K
24. 1621K
25. 1625K
26. 1628K
27. 1637K
28. 1672K
29. 1674K
30. 1685K
31. 1686K
32. 1687K
33. 1688K
34. 1694K
35. 1697K
36. 1713K
37. 1714K
38. 1717K

Disk 3

1. 1718K
2. 1720K
3. 1721K
4. 1775K
5. 1780K
6. 1818K
7. 1872K
8. 1873K
9. 1874K
10. 1875K
11. 1876K
12. 1898T
13. 1938V
14. 1960V
15. 1962V
16. 1963V
17. 1965_

18. 1969V
19. 1973V
20. 1974V
21. 1975V
22. 1978V
23. 1980V
24. 1981V
25. 1983V
26. 1984V
27. 1985T
28. 1990V
29. 1991V
30. 1998V
31. 2011V
32. 2017V

Disk 4

1. 2022V
2. 2023V
3. 2024V
4. 2026V
5. 2033V
6. 2035V
7. 2036V
8. 2037V
9. 2038V
10. 204
11. 2068V
12. 2069V
13. 2075V
14. 2076V
15. 2077V
16. 2078V
17. 2079V
18. 3004V
19. 3006V
20. 3007V
21. 3014K
22. 3015K
23. 3027K
24. 3028V
25. 3043K
26. 3044K
27. 3048V
28. 3050K
29. 3051V

30. 3052V
31. 399
32. 4026V
33. 4027MC
34. 4044

Disk 5

1. 4046K
2. 4069S
3. 4070S
4. 4073D
5. 414
6. 417
7. 437/432
8. 441
9. 442
10. 443
11. 446
12. 447
13. 448
14. 449
15. 5014D
16. 5053D
17. 5054D
18. 5055D
19. 5057D
20. 5059S
21. 562
22. 586
23. 587
24. 589
25. 591
26. 592NM
27. 6010D
28. 6025D
29. 6049D
30. 6051
31. 6061D

Disk 6

1. 6069K
2. 6092D
3. 6139K
4. 6140D
5. 6142K
6. 6143D

7. 6144K
8. 6145D
9. 6146D
10. 6147D
11. 6148D
12. 6149D
13. 6150D
14. 6156D
15. 6157K
16. 6162K
17. 6163D
18. 6189D
19. 6190D
20. 6193D
21. 6194D
22. 6195D
23. 6214V
24. 6216D
25. 6217P
26. 6219D
27. 6221D
28. 6247S
29. 626

Disk 7

1. 627
2. 629
3. 631
4. 632
5. 68
6. 708
7. 709
8. 710
9. 711
10. 7358CS
11. 7361CS
12. 7404CS
13. 7406CS
14. 748K
15. 7493CS
16. 7496CS
17. 749K
18. 75.2.11
19. 75.2.3
20. 750K
21. 7513CS

22. 7532CS
23. 7537
24. 7558CS
25. 7574CS
26. 7575CS
27. 7579CS
28. 7614CS
29. 7621CS
30. 7622CS
31. 7623CS
32. 7624CS
33. 7626CS
34. 7645CS

Disk 8

1. 7646CS
2. 7647CS
3. 7648CS
4. 7651CS
5. 7653CS
6. 7654CS
7. 7655CS
8. 7656CS
9. 7661CS
10. 7662CS
11. 7663CS
12. 7664CS
13. 7665CS
14. 7666CS
15. 766K
16. 7670CS
17. 7676CS
18. 7680CS
19. 7685CS
20. 7692CS (originally labeled 769_)
21. 7693CS
22. 7694CS
23. 7698CS
24. 770K
25. 7719CS
26. 771K
27. 7722CS
28. 7725CS
29. 7731CS
30. 7733CS

Disk 9

1. 7734CS
2. 7735CS
3. 7737CS
4. 773K
5. 7744CS
6. 7748CS
7. 7749CS
8. 7750CS
9. 7762CS
10. 7763CS
11. 7764CS
12. 7766CS
13. 7768CS
14. 7771CS
15. 7778CS
16. 7779CS
17. 7780CS
18. 7782CS
19. 778K
20. 79.1.7
21. 79.1.8
22. 79.2.255
23. 80.10.2
24. 80.10.3
25. 803K
26. 82.22.10
27. 84.9.2
28. 865K
29. 87.4.142
30. 8795T
31. 88.1.10
32. 88.1.8
33. 88.3.6
34. 887K
35. 888K
36. 890K
37. 9
38. 90-5-1043
39. 90-5-105

Disk 10

1. 90-5-1327
2. 90-5-1329
3. 90-5-1343
4. 90-5-1379

5. 90-5-1394
6. 90-5-1485
7. 90-5-1534
8. 90-5-1616
9. 90-5-716
10. 90-5-767
11. 90-5-909
12. 90-5-93
13. 91
14. 91-1-53
15. 912K
16. 922K
17. 930K
18. 932K
19. 945K
20. 951K
21. 958K

Disk 11

1. Chihuahuan Polychrome vessels
2. Cibola White Ware vessels
3. Corrugated vessels
4. Effigy vessels
5. Maverick Mountain Series vessels
6. Red-on-buff and red-on-brown vessels
7. Roosevelt Red Ware vessels

Appendix C: Useful ceramics references (grouped by category).

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