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Mission Statement

The Journal of Arizona Archaeology is a peer-reviewed journal that focuses on the presentation of emerging ideas, new methods, and current research in Arizona archaeology. It endeavors to be a forum for the scholarly, yet simple communication of research and management related to Arizona's archaeological record. The journal is published twice a year by the Arizona Archaeological Council (AAC). At least one issue per year is devoted to the theme of the AAC annual fall conference. The conference issue (or issues) is overseen by a guest editor. The remaining issues of the journal are intended for open submissions. The frequency of general submission issues is dependent on the number of appropriate manuscripts received throughout the year and the workload of the editorial staff.

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Editorial Contact Information

M. Scott Thompson
School of Human Evolution and Social Change, Arizona State University
PO Box 872402, Tempe, AZ 85287-2402
Mason.Thompson@asu.edu

THEMED ISSUE:

FROM WITHOUT AND WITHIN: LONG-DISTANCE INTERACTION, CULTURE CHANGE, AND CULTURE CONTACT IN ARIZONA

PREFACE

I am pleased to be able to present to the readers of the *Journal of Arizona Archaeology* this special guest-edited issue. The theme of this issue is "From Without and Within: Long-Distance Interaction, Culture Change, and Culture Contact in Arizona." This theme was also the focus of the 2011 Arizona Archaeological Council (AAC) Fall Conference which took place at the Arizona History Museum in Tucson. In that conference, a group of 22 scholars from academia and cultural resource management explored themes of long-distance exchange, culture change, and extra-regional interactions and social relations in a diverse set of case studies ranging from Late Archaic farming populations to contemporary undocumented migrant sites along the U.S.-Mexico border. With over 100 people in attendance, the conference was a great success and the research presented that day is a testament to the quality and diversity of archaeological thought about our state's rich past.

Two of the articles in this issue are based on research presented at that 2011 AAC Fall Conference—Christopher P. Garraty's essay on ceramics from the Mescal Wash site, "Social Identity and Political Competition in a Culturally Diverse Landscape: Decorated Pottery from the Mescal Wash Site, Southeastern Arizona," and Stephanie M. Whittlesey's and J. Jefferson Reid's essay on macaw remains, "Macaw Symbolism and Ritual at Grasshopper Pueblo and Paquíme." Garraty's article focuses on the analysis of a collection of painted pottery from the Middle Formative period site of Mescal Wash in the southeastern portion of the state. His study of decorated ceramic use over the long occupation of the site suggests that, within this culturally diverse landscape, identity was dynamic and constantly changing and was based, in part, on long-distance social relations and interactions as well as increasing suprahousehold political competition. In their article, Whittlesey and Reid examine the distribution and the treatment of macaws at both Grasshopper Pueblo and Paquíme. Macaws represent one of the most obvious examples of a long-distance interactions and exchange in the Southwest and the variation that they identify in the breeding and consumption of these birds at the two sites highlights the variability in how these birds were incorporated into religious ritual practice across the region.

In their essay "Variability in Far Western Puebloan Subsistence Strategies: The View from the Uinkaret Plateau, Northwest Arizona," Jacob L. Fisher, Joel C. Janetski, and Keith L. Johnson provide a detailed and important examination of the variability inherent in Far Western Puebloan subsistence strategies and mobility patterns. Their case study from Antelope Cave on the Uinkaret Plateau identifies this site as a location of occasional rabbit drives—procurement activities that were apparently supplemented with the harvesting of nearby crops—by village dwellers who only seasonally occupied this particular locale. Their study contributes to our understanding of Virgin Anasazi subsistence and mobility strategies by exploring the variability that existed among the Virgin Anasazi in terms of the relative contributions of farming, hunting, and gathering to the overall subsistence strategy apparent at any one site.

Kelly L. Jenks provides an intriguing look into the daily life and practices of the inhabitants of the Tubac Presidio in her essay, "An Analysis of Majolica Ceramics from the Hispanic Presidio Community at Tubac, Santa Cruz County, Arizona." Jenks' study of the majolica pottery from excavations conducted in the 1980s and 1990s at Tubac highlight the value of examining data from existing collections. Majolica tableware was an integral part of the everyday life of the colonial inhabitants of the presidio and was imported from a variety of manufacturing locales in

Mexico that produced vessels with both Old World and New World decorative styles. The use of majolica at Tubac was an expression of a "Hispanic" colonial identity that was adopted by people of diverse social class and ethnic background who found themselves living together in this frontier community.

In closing, I want to thank the authors in this issue for their exceptional research and for their hard work in meeting all of our deadlines with such quality scholarship. Their work represents significant contributions to many of the research themes and topics that were explored at the 2011 AAC Fall Conference. I would also like to extend my gratitude to the scholars who presented their work at that conference and to those in attendance. And, finally, we all owe special thanks to the general editor, M. Scott Thompson, and the managing editor, Sophia E. Kelly. Scott and Sophie are the founding editors of the *Journal of Arizona Archaeology* and they are stepping down from these roles after the publication of this issue. The journal is very much Scott's and Sophie's creation and the entire AAC membership has benefited immensely from their foresight and their dedication in creating this scholarly venue. Douglas B. Craig will take over as the general editor after the publication of this issue and, with Doug at the helm, the future certainly looks bright. It has been a privilege to have worked with Scott and Sophie over the past several years and to have helped the journal along, if only in a small way, with the publication of this issue.

William M. Graves

AN ANALYSIS OF MAJOLICA CERAMICS FROM THE HISPANIC PRESIDIO COMMUNITY AT TUBAC, SANTA CRUZ COUNTY, ARIZONA

Kelly L. Jenks

ABSTRACT

In a state known for its rich prehistory, the early history of Spanish colonial settlement sometimes gets short shrift. Archaeological studies of Arizona's colonial settlements are few and far between, and typically focus on mission or military structures rather than on the daily lives of colonial citizens. Excavations conducted in the 1980s and 1990s at the Spanish- and Mexican-period presidio site in Tubac, Arizona produced an abundance of domestic refuse pertaining to the presidio's residents, an ethnically and culturally diverse group of civilians and soldiers. Detailed provenience information for these artifacts often is lacking; nevertheless, this collection offers new insight into the practices and priorities of Tubac's colonial residents. Analysis of majolica fragments reveals how these ceramics were incorporated into daily life, and considers what role they may have played in the construction of a colonial identity.

Over a century of archaeological research in Arizona has produced a detailed record of the practices and preferences of the region's prehistoric inhabitants. The richness of the datasets relating to Hohokam, Mogollon, and Ancestral Pueblo communities contrasts sharply with the meager data available for colonial period Hispanic sites (Table 1), much of which emphasizes art, architecture, and administrative contexts (e.g., missions) rather than the domestic contexts of regular colonial citizens. This is unfortunate, as it prevents archaeologists from drawing connections and making comparisons among the distant past, recent past, and present.

Archaeologists have been making inroads in this area over the past few decades. One of the largest colonial research projects to date was conducted in the late 1980s and 1990s at the site of a Spanish- and Mexican-period presidio settlement in Tubac, Arizona. Directed by Jack S. Williams of the Center for Spanish Colonial Archaeology, a crew of students and volunteers excavated in and around residential structures and refuse deposits in the presidio's South Barrio, the portion of the site thought to house regular citizens and soldiers rather than the officers and colonial authorities. These excavations have the potential to shed light on the daily lives and practices of Arizona's colonial citizens, but, unfortunately, no reports or maps of these excavations have been produced. A small collection of field notes and a portion of the artifacts recovered from Williams' excavations at Tubac were eventually turned over to the Arizona State Museum (ASM) and made available for study. However, most scholars have avoided working with this collection because provenience information for many of the artifacts is either lacking or indecipherable, even with reference to the original field notes (Waugh 2005:133). This lack of detailed provenience information is a significant problem, making it difficult to identify where, when, and how artifacts were used within this community and thus challenging to create a detailed picture of colonial life at the site. Also, because the field notes on file at ASM do not contain complete descriptions or tallies of the recovered artifacts, it is difficult to assess the completeness of artifact collections. Yet, even with these very serious problems, the Tubac presidio collection remains an unrivaled and mostly untapped resource for information about the patterns and practices of daily life within this colonial community.

The Tubac presidio presents a unique opportunity to learn about Arizona's Spanish- and Mexican-period colonial citizens. Tubac was one of only three presidios in Arizona—the others being Tucson and Terrenate—and it hosted the largest Hispanic civilian population of

Kelly L. Jenks / Fort Lewis College / kljenks@fortlewis.edu

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Table 1. Spanish and Mexican Period sites in Arizona.

Site	Type	Date Range	References
Guevavi	Mission	1691–1775	(Burton 1992; Burton and Benitez 1992; Kessel 1970; Robinson 1976; SWCA 1991)
Tumacácori	Mission	1691–1848	(Barton, et al. 1981; Beaubien 1937; Brewer 1951; Fratt 1981, 1986; Pinkley 1936; Shenk 1975, 1976)
San Xavier del Bac	Mission	1692–1853+	(Ayres 1970; Barnes 1971; Cheek 1974; Ciolek-Torrello and Brew 1976; Fontana 1996; O'Mack, et al. 2004; Olsen 1974; Ravesloot 1987; Robinson 1963; Thiel 2000)
Tubac	Presidio	1751–1776, 1787–1846	(Dobyns 1995; Huckell and Huckell 1982; Shenk and Teague 1975; Thiel 1995; Williams 1988, 1991, 1992a)
Calabazas	Mission	1756–1786, 1807–1830, 1844–1853+	(Burton 1992; Stone 1979)
San Agustín	Mission	1772–1831	(Barnes 1984; Dobyns 1976; Hard and Doelle 1987; O'Mack, et al. 2004; Pavao-Zuckerman 2011; Pavao-Zuckerman and LaMotta 2007; Thiel, et al. 1995; Thiel and Mabry 2006; Williams 1986)
Santa Cruz de Terrenate	Presidio	1776–1780	(Morgan 2000; Sugnet 1994; Sugnet and Reid 1994; Thiel and Vint 2003; Waugh 1995)
Tucson	Presidio	1776–1856	(Barnes 1984; Broockmann 2007; Chambers 1955; Ciolek-Torrello and Swanson 1997; Dobyns 1976; Elson and Doelle 1987; Haury and Fathauer 1974; Olson 1985; Thiel 1996, 2004, 2008a, 2008b; Thiel, et al. 1995; Thiel and Mabry 2006; Yanez, et al. 2010)
Cuiquiburitac	Mission	1810–1817	(Ahlborn 1987; Fontana 1987; Reid and Heilen 2005)

any colonial-period site in the state. Unlike Tucson, the area surrounding this site has not been intensively developed, thus colonial-period deposits are relatively well preserved. Finally, Tubac was home to a remarkably diverse population of Hispanic and indigenous presidio soldiers, civilians, and neophytes, many of whom would have lived in the South Barrio. This diverse population makes the presidio the ideal context in which to explore issues relating to colonial identity and culture change. Given all of this, it would seem a shame to let the artifact collections remain unanalyzed, even with the problems described above. Hence, this article presents a detailed analysis of the majolica recovered from Williams' Tubac South Barrio excavations—a collection comprising over 3,000 sherds. The goals of this analysis are (1) to describe and contextualize the collection, particularly with regards to the date, function, and manufacturing locale(s) of the vessels, and (2) to consider what these artifacts reveal about the citizens' construction of a colonial identity and involvement in the world economy. I argue that the daily use of majolica tablewares in the community over time helped to create a shared Hispanic identity among the ethnically diverse residents—an identity that creatively combined Spanish colonial ideals with local preferences and practices.

SETTING THE SCENE: TUBAC PRESIDIO

The Tubac presidio was one of a series of military colonies scattered across the northern frontier of New Spain—a Spanish viceroyalty comprising modern-day Mexico, Central America, the Spanish East and West Indies, and portions of the southern and western United States. These northern presidios served the dual purpose of staking a claim to contested territories and providing a line of defense against incursions by competing colonies or hostile tribes (Gerald 1968; Williams 1992b). Most presidios began as isolated military outposts staffed by fewer than 20 men, and many lasted only a few years before being relocated or disbanded. Some presidios, particularly those with reliable access to natural resources, indigenous labor, and trade, gradually developed into large colonial settlements housing soldiers, their spouses and children, civilian farmers and craftsmen, clergymen, missionized Indians, secular authorities, and others. These presidio communities were remarkably diverse, probably as a result of military recruitment policies that welcomed men from various backgrounds as well as the relative fluidity of colonial society along the frontier. Translating a letter written in 1800 by a priest in the Califor-

nia mission system, Guerrero (2010:12) noted that the missionaries preached in Spanish, the Native congregation spoke their own language, and "the priests, the soldiers, and the Indians…speak a mixture of Mexican, Otomite, Lipan, Apache, etc., which is the [composite] language used by the troops." Tubac was a similarly heterogeneous settlement. Established near mission San José de Tumacácori, it served as the base camp for colonial troops, and home to a multiethnic population of military, civilian, and neophyte settlers.

A Brief Site History

Tubac is located approximately 73 kilometers south of Tucson on a low terrace just west of the Santa Cruz River (Figure 1). This location provided its inhabitants with access to fresh water from the river, arable lands within the river valley, native grasslands for grazing, and lumber from the nearby Santa Rita Mountains (Huckell and Huckell 1982). The site was first mentioned in 1726 by the Jesuit missionary Joseph Agustín Campos, who described it as a small O'odham ranchería (Dobyns 1995). In 1732, Tubac was described as a visita—a mission site without a resident priest—administered by Jesuit missionaries operating out of the head mission (cabecera) at Los Santos Ángeles de Guevavi. At this time, the settlement reportedly included a few colonial families in addition to the community of missionized O'odham Indians. Relations between colonial and O'odham populations were far from harmonious, however, and Tubac was one of many colonial outposts destroyed during the "Upper Pima Revolt" of 1751 (Dobyns 1995; Williams 1992a).

The following year, as part of a broader strategy to reclaim and pacify the area and to provide protection for the nearby Tumacácori mission, Spanish authorities established the Presidio San Ignacio de Tubac at the former mission site. This presidio town, which was described and depicted in Josef de Urrutia's report in 1766, consisted of more than 70 structures "loosely organized around two major plazas" (Williams 1991:102) separated by an arroyo. The neighborhood around the northern plaza (the "North Barrio") contained the chapel, commandant's house, and a number of military buildings, while the South Barrio likely contained private residences (Dobyns 1995; Williams 1988, 1991, 1992a). Authorities intended for the community to be surrounded by defensive walls; however, there is no evidence that these walls were ever constructed. In 1776, Tubac's presidio forces were transferred north to establish a new fortress across the river from the Native American mission community of San Agustín del Tucson, while the civilian population was forbidden to leave the settlement. A combination of droughts and Indian raids reduced the local population from its maximum size of about 500 to a mere 150 in 1779. Only nine residents remained in 1780, and the site appears to have been abandoned completely by 1783 (Dobyns 1995; Williams 1992a, b).

In 1787, Tubac was reestablished as the base for a new infantry company recruited from among the northern O'odham. This company, which came to be known as Presidio San Rafael de Buenavista or, more commonly, as the presidio of "Pimas de Tubac," soon expanded its recruiting efforts to Opata- and Yuman-speaking populations. Thus, within a decade of its abandonment, Tubac had become the base camp for a company of O'odham, Opata, and Yuman soldiers, led by mostly Hispanic officers (Dobyns 1995). Tubac also appears to have sheltered a number of "apaches de paz"—peaceful Apaches who settled around the outskirts of this community in order to benefit from the protection of the troops and the economic opportunities presented by the settlement. Military and civilian populations increased gradually over the following decades, such that by the time of Mexican independence in 1821, the site was home to a relatively large and exceedingly diverse colonial population (Dobyns 1995; Williams 1992a:20). Political and economic developments in the new nation (re)created hostilities with Apaches and Yaquis along the northern frontier, and led to increased raiding by the Apaches and a lengthy war with the Yaquis. The consequences of these events were dire for the northern settlements, and Tubac was all but abandoned by the time of the Mexican-American War (1846-48).

The former presidio officially became part of the United States with the Gadsden Purchase of 1853. In the years that followed, the site was re-occupied in intervals by a small group of miners (1856–1861), a camp of Union soldiers (1862–1867), and an agricultural hamlet (1867–1917). The latter grew incrementally after World War I and expanded rapidly after being transformed into an artists' colony in the period following World War II. Fortunately for archaeologists, most of the development that took place in Tubac during the American period occurred to the northwest of the former presidio site. Only a fraction of modern Tubac covers the Spanish- and Mexican-period components of the site (Williams 1992a:24).

Archaeology at Tubac and the South Barrio Excavation Collections

The site of Tubac's presidio community was rediscovered during an archaeological survey conducted by Edward Danson and Louise Caywood in October of 1941, and was recorded as AZ DD:8:33 (ASM) (Shenk and Teague 1975). The North Barrio of Tubac that contained the remains of the "Captain's House" and military headquarters was incorporated into the Arizona State Park system in 1957 as the Tubac Presidio State Historic Park; the South Barrio immediately south of

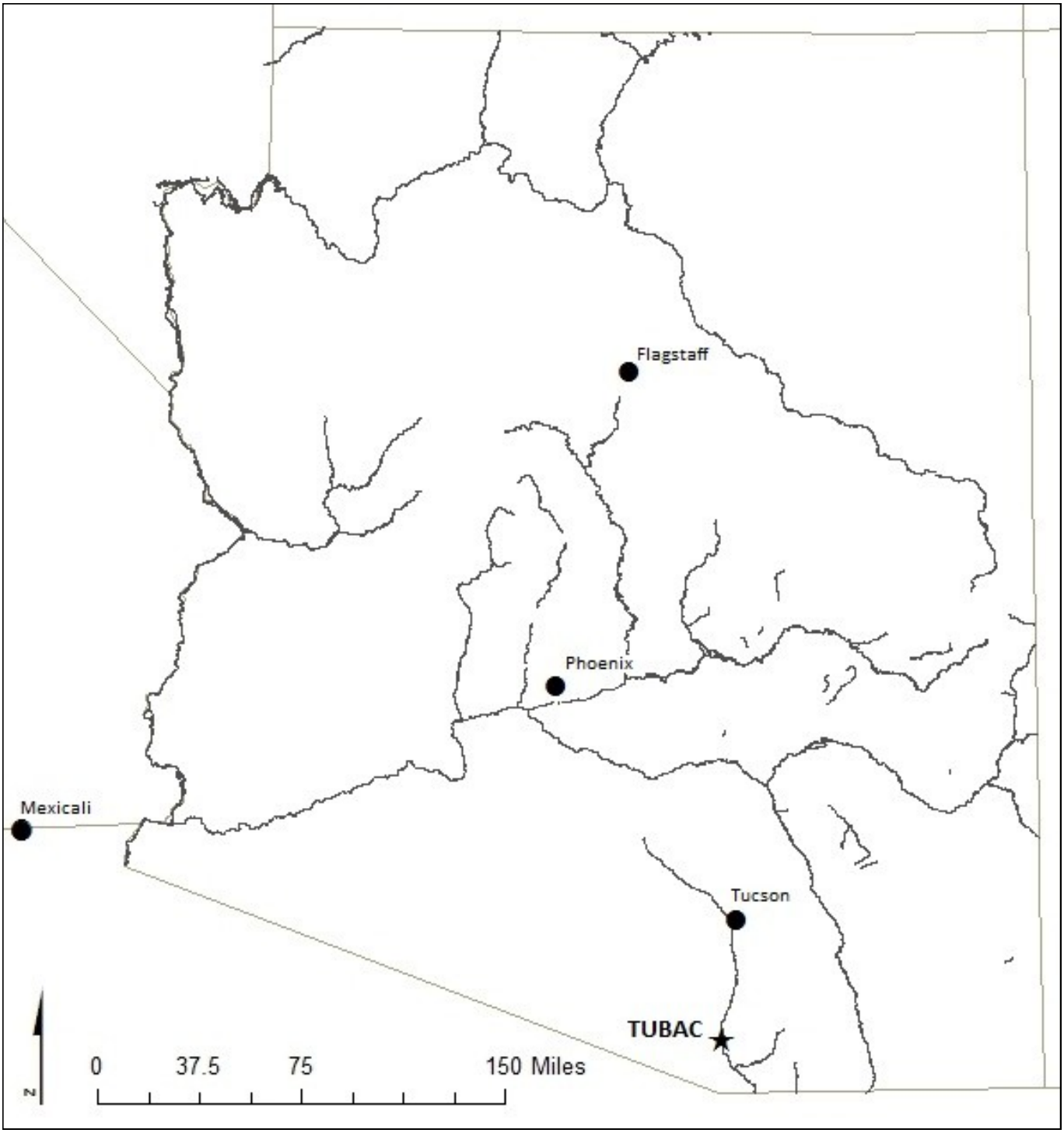

Figure 1. Location of Tubac Presidio, Santa Cruz County, Arizona.

the park was later acquired and is currently administered by the Archaeological Conservancy (Waugh 2005:132) (Figure 2).

Several informal archaeological investigations took place on private lands surrounding the park in the years after its creation (Williams 1992a:7). The U.S. Army Corps of Engineers (USACE) also excavated portions of the site in the 1960s as part of an erosion/flood control project, turning up intact colonial-period deposits in the process and re-depositing them in a large berm running north-south through the South Barrio (parallel to and west of the river) (Williams 1992a:7). The first professional excavation of the presidio site began in 1974, when ASM staff conducted fairly extensive excavations in the North Barrio in an attempt both to learn more about life on the Sonoran frontier and to harvest materials with which to create an interpretive exhibit at the park (Shenk and Teague 1975). Five years later, archaeologists from the Cultural Resources Management Section of the ASM conducted testing on a parcel of park land situated just west of the presidio site in order to assess the potential for intact cultural deposits and feasibility for future development projects (Huckell and Huckell 1982). Portions of this project area were later monitored by archaeologists when the state park converted the land into a parking lot (Freisinger 1995; Montero 1993).

In 1988, as director of the Center for Spanish Colonial Archaeology, Inc., Jack S. Williams initiated a multi-year archaeological exploration of the Tubac presidio site. Work focused primarily on lands located outside of the park boundaries. Early projects included mitigation and analysis of materials recovered from the Otero House, which is located on a parcel of private land just south of the park museum, as well as excavations near the Captain's House in the North Barrio. The latter project was completed during the summer of 1992 as part of the "Discovering Arizona's Past" program sponsored and administered by the Tubac Presidio State Historic Park (Williams 1992a). Portions of Williams' project area were later re-excavated as part of a testing project performed in advance of construction work at the Tubac schoolhouse (Thiel 1995). This report was critical of William's work and identified inadequacies in both excavation methods and reporting.

Williams' later work at the site seems to have focused on the presidio's South Barrio, and it is this work that produced most of the majolica fragments discussed below. Unfortunately, very little is known about these investigations at present, as no comprehensive report has been published (Waugh 2005:133). In his Ph.D. dissertation (Williams 1991), Williams used Urrutia's plan map of Tubac in 1766 to identify and assign structure numbers to buildings in both barrios, and claimed to have excavated portions of the residences he identified as Structures 1, 17, 23, 22, 32, 34, 37, 41, 68, 69, and 73. Unfortunately, he did not provide descriptions of these features, nor did he describe how these features were investigated. Williams continued to conduct occasional field work at the presidio site for at least four years after he completed his dissertation, but never wrote up this later work. One half-full standard filing box containing Williams' original field notes from the Tubac presidio is curated along with the artifacts at the ASM. However, these notes offer little information about the locations, dimensions, or methods of investigation of features in the South Barrio.

Given lack of provenience information for Williams' Tubac South Barrio collection, it should come as no surprise that little is known about the context of the majolica fragments analyzed in this article, save for the tidbits of information that were recorded with the artifacts themselves. All of the notes that accompanied the Tubac majolica fragments were transferred onto inventory cards when ASM staff prepared the collection for curation. Excavation dates were recorded for only 149 sherds; of these, 2 were excavated in 1988, 1 in 1999, 13 in 1991, 59 in 1992, 19 in 1993, 44 in 1994, and 11 in 1995. Quadrant numbers were recorded for 957 sherds, lot numbers for 3,011, and coordinates for 1,948. Unfortunately, I was unable to locate any maps or logs that identified the locations of these proveniences. Additionally, I was warned that new grids were established in different field seasons, thus the coordinates listed for these artifacts likely belonged to competing coordinate systems. New provenience numbers were assigned to each bag of sherds during the ASM inventory of these artifacts, but these numbers are not associated with known locations and "sequential numbers do not mean that the units are contiguous on the ground" (Waugh 2005:133).

While the proveniences of many of the sherds are ambiguous or unknown, a total of 2,801 sherds are explicitly linked with one of six named features: Structure 7, Structure 101, Structure 102, Casa de los Osos, Casa Escondida, and the East Midden. No comprehensive site maps or feature descriptions have been produced; however, some information about the approximate location and nature of these features is contained in the field notes, in a draft map accompanying those notes (Figure 3), and in a short explanatory note sent by Jack Williams to the ASM staff. According to these sources, the East Midden is located in the south half of the South Barrio to the east of the large north-south berm constructed by the USACE in the 1960s. Structure numbers over 100 were assigned to features that were covered or significantly disturbed by the USACE berm, and artifacts screened from the berm within 2 m of such a feature were assigned to their feature number. One of these, Structure 101, is located near the northern edge of the South Barrio, and the

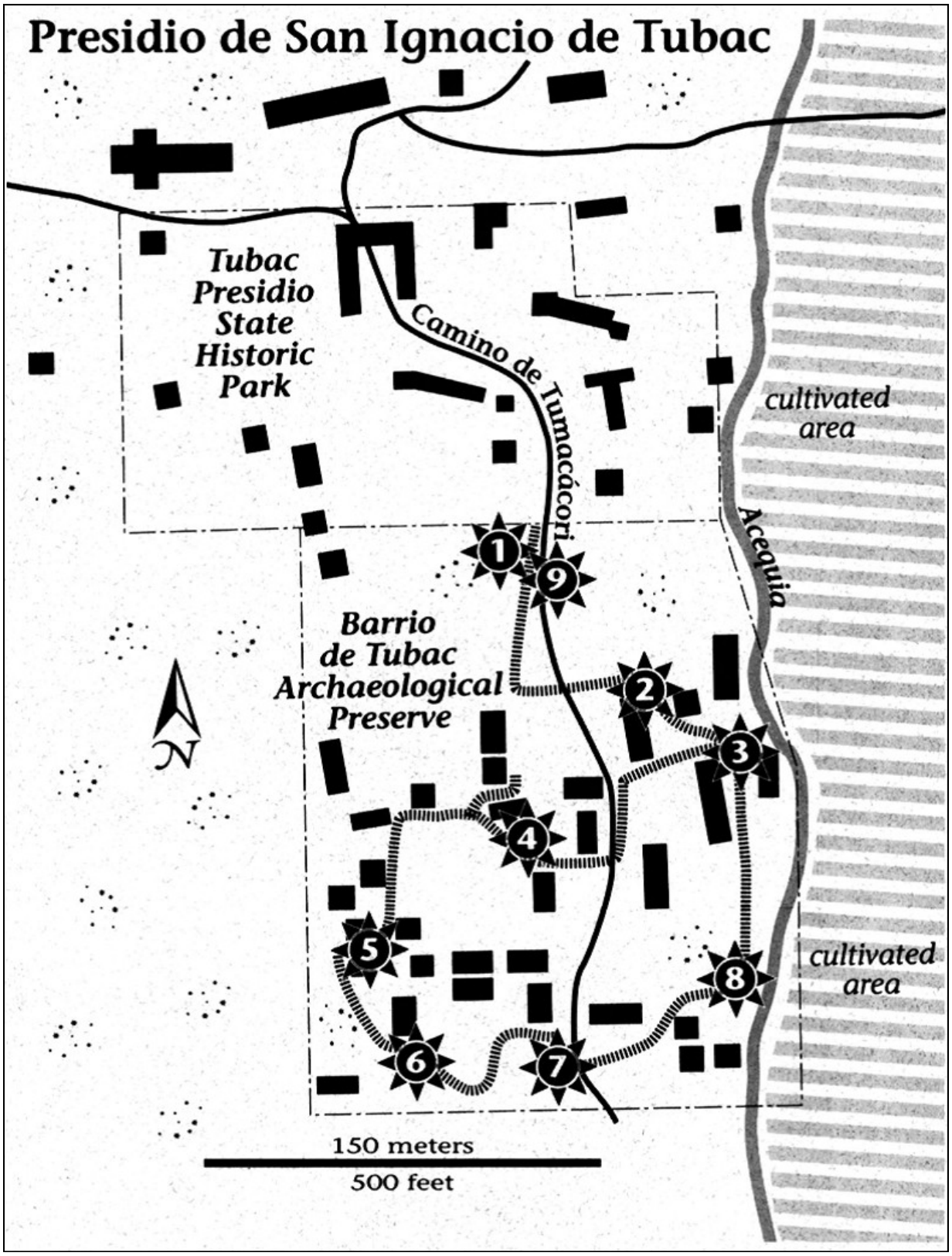

Figure 2. South Barrio of Tubac. Map produced by the Archaeological Conservancy as part of a project financed in part by a grant from the Historic Preservation Heritage Fund, which is funded by the Arizona Lottery and administered by the Arizona State Parks Board. Reprinted courtesy of the Archaeological Conservancy.

Figure 3. Map of identified features in the South Barrio: 1) Plaza, 2) Structure 102, 3) Structure 101, 4) Casa Escondida, 5) East Midden, and 6) Casa de los Osos. Solid lines indicate structures depicted by Urrutía; dotted lines indicate ruins identified by The Center for Spanish Colonial Archaeology. Draft map produced by The Center for Spanish Colonial Archaeology and modified by the author. Courtesy of the Arizona State Museum Archives, University of Arizona.

second, Structure 102, is just south of Structure 101. Casa Escondida appears to be situated along the eastern edge of the South Barrio, while Casa de los Osos is located along the southern edge of the South Barrio, just east of the USACE berm and west-southwest of the East Midden. Finally, Structure 6—which produced only three sherds—is located in the North Barrio near the southern edge of the Arizona State Parks boundary. The exact dimensions of these features are not recorded in the available field notes, though estimates of their sizes may be made with reference to a draft map that Williams produced (see Figure 3). The method of data recovery employed at each of these features (e.g., screen mesh size, unit size, natural or arbitrary levels, etc.) is also, at present, unknown. Given the close proximity of many of these features to the USACE berm, it is likely that most, if not all, were disturbed by its construction, and, prior to its construction, by water erosion.

The remainder of this article is devoted to prefacing, describing, and interpreting a ceramic analysis focused on reconstructing the daily practices of Tubac's colonial citizens. The following section provides an overview of majolica and its history in the Spanish colonies, along with a description of the Tubac collection and summary of the methods used to identify these ceramics. The ceramic analysis focuses on the identification of decorative type, vessel form, paste color, and sherd size, as well as any deliberate modifications made to vessels or vessel fragments. The identification of decorative types establishes a chronology for the collection, and also speaks to the aesthetic preferences of the colonists and the availability of these wares in northern markets. Vessel form largely determines vessel function, and understanding the distribution and range of vessel forms across the site can be used to establish a pattern of the culinary preferences and practices of its residents. Modifications of form are also interesting because of what they reveal about local needs and desires. Differences in paste color suggest different clays used by competing manufacturers, thus the identification of these paste colors can help situate Tubac within the wider colonial economy. Finally, the degree of fragmentation of majolica vessels offers insight into natural and cultural formation processes at the site, and may also be used to assess possible mechanical differences among vessel types. The results of these analyses reveal much about how majolica ceramics were used at the Tubac presidio, and offer particular insights into how the daily use of majolica tablewares helped to create and maintain a Hispanic colonial identity among the ethnically diverse inhabitants of this site.

BACKGROUND: MAJOLICA IN COLONIAL ARIZONA

Majolica is a low-fired earthenware pottery covered in an opaque tin glaze. This glaze often appears white or cream-colored—masking the variable color of the paste—but can also be produced in other colors such as the light blue background seen in Tumacacori Polychrome or the bright yellow of the aptly-named Yellow Polychrome. Tin-glazed pottery was developed in the Mediterranean region prior to the Christian era, and accompanied Muslim conquerors across northern Africa and into Spain some time before the eleventh century (Goggin 1968). A Moorish style of decoration involving metallic lustre glazes and abstract images was popular in Spain until the sixteenth century when the Christians began to reconquer the peninsula. At the beginning of the sixteenth century, a new style of decoration influenced by the Italian Renaissance began to emerge. This Italian-derived style, with its emphasis on elaborate motifs and vibrant colors, especially yellow, orange, and green, had replaced the Moorish style in Spain by the time of the final Moorish expulsion in 1609 (Goggin 1968; Lister and Lister 1969). Spanish conquest and colonization of the New World, beginning in the late-fifteenth and sixteenth centuries, brought both of these traditions of majolica manufacture to the Americas.

Colonists in New Spain began producing their own versions of majolica shortly after conquest. Colonial potters were producing majolica in Mexico City before 1573 and in Puebla just before 1600 (Lister and Lister 1982:6-8; 1987:231). Over the course of the colonial period, majolica production would spread, albeit on a smaller scale, to Guanajuato, Guadalajara, Oaxaca, Aguascalientes, Atlixco, Patzcuaro, and other communities in New Spain (Goggin 1968). Pottery manufacture in the Spanish colonies and in Spain was greatly influenced by an expansion of trade with China in the late-sixteenth century, which brought quantities of Chinese porcelain to both regions. These imported vessels inspired a new decorative tradition that emphasized blue-on-white decoration and Chinese-inspired decorative motifs (Lister and Lister 2001). Both Chinese- and Italian-inspired decorative traditions dominated colonial majolica wares until the eighteenth century, after which local and English-inspired designs gradually became more popular.

The 3,144 majolica sherds that are the subject of this analysis were recovered from a variety of contexts in the Tubac presidio's South Barrio (Table 2), including at least 66 percent from the East Midden, five percent from Casa Escondida, and three percent from Structure 102. A total of 113 sherds (3.6 percent of the sample) are described as surface collections. Another 767 sherds, including all of those collected from Struc-

Table 2. Proveniences.

Primary Feature	Count	Percentage
Casa de los Osos	15	0.5
Casa Escondida	195	6.2
East Midden	2086	66.3
East Midden?	365	11.6
Otero?	1	0.0
STP 3 on E. edge of East Midden	2	0.1
STP 4 on E. edge of East Midden	1	0.0
Structure 101	37	1.2
Structure 102	97	3.1
Surface Collection	110	3.5
Surface near Structure 6	3	0.1
Unknown	232	7.4
Grand Total	3144	100.0

tures 101 and 102, lack detailed provenience information and may have been collected from the surface. Most of the sherds come from proveniences where excavations did occur, however, and likely derive from those excavations. Excavation levels are recorded for 2,377 sherds, including several otherwise lacking provenience information. Thus, at a minimum, 75 percent of the majolica fragments were recovered during excavations. Most of the Tubac South Barrio majolica collection (3,125 sherds) is housed in the ASM repository; the remaining 19 sherds are on loan from the ASM to the Tubac Presidio State Historic Park.

Ten attributes were recorded for each sherd in the collection: size class, weight, thickness, form, portion, rim diameter, rim portion, paste color, type, and alterations. Size class was assigned by identifying the best fit among a set of size class boxes. Sherd weight was measured to the nearest tenth of a gram on a calibrated electric scale, and those weighing less than 0.1 g were arbitrarily assigned a weight of 0.05 g. Sherd thickness was measured to the nearest hundredth of a millimeter using digital calipers. Vessel form was determined, when possible, following the method described by Anita Cohen-Williams and Jack S. Williams in their report, "Reconstructing Maiolica Patterns from Spanish Colonial Sites in Southern California" (2004). Namely, sherds with extensive decoration on the interior surface and possibly with blue arcades on the exterior were recorded as "plato/sopero" (plate/soup dish) fragments, while curved sherds with decoration on their exterior surface—excluding arcade designs—were recorded as "cup/bowl/jar/pitcher" fragments. In the case of rim sherds, rim diameter and orientation (horizontal for the former, vertical for the latter) further aided in identification of vessel forms. Specific identifications of vessel form (i.e., cup, jar, sopero, etc.) were made only when enough of the vessel was present to distinguish it from similar forms. Rim diameter was recorded in centimeters using a rim diameter chart, and measurements were only taken for rim sherds that constituted more than five percent of the full diameter. Rim sherds that were too irregular or flat (as was frequently the case for plato or sopero rim-sherds) were not measured. Paste color was measured and recorded using the 1998 Munsell Soil Color Chart.

Various sources were consulted for descriptions and dates of common majolica types (Barnes 1971; Barnes and May 1972; Cohen-Williams 1992; Cohen-Williams and Williams 2003, 2004; Deagan 1987; Goggin 1968; Lister and Lister 1969, 1982, 2001), with preference given to scholars describing collections from Sonora, southern Arizona, and California (i.e., Barnes 1971 and Cohen-Williams 1992) (Table 3). Reference was also made to the small comparative collection at the ASM and the much larger Historical Archaeology Digital Type Collection made available online by the Florida Museum of Natural History (Deagan et al. 2007). Sherds were assigned to specific types only when enough of the design was preserved to be confident in this classification; otherwise, sherds were assigned to more general types (e.g., "indeterminate duochrome" or "Puebla Blue-on-white) or categorized as indeterminate. This analysis follows Cohen-Williams and Williams (2004) in lumping indeterminate Abó and Aranama Polychromes into a single type unless enough decoration is present to identify the sherd to a specific variety.

THE GRITTY DETAILS: WHAT DO THESE SHERDS TELL US ABOUT TUBAC AND ITS INHABITANTS?

The Tubac majolica sherds can be divided into 14 general decorative types (Table 4).The best represented types are Puebla Blue-on-white at 43 percent, undecorated white fragments at 30 percent, Abó/Aranama Polychromes at 10 percent, and Puebla Polychrome at 7 percent. In her analysis of common majolica types in northern New Spain, Cohen-Williams (1992) observed that in sites dating 1750–1800 majolica assemblages are dominated by Puebla Blue-on-white, while sites occupied 1800–1850 are dominated by Abó/Aranama Polychromes and often feature small amounts of Tumacácori Polychrome. An examination of majolica types in the three best-represented proveniences (East Midden, Casa Escondida, and Structure 102) reveals some differences in distribution. The East Midden contains a proportionally low number of Abó/Aranama and Tumacacori Polychrome sherds and a high number of Pueblo Blue-on-white sherds, while

Table 3. Date ranges for major ceramic types.

Types and Varieties	Date Range	Source
Puebla Duochromes		
Indeterminate Puebla Blue on White	1700–1850	Deagan 1987, Goggin 1968, Smith 1965
Huejotzingo Blue on White	1700–1850	Deagan 1987
San Augustin Blue on White	1700–1730	Deagan 1987, Goggin 1968, Smith 1965
San Antonio Blue on White	1730–1750	Ivey and Fox 1999
Huejotzingo Green on White	1770–1850	Barnes and May 1972
Wavy Rim Green on White	1770–1850	Barnes and May 1972
Puebla Polychromes		
Indeterminate Puebla Polychrome	1650–1725	Deagan 1987
Lacy Polychrome	1600–1700	Fairbanks 1973, Lister and Lister 1974
Castillo Polychrome	1598–1725	Plowden 1958, Snow 1965
San Elizario Polychrome	1750–1850	Gerald 1968, Huckell 1982
Abo/Aranama Polychromes		
Indeterminate Abo/Aranama Polychromes	1650–1800	Deagan 1987
Monterey Polychrome	1750–1830	Cohen-Williams and Williams 2003
San Diego Polychrome	1750–1835	Cohen-Williams and Williams 2004
San Ignacio Polychrome	Late 1700s	Cohen-Williams and Williams 2004
Tubac Polychrome	Late 1700s – Early 1800s	Cohen-Williams and Williams 2004
Tucson Polychrome	1820–1850	May 1972
Santa Cruz Polychrome	1750–1800	Cohen-Williams and Williams 2004
Tumacacori Polychromes		
Indeterminate Tumacacori Polychrome	1780–1860	Barnes and May 1972, Deagan 1987
Tumacacori II Polychrome	1810–1840	Barnes and May 1972, Deagan 1987
Other Polychromes		
San Luis Polychrome	1650–1750	Deagan 1987
*Yellow Polychrome	1780–1860	Cohen-Williams and Williams 2004
Ventura Polychrome	1800–1850	Barnes and May 1972
*Cohen-Williams and Williams (2004) identify this as "Mexico City Polychrome," but observe that a similar yellow ware was produced in Puebla. They say that the ware is approximately contemporaneous with Tumacacori Polychrome.		

Table 4. General decoration types.

General Type	Count	Percentage
Abo/Aranama Polychromes	322	10.2
Fine Line Polychromes	3	0.1
Indeterminate	1	0.0
Indeterminate Duochrome on Cream	2	0.1
Indeterminate Duochrome on White	27	0.9
Indeterminate Polychrome on White	119	3.8
Pseudomajolica	44	1.4
Puebla Blue on White	1341	42.7
Puebla Green on White	4	0.1
Puebla Polychrome	230	7.3
San Luis Polychrome	2	0.1
Tumacacori Polychromes	79	2.5
Undecorated White	957	30.4
Yellow Polychrome	13	0.4
Grand Total	3144	100.0

Structure 102 and Casa Escondida contain proportionally higher numbers of Abó/Aranama Polychrome sherds and lower numbers of Puebla Blue-on-white. This suggests that the East Midden is more closely associated with Presidio San Ignacio de Tubac (1752–1783), while Structure 102 and Casa Escondida more likely date to the occupation of Tubac's second presidio, Presidio San Rafael de Buenavista (1787–ca. 1846).

Table 5 presents a summary of identified vessel forms along with their average vessel wall thickness. Because most majolica fragments were smaller than 2 cm^2, a large percentage of the collection (45 percent) could not be categorized, and very few sherds could be assigned to a specific vessel form (Figure 4). The remaining fragments were lumped into two general categories: cup/bowl/jar/pitcher forms (15 percent) or plato/sopera forms (38 percent). Vessel wall thickness for plato/sopera forms tends to be greater than for cup/bowl/jar/pitcher forms, though a boxplot of wall thickness reveals a considerable amount of overlap (Figure 5). An independent samples T-Test (Table 6) confirms that the difference in sherd thickness is statistically significant, which reinforces a similar observation made by Cohen-Williams and Williams (2004). An examination of the relationship between vessel form and decorative type reveals that cup/bowl/jar/pitcher forms are more likely to have Tumacacori Polychrome or Puebla Blue-on-white decoration, while 79 percent of Abó/Aranama sherds are identified as belonging to plato or sopera vessel forms. As greater percentages of Abó/Aranama sherds are found at Casa Escondido and Structure 102 than in the East Midden, it is perhaps unsurprising that sopera/plato forms occur with greater relative frequencies in those structures than in the midden.

Ten sherds show signs of being intentionally altered and reused by presidio inhabitants (Table 7). Two plato/sopero sherds were perforated with round drill holes just below the rim (Figure 6). Di Peso (1951; 1953:222) argues that this was most likely done in order to make it possible to carry the dish (via a strip of sinew or a hook of sorts) while traveling; however, it is difficult to imagine that these relatively fragile ceramics would have traveled well. Alternatively, the holes might have served to hang the vessels upon the wall, either as decoration or storage (c.f., National Gallery of Art [U.S.] 1993:138; Treadwell 1872:54). This practice was common in Dutch colonial America during the seventeenth and eighteenth centuries, where majolica vessels were suspended from the wall by a loop or ribbon passed through a hole drilled in the edge of the plate or dish (Wilcoxen 1987:65). Yet again, it is possible that these were repair holes, drilled in order to bind two broken pieces together.

Also showing signs of reuse: seven sherds were worked into probable game pieces. Six sherds were fashioned into rounded shapes and one into a hexagon. The hexagonal sherd was produced out of pseudomajolica (characterized by cream enamel and an iridescent, greenish glaze) and seems to have been worked so that the shiny side would be face-up (Figure 7). One of the rounded sherds was formed out of the base of a cream-enameled cup or bowl. The footring of this vessel, measuring 5 cm in diameter, provided the basic shape, and the sides were chipped away and partially ground down. The remaining worked sherds all possess one smooth, rounded edge and seem to represent broken portions of what were once larger, circular worked sherds.

Paste color was recorded for all of the sherds in hopes that it might aid in the identification of different production areas (Table 8). Paste color was determined using the existing surface rather than a clean break; consequently, some of the paste colors were masked by dirt while others were discolored as a result of post-depositional burning. Nevertheless, the paste color of most sherds fell within one of three categories: pink (29 percent), very pale brown (29 percent), and pale yellow (22 percent). The latter two categories could be combined to create a large "off-white" category that accounts for 51 percent of the assemblage. An examination of the relationship between paste color and decorative type reveals that pale yellow paste is more commonly found in Puebla Duochromes, especially Huejotzingo Blue-on-white and Indeterminate Puebla Blue-on-white, while pink paste is decidedly more common in Abó/Aranama and Tumacácori Polychrome wares (Figure 8). Undecorated white sherds have a similar distribution of pink, very pale brown, and pale yellow paste colors to Puebla Blue-on-white. This similarity suggests that many of these plain white sherds come from undecorated portions of Puebla Blue-on-white vessels. Paste color is also loosely correlated with the tentatively dated features—more pink-bodied wares were recovered at Casa Escondida and Structure 102—and with differences in sherd thickness and weight—pink-bodied wares tend to be thicker and heavier on average than light-bodied wares. However, these loose associations likely reflect the greater numbers of Abó/Aranama and Tumacacori Polychromes recovered from those proveniences, and the higher frequency of relatively thick-walled plato/sopera vessel forms decorated in the Abó/Aranama style.

The differences in paste color between sherds belonging to the same decorative type suggest that most, if not all, of the decorative types recovered at Tubac were produced in at least two, and probably several different locations. Most discussions of Mexican majolica sources generalize that light-colored pastes were manufactured in Puebla, while pink-to-terra cotta-colored pastes were produced in Mexico City (Cohen-Williams and Williams 2004; Goggin 1968; Lister and

Table 5. Vessel form and wall thickness.

Vessel Form	Count	Percent of Collection	Average Thickness (mm)	Standard Deviation of Thickness
Cup	7	0.22	3.22	1.18
Cup/Bowl/Jar/Pitcher	487	15.49	3.34	0.79
Bowl	3	0.10	3.79	1.11
Indeterminate	1426	45.36	4.13	1.05
Plato/Sopera	1198	38.10	4.52	1.00
Sopera	15	0.48	4.81	0.91
Lid	7	0.22	5.61	1.94
Other	1	0.03	6.53	-
Grand Total	3144	100.00	4.16	1.07

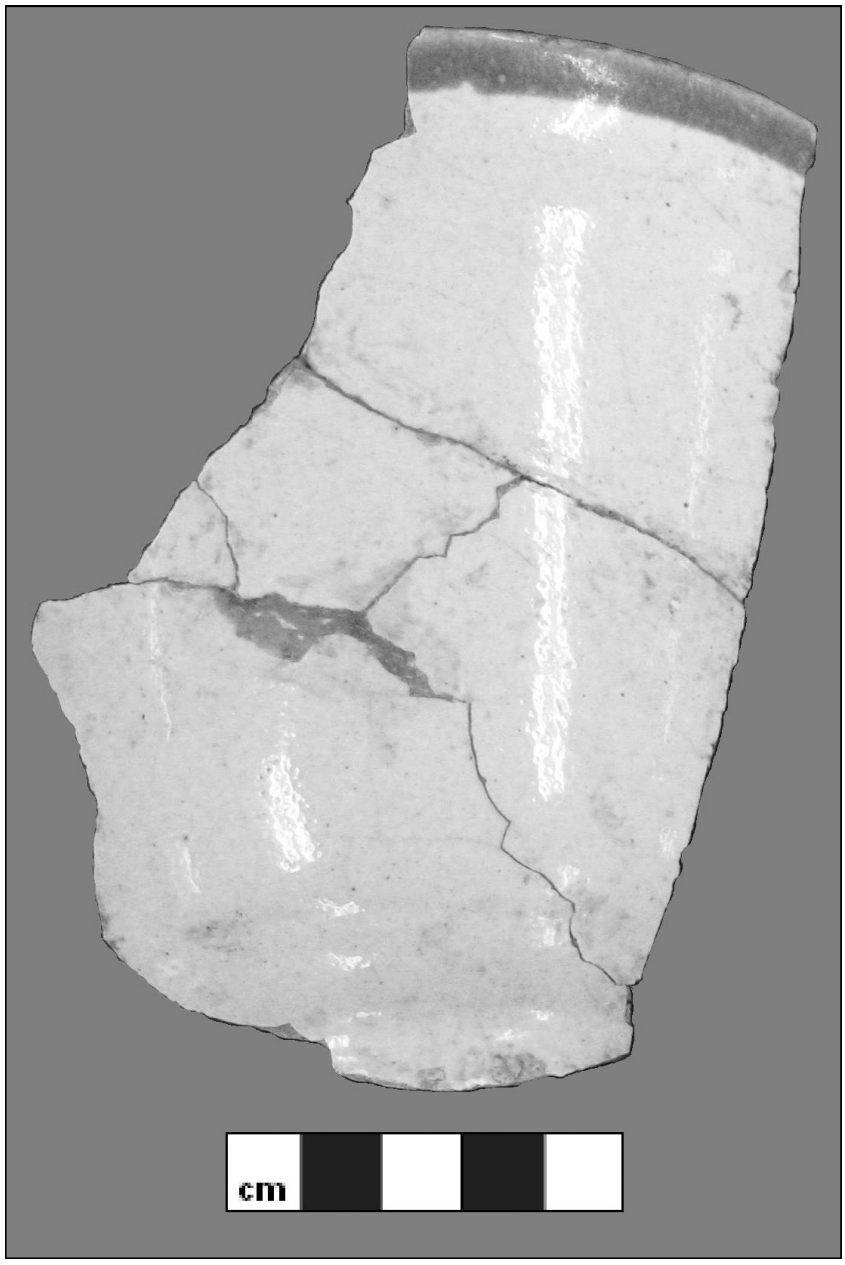

Figure 4. Partially reconstructed cup recovered from STP 4 on the east edge of the East Midden (ID number 1902, provenience number 4222). Courtesy of the Arizona State Museum, University of Arizona.

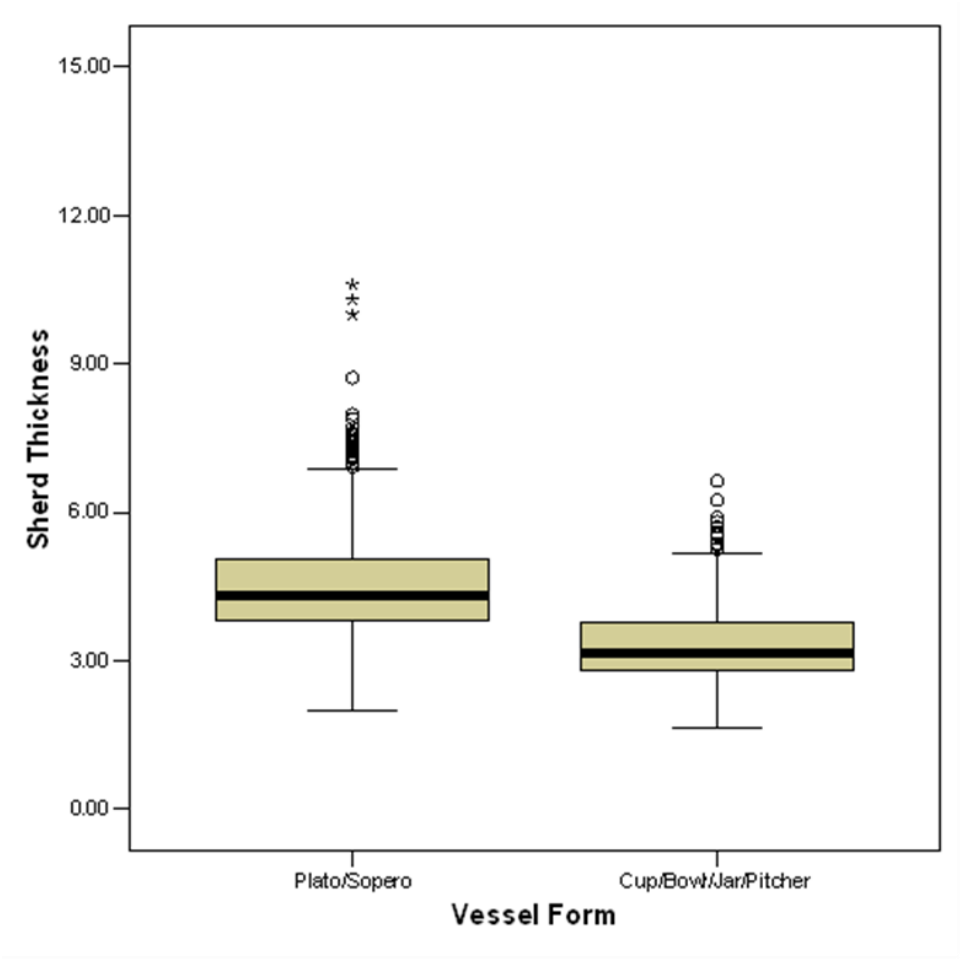

Figure 5. Boxplot of sherd thickness by vessel form.

Table 6. Independent samples T-Test of sherd thickness by vessel form.

VARIABLE	N		Mean			Std. Deviation			
Plato/Sopero	1194		4.5136			1.00351			
Cup/Bowl	487		3.3416			.78549			
Independent Samples Test									
	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	28.023	.000	23.051	1679	.000	1.17193	.05084	1.07221	1.27164
Equal variances not assumed			25.511	1142.236	.000	1.17193	.04594	1.08179	1.26206

Figure 6. Perforated sherds recovered from the East Midden (ID numbers 463, 3037, and 268, provenience numbers 3737, 4083, and 3653). Courtesy of the Arizona State Museum, University of Arizona.

Table 7. Alterations.

Provenience	Specific Type	Form	Portion	Worked	Perforated
East Midden	Huejotzingo Blue on White	Cup/Bowl/Jar/Pitcher	Rim		1
	Pseudomajolica, Cream	Cup/Bowl/Jar/Pitcher	Footring	1	
		Plato/Sopera	Base	1	
	Puebla Blue on White	Indeterminate	Body/Side	2	
		Plato/Sopera	Body/Side		1
	White	Indeterminate	Indeterminate	1	
		Plato/Sopera	Rim		1
Structure 102	Puebla Blue on White	Plato/Sopera	Base	1	
Unknown	Puebla Blue on White	Other	Indeterminate	1	
Grand Total				7	3

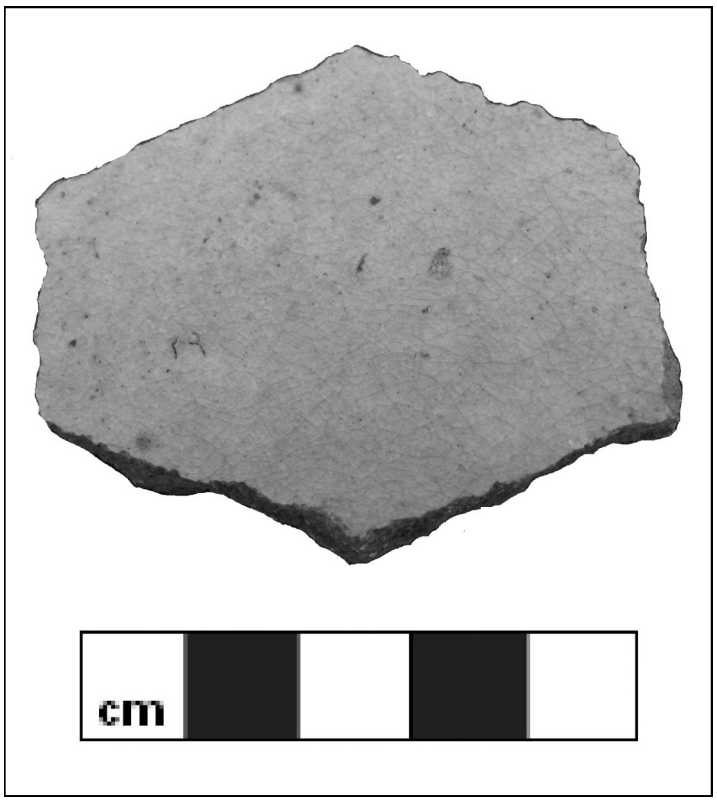

Figure 7. Worked sherd recovered from the East Midden (ID number 1554, provenience number 3804). Courtesy of the Arizona State Museum, University of Arizona.

Table 8. Paste Color.

Munsell color	Count	Percentage
black	1	<0.1
brown	4	0.1
dark grey	2	0.1
dark greyish brown	1	<0.1
grey	3	0.1
greyish brown	4	0.1
light brown	31	1.0
light brownish grey	40	1.3
light grey	191	6.1
light olive brown	1	<0.1
light red	15	0.5
light reddish brown	92	2.9
light yellowish brown	1	<0.1
pale brown	24	0.8
pale yellow	694	22.1
pink	923	29.4
pinkish grey	49	1.6
pinkish white	96	3.1
reddish brown	3	0.1
reddish grey	1	<0.1
reddish yellow	7	0.2
very dark grey	2	0.1
very pale brown	926	29.5
white	13	0.4
yellowish red	1	<0.1
unknown	19	0.6
Grand Total	3144	100.0

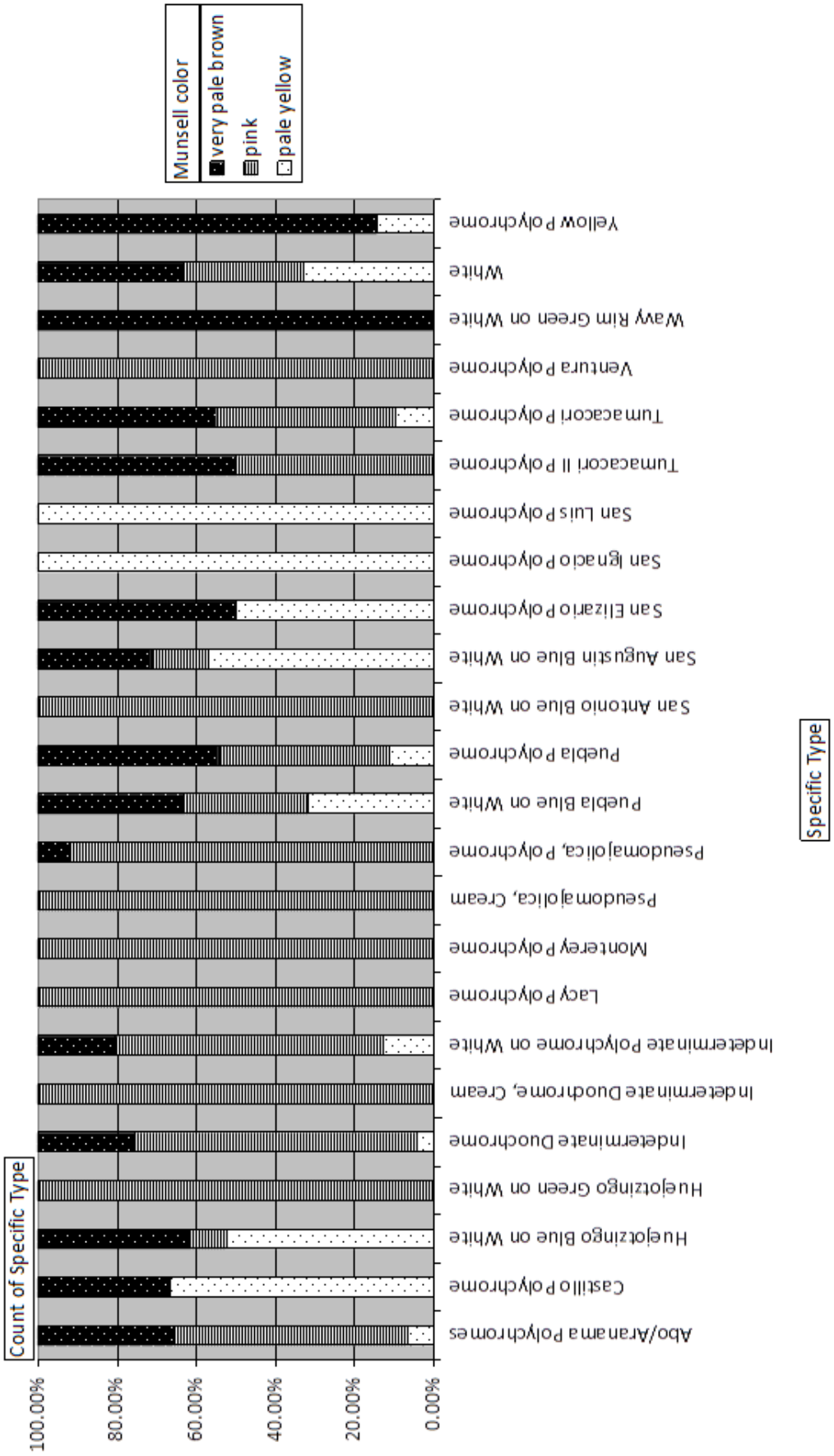

Figure 8. Common paste colors by decorative type.

Lister 1982). This basic classification system, while useful, ignores smaller production centers located within and outside of Mexico and fails to account for the hundreds of Tubac majolica sherds that are neither pink- or white-bodied. While some sourcing studies have been conducted (Olin 1978, 1989), more chemical and petrographic analyses are needed to improve our knowledge of the types of clays associated with the various majolica production sites.

Finally, the sizes and weights of Tubac majolica sherds were measured in order to address questions about formation processes at work at the site. In an attempt to explain the unusual size distribution of this data, size classes were evaluated against ceramic provenience, decoration type, paste color, and vessel form. In examining the size data for each stratum of each feature, the initial assumption was that certain features (such as the East Midden) and levels (such as the surface) may have been at greater risk of trampling and compaction and, thus, would contain higher percentages of small sherds. The data only partially supports this hypothesis, as sherds from excavated levels are generally as small as, and sometimes smaller than those collected on the surface. However, there are statistically significant differences in sherd size between the East Midden, Casa Escondida, and Structure 102 ($\chi^2 = 7.895$, $p = 0.019$). The percentages of different size classes and the overall average size class for each of the general decoration types were also calculated to test the idea that some decorated types may have been stronger or better protected than others. The results indicated that Abó/Aranama Polychromes (with an average size class of 2.2) were larger on average than the other well-represented categories of Puebla Blue on White (1.8) and Puebla Polychrome (1.9). Once again, a Friedman test indicated that these differences were statistically significant ($\chi^2 = 8.316$, $p = 0.016$).

Sherd size was analyzed for each paste color category in order to test the theory that different breakage patterns between these decorative types actually reflected differences in the strength of the vessel paste. Surprisingly, these calculations did not seem to show a great deal of variation between paste colors, and a Friedman test of the three best represented categories—pale yellow, very pale brown, and pink—confirmed that there were no significant differences ($\chi^2 = 4.800$, $p = 0.091$). The last test involved a comparison between sherd size and vessel form. The same percentages and average size classes were calculated for the two main vessel form categories (plato/sopero and cup/bowl/jar/pitcher) in order to test the theory that the latter, because they generally have thinner walls, might break into smaller pieces. There are some differences between the vessel forms: 88 percent of cup/bowl sherds are size class 2 or smaller, while the same is true for only 75 percent of plato/sopero sherds. However, these differences are not statistically significant ($\chi^2 = 2.667$, $p = 0.102$). In sum, it appears that differences in sherd size are related to differences in provenience and decorative type. Remembering that later decorative types appear with greater frequency in two proveniences, Casa Escondida and Structure 102, it is possible that smaller sherd size is a product of age, with older assemblages suffering more from the accumulated effects of weathering and trampling.

To contextualize these results, the Tubac majolica collection was compared to majolica assemblages recovered from other Hispanic settlements in Northern New Spain. Tubac possesses a very large collection of majolica sherds when compared with Arizona's other presidio communities—Tucson and Terrenate (Barnes 1984; Barnes and May 1972; Cohen-Williams 1992; Olsen 1985; Sugnet and Reid 1994; Thiel 2006; Waugh 2005)—as well as with colonial settlements in Texas, New Mexico, and California (e.g., Akins 2001; Cohen-Williams 1992; Cohen-Williams and Williams 2003, 2004; Ferg 1984; Gilmore 1992; Jenks 2011; Loren 2000; Plowden 1958; Snow 1993; Snow 1965; Vierra 1997; Voss 2005, 2012; Walter 2004). This difference may be a product of the scale of excavations at Tubac or the fragmented nature of its collection, or it might reflect differences in ceramic preferences or market availability. The research that would be required to address this issue is beyond the scope of this analysis. Regardless of the collection size, majolica from Tubac's South Barrio fits within a broader regional pattern of late-eighteenth- and early-nineteenth-century colonial settlements dominated by Puebla Blue-on-white majolica vessels and exhibiting a general preference for sopera/plato vessel forms (Cohen-Williams 1992; Cohen-Williams and Williams 2004). The Tubac collection may be slightly unusual in the high degree of vessel fragmentation; however, recent excavations at the site of the Tucson presidio recovered over 800 majolica sherds, most of which were also quite small. Homer Thiel interpreted this fragmentation as the result of a late-colonial-period preference for disposing of trash on the ground outside where it was subjected to trampling by people and animals (Thiel 2006:12.2). Similar practices likely contributed to vessel fragmentation at the Tubac presidio site. Finally, detailed analyses of majolica paste color have not been performed for other colonial settlements in Northern New Spain, thus no paste color comparisons can be made.

THE BIGGER PICTURE: COLONIAL IDENTITY AND THE GLOBAL ECONOMY

In a recent publication, Barbara Voss (2012) pointed out that, while colonial archaeologists often treat majolica as a marker of Hispanic ethnicity or elite social status, the wares themselves were relatively inexpensive and rarely were acknowledged by colonial authorities in inventories or acquisition lists. Voss examined a collection of colonial-period acquisition lists produced by administrators in the California presidio system and observed that administrators seldom described the vessels at all—certainly not with the level of detail devoted to clothing or weaponry. When majolica was mentioned, administrators were far more likely to describe vessel form than decorative type. Given this disinterest on the part of colonial authorities, Voss suggested that colonial archaeologists may have exaggerated or, at least, uncritically assumed the social value of decorated majolica vessels in colonial contexts.

Voss made excellent points, and archaeologists should be cautious of treating majolica as a simple marker of ethnicity or class. Nevertheless, it is still reasonable to consider majolica tablewares as playing a role in the construction of colonial identity. In his research on majolica in South American colonial assemblages, Ross Jamieson (2001, 2004) openly acknowledged that ceramics were rarely of sufficient value to attract the attention of colonial record keepers, especially when compared with items like clothing and household furnishings, objects that often were described in great detail. And yet, he pointed out that majolica tablewares played a prominent role in the daily lives of colonial citizens, a role that perhaps is more significant because it was not openly acknowledged but rather quietly assumed. Drawing on the complementary works of Pierre Bourdieu (1977) and Anthony Giddens (1979), Jamieson (2001) argued that material culture plays a role in the production and maintenance of social identity and social status—not just through overt, highly visible expressions (expensive furniture, 'cool' clothes, symbols of authority), but also through the routine practices of daily life. Most people today spend little time thinking about their tableware. It is relatively inexpensive, and less significant than clothing or architecture in expressing social identity, status, or taste. Nevertheless, we eat off these wares multiple times every day, and the practice of dining—what we eat, how we prepare it, how we eat it, who eats with us, where they are allowed to sit, what they are allowed to eat, what constitutes appropriate or inappropriate table manners, etc.—expresses and reinforces our cultural identity. Similarly, the majolica tableware that was used daily in colonial households played a role in creating and maintaining Hispanic colonial identity.

It is in this light that I view Tubac's majolica collection. Colonial citizens at Tubac had easy access to indigenous wares and used them for a variety of utilitarian functions (cooking, water storage, etc.) (Waugh 2005), but they also possessed smaller numbers of majolica vessels that they used almost exclusively as tableware. Furthermore, rather than choosing to replace old or broken majolica vessels with inexpensive, locally available O'odham pottery, many of the inhabitants instead opted to replace them with fragile majolica vessels imported from markets in central Mexico. This suggests that many of Tubac's ethnically diverse occupants considered Mexican majolica to be an integral part of a civilized table setting—part and parcel of the colonial way of life. Mexican majolica vessels, while relatively unimportant and inexpensive when compared with other household items, seem to have had sufficient social value for their owners that they remained in constant circulation, even when cheaper wares were more readily available.

Analysis of vessel form, while made difficult by the highly fragmented nature of the collection, also provides some insight into the kinds of foods produced and preferred by residents of Tubac's South Barrio. The greater quantity of plates or soup dishes relative to cups, bowls, jars, or pitchers suggests that dry foods and especially stews may have been staples of the local diet, and that majolica vessels were used more frequently for serving food than for the serving or storage of beverages. Additionally, the absence of chocolate saucer forms and relative rarity of cup fragments may indicate that few of the colonists drank tea or chocolate. The latter seems unlikely, however, as chocolate-serving vessels (*chocolateros*) have been recovered at other colonial settlements in southern Arizona (Thiel 2006:12.2–12.3). In many parts of the Spanish colonies, the consumption of these beverages was an important social custom.

The presence of small numbers of re-worked and reused majolica fragments is suggestive of the priorities and practices of Tubac's residents. The identification of probable game pieces produced from majolica sherds demonstrates that recreational activities took place within the community and further suggests the influence of indigenous cultures, as ceramic gaming pieces made of indigenous wares are often found in prehistoric and historical-period Native settlements in the Southwest (e.g., Kidder 1932; Koziarski 2010). The presence of perforated rim sherds suggests that these majolica vessels had value, whether these holes were used to repair a broken vessel, to carry the vessel, or to hang it from the wall.

Tubac's majolica collection offers insight into how this relatively unassuming frontier town fit within the wider colonial economy. Analyses of paste color and decorative style suggest that the citizens of Tubac imported their majolica from multiple production centers in New Spain, with the light-bodied wares (representing over half of the collection) most likely coming from Puebla, the largest of the Mexican manufacturing areas. Crates containing mixed sets of this fragile and relatively bulky pottery would have been shipped via mule train to the northern frontier, where they were probably priced and sold in sets of twelve (Voss 2012). The most common decorative styles at Tubac were Puebla Blue-on-white—historically inspired by blue-on-white decorated Chinese porcelain—and Abó/Aranama Polychromes, a product of the Italian majolica tradition. Both styles were eclipsed in the urban colonial centers by new styles mimicking the designs on English manufactured ceramics. Sites on the colonial frontier seem to have lagged slightly behind their urban counterparts in possessing majolica vessels decorated with these earlier traditions, perhaps as a result of the "heirloom" effect or their greater distance from colonial markets, but perhaps also because of their greater intimacy and competition with the Anglo population.

The presence of Italian, Chinese, and English-inspired decorated wares at the Tubac presidio demonstrates that even this impoverished frontier outpost was connected to the larger world through its participation in an increasingly globalized economic system (Orser 2009). The Italian style came to Spain as the re-conquering Spanish Christians sought to maintain ties with their Catholic brethren, and was transferred to the Americas when the same conquering Spaniards moved west in an attempt to spread Christianity and open trade with the Orient. The Chinese style reached the Americas and Spain via galleons that brought goods (and sometimes slaves) from Manila to Mexico and from Mexico to Spain. Contact with this culture brought new forms of art and architecture as well as new serving wares and a popular new beverage (tea) with its own set of materials and practices. Finally, the development of a ceramic industry in England inspired Mexican potters to produce vessels similar to or dissimilar enough from English ceramics to compete with these new, cheap, imported wares. Although Tubac may have been located far from the centers of action and interaction, its inhabitants felt all of these changes in subtle ways via their everyday exposure to these transforming decorative traditions.

CONCLUSION

The majolica collection from Tubac's South Barrio provides new and valuable insight into the daily lives of colonial citizens. Tubac's residents were a diverse group in terms of ethnicity, social class, occupation, even gender and age, but within this secular context they came together to form a uniquely colonial community. Colonial citizens relied heavily upon inexpensive, locally produced wares for cooking and storage, but also continued to import and use Mexican majolica tablewares. Their demand for majolica vessels suggests that they viewed these items as an integral part of a 'civilized' dining service, and preferred to limit the use of local wares to less visible contexts. They purchased majolica from multiple manufacturing centers in Mexico and were exposed to decorative styles emanating from Mexico and the Old World, but they also selected and used these vessels in ways that reflected local needs and practices, e.g., working sherds into gaming pieces and perforating vessel rims.

People often assume when archaeologists speak of "Spanish" presidios or "Spanish" colonial settlements that the residents were mostly Spanish. In fact, we know that pure Spanish ancestry was relatively uncommon in the Spanish- and Mexican-period Southwest. What we see in these sites is an expression of "Hispanic" colonial identity, an identity that was adopted by individuals of various backgrounds and expressed through a particular suite of preferences and practices, such as a preference for eating stews served in Mexican majolica soup dishes. By examining collections such as the one described here, we can begin to explore this process of "Hispanicization" and perhaps gain a better understanding of what Spanish colonialism really means.

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VARIABILITY IN FAR WESTERN PUEBLOAN SUBSISTENCE STRATEGIES: THE VIEW FROM THE UINKARET PLATEAU, NORTHWEST ARIZONA

Jacob L. Fisher
Joel C. Janetski
Keith L. Johnson

ABSTRACT

Subsistence data from Far Western Pueblos in riverine settings demonstrate the importance of maize farming, although variability in recovery techniques and sampling choices have resulted in ambiguity regarding the use of wild foods. The dry deposits of Antelope Cave on the Uinkaret Plateau in northwestern Arizona have yielded a rich assemblage of faunal and botanical remains that demonstrate the importance of hunted prey and gathered foods. In particular, cave debris contains strong evidence of highly successful communal jackrabbit drives that provided food and raw material for robes, as well as indication of crop cultivation nearby. We suggest Puebloan people maximized returns and reduced risks through a combination of seasonal movements and the use of both wild and cultivated resources. The use of a flexible subsistence strategy that crosscut a diverse landscape illustrates how Puebloan people exercised their intimate knowledge of the land.

Far Western Puebloans occupied that portion of the American Southwest stretching westward from Kanab, Utah, across northern Arizona and southern Utah to the Muddy River drainage of southern Nevada (Watson 2008). Others (Altschul and Fairley 1989:101) extend this range as far east as the Colorado River (see Lyneis 1995 for a more restricted definition). The most thoroughly studied region is the lower Virgin River and its tributaries (Aikens 1966; Allison 1990; Dally and McFadden 1985, 1988; Lyneis 1995; Shutler 1961; Walling et al. 1986; Westfall et al. 1987). Research has shown that farming-based populations flourished here from the first century A.D. until about A.D. 1200 when, like Puebloan societies in the Four Corners and elsewhere, there was a dramatic contraction of populations, presumably to the aggregated pueblos of Arizona and New Mexico. These far west Puebloans, traditionally referred to as the Virgin Anasazi, are often ignored or treated briefly in the more general Ancestral Puebloan literature (e.g., Driver 2002; James 2006; Kohler et al. 2008) largely due to the limited amount of research on this area compared to the massive number of studies on the Four Corners area.

Previous research in the area demonstrates that our understanding of Far Western Puebloan subsistence practices is still in flux. The intention of this paper is to continue refining insights into Virgin Anasazi strategy variability with new data from the Uinkaret Plateau in northwestern Arizona, specifically from Antelope Cave, a dry, sheltered site with rich artifactual, faunal, and botanical material. We propose that Ancestral Puebloans in this region practiced a complex pattern of seasonal movement that included sites such as Antelope Cave that functioned logistically as a field station remote from village sites to the northeast as well as a locale for communal rabbit drives to procure fur and food.

There has been very little research on subsistence strategies in the region, and scholars have presented conflicting positions on this issue. Scenarios range from fully sedentary farmers relying heavily on domesticates to farmer/foragers favoring a mixed strategy. Aikens (1966), Dalley and McFadden (1985, 1988), and others, for example, have been proponents of the former view and describe the Virgin Anasazi of the upper Virgin River as wholly horticultural populations who relied little on hunting. In contrast, Allison (1990:112) has maintained that "Dalley and McFadden are wrong about the lack of hunting by the St. George Basin Anasazi"; he presented data from his work along the Santa Clara River to support that statement. In addition, Westfall et al. (1987:144) stated that the Virgin Anasazi "pursued a broad-based foraging strategy"

Jacob L. Fisher / Department of Anthropology, California State University, Sacramento / jlfisher@csus.edu
Joel C. Janetski / Department of Anthropology, Brigham Young University / joel_janetski@byu.edu
Keith L. Johnson / Museum of Anthropology, California State University, Chico / kljohnson@csuchico.edu

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that included hunting, with a tendency toward specializing on local resources late in the sequence.

Recently, Harry and Watson (2010) revisited issues of Virgin Anasazi subsistence using new data from Lost City, while Watson (2008) provided a more synthetic treatment of Virgin Anasazi subsistence. Harry and Watson (2010) studied faunal remains from House 20 at Main Ridge in the Lost City complex to examine the relative importance of farmed products in the diet as well as the role of local and non-local foodstuffs. Their conclusion is that diets were a mixture of both wild foods and domesticates. Landon (2010) provided a detailed review of macrobotanical data from the region and added additional data from Pueblo II sites near Hurricane, Utah. Her findings demonstrated variability in macrobotanical remains between indoor and outdoor hearths, and among different pithouses. She concluded that domesticates were of primary dietary importance, although wild and weedy plants were common in all cases. She found few differences between lowland and upland sites, however. Landon's emphasis on wild seeds as a supplement to domesticates is supported by Nelson et al. (2005), who reported abundant wild seeds stored in a Pueblo II burial vessel at the Reusch Site north of St. George. Martin's (1999) stable carbon isotope analysis of Basketmaker and Puebloan burials from the larger region also demonstrated that maize contributed the largest component of the diet, but wild resources still comprised 25 percent of the diet.

For the most part, past research in the region has focused on dietary emphasis without consideration of overall subsistence strategies. Exceptions include Watson's (2008) regional approach, which, while conceding dietary primacy to maize, offers an ecological perspective on Virgin Anasazi faunal use. He suggested that the importance of large versus small game varied with physiographic setting. He examined faunal data from the Virgin River lowlands, the St George Basin, and upland or plateau regions to support his argument. Talbot and Richens (2009) brought a different and important perspective in their study of non-structural sites in the Sand Hollow region just south of the Virgin River and east of St George, Utah. They also recognized the importance of maize in the diet but concluded that Puebloan peoples occupying the structural sites along the river "ranged far for wild resources, and that the efforts were indeed serious and logistically complex" (Talbot and Richens 2009:273).

UINKARET PLATEAU ENVIRONMENTS

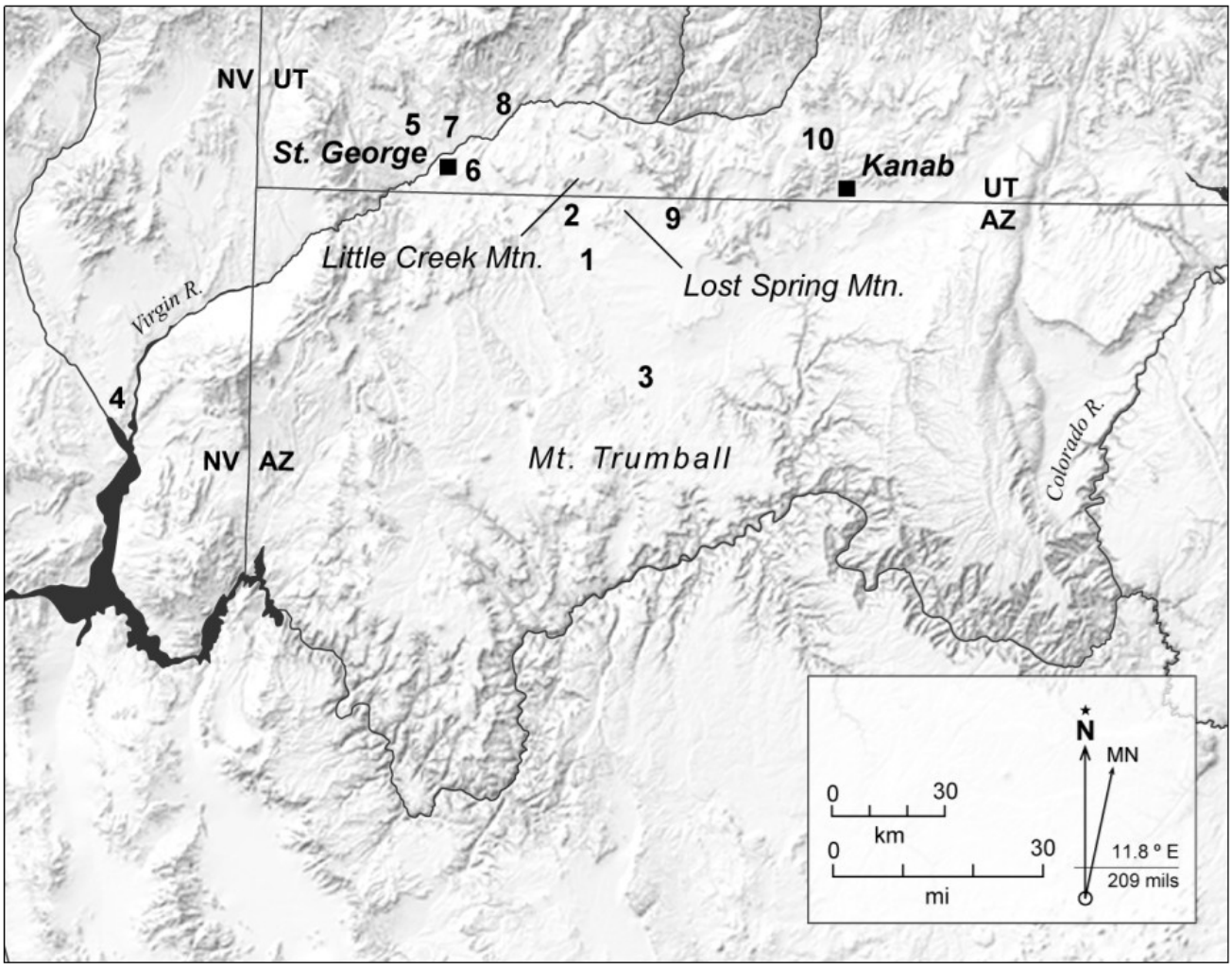
The northern Uinkaret Plateau is a gently rolling limestone formation bounded sharply by the Hurricane Cliffs to the west and by the Uinkaret Mountains to the south (Figure 1). The plateau blends imperceptibly into Antelope Valley to the southeast and transitions more abruptly into highlands such as Yellowstone Mesa to the east and Lost Springs and Little Creek Mountains to the north and east. Short Creek drains the Vermillion Cliffs and the Canaan Mountain region south of Zion National Park, cuts between the Lost Springs and Little Creek uplands, and joins with Cottonwood Creek and Clayhole Wash just above Rock Canyon. The latter, along with Cottonwood Canyon, cuts through the Hurricane Cliffs and drains into Hurricane Wash 350 m below. Clayhole Wash drains the Uinkaret Mountains to the south. The region is semi-arid with only a few scattered springs and intermittent drainages. Elevations range from approximately 1829 m (6000 ft) at the southern extent of the Plateau to 1280 m (4200 ft), where Short Creek drops into Rock Canyon.

Permanent water is limited to occasional springs, all of which are between 5 and 7 km distant from Antelope Cave. The vegetation in the vicinity of the cave is sparse and dominated by xeric species: big sage (*Artemisia tridentata*), snakeweed (*Gutierrezia* sp.), shadscale (*Atriplex confertifolia*), four-wing saltbush (*Atriplex canescens*), rabbitbrush (*Chrysothamnus nauseosus*), Mormon tea (*Ephedra* sp.), skunkbush (*Rhus trilobata*), and cactus (*Opuntia* spp.) in addition to perennial grasses (*Stipa* and *Agropyron*), annual grasses, and desert flowers.

ANTELOPE CAVE DESCRIPTION

Antelope Cave (NA 5507) is a large collapse and solution cavern in the upper levels of the Permian age Kaibab limestone formation near Clayhole Wash on the open rolling plain of the Uinkaret Plateau (see Figure 1). Currently, the Navajo-McCullough Transmission Line runs just north of the sink. The elevation of the cave is 1417 m (4650 ft).

The cave entrance is at the head of a small draw draining into Clayhole Wash and is partially obscured by large limestone boulders that have fallen in front of the cave. A small limestone rimrock immediately above and circling the opening of the cave is the only visual landmark of the cave entrance. The cave interior is hemispherical. The area immediately inside the entrance is dominated by several massive limestone blocks that had fallen from the ceiling relatively recently. The floor descends rapidly to the rear in a series of distinct terraces corresponding to roof spalling events. Along the west wall and to the rear of the cave, the floor is covered with dirt, and the ceiling is heavily blackened from smoke. At the extreme back/bottom of the cavern, there is a sink marked by concentric bands of limestone rock; the bands were formed by the slow, spiraling and sinking of the cave deposits into a solution cavern that is believed to exist



1. Antelope Cave
2. Rock Canyon Shelter
3. Heaton Cave
4. Lost City
5. Santa Clara sites
6. Sand Hollow sites
7. Red Cliffs / Little Man sites
8. Quail Creek sites
9. Hildale sites
10. Cottonwood Canyon

Figure 1. Locations of Antelope Cave and other archaeological sites discussed in the paper.

below (Maxfield 1983). The presence of such a cavern is supported by the testimony of the Atkin family (see Previous Research below), who stated that another smaller cavern underlies Antelope Cave. The cave interior is cool and pleasant, although the coolness becomes less agreeable after a period of inactivity.

After a rainstorm, water enters the cave at its south end. As a result, the lower midden in unit UCLA 59-1 was found to be damp up to 75 cm (30 in) from the surface. However, the rest of the cave's cultural deposit has remained dry for 2000 years or perhaps longer.

Vandal pits pock the site surface where occasional faunal bone, vegetal fragments, and artifacts are visible. A long history of vandalism has compromised cave stratigraphy as a result of overlapping pit excavations and redundant burying of intact deposits with back dirt. Profile cleaning and test excavations are difficult due to poor visibility in the cave and the very dry deposits. Disturbance causes dust to float in the air, and that dust obscures vision and hinders breathing until a gentle current carried the dust up and out the cave entrance.

PREVIOUS RESEARCH AT ANTELOPE CAVE

Archaeological work in the Uinkaret Plateau portion of the Arizona Strip has been sparse since Judd's (1926) exploratory trips. Some attention in the region has been focused on the dry contents of Antelope Cave (see below), but more extensive excavations and surveys have been made north of the project area on Little Creek Mountain (Heid 1982; Thompson 1980) and to a lesser extent on Lost Creek Mountain (Barbara Walling-Frank, personal communication 2010). A massive excavation project was carried on in advance of State Highway 213 construction to the north and east of the site (Wade 1967). Allison (1988) led some survey and mapping work on Yellowstone Mesa to the east, while Westfall et al. (1987) surveyed the Kanab Plateau. Additionally, excavations near Hildale and Colorado City on Short Creek have revealed abundant Puebloan occupation spanning Basketmaker through Pueblo II (Nielsen 1998). Moffitt et al. (1978) surveyed the Navajo-McCullough Transmission Line, which crosses the northern end of the Uinkaret Plateau a mere 100 m north of Antelope Cave. For a more complete, although somewhat dated review of past work in the broader Arizona Strip, see Altschul and Fairley (1989).

William Atkin, of St. George, Utah, first explored Antelope Cave in the 1920s and later sent a modest collection of artifacts to the Smithsonian for identification. Although these items were not returned, Smithsonian personnel informed the Atkins family that the cave was used in Basketmaker times (Floyd Atkin, personal communication 2009).[1] The reputation of the site as a rich source of prehistoric artifacts spread quickly after its discovery and attracted numerous collectors. The total scope of the material recovered will never be known, but certainly included hundreds of sandals (both Basketmaker and Pueblo styles), whole ceramic vessels, basketry, and many miscellaneous perishable items (Robert Euler, personal communication 1985; Johnson and Pendergast 1960). The looting continued at least into the 1980s, despite the efforts of the Bureau of Land Management (BLM) to seal the site. Floyd Atkins related in 2009 that there was evidence of recent collecting activity during a visit to the site in 2006.

Jack Rudy of the University of Utah conducted the first professional archaeological work in Antelope Cave with his visit in 1949; he reported heavy vandalism at the time (Jesse D. Jennings, personal communication 1986). Robert Euler excavated the cave in 1953 and 1954 while he was Curator of Anthropology at the Museum of Northern Arizona (MNA) (Figure 2). Euler excavated a series of test pits and mapped the cave with a small crew that included Milton Wetherill, then Associate Curator of Mammology at MNA, and Leland J. Abel, who also served as project photographer.

Archaeologists with the University of California, Los Angeles (UCLA) carried out the most extensive excavations. Clement Meighan in 1956 and Henry Nicholson in 1957 directed excavations of two test units (UCLA E and B) with students from UCLA summer field schools based in Cedar City, Utah. Robert Euler supervised the student excavation of UCLA Unit E in 1956 and Henry Nicholson oversaw the work at UCLA Unit B in 1957. In 1959, Vilate Hardy of La Verkin, Utah, convinced Clement Meighan to carry out more intensive investigations at the cave before vandals destroyed most of the site. As a result, UCLA sent David Pendergast, Keith Johnson, and Basil Katem to the cave in 1959 to salvage as much archaeological material as possible in a short amount of time. The crew of three spent 19 days in Antelope Cave and excavated five test pits (Figure 3). Because of the dim light and thick dust in the cave, the 1959 UCLA crew constructed a unique tram/pulley system to carry deposits up and out of the cave for processing (Figure 4). In 1960 Johnson and Pendergast along with Esther Pendergast returned to the cave to complete the excavation of unit UCLA 59-5 and to sample one of two possible living areas. UCLA geographer Richard Logan accompanied this group and gathered data for a report on the physical geography of the area. In 2009, Johnson revisited the cave to obtain a radiocarbon sample from one of the hearths located on a huge limestone slab near the cave entrance.

Figure 2. Photo of Antelope Cave interior in 1954, Robert Euler and Milton Wetherill in the rear of the cave, courtesy of the Museum of Northern Arizona, NA5507.14, Leland J. Abel, photographer.

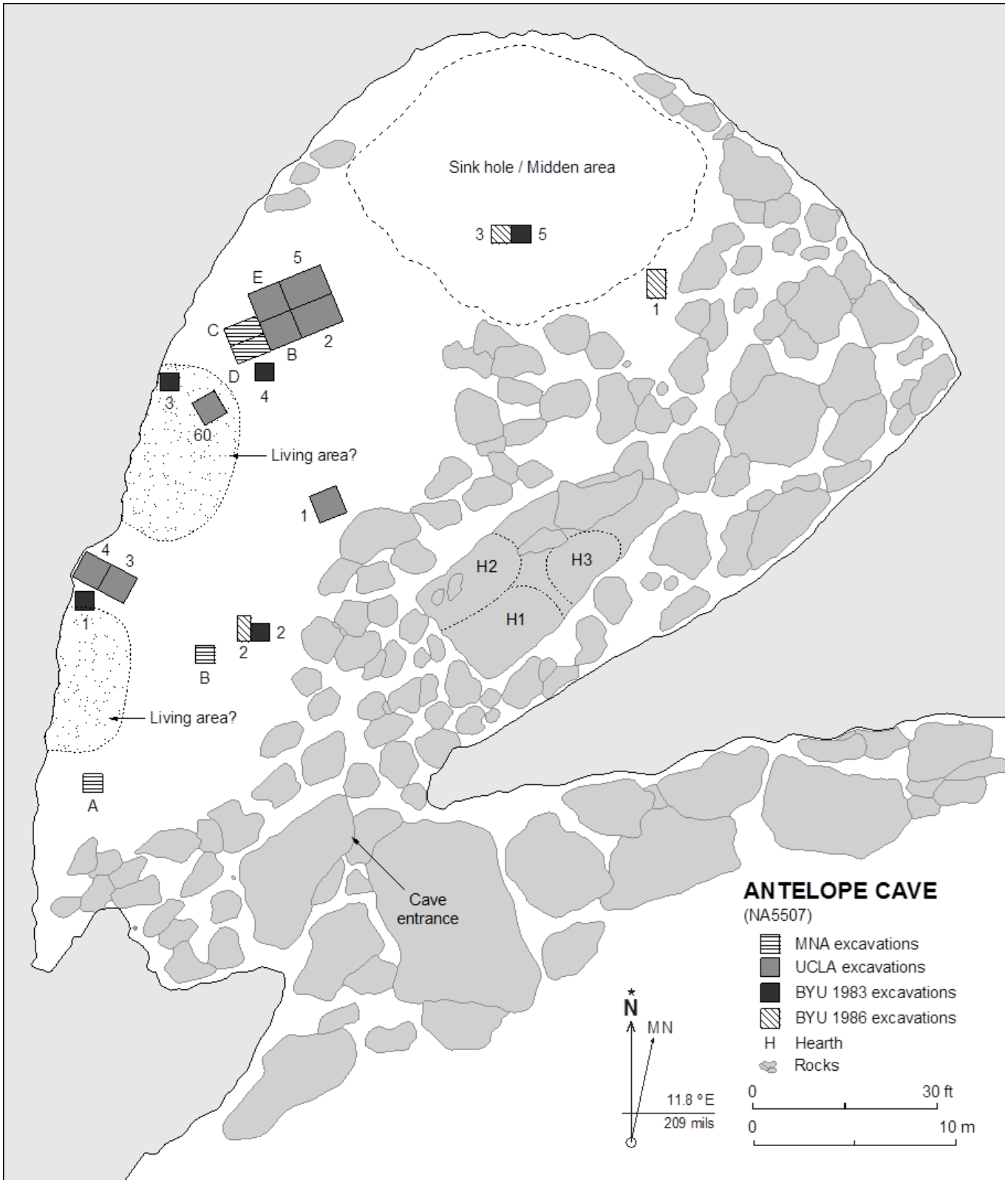


Figure 3. Plan map of Antelope Cave showing locations of tests by the Museum of Northern Arizona, UCLA, and Brigham Young University.

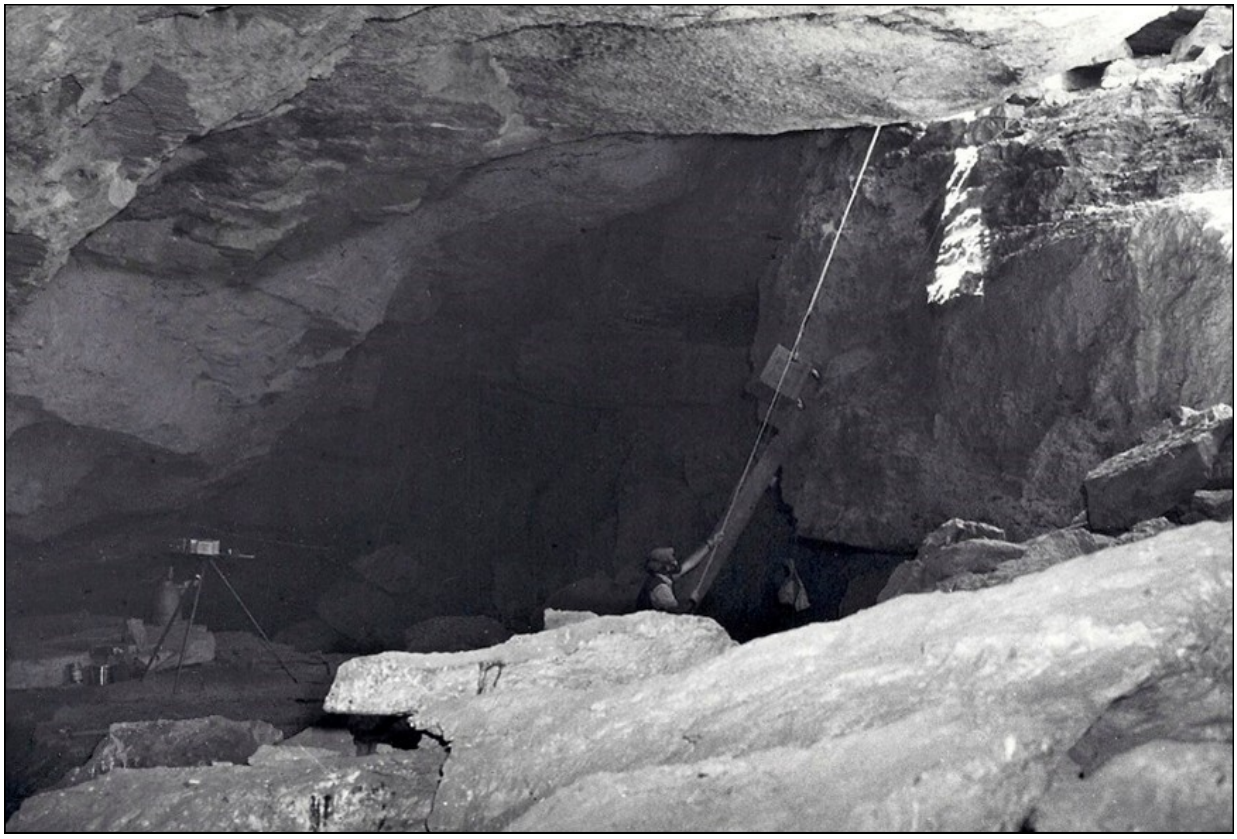


Figure 4. David Pendergast operating the UCLA pulley to remove cave deposits, June 16, 1959.

The substantial collections recovered through this work are, at the time of this writing, with Keith Johnson at the Museum of Anthropology, California State University, Chico, on loan from the Fowler Museum of Cultural History at UCLA. Johnson and Pendergast (1960) produced a short summary of their excavations and a cursory catalog. More recently, analysis of coprolites from the UCLA collections has revealed the importance of human and dog parasites present in the cave (Fugassa et al. 2011; Johnson et al. 2008), as well as detailing the diet of the Virgin Anasazi who lived there (Reinhard et al. 2012; see below).

Hugh Culter conducted some botanical analysis of the Euler material during the Glen Canyon Project (Cutler 1966, 1968; Cutler and Meyer 1965), and Richard Hevly analyzed some of the corn from the cave in the late 1960s. Also, in 1970, Paul S. Martin was interested in the possibility that sloth dung might be present in Antelope Cave; however, no verification of sloth dung is known. The above analyses and inquiries are documented by letters on file at the Arizona Strip BLM archaeologist offices in St. George (Janetski and Hall 1983:10).

No professional work was done at the cave after UCLA's efforts until Moffitt et al. (1978) of the Museum of Northern Arizona visited the site during the survey of the Navajo-McCullough transmission line. They made a small surface collection of ceramics and projectile points and perhaps other artifacts, although it is possible that they only photographed some items (Moffitt et al. 1978:166-167). In 1983, the Office of Public Archaeology at Brigham Young University, in cooperation with the Arizona Strip Bureau of Land Management, visited the site to assess whether intact deposits remained and assess the roof stability (Janetski and Hall 1983). Some surface collections were made and a small test pit placed in the midden in the sink area to recover datable materials. Janetski and Hall (1983) concluded that intact deposits remained at the site. BYU archaeologists returned in 1986 to determine when the site was first occupied and to recover systematic samples of stratified sediments for faunal and paleoenvironmental data (see Janetski and Wilde 1989 for a preliminary report and Janetski et al. 2012 for the final report). During the course of BYU/OPA's research, the Arizona Strip BLM borrowed Euler's Antelope Cave collections from the Museum of Northern Arizona. The materials were then transferred to OPA/BYU, where they remain as of this writing. Collections consist of unmodified faunal material, chipped stone, ceramics, and textiles, including sandals and abundant cordage (Janetski et al. 2012; Yoder 2008, 2009, 2010).

Table 1. Radiocarbon dates from Antelope Cave.

Lab Number	Provenience	Material	Radiocarbon Age	2σ calibrated range
A-3510	Stratum 3, BYU Test 5	corn cob	1190 ± 110 BP	AD 644-1032
A-3511	Stratum 2, BYU Test 5	cob/sandal fragment	1160 ± 100 BP	AD 660-1032
Beta 8394	Rear midden	atlatl fragment	1859 ± 60 BP	AD 26-331
Beta 24432	Stratum 2-A, BYU Test 2	unid wood charcoal	3290 + 60 BP	1730-1438 BC
Beta 24434	Stratum 2-C, BYU Test 2	unid wood charcoal	3490 + 60 BP	1964-1643 BC
Beta 24433	Stratum 2-A, BYU Test 2	unid wood charcoal	3590 + 50 BP	2128-1773 BC
AA80803	MNA collections	yucca sandal	1241 ± 36 BP	AD 683-878
AA80801	MNA collections	yucca sandal	1237 ± 42 BP	AD 680-885
AA80802	MNA collections	yucca sandal	1228 ± 36 BP	AD 668-885
Beta 264019	UCLA Hearth 3	ash/charcoal	180 ± 40 BP	AD 1650-1950
Beta 257786	UCLA 59-2, 0-6"	yucca quid	1230 ± 40 BP	AD 680-890
Beta 257787	UCLA 59-2, 24-30"	yucca quid	1190 ± 40 BP	AD 710-750 AD 760-900 AD 920-960
Beta 257788	UCLA 59-5, 66-72"	corn cob	1220 ± 40 BP	AD 680-890

ARCHAEOLOGY AT ANTELOPE CAVE

Dating and Stratigraphy

Thirteen radiocarbon ages obtained from a variety of material are now available from Antelope Cave (Table 1). The dates combined with ceramic typology demonstrate use of Antelope Cave in the Late Archaic, Basketmaker II, late Basketmaker III/early and later Pueblo I, and Pueblo II periods. The dates correspond well with late Archaic artifacts found in the lower sediments of the test units, and corroborate a late Archaic occupation similar in age to Rock Canyon Shelter (Janetski et al. 2012) and other sheltered sites on the Arizona Strip (John Herron, personal communication 2012). Johnson and Pendergast (1960) recovered at least 13 square-toed sandals as well, which demonstrates a substantial Basketmaker II occupation. The Archaic dates and atlatl points from Euler's work and BYU's tests are all evidence of pre-farming use of the site. The early Puebloan material culture overlies, and in some cases, overwhelms earlier Basketmaker and Archaic remains; consequently, the spatial extent of these earlier occupations is largely unknown. A test unit (BYU 86-2) placed at the lower edge of the large rock fall (see Figure 2) demonstrated that Late Archaic deposits most likely lie under the large monoliths at the front of the cave (Figure 5). Interestingly, there does not appear to be a Basketmaker presence in these deposits, as the ceramics from levels immediately above Stratum 2-C are all Puebloan. The BYU tests recovered no evidence of post-Anasazi occupations. Artifacts attributable to the Southern Paiute may exist in private collections, however. The Museum of Northern Arizona holds photos of private collections attributed to the cave that show a twined water jar (VH 20) that is likely affiliated with the Southern Paiute (photocopies provided by Rick Malcomson).

Cave stratigraphy varied widely depending on the area tested. The BYU 1986 test adjacent to the rock fall found the most intact sediments. They consisted of alternating layers of matted vegetation, rock spall, and fine grayish brown, ashy sediment (see Figure 5). The tests in the sink were apparently in a midden or dump area, with very little sediment observed in the deposits. Rather the fill consisted mostly of matted vegetation, grass, small twigs and other plants parts that were so abundant that cutting profiles and screening were difficult. A depression or pit in Stratum 2-F is the only possible feature found at Antelope Cave during BYUs 1983 and 1986 work. However, the UCLA crew recognized two possible living areas in 1959 (see Figure 3). At that time, these two areas were relatively flat. Adjacent to each area were higher mounds of midden containing discarded materials such as corn cobs, faunal bones, and broken artifacts. The presence of these remains adjacent to the living areas suggests that occupants created a "toss zone" (Binford 1983), a conclusion that is supported by the discovery of two superimposed fire hearths in unit UCLA 60 in the northernmost living area. In 2009, Johnson recorded three hearths on top of the monolithic limestone slab

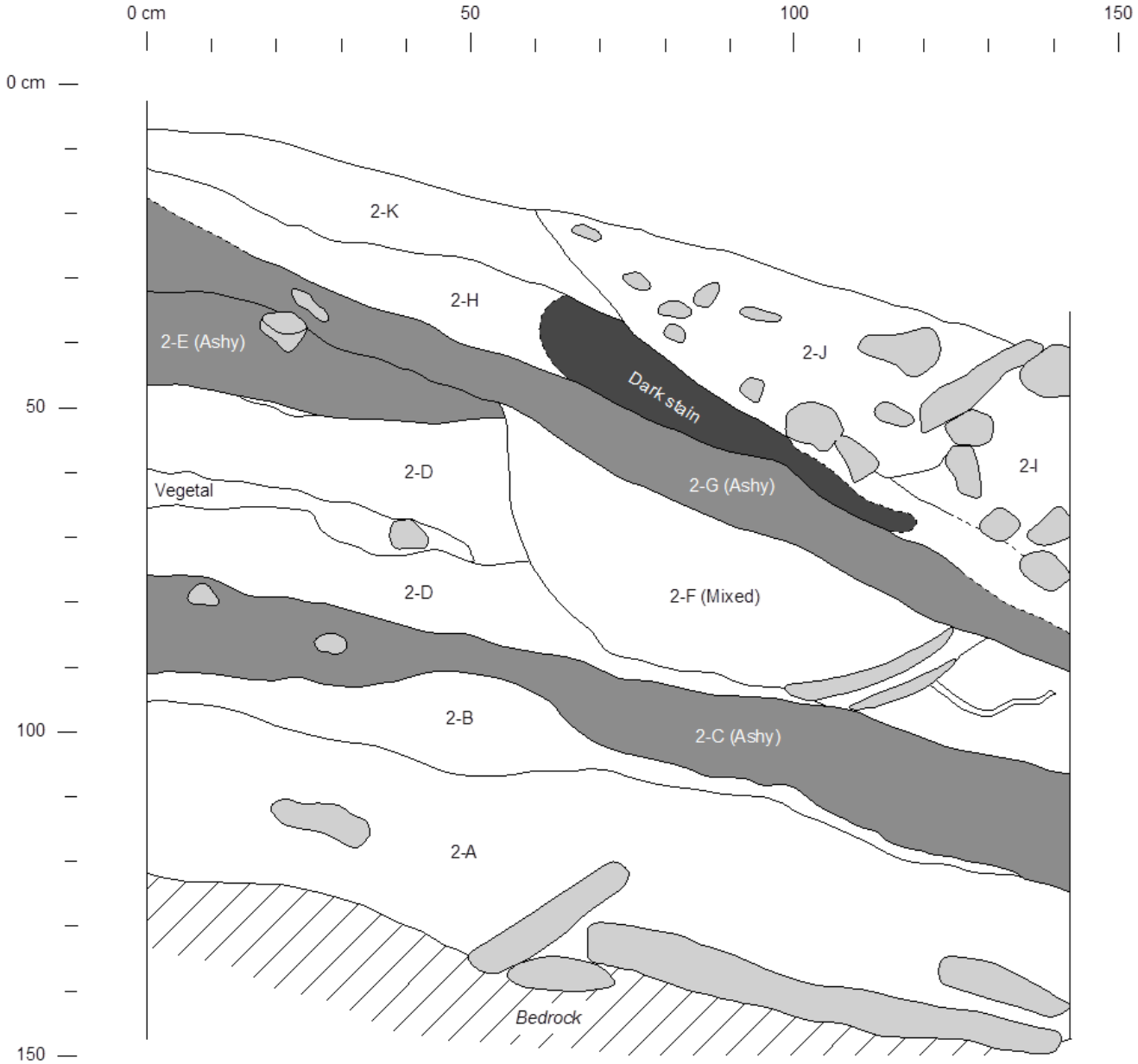


Figure 5. Profile of BYU 86-Test 2.

near the cave entrance. The fire forming Hearth No. 3 was ignited sometime between 1650 cal A.D. and 1950 cal A.D. (Table 1), long after the Puebloans had abandoned the cave.

It is possible vandals have destroyed evidence of features; however, no slabs were observed on the surface that would suggest the presence of such features. Surely, given the smoke-blackened condition of the ceiling, many hearths existed, but those portions of the cave where fires were likely built are now largely destroyed by looting and previous excavations. Numerous soot-encrusted and blackened sherds and charred faunal remains also testify to cooking fires. A single, burned sandstone slab fragment recovered from BYU 86-3 may suggest slab-lined features were present at one time, and the several fire-blackened but reworked slabs from the 1954 collections may represent the remains of slab-lined cists.

Antelope Cave Collection

Dry caves are renowned for the preservation of all material remains left by their visitors, people and animals alike, and Antelope Cave is no exception. Textiles, primarily sandals and cordage (including net fragments), are abundant in these collections, as are faunal bone and botanical remains. Ceramics, chipped, and ground stone are also common, although stone tools are relatively sparse when compared to nearby Rock Canyon Shelter, another dry site located in the canyon of its namesake (Janetski et al. 2012). Given the subsistence focus of this paper, the emphasis is on the botanical and faunal remains.

Botanical Remains. Plant remains are very well represented in the Antelope Cave collections. Macrobotanical analysis of the material recovered by MNA, UCLA, and BYU has identified a minimum of 26 plant taxa representing a wide range of ecozones. Table 2 presents plant taxa recovered along with counts of seeds in some cases. The latter category contains specimens of unworked sticks or other plant parts presumably gathered for firewood. Domesticates are common, with corn (*Zea mays*) the most abundant taxon, and beans (*Phaseolus* sp.) and squash (*Cucurbita* sp.) also present.

The richness of this assemblage is due to the preservation of the dry deposits. Those dry deposits also complicate differentiating items deposited as a consequence of human activity and items brought in via other, non-anthropogenic agents. What is perhaps most striking, however, is that many of these taxa are not available immediately outside the cave and represent a range of environmental settings. Plant taxa include species from riparian (willow, reeds, and hackberry), pinyon-juniper woodlands (pinyon pine, juniper, chokecherry, service berry, and cliff rose), and mixed desert shrub (black brush, sagebrush, and mesquite) communities.

The importance of this array of plant macrofossils is that they represent the broad catchment of site occupants. In other words, cave visitors apparently had traveled through ecozones where they gathered these plants and brought them to the cave. In addition, these remains undoubtedly represent gathering activities that occurred while people were in residence, and the macrobotanical material gathered would have served as fuel as well as food. Domesticates and pinyon suggest summer and early fall occupation, while other remains (Indian rice grass, mallow, and other grasses) typically are ready for collecting by early summer, although the timing for the ripening of these and other grasses could extend into early fall depending on elevation (Kelly 1964:41; Cumming and Puseman 2009). Reinhard's (2009) analysis of seeds from coprolites also suggests late summer to early fall site use. It is important to recognize, however, that conclusions regarding season of site use based solely on the presence of certain seeds must be done with caution given that such seeds could be stored and consumed at other times of the year. Inferences derived from pinyon must be treated with particular caution, because it could be stored for several years (Fowler 1986:65).

Faunal Remains. In general, the recovered faunal assemblage appears to be primarily the result of past cultural processes. The assemblage is characterized by a combination of an extremely low frequency of non-human modifications with a comparatively high frequency of cultural markers, such as burning, that suggest that humans were the primary agent of deposition (Fisher 2009). Furthermore, the assemblage appears to be largely unaltered by post-depositional impacts, as indicated by the lack of density-mediated destruction (Fisher 2009).

The archaeofauna from Antelope Cave is strongly dominated by jackrabbits (*Lepus californicus*), and to a much lesser degree, cottontail rabbits (*Sylvilagus* sp.) (Table 3). Larger taxa (pronghorn, deer, mountain sheep), some small mammals (other than leporids), and birds are also present but in very modest quantities. Some of the non-leporid taxa may represent non-dietary use of animal resources (e.g., fur-bearing species), or these remains may have resulted from non-cultural deposition (e.g., rodents). Large game likely was a minor contribution to the diet compared to the leporid resources. As with the botanical remains discussed above, the faunal remains include non-locally available taxa. In particular, the presence of waterfowl (Canada goose, *Branta canadensis* and unidentified Anatidae) provides further support that the occupants of Antelope Cave had a wide catchment that included riparian zones.

Table 2. Macrobotanical remains recovered from Antelope Cave by MNA, UCLA, and BYU.

	Taxon	Common Name	MNA/BYU		UCLA	Totals
			Seeds	Stems/Wood	Seeds	
Domesticates						
	Zea mays	maize/corn				
	kernels		765		3245	**4010**
	cobs		533		6382	**6915**
	cob fragments		199			**199**
	husks			75		**75**
	Cucurbitae	gourd family				
	seeds		24		78	**102**
	rind fragments			21	387	**408**
	Phaseolus vulgaris	common bean	19		80	**99**
Trees						
	Celtis reticulata	neatleaf hackberrty	405			**405**
	Juniperus sp. seeds	juniper	99	11	31	**141**
	Pinus spp. nut hulls	two-leaf pinyon	101	1	201	**303**
	Prunus sp.	chokecherry	5			**5**
	Rhus sp.	skunkbush		1		**1**
	Salix sp.	willow		31		**31**
	Quercus sp.	oak			14	**14**
Shrubs						
	Amalanchier sp.	service berry	2			**2**
	Artemesia tridentata	big sagebrush		189		**189**
	Atriplex	salt bush	1	94	7	**102**
	Cercocarpus sp.	mountain mahogany		1		**1**
	Cheno-Am	various		1271		**1271**
	Chrysothamnus nauseosus	rabbit brush		7		**7**
	Echinocereus-type	claretcup cactus	3			**3**
	Ephedra spp.	Mormon tea		76		**76**
	Helianthus-type	sunflower	2			**2**
	Cactaceae	cactus		214		**214**
	Opuntia sp.	prickly pear cactus	11		8	**19**
	cf. *Polygonum* sp.	knotweed		7		**7**
	Physalis-type	nightshade	6			**6**
	Purshia mexicana	cliff rose	1	1		**2**
	Yucca sp.	yucca	78	189	238	**505**
Forbs						
	cf. *Astragalus*	locoweed	1			**1**
	Atriplex humenelytra	desert holly			15	**15**
	Ceratoides lanata	winterfat		1		**1**
	cf. *Corispermum*	tickseed	2			**2**
	Cruciferae	mustard family	3			**3**
	Lilliaceae	lily			2	**2**
	Mentzelia albicaulis	stickleaf	2			**2**
	Mirabilis sp.	four-o'clock	7			**7**
	Nicotiana sp.	tobacco	3			**3**
	Portulaca sp.	purslane	2			**2**
	Sphaeralcea sp.	mallow	1			**1**
Grasses						
	Achnatherum hymenoides	Indian rice grass		15		**15**
	Graminae	grass family		86		**86**
	Panicum urvilleanum	panic grass			11	**11**
	Phragmites sp.	arrow reed		171		**171**
	cf. *Sporobolus*	dropseed	937			**937**
	Poaceae	Unidentified grass	24		58	**82**

Table 3. Faunal skeletal remains recovered from Antelope Cave by MNA, UCLA, and BYU.

Taxon	NISP				Total NISP
	MNA 1954	UCLA	BYU 1983	BYU 1986	
Small Artiodactyl	15	44	6		65
Antilocapra americana	1			1	2
cf. *Antilocapra americana*			1		1
Ovis canadensis	13	13	3	1	30
Odocoileus hemionus	1				1
Chiroptera		1			1
Carnivora		1			1
Felis rufus		2		1	3
cf. *Urocyon cinereoargenteus*		7			7
Leporidae	19	122	70	191	402
Lepus californicus	433	19881	795	2090	23199
Sylvilagus spp.	27	3420	150	744	4341
Rodentia		1			1
Spermophilus spp.				4	4
Neotoma sp.		22	4	10	36
Thomomys sp.		15	13	34	62
Dipotomys sp.				1	1
Anatidae		1			1
Picadae		1			1
Strigidae		1			1
Corvus corax		2			2
Testudinae		4			4
Squamata		1			1
Iguanidae				6	6
Aves, Unidentified		3	3	17	23
Mammalia, Unidentifed	2		336	3297	3635
Unidentified		606	10		616
Total NISP	511	23542	1381	6397	31831
Total Bone	**511**	**24148**	**1391**	**6397**	**32447**

Table 4: Distribution of leporid fur/skin scrap from UCLA excavations.

Depth (inches)	UCLA Excavation Unit						Total
	59 -1	59 - 3	59 - 4	59 - 2	59 - 5	NP	
0-6		9		113	332	5	459
6-12	39		5	167	165	4	380
12-18		8	8	82	125		223
18-24	1	22	13	106	276		418
24-30	13	6	6	41	379		445
30-36		7	17	39	273		336
36-42		3	11	33	3		50
42-48			2	30	10		42
48-54				39	13		52
54-60					9		9
60-66					9		9
66-72					2		2
Total	**53**	**55**	**62**	**650**	**1596**	**9**	**2425**

Based on the relatively high level of skeletal completeness, it appears that whole jackrabbits and cottontail rabbits were brought to the site for consumption and fur processing. Jackrabbits were systematically and intensively processed for cooking, an interpretation that is based on patterns of burning, fragmentation, relative skeletal abundances, and other data (Fisher 2009). This processing included butchering into smaller components, roasting of meaty segments, pulverization of the rib cage, fragmenting long bones for marrow access, and stewing the latter two products with wild and cultivated plant resources.

In addition to the culinary processing, evidence for fur processing is present at Antelope Cave. There are 2,425 scraps of rabbit fur or skin with attached fur from the 1959 excavations (Table 4). We believe that most of these fur fragments are discard from the manufacture of skin cordage or the production of rabbit skin blankets. The vast majority of specimens are of untwisted rawhide with fur attached, although 132 twisted cords of rawhide with fur attached and lengths ranging up to 37 cm are also present. Scraps vary greatly in size and shape; burned fur was noted on only one specimen. The fur scraps come from several parts of the rabbit pelt and show a variety of colors, including white, light tan, dark tan, red-brown, gray, black, and combinations of these colors. On some of the twisted strips, the fur has been evenly trimmed so the hair is a uniform length along the entire piece. More than half the specimens (n = 77) are single-ply; the rest are composed of 2-, 3-, 4-, and 5-ply cordage twisted together. None are braided. Of the 132 pieces of twisted fur, 115 are Z-twist; only 17 are S-twist. A few of the strips have been extended by the addition of one or more of the cords coiled together or tied together with fiber knots.

Further evidence for fur-processing at Antelope Cave come from the archaeofaunal skeletal remains. Whole, articulated, furred feet are common in the assemblage, which may represent discarded by products from the processing of the skins. Additionally, the lack of burning around the braincase compared to the facial portion of the skull suggests that the brain was removed before roasting; the brain may have been used to process the skins, although consumption is also reported ethnographically (Fowler 1989). Skeletal remains of bobcat (*Lynx rufus*) and fox (cf. *Urocyon cinereoargenteus*), and fur remains of ringtail (*Bassariscus astutus*) also hint at fur processing of other taxa. Cutmarks present on a bobcat maxillary specimen are likely the result of skinning the animal for its fur.

No significant change through time could be detected in relative abundance or utilization of particular species in the samples recovered by BYU and MNA. However, it was observed that the only small artiodactyls recovered by BYU came from the late Archaic levels in BYU 86–2, while leporids are abundant in both late Archaic and Puebloan levels. Based on the much larger sample from the UCLA excavations, Fisher (2009) reported a greater use of artiodactyls early, especially during the Basketmaker period as compared to the Puebloan period, although artiodactyls were never a significant part of the diet. When comparing leporids, Fisher (2009) found a significant increase in the use of *Lepus* over *Sylvilagus* through time. He speculated that this shift from *Sylvilagus* to *Lepus* may re-

flect the impact of local environmental changes (see below). It is worth noting that Driver's (2002) broad synthesis of Anasazi faunal trends in the Four Corners region found that, contrary to expectations, *Lepus* use did not increase through time, despite a growing reliance on domesticated crops.

ANTELOPE CAVE SITE FUNCTION

Antelope Cave appears to have functioned as temporary living quarters while individuals hunted, perhaps tended crops, and used fur from captured leporids to manufacture raw material for making rabbitskin robes. Here, we review evidence that the deposits at Antelope Cave represent local communal jackrabbit drive and horticultural activities (assumed by Janetski and Hall 1983).

The previous section demonstrated that the primary prey of hunters during all periods were leporids, mostly jackrabbits, which were harvested in large numbers. The assumption is that the high numbers of *Lepus* remains are evidence of communal drives to capture these otherwise elusive animals. Testing this assumption presents some difficulties and demands further discussion. Following that discussion, we confront the evidence for gardening locally and the composition of the groups who used the site. Both questions play into our understanding of how Antelope Cave functioned within the regional Puebloan strategy.

Evidence for Communal Jackrabbit Drives

Communal jackrabbit drives are well documented in the Great Basin and Southwest ethnographic literature, although the number as well as age and gender of the participants vary somewhat between accounts. These analogs provide some basis for assuming that communal jackrabbit hunts on the Uinkaret Plateau consisted of small groups, perhaps mostly adult males and boys, who drove their prey into nets. Howard Egan's (1917) descriptions for the Western Shoshone are especially useful. Once the area to be driven was identified, nets owned by families were stretched between posts, each family's net joining with another's until they formed a semi-circle with wings into which the drivers herded the rabbits. Each net was about 76 cm high and 140 m to 180 m long. Kelly (1964:50-51) has described a Kaibab Southern Paiute drive as consisting of 10 to 20 males, from one or more bands, who used three to five nets strung together. Puebloan people valued rabbits as a food source and as the focus of sport hunting. Men hunted rabbits for sport and as part of a ritual activity that involved throwing sticks to dispatch rabbits (various in Ortiz 1979, but see Kennard 1979:357 and Bodine 1979:256 for specifics).

Several researchers (see Shaffer and Gardner 1995; Schmidt 1999; Schmitt and Lupo 2005 and references therein) have provided excellent summaries of ethnographic accounts and the behavioral characteristics of *Lepus* spp. that predisposed them to drives. These accounts support our position that individual capture of such massive numbers of jackrabbits (combined NISP of 23,199 for all excavations) is unlikely. Abundant jackrabbit remains often suggest that communal drives were used to capture these animals for both food and for their skins, which were commonly used to make warm robes or blankets (Yoder et al. 2005). Steward (1941:220), for example, noted that a "major purpose" of Western Shoshone communal rabbit hunts was "to provide skins for woven blankets." Also Kelly (1964:68) described in detail how Kaibab Paiute made rabbitskin blankets used by both men and women for "wraps" or "bedding." However, some caution must be exercised before attributing communal hunting to the Antelope Cave assemblage, because assemblages consisting of large quantities of jackrabbit remains may also represent an accumulation of individually captured animals (Grayson and Cannon 1999; Jones 2004; Lyman 2003).

Accumulation rates may be used to rectify this problem of equifinality. There is overlap between three radiocarbon dates spanning 1.85 m (6 ft) of deposits from two adjacent excavation units, UCLA AC 59 -2 and AC 59-5 (Table 1). As presented in Figure 6, the Leporid Index

$$\sum \textit{Sylvilagus} \,/\, \sum \text{Leporids}$$

decreases incrementally through time in these units (Spearman's $r_s = +.905$, $p = .002$; Level 42-48" removed as outlier). This decrease corresponds well with alluvial and palynological data that indicate that this period saw the development of an open landscape (Dean 1985 in Rose 1989), a shift that likely favored *Lepus* over *Sylvilagus*. Thus, this portion of the assemblage does not represent a single deposit, as suggested by the radiocarbon dates, but a series of deposits documenting local environmental change in resource abundances. These data do not, however, preclude the possibility of communal drives at Antelope Cave; it may simply be that Puebloan people increasingly focused on drives which would have resulted in the capture of more jackrabbits.

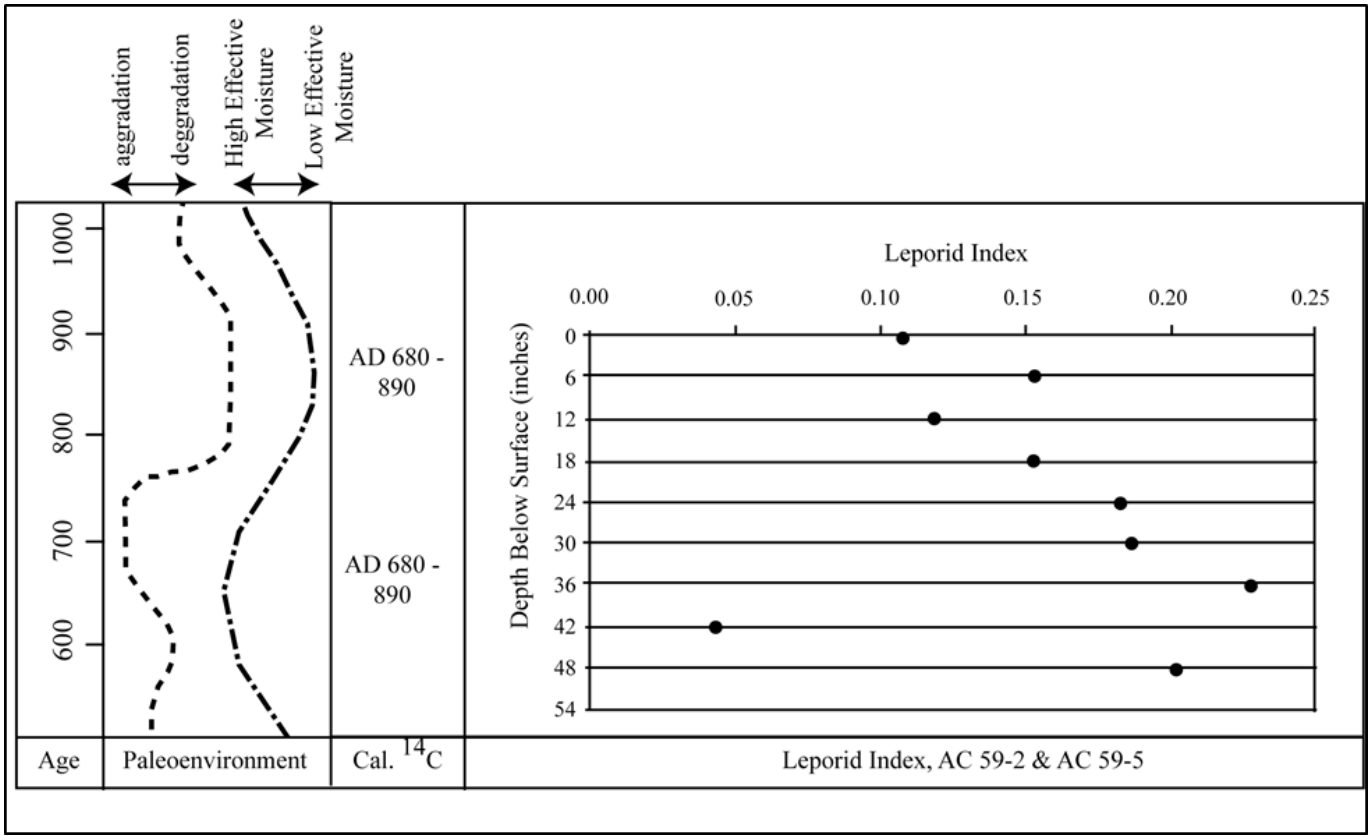
Communal hunting may also be identified using catastrophic mortality profiles (e.g., Jones 2006; Klein 1982; Lupo and Schmitt 2002), and may be utilized for *Lepus* based on the relative abundance of age classes in an assemblage. Data regarding birthing times for jackrabbits in northwestern Arizona are not available, but data from California and southern Arizona indicate that birthing peaks in late winter and spring, and ceases in September (Haskell and Reynolds 1947; Vorhies and Taylor 1933). As noted above, plant remains from Antelope Cave coprolites represent diets consumed in

late summer or early fall (Reinhard 2009), when birthing declines and hares are in prime condition for hunting (Fowler 1986:82).

Epiphyseal fusion of the proximal humerus is complete around 11 to 15 months in jackrabbits (fusion timing of other skeletal parts is unknown), and skeletally mature adults are almost never in frequencies greater than 50 percent in populations from Sacramento Valley, California (Lechleiner 1959; Tiemeier and Plenert 1964). If the Antelope Cave faunal assemblage was a product of fall communal drives, the resulting death assemblage should approximate this distribution of skeletal mature to immature individuals. In contrast, only nine (1.9 percent, NISP = 475) unfused proximal humeri (the skeletal part used by Lechleitner (1959) for age classifications) are present in the Antelope Cave assemblage. The very sparse evidence for subadults in the assemblage argues against drives as a primary method for obtaining *Lepus* remains. However, this conclusion is based on the assumption that the relative abundance of juvenile jackrabbits would be as high as the frequencies observed by Lechleitner (1959) in California, yet there are expected differences in demographics and reproduction between geographic regions. If birthing ceases much earlier in the vicinity of Antelope Cave (as may be expected in a more marginal environment), fewer subadults would be present in the fall. It is also noteworthy that the high level of preservation may actually result in lower observation of incompletely fused humeri, because the frequent presence of desiccated tissue limits the visibility of epiphyseal lines.

Patterning in burning and element representation has also been used as evidence for drives. For example, Schmidt (1999:111) found that a high percentage of the leporid bones from the Five Feature Site, a late Formative site in southeast Arizona, was burned, and there was a strong pattern in the elements present, notably only distal tibiae and radii along with foot bones. Schmitt et al. (2004: 93) on the other hand reported leporid remains from Archaic levels in Camel's Back Cave in west central Utah. These authors documented that skull and limb bones were the most common elements recovered, a pattern suggesting not only butchering and transport of select body parts but also mass capture (see also Shaffer and Gardner 1995 for additional archaeological examples of drive evidence). As previously discussed, systematic processing also occurred at Antelope Cave (Fisher 2009). Although these reports describe contrasting patterns, the fact that there is patterning suggests people processed these animals in culturally prescribed ways. However, such systematic processing does not necessarily equate with the mode of capture unless it can be

Figure 6. Changes in the Leporid Index through time for adjacent excavation units AC 59-2 and AC 59-5 compared with radiocarbon dates and paleoenvironmental data. Paleoenvironmental data from Rose (1989).



demonstrated that such methods were not used for individually acquired hares.

The presence of a variety of hunting equipment commonly associated with communal hunting of jackrabbits at Antelope Cave provides the strongest support for the drive argument. One throwing stick and 57 net fragments were recovered from the 1959-60 excavations, and additional net fragments and a throwing stick were recovered during later work. Both of these artifact types were employed during drives ethnographically (Adovasio et al. 2009; Shaffer and Gardner 1995: Kennard 1979). Additionally, arrow points (n = 31), wooden nocks for arrows (n = 3), and cane arrow fragments (n = 12) may have been used to dispatch hares during drives (e.g., Fowler 1989) or for individual hunting of other game, including mountain sheep and cottontail rabbits.

Clearly, identifying the communal rabbit drives from archaeological data with a high level of confidence is difficult. However, it is our position that the bulk of the jackrabbit assemblage from Antelope Cave represents the products of communal rabbit drives. This conclusion is supported by the analysis of 20 human coprolites from Antelope Cave. That work reveals that rabbit meat was almost as prevalent (14 of 20 coprolites) in the Antelope Cave diet as all other plant foods combined. In addition, maize made up only 25 percent of the major foods eaten in the cave (5 of 20 coprolites), less than prickly pear alone (7 of 20 coprolites) (Reinhard et al. 2012, Supplement A:3, Table A1).

Understanding why past peoples would have focused foraging efforts on such relatively small game has been debated in recent literature. Grimstead (2010) modeled the travel and transport costs for black-tailed deer (*Odocoileus hemionus*), antelope jackrabbit (*L. alleni*), and desert cottontail (*S. audubonii*) obtained between 0-200 km from a central place. She concluded that large game remains a high-return prey item even with high travel distances. A 141 kg artiodactyl procured within 200 km would produce the equivalent return of 31 jackrabbits acquired within 1 km. This model assumes that the captured product was transported back to a central place and explains why large game continued to be hunted at the structural sites; the model does not account for logistical bases used to acquire smaller game. Grimstead (2010) found that the "point of no returns" for central-place foraging of jackrabbits is 23.6 km. When approaching this distance, it may be more profitable to move the central place from a residential base to a logistical base. This distance places Antelope Cave well within the foraging radius from known residential bases on Little Creek and Lost Spring Mountains that lie 20 and 10 km distant respectively.

Although this estimated distance can be used to determine when logistical bases might be established, it does not predict whether people will hunt on an individual basis or use communal drives at such locations. Ugan (2005) evaluated the return rates of mass harvested and individually acquired prey to demonstrate that the supposed high efficiency of mass collecting is generally overstated, since the processing costs for each individual package acquired from communal hunts are still relatively high and the returns per individual are low.

However, Ugan's study focused on energy-based return rates while masking other, non-dietary uses for game. The evidence at Antelope Cave for fur processing indicates that this was likely an important product, as documented in various ethnographic accounts (e.g., Fowler 1989). Whether fur was the primary or secondary product is not known, but it clearly provided an additional resource that cannot be incorporated easily into diet-based foraging models. Rather the rabbit skins and fur may have acted as a currency other than calories and may have provided benefits beyond nutrition (e.g., see Bettinger 1991:114).

Additionally, hunting risk should be considered. The intrapatch encounter rate for jackrabbit drives is 0.6 to 4.9 kg/hr, which exceeds the maximum rates provided for individually hunted deer (0.4 kg/hr) and bighorn sheep (0.7 kg/hr) (Simms 1987: Table 8). While the post-encounter energetic returns for jackrabbits may be comparatively lower than that of small artiodactyls, the high encounter rates suggest that hunters were not likely to return home empty-handed. Indeed, the fact that nets and other equipment were cached at Antelope Cave suggests that the occupants recognized the low risk involved in communal hunting of jackrabbits at this location. Furthermore, communal rabbit drives may have been embedded into other seasonal activities, such as crop harvesting (see below) and ceremonial events (e.g., Beaglehole 1936) that involved family groups. It is expected that risks associated with hunting would have been minimized during visits to the site to allow for these other activities to occur.

In conjunction with foraging models, stronger faunal data from structural sites may be used to test whether the importance of logistical bases for communal jackrabbit drives increased through time. For one, Harry and Watson's (2010) contention that the high frequency of artiodactyls at structural sites is the result of regional compaction may be demonstrated by showing that artiodactyls increased in abundance through time. If hunting artiodactyls in surrounding patches increased, it is expected that transportation costs increased. Increases in transported cost can be identified with skeletal part representation and isotopic analyses (Fisher 2010, Fisher and Valentine 2013). It is also critical to demonstrate that such hunting insufficiently met the energetic requirements from animal resources.

Evidence for Farming at Antelope Cave

Several questions about Virgin Anasazi settlement and subsistence are posed by the presence of sites such as Antelope Cave, which appears to have functioned as temporary living quarters for Anasazi peoples while they hunted and presumably planted and tended crops (Janetski and Hall 1983). For example, excavators recovered thousands of maize cobs and shucks as well as abundant squash and bean remains (see Table 2). We believe that such non-food by-products would not have been transported to Antelope Cave from village locations given the minimal caloric benefit. Also, Hugh Cutler's analysis (undated manuscript, Illinois State Museum) of corn cobs from MNA pit C revealed that 80 percent of the corn was eaten or shelled almost immediately after harvesting (see also Cutler and Mayer 1965). His conclusions are based on an observation that small fragments of a corn kernels' skin (pericarp) remain attached to the pedicel and are visible on the cobs after fresh, moist corn is eaten or shelled.

Concomitantly, with the exception of a few hearths, constructed site facilities are essentially non-existent in Antelope Cave. Puebloan peoples commonly constructed dwellings inside caves and overhangs, as Judd's (1926) work in Cottonwood Canyon near Kanab amply illustrated. The presumption is that if long term stays, as required by tending gardens, were intended, occupants would have invested in similar facilities. Below we attempt to resolve these somewhat contradictory lines of evidence.

The Antelope Cave data suggest that the Virgin Anasazi in the Uinkaret Plateau region were not practicing the traditional, sedentary strategy assumed for people in the Kayenta and Mesa Verde regions. Rather, Virgin Anasazi peoples may have developed a residentially mobile or transhumant strategy (see also Ambler et al. 1983; Fairley 1989:121). Transhumance suggests seasonal shifts in residence location, moves which are designed to meet subsistence and perhaps other life requirements. The traditional literature on the Pueblo I Virgin Anasazi settlement-subsistence strategies contains some speculation regarding seasonal mobility (see Altschul and Fairley 1989:120-121 for a review). Several researchers have advanced the notion of spring-summer occupations in lowland, riverine settings and fall-winter use of the uplands in the region (Aikens 1966; Heid 1982). Geib (1996:182) has offered a model of Puebloan seasonal movement between lowlands and highlands in the Glen Canyon region. Geib (1996) suggested that temperature gradients between the lowlands and highlands provided an opportunity for a mid-to late summer harvest in the lowland environments and a later fall harvest in highland areas. Schwartz et al. (1981) have posited a reverse pattern (i.e., summer highland occupation and winter lowland) for the Grand Canyon to the south during the slightly later A.D. 1050-1150 period. A paucity of survey data makes proposing a residentially mobile model for the Uinkaret Plateau difficult, an issue largely unchanged since Altschul and Fairley's (1989) excellent overview (see also O'Hara 2010).

Posing an appropriate analog for a transhumant or seasonally mobile pattern is also difficult. The modern Pueblo groups, such as the Hopi and others, who are considered by most to be descendants of the Anasazi, do not practice a strategy of seasonal movement. Nor did any Pueblo groups reside in the study area during the Historic period. Since the time of European contact, the only recorded Native Americans who occupied the region were the Uinkaret Band of the Southern Paiute (Kelly 1964). The Uinkaret people were hunter-gatherers, but the Kaibab to the east were recent horticulturalist (Kelly 1964; Fowler 1982; Kelly and Fowler 1986). We recognize that, although there are some similarities in the Kaibab and prehistoric Anasazi pattern (e.g., both made ceramics, practiced farming), there were also significant differences. The Anasazi architectural style and ceramic traditions were both more elaborated than the Southern Paiute. In addition, based on investments in storage facilities, the importance of agriculture was greater for the Anasazi than for the Southern Paiute. As a consequence, the application of a Southern Paiute analog must be made with caution.

In this context, we suggest a model of greater settlement mobility combined with the Hopi practice of double or triple cropping (Whiting 1966) is useful in understanding the regional pattern and the role of Antelope Cave within it. The purpose of such a strategy is to insure against crop failure. The Hopi planted crops in a variety of locales, such as in flood plains, in the mouth of draws, and on mesas. The area around Antelope Cave, including Clayhole Wash, likely offered flood plain and akchin settings which would perhaps complement crop production in mesa top environments. The assumption is that the fields were maintained and harvested during short term visits to these locales. Testing these ideas would require survey around the site to determine the feasibility of local gardening as well as to document the presence or absence of either field houses or residences. Although there is no known evidence for it, the cave may have also served as temporary storage for crops destined for transport to villages.

The probability that cave users spent time in more traditional Pueblos in other locations is supported by two lines of evidence. First, the parasitological data from human coprolites provide important insights regarding seasonal mobility. The high incidence of pinworm (*Enterobius vermiculais*) eggs (5 of 22 samples)

from Antelope Cave is comparable to that found at Ancestral Puebloan village sites; the comparable infection rates suggests that the occupants of the site likely came from more crowded conditions elsewhere (Fugassa et al. 2011). Furthermore, a high incidence of whipworm (*Trichuris vulpis*) in canid coprolites suggests that dogs came to Antelope Cave from a location with high canid population densities (Fugassa et al. 2011). Interestingly, despite the coprolite evidence of dogs at Antelope Cave, the faunal remains show no evidence of carnivore ravaging (e.g., density mediated destruction or markers of chewing or digestion). If visits to the cave were limited to harvesting crops and conducting rabbit drives, dogs may have been well supplied with jackrabbit viscera to the extent that they did not ravage the scrap bone. Second, the abundance and diversity of plant remains from both riverine and upland sites indicate that users spent time in such zones and carried important resources with them to Antelope Cave. While the presence of domesticated crops, including non-dietary portions of maize (e.g., pollen, stems, shucks, cobs), is indicative of local cultivation, the lack of storage and other site investments hints at the possibility that the processed product (i.e., shelled corn may have been transported to more permanent, densely packed settlements. Kelly (1964:39), for example, reported that the St. George Paiute traded "a small sack of corn" to the Kaibab Paiute; the description suggests corn was transported as kernels. An archaeological example comes from Cowboy Cave, which yielded two skin bags containing shelled corn (Jennings 1980:29). Both cases support the conclusion 1) that maize was grown locally, as it is unlikely that shucks, stems, and cobs would have been transported any distance, and 2) that maize grown in the vicinity of the cave would have been carried to distant locales as shelled kernels.

The many sandals recovered by researchers from MNA and UCLA also provide useful insights regarding site function and perhaps group composition. The total number of sandals taken out of the cave will probably never be known. However, the MNA collections combined with those from UCLA and the few collected by BYU bring the total to over 200, by far the majority of which are the round-toed, Pueblo I style (see Yoder 2009, 2010). Based on length measurements, Yoder has argued that all of the round-toed (Pueblo I) sandals from the cave available for his analysis were adult -size. The UCLA collection contains a single sandal fragment considered child-size. These data suggest that adults were the primary users of the cave, although it is possible that most children went barefoot. The evidence for residential groups is hard to ignore, however. For example, adult-sized sandals could have been worn by women. The presence of women is amply supported by the enormous quantity of plant remains and rabbit skin robe material, both of which are material consequences of activities assumed to be carried out by women (see Kelly 1964; Schwartz 1983 for gender roles of Southern Paiute and Havasupai). It is doubtful that women would be in the cave without children; consequently, we conclude that family groups were often present in the cave.

THE ROLE OF ANTELOPE CAVE IN THE VIRGIN ANASAZI SUBSISTENCE STRATEGY

How do the Antelope Cave data play into our understanding of Virgin Anasazi subsistence strategies? The massive quantity of leporid remains in Antelope Cave dating to the early Puebloan period points to the importance of hunting by Virgin Anasazi on the Uinkaret Plateau during the early Pueblo period. But these findings seem to contrast with the faunal data from some Anasazi sites in the St. George area, where the absence of faunal remains led to the conclusion that Virgin River Puebloans were full time horticulturalists (Aikens 1966; Dalley and McFadden 1985, 1988; Martin 1999). Excavations by the University of Utah at sites such as the Frei Site (Pendergast 1960), Gunlock Flats (Day 1966), and Three Mile Ruin (Aikens 1965); by the BLM at Red Cliffs and Little Man sites (Dalley and McFadden 1985, 1988); and by Walling et al. (1986) at Quail Creek Reservoir sites, recovered little in the way of animal bone. This variability could be due to several factors taken either individually or in combination: 1) differential screen sizes or the lack of screening altogether, 2) variable sample sizes, 3) sampling bias (whether or not portions of middens were excavated), 4) poor preservation, 5) variations in Anasazi strategies in the region, 6) differences in site function, or 7) temporal differences.

There is little doubt that the presence or absence of screening has biased the faunal data available for analysis. The two sites that contained the highest numbers of bone (42Ws1342 and NA5507) were both screened, and portions or all of the deposits were processed with eighth-inch screens. However, other sites that were screened (e.g., 42Ws1287, 42Ws1288, and 42Ws326) yielded few bones (2, 276, and 275 respectively), despite the excavation of rather large samples. Conversely, at least one site that was not screened (42Ws395 [Walling et al. 1986: Table 31]) yielded a significant sample of faunal bone (n = 429).

The variability seen among these sites may simply be a matter of differential sampling, either in the location of excavations or in the choice of faunal elements collected. More specifically, the differences may be a result of excavating only living areas (houses) and ignoring middens or dump areas, or collecting only complete or "interesting" bones. Allison (1990:88-89), for

example, noted that the small number of bones from Anasazi Valley site 42Ws1287 is most likely due to the fact that midden was not sampled. In support of that conclusion, he observed that all but three of the bones from 42Ws1288 came from midden deposits. Pendergast (1960:134) made a similar comment about the importance of sampling refuse areas to recover food scrap in his description of the work at the Frei Site. All 110 of the deer bones from the site apparently came from midden in the fill of the structures excavated. A similar pattern may be present at 42Ws326, where 173 of the 275 bones recovered came from an area east of the primary concentration of house and cist features (Baker and Billat 1992:81). Although this area (Cist Complex 3) was not labeled a midden in the report, it may have functioned as a dump. In addition, over half of the remaining bone came from structural fill, which may also represent dumping activities. At 42Ws395, the larger yield of bone may simply be the result of a sampling bias, as it was one of the largest excavations on the project. Significant quantities of the bone from here were recovered from structural fill also. A similar case can be made for the recovery of a fairly rich assemblage of faunal material from House 20 at Main Ridge (Harry and Watson 2010). However, Dalley and McFadden (1985, 1988) excavated significant samples of midden areas and still recovered minimal bone, although they did not screen.

Although differential data recovery techniques, biased sampling, and variable sampling size may account for a significant portion of the variability in the St. George Anasazi sites, these seem to fall short of explaining the patterning present in the archaeological record for the larger region. We suggest that attempting to sort Virgin Puebloan subsistence into either-or categories, such as primarily farming or a mix of wild food gathering and farming, falls short of capturing the complexity of the strategy.

For some limited archaeological illustration of this possibility, we turn to data from the work of Moffitt et al. (1978) on the Navajo-McCullough Transmission Line southwest of St. George and into northern Arizona, and to the data from Antelope Cave. The research of Moffitt et al. (1978) included survey and excavation in the Beaver Dam Mountains north of the Virgin River in extreme southwestern Utah. The seven sites that they investigated contained multiple occupations from the Archaic period through the Late Prehistoric and Historic Southern Paiute periods. All deposits were screened. Of the seven sites, three (NA11,405, NA11,408, and NA11,634) contained evidence of Virgin Anasazi use. NA11,634, for example, contained two roasting pits, probably for processing mescal, that also yielded Anasazi ceramics. At NA11,405 they found a wickiup depression (Wickiup Depression 3) that contained only Anasazi diagnostics, and another, Wickiup Depression 4, which contained a mixed assemblage of Anasazi and Southern Paiute sherds (Moffitt et al. 1978:11-20). Bone was more abundant here than at any of the other Beaver Dam Mountain sites, although the bone is reported as a single lot rather than by provenience; as a result, no specific statements can be made about Anasazi hunting activities. Large mammal bone was by far the most abundant class of faunal remains recovered, however.

All of the sites mentioned above are away from the river and tend to represent more ephemeral use than sites with formal architecture. Antelope Cave was also well away from the riverine setting and contrasts markedly from excavated structural sites. As noted, no constructed features (walls, cists) were encountered during either UCLA's or BYU's visits nor did Euler (personal communication, various) mention any such features. The absence of structural features suggests the cave functioned as a logistical outpost for both fall jackrabbit drives and an alternative location for strategically placed garden plots. The cave lies at a distance from residential sites on Short Creek or Little Creek and Lost Spring Mountains, the proposed sources for Antelope Cave visitors. In addition, travelers on their way across the Uinkaret Plateau may have used the cave to cache items, especially sandals, for future use. However, most of the objects from the excavations reflect the domestic activities of family groups living in the cave. Besides sandals, these include thousands of pieces of cordage (fiber, feather, fur, hair), basketry, pottery, and seed grinding implements.

Sites in uplands documented by Moffitt et al. (1978) as well as those in lower lying areas but away from the Virgin River corridor (see Talbot and Richens 2009) were also distant outposts that were important dietary procurement locales for the Anasazi. Most scholars working in the region are in agreement that maize was the primary component of Virgin Anasazi diet (e.g., Martin 1999; Watson 2008; Landon 2010); however, non-riverine sites such as Antelope Cave and perhaps Heaton Cave (Judd 1926) and Rock Canyon Shelter (Janetski et al. 2013) are critical nodes in a far-flung subsistence strategy. Martin's (1999) important study found that up to 75 percent of Virgin Anasazi diet consisted of plants with a $\delta^{13}C$ signature. The remaining 25 percent of the diet consisted of wild resources, including a wide array of plants and animals. The rich plant assemblages reported by Nelson et al. (2005) from the Reusch site as well as work by others (Allison 1990; Harry and Watson 2010; Landon 2010; Westfall et al. 1987 to name a few) make clear that gathering such resources was a continuous activity. Similarly, the many sites yielding faunal bone are evidence that animal protein was pursued aggressively and successfully.

Along the Virgin River, large game appears to have been most important. The high frequency of artiodac-

tyls at structural sites in riverine contexts may be due to the concentration of settlements in the region, as Harry and Watson (2010) noted. This compaction likely would have resulted in resource depression of locally available large game, while simultaneously decreasing the hunting pressure of prey populations in surrounding areas. In such a case, central place foraging from structural sites may result in no apparent resource depression of artiodactyls in the archaeological record (Cannon 2000). Ugan and Coltrain (2012), for example, have demonstrated the importance of leporids as a source of protein among Fremont farmers in the Parowan Valley just north of the St George Basin, despite the fact that the site (Median Village) archaeofauna contained an overwhelming number of small artiodactyl remains. Their study hints at the importance of rabbit drives and may help explain the unique assemblage at Antelope Cave.

CONCLUSION

Antelope Cave is an important dry site that contains a unique and rich array of material culture and subsistence data for the Uinkaret Plateau area. Our interpretation of the recovered data is that family groups, who traveled here from residences elsewhere, used Antelope Cave as a point location for seasonal rabbit drives. Those drives not only captured much desired protein but procured valuable raw material for rabbit skin robes widely used across the arid west for protection against the elements. Evidence from the cave also suggests the occupants hedged against stressful times by planting crops nearby that would have been available for harvest at about the same time as the rabbit drives. Antelope Cave exemplifies the importance of procurement points at some distance from villages. The apparent variability in subsistence-related debris may represent the material remains of a strategy that included farming as well as fairly complex logistical efforts to exploit wild resources, some of which were transported to residences (see Lyneis 1995 for a review of Virgin settlement-subsistence models). These patterns are difficult to tease apart given the gross character of the available dating tools and seasonality indicators. Recent work that has established more consistent recovery techniques and that has addressed more specific questions has helped to refine our understanding of Virgin Anasazi subsistence strategies.

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Notes

1. Mr. Floyd Atkin related this early site history during a on-site visit with the BYU crews in 1986 and during a phone conversation in 2009. In 1986 the Atkin family (Luen Atkin Woodbury and Floyd Atkin, daughter and son of William Atkin respectively) donated several objects (two sandals, a net fragment, and a wooden "rabbit club") to the Museum of Peoples and Cultures at Brigham Young University. At one point a significant portion of the Atkin collection was provided to Jim Johnson for a private museum in St George. After Johnson's death, some of the collection was returned to the Atkin family.

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SOCIAL IDENTITY AND POLITICAL COMPETITION IN A CULTURALLY DIVERSE LANDSCAPE: DECORATED POTTERY FROM THE MESCAL WASH SITE, SOUTHEASTERN ARIZONA

Christopher P. Garraty

ABSTRACT

An analysis of Middle Formative period (A.D. 750–1150) painted sherds from the Mescal Wash Site (AZ EE:2:51 [ASM]) in southeastern Arizona highlights the use of decorated serving vessels as media for expressing social identity under conditions of political competition and instability. Southeastern Arizona was a culturally diverse landscape, and interaction among peoples of different backgrounds was recurrent, creating a heightened awareness of identity. A large excavated collection and fine-grained chronology permitted a detailed quantitative study of changes in decorated ceramic use. Results of analysis suggest that social identities were fluid and ephemeral in response to rampant social change and perturbations in extra-local social affiliations and relationships.

Unlike other regions of the U.S. Southwest, prehistoric southeastern Arizona is not marked by a single dominant material cultural tradition but, rather, incorporated a heterogeneous mix of material culture traits, including attributes of the Hohokam, Salado, Mogollon, Trincheras, and Chihuahuan traditions (e.g., Fulton and Tuthill 1940; Heckman et al. 2000; Tuthill 1947; Vanderpot and Altschul 2007). Southeastern Arizona is traversed by the San Pedro River, which was used as a transportation artery between the desert and grasslands and facilitated transmission of people, ideas, and material culture. Consequently, questions concerning cultural diversity and social interaction among groups from different cultural backgrounds are crucial for this region (Vanderpot and Altschul 2007). I address the question of multiculturalism and social interaction in southeastern Arizona based on a longitudinal analysis of decorated serving vessels from the Mescal Wash Site (Mescal Wash, for short). Building on hypotheses put forth by Vanderpot and Altschul (2007), I posit that decorated serving vessels were used as media for expressing social identity under conditions of political competition and instability (Hayden 1995, 1998), My argument is based on the assumption that decorated vessels offered an effective visual medium for expressing social affiliation and identity in the past, because they exhibit salient decorative attributes that were recognizable to viewers and widely associated with specific regional cultural traditions (Junker 2001:289; Mills 2007:212-213; Twiss 2008:422). I also assume that decorated pots were frequently used for preparing and serving food and drinks during suprahousehold commensal feasts, which heightened their public visibility (e.g., Bray 2003; Clark and Blake 1994; Dietler 1996; Mills 2007; Twiss 2008; Wills and Crown 2004).

Mescal Wash (AZ EE:2:51 [ASM]) is a large multicomponent site located about 50 km southeast of Tucson (Figure 1). It was occupied over a long span but most intensively during the Middle Formative period from about A.D. 700 to 1150 (Vanderpot and Altschul 2007:56-61). During this latter period, which correlates with Colonial and Sedentary periods in the Hohokam sequence, Mescal Wash was situated in an area that Vanderpot and Altschul (2007:65-69) describe as a cultural frontier along the "interstices" of various neighboring regional traditions, principally the Phoenix and Tucson Basin Hohokam and Dragoon traditions (see also Altschul et al. 2000). The site is located along Cienega Creek, a logistically practical transportation route between the San Pedro Valley to the east and the Tucson Basin to the west (Vanderpot and Altschul 2007:67). Based on its location, travel and interaction among individuals and groups from different cultural

Christopher P. Garraty / Logan Simpson Design Inc. / cgarraty@lsdaz.com

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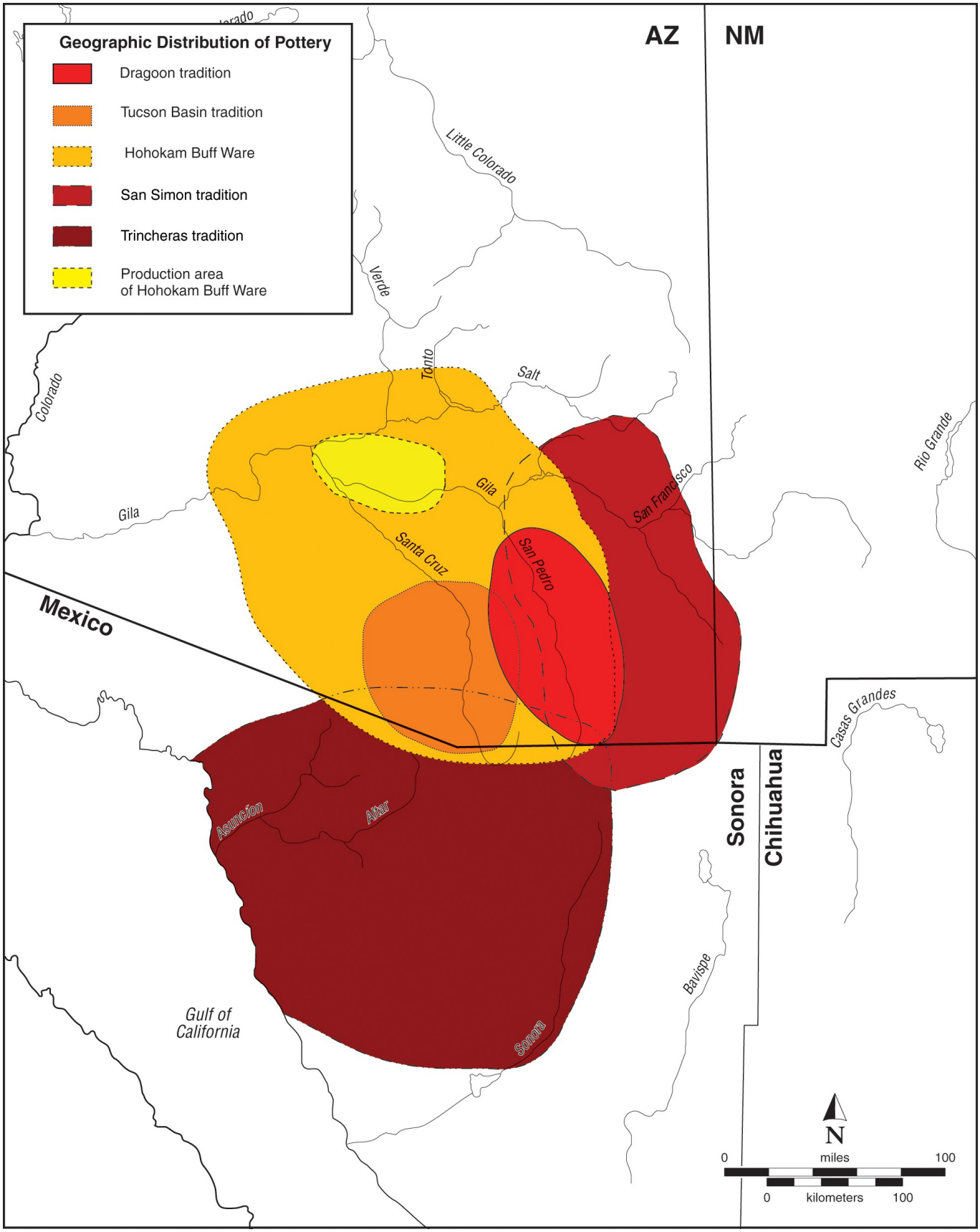


Figure 1. Approximate boundaries of the culture areas and painted-pottery traditions discussed in the text (Vanderpot and Heilen 2011:Figure 20) (courtesy of Statistical Research, Inc.).

traditions was probably commonplace in the Mescal Wash area.

Interaction among groups from different cultural backgrounds is evidenced at Mescal Wash by diverse material culture as well as variability in mortuary practices and architecture among seemingly contemporaneous features (Garraty et al. 2011; Vanderpot 2001:12, 15-16; Vanderpot and Altschul 2007). Based on this evidence, Vanderpot and Altschul (2007:65-68) put forth various hypotheses to explain the diversity of material traits. Their proposals included sequential occupation by culturally distinct groups, co-residence by different ethnic groups, and occupation by generally continuous population of local residents who selectively borrowed material culture expressions from neighboring traditions. They concluded that elements of all three hypothesis may be relevant and hypothesize that Mescal Wash might have functioned as neutral and unaffiliated "free zone" where groups and individuals from various cultural backgrounds separately and autonomously stewarded and shared resources available in the vicinity (Vanderpot and Altschul 2007:68-69)

Regardless of the root causes of multiculturalism, the occupants of Mescal Wash no doubt recognized this diverse social and cultural landscape and shaped their actions and culture material expressions accordingly. Social expressions of identity were crucial in frontier areas where pre-Hispanic peoples from different backgrounds came into frequent contact. The crystallization of social identities is an interactive and dynamic process: social groups do not construct and perpetuate their ethnic identities in a vacuum but, rather, in relation to other groups (e.g., Barth 1969). As Duff (2002:xiii) explained, "Understanding how individuals perceived their own identity in relation to others is critical for the reconstruction of local and regional social organization." In the pre-Hispanic city of Teotihuacan in highland central Mexico, for example, enclaves of peoples with ancestral roots in Oaxaca and the Gulf lowlands for centuries highlighted and sustained certain material culture traits from their homelands as a means of emphasizing their identities relative to the city's indigenous population—even after those traits became anachronistic and passé in their native lands (Spence 1992, 1996).

Social groups may variably emphasize and express specific material culture traits or symbols depending on the frequency and duration of interaction with "outsiders." Consequently, material expressions of identity and affiliation may be more pronounced and competitive during periods of social change or disruption (Hill 1996; Mills 2004; Peeples 2011). Public events, such as commensal feasts, provided ideal contexts for expressions of identity and affiliation in multicultural contexts (e.g., Dietler 1996; Wills and Crown 2004). Suprahousehold commensal feasts and ritual gatherings likely were frequent during the Pre-Classic period among the Hohokam, especially in villages with ball courts (Abbott 2006; Abbott et al. 2007; Wilcox and Sternberg 1983). Ball courts offered prime venues for the consumption, display, and possible exchange of socially meaningful material culture (Bayman 2002:77). No ball courts have been documented in the immediate Mescal Wash vicinity (the nearest documented ball court is approximately 25 km away; Ferg 1984:110-114), but we cannot rule out that suprahousehold feasting and commensal gatherings were commonplace at larger non-ball court settlements in the region, including Mescal Wash. In fact, the establishment of regular public gatherings at the ball court villages may have encouraged comparable (and possibly competing) public events at some non-ball court settlements.

In this paper I present the results of a longitudinal study of decorated ceramics from a portion of Mescal Wash excavated by Statistical Research Inc. (SRI) in 2001 (see Vanderpot, 2011 and Vanderpot and Heilen 2011). The site's diverse character is evidenced by a complex mix of decorated pottery associated with multiple regional traditions in the southern deserts, mainly the Tucson and Phoenix Basin painted wares associated with Hohokam tradition and the Dragoon and San Simon Series painted wares associated with Mogollon tradition (Garraty and Heckman 2011). My goal is to distinguish diachronic trends in this complex array of decorated wares and, based on that evidence, disentangle the complex ways that the site's inhabitants expressed identities and affiliations through the medium of visually distinctive painted pottery.

The large number of features recorded at the site (see Vanderpot 2011) and high-resolution chronology (Lengyel 2011a) offer a strong empirical foundation for exploring the temporal and spatial dimensions of decorated pottery use. Given the enormous scope of this project, however, I concentrate here mainly on the temporal dimension and refer the reader to Garraty and Heckman's (2011) longer chapter for a discussion of intra-site spatial variability.

SITE BACKGROUND AND CERAMIC COLLECTION

In 2001, SRI mechanically stripped 13,262 m^2 in Mescal Wash and exposed over 2,000 subsurface features, about one-quarter of which were excavated, including structures, extramural thermal and non-thermal pits, middens, and human burials (Figure 2). The site was organized into eight loci, labeled Loci A–H in Figure 2. SRI's data recovery focused mainly on Loci A, C, and D, especially the latter locus. The dense concentration of features in Locus D mostly was assigned

Figure 2. Map of the Mescal Wash site, showing excavated features and Phase 1 and Phase 2 excavation units (Vanderpot 2011:Figure 3.2) (courtesy of Statistical Research, Inc.).

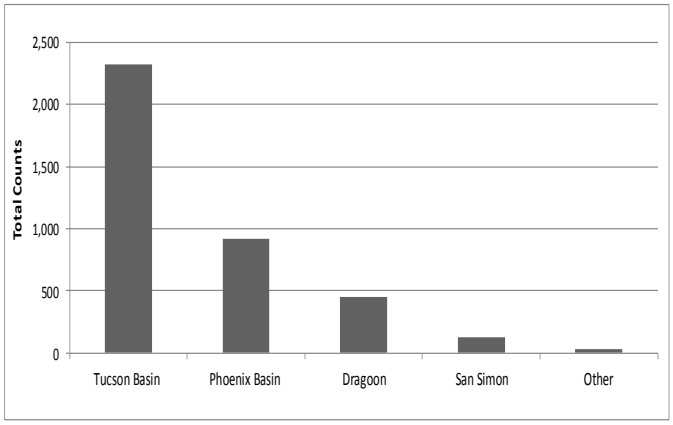


Figure 3. Bar chart showing frequencies of ceramic artifacts assigned to each of the major regional painted-pottery traditions.

to the early portion of the Middle Formative (A.D. 750 –950), called the Middle Formative A period here. Features in Loci A and C mostly were assigned to the subsequent Middle Formative B period (A.D. 950–1150).

SRI archaeologists recovered 54,076 ceramic artifacts during data recovery investigations in Loci A, C, and D; this figure does not include ceramics from mortuary features (Garraty and Heckman 2011). Unfortunately, nearly half of the collection (48 percent) consisted of very small sherds that were too small for analysts to classify by ware or type (Garraty and Heckman [2011] discuss various formation processes likely responsible for the high rates of ceramic breakage.). My analysis here relies on the remaining 52 percent of the collection consisting of larger sherds and whole or partial vessels (see Garraty and Heckman (2011) for a detailed discussion of the analytical methods and classification protocols). Sherds and vessels with painted decoration comprise 21 percent of the collection (excluding very small sherds). Slightly more than one-third of the painted ceramics were classified as Tucson Basin Hohokam wares, mainly red-on-brown wares (Figure 3). Also prevalent were painted types associated with the Phoenix Basin Hohokam tradition (Middle Gila Buff Ware), which accounts for one-quarter of painted ceramics, and Dragoon and San Simon Series types, which together account for 10 percent. Lower-frequency categories include Trincheras, Mimbres, San Carlos, and Babocomari wares.

DECORATED POTTERY FROM MESCAL WASH

Vanderpot and Altschul (2007) emphasized the material cultural and architectural influences from the geographically proximate Tucson Basin and Dragoon traditions, but Middle Gila Buff Ware ceramics associated with the more-distant Phoenix Basin outnumber Dragoon Series painted ceramics by a considerable margin. As this observation makes clear, proportional representations of painted ware categories do not reflect geographical distances from the inferred regions associated with them, although it is possible that local potters deliberately and selectively imitated "foreign" painting styles and motifs (provenance analysis of ceramics clays, paints, or non-plastic inclusions will help resolve this question.)

Moreover, painted ware proportions suggest that the Middle Formative period inhabitants of Mescal Wash maintained stronger social and economic ties to the Hohokam traditions to the west and northwest than they did to the Mogollon traditions to the east, an inference borne out by an examination of vessel forms. Garraty and Heckman's (2011) detailed functional analyses of painted vessels and rims showed that the site inhabitants procured (or imitated) a variety of forms from the Phoenix and Tucson Basins, but they procured bowls almost exclusively from the San Pedro (Dragoon Series) and San Simon Valleys (Table 1). The ratio of bowls to jars among the Hohokam painted rims and vessels (both Tucson and Phoenix Basin styles) is roughly 4:1 , compared to approximately 26:1 among Dragoon Series, San Simon Series, and other foreign-style painted rims and vessels. Dragoon and San Simon Series wares were manufactured as both bowls and jars (Heckman et al. 2000); thus, this pattern cannot be ascribed to production frequency or a restricted availability of Dragoon and San Simon Series jars. The evidence implies that Hohokam painted vessels from the Phoenix and Tucson Basin traditions

Table 1. Matrix summarizing the relationship between the regional communities and the forms and sizes of vessels associated with the major painted pottery traditions.

Regional Painted Tradition	Approx. Distance	Vessel form	Vessel size
Tucson Basin Hohokam	Nearby	Variety of bowl and jar forms	Small and Large vessels
Phoenix Basin Hohokam	Distant	Variety of bowl and jar forms	Mostly small
Dragoon Series	Nearby	Mostly/all bowls	Small and Large vessels
San Simon Series	Distant	Mostly/all bowls	Mostly small
Other Non-Local Traditions	Distant	Mostly/all bowls	Mostly small

were used for everyday domestic tasks, such as serving food and drink, cooking, and storage. It also implies a certain level of familiarity with—and possibly a stronger social connection with—the Hohokam cultural traditions. By contrast, non-Hohokam vessels may have been regarded as "exotic" trade wares that were mainly used as serving containers (bowls). This conception implies socially distant ties to the Mogollon region relative to the Hohokam region.

Vessels associated with the Tucson Basin and Dragoon Series painted traditions tend to be larger (based on orifice diameters) than those associated with the more-distant Phoenix Basin, San Simon, and other traditions (see Table 1; see Garraty and Heckman [2011] for details). Assuming that some or most of the painted pottery was physically imported from these regions, it stands to reason that smaller, lighter, and less bulky merchandise was brought in from distant sources, given the logistical difficulties inherent in having human carriers move heavy pottery over rugged terrain. More perplexing, however, is that, despite their generally smaller size, about 20 percent of the Middle Gila Buff Ware vessels (possibly imported from the Phoenix Basin) were jar forms of varying shapes. Bowls and other unrestricted vessel forms (e.g., plates) are easily stacked for transport (e.g., Zedeño 1994), but less-stackable jars likely presented logistical limitations for long-distance exchange. If the Middle Gila Buff Ware jars were imported from the Phoenix Basin, then the inhabitants of Mescal Wash seem to have been willing to shoulder a heavy burden to obtain them (or pay for others to do so). Furthermore, if Middle Gila Buff Ware vessels were regarded as a vital component of a ritual toolkit, as Whittlesey (1997:441-443) and Abbott et al. (2001) have proposed, then the high transportation cost may have been regarded as a necessary burden (following Spielmann 2002).

LONGITUDINAL TRENDS IN DECORATED POTTERY FREQUENCIES

Creating Refined Chronological Groups

A crucial component of this study is the fine-grained chronology and occupation sequence derived from Lengyel's (2011a) archaeomagnetic (AM) analysis. Lengyel used AM data—combined with inspections of feature radiocarbon dates, stratigraphic relationships, and temporally diagnostic artifacts (projectile points, ceramic cross-dating)—to group selected features (mainly structures) into one of six occupation episodes during the Middle Formative period (Table 2). Although Lengyel considered multiple lines of evidence, she primarily relied on the chronometric and stratigraphic evidence and used the artifact evidence to crosscheck her interpretations. Hence, her inferred episodes are largely independent from the painted ceramic evidence. Lengyel's statistical analyses indicate that features assigned to each of the six occupation episodes were contemporaneous and not coeval with those assigned to different episodes. I refer to these groups of contemporaneous features as AM groups, which offer a fine-grained basis for inferring diachronic changes in painted pottery use over successive occupation episodes. These AM groups comprise the analytical units used for my longitudinal analysis below.

The inferred date ranges listed in Table 2 are the minimum inclusive time spans, i.e., they include the latest inferred starting dates and earliest ending dates among the analyzed features. The lengths of the date ranges vary considerably, and several of them overlap. For my purposes, however, precise time estimates are not as crucial as the relative diachronic sequence itself. Importantly, AM Groups 3, 4, and 5 seem to encompass relatively brief and heavily overlapping date ranges during the mid to late A.D. 900s and early 1000s. This result suggests a rapid succession of short-lived occupations with abrupt changes in settlement pattern. Distinct residential and domestic features were assigned to these groups. This time span is crucial for understanding changes in decorated pottery use under conditions of rapid social change corresponding to the end of the Middle Formative A period and the beginning of the Middle Formative B period.

It is not clear whether this proposed sequence of rapid social change reflects a trend of rapid abandonment and reoccupation by different groups (or even repeated occupation by the same group) or a pattern of shifting settlement choices by a stable residential group that continuously occupied the site (Vanderpot and Altschul 2007). Additional evidence will be required to fully corroborate these hypotheses. However, the ceramic evidence presented below tentatively supports the latter hypothesis that a single and continuous residential population (or possibly a single group of recurrent occupants) selectively obtained or imitated painted pottery vessels affiliated with neighboring traditions. I explore the implications of this inference in the following sections.

Evaluating Longitudinal Changes in Decorated Pottery Frequencies

Changes in the percentages of painted and unpainted wares among the six AM groups indicate an increase over time in the use of decorated pottery relative to undecorated pottery at Mescal Wash (Figure 4). Above, I hypothesized that AM Groups 3, 4, and 5 indicate a succession of relatively short-term occupations or seemingly rapid changes in settlement pattern. These three groups are also associated with a pronounced pattern of increasing proportions of painted pottery; the increase indicates a surge in the rate of

Table 2. AM groups and inferred date ranges (adapted from Lengyel 2011a and 2011b).

AM Group	Feature No.	Feature type	AM date range*	Inferred date range	Inferred Period
Group 1	438	Structure	A.D. 735-865	A.D. 785-840	Early Middle Formative A
	492	Structure	A.D. 735-840		
	565	Structure	A.D. 735-840		
	3679	Structure	A.D. 735-865		
	7559	Structure	A.D. 785-840		
	7880	Structure	A.D. 735-865		
	8655	Structure	~A.D. 850		
	8842	Structure	A.D. 735-840		
	9867	Structure	A.D. 760-840		
	10560	Structure	A.D. 735-840		
	11342	Non-thermal pit	A.D. 760-840		
Group 2	3696	Roasting pit	A.D. 835-915	A.D. 835-915	Late Middle Formative A
	4682	Structure	~A.D. 900		
Group 3	2195	Structure	A.D. 835-990	A.D. 960-990	Middle Formative A-B transition
	3545	Structure	A.D. 960-1015		
	6129	Structure	A.D. 935-1000		
	10561	Structure	A.D. 835-990		
	10781	Structure	A.D. 935-1015		
Group 4	3569	Structure	A.D. 935-1015	A.D. 935-1015	Middle Formative A-B transition
	3818	Horno	A.D. 935-1015		
	6154	Structure	A.D. 935-1015		
	7201	Structure	A.D. 935-1015		
	10729	Structure	A.D. 935-1015		
	10782	Structure	A.D. 935-1015		
Group 5	1189	Structure	A.D. 935-1040	A.D. 935-1015	Middle Formative A-B transition
	2160	Structure	A.D. 935-1040		
	3663	Structure	A.D. 935-1040		
	6095	Structure	A.D. 935-1040		
	6098	Structure	A.D. 935-1015		
Group 6	200	Structure	A.D. 935-1040	A.D. 1010-1040	Middle Formative B
	207	Structure	A.D. 935-1150		
	290	Structure	A.D. 1010-1150		
	379	Structure	A.D. 1010-1140		
	2157	Structure	A.D. 935-1040		
	4768	Structure	A.D. 1010-1090		
	4931	Roasting pit	A.D. 985-1315		
	6138	Structure	A.D. 935-1315		
	6153	Structure	A.D. 1010-1040		
	7153	Horno	A.D. 985-1040		
	7461	Structure	A.D. 935-1040		

*From Lengyel 2011b

Figure 4. Longitudinal changes in percentages of painted and unpainted ceramic artifacts.

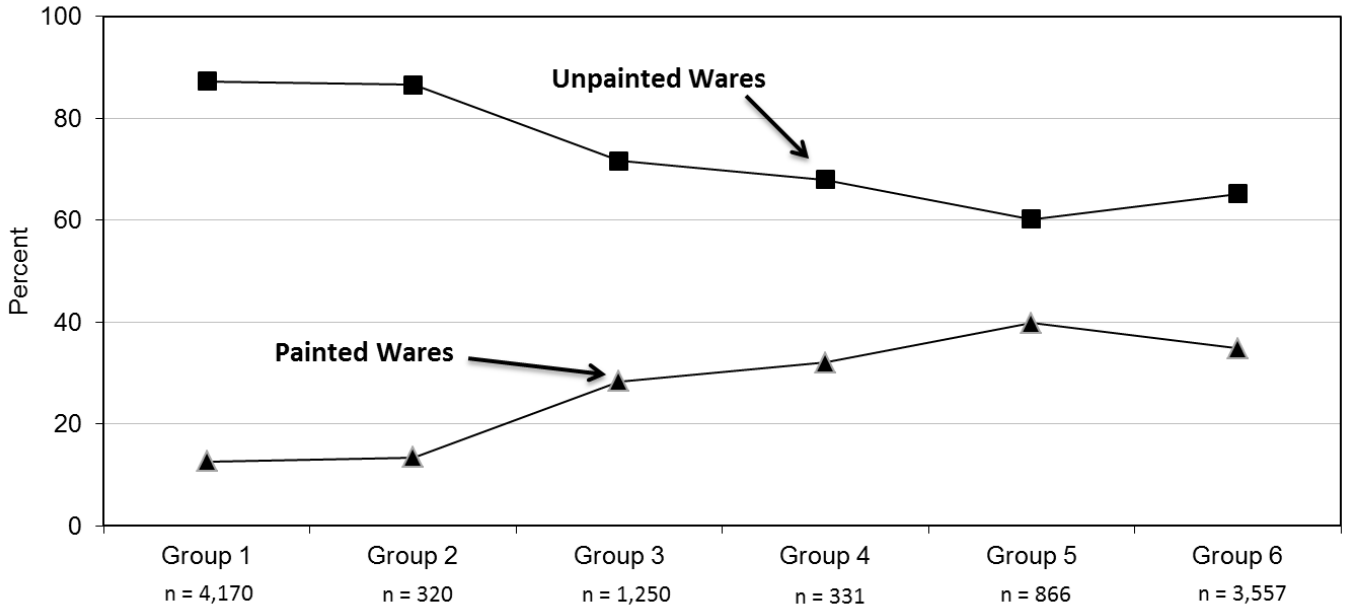
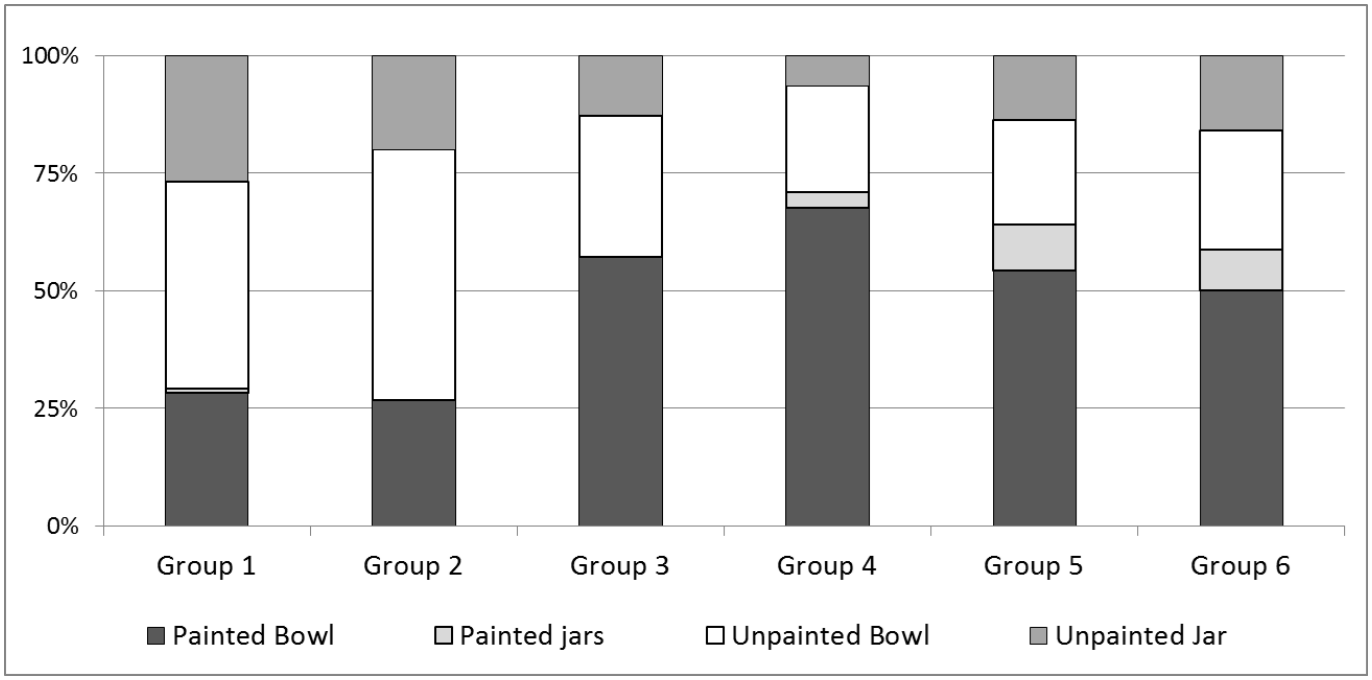


Figure 5. Longitudinal changes in percentages of painted and unpainted bowls and jars (rim sherds only).



painted pottery use during the Middle Formative A-B transition and early Middle Formative B period.

In line with this finding, the percentages of painted bowls and jars also increase substantially from the Middle Formative A period (Groups 1 and 2) to the Middle Formative A-B transition (AM Groups 3-5) and Middle Formative B period (AM Group 6). Painted bowls and jars partially replaced unpainted bowls and jars over time in household pottery inventories (Figure 5). The changes illustrated in Figure 5 also suggest that the process of replacing unpainted vessels with painted ones began with bowls and later was extended to jars. This longitudinal trend implies a shift in how the inhabitants of Mescal Wash viewed and used domestic pottery. They appear to have increasingly perceived and used household bowls and jars as media for exhibiting or communicating social information.

Figure 6 more narrowly illustrates changes in proportions of painted ware categories associated with the various regional traditions. Frequencies of Middle Gila Buff Ware generally decline over time, and frequencies of Tucson Brown Ware generally increase, especially in AM Groups 5 and 6. However, AM Group 4 shows a slight reversal in these trends, i.e., a small increase in Middle Gila Buff Wares and decrease in Tucson Brown Wares relative to preceding Group 3. The Dragoon Series painted wares show non-sequential peaks in AM Groups 1 and 4. Notable also is that AM Group 3 exhibits a more diverse mix of painted wares than the other groups: painted wares assigned to this group include those affiliated with the Tucson Basin, Phoenix Basin, Dragoon, San Simon, and Trincheras traditions. This pattern of diversification suggests an expansion of interregional-scale social and economic relationships in Mescal Wash during the onset of the Middle Formative A-B transition.

Figure 6 shows variability in frequencies of specific painted categories among the AM groups, but it does not provide an effective visual medium for illustrating the rate or "degree" of proportional changes in painted ware frequencies over successive occupation episodes. One way to quantify these changes is to evaluate similarities in percentages of painted ware classes between successive AM groups. I evaluate inter-group similarities using Brainerd-Robinson (BR) coefficients of similarity, which measure similarity between pairs of collections calculated as percentages (Brainerd 1955; Robinson 1955). The BR calculation is 200 minus the sum of the differences in type percentages between the two collections, so that a score of 200 indicates maximum similarity, and a score of zero indicates maximum difference. For ease of interpretation, I scale the BR scores as proportions between 0 and 1, with a value of 1 indicating maximum similarity. I separately assess changes in frequencies of painted and unpainted wares. The latter sherds and vessels were classified into types mainly based on paste and surface treatment attributes (see Garraty and Heckman 2011).

For unpainted wares, between-group BR scores are relatively high throughout the AM-group sequence; they range from approximately .85 to .95. The scores suggest little change over time in consumption choices and preferences for everyday undecorated utility wares (Figure 7). The type definitions for unpainted wares were based on broadly defined temper-inclusion attributes and surface-treatment characteristics. The relative stability of these attributes over time indicates generally stable and continuous technological attributes and raw materials for plain wares. This trend further implies a consistent and repeated pattern of domestic procurement for unpainted utility wares. Unpainted wares are less likely than painted wares to have been selected to communicate social information (e.g., social affiliation) to a community-scale public audience (Twiss 2012; but cf. Bowser and Patton 2004), and, if so, they were less sensitive to perturbations in suprahousehold social relationships. However, unpainted utilitarian wares no doubt were sensitive to changes in "supply-side" factors, such as provisioning networks and raw materials selection by different producers. This evidence implies relatively stable provisioning networks for quotidian domestic wares during the Middle Formative period and also supports the hypothesis of a continuous population rather than a succession of culturally distinct groups.

In contrast, the generally lower BR scores for the painted wares (from roughly .50 to .80) suggest more pronounced changes over time in consumption choices and preferences. For the painted wares, the transitions between AM Groups 1 and 2 (BR= .72) and between Groups 2 and 3 (.79) do not suggest pronounced changes in painted pottery use and preferences during the Middle Formative A period. However, pronounced changes are more striking between AM Groups 3 and 4 (.64) and between Groups 4 and 5 (.55), especially the latter, as evidenced by the declining BR values. The high BR score between AM Groups 5 and 6 (.92) again suggests little change in painted pottery preferences during the late Middle Formative B period. Again, this evidence suggests pronounced changes in painted pottery preferences and procurement during the Middle Formative A-B transition and early Middle Formative B period.

The erratic trend of longitudinal change for painted pottery contrasts with the relatively stable trend for unpainted pottery. If the BR-score trends had suggested comparable perturbations for both decorated and undecorated pottery use, I would attribute the changes to economic causes, i.e., to rapid shifts in household provisioning and trade connections. However, rapid and erratic changes are evident only in painted pottery frequencies. These changes more likely were predicat-

Figure 6. Longitudinal changes in percentages of painted wares associated with various regional traditions.

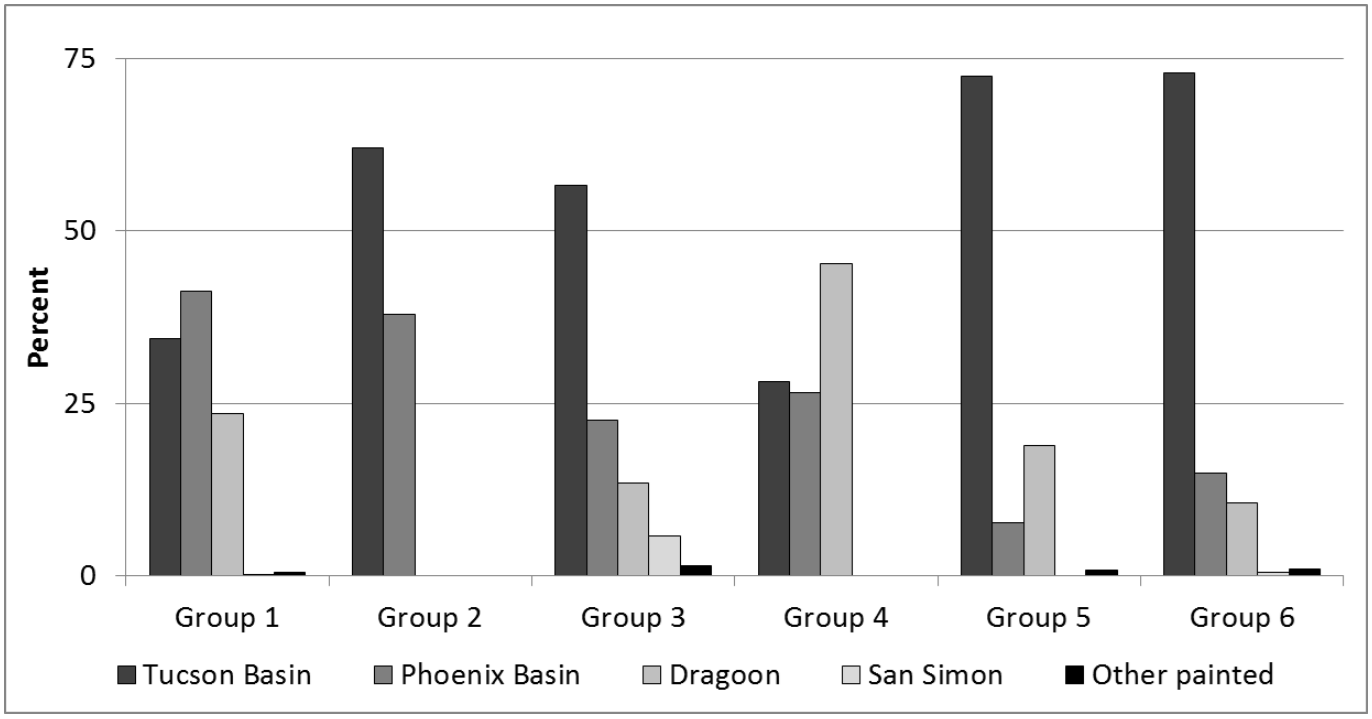
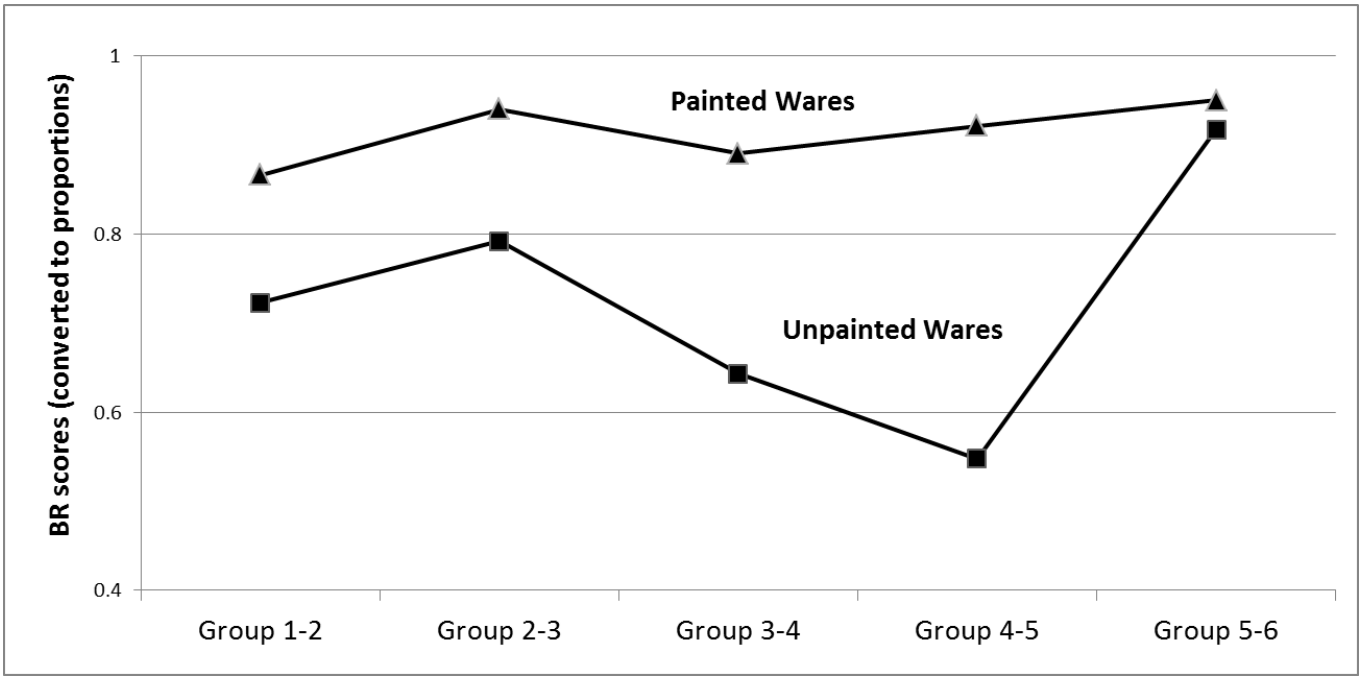


Figure 7. Longitudinal changes in between-group Brainerd-Robinson (BR) coefficients.



ed on changes in pottery users' preferences, which in turn may have been linked to changes in the ways that the inhabitants of Mescal Wash used painted pottery to express social identity and affiliations with extra-local regional communities. I explore the social implications of these trends in the following discussion.

DISCUSSION: SUPRAHOUSEHOLD FACTIONS AND SOCIAL IDENTITY IN MESCAL WASH

Based on the evidence presented above, I propose that the Middle Formative period inhabitants of Mescal Wash used painted pottery vessels as a medium (likely one of multiple material-culture media) for expressing social identity under conditions of increasing suprahousehold political competition and instability. Bayman (2002) emphasized the importance of a communal ideology of corporate group membership and identity among the Pre-Classic Hohokam. He concluded that marine shell bracelets, a common adornment among the Hohokam, were insignia of group membership and a communal ideology and interpreted marine shell ornaments as paraphernalia used in connection with public ritual events. Like shell adornments, painted vessels also could have functioned as insignia of group membership and identity. Decorative patterns probably could be identified with specific regional traditions and, therefore, were ideal for conveying information about social identity. It is therefore plausible that local potters imported or locally manufactured painted pottery as tokens of identity, affiliation, or ritual performance. I further posit that, under conditions of social transformation during the Middle Formative A-B transition, expressions of affiliation with non-local cultural traditions may have become erratic and unsteady, and thus created the longitudinal changes in painted pottery frequencies observed in the Mescal Wash collection.

In my view, the changing frequencies of painted wares are best explained in terms of "demand-side" factors, specifically, the variability over time and space regarding how pottery users chose to express their social identities and affiliations through the medium of painted pottery. Other explanations for ceramic diversity—such as successive waves of migration by different groups or "supply side" factors related to economic provisioning—fail to account for the ceramic evidence. The residential features containing diverse painted pottery proportions were contemporaneous. The dating of these assemblages and features diminishes the possibility that different migrating groups (each with their native painted pottery) settled the site at different times (see Garraty and Heckman 2011; Vanderpot and Altschul 2007). Furthermore, as the Brainerd-Robinson study above makes clear, longitudinal changes in frequencies of painted wares are generally variable and erratic, but plain ware type frequencies are consistent. This trend implies consistency and stability in domestic provisioning during the Middle Formative period; if so, the observed changes in painted ware frequencies cannot be readily explained as a matter of "supply-side" factors, such as shifting domestic provisioning networks. In addition, the regional painted wares discussed in this paper (Middle Gila Buff Ware, Tucson Basin Brown Ware, and Dragoon and San Simon series pottery) were produced throughout the Middle Formative sequence (see Heckman et al. 2000), and thus the longitudinal changes described above cannot be ascribed to availability and the duration over which those wares were manufactured and circulated. (To be sure, the scale of Middle Gila Buff Ware declined precipitously after about A.D. 1060 [Abbott 2006], but that period of decline postdates all but the final AM group discussed above.)

My argument rests on the idea that suprahousehold-scale commensal feasts and public gatherings were relatively frequent and well attended at Mescal Wash during the Middle Formative period. The evidence for this scale of feasting activity at Mescal Wash is tentative, pending the results of additional lines of evidence (e.g., faunal and botanical evidence), but several lines of evidence support the possibility. One line of evidence for feasting is the presence of large outdoor cooking facilities to prepare food for large suprahousehold gatherings (e.g., Hayden 2001:49; Twiss 2008; Wiessner 2001). At Mescal Wash, 70 extramural thermal pits were partially or fully excavated during SRI's investigations. Twenty one of these features (30 percent) were defined as large cooking pits (e.g., large roasting pits and hornos; see Vanderpot 2011). Some or all of the large thermal pits may have been used to prepare comestibles for public feasts. It is difficult to evaluate this percentage, however, without comparative evidence of thermal pit sizes and frequencies from contemporaneous sites in southeastern Arizona. Refined temporal assignments for these pits would also aid interpretation.

Another possible indicator of feasting is the presence of special disposal areas to accommodate the tremendous amount of refuse generated during communal feasts (Clarke 2001; Twiss 2008:420). In Locus A, Garraty and Heckman (2011) found that both the percentages of painted ceramics and the ratios of bowls to jars were substantially higher in extramural pits than in intramural features and middens. These pits may have contained accumulated refuse from outdoor suprahousehold communal feasts; conversely, everyday domestic trash and other debris were likely deposited in middens and abandoned structures. (This same pattern was not recognized in Loci C and D, which like-

ly reflects the more robust presence of Middle Formative A components in these loci, during which commensal feasting appears to have been less prevalent.)

Assuming that public feasting was prevalent at Mescal Wash during the Middle Formative period—especially during the transitional Middle Formative A-B and Middle Formative B periods—painted vessels would have provided ideal media expressing group membership and affiliation (Mills 2007; Spielmann 2004; Van Keuren 2004). Painted vessels would have been highly visible and readily displayed during public commensal gatherings in which food, drink, and intoxicants were shared (Junker 2001:289; Mills 2007; Twiss 2008). This hypothesis accommodates the inferred large volume of foreign-style painted pottery in the site collection and accounts for variability in percentages of painted pottery ware classes among contemporaneous features (see Garraty and Heckman 2011).

The refined chronological study highlights a series of especially rapid changes in decorated pottery preferences and affiliations over what seem to be relatively short time spans during the A.D. 900s and early 1000s (AM Groups 3-5). This rapid turnover in settlements—coupled with the shifting proportions of decorated pottery wares—suggests that the Middle Formative A-B period transition was a time of social disruption, instability, and rapidly shifting extra-local alliances. Affiliations with external communities, whether real or fictive, provided a source of political capital for aspiring leaders and suprahousehold factions vying for power. In this scenario, the increasing diversity and frequencies of painted pottery wares during the Middle Formative A-B period transition possibly indicate an acceptance or "buying into" foreign ritual practices or ideologies (Clark and Blake 1994; see also Crown 1994; Whittlesey 1997).

Although spatial analysis is not the focus of this article, it is worth noting that the painted pottery distributions also vary spatially among contemporaneous house groups (Garraty and Heckman 2011; see also Garraty et al. 2011). For the Middle Formative A period, Garraty and Heckman (2011) defined four possible house groups in Locus D, each of which contained significantly different percentages of painted pottery associated with different regional traditions (significant at the 0.0001 level). Three house groups were assigned to the Middle Formative B period in Loci A, C, and D; these groups also contained statistically significantly different percentages (at the 0.0001 level) of the same regional ware categories. This evidence underscores the extent to which pottery affiliated with the different regional traditions was available to coeval site residents. It corroborates the argument above that the intra-site variability in painted pottery was based on "demand-side" choices and preferences among pottery users rather than "supply-side" factors, such as availability and access to different provisioning networks. The data also imply possible contestation, competition, and varying claims of affiliation among coeval factions.[1]

The spatial evidence thus complements the temporal evidence in showing variability in proportions of different painted pottery categories. Potentially pertinent to these changes is the expansion of the Hohokam ball court system and "internationalization" of social interactions in the early to mid A.D. 900s. These transformations likely created a heightened consciousness of identity and cultural affiliation, especially in the frontier areas of the system, such as southeastern Arizona. The heightened consciousness of social identity, in turn, could have created an atmosphere of uncertainty and rapid changes in expressions of non-local affiliation. Feasting and other public displays of affiliation may have intensified starting in the mid A.D. 900s in response to disruptions and rapid realignments of extra-local social relationships and internal competition for external social ties as sources of political capital (sensu Clark and Blake 1994).

I am unable to fully evaluate my hypothesis based on ceramic evidence alone; complementary lines of evidence will be needed to corroborate it. Especially vital will be information concerning the logistical feasibility of long-distance exchange from the Phoenix Basin and other areas. Compositional provenance evidence will be essential to evaluate the sources of the painted sherds and to distinguish between importation and local imitation of foreign-style painted pottery. At a broader scale, a thorough understanding of Mescal Wash and surrounding sites in southeastern Arizona would greatly benefit from a multifaceted and highly detailed investigations of social identity and change comparable to those conducted by Duff (2002), Bernardini (2005), and Peeples (2011) in the Puebloan region of the U.S. Southwest.

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Notes

1. Additional studies will be required to assess the extent to which the variable distribution of painted ware correlates with other lines of evidence (e.g., architectural styles, food choices). Worth noting, however, is Garraty and colleagues' (2011) finding of variable mortuary practices among the inferred Middle Formative A house groups in Locus A. (The mortuary evidence for the Middle Formative B period was too sparse to assess this correlation.)

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MACAW SYMBOLISM AND RITUAL AT GRASSHOPPER PUEBLO AND PAQUIMÉ

Stephanie M. Whittlesey
J. Jefferson Reid

ABSTRACT

*One of the clearest examples of long-distance trade and interaction is the exchange of live scarlet macaws (*Ara macao*) between Paquimé in northern Chihuahua and various pueblo communities of the U.S. Southwest. Our paper examines the distribution and treatment of macaws at Grasshopper Pueblo and contrasts these observations with Paquimé. Although Paquimé is usually cited as a breeding and distribution center for macaws, the residents also were conspicuous consumers of their own goods, and sacrificed hundreds of macaws in what may have been annual ceremonies. The differences between Grasshopper Pueblo and Paquimé, above and beyond conspicuous consumption, suggest the variable ways a single, highly symbolic bird was incorporated into Southwestern religion and ritual, with implications for transmission and transformation of cultural information.*

Archaeologists have always been interested in the long-distance exchange of live scarlet macaws (Ara macao) between the U.S. Southwest and Mesoamerica. These gorgeously plumed birds are native to the humid lowlands of southern Tamaulipas, Mexico, southward to Brazil and Bolivia, perhaps including portions of western Mexico (Somerville et al. 2010). A second species, the military macaw (*Ara militaris*), inhabits semiarid, mountainous forest and ranges from west-coastal Mexico northward to Sonora and Chihuahua and perhaps into the U.S. Southwest in prehistory (Creel and McKusick 1994:511; Juniper and Parr 1998:422). Macaws figure prominently in Mesoamerican mythology, cosmology, and ritual and were politically and economically significant. Macaws also were important in the U.S. Southwest where, because the birds were well outside their native habitat, it was necessary to acquire live birds by trade or direct procurement. Numerous skeletons of scarlet and military macaws have been unearthed from archaeological sites. By analogy with historically described Native Americans and Mesoamerican texts, we know that macaws took a prominent role in ancient Pueblo ceremonialism.

Since the discovery of hundreds of scarlet macaws and military macaws at the Medio period site of Paquimé (Casas Grandes) in northwestern Chihuahua, along with inferred nesting pens (Di Peso et al. 1974a), archaeologists have believed that the birds found at Southwestern sites contemporaneous with Medio period Paquimé were bred and raised there. Scholars have critiqued and revised Charles Di Peso's mercantile model of Paquimé as a center of long-distance trade with Mesoamerica and the Southwest (for example, Minnis and Whalen 2004), but most archaeologists still view Paquimé as the breeding and distribution center for macaws. Vokes and Gregory (2007:328), for example, stated that "the only sites with definitive evidence of macaw breeding facilities and evidence of hatchings are Paquimé. . .and settlements in the surrounding region." We contend that neither Paquimé nor any Southwestern site with remains of macaws show convincing evidence that macaws were a major commodity for trade. Instead, we argue that the birds were acquired or bred for ritual purposes.

This paper discusses the macaw collection from Paquimé and its recovery context and then compares this data with information from the birds found at Grasshopper Pueblo in east-central Arizona. We touch on the symbolism and meaning of macaws in Mesoamerican and Southwestern cosmology and ritual. In this discussion, we seek to make three major points. First, we marshal evidence to demonstrate that macaw breeding at Paquimé apparently was not for large-scale, commercial exportation of feathers and birds but was designed primarily to fulfill the needs of local ritual activities (see VanPool 2003). Second, we comment on macaw iconography with reference to the

Stephanie M. Whittlesey / Independent Consultant / swhittlesey@cox.net
J. Jefferson Reid / School of Anthropology, University of Arizona / jreid@email.arizona.edu

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Southwestern Regional Cult, the katsina cult, and the chronology of cult adoption and spread. Our comparison indicates that a single important symbol—the macaw—was incorporated into ritual systems in various ways, with implications for the investigation of multiethnic communities, population movement, and adoption of ritual cults. This paper is an initial, abbreviated formulation of our thoughts and hypotheses to serve as a baseline for discussion.

MACAWS AT PAQUIMÉ

Literally hundreds of macaws were found during the Amerind Foundation's excavations (Di Peso et al. 1974a) of the Medio period occupation at Paquimé. Di Peso et al. (1974a) originally dated the Medio period beginning at A.D. 1060. Dean and Ravesloot (1993) revised the chronology based on a reevaluation of the tree-ring dates, and most scholars now accept a date of A.D. 1200 to 1450 for the Medio period (Minnis and Whalen 2004). The 503 birds included 322 scarlet macaws, 81 military macaws, and 100 birds that were only identifiable to species.[1] Archaeologists found 56 adobe pens with circular stone "doughnut" rings and pestle-shaped plugs to keep the birds inside (Figure 1). Many pens contained bird feces and bones, and one also contained eggshells. Nearly 60 percent of the birds were found in Unit 12, which Di Peso called the House of the Macaws.

This information suggested to Somerville et al. (2010:133) that the Paquiméños were "actively breeding scarlet macaws so that they did not have to engage in trade to acquire the tropical birds." Further, they believed this process operated within a prestige economy, and leaders legitimated their power by controlling goods with valued symbolic connotations—the scarlet and perhaps military macaws.

Most scarlet macaws apparently were killed at a standard age (around 11 months), probably by smothering, and were formally buried. The birds were buried with feet and wings folded tightly against the body and the head tucked down on the breast, a position that McKusick (1974:276) referred to as typical for a cooled bird carcass. The tail feathers may have been plucked before burial, as there was insufficient room in the pits—which averaged 27 cm long × 20 cm wide × 25 cm deep—to accommodate the tail feathers. Most birds were flexed on their left sides, although there was considerable variability in body positioning.

About 65 percent were articulated burials in plaza contexts, either below the plaza floors or in earlier plaza fill (McKusick 1974:284). In Plaza 3-12, the burials were concentrated in the southeastern corner (Figure 2). Plaza 3-12 also contained numerous thermal facilities, including fire pits and what Di Peso et al. called pit ovens. Remodeling and super-positioning of nesting

Figure 1. Macaw nesting boxes with "doughnut" ring and plug closures.

boxes and thermal facilities indicates the plaza was used for a considerable length of time.

The articulated burials included single and multiple birds, headless birds, a few birds that were interred with human burials (Figure 3), and a few bird burials accompanied by burial furniture. There is no information to determine whether the multiple burials contained birds that were buried simultaneously or sequentially. In addition, Di Peso et al. (1974b) recovered disarticulated skeletons, birds that were inferred as having died accidentally, and random skeletal elements.

If indeed macaw aviculture and distribution were sources of wealth, power, and prestige at Paquimé, it seems illogical to sacrifice and bury the birds, a practice that speaks to conspicuous consumption. If the birds were exchange goods, a sounder economic strategy would have been to allow them to survive to breeding age and continue to provide the Paquiméños with even more birds for exchange or sources of feathers. Several lines of evidence suggest that macaws were not being bred at Paquimé for commercial purposes but rather for ceremonial reasons.

First, the age distribution is unusual. Nearly 90 percent were under the breeding age of 4 years (McKusick 1974). Most birds were aged between 4 and 12 months when buried, as shown in Table 1, which summarizes the articulated macaw burials. Breeding-age birds and young birds are far less numerous—only 33 of breeding age (8.6 percent) and only 20 nestlings and juveniles (5.3 percent) (Table 1).[2]

It is impossible to know, of course, how many breeding-age birds may have been removed from the site upon abandonment. Regardless, there seems to

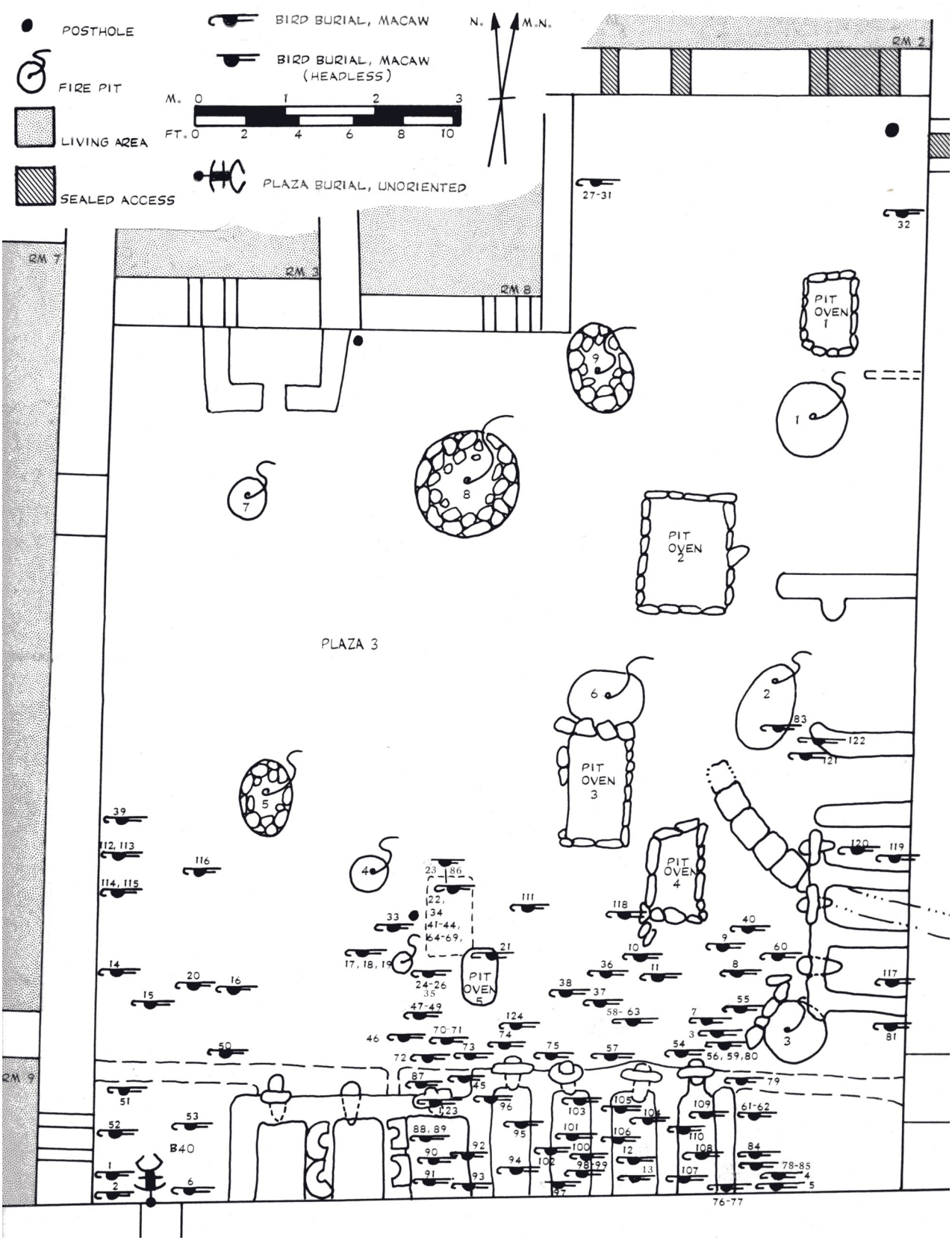

Figure 2. Map of Plaza 3-12 in the House of the Macaws at Paquimé. Note nesting boxes along south and east walls. Detail of Di Peso et al. 1974a:Figure 39-5. Courtesy of The Amerind Foundation, Inc., Dragoon, Arizona. Alice Wesche, Artist.

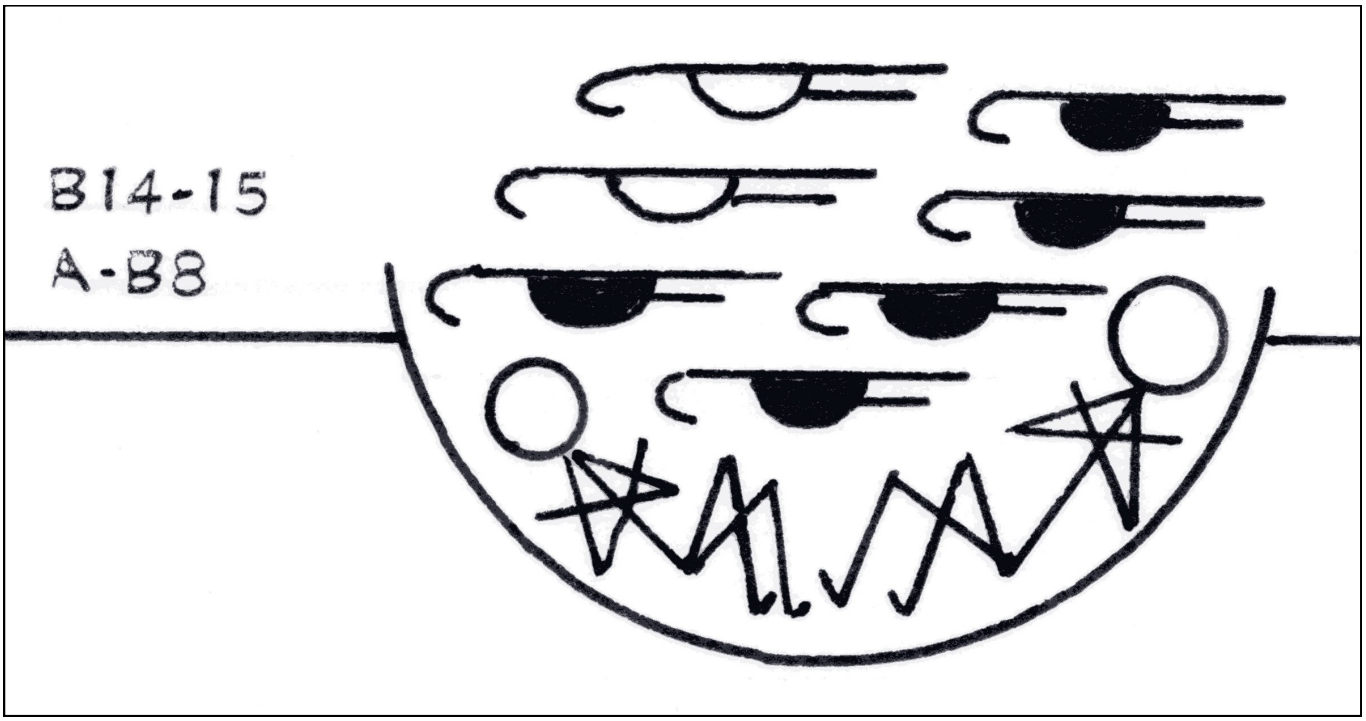

Figure 3. A multiple burial of macaws with two human burials at Paquimé. Open macaw body represents military macaws, solid macaw body indicates scarlet macaws. Detail of Di Peso et al. 1974b: Figure 322-8. Courtesy of The Amerind Foundation, Inc., Dragoon, Arizona. Alice Wesche, Artist.

have been insufficient numbers of adults to have created the large population of new-fledged birds that were sacrificed. Scarlet macaws lay as many as four eggs, usually only three of which will produce surviving chicks without human intervention. Between seven and eight weeks in age, the birds must be removed and hand raised if a tame bird is desired. Additional chicks would be lost during this vulnerable stage when they chill easily and are subject to respiratory disease (McKusick 1974).

To indulge in a little speculative arithmetic, if we start with 450 newly fledged and younger birds at Paquimé and assume two chicks survived from each clutch, this would require 225 laying events. If we further assume that half of the adult birds were females, we arrive at each female macaw producing 34 chicks per year. Females would have to continue breeding at this rate for approximately 13 years to create the mortuary sample. Although this is not impossible, given that macaws can live to 50 years or more, it is certainly incongruent with the number of breeding-age birds at Paquimé. The scarcity of scarlet-macaw eggshells (one sample) also is curious. Minnis et al. (1993) attributed this to preservation and sampling issues, but we wonder how bird feces would have survived and eggshells did not. In addition, we note that female macaws may lay unfertilized eggs.

Plaza 3-12 was the only area at Paquimé to have a complete range of scarlet macaw remains, including eggshells, two nestlings (hatching to 7 weeks), 10 juvenile birds (7 weeks to 4 months), and one young immature bird (4 to 10 months). Another nestling and the highest percentage of breeding-age adults at the site were found in Plaza 3-11. Our point is that the number of combined baby birds and adult birds compared to the huge number of new-fledged birds is insufficient evidence for a breeding program of commercial scale.

Second, there is considerable evidence for ritual sacrifice and burial of macaws. As Table 1 shows, most articulated burials were immature birds between 4 and 11 months of age. At that age, according to McKusick (1974:277), birds would be fully feathered except for the long tail feathers, which develop sometime between 11 and 12 months (the new-fledged stage). Differences between proveniences and burial type (see Table 1) also indicate ritual usage. All birds of breeding age and older were found as multiple burials in plazas. Interments of macaws with human burials apparently also represent ritual sacrifices, as they contain a high percentage of immature birds, not the older birds that would be expected if the creatures were pets. No birds with humans were found in subfloor room contexts; all such interments were in plazas.

The color symbolism of macaw feathers also indicates ritual usage. Whereas the proportion of scarlet (red) to military (green) macaws in the sample as a whole is 4:1, the proportion in the multiple articulated burials is 2:1. The military macaws in the mixed burials

Table 1. Age of Articulated Macaw Burials at Paquimé by Provenience and Type.

Age	Plaza Burials (Single)	Plaza Burials (Multiple)	Plaza Burials with Burial Furniture	Room Subfloor Burials (Single and Multiple)	Burials with Human Remains (Single and Multiple)	Headless Burials (Single and Multi-ple)	Total
Nestling							
A. macao	–	3	–	–	–	–	3
Subtotal	0	*3*	–	–	–	–	*3*
Juvenile							
A. macao	–	4	–	1	–	–	5
A. militaris	–	1	–	1	–	–	2
A. species	1	9	–	–	–	–	10
Subtotal	*1*	*14*	*0*	*2*	*0*	*0*	*17*
Young Immature							
A. macao	–	2	–	–	5	–	7
Subtotal	0	*2*	*0*	*0*	*5*	*0*	*7*
Immature							
A. macao	26	101	2	4	2	32	167
A. militaris	4	28	–	2	2	8	44
A. species	2	23	–	2	–	3	28
Subtotal	*32*	*152*	*2*	*8*	*4*	*43*	*239*
Immature or Older							
A. macao	2	27	1	–	–	2	32
A. militaris	–	9	–	–	–	–	9
A. species	–	4	1	–	–	4	11
Subtotal	*2*	*40*	*2*	*0*	*0*	*6*	*52*
New-fledged							
A. macao	1	10	–	1	–	–	12
A. militaris	–	5	1	–	–	–	6
A. species	–	1	–	–	–	–	1
Subtotal	*1*	*16*	*1*	*1*	*0*	*0*	*19*

Table 1. Age of articulated macaw burials at Paquimé by Provenience and type (continued).

Age	Plaza Burials (Single)	Plaza Burials (Multiple)	Plaza Burials with Burial Furniture	Room Subfloor Burials (Single and Multiple)	Burials with Human Remains (Single and Multiple)	Headless Burials (Single and Multiple)	Total
Adolescent (Adult 1)							
A. macao	2	2	–	–	–	–	4
A. militaris	1	–	–	–	–	–	2
A. species	1	1	–	–	–	–	1
Subtotal	*4*	*3*	*0*	*0*	*0*	*0*	*7*
Adult 1 or Older							
A. militaris	–	1	–	–	–	–	1
Subtotal	–	*1*	*0*	*0*	*0*	*0*	*1*
Breeding (Adult 2)							
A. macao	–	28	–	–	–	–	28
A. militaris	–	4	–	–	–	–	4
A. species	–	1	–	–	–	–	1
Subtotal	*0*	*33*	*0*	*0*	*0*	*0*	*33*
Aged (Adult 3)							
A. macao	–	1	–	–	–	–	1
A. militaris	–	1	–	–	–	–	1
Subtotal	*0*	*2*	*0*	*0*	*0*	*0*	*2*
Unknown Age							
A. species	–	2	–	–	–	–	2
Subtotal	*0*	*2*	*0*	*0*	*0*	*0*	*2*
Total	**40**	**268**	**5**	**11**	**9**	**49**	**382**

Figure 4. Uppermost layer of a multiple macaw burial at Paquimé. Open macaw body represents military macaws, solid macaw body indicates scarlet macaws. Note one headless scarlet macaw. Detail of Di Peso et al. 1974b:Figure 322-8. Courtesy of The Amerind Foundation, Inc., Dragoon, Arizona. Alice Wesche, Artist.

represent about 73 percent of the total count of the birds (Di Peso and McKusick 1974:291). Some burials were extraordinarily complex and clearly ritual in nature. One contained 34 birds (four military macaws, 29 scarlet macaws, and one unidentified species). They were arranged in two layers. The lower section contained 26 birds in unknown positions. Above these were one military macaw and seven scarlet macaws arranged with their heads facing outward and their feet inward, like the spokes of a wheel (Di Peso and McKusick 1974:289) (Figure 4). This arrangement indicates sun symbolism to VanPool and VanPool (2007:100–101).

Decapitation of birds indicates deliberate sacrifice. Headless birds were found in single and multiple burials (see Table 1) and occasionally were combined with headless turkey burials.[3] According to McKusick (2001:44), Mesoamerican codices depict the decapitation of turkeys, the sprinkling of their blood, and the offering of their heads on altars. No similar information is available for macaws, as far as we know. Decapitation, of course, was a common element of sacrifice in Mesoamerica; it figures prominently in the Popul Vuh and others texts. Decapitation of humans also is depicted on Mimbres pottery (Brody et al. 1983:118). Using Mesoamerican analogies, Harmon (2006:200–204) associated human sacrifice with the configurations of ball courts. The I-shaped ball court can be interpreted as a headless body, with the ball itself standing for the skull. The T-shaped ball court at Paquimé may represent a dismembered body. The T-shaped court contained dismembered human burials, and the distinctive center marker is interpreted as a skull, again using Mesoamerican analogies (Harmon 2006:202).

Turkeys at Paquimé were deliberately sacrificed and buried in much the same ways as macaws, including decapitation, but most turkeys and macaws were buried separately in different plazas. Plaza 3-13 contained adobe nesting boxes for turkeys similar to those used for macaws, although they lacked the entry stones.

The association of ritually sacrificed birds and plazas is conspicuous at Paquimé. Although Di Peso et al. (1974a:534) believed that the pit ovens and fire pits found in the Plaza 3-12 were used to prepare food for the birds kept there, it seems equally likely they could have been involved in communal feasting activities associated with the rites that included sacrifice and burial of the birds. The association between plazas and ceremonialism is discussed further below.

Third, the ritual sacrifice of macaws appears to have precluded the profitable trade in macaw feathers. Macaws shed most of their feathers in the months of summer through December; the long, valuable tail feathers are dropped singly in a short six-week period during this time (Di Peso and McKusick 1974:272–273). Reyman (1995:275) estimated that a single macaw could produce “from several dozen to thousands” of feathers in its lifetime. Allowing captive birds to live would have provided a natural supply of these feathers. Plucking the secondaries of live birds can be done (Judd 1954:263), but it is detrimental to the bird’s health and results in osteopathology, which was observed among the Paquimé macaws. Di Peso and McKusick (1974) do not summarize the age of the birds showing such deformities. As noted above, the majority of deliberate macaw burials represent immature birds less than 12 months in age. At this age, birds have feathers that are not of commercial quality and have not yet fledged the prized long tail feathers (Di Peso and McKusick 1974:273). In short, the failure to keep adult birds alive for their naturally shed feathers and the sacrifice of young birds before they were fully feathered indicates the macaws were not raised for trade in feathers.

Recently, Somerville et al. (2010) conducted stable carbon and oxygen isotope analyses of 30 Paquimé macaw-bone samples that support the idea that the birds were bred and raised there. A few samples showed unexpected isotope ratios, leading the analysts to conclude that the Paquiméños occasionally supplemented their breeding population with additional macaws from lowland Mesoamerica or, in one

case, another highland Chihuahua settlement (Minnis et al. [1993] noted that cage stones were found at several sites during surveys in northwestern and west-central Chihuahua.). Because none of the sampled specimens were sufficiently mature to breed, they could not have been used for breeding purposes. We think these birds were imported for the same reason as the birds that were bred locally—for ritual sacrifice.

MACAWS AT GRASSHOPPER

Grasshopper Pueblo is a 500-room Mogollon Pueblo site located on the Fort Apache Indian Reservation in east-central Arizona. It was excavated between 1963 and 1992 by the University of Arizona Archaeological Field School (Reid and Whittlesey 1997, 1999, 2005). The pueblo consists of two major units, the East Village and the West Village, located on both sides of Salt River Draw (Figure 5). During the excavations, 35 sets of macaw remains were recovered; the remains represent 15 complete or nearly complete, articulated skeletons and 20 sets of disarticulated, isolated skeletal elements from approximately 20 to 25 individual birds.[4] The total number of birds is probably less, given that some of the isolated skeletal elements would likely match with other elements. All were either scarlet macaws or unidentifiable *Ara* species (scarlet or military). Because of the general scarcity of military macaws in comparison to scarlet macaws and the lack of military macaws among the identifiable remains, it is likely that most *Ara* species represent *Ara macao*. The isolated remains include four crania and associated elements that apparently match the four headless complete skeletons (McKusick 1982; Olsen 1990; Olsen and Olsen 1974).

The macaws were found throughout the pueblo, including the East Village, West Village, and the Great Kiva. Most Great Kiva burials were interred in Plaza 3 underlying the Great Kiva, and were buried before adjacent rooms were built. The Great Kiva (Figure 6), the adjacent room subfloors, and Room 246 contained the greatest number of macaws. At Grasshopper Pueblo, plazas were primarily outdoor ritual spaces, presumably the location of ceremonial dances (Adams 1991), although some domestic activities took place there, including cooking and refuse disposal. The three Grasshopper plazas also were communal cemeteries, each associated with one of the three major room blocks. Room 246 was another area with ritual functions. It was a manufacturing and storage room with a unique assemblage of ritual artifacts, including the macaw burials, burials of hawks and eagles, pigments, flint knapping tools, and large, lanceolate chert bifaces in various stages of fabrication. It has been interpreted as similar to historical Pueblo clan houses.

The complete, articulated skeletons (Table 2) (n = 14, plus 1 partially complete) apparently were interred in the flesh, as indicated by the presence of tracheal rings (Hargrave 1970). Most birds likely were dispatched by smothering or choking, but one adult bird was apparently killed by a blow to the back of the head. Its wings and feet may have been bound closely to the body before burial (Olsen 1990:58). All but one of the complete or nearly complete burials were identified as *Ara macao*. Four of the complete or nearly complete burials were missing crania. In one case, the cranium and the postcranial skeleton were found in the same provenience, a stone-lined pit in Room 215. Clearly, the bird had been decapitated before deposition in the pit.

There was one multiple burial, two birds interred with heads in the same direction in the Great Kiva subfloor, and two burials associated with young children. One bird was found with a child in Room 246. This bird burial also contained the right femur of another bird. A second child aged five to six years was buried below the floor of Room 22 adjacent to the Great Kiva. A scarlet macaw was above the child's chest. Originally interpreted as a single bird that was the child's beloved pet (Olsen and Olsen 1974), subsequent analysis demonstrated that the bird was composed of "spare parts"—the head, wings, and sternum were from a breeding-age bird, and the pelvis and legs represented an immature bird, probably less than a year old (McKusick 1982:95, 2001:79). The reassembled bird obviously could not have been a pet; it may have been created for ritual purposes as an accompaniment to the child.

The age distribution of the complete or nearly complete burials indicates that new-fledged birds aged 11 to 12 months were the majority, particularly if those birds labeled only as adult are included in this category (see Table 2). These birds constitute two-thirds of the complete skeletons. The complete burials also include two juvenile birds (aged 4 weeks to 7 months) (13.3 percent) and one bird of breeding age (4+ years), the reassembled bird with child Burial 130 (6.7 percent).

The individual elements offer a similar story. Among *Ara macao*, most birds are adult (probably new fledged) (44.4 percent) and two are newly fledged (22.2); there is also one juvenile, one breeding-age, and one unknown-age bird (11.1 percent each) (Table 3). Fifteen of 16 *Ara* sp. elements represent adults (probably new fledged) (93.7 percent) (see Table 3).

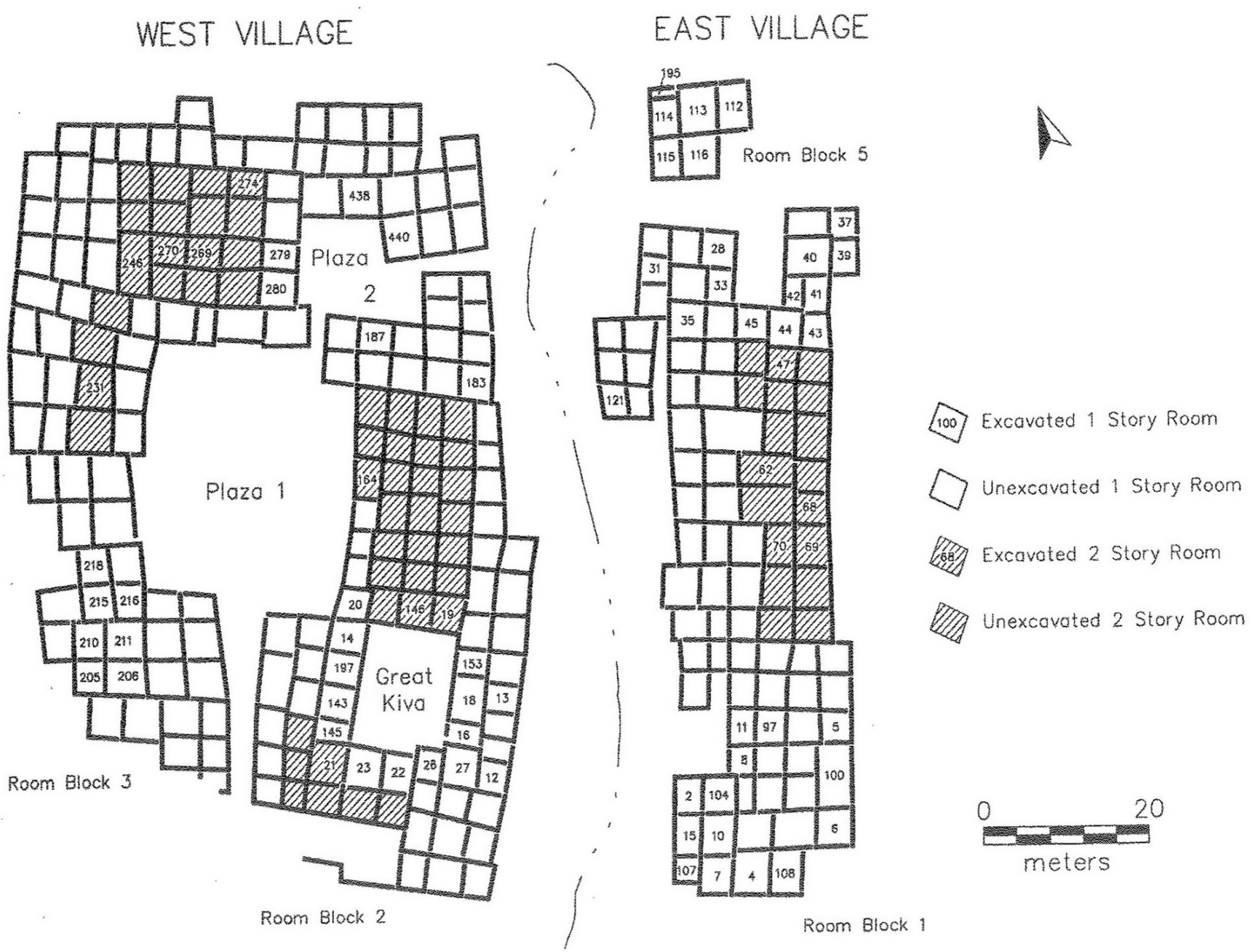

Figure 5. Map of Grasshopper Pueblo.

Figure 6. The Great Kiva at Grasshopper Pueblo.

COMPARISONS BETWEEN GRASSHOPPER AND PAQUIMÉ MACAWS

The treatment and age distribution of Grasshopper macaws are similar to Paquimé and other collections of Southwestern birds in some ways but differ in others. At both sites, the articulated birds were buried in predominantly ritual contexts, especially plazas, and most had been dispatched by smothering. Some birds were decapitated. At Grasshopper Pueblo, 4 of 15 interments (26.7 percent) were headless, compared to 49 of 382 (12.8 percent) at Paquimé. The detached crania were buried in three different contexts representing fill or subfloor refuse. There are far fewer multiple burials at Grasshopper than at Paquimé (one), and there were none of the unusual and spectacular multiple burials or burials with furnishings. Two bird burials at Grasshopper accompanied the interments of children (13.3 percent) compared to nine at Paquimé (2.4 percent).

The age distribution of the birds is similar, in that most burials represent young mature birds, but some differences are apparent. At Grasshopper, most burials either were new-fledged birds or adults likely to have been newly fledged birds (66.7 percent). By contrast, the greatest percentage of articulated burials at Paquimé falls into the immature category (62.6 percent), whereas this age category is not represented at Grasshopper Pueblo. Some of these differences may be related to the methods used by different avian osteologists to age the skeletons. No nestlings were found at Grasshopper. At Paquimé, 11.3 percent of the articulated burials were breeding age or older, but only one bird of breeding age was found at Grasshopper (6.7 percent), and no older birds were present. Another breeding-age bird was among the disarticulated and scattered macaw elements.

The presence of the juvenile birds at both sites is intriguing (13.3 percent at Grasshopper and 4.4 percent at Paquimé). These baby birds have specialized requirements, particularly for warmth and food (good nutrition is vital to feather development). This suggested to McKusick (1982:9) that the young birds at Grasshopper Pueblo may have been hatched and raised there. We emphasize that of the 128 macaws McKusick (2001:72) tabulates in her survey of Southwestern macaws, the only juveniles were from Grasshopper, and Grasshopper's juveniles are twice the pro-

Table 2. Complete or nearly complete *Ara macao* and *Ara* sp. burials from Grasshopper Pueblo. *Ara macao* unless otherwise noted.

Provenience	Juvenile	New-fledged	Unidentified Adult (Probably New Fledged)	Breeding Age	Age Unknown	Remarks
Great Kiva subfloor, (Plaza 3)	–	3 sex unknown	–	–	1 sex unknown	2 buried together
Great Kiva, subfloor (Plaza 3)	–	–	–	–	1 sex unknown	cranium missing; missing left wing elements
Room 22, subfloor	–	1 partial, sex unknown	–	1 partial, sex unknown	–	"spare parts" bird with Burial 130
Room 68	–	–	1 sex unknown	–	–	
Room 114	–	1 sex unknown	–	–	–	pathologies present
Room 187 subfloor	–	–	1 female?	–	–	disarticulated
Room 215, Feature 8 (stone-lined pit)	–	1 sex unknown	–	–	–	cranium missing
Room 246, Floor 2	–	–	1 male?	–	–	depressed cranial fracture
Room 246, subfloor	–	–	1 sex unknown	–	–	buried with child Burial 613
Room 246, subfloor, Fea. 19	1 sex unknown	–	–	–	–	cranium missing
Room 246, subfloor. Fea. 19	1 sex unknown[a]	–	–	–	–	cranium missing; nearly complete[b]
Total	2	6	4	1	2	–

[a] "Very immature" and *Ara* sp.; [b] missing mandible and most wing elements

Table 3. Individual *Ara macao* and *Ara* sp. elements. Sex unknown for all.

Species	Provenience	Elements	No. Ind.	Remarks
Ara macao				
Juvenile	Great Kiva, fill/floor	4, cranium, right humerus, right femur, right tibiotarsus	1	
New fledged	Test 33	6, right and left femora, right tibiotarsus, left ischium, pygostyle, right acetabulum	1	
	Room 215	4, cranium, mandibles, left palatine	1	
Adult, probably new fledged	Room 69, subfloor	sternum; left femur	2	
	Room 215, subfloor	cranium, palatines, premaxilla, mandible	1	
	Room 246, subfloor	1 femur	1	associated with complete macaw and child Burial 613
Breeding age	Room 21, subfloor?	cranium only	1	
Unknown age	Room 213, subfloor	proximal phalanx	1	
Ara sp.				
Adult, probably new fledged	Great Kiva, subfloor (Plaza 3)	1, right ulna	1	
	Great Kiva, subfloor (Plaza 3)	5, palatines, right ulna, pedal phalanx	1	
	Room 18, subfloor?	1, left ulna	1	ulna roughened
	Room 68	3, left humerus, left ulna, left femur	1 or 3[a]	match with Room 69 below?
	Room 69	1, left humerus	1	
	Room 69	3, right humerus, left coracoid, right femur	1 or 3[a]	match with Room 68 above?
	Room 69, subfloor?	1, right tarsometarsus	1	
	Room 69, subfloor?	1, right coracoid	1	
	Room 246, subfloor	1, left scapula	1	
	Room 246, Floor 2	2, left palatine, left jugal	1 or 2[a]	
Unknown	Room 4	1, right radius	1	
Total			**20 or 25**	

[a] notes are unclear if elements are from different individuals

portion of juveniles at Paquimé. It seems improbable that traders could transport vulnerable juveniles from Paquimé, presumably the nearest source, all the way to Grasshopper and arrive with live birds. Either macaws were being bred at Grasshopper, or the birds were dead on arrival.

At both Paquimé and Grasshopper, macaws appear to have served a ritual function, in that they were deliberately killed and ritually buried, sometimes with human interments. The birds were killed at approximately the same age at both sites, around 11 months in age. The macaws at both sites were associated with plazas, which appear to have served ritual as well as domestic functions at both settlements. The greatest differences between the sites are the striking disparity in the total number of macaws, as well as the absence of military macaws, the lack of multiple burials with more than two birds, and the absence of birds with burial furniture at Grasshopper Pueblo. The relatively greater formality of articulated burials in specific areas of the plazas (southeastern corners) at Paquimé also is notable.

MACAW SYMBOLISM AND RITUAL USE

Macaws were important symbols in ancient Mesoamerica and the U.S. Southwest. Mesoamerican peoples associated the predominant red feathers of the scarlet macaw with fire (Aguiler 1985; Miller and Taube 1993:132), the sun (Paddock 1966), the end of the dry season (Tedlock 1985), and warriorhood (Seler 1992). In the Popul Vuh, Seven Macaw, or Itzam-Yeh, is the prideful bird who thought he was the sun. At Copan, macaws were associated with the Main Ball Court, Ball Court A. Bench markers in the form of macaw heads were built in three early stages of the ball court, and 16 additional macaw sculptures were perched on the ball-court buildings. Both sets of macaws represented Seven Macaw (Friedel et al. 1993:364–366). Given this association, it might be considered odd that none of the macaws at Paquimé were found in the ball courts.

Harmon (2006:195) has stated that in some parts of Mesoamerica, macaws were considered "helpers" that assisted the sun in its daily journey across the sky. McKusick (1974:273) has suggested that the scarlet macaw was associated with the cult of Quetzalcoatl, the feathered serpent, and the military macaw with its green plumage was associated with Chalchihuitlicue, the goddess of lakes and streams, who was Tlaloc's consort and was symbolized by green stones such as jade and turquoise (McKusick 2001:81). On Ramos Polychrome vessels from Paquimé, VanPool (2003) illustrated several cases of what she interpreted as shamanic transformations that involved humans becoming macaws or feathered serpents.

Similar symbolism can be seen in Pueblo cosmology and mythology. Macaws are associated with the color red and the sun; because the sun goes to the southland in winter, macaws also represent the south direction[6] (Crown 1994:167; Parsons 1996:365; Roediger 1941:71; Smith 1952:189; Tyler 1979). A Pueblo myth relates that the scarlet macaw's tail feathers gave the sun its yellow color (Parsons 1996:240).

Macaw feathers also are linked to rain and farming. According to Smith (1990:150), macaws were considered to possess specific powers to bring rain and represented the nadir, combining symbolism of the Underworld and rain. Other parrots, such as the thick-billed parrot (*Rhynchopsitta pachyrhyncha*), a bright-green bird that once inhabited forested parts of southeastern Arizona and southwestern New Mexico, may have represented comparable symbols. Eggan (1950:83), for example, observed that parrots were associated with the Katsina clan, which owned the parrot feathers used as integral parts of some katsina costumes and in ceremonies to bring rain. Lang and Harris (1984:117) pointed out that macaws were associated with summer and symbols of summer, such as the rainbow, Pueblo Corn Maidens, and the Germinator, an Underworld supernatural who is lord of the crops. Historic and late prehistoric kiva murals vividly depict macaws and other parrots as well as brightly colored feathers (Hibben 1975:60; Smith 1952:183).

It does not seem coincidental that macaws were associated with plazas. These outdoor spaces with communal ceremonial (as well as domestic) functions may reflect cosmological linkages among the ancestors, water, and rain deities. In a complicated suite of ideas devoted to bringing rain for crops, Mesoamerican rain deities such as Tlaloc and Ehecatl/Quetzalcoatl were associated with water, the Underworld, and the ancestors (Schaafsma 1999). A rectangular plaza with its four corners likely represented the four directions of the cosmos that is repeated consistently in Mesoamerican architecture, ritual, and ideology (Miller and Taube 1993:150; Preucel 1996:125). For example, Tlaloc's patio was described as having four jars standing in the corners that contained beneficent rain, mildew, drought, and destructive rain (Peterson 1959:131).

Schele (1996:108), Diehl and Coe (1996:225), and Kolata (1993), among others, have delineated rich associations among plazas, water, the Underworld, and ceremonial caches of green stone, such as jade and serpentine, at ancient sites in Mesoamerica and South America. Friedel et al. (1993:155) wrote that "[s]een symbolically, the heart of Copan contained the Primordial Sea in its plazas." Prayers, offerings, and rituals carried out in plazas can be viewed as petitions to the ancestors and rain deities. Similarly, among the Pueblos, the center of the plaza, variously described as the

world center (axis mundi), emergence place, earth navel, or sipapu, provides an entrance to and point of contact with the watery Underworld of the ancestors (Ortiz 1969; Ruscavage-Barz and Bagwell 2006; Swentzell 1990:29).

Macaw sacrifice and burial, which McKusick (1974, 2001) places at the spring equinox, likely were such petitions for rain; they may have been analogues to the Hopi practice of sacrificing young eagles (which, it should be noted, also was conducted by smothering, and the sacrificed birds were buried formally in special cemeteries, according to McKusick [2001:52–58]). As Schaafsma (1999:175) has observed, sacrifice (of people, ritual impersonators, prayer sticks, and foodstuffs) was a critical component of rain cults in Mesoamerica and among the Pueblos.

This leads us to wonder about the age at which macaws were sacrificed. It is so consistent, not only at Paquimé and Grasshopper but also at other Southwestern sites (Hargrave 1970; McKusick 2001), that either the birds' age itself or the time of sacrifice must have held ritual significance. A ritual including macaw sacrifice at the vernal equinox could be viewed as pleas for rain and abundant crops at the beginning of spring and the planting season. The implications of the macaws' age for exchange models are discussed below.

MACAW ICONOGRAPHY, CERAMIC STYLES, AND SOUTHWESTERN CULTS

Archaeologists have written a great deal about the katsina cult, primarily on the timing of its introduction and its function in Southwestern ceremonialism. Schaafsma (1999:165) has written that the katsina cult "is a northern peripheral manifestation of a Mesoamerican constellation of ideas in the realm of Tlaloc"—that is, a cult dedicated to bringing rain for crops and incorporating ancestor veneration. Adams (1991:3) echoed this point, writing that the katsinas are spirits, "ancestors who act as messengers between the people and their gods. They are also rainmakers, coming as clouds to the villages to which they are annually summoned." Although the katsina cult incorporates some distinctly non-Mesoamerican concepts, its basic elements appear to have been Mesoamerican derived.

Archaeological correlates of the katsina cult in prehistory are rectangular kivas, plaza-oriented pueblos, masked figures, Jornada-style rock art, and ceramic iconography focused on abstract bird forms and occasional macaw or parrot imagery (Fourmile Style) (Adams 1991). Adams placed the origin of the katsina cult in the upper Little Colorado River drainage sometime in the late thirteenth century. Thus, macaws and plazas are critical components of the katsina cult.

Crown (1994) posited an alternative cult that she labeled the Southwestern Regional Cult. This ideological system was concerned with individual well-being, the afterlife, and ancestors. The cult also originated in the Mogollon Rim region, but Crown associated its appearance specifically with the Pinedale Style of ceramic decoration. Stylized macaws or parrots are the only animals, other than snakes and rare insects, that appear in Pinedale Style as Crown defined it.

Carlson (1982) argued that the katsina cult developed in the Mimbres region around A.D. 1100, if not earlier. Crown (1994) agreed that most, if not all, katsina icons she identified were present at this time, but they were not associated with a regional cult. Instead, these icons reappeared after a hiatus in the Pinedale Style that she linked to the Southwestern Cult. The subsequent spread of these icons "indicates the spread of a regional cult. . . and a belief system" (Crown 1994:221).

Macaws clearly were distributed to the ancient Southwest at least two centuries before the appearance of the katsina/Southwestern cult. Creel and McKusick (1994) tabulated 22 scarlet macaws, military macaws, and parrots at Mimbres sites, most of which dated to the Classic period around A.D. 1000. Mimbres black-on-white pottery depicts the transportation, raising, and possibly breeding of macaws or other parrots (Figure 7). Importantly, some of these images show juvenile birds that had not yet fledged their long tail feathers. Forty-one macaws were found at Wupatki, a Sinagua settlement occupied in the A.D. 1100s, and numerous macaws dating to the tenth and eleventh centuries were uncovered at Chaco Canyon. Twenty-nine birds were recovered from Pueblo Bonito alone (Hargrave 1970).

The source of these macaws is unknown. Because they predate occupation of Medio period Paquimé, we must look to another source. Isotopic analysis, such as the work that Somerville et al. (2010) have conducted, might assist in resolving this issue. Vokes and Gregory (2007:330) hypothesized that "Mimbres populations were the 'brokers' directly involved in acquiring the birds from areas farther south and moving them north." Regardless, there was a hiatus in macaw distribution of about 150 years until the appearance of the birds in the mid- A.D. 1250s at large, aggregated Mogollon Pueblo sites in east-central Arizona, such as Turkey Creek Pueblo, and at later fourteenth-century sites, such as Grasshopper Pueblo and Point of Pines.

CONCLUSIONS

We began this study intending only to compare and contrast the disposition and uses of macaws at Grasshopper Pueblo and Paquimé, but the information we uncovered during this process has led us to ques-

Figure 7. Macaw depictions on a Mimbres Polychrome bowl. Note juvenile birds. LMA no. 16123. Logan Museum of Anthropology, Beloit College.

tion the traditional interpretation of Paquimé as a regional trading center, at least with regard to macaws. The hundreds of macaws at Paquimé and the presence of nesting boxes and eggshells have indicated to archaeologists that the birds were bred and raised there in captivity for commercial distribution. The age distribution of macaws and their repeated ritual sacrifice and burial in plazas is inconsistent with this model. Paquimé may have been a center place, but it more likely was a ceremonial center rather than a commercial one, at least with regard to macaws (see VanPool 2003 for a similar interpretation).

This does not mean that Paquimé was not the source of the macaws found in the Puebloan Southwest in the thirteenth and fourteenth centuries. The system could easily have produced the relatively small number of birds that were distributed to the north. Some macaws at Point of Pines and Paquimé shared cranial abnormalities not found elsewhere; this pattern suggests Paquimé was the source of the Point of Pines birds (McKusick 2001:77). We do not know where the earlier Mimbreños, Chacoans, and Sinaguans obtained their macaws.

Throughout the Southwest, most macaws found in the archaeological record are within uniform age range of 11 to 12 months: Hargrave's (1970:53) study found that 71 percent of macaws from 24 sites were this age at death. Given the distance from Paquimé to east-central Arizona and the rugged, mountainous territory that macaw vendors would have to cross (Wygant 2007), this journey would have been difficult to accomplish. According to McKusick (1974:276), "The transportation of macaws would be easiest to accomplish after the juvenile was fully feathered and beyond the danger of respiratory infection. . . [I]t is unlikely that the birds could have survived a long move any earlier than two months." Further, she stated that if hatching took place in March, the birds could begin a long journey late in May, after they were well-feathered and cool nights were over. Macaw vendors probably would have to be skilled aviculturists to keep the young birds alive while crossing hundreds of kilometers between Paquimé and Southwestern settlements.

This leads us to consider how sacred objects, so-called inalienable possessions (Mills 2004; Weiner 1992), are incorporated into different social systems. Whittlesey (2004, 2009), among many other scholars, has argued that much of the U.S. Southwest shared an integrated cosmological, ideological, and iconographic system that originated in ancient Mesoamerica. Its overall "purpose," if a belief system can be said to have one, was primarily to bring rain and abundant crops, particularly maize. As such, this belief system probably entered the Southwest along with the earliest cultivated maize circa 2100 B.C. It appears to have been most highly developed in agriculturally focused, maize-dependent communities beginning sometime around A.D. 800, and it culminated in the katsina cult of the late thirteenth and fourteenth centuries. This is not to say that there was no diversity in belief systems in either Mesoamerica or the prehistoric Southwest, for clearly there was.

If Paquimé was indeed an important ceremonial center on the northern periphery of the Mesoamerican world, we would expect that the belief system and symbolism associated with bringing rain would be expressed more directly than among Southwestern communities, which were separated from the source of the ceremonial system by distance and time. Is that the case? The obvious parallels at Paquimé and Grasshopper Pueblo are more numerous than the differences. These include the relative age at which the birds were sacrificed, the burial of the birds in plazas, and the association of birds with human interments. It is possible, although unlikely, that the Grasshopper residents also attempted to breed macaws. Differences include the presence of an older bird dispatched by a blow to the head, suggesting the bird may have been kept as a pet, and the assembly of a complete macaw skeleton from parts of at least two skeletons. There also are some minor differences in the age distributions. The major difference, of course, is the sheer number of macaws at Paquimé. Overall, macaws were used in much the same ways at Grasshopper Pueblo and Paquimé, although we cannot know their specific meaning at these different places. It appears that the associated ideology and cosmology persisted over hundreds of kilometers, and that macaws (and no doubt their feathers) were indeed inalienable possessions, rather than prestige items or simple economic goods.

This was not the case everywhere. A complete overview of Southwestern macaws is beyond the scope of this paper, but one example will suffice. Most macaws at Turkey Creek Pueblo in east-central Arizona were found in trash mounds or middens (Hargrave 1970:44). A careful review of macaw treatment in the Southwest might reveal other distinctive patterns.

Macaws apparently were crucial components of a religious ideology devoted to the bringing of rain for crops, ancestor veneration, and the afterlife in ancient Mesoamerica and the Southwest. How early this belief system and its associated iconography appeared in the Southwest is disputed. By the fourteenth century, macaw or parrot imagery was clearly depicted on Four-mile Style pottery and may have had its beginnings earlier on the Pinedale Style widespread in Roosevelt Red Ware, Cibola White Ware, and White Mountain Red Ware pottery. Macaws and other parrots remained vital pieces of belief and ritual into the Historic period katsina cult.

We are curious about who at Grasshopper may have acquired macaws and raised them to the age of sacrifice. Inalienable possessions are called by this label because they are not owned by any particular individual. It is tempting to associate macaw ritual usage with a macaw or parrot clan, but this does not seem to have been the case at Grasshopper. Previously, we have suggested that Grasshopper was a multiethnic community incorporating Ancestral Pueblo people from the Colorado Plateau, Mogollon people from the Mogollon Rim area, and local residents (Ezzo et al. 1997; Ezzo and Price 2002; Reid and Whittlesey 1999; Riggs 2001). Room Block 2 and the underlying Plaza 3 later converted into the Great Kiva, where most of the macaw burials were interred, apparently were founded by local residents (Reid and Whittlesey 1999; Riggs 2001). If so, the social or ceremonial group that participated in rituals involving macaws primarily were local Mogollones; the residents of Room Block 1 representing Ancestral Puebloans and the residents of Room 246 in Room Block 3 of mixed affiliation were included, but in smaller numbers. This distribution suggests to us that macaw ritual was not associated with a clan or other kinship group but with a sodality or ceremonial society. Macaw ritual use may have been, in part, an integrative mechanism to bring together peoples of different cultural affiliation. We also see this expressed at Grasshopper in a male sodality represented by quivers of arrows, which may have denoted a war or hunting society. This group included members of all ethnic groups co-residing at Grasshopper Pueblo (Reid and Whittlesey 1982, 1999).

The lesson we take from this exploration is that it may be necessary to rethink archaeological correlates of ethnic identity and cultural affiliation. Religious beliefs are often considered powerful representations of ethnic identity. For example, Sharer and Ashmore (1987:406) wrote that "ideology encompasses the belief and value system *of a society*" (emphasis added). If inalienable possessions do not correlate with ethnic identity, as appears to be the case for the Grasshopper Pueblo macaws, we must seek other symbols of identity.

Future research might apply isotopic sourcing to determine where Southwestern macaws were born and raised, explore the trade routes that brought macaws to the Southwest, and compare and contrast macaw ritual and disposition among diverse culture areas of the Southwest. An analysis of other supposed commercial trade items at Paquimé, such as shell ornaments and copper bells, could help to determine if our hypothesis that the settlement was a religious rather than an exchange center is correct.

Notes

1. Other species, including thick-billed parrot, lilac-crowned parrot, and Amazon parrot, were present but rare.
2. None of the macaws were assigned to a sex.
3. We do not know where the decapitated crania were deposited.
4. The osteologists' notes are unclear concerning number of individuals, hence the ambiguity of the total.
5. McKusick (1974) listed two birds with depressed skull fractures, one of which had begun to heal.
6. Compare the clustering of birds in the southeastern corner of plazas at Paquimé.

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